Attachment F-2

Project-specific Water Quality Management Plans

FOR REVIEW ONLY

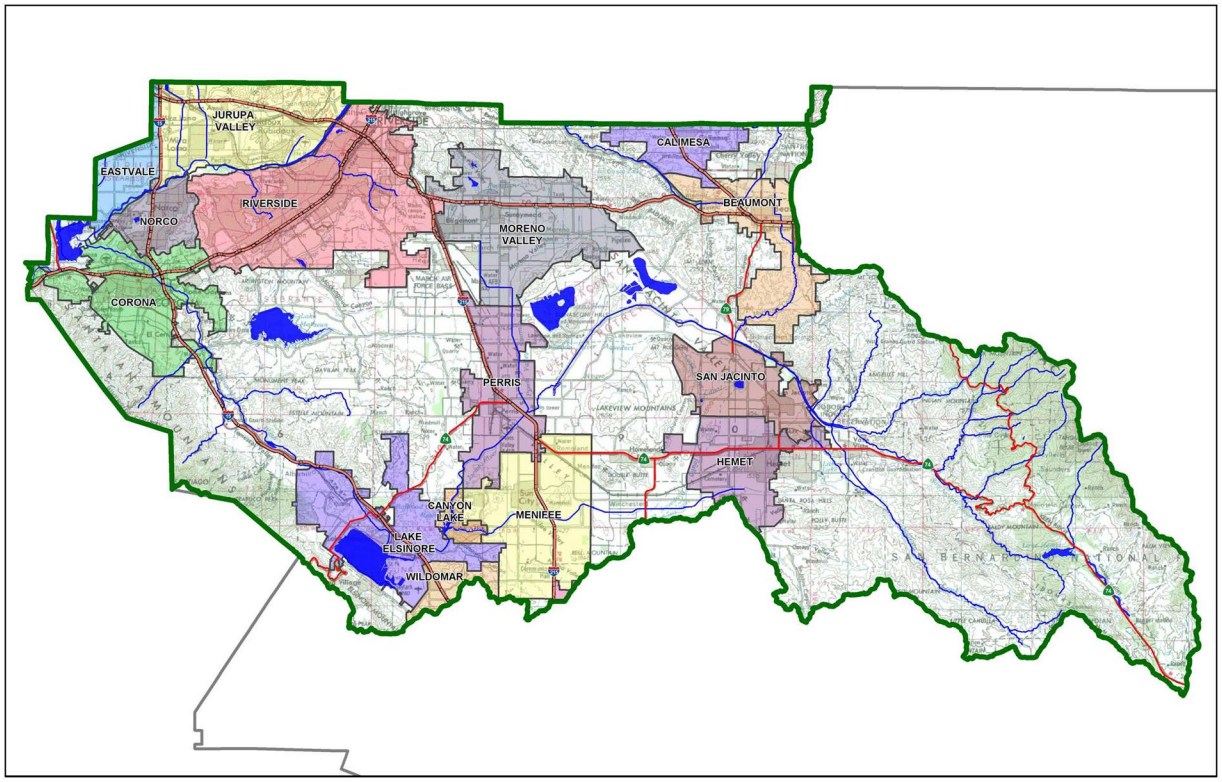
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Birtcher Commerce Center Oak Valley – Building A

Development No: DPR 21-03

Design Review/Case No:



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☒ **Preliminary**
☐ **Final**

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Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

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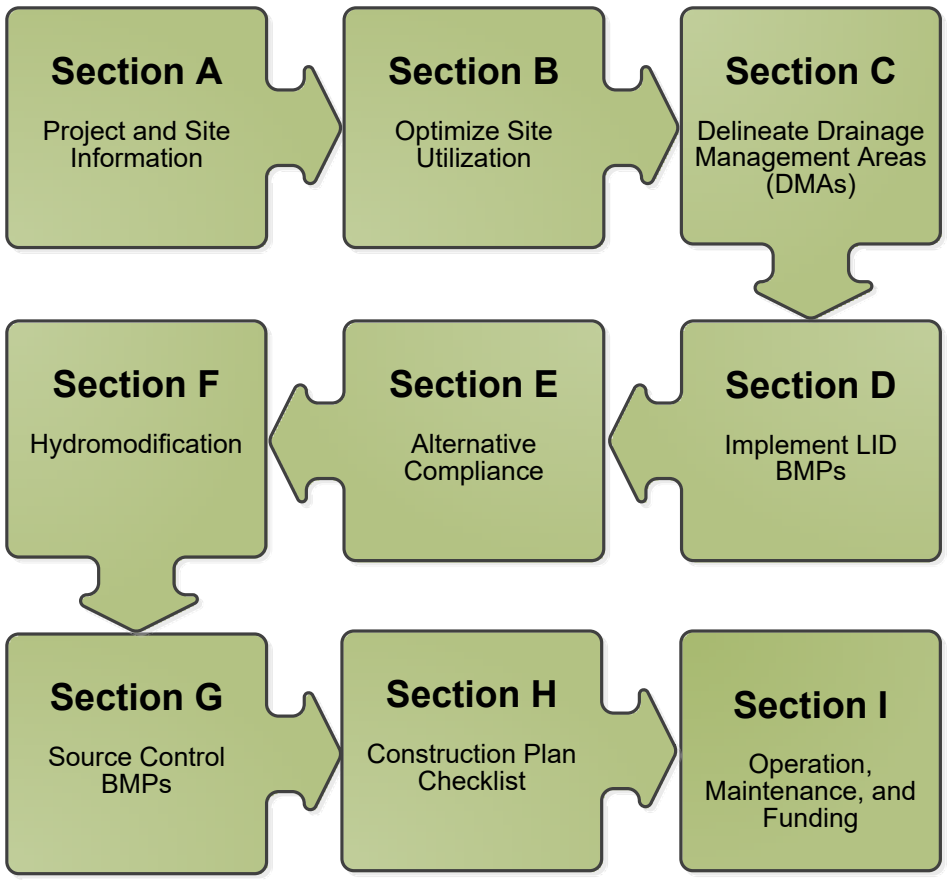
A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Birtcher Development by Albert A. Webb Associates for the Birtcher Commerce Center Oak Valley – Building A project.

This WQMP is intended to comply with the requirements of City of Calimesa, County of Riverside for County of Riverside Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (Municipal Code Section 13.12 – Stormwater Drainage System Protection Regulations).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 8
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 10

Section C: Delineate Drainage Management Areas (DMAs) 12

Section D: Implement LID BMPs 14

D.1 Infiltration Applicability 14
D.2 Harvest and Use Assessment 15
D.3 Bioretention and Biotreatment Assessment 17
D.4 Feasibility Assessment Summaries 18
D.5 LID BMP Sizing 19

Section E: Alternative Compliance (LID Waiver Program) 23

E.1 Identify Pollutants of Concern 24
E.2 Stormwater Credits 25
E.3 Sizing Criteria 25
E.4 Treatment Control BMP Selection 26

Section F: Hydromodification 27

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 27
F.2 HCOC Mitigation 28

Section G: Source Control BMPs 29

Section H: Construction Plan Checklist 33

Section I: Operation, Maintenance and Funding 34

List of Tables

Table A.1 Identification of Receiving Waters....8
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....12
Table C.2 Type 'A', Self-Treating Areas....12
Table C.3 Type 'B', Self-Retaining Areas....12
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....13
Table C.5 Type 'D', Areas Draining to BMPs....13
Table D.1 Infiltration Feasibility....14
Table D.2 LID Prioritization Summary Matrix....18
Table D.3 DCV Calculations for LID BMPs....19
Table E.1 Potential Pollutants by Land Use Type....24
Table E.2 Water Quality Credits....25
Table E.3 Treatment Control BMP Sizing....25
Table E.4 Treatment Control BMP Selection....26
Table F.1 Hydrologic Conditions of Concern Summary....27
Table G.1 Permanent and Operational Source Control Measures....29
Table H.1 Construction Plan Cross-reference....33

List of Appendices

Appendix 1: Maps and Site Plans....35
Appendix 2: Construction Plans....36
Appendix 3: Soils Information....37
Appendix 4: Historical Site Conditions....38
Appendix 5: LID Infeasibility....39
Appendix 6: BMP Design Details....40
Appendix 7: Hydromodification....41
Appendix 8: Source Control....42
Appendix 9: O&M....43
Appendix 10: Educational Materials....44

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial / Business Park
Planning Area:	Summerwind Ranch at Oak Valley Specific Plan
Community Name:	Birtcher Commerce Center Oak Valley
Development Name:	Birtcher Commerce Center Oak Valley – Building A
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°58'22.41"N / 117°03'07.68"W	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
APN(s): 413-190-025 & 413-290-047	
Map Book and Page No.: Thomas Bros Page: 689, Grid: H3, H4, J3, J4 ; Page: 690, Grid: A4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial, Business Park
Proposed or Potential SIC Code(s)	1541 – General Contractors-Industrial Buildings and Warehouses 1542 – General Contractors- Non-Residential Other than Industrial and Warehouses
Area of Impervious Project Footprint (SF)	1,304,638 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	1,304,638 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B, C, D
What is the Water Quality Design Storm Depth for the project?	0.78
Design rainfall intensity for QBMP calculations	0.2 inches/hr

Project Description

The Birtcher Commerce Center Oak Valley (BCCOV) - Building A project proposes an industrial development in the City of Calimesa on approximately 33.4 acres of vacant land located within the boundaries of the 220-acre PM 37862 (overall BCCOV project site). The overall BCCOV project site consists of approximately 220 acres of vacant land and is bounded by the Interstate-10 (I-10) highway along its northeast, the single-family residential tract TR 32702 (currently under construction) along its southeastern boundary, vacant land along its southern boundary, and a future residential development to its northwest. The San Timoteo Creek runs from north to south along the eastern boundary of the

overall BCCOV site and continues south of the site. The BCCOV - Building A project is bounded by Singleton Road to its northwest, the future BCCOV – Building B development to its northeast, the San Timoteo Creek along its southeastern boundary, and vacant area to its southwest.

The overall BCCOV project site is currently vacant. Runoff from the onsite area and offsite areas north of the project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from north to south. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue through the southern boundary before ultimately discharging into the San Timoteo Creek.

Prior to any construction commencing for the BCCOV - Building A project, the overall BCCOV project site will be mass graded. The mass grading phase also includes the construction of retaining walls along the boundaries of the overall BCCOV project, graded pads, the construction of backbone street improvements for Singleton Road and Roberts Road, the installation of backbone storm drain facilities, and the installation of storm drain stub-outs for the individual BCCOV industrial developments to discharge into. The overall drainage pattern of the mass grade phase will perpetuate the drainage pattern of the existing, vacant project site. However, runoff in the mass graded phase will be captured in temporary inlets and conveyed towards the backbone storm drain facilities. The backbone storm drain facilities have been designed to convey the fully developed flows from the overall BCCOV project as well as the existing offsite flows generated north of the I-10 highway southerly towards the San Timoteo Creek. A separate drainage study titled "Hydrology and Hydraulics Study: Oak Valley Town Center Parcel Map No. 37862 Mass Grading Plan" was conducted for the mass grade phase of the project and encompasses the design and layout of the backbone storm drain facilities.

For the proposed condition, runoff is captured through a series of catch basins and grate inlets located throughout the site at localized low points. Captured flows are directed towards proposed treatment devices in order to treat for water quality requirements. Flows are then conveyed towards the existing stub-outs via proposed onsite storm drain pipe that connect into the backbone storm drain facilities. Flows generated by the BCCOV - Building A project development ultimately discharge south of the overall BCCOV project site and into the San Timoteo Creek similar to the existing condition.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to highly variable infiltration rates of the existing soil as well as potentially collapsible soil being present throughout the site. Due to site constraints, most notably the significant offsite grading requirements of the overall BCCOV site, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary actually drains offsite and into the backbone streets. However, in this preliminary analysis all areas within the project boundary have been considered in the Qbmp calculations in order to provide a conservative treatment flow rate.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharging into the proposed CMP chamber detention systems. Mitigated flows outlet to the provided stub-outs. The proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm

events to bypass the vault and enter the onsite storm drain facilities. All captured onsite flows will be directed towards the provided lateral stub-outs constructed in the mass grade phase.

The project is required to address increased runoff mitigation for the 24-hour, 2-year storm event to meet HCOC requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study.

Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.1 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	N/A	GWR, MUN, REC1, REC2, WARM, WILD	20± miles
San Timoteo Creek Reach 2	N/A	GWR, MUN, REC1, REC2, WARM, WILD	10± miles
San Timoteo Creek Reach 1B & 1A	N/A	AGR, MUN, REC1, REC2, WARM, WILD	5± miles
Santa Ana River Reach #5	N/A	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.
Santa Ana River Reach #4	Pathogens	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.

A.2 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* *City of Calimesa Grading Permit*	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The currently vacant site generally drains from north to south towards the San Timoteo Creek. In this existing condition, flows are generally conveyed via smaller streambed areas that run from north to south through the overall BCCOV site. These smaller streambed areas discharge flows south, offsite into the San Timoteo Creek. In the mass grade phase, the project site generally sheet flows towards temporary inlets that discharge into the backbone storm drain facilities located along Singleton Road/Roberts Road. This backbone storm drain discharges flows towards the San Timoteo Creek south of the overall project site similar to the vacant site conditions.

In the developed condition, a network of catch basins and inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards existing stub-outs provided in the mass grade phase. From there, flows are conveyed into the backbone storm drain line located along the southwestern project boundary before ultimately discharging south, offsite towards the San Timoteo Creek similar to the existing condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing vegetation is very minimal. The existing project site is primarily barren, so no vegetation is proposed to be protected.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Due to poor infiltration capacities and potentially collapsible underlying soils throughout the site, an infiltration-based BMP is not feasible to treat for water quality requirements.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious areas will be minimized as much as possible while maintaining safe and usable facilities onsite. Landscaped areas have been provided throughout the projects site along concrete walkways, around the proposed building, adjacent to parking areas, and in other feasible locations throughout the site.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, however, based on the nature of the industrial development, not all runoff can feasibly be directed towards a pervious area before being captured. Pervious landscaped areas are proposed throughout the site where possible in order to maximize the chances of runoff dispersing into landscaped areas before being captured. All runoff that is captured onsite will be directed towards an MWS vault (or series of MWS vaults) to provide water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA A-1	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	296,320	D
DMA A-2	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	352,946	D
DMA A-3	Mixed Use – Concrete or Asphalt, Ornamental Landscaping	177,987	D
DMA A-4	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	214,035	D
DMA A-5	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	414,995	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA A-1	MWS Vaults (2 - 8'x20' vaults in series)
DMA A-2	MWS Vaults (2 - 8'x24' vaults in series)
DMA A-3	MWS Vault (8'x20')
DMA A-4	MWS Vaults (2 - 8'x16' vaults in series)
DMA A-5	MWS Vaults (3 - 8'x20' vaults in series)

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: All DMAs		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Soils underlying project site are potentially collapsible and not suitable for infiltration		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA A-1	☐	☐	☐	☒	☐
DMA A-2	☐	☐	☐	☒	☐
DMA A-3	☐	☐	☐	☒	☐
DMA A-4	☐	☐	☐	☒	☐
DMA A-5	☐	☐	☐	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the BCCOV - Building A project will utilize biotreatment (MWS vaults) throughout the site to treat for water quality requirements. Infiltration-based BMPs are not feasible due to poor infiltration capacities of underlying soils and potentially collapsible soils (see Appendix 3 for preliminary geotechnical investigation). Harvest and use BMPs are not feasible as reclaimed water will be used for non-potable water demands. Bioretention BMPs are not feasible due to site constraints including minimum parking density requirements and significant offsite grading conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA A-1*		
	[A]		[B]	[C]	[A] x [C]			
Building	*191432*	*Roofs*	*1*	*0.89*	*170757.3*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*88329*	*Concrete or Asphalt*	*1*	*0.89*	*78789.5*			
Landscape	*16559*	*Ornamental Landscaping*	*0.1*	*.11*	*1829.1*			
	$A_T = \Sigma[A]$ **296320**				Σ= [D] **251375.9**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.2**	[G] ***1.2***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA A-2*		
	[A]		[B]	[C]	[A] x [C]			
Building	*181913*	*Roofs*	*1*	*0.89*	*162266.4*			
Concrete / Asphalt	*128962*	*Concrete or Asphalt*	*1*	*0.89*	*115034.1*			
Landscape	*42071*	*Ornamental Landscaping*	*0.1*	*.11*	*4647.1*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **352946**				Σ= [D] **281947.6**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.3**	[G] ***1.3***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA A-3*		
	[A]		[B]	[C]	[A] x [C]			
Concrete / Asphalt	*122352*	*Concrete or Asphalt*	*1*	*0.89*	*109138*			
Landscape	*55635*	*Ornamental Landscaping*	*0.1*	*.11*	*6145.3*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **177987**				Σ= [D] **115283.3**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.5**	[G] ***0.5***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA A-4*

	[A]		[B]	[C]	[A] x [C]			
Building	*129621*	*Roofs*	*1*	*0.89*	*115621.9*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*74424*	*Concrete or Asphalt*	*1*	*0.89*	*66386.2*			
Landscape	*9990*	*Ornamental Landscaping*	*0.1*	*.11*	*1103.5*			
	$A_T = \Sigma[A]$ **214035**				Σ= [D] **183111.6**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.8**	[G] ***0.8***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***DMA A-5***		
	[A]		[B]	[C]	[A] x [C]			
Building	*204060*	*Roofs*	*1*	*0.89*	*182021.5*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*178620*	*Concrete or Asphalt*	*1*	*0.89*	*159329*			
Landscape	*32315*	*Ornamental Landscaping*	*0.1*	*.11*	*3569.5*			
	$A_T = \Sigma[A]$ **414995**				Σ= [D] **344920**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.6**	[G] ***1.6***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
All DMAs	Bacteria/ Pathogens	Medium

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition C in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study. The 24-hour, 2-year unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. A routing analysis was performed to demonstrate that the proposed CMP chamber systems have substantial volume needed to mitigate flows to existing condition flow rates and determine the required orifice outlet sizing. See Appendix 7 for the unit hydrograph and routing analysis details. Further details can also be found in the "Preliminary Drainage Study – BCCOV Building A".

EXISTING CONDITION 2-YEAR, 24-HOUR STORM		
	VOL (AC-FT)	PEAK FLOW (CFS)
AREA A1	0.76	1.26
18.1% A1 (PROP. AREA 1)	-	0.23
25% A1 (PROP. AREA 2)	-	0.31
32.4% A1 (PROP AREA 3)	-	0.41
24.5%A1 (PROP AREA 4)	-	0.31
AREA A2	0.16	0.48
AREA A3	0.45	1.21
41.6% A3 (PROP AREA 6)	-	0.50
58.4% A3 (PROP AREA 7)	-	0.71

PROPOSED CONDITION 2-YEAR, 24-HOUR STORM			
	VOL (AC-FT)	PEAK FLOW (CFS)	ROUTING PEAK FLOW (CFS)
AREA 1	1.06	1.75	0.16
AREA 2	1.40	2.37	0.33
AREA 3	1.67	2.75	0.47
AREA 4	1.20	1.96	0.32
A1 COMBINED	5.33	8.83	1.28
AREA 5 (EXISTING A2)	1.18	1.94	0.44
AREA 6	1.26	2.07	0.51
AREA 7	1.70	2.80	0.78
A3 COMBINED	2.96	487	1.29

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	*Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.*	*Maintain and periodically repaint or replace inlet markings.* *Provide stormwater pollution prevention information to new site owners, lessees, or operators.* *See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Interior floor drains and elevator shaft sump	*The interior floor drains and elevator shaft sump pumps will be plumbed to*	*Inspect and maintain drains to prevent blockages and overflow.*

	sanitary sewer	
Landscape/Outdoor Pesticide Use	*Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.* *Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.* *Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.* *Consider using pest-resistant plants, especially adjacent to hardscape.* *To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.*	*Maintain landscaping using minimum or no pesticides.* *See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/* *Provide IPM information to new owners, lessees and operators.* *Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Refuse Areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com*

Vehicle and Equipment Cleaning	*If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.*	*Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/*
Plazas, Sidewalks and parking lots.		*Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Loading Docks	*Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.* *Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.* *Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.*	*Move loaded and unloaded items indoors as soon as possible.* *See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fire Sprinkler Test Water	*Water discharged from the fire sprinkler systems shall not enter the storm drain system. Discharged water from fire sprinkler testing shall be collected and used for onsite landscape or disposed of at a local waste water treatment plant.*	*See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling*

		Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
All DMAs	MWS Vaults	Appendix 6

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section H will be completed and addressed during Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

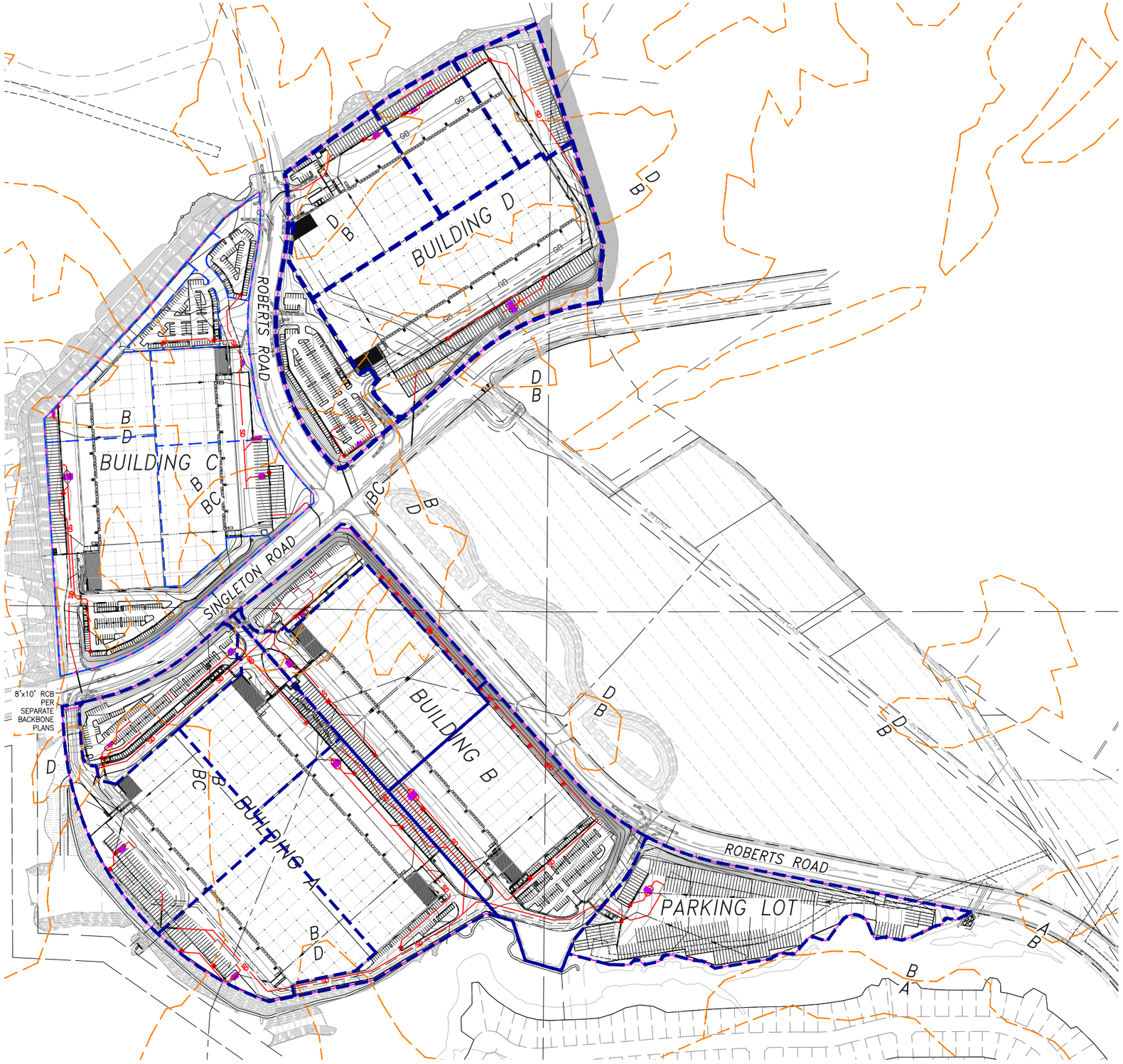
☒ Y ☐ N

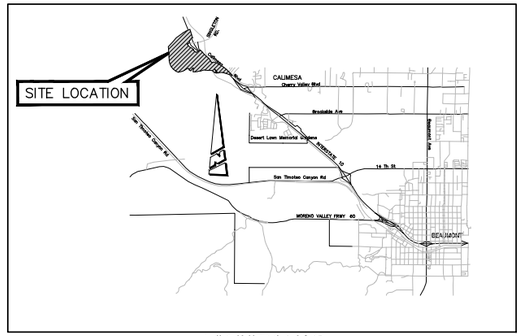
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section I will be completed and addressed during Final WQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

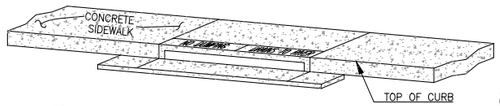


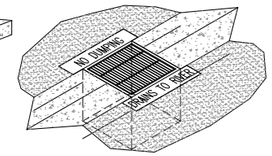


VICINITY MAP

N.T.S.

T2S, R2W, SECTION 23,24,25,26





1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING – DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NTS

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL BELOW (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).
3. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
4. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

SITE CONSTRAINTS:

1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE USE OF RECYCLED WATER FOR IRRIGATION PURPOSES.

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

N
W WEBB E
S

1" = 200'

200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

OVERALL BCCOV SITE PLAN
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/8/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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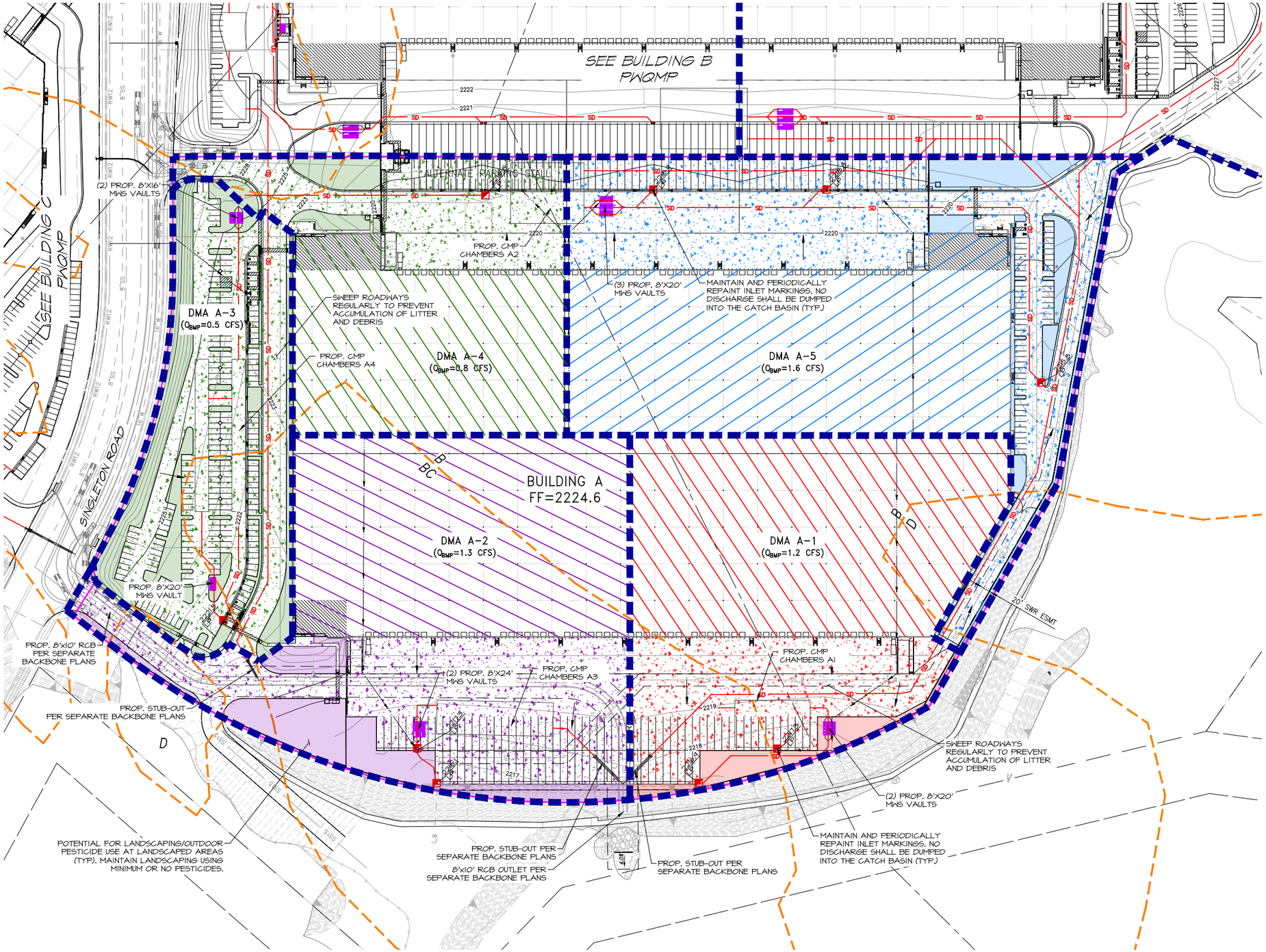

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

DMA AREA TABLE					
	DMA A-1	DMA A-2	DMA A-3	DMA A-4	DMA A-5
ROOFS (SF)	191,432	181,913	–	129,621	204,060
CONCRETE (SF)	88,329	128,962	122,352	74,424	178,620
LANDSCAPE (SF)	16,559	42,071	55,635	9,990	32,315
QBMP (CFS)	1.2	1.3	0.5	0.8	1.6
QTREAT (CFS)	1.2	1.3	0.5	0.8	1.6

N E W S

1" = 80'

80 0 80 160 240

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

BCCOV – BUILDING A
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=80'
DATE:	12/8/2021
DESIGNED:	AYS
CHECKED:	BJV
PLN CK REF:	
F.B.	

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O.	21-0034
SHEET	2
OF	2 SHEETS
DWG. NO.	

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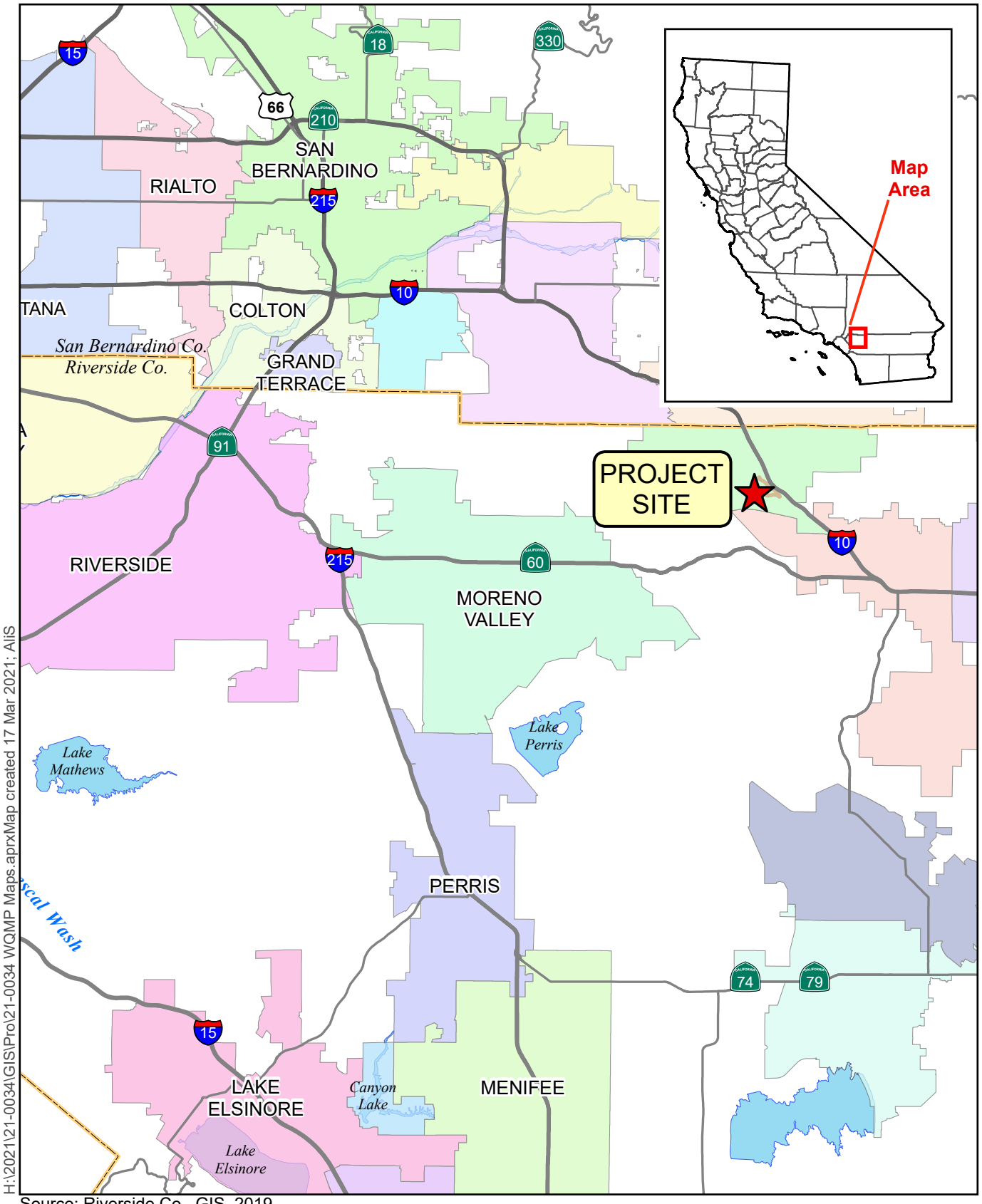

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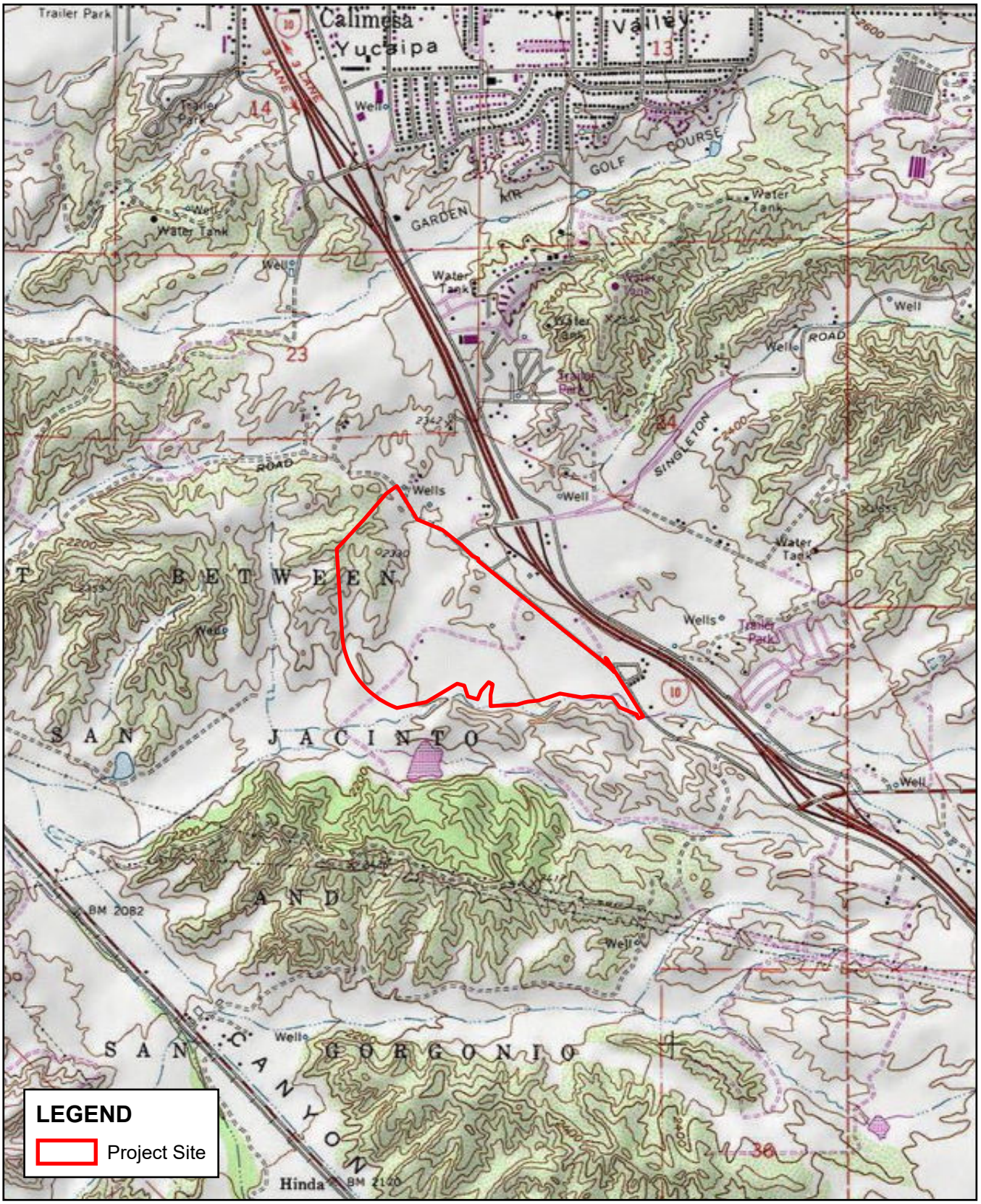
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: ESRI / USGS 7.5min Quad
DRGs: EL CASCO

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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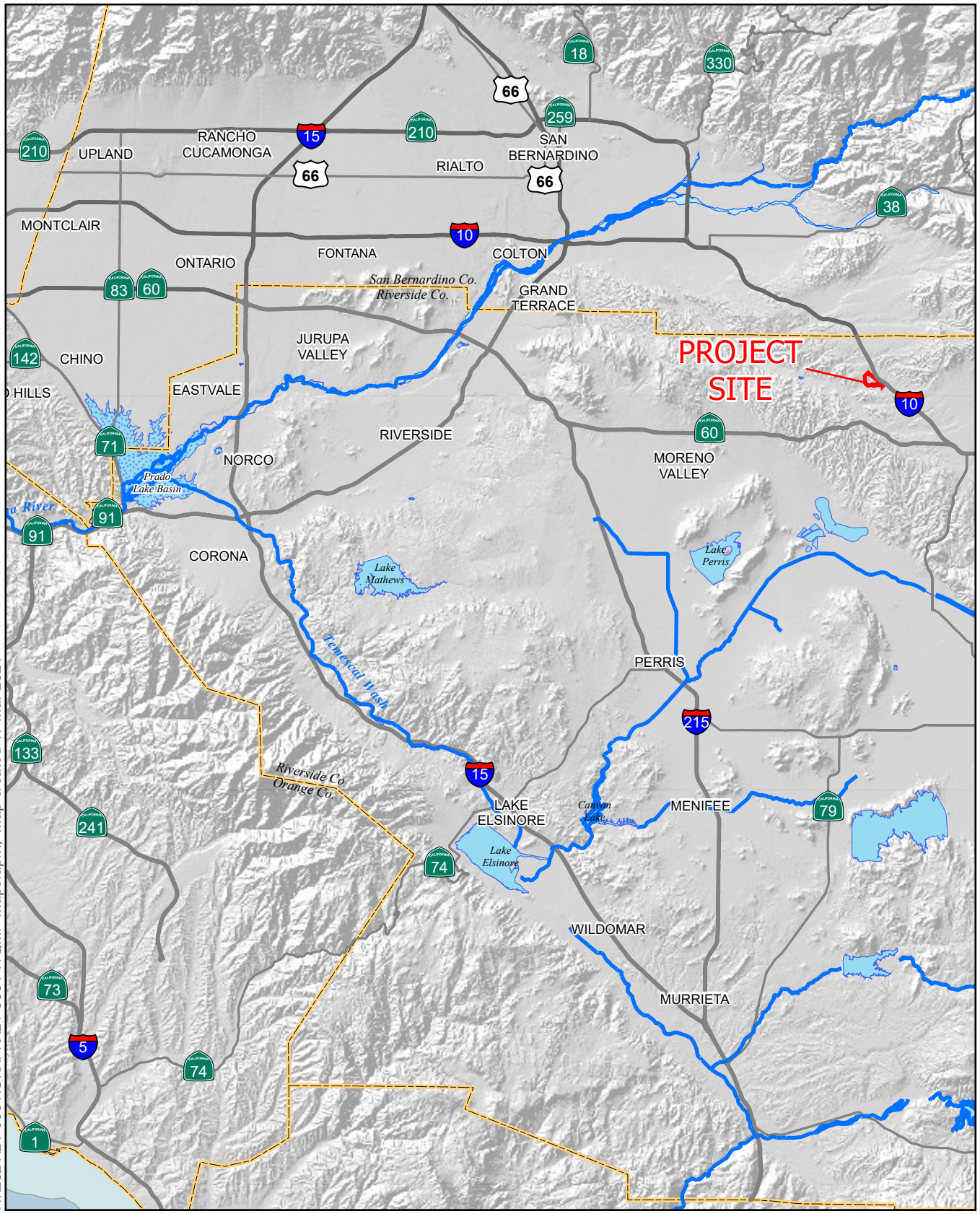
Source: Riverside Co. GIS, Jan. 2020.

0 600 1,200 1,800 Feet

Figure 3 - Aerial Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: USGS DLG; USGS 30m DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.88 PradoDam
0.50 LakeMathews
0.51 Woodcrest
0.68 PigeonPass
0.66 MorenoEast
0.68 PerrisReservoir
PROJECT SITE
0.85 Beaumont
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.90 HurkeyCreek
0.65 Anza
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.77 SantaRosaPlateau
0.52 SkinnerLake
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Appendix 2: Construction Plans

Grading and Drainage Plans

To be provided during Final Engineering

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

January 21, 2021

Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, California 92660

Attention: Mr. Randy Rankin
President of Construction

Project No.: **20G144-2**

Subject: **Geotechnical Review Letter**
Proposed Commercial/Industrial Development
Singleton Road at Roberts Road
Calimesa, California

Reference: Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, City of Calimesa, County of Riverside, California, prepared for Oak Valley Development Company by Advanced Geotechnical Solutions, Inc. (AGS), Report No. 2004-04-B-5, P/W 2004-01, dated December 23, 2020.

Dear Mr. Rankin:

In accordance with your request, we have reviewed the above-referenced geotechnical report for the proposed development. These reports were reviewed for conformance with generally accepted standards of practice for commercial/industrial development.

Document Review

Southern California Geotechnical, Inc. (SCG) was provided with copies of the above-referenced report previously prepared for the subject site. Comments generated during our review of the referenced documents are presented below:

This report consists of a geotechnical investigation performed in 2020 for a 266-acre site located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in Calimesa, California. The site is identified as being a part of Parcel Map 37862.

The overall site, which was the subject of this report, includes:

a) Four (4) new commercial/industrial buildings, ranging in size from 250,000± ft^2 to 500,000± ft^2, to be constructed in the western and southern areas of the subject site,
b) A new proposed commercial/retail center in the northeast portion of the site bounded by Singleton Road, and
c) A new sewer lift station to be constructed near the southwest corner of the tract.

Please note that only the four (4) proposed commercial/industrial buildings are included in the scope for our client, Birtcher Development. It is our understanding that the remaining proposed structures will be developed by a different developer, Oak Valley Development Company.

The stated scope of this report included providing geologic and geotechnical information and recommendations for the development of the Parcel Map 37862 relative to:

- Unsuitable soil removals,
- Cut, fill and natural slope stability,
- Buttress/stabilization fill requirements,
- Cut/fill pad overexcavation criteria,
- Remedial and design grading recommendations,
- Handling and disposal of oversize hard earth materials,
- Stabilization and removal of saturated removal bottoms, and
- Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

The report indicates that AGS conducted two phases of subsurface investigations. The first phase was performed on May 6, 2020 and May 7, 2020. The second investigation was performed between August 5, 2020 and August 14, 2020. These investigations included twenty-two (22) test pits ranging in depth from 9 to 14 feet and twenty-seven (27) borings drilled to a depth of up to 71½± feet.

The report identified five (5) main geologic units at the subject site. They are, from youngest to oldest:

- Artificial Fill – Undocumented (Map symbol Afu)
- Alluvium (Map symbol Qal)
- Older Alluvium (Map symbol Qoa) – The report states that the older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.
- Very Old Alluvial Fan Deposits (Map symbol Qvof), and
- Sedimentary Deposits of Live Oak Canyon (Map symbol Qlo)

The report indicates that groundwater was encountered throughout the site at highly variable elevations. This variability combined with the range in planned cuts and fills, will likely result in the presence of saturated soils at or near the planned removal depths. This condition will likely require mitigation that may include drying and/or mechanical stabilization of the saturated subgrade soils as well as possible dewatering.

This report states that the expansion potential of the on-site materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D-4829. AGS recommends that further testing and geologic mapping should be conducted during and upon completion of grading operations to provide design recommendations on a pad-by-pad basis.

This report states that on-site materials are significantly compressible, which includes undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. AGS recommends that these significantly compressible materials and the alluvial soils prone to hydro-consolidation be removed and replaced with compacted fill.

This report states that based on the chemical testing performed, the potential for sulfate attack on concrete in contact with the on-site soils is negligible and the on-site surface soils are not considered corrosive to buried ferrous metals.

Isolated layers of peat were encountered at the site and were recommended to be removed in their entirety due to their highly compressible nature.

Estimated depths of removal, ranging from ½ to 40+ feet, for both structural areas and landscape/parking areas for different geologic units were included in Table 7.1 on page 18 of this report.

This report included geotechnical mitigation recommendations related to overexcavation of building pads and streets related to cut/fill transition pads, steep cut and cut/fill transitions.

Comments

This report states that on-site materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. We would also include portions of the "very old alluvium."

Based on our review of the boring log data, it appears that some of the soils identified as older alluvium has similar and even lower blowcounts and relative densities than some of the soils identified as younger alluvium. **Based on our review of the blowcount and consolidation data, it is our opinion that some localized deeper removals of the Qoa and Qvof will be required.**

The report indicates Mirafi RS280i as a possible geotextile to be used to help mitigate an unstable excavation bottom. We would recommend consideration be given to include RS580i as an additional alternative for more unstable bottoms.

Page 23 of the report states that the on-site fill soils are subject to post-grading settlement and it is recommended that all fills overlying saturated soils be monitored prior to release for construction. The report recommends surface monuments. We concur with this recommendation and recommend that consideration should also be given to monitoring the settlement of the underlying bottoms using settlement plates similar to AGS's Plate 11 in the Appendix of their report.

Based on the presence of highly compressible soils at the subject site, we recommend that consideration should be given to requiring a 95 percent relative compaction standard for all new fill soils placed deeper than 20 feet below proposed site grades within the foundation influence zones of proposed buildings.

We concur with AGS's recommendation that additional investigations may be required at a later date to develop more detailed design-level recommendations after more details are provided about the proposed development including, but not limited to: final site elevations, proposed building configurations/locations, and structural requirements/settlement tolerances.

It is our opinion that the report has been prepared in general accordance with accepted geotechnical standards of practice.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, GE 2655
Principal Engineer



Daryl A. Kas, CEG 2467
Senior Geologist

Distribution: (1) Addressee

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CITY OF CALIMESA COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for:
Oak Valley Development Company
10410 Roberts Road
Calimesa, CA 92320

Prepared by:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

December 23, 2020
Report No. 2004-01-B-5
P/W 2004-01

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

Oak Valley Development Company
10410 Roberts Road
Calimesa, California 92320

December 23, 2020
P/W 2004-01
Report No. 2004-01-B-5

Attention: Mr. John Ohanian

Subject: ***Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, Calimesa, County of Riverside, California***

References: See Appendix

Gentlemen:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Geotechnical Investigation and Review of Mass Grading Plans for the Oak Valley Town Center Project, Parcel Map 37862, located in the City of Calimesa, California. In this report, AGS compiled previous investigative data, new data, and analyzed how it affects the proposed design as shown on the Mass Grading Plan prepared by Proactive Engineering Consultants West.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Prepared by:

SHANE P. SMITH
Staff Engineer

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JOHN J. DONOVAN
GE 2790
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Reviewed by:

JOHN J. DONOVAN
RCE 65051, RGE 2790, Reg. Exp. 6-30-21

PAUL J. DERISI
CEG 2536, Reg. Exp. 5-31-21

Distribution: (1) Addressee (electronic copy)

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1. Scope of Work 1
1.2. Geotechnical Study Limitations 2
2.0 SITE LOCATION AND DESCRIPTION 2
2.1. Site Location 2
2.2. Site Description 2
3.0 PROPOSED DEVELOPMENT 2
4.0 FIELD AND LABORATORY INVESTIGATION 3
4.1. Previous Investigations 3
4.2. Current Investigation 3
5.0 ENGINEERING GEOLOGY 4
5.1. Geologic Analysis 4
5.1.1. Literature Review 4
5.1.2. Aerial Photograph Review 4
5.1.3. Field Mapping 4
5.2. Geologic and Geomorphic Setting 4
5.3. Stratigraphy 5
5.3.1. Artificial Fill – Undocumented (Map Symbols afu) 5
5.3.2. Alluvium (Map Symbol Qal) 5
5.3.3. Older Alluvium (Map Symbol Qoa) 5
5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof) 6
5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo) 6
5.4. Groundwater 6
5.5. Non-seismic Geologic Hazards 7
5.5.1. Mass Wasting and Debris Flows 7
5.5.2. Flooding 7
5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring 7
5.6. Seismic Hazards 8
5.6.1. Surface Fault Rupture 8
5.6.2. Liquefaction/Dynamic Settlement 8
5.6.3. Lateral Spreading 10
5.6.4. Seismically Induced Landsliding 10
5.6.5. Earthquake Induced Flooding 10
5.7. Seismic Design Parameters 10
5.8. Site Specific Ground Motion Hazard Analysis 11
5.8.1. Probabilistic Seismic Hazard Analysis 11
5.8.2. Deterministic Seismic Hazard Analysis 12
5.8.3. Site-Specific Design Response Spectrum 12
6.0 GEOTECHNICAL ENGINEERING 14
6.1. Material Properties 14
6.1.1. Excavation Characteristics 14
6.1.2. Compressibility 14
6.1.3. Collapse Potential/Hydro-Consolidation 14
6.1.4. Expansion Potential 14
6.1.5. Shear Strength 14

6.1.6. Chemical and Resistivity Test Results 15
6.1.7. Earthwork Adjustments 15
6.1.8. Pavement Support Characteristics 16
6.2. Analytical Methods 16
6.2.1. Slope Stability Analysis 16
6.2.2. Pavement Design 16
6.2.3. Bearing Capacity and Lateral Pressure 16
7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS 16
7.1. Site Preparation and Removals/Overexcavation 17
7.1.1. Overexcavation of Building Pads and Streets 18
7.1.1.1. Cut/Fill Transition Pads 18
7.1.1.2. Steep Cut and Cut/Fill Transitions 18
7.1.1.3. Street Overexcavation 19
7.1.2. Removals Along Grading Limits and Property Lines 19
7.2. Subgrade Stabilization 19
7.3. Slope Stability and Remediation 20
7.3.1. Cut Slopes 20
7.3.2. Fill Slopes 20
7.3.3. Skin Cut and Skin Fill Slopes 21
7.3.4. Fill Over Cut Slopes 21
7.3.5. Offsite Drainage Channel Slopes 21
7.3.6. Surficial Stability 21
7.3.7. Excavation and Temporary Cut Slopes 22
7.3.8. Geologic Observation During Grading 22
7.4. Survey Control During Grading 22
7.5. Settlement Monitoring 23
7.6. Subsurface Drainage 23
7.6.1. Canyon Drains 23
7.6.2. Heel Drains 23
7.6.3. Cut Slope Toe Drains and Subdrains 23
7.7. Seepage 23
7.8. Construction Dewatering 23
7.9. Earthwork Considerations 24
7.9.1. Compaction Standards 24
7.9.2. Fill Materials/ Import Soils 24
7.9.3. Benching 24
7.9.4. Mixing and Moisture Control 24
7.9.5. Haul Roads 25
7.9.6. Oversize Rock 25
7.9.6.1. Rock Blankets 25
7.9.6.2. Rock Windrows 25
7.9.6.3. Individual Rock Burial 26
7.9.6.4. Rock Disposal Logistics 26
7.9.7. Fill Slope Construction 26
7.9.7.1. Overbuilding Fill Slopes 26
7.9.7.2. Compacting the Slope Face 26

7.9.8. Utility Trench Excavation and Backfill 27
7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation 27
8.0 DESIGN RECOMMENDATIONS 27
8.1. Structural Design Recommendations 27
8.1.1. Foundation Design 28
8.1.2. Settlement 28
8.1.3. Isolated Footings 29
8.1.4. Deepened Footings and Setbacks 29
8.1.5. Footing Excavations 29
8.1.6. Moisture and Vapor Barrier 30
8.1.7. Concrete Design 30
8.2. Retaining Wall Design 30
8.2.1. Retaining Walls (backfilled with Native Materials) 30
8.2.2. Retaining Wall Drainage 31
8.3. Civil Design Recommendations 32
8.3.1. Site Drainage 32
8.3.2. Exterior Flatwork 33
8.3.3. Pavement Design 33
8.3.3.1. Asphalt Concrete Pavement 33
8.3.3.2. Portland Cement Concrete Pavement 34
8.4. Corrosion 35
9.0 SLOPE AND LOT MAINTENANCE 35
9.1. Slope Planting 35
9.2. Pad Drainage 35
9.3. Slope Irrigation 35
9.4. Burrowing Animals 36
10.0 FUTURE STUDY NEEDS 36
10.1. Future Studies and Reviews 36
10.2. Grading Observation 36
11.0 CLOSURE 36
11.1. Geotechnical Review 36
11.2. Limitations 37

ATTACHMENTS

Figure 1 - Site Location Map
Figure 2 - Regional Geologic Map
Figure 3 - Fault Map
Figure 4 - Seismic Response Spectra

Appendix A - References
Appendix B - Subsurface Logs
Appendix C - Laboratory Test Results
Appendix D - Engineering Analyses
Appendix E - Earthwork Specifications and Grading Details
Appendix F - Homeowners Maintenance Guidelines

ENCLOSURES

Plates 1 through 9 - Geotechnical Maps (Mass Grading Plans)
Plates 10 through 12 - Geologic Cross-Sections A-A' through N-N'

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CALIMESA, COUNTY OF RIVERSIDE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of this AGS's geotechnical investigation and review of the 60-scale Mass Grading Plans for Parcel Map 37862, in the City of Calimesa, County of Riverside, California prepared by Proactive Engineering Consultants provided to AGS on December 10, 2020.

The purpose of our review and report is to present geologic and geotechnical information obtained during previous geotechnical studies by Pacific Soils Engineering (PSE) with supplemental geologic and geotechnical data obtained by AGS during the current investigation. AGS has provided remedial grading recommendations for the ultimate mass grading configuration whereas an interim grading configuration is currently depicted on the 60-Scale Mass Grading Plan, shown on the attached plates. The interim grading condition avoids drainage areas. Proposed remedial grading conditions shown on Plates 1 through 9 are based on the ultimate mass grading condition. This study is aimed at providing geologic and geotechnical information and recommendations for the development of Parcel Map 37862 relative to: 1) Unsuitable soil removals; 2) Cut, fill and natural slope stability; 3) Buttress/stabilization fill requirements; 4) Cut/fill pad overexcavation criteria; 5) Remedial and design grading recommendations; 6) Handling and disposal of oversize hard earth materials; 7) Stabilization of saturated removal bottoms; and 8) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.1. Scope of Work

This study is aimed at providing geotechnical/geologic conclusions and recommendations for development of the Parcel Map 37862 commercial/retail development. The scope of this study included the following tasks:

- Review of readily available maps, geotechnical and geologic literature and aerial photographs (Appendix A).
- Compiling available data from previous published and unpublished studies by PSE.
- Preparation of Geotechnical Maps using the 60-scale plan with a base design provided by Proactive Engineering Consultants West, Inc. (Plates 1 through 9).
- Preparation of geologic cross-sections A-A' through N-N' (Plates 10 through 12).
- Perform data analyses in relation to the site-specific proposed improvements.
- Provide analysis and discussion of the excavation characteristics (i.e. rippability) of onsite formational materials.
- Formulation of grading, remedial grading and earthwork recommendations.
- Slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Determination of engineering parameters including earthwork adjustments, bearing and friction values, active, passive, and at-rest pressures for retaining walls.

- Perform a limited seismic hazard analysis.
- Preparing and publishing this report which presents geotechnical recommendations pertinent to the accompanying 60-scale grading plans.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on data developed during previous investigations performed by PSE and the current investigation performed by AGS. The conclusions presented herein are based upon the current design as reflected on the accompanying plans. Changes to the plans would necessitate further review.

The materials immediately adjacent to or beneath those observed and sampled may have different characteristics than those observed and sampled. No representations are made as to the quality or extent of materials not observed nor subjected to laboratory testing. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE LOCATION AND DESCRIPTION

2.1. Site Location

The subject site is an irregular shaped, 266-acre parcel located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in the City of Calimesa, Riverside County, California (Figure 1).

2.2. Site Description

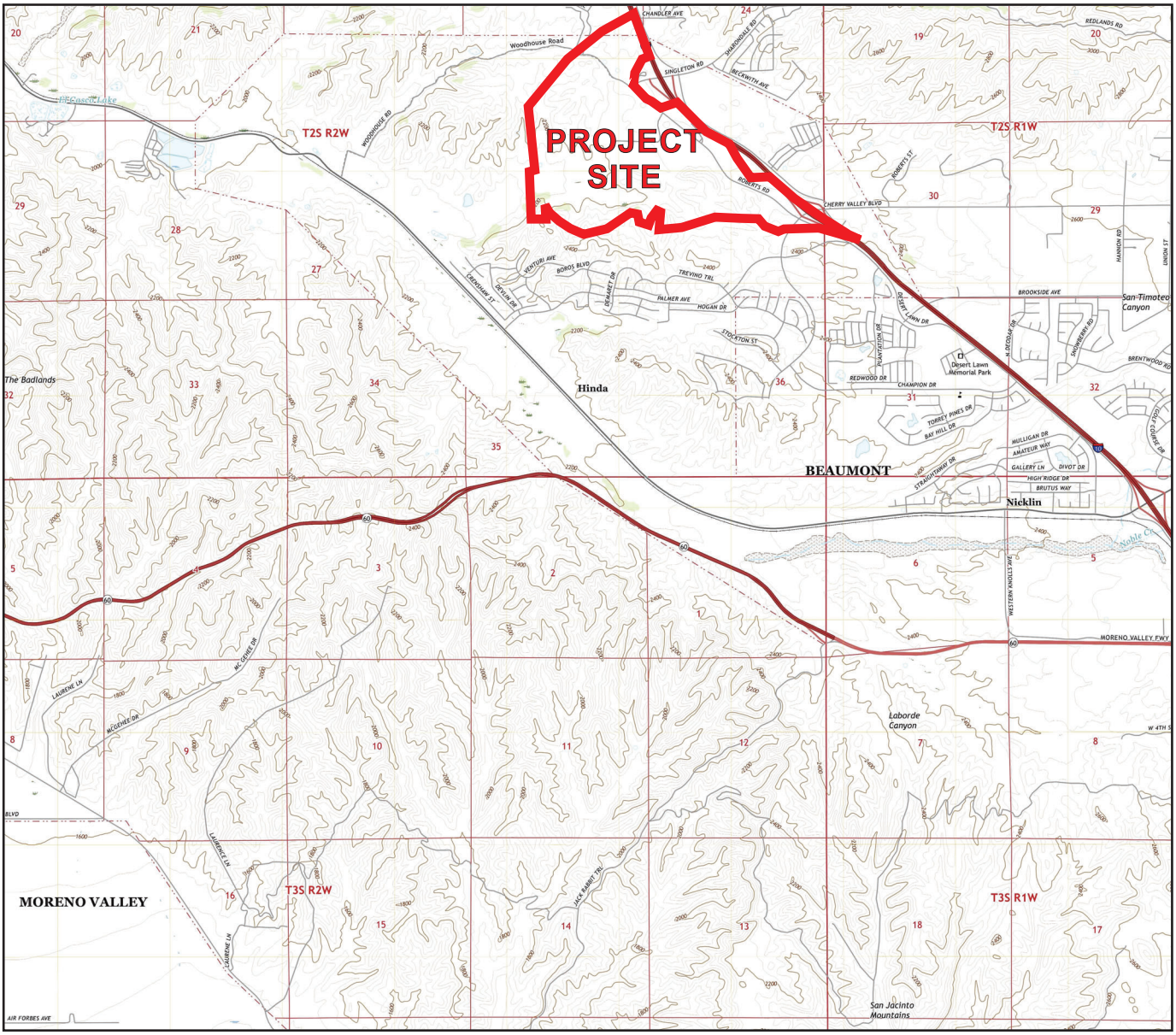
The site currently supports agricultural use (dry farming) on the southern and western portions of the site with several residential structures and outbuildings located within the northeastern, central, and southern portions of the site. Existing Roberts Road runs through the project site from southeast through the northeast. A failed concrete pipe culvert and associated headwall was observed beneath the northern portion of Roberts Road which has been undermined. The road was barricaded and closed to travel in this area.

Remnants of a prior low height dam are located across the main drainage that traverses the site, and its location is reflected by a line of artificial fill (afu) shown on Plate 1. A reservoir upstream of this dam is shown on older topographic maps of the area. Based on a review of historic aerial photographs, the active channel eroded a portion of this dam over 40 years ago.

The northwestern portion of the site consists of rolling hills underlain by formational materials consisting of the Live Oak Canyon and San Timoteo Formations. Several drainages exist onsite with two larger drainages transecting the site from northeast to southwest and one touching on the southwestern project boundary flowing from east to west.

3.0 PROPOSED DEVELOPMENT

It is our understanding that the proposed development as currently envisioned will consist of the following separate components:



SITE LOCATION MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

P/W 2004-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA (2018)

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- A commercial/retail center in the northeast portion of the site bounded by Singleton Road which will include extensive parking areas and possibly a new City Hall. These structures will likely be concrete "tilt-up" or conventional wood frame structures varying from 1 to 3 stories in height and would likely be supported by shallow slab-on-grade foundation systems. In addition to the commercial structures, a "man-made" lake would occupy the southwestern portion of the commercial/retail center.
- Large shipping and manufacturing buildings to be constructed on the western and southern areas of the property ranging in size from 250,000 to 500,000 square feet. The limits of these proposed structures are shown in blue on the attached Geotechnical Maps. It is anticipated that these structures will consist of concrete–tilt-up structures supported by shallow slab-on-grade foundation systems. Surrounding both the commercial and retail components will be interior roadways with primary access provided from Roberts Road and Singleton Road.
- A sewer lift station will be constructed near the southwest corner of the tract.

The mass grading plan shown on Plates 1 through 9 depicts an interim grading condition that avoid drainage areas. It is our understanding that the ultimate grades will be located within these areas.

4.0 FIELD AND LABORATORY INVESTIGATION

4.1. Previous Investigations

Several studies by PSE were previously completed onsite and near-by offsite. A description of the relevant data used within this current investigation is presented below.

- PSE conducted a subsurface investigation in 2004. AGS has utilized five (5) subsurface borings from this investigation (B-037, B-043, B-081, B-095, and B-096). These borings were excavated with a truck mounted drill rig equipped with 18-inch and 30-inch diameter bucket augers to depths ranging from 16 to 65 feet below ground surface (bgs). The locations of the exploratory excavations are shown on the Plates 1 through 9. Boring logs are presented in Appendix B.
- Laboratory testing was performed as a part of the PSE 2004 investigation and included chemical and resistivity testing, sieve analysis, maximum dry density and optimum moisture content, direct shear strength, and consolidation characteristics. Pertinent laboratory test results can be found in Appendix C.

4.2. Current Investigation

AGS conducted two phases of subsurface investigations, one on May 6 and 7, 2020, and the subsequent between August 5, 2020, and August 14, 2020, to evaluate the subsurface conditions as they relate to the proposed mass grading. Twenty two (22) test-pit excavations (T-1 through T-22) were excavated and logged to depths ranging from 9 to 14 feet bgs utilizing a JCB 3CX rubber-tired backhoe. Representative bulk samples were obtained and transported to our laboratory for testing to determine in-situ moisture content, maximum density and optimum moisture content, "remolded" shear strength, grain size distribution, and corrosivity. Test pit logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Twenty seven (27) borings were excavated, logged, and sampled with a truck mounted 8-inch hollow stem auger to depths of up to 71.5 feet. These borings were logged independently by both AGS and Southern California Geotechnical, Inc. (SCG). Representative bulk and relatively undisturbed samples were obtained and transported to AGS's laboratory for testing from eighteen of these borings (AGS-1 through AGS-18, except AGS-7 which was not used). Representative bulk and relatively undisturbed samples were obtained and transported to SCG's laboratory for testing from ten of these borings (SCG-1 through SCG-10). Test pit and boring logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Plates 1 through 9 show the locations of these exploratory excavations.

5.0 ENGINEERING GEOLOGY

5.1. Geologic Analysis

5.1.1. Literature Review

As part of this study, AGS has reviewed the geologic documents referenced in Appendix A. Where deemed appropriate, relevant geologic information has been included in this report.

5.1.2. Aerial Photograph Review

AGS has reviewed current and historical aerial photographs available through sources on the internet.

5.1.3. Field Mapping

Geologic field mapping was performed during our subsurface explorations.

5.2. Geologic and Geomorphic Setting

The Oak Valley Town Center lies on the Beaumont Plains at the north edge of the San Jacinto Mountains – one of the several northwest-trending mountain ranges that comprise the Peninsular Ranges Province of Southern California. Displacements along a series of northwest-trending active faults that extends from the Mojave Desert in the east, to the California Channel Islands in the west have and are elevating the mountain ranges above intervening lowlands. The faults include nearby San Andres fault zone, and the related San Gorgonio Pass Fault, and San Jacinto faults. These faults are, respectively, about 7-miles northeast, 3-miles east, and 5-miles southwest of the site.

According to Matti (2016), the sedimentary section below the Beaumont Plains near the study site includes in decreasing age: Pliocene to Pleistocene alluvial fan and flood plain deposits (5 Mya to ~1.3 Mya), perhaps up to several thousand feet thick, assigned to the San Timoteo Formation which were sourced from San Gabriel Mountains northwest of the area; Pleistocene alluvial and flood plain deposits, assigned sediments of the Live Oak Canyon, that were deposited after the San Timoteo Anticline disrupted the previous depositional pattern around 1.3 Mya; Holocene alluvium and colluvium within active stream channels and swales; topsoil; and local prisms of artificial fill.

West-flowing San Timoteo Creek drains the Beaumont Plains. That high-order drainage has kept pace with uplift in the plains and the west-adjacent San Timoteo Badlands, resulting in ongoing

incision and headward erosion of its channel. Many low-order drainages have consequently formed as tributaries to San Timoteo Creek. These drainages dissect the Beaumont Plains and form distinctive badlands topography common to the area. The canyons and swales on the study site are part of this system.

5.3. Stratigraphy

Mapping and nomenclature following Matti, Morton and Langenheim (2015) are being used for this report (Figure 2, Regional Geologic Map). The site has been mapped as being underlain by Pleistocene and Pliocene age sedimentary deposits of Live Oak Canyon (formerly described as the upper member of the San Timoteo Formation) within the northern rolling hills portion of the site. The majority of the site is mapped as Pleistocene age very old alluvial fan deposits overlain by Holocene age young alluvial axial-valley and fan deposits. The existing channels onsite are mapped as modern age very young wash deposits. Undocumented fill exists in areas where the land surface has been modified in order to support access roads and berms, especially in the vicinity of the existing structures and Roberts Road. For the purpose of this report, the three younger (Holocene) alluvial deposits described below have been labeled as one unit (Qal) on Plates 1 through 9. Approximate surface geologic contacts are shown on Plates 1 through 9. Brief descriptions of the geologic units encountered at the site are presented below, from youngest to oldest.

5.3.1. Artificial Fill – Undocumented (Map Symbols afu)

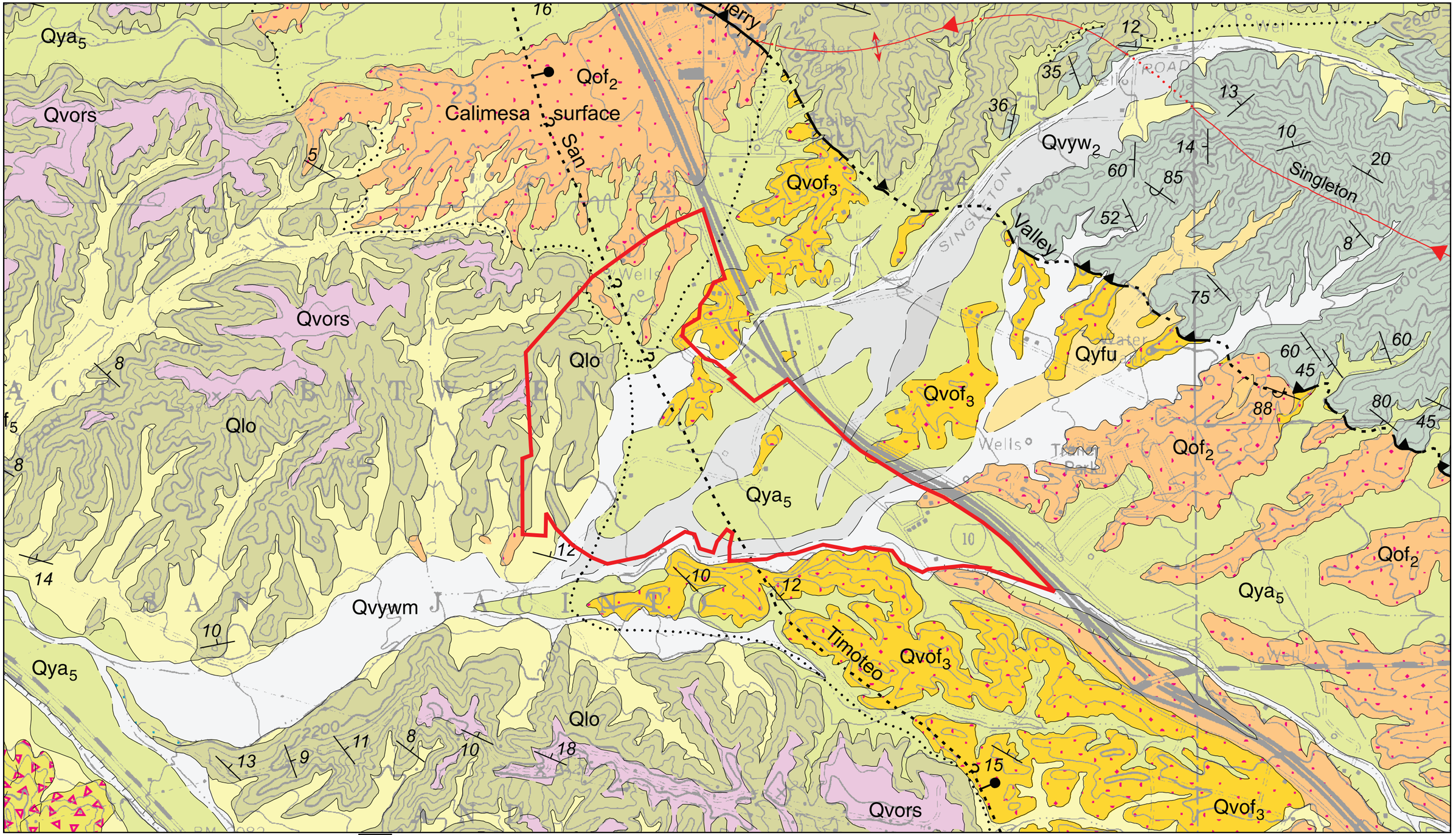
Artificial fill soils were observed throughout the site specifically along margins of adjacent residential developments, underlying existing structures and at roadway improvements including Roberts Road and other disturbed access roads onsite. Artificial fill was not encountered within our subsurface excavations however it is anticipated to be locally derived.

5.3.2. Alluvium (Map Symbol Qal)

Holocene age alluvium are located surrounding the major drainages onsite and cover most of the southerly portion of the site. The alluvium includes very young wash deposits, located within the active drainage channels, young axial valley deposits, and young alluvial fan deposits. These deposits have not been differentiated on the plans or boring logs. These deposits consisted of poorly consolidated sediments within the active drainage channels to more consolidated sediments elsewhere. The alluvium ranges from dry to wet with consistencies that generally range from soft/loose to medium dense/stiff. Up to 60 feet of alluvium was encountered in boring AGS-3. Abundant peat was encountered within boring AGS-4 at depths of up to 35 feet. Additional layers may be present between the roughly 5-foot sampling intervals. Cone penetration tests may be useful in identifying thin layers of peat deposits that may be present as well as the lateral extents.

5.3.3. Older Alluvium (Map Symbol Qoa)

An intermediate age alluvial deposit was observed in several borings and test pits underlying the young alluvial deposits. The older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.



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SOURCE MAP - GEOLOGIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE CALIFORNIA. HIRSCHBERG, MATTI AND COSSETTE (2015)

SCALE: 1 in. = 1000 ft.

Qvywm	Very young wash deposits (modern)
Qya_5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf_5	Young alluvial-fan deposits, unit 5 (middle Holocene)
$Qvof_3$	Very old alluvial-fan deposits, unit 3 (middle Pleistocene)
Qlo	Live Oak Canyon Formation (Pleistocene)

REGIONAL GEOLOGIC MAP

FIGURE 2

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The older alluvium has consistencies that range from medium dense/stiff to very dense/hard. This unit is considered to be late Pleistocene in age.

5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof)

Middle to Lower Pleistocene age very old alluvial fan deposits were encountered within the majority of test pit excavations underlying younger alluvial deposits. This unit was observed to be composed mainly of silty sand in a medium dense to dense condition. The very old alluvium is distinguished from the overlying younger alluvial deposits by its higher relative density, weakly cemented nature, and iron oxide development. Generally minor porosity within the upper five feet existed within this unit.

5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo)

Sedimentary deposits of Live Oak Canyon is a new unit name designated by Morton & Matti (2015) that applies to a sequence of sandy and conglomeratic rock that crops out in low hills and mesas north of San Timoteo Canyon. These materials were previously assigned to the upper member of the San Timoteo Formation and range in age from late Pliocene to early Pleistocene. The sedimentary deposits of Live Oak Canyon have been mapped within the rolling hills located in the northwestern portion of the project site. As encountered onsite, this unit is mostly composed of thickly bedded fine to medium-grained silty sandstone and conglomerate that is yellowish brown to light gray brown and moderately hard. In PSE's B-43 boring, some light grey moderately hard sandy siltstone was encountered. Iron oxide staining was observed in this unit. Although not encountered in exploratory excavations onsite, occasional clay beds may be present within this unit. Regionally, bedding within this unit has been mapped to dip at shallow inclinations (~10 degrees) to the northeast. One bedding attitude taken from B-43 indicates that the bedding dips at 10 degrees to the north-northeast.

5.4. Groundwater

Groundwater was encountered within several exploratory borings and Test Pit T-2 at various depths and elevations in the main drainage course that crosses the site. Standing water was present at the time of our current investigation within the drainage channel running under existing Roberts Road south of the Singleton and Roberts Road intersection. However, groundwater was not encountered in AGS-13, which was excavated just to the north of this drainage course to a depth of 50 feet (elevation 2195). The depth/elevation of the observed groundwater varied across the site and may be difficult to accurately predict. The presence of the concealed San Timoteo Canyon fault may have an impact on groundwater conditions. Matti, et al (2006) has shown groundwater to generally flow to the west in the area, and describes the presence of a groundwater barrier, which has been inferred to be a splay of the San Timoteo Canyon fault. There are four known active wells on the site. The depths of two are known (288 and 319 feet) whereas the other two are not known. The type of well construction, including limits of the screened zones, are unknown. Recent measurements maintained by the USGS California Water Science Center (July and December 2020) indicate that groundwater depths are around 100 to 170 feet (elevations 2105 to 2140). In Spring of 2000, groundwater elevations in the area upstream of the fault have been generalized at

an elevation of around 2175 feet (Matti 2006, Figure 28), which appear to be based on the nearby well readings (depths ranged from 59 to 102 feet in April 2020, which corresponded to an elevation of around 2175). Matti (2006) mentions the location of the fault coincides where springs have been documented historically in this area. However, Matti does not describe the precise locations of these springs. The well readings may be measuring a lower groundwater surface than those encountered in the recent borings.

Shallow groundwater conditions were encountered near the intersection of proposed Roberts and Singleton Roads and the northwest side of Lot 3. In this area, groundwater was encountered at depths of 15 feet (elevation 2216) in PSE-96, 11 feet (elevation 2217) in AGS-3, 10 feet in test pit T-10 (elevation 2216), 15 feet (elevation 2208) in AGS-16, and 40 feet (elevation 2210) in PSE-95. Just upstream of this area, groundwater was not encountered in AGS-13, which was excavated to a maximum depth of around 50 feet (elevation 2195). Groundwater was not encountered in SCG-10 located to the southeast, which was excavated to a maximum depth of around 50 feet (elevation 2180) nor in AGS-4, located downstream and drilled to a maximum depth of around 45 feet (elevation 2150).

Groundwater depths across the site will vary in relation to the time of year, rainfall, and discharge from upstream bodies of water. It should be anticipated that groundwater will be encountered during construction and will require mitigation, especially near the northwest corner of Lot 3. This mitigation may include dewatering areas where the remedial excavation extends below the groundwater level and stabilization of removal bottoms that are near the groundwater level. Subdrains are proposed in this area to mitigate the potential for groundwater rising and impacting surface improvements.

5.5. Non-seismic Geologic Hazards

5.5.1. Mass Wasting and Debris Flows

The site is gently sloping with some steeper topography within the northwestern portion of the project site. Due to the gently sloping existing terrain and proposed mass grading, mass wasting and debris flows are not considered a site hazard.

5.5.2. Flooding

The project site has been mapped as FEMA flood zone “X” which is characterized as an “Area of Minimal Flood Hazard”.

5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring

Some layers of peat were identified in the recent alluvial deposits. Settlement of peat deposits can occur when the moisture content is reduced and oxidation/decomposition is allowed to occur. Subsidence is also related to groundwater withdrawal and changes in stresses. Hazards associated with subsidence can be mitigated with proper design and construction practices. It is proposed to remove peat within building pad areas to mitigate the potential for settlement. Other improvements located outside the areas of deep removals

may be subject to possible settlement/subsidence due to groundwater withdrawal and changes in stresses.

Evidence of ground fissuring has not been identified on the site, and AGS is unaware of ground fissuring in the surrounding areas

5.6. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding.

The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

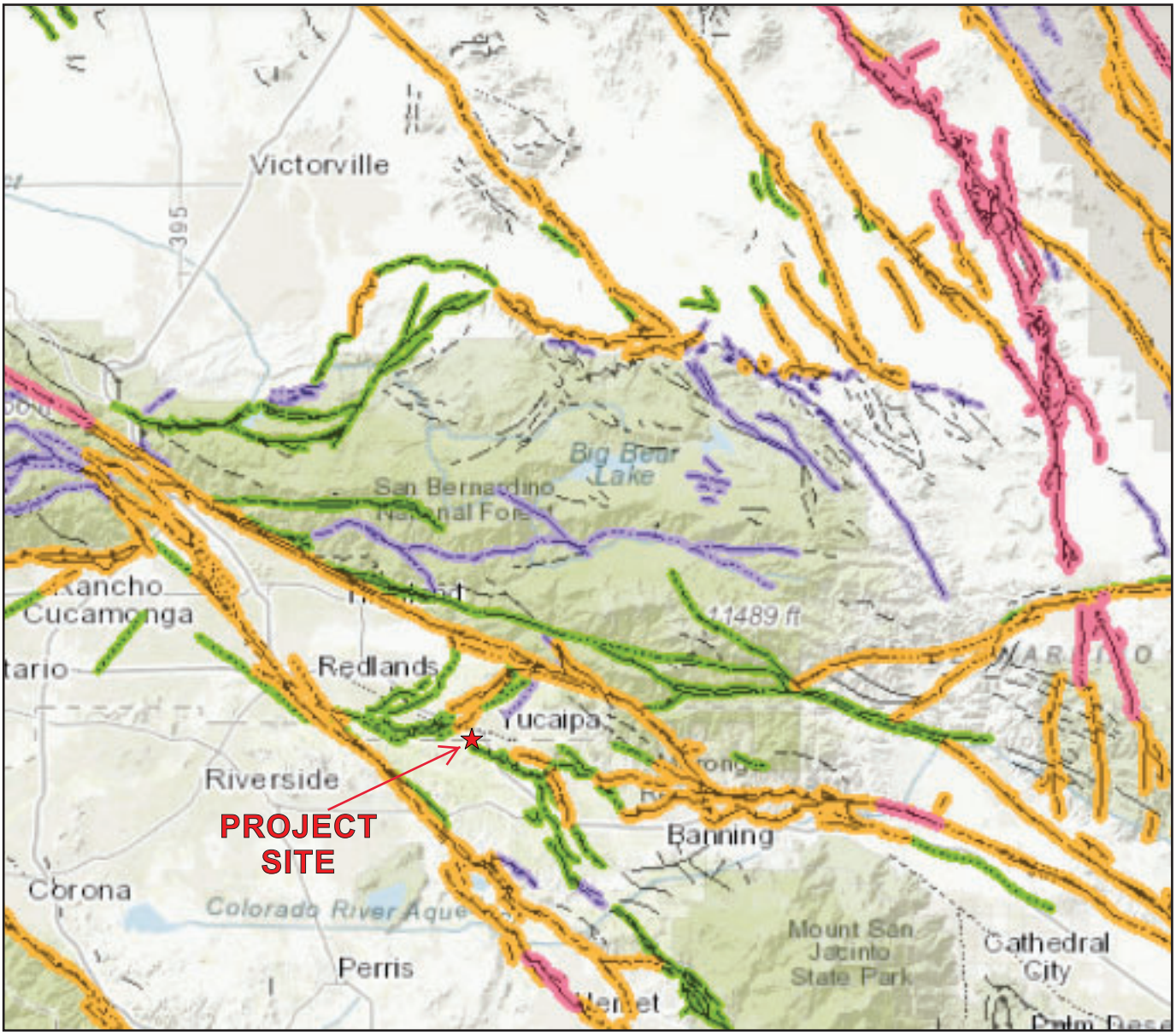
5.6.1. Surface Fault Rupture

There are no known active faults that transect or project into the site. The nearest known active fault is the San Gorgonio Pass Fault located approximately 1.5 miles northeast of the project site (See Figure 3, Regional Fault Map). The San Timoteo Canyon Fault is mapped transecting the site from the southeast to the northwest. The San Timoteo Canyon Fault is an inferred and concealed structure that is tagged with question marks to indicate that its existence is questionable and the evidence for the fault's existence is indirect. The San Timoteo Canyon Fault in the area is entirely concealed by younger Quaternary-age alluvial deposits. The fault is considered to be older than late Quaternary in age but its lower age limit is unknown. Accordingly, the potential for fault surface rupture within the project is considered low.

5.6.2. Liquefaction/Dynamic Settlement

Liquefaction is the phenomenon in which the buildup of excess pore pressures, in saturated granular soils due to seismic agitation, results in a temporary "quick" or "liquefied" condition. Loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. Once the excess pore water pressure dissipates, the liquefied zones/lenses will likely consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways, and may include ground deformation, loss of bearing strength, lateral spreading, flow failure, and dynamic settlement.

The very young wash deposits, young axial-valley deposits, and young alluvial fan deposits are potentially liquefiable in their present condition. Saturated younger alluvial deposits were encountered near the northeast corner of Lot 3. The potential for liquefaction of the saturated deposits was evaluated. The analyses were performed using LiqSVS software (Version 2.0.1.7 by GeoLogismiki, 2019). The deterministic methods presented in NCEER



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FAULT MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

SOURCE MAP - CALIFORNIA DEPARTMENT OF CONSERVATION FAULT ACTIVITY MAP OF CALIFORNIA (2010)

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FIGURE 3

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(1997) were used, and a corresponding dynamic settlement was estimated by the program using the curves proposed by Ishihara and Yoshimine (1992) as described in Zhang et al. (2002) and a groundwater level of 11 feet. Borings AGS-3 and AGS-16 form the basis of our analysis. The peak ground acceleration was determined in accordance with ASCE 7-16 and was determined to be 0.87g. Based on the deaggregation analysis results from the USGS Unified Hazard Tool website, a mean earthquake magnitude of 7.5 for the 2% in 50 year risk was used for the analysis using 100 percent of the PGA_M.

The upper 10 feet of soils were excluded from the analysis since these soils should be removed during remedial grading efforts. Based on test results, certain layers were assumed to behave more "clay-like" and were considered non-liquefiable. Laboratory test results were used to substantiate which soil layers are considered potentially liquefiable or subject to cyclic softening. The moisture contents of the samples (most of which are considered saturated and below the ground water table) were determined and compared with the plasticity indices. The results indicate that fine-grained soils encountered are not considered sensitive and subject to cyclic softening. The liquidity index (LI) indicates that the clayey soils are generally low. Based on the test results, the finer-grained soils onsite are considered to behave clay-like and are not considered susceptible to liquefaction or cyclic softening.

Based on a calibration report for 2R Drilling, an Energy Transfer Ratio of 85.5 percent was used, which corresponds to a Hammer Efficiency Ratio (Ce) of 1.43. The blow counts obtained from the SPT were used in the analyses. Samples were also collected using the Modified California Sampler, and the blow counts were used after applying a reduction factor of 0.6.

The calculations, included in Appendix D, indicate that potentially liquefiable soil layers are located at depths of around 30 feet in AGS-3 and AGS-16. The significant 30-foot thick non-liquefiable crust is anticipated to mitigate the potential for surface manifestations, including settlement, reduced bearing capacity, ground deformation, and lateral spreading. Additionally, it is recommended that a geotextile such as Mirafi RS280i be placed on the saturated subgrade in order to stabilize the subgrade. The related total dynamic settlements summarized in Table 5.6.2, below, are based on methods described in Zhang et al. (2002), and are considered conservative estimates based on the significant thickness of a non-liquefiable soil crust and recommended placement of the geotextile fabric. According to SP-117A (CDMG 2008), up to two thirds of the total settlement should be considered as differential settlement unless more precise predictions of differential settlement can be made. Considering the thick non-liquefiable crust, and placement of 10 to 15 feet of newly compacted fill over a geotextile fabric, it is AGS's opinion that the differential settlement may be less than 2/3 of the total settlement. AGS has estimated that the differential settlement is one half of the total. The structural engineer should design the structures within the northwest corner of Lot 3 to accommodate this settlement without collapsing.

TABLE 5.6.2 ESTIMATED DYNAMIC SETTLEMENT		
Boring	**Full PGA**	
	Total Settlement (inches)	**Differential Settlement (inches)**
AGS-3	2.2	1.1
AGS-16	3.7	1.9

5.6.3. Lateral Spreading

Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in a shallow underlying deposit during an earthquake. With the remedial grading recommendations of removing and recompacting the young alluvial soils, and the thickness of the non-liquefiable crust, the potential for lateral spread and surface manifestations is considered to be low. However, if saturated alluvial soils are left-in-place these areas may be prone to lateral spread. In that case, further evaluation of ground improvement measures may be necessary.

5.6.4. Seismically Induced Landsliding

No landslides, including shallow surficial failures have been mapped onsite. This indicates the lack of any seismically activated land sliding during past historic and ancient seismic events. Seismicially-induced landsliding is not considered a significant concern in either the pre- or post-development site conditions.

5.6.5. Earthquake Induced Flooding

Earthquake induced flooding can be caused by tsunamis, dam failures, or seiches. Also, earthquakes can cause landslides that dam rivers and streams, causing flooding upstream above the dam and also downstream when these dams are breached. A seiche is a free or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. Due to the lack of a freestanding body of water nearby, the potential for a seiche impacting the site is considered to be non-existent.

5.7. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 259 m/s. Table 5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 33.980°N and Longitude 117.051°W. The seismic provisions of 2019 CBC are different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located in Site Class D soil conditions except for certain cases noted in ASCE 7-16 Section 11.4.8.

TABLE 5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Seismic Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	2.239g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.772g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	2.687g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	1.791g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	1.099g
Seismic Design Category	N/A[3]

Notes:
[1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8
ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$.

5.8. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra including the probabilistic and deterministic seismic hazard analyses are described below.

5.8.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

5.8.2. Deterministic Seismic Hazard Analysis

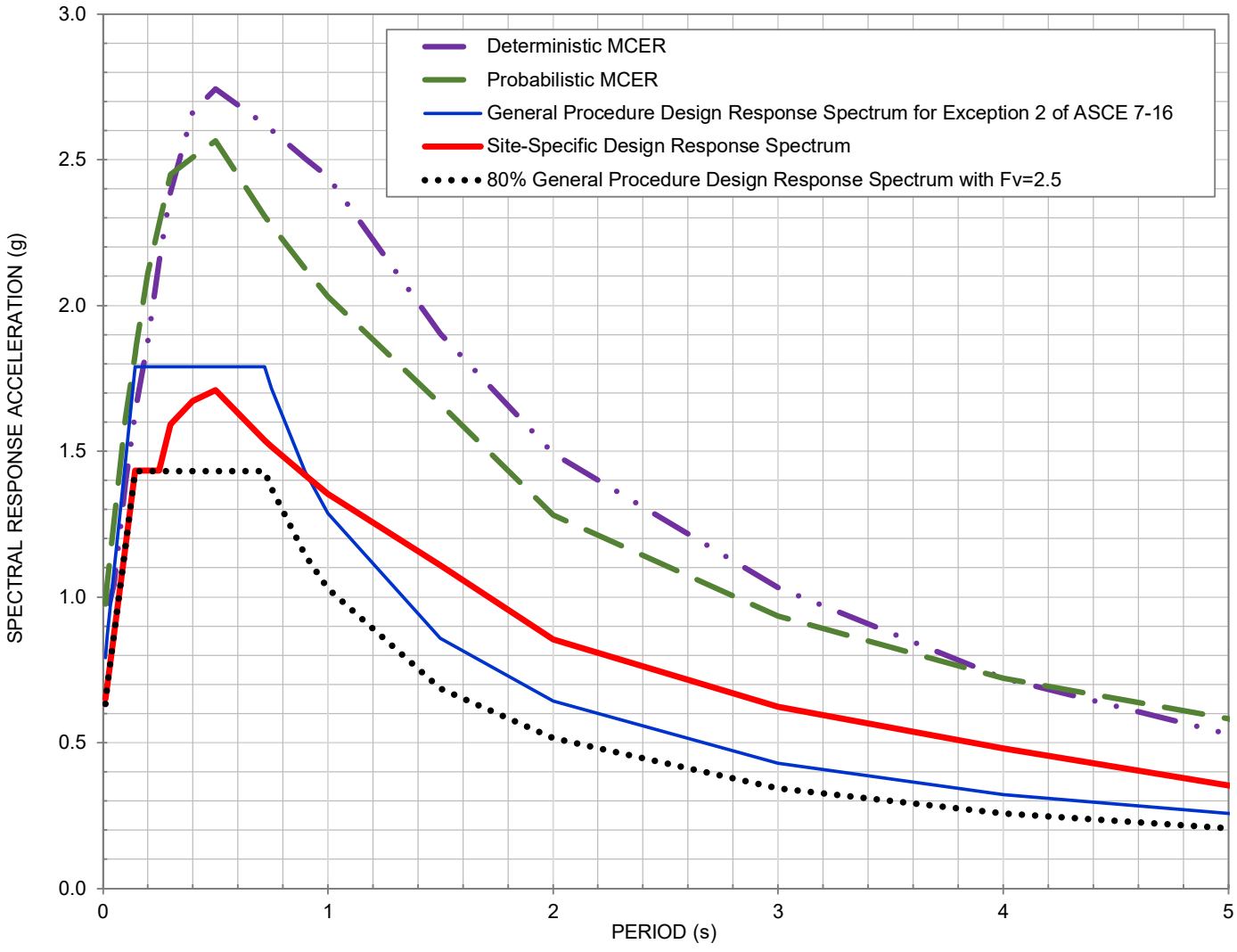
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation we selected three "controlling" sources and seismic events: the San Gorgonio Pass fault, the San Jacinto fault (San Jacinto Valley section) and the San Andreas fault (San Bernardino South section). Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

5.8.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 5.8.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.650
0.02	0.693
0.03	0.753
0.05	0.872
0.075	1.022
0.1	1.172
0.144	1.433
0.15	1.433
0.2	1.433
0.25	1.433
0.3	1.592

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	1.672
0.5	1.711
0.718	1.537
0.75	1.516
0.9	1.418
1.0	1.353
1.5	1.108
2.0	0.853
3.0	0.623
4.0	0.480
5.0	0.353



Note: See report for values of the various curves.

AGS

SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

PARCEL MAP 37862
ROBERTS RD AND CHERRY VALLEY BLVD
CALIMESA, CALIFORNIA

PROJECT NO.	DATE	
2004-01	12/20	**FIGURE 4**

TABLE 5.8.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.791	0.915	1.065	0.975	0.979	0.645	0.979	0.975	0.633	0.650
0.02	0.866	0.915	1.143	1.046	0.983	0.690	0.983	0.983	0.693	0.693
0.03	0.941	0.915	1.220	1.117	0.978	0.735	0.978	0.978	0.753	0.753
0.05	1.091	0.915	1.375	1.259	1.045	0.825	1.045	1.045	0.872	0.872
0.075	1.278	0.915	1.569	1.436	1.214	0.938	1.214	1.214	1.022	1.022
0.1	1.465	0.915	1.763	1.614	1.390	1.050	1.390	1.390	1.172	1.172
0.144	1.791	0.915	2.000	1.830	1.630	1.246	1.630	1.630	1.433	1.433
0.15	1.791	0.915	2.034	1.862	1.658	1.275	1.658	1.658	1.433	1.433
0.2	1.791	0.915	2.305	2.110	1.874	1.500	1.874	1.874	1.433	1.433
0.25	1.791	0.913	2.494	2.278	2.149	1.500	2.149	2.149	1.433	1.433
0.3	1.791	0.912	2.687	2.450	2.388	1.500	2.388	2.388	1.433	1.592
0.4	1.791	0.909	2.760	2.508	2.665	1.500	2.665	2.508	1.433	1.672
0.5	1.791	0.905	2.834	2.566	2.743	1.500	2.743	2.566	1.433	1.711
0.718	1.791	0.898	2.567	2.305	2.622	1.500	2.622	2.305	1.433	1.537
0.75	1.716	0.897	2.535	2.274	2.601	1.500	2.601	2.274	1.372	1.516
0.9	1.430	0.892	2.384	2.127	2.505	1.500	2.505	2.127	1.144	1.418
1	1.287	0.889	2.284	2.030	2.441	1.500	2.441	2.030	1.029	1.353
1.5	0.858	0.889	1.870	1.663	1.903	1.000	1.903	1.663	0.686	1.108
2	0.643	0.889	1.440	1.280	1.493	0.750	1.493	1.280	0.515	0.853
3	0.429	0.889	1.052	0.935	1.032	0.500	1.032	0.935	0.343	0.623
4	0.322	0.889	0.811	0.721	0.722	0.375	0.722	0.721	0.257	0.480
5	0.257	0.889	0.656	0.583	0.530	0.300	0.530	0.530	0.206	0.353

Site-specific design response parameters are provided in Table 5.8.3B. These parameters were derived from the Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 5.8.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	2.882g
Spectral Response Acceleration 1-second period, S_{M1}	2.882g
Design Spectral Response Acceleration for short period, S_{DS}	1.922g
Design Spectral Response Acceleration for 1-second period, S_{D1}	1.922g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.890g

6.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

6.1. Material Properties

6.1.1. Excavation Characteristics

It is anticipated that excavations within the undocumented artificial fill, topsoil, young alluvium, older alluvium, very old alluvial fan deposits, and the highly weathered portions of the formational materials can be accomplished with conventional heavy equipment. It is possible that the deep excavations within the unweathered formational materials on the northwestern portion of the property area could require heavy ripping in deeper cuts.

6.1.2. Compressibility

Onsite materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the very old alluvial deposits and Live Oak Canyon deposits. These materials will require complete removal below structural areas prior to placement of fill, where exposed at design grade, and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 7.1 and earthwork adjustment estimates are presented in Section 6.1.7.

6.1.3. Collapse Potential/Hydro-Consolidation

Some of the upper alluvial soils are susceptible to hydro-consolidation. Beneath settlement sensitive improvements, it is recommended that the upper soils prone to hydro-consolidation be removed and replaced with compacted fill.

6.1.4. Expansion Potential

Based upon AGS's observations and preliminary testing and review of relevant laboratory testing by PSE, the expansion potential of the onsite materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D4829. However, it is anticipated that the majority of materials will fall into the "very low" to "low" range. Further testing and geologic mapping should be conducted during and upon completion of the grading operations to provide design recommendations on a pad by pad basis.

6.1.5. Shear Strength

Based on our laboratory testing, reviewed laboratory testing from PSE and previous experience on similar projects, the following shear strength values may be used for design.

TABLE 6.1.5 Shear Strength Parameters Used for Design (Ultimate)			
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Moist Density (pcf)**
Artificial Compacted Fill	150	31	125
Young and Older Alluvial Deposits (Qal & Qoa))	100	30	125
Very Old Alluvial Fan Deposits (Qvoa)	200	32	125
San Timoteo and Live Oak Canyon Formations	400	34	130

6.1.6. Chemical and Resistivity Test Results

The results of previous preliminary chemical/resistivity testing are presented in Appendix C. Corrosive soils are defined as soils that have minimum resistivity less than 1,000 ohm-centimeters, chloride concentration greater than 500 ppm, sulfate concentration greater than 2,000 ppm, or pH less than 5.5 (Caltrans, 2018).

Test results indicate that the potential for sulfate attack on concrete in contact with the on-site soils is negligible in accordance with ACI 318, Table 4.3.1. In addition, test results also indicated that the potential for chloride attack of reinforcing steel in concrete structures and pipes in contact with the on-site soil is negligible.

Resistivity test results indicate that the on-site near-surface soils are not considered corrosive to buried ferrous metals. However, a corrosion specialist may be consulted regarding suitable types of piping and appropriate protection for underground metal conduits, if needed.

Final determination of the corrosivity of the site should be based upon testing of soils from the site and import soils during grading operations.

6.1.7. Earthwork Adjustments

In consideration of the proposed mass grading to develop the project as currently proposed, the following average earthwork adjustment factors presented in Table 6.1.7 have been formulated for use in the earthwork design of the project.

TABLE 6.1.7 EARTHWORK ADJUSTMENTS	
Geologic Unit	**Approximate Range**
Artificial Fill, Topsoil, Young Alluvial Deposits	5% to 15% shrinkage (average ~12%)
Old and Very Old Alluvium Live Oak Canyon Formation	5% shrinkage to 10% bulk (average ~3% bulk)

6.1.8. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. If structural pavements are to be constructed (concrete or asphaltic concrete), an R-value of 30 can be utilized for the preliminary design of pavements. Final design should be based upon representative sampling of the as-graded soils.

6.2. Analytical Methods

6.2.1. Slope Stability Analysis

Stability analyses were performed for both static and seismic (pseudo-static) conditions using the GSTABL7 computer program. The Modified Bishop method was used to analyze circular type failures. The critical failure surface determined in the static analysis was used in the pseudo-static analysis. A horizontal destabilizing seismic coefficient (kh) of 0.15g was selected for the site and used in the pseudo-static analyses.

Surficial stability analyses were conducted using an infinite height slope method assuming seepage parallel to the slope surface.

6.2.2. Pavement Design

Asphalt concrete pavement sections have been designed using the recommendations and methods presented in the Caltrans Highway Design Manual.

6.2.3. Bearing Capacity and Lateral Pressure

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases.

7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

Some of the alluvial soils onsite are considered prone to hydro-consolidation. Layers of peat were also encountered at depths of up to around 35 feet in AGS-4. Peat is considered highly compressible and is subject to significant volume changes, even with minor changes in stresses and moisture content. It is recommended that these materials be removed below proposed structural areas. Lesser removals can be considered for areas where the potential for settlement may not warrant the cost of complete removal, such as in landscape and parking areas, where the cost associated with possible additional maintenance may be less than the cost remedial grading.

7.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of Riverside and AGS's Earthwork Specifications (Appendix E).

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing foundations elements, standpipes, irrigation lines, and utility conduits should be removed and wasted off-site. Concrete can be placed in the fill provided it is broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations presented in Section 7.9.6. Cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

Topsoil, undocumented fills, the upper young alluvial deposits, and highly weathered portions of older and very old alluvial fan deposits and Live Oak Canyon deposits should be removed in areas planned to receive compacted fill. Additionally, younger alluvial deposits, peat deposits, and porous older alluvium above the groundwater should be completely removed in areas intended to support settlement-sensitive structures. The removals for building areas should extend a minimum of 10 feet outside the building limits or at a 1:1 projection down and away from the building limits until a competent bottom is achieved, whichever is greater. It is anticipated that the upper 3 feet of alluvial soils should be removed in parking and landscape areas. Deeper alluvial removals should be conducted in street areas to support utilities and facilitate trenching. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals are presented in Table 7.1 and shown on Plates 1 through 12.

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. The removal bottoms should be observed and mapped by the engineering geologist prior to fill placement.

In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

TABLE 7.1

ESTIMATED DEPTH OF REMOVALS

Geologic Unit (map symbol)	Estimated Removal Depth	
	Structural Areas	Landscape Parking Areas
Topsoil	0.5-3 feet	
Undocumented Artificial Fill (afu)	1-10+ feet	
Young Alluvial Deposits (Qal)	1-40+ feet	1-3+ feet
Old Alluvial (Qoa) and Very Old Alluvial Fan Deposits (Qvof)	1-5 feet	1-3 feet
Highly Weathered Live Oak Canyon Formation (Qlo)	1-3 feet	

7.1.1. Overexcavation of Building Pads and Streets

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur exposed at the design elevation. Overexcavation recommendations are provided below. The overexcavation should expose competent bottoms, and the replacement fill should be compacted to project specifications as described in Section 7.9.1.

7.1.1.1. Cut/Fill Transition Pads

Where design grades and/or remedial grading activities create a cut/fill transition beneath building pads, the cut and shallow fill portions of the commercial building pad should be over-excavated a minimum depth of five (5) feet and replaced to design grade with compacted fill. In Lot 3 where deeper removals are planned, the cut portions of the building pad exposing Very Old Alluvial Deposits and Live Oak Canyon Formation should be overexcavated a minimum of 10 feet. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas. At this time specific locations of the buildings on the east side of Roberts Road are not known. Accordingly, it may be prudent to sheet grade the lots, and wait to conduct the undercuts once final foundation depths and building locations are determined.

7.1.1.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) of the deepest fill section within the pad but need not exceed 10 feet. The transition between the deep fill and cut (capped) portion of the lot should not exceed a 2:1 gradient.

7.1.1.3. Street Overexcavation

The overexcavation of street areas to facilitate utility installation is not anticipated to be required.

7.1.2. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

It is our understanding that development is planned on the adjacent parcels. Development of one parcel may impact remedial grading efforts needed to support the adjacent parcel development. Coordination with the adjacent property owner should be considered to avoid negatively impacting future development efforts on the adjacent parcel.

7.2. Subgrade Stabilization

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of 1½" angular rock wrapped in geotextile (such as Mirafi RS280i) over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water

truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

7.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. If field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

7.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 or flatter (horizontal to vertical). The highest proposed cut slope is 72 feet in height- 35 feet of 3:1 (H:V) above a 37 foot 2:1 (H:V). It is anticipated that slopes excavated in very old alluvium will be grossly and surficially stable to the proposed heights. If unconsolidated coarse-grained lenses of materials are encountered on the slope face, local stabilization may be necessary.

Although not encountered during the subsurface investigation, occasional weak beds are present in the Live Oak Canyon Formation. It is anticipated that slopes excavated in Live Oak Canyon Formation will be grossly and surficially stable to the proposed heights unless out-of-slope bedding conditions are encountered. Bedding generally dips to the northeast, so cut slopes facing this direction may need to be stabilized. Generally, the proposed cut slopes within the Live Oak Canyon Formation face to the east, southeast and south.

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcut. Terrace drains and benches should be constructed on cut slopes in accordance with the County of Riverside Grading Ordinance.

7.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 46 feet. Fill slopes, when properly constructed with onsite materials and maintained as described herein, are expected to be grossly and surficially stable as designed.

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will

improve surficial stability and should be considered. Areas subject to potential scour should be armored.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of ascending slope, whichever is greater. Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward, from the catch point of the design toe at a minimum 1:1 projection, to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County of Riverside Grading Ordinance.

7.3.3. Skin Cut and Skin Fill Slopes

A review of the mass grading plans did not indicate any significant design skin fill and skin cut conditions, however, skin cut or thin fill sections may be created during grading. If these conditions occur, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half the remaining slope height, and not less than 15 feet, is provided. Where the design cut is insufficient to remove all unsuitable materials, overexcavation and replacement with a stabilization fill will be required, as shown on Grading Detail 6 in Appendix E.

7.3.4. Fill Over Cut Slopes

Fill over cut slopes should be constructed such that the cut portion is excavated first for geologic mapping and stability determination. If deemed stable then a "tilt-back" keyway half the remaining slope height or minimally twenty (20) feet wide should be established. Drains will be required for this condition with the locations determined based upon exposed field conditions.

7.3.5. Offsite Drainage Channel Slopes

Along the southerly boundary, steep natural slopes are present along the active drainage channel and outside the grading limits (See Cross Sections K-K', L-L', M-M', N-N'). Continued migration of this channel, scour, and/or undercutting of these slopes may impact onsite improvement and/or lead to slopes having a factor of safety that is less than desired. It is our understanding that future plans may include stabilization of portions of this channel. AGS should evaluate the proposed channel improvements to determine if additional stabilization measures or setbacks are warranted on this boundary.

7.3.6. Surficial Stability

The surficial stability of 2:1 (or flatter) fill and cut slopes have been analyzed, and the analysis presented in Appendix D indicates a factor-of-safety in excess of code minimums. When fill and cut slopes are properly constructed and maintained, satisfactory performance can be anticipated although slopes will be subject to erosion, particularly before landscaping is fully established.

7.3.7. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials (Live Oak Canyon Formation) can be considered a Type "A" soil. Very Old Alluvial Fan Deposits and Engineered Fill can be considered Type "B" soils. Young and older alluvial soils can be considered Type "C". Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material, 1:1 in fill soils, and 1.5:1 in young alluvial soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations. Final determination should be made during construction by the project Geotechnical Engineer based upon field observation.

For vertical excavations less than approximately 15 feet in height, cantilevered shoring may be used. Where cantilevered shoring is used for deeper excavations, the total deflection at the top of the wall tends to exceed acceptable magnitudes. Shoring of excavations deeper than approximately 15 feet may need to be accomplished with the aid of tied back earth anchors.

The shoring design should be provided by a California Registered Civil Engineer experienced in the design and construction of shoring under similar conditions. Once the final excavation and shoring plans are complete, the plans and the design should be reviewed by AGS for conformance with the design intent and recommendations. Further, the shoring system should satisfy applicable requirements of Cal-OSHA.

Personnel from AGS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including Cal-OSHA requirements, should be met.

7.3.8. Geologic Observation During Grading

All temporary slope excavations, including front, side and backcuts, and all cut slopes should be mapped to verify the geologic conditions that were modeled prior to grading are consistent with the exposures during the grading. Slope stability analyses and designed keyways may have to be modified based on conditions exposed during grading.

7.4. Survey Control During Grading

Removal bottoms, keyways, sub drains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations. Survey support will also be required to monitor settlement as discussed in Section 7.5.

7.5. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated alluvial soils be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix E).

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

7.6. Subsurface Drainage

7.6.1. Canyon Drains

Six- (6), eight- (8), and ten- (10) inch diameter canyon subdrains are recommended along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. The diameter and approximate locations of proposed subdrains are shown on Plates 1 and 9. Final determination of drain locations will be made in the field, based on exposed conditions. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

7.6.2. Heel Drains

Heel drains will be required for all stabilization fill keyways. Tentative heel drain locations can be provided when more detailed grading plans become available. Heel drains should be constructed in accordance with the details shown on Detail 3 (Appendix E).

7.6.3. Cut Slope Toe Drains and Subdrains

Consideration should be given to placing a toe drain on all major cut slopes in order to provide drainage for possible future nuisance water on the cut slopes.

Subdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

7.7. Seepage

Seepage, when encountered during grading, should be evaluated by the Geotechnical Consultant. If seepage is excessive, remedial measures such as horizontal drains or under drains may need to be installed.

7.8. Construction Dewatering

Due to the presence of shallow groundwater encountered during our field exploration, dewatering measures may be necessary during the excavation operation. It should be noted that controlling and maintaining of groundwater during construction is the responsibility of the contractor. As part of

the groundwater control, the quality of collected water should also be checked in accordance with applicable permits and regulations for water discharge.

7.9. Earthwork Considerations

7.9.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction listed below as determined by ASTM Test Method: D 1557. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

- Minimum 90% relative compaction: general fills unless higher compaction standard applies.
- Minimum 93% relative compaction: below subdrains.
- Minimum 95% relative compaction: upper 12-inches below pavement areas and fills deeper than 40 feet.

7.9.2. Fill Materials/ Import Soils

Most of the soils encountered during our subsurface exploration should be suitable for use as engineered fill provided oversize rock is disposed of in accordance with the recommendations in Section 7.9.6.

Any imported fill material should consist of granular soil having a "very low" expansion potential (expansion index of 20 or less). Import should also have a low corrosion potential (chloride content less than 500 parts per million, soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Import soils should be tested and approved by the Geotechnical Consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

7.9.3. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

7.9.4. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

7.9.5. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

7.9.6. Oversize Rock

Allow large quantities of oversize materials are not expected, some oversized rock material [i.e., rock fragments greater than eight (8) inches] may be encountered during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within commercial pads and to two (2) foot below the deepest utility in street and building utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

7.9.6.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

7.9.6.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural

fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

7.9.6.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

7.9.6.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

7.9.7. Fill Slope Construction

Fill slopes may be constructed by preferably overbuilding and cutting back to the compacted core or by back-rolling and compacting the slope face. The following recommendations should be incorporated into construction of the proposed fill slopes.

Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal before compaction, shaping and grid rolling.

Seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

7.9.7.1. Overbuilding Fill Slopes

Fill slopes should be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the compaction of the slope face meets the minimum project requirements for compaction. Compaction of each lift should extend out to the temporary slope face.

7.9.7.2. Compacting the Slope Face

As an alternative to overbuilding the fill slopes, the slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Back-rolling at more frequent intervals may be required. Compaction of each fill should extend to the face of the slope. Upon completion, the slopes should be watered, shaped, and track-walked with a D-8 bulldozer or

similar equipment until the compaction of the slope face meets the minimum project requirements. Multiple passes may be required.

7.9.8. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation

The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc., should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content prior to concrete placement.

8.0 DESIGN RECOMMENDATIONS

From a geotechnical perspective, the proposed development is feasible provided the following recommendations are incorporated into the design and construction. Preliminary design recommendations are presented herein and are based on some of the general soils conditions encountered during the geotechnical investigations. As such, recommendations provided herein are considered preliminary and subject to change based on the results of additional subsurface exploratory investigation.. Final design recommendations should be provided in a final rough/precise grading report.

8.1. Structural Design Recommendations

Precise building products, loading conditions, and locations are not currently available. It is anticipated that the as-graded near-surface soils could vary from “very low” to “medium” in

expansion potential when tested in general accordance with ASTM D 4829, although a majority is expected to be "very low" to "low". AGS has provided recommendations below assuming a "very low" to "low" expansion potential, which should be verified during grading.

8.1.1. Foundation Design

At this time specific building types, heights and locations have not been determined. Accordingly, the following general design parameters can be used for preliminary design and budgeting. Once the proposed buildings type and locations are known, site specific foundation design parameters should be developed by the project Geotechnical Engineer. The following values may be used in preliminary foundation design.

The values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

TABLE 8.1.1
FOUNDATION DESIGN PARAMETERS (COMMERCIAL/RETAIL)

Allowable Bearing	2,000 psf, increasing by 300 psf for each additional foot of embedment and width beyond the minimum provided, up to 3,000 psf assuming a minimum embedment of 18 inches below lowest adjacent finish grade.
Lateral Bearing	250 psf per foot of depth to a maximum of 2,000 psf for level conditions. Reduced values may be appropriate for descending slope conditions.
Sliding Coefficient	0.35
Assumed Expansion Potential	"Very Low" to "Low"
Slab-on-Grade Thickness	Minimum 4 inches
Slab-on-Grade Reinforcement	No. 3 rebar 18-inches on center each way
Continuous Footing Width	Minimum 12 inches (one-story), 15 inches (two stories)
Continuous Footing Depth*	Minimum 12 inches
Min. Footing Reinforcement	No. 4 rebar - 2 on top, 2 on bottom or No. 5 rebar, 1 on top and bottom
*Notes on Footing Embedment: Depth of embedment should be measured below lowest adjacent finish grade. Footings Adjacent to Swales and Slopes: If exterior footings adjacent to drainage swales are to exist within 5 feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least 5 feet is provided horizontally from edge of the footing to the face of the slope.	

8.1.2. Settlement

Settlements are likely to be produced from structural loads and long term settlement of the fill and underlying alluvial soils. As verified by settlement monitoring, primary settlement of the compacted fill materials should be completed prior to the release of lots for construction. AGS has provided a preliminary estimate of settlement for a typical one to two story building with shallow foundations. However, AGS should re-evaluate the settlement based on as-graded soil conditions and actual structural loads.

For lots with less than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 3/4 inch total and 3/8-inch across 20 feet.

For lots with greater than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 1 inch total and 1/2-inch across 20 feet.

For lots with left-in-place saturated alluvial soils, estimated settlements are 1.5 inches total and 3/4-inch across 20 feet. Structures should also be designed to accommodate the potential seismic settlement described in Section 5.6.2.

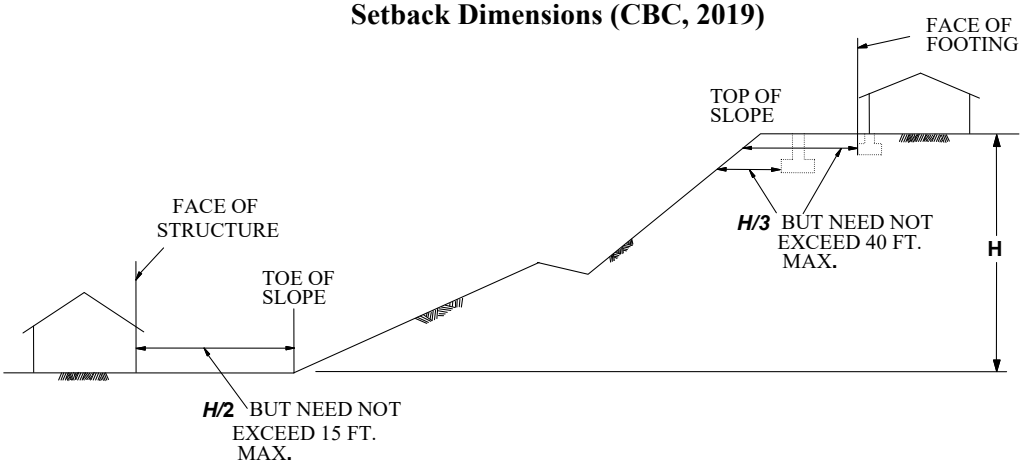
8.1.3. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

8.1.4. Deepened Footings and Setbacks

Improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code, require that structures be set back or footings deepened where subject to the influence of these natural processes. For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in the following figure.

FIGURE 8.1.4
Setback Dimensions (CBC, 2019)



8.1.5. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Spoils from the footing excavations should not be placed on slab-on-grade areas unless the soils are properly compacted. The footing excavations should not be allowed to dry back and should be kept moist until concrete is poured. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

8.1.6. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

8.1.7. Concrete Design

The test results from a sample collected during the current investigation indicated a sulfate concentration that corresponds to a S0 sulfate exposure class when classified in accordance with ACI 318.

Additional testing should be conducted after mass grading. It should be recognized that some fertilizers have been known to leach water-soluble sulfate compounds into soils containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. Accordingly, it is suggested that Portland cement type II/V be used for concrete in contact with soil.

8.2. Retaining Wall Design

8.2.1. Retaining Walls (backfilled with Native Materials)

The foundations for retaining walls should be founded on compacted fill, competent very old alluvial fan deposits, or Live Oak Canyon Formation and may be designed in accordance with the recommendations provided in Table 8.1.1. When calculating the lateral resistance, the upper 12 inches of soil cover should be ignored in areas that are not covered with hardscape. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance.

Retaining walls should be designed to resist earth pressures presented in the following table. These values assume that the retaining walls will be backfilled with native materials as shown in Detail RTW-A. Retaining walls should be designed to resist additional loads such as construction loads, temporary loads, traffic loads, and other surcharges as evaluated by the structural engineer.

The following Rankine earth pressure coefficients are recommended for the design of retaining walls onsite:

Static Case

"Native" backfill (C =150 psf, ϕ= 31°, density = 125 pcf)

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	390
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	63
Coefficient of Passive Pressure:	$K_p = 1.18$	148
Coefficient of At Rest Pressure:	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density (pcf)

k_h = seismic pseudostatic coefficient = $0.5 * PGA_M / g$

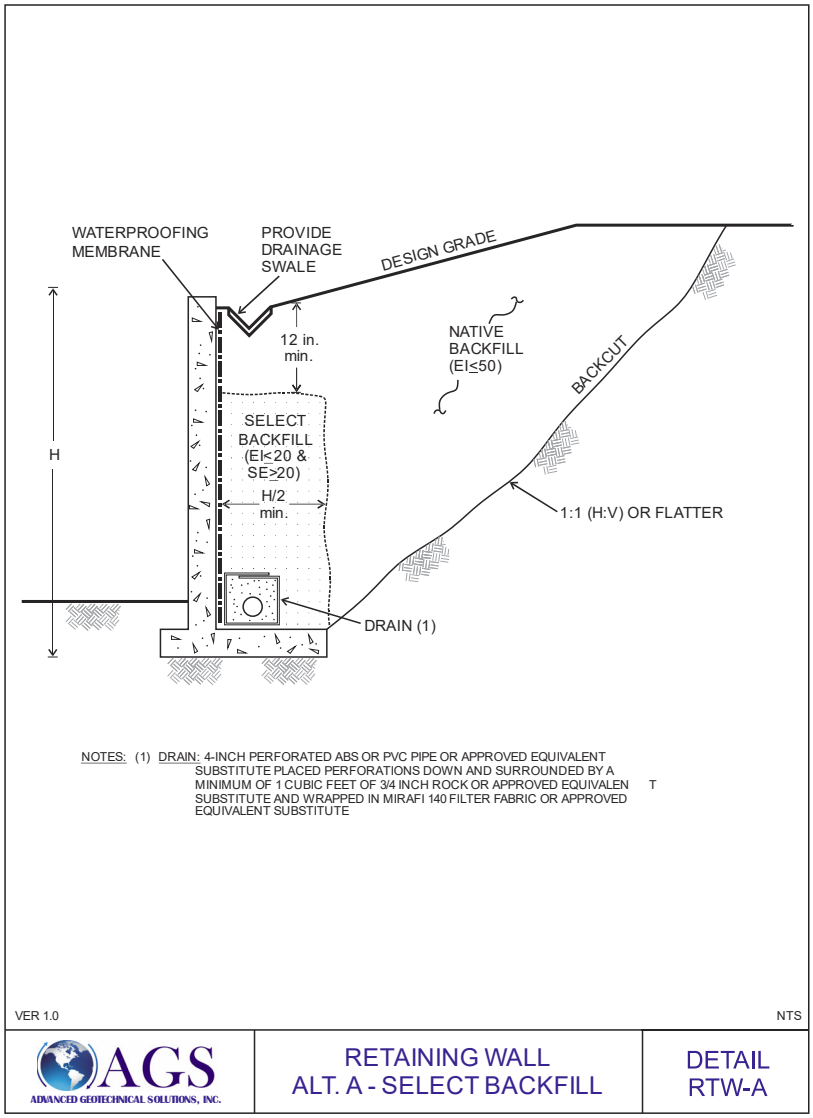
Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

8.2.2. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces as shown in Details RTW-A and RTW-B. Otherwise, the retaining walls should be designed to resist hydrostatic forces. Proper drainage devices should be installed along the top of the wall backfill and should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8 inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by

compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



8.3. Civil Design Recommendations

8.3.1. Site Drainage

Final site grading should assure positive drainage away from structures. Planter areas should be provided with area drains to transmit irrigation and rain water away from structures. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

8.3.2. Exterior Flatwork

- **Slab Thickness:** Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- **Control Joints:** Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.
- **Flatwork Reinforcement:** Consideration should be given to reinforcing any exterior flatwork.
- **Thickened Edge:** Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.3.3. Pavement Design

Preliminary pavement recommendations for streets and driveways are provided below. The performance of pavement is highly dependent on providing positive surface drainage away from the edge of pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed towards controlled drainage structures and not towards pavement areas. Landscaped areas adjacent to pavement areas are not recommended due the potential for surface or irrigation water infiltrating into the aggregate base and pavement subgrade. If landscaped areas are placed adjacent to pavement areas, consideration should be given to implementing measures that will reduce the potential for water to be introduced into the aggregate base. Such measures may include installing impermeable vertical barriers between the landscaped area and pavement areas including deepened curbs or 10 mil thick plastic liners extending a minimum of 6 inches below the bottom of the aggregate base.

8.3.3.1. Asphalt Concrete Pavement

Presented below are preliminary pavement sections for a range of traffic indices and an assumed Resistance-Value (R-Value) of 30 for the subgrade soils. R-Value testing of the subgrade soils should be performed during precise grading operations. The project Civil Engineer or Traffic Engineer should select traffic indices that are appropriate for the anticipated pavement usage and level of maintenance desired through the pavement life. Final pavement structural sections will be dependent on the R-value of the subgrade materials and the traffic index for the specific street or area being addressed. The pavement sections are subject to the review and approval by the County of Riverside.

TABLE 8.3.3.1. PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS*			
Traffic Index	**Assumed R-Value**	**Asphalt Concrete (inches)**	**Class II Aggregate Base (inches)**
4.5	30	3	5
5.0	30	3	6
5.5	30	3	7
6.0	30	3.5	8
6.5	30	4	8
7.0	30	4	10
7.5	30	4.5	10
8.0	30	5	11
*Note: See additional recommendations for subgrade preparation below.			

Pavement subgrade soils should be moisture conditioned to near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557 and should conform with the specifications listed in Section 26 of the *Standard Specifications for the State of California Department of Transportation* (Caltrans) or Section 200-2 of the *Standard Specifications for Public Works Construction* (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans *Standard Specifications* or Section 203-6 of the Green Book.

8.3.3.2. Portland Cement Concrete Pavement

Portland cement concrete may be used for the onsite driveways, trash enclosures, and truck loading docks. The following concrete pavement sections were determined using the recommendations provided in "Design of Concrete Pavement for City Streets" by the American Concrete Pavement Association. Testing of subgrade soils should be performed once driveway subgrades are achieved to determine the actual R-Value of the subgrade soils and/or corresponding modulus of subgrade reaction.

TABLE 8.3.3.2 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS				
Traffic Classification	**Maximum ADTT***	**Portland Cement Concrete Section (inches)**	**k* (pci)**	**MR* (psi)**
Collector	100	6.5	200	550
Industrial	300	8.0	200	550
*Notes: k = Modulus of subgrade reaction; ADDT = Average daily truck traffic; MR=Flexural strength of concrete (Modulus of Rupture) 550 corresponds to concrete having a minimum compressive strength of roughly 3,000 psi				

Joints should be provided at a minimum spacing of 8 feet. The joints should be caulked and sealed with a flexible compound to reduce the potential for moisture

infiltration. The civil engineer should determine the need for reinforcement and doweling.

The subgrade should be moisture conditioned and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Subgrade soils should be at or near the optimum moisture content to a depth of 12-inches immediately prior to placing concrete.

8.4. Corrosion

As discussed in Section 6.1.6, previous testing (pH, electrical resistivity, chloride content, and sulfate content) indicate that the soil conditions are not anticipated to be corrosive according to the Caltrans definition of a corrosive site. Final verification of site corrosivity will be based upon testing of import soil and soil from the site during grading operations. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of the construction materials.

9.0 SLOPE AND LOT MAINTENANCE

Maintenance of improvements is essential to the long-term performance of structures and slopes. Although the design and construction during mass grading created slopes that are considered both grossly and surficially stable, certain factors are beyond the control of the soil engineer and geologist. The property owners must implement certain maintenance procedures.

9.1. Slope Planting

Slope planting should consist of ground cover, shrubs and trees that possess deep, dense root structures and require a minimum of irrigation. The property owner should be advised of their responsibility to maintain such planting.

9.2. Pad Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure, or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water away from structures and slopes. Property owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, downdrains, and other devices that have been installed to promote structure and slope stability.

9.3. Slope Irrigation

The property owner should be advised of their responsibility to maintain irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful run-off and ground saturation should be avoided. If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

9.4. Burrowing Animals

Property owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

10.0 FUTURE STUDY NEEDS

10.1. Future Studies and Reviews

This report represents a geotechnical review of the current 60-scale mass grading plans for the project. From a geotechnical standpoint, it is AGS's opinion that additional subsurface investigation and analysis is required before construction of the proposed project begins.

As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Additional subsurface investigation and analysis
- Review of Rough Grading plans
- Review of Precise Grading plans
- Review of Foundation plans
- Review of Retaining Wall plans
- Review of road improvements, including potential impacts to existing improvements.

Project plans should be forwarded to the geotechnical engineer/geologist for evaluation and comment, as necessary

10.2. Grading Observation

Geologic exposures afforded during remedial and rough grading operations provide the best opportunity to evaluate the anticipated site geologic structure. Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional near-surface samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from the exploratory excavations at the locations indicated on the plans. The findings are based on the review of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

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APPENDIX B

SUBSURFACE LOGS

APPENDIX B-1

SUBSURFACE LOGS (AGS)

Date Excavated 5/6/2020, 5/7/2020 & 8/5/2020
Logged by SS
Equipment: JCB 3CX Backhoe

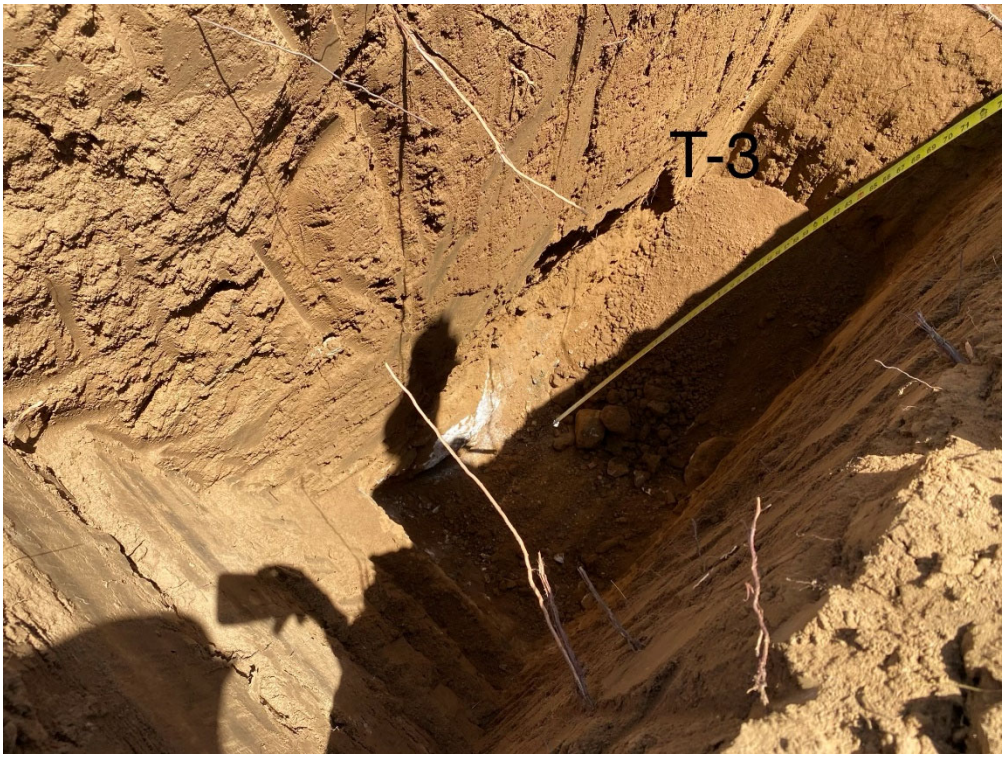
LOG OF TEST PITS

Excavation No.	Depth	USCS	Description
T-1	0.0 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @1.0 ft., moist; occasional gravel
	6.5 – 11.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @11.0 ft., increased density TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-2	0.0 – 4.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous
	4.5 – 11.5 ft.	SM/CL	@4.5 ft., Clayey SAND to Sandy CLAY, fine- to medium-grained, dark gray brown, very moist, loose to firm; micaceous @6.0 ft., wet @10.0 ft., Seepage, caving TOTAL DEPTH = 11.5 ft. SEEPAGE @ 10 ft., CAVING BELOW 10 ft.

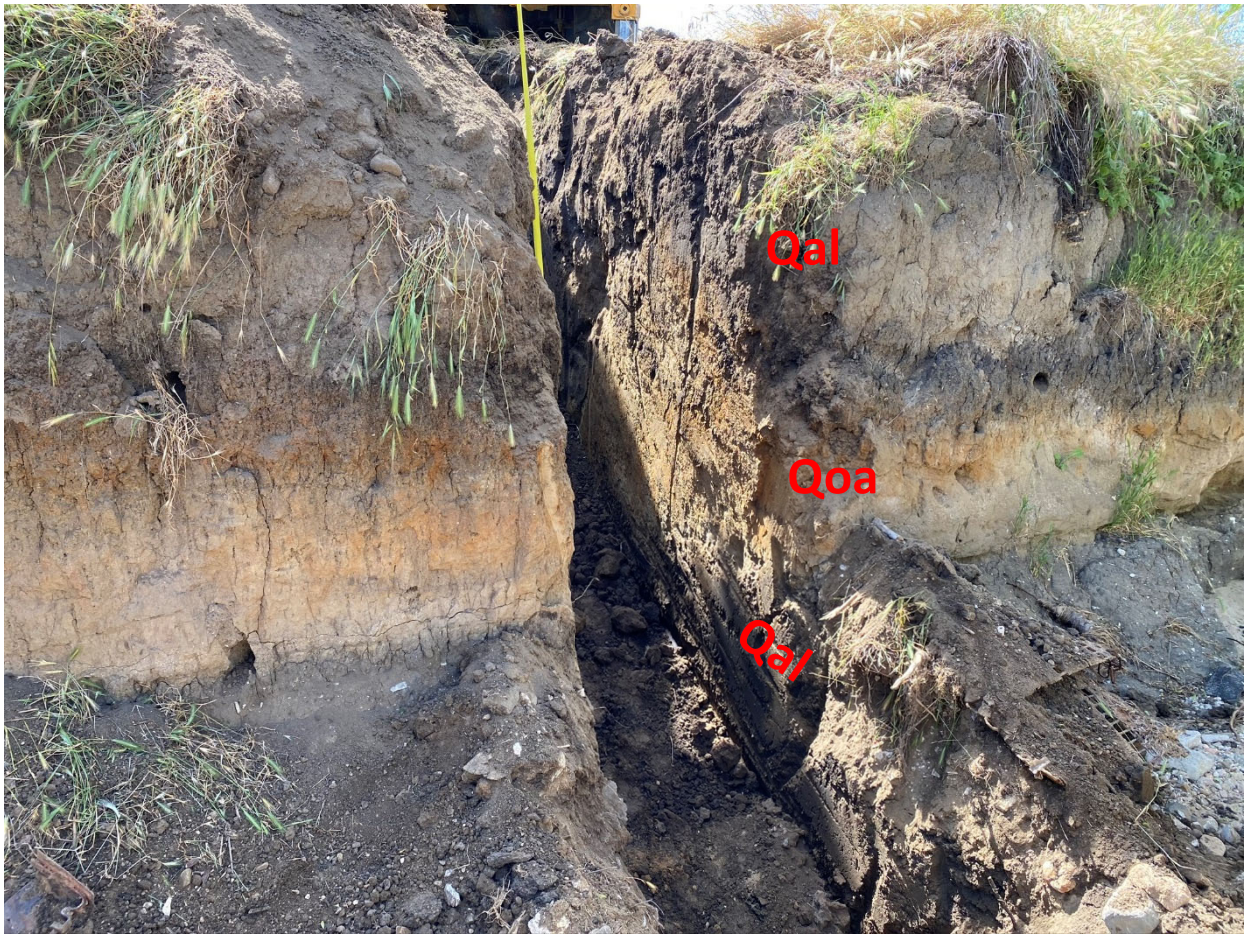


Excavation No.	Depth	USCS	Description
T-3	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to medium-grained SAND, brown, slightly moist, loose; roots
	1.0 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown, moist, medium dense; occasional gravel @6.0 ft., Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense; abundant sub-rounded to sub-angular gravel to cobble
	8.0 – 13.0 ft.	GM	@8.0 ft., Sandy sub-rounded GRAVEL layer, yellow brown to orange brown, slightly moist, medium dense; 2-3-foot boulder in sidewall
	13.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, slightly moist, medium dense to dense; micaceous, iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-4	0.0 – 4.0 ft.	SM	**Alluvium (Qal)** Clayey fine- to coarse-grained SAND, dark gray brown, moist, loose
	4.0 – 8.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense to dense; micaceous, iron oxide staining, weakly cemented @6.0 ft., Silty fine-grained SAND
	8.0 – 12.0 ft.	SM/SC	**Alluvium (Qal)** Silty SAND to Clayey SAND, fine- to coarse-grained, dark gray brown, moist, loose; rounded to sub-rounded gravel to cobble. (Channel deposits undermining the side wall of channel)

TOTAL DEPTH = 12.0 ft.
NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-5	0.0 – 2.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.5 – 11.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; minor porosity, weakly cemented @4.0 ft., Yellow brown to orange brown; occasional sub-rounded gravel @8.0 ft., no longer porous @10.0 ft., increased density; occasional sub-angular gravel to cobble TOTAL DEPTH = 11.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-6	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous, roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, yellow brown, slightly moist to moist, loose to medium dense
	6.5 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; weakly cemented, micaceous, minor porosity, trace coarse-grained sand to fine gravel @9.0 ft., Dense; no longer porous
	11.0 – 12.0 ft.	GM	Fine- to coarse-grained Sandy GRAVEL to COBBLE, yellow brown, slightly moist, dense
			TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-7	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 14.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine- to coarse grained SAND, dark yellow brown, slightly moist, medium dense to dense; occasional gravel @3.0 ft., moist; weakly cemented @8.0 ft., trace clay
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-8	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @2.0 ft., occasional gravel @4.5 ft., increased moisture; minor porosity
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse grained SAND, yellow brown to gray brown, moist, medium dense to dense; some gravel to cobble @9.0 ft., trace clay; weakly cemented, minor porosity, micaceous @10.0 ft., trace clay TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-9	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous @6.0 ft., yellow brown to gray brown, medium dense
	8.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented @11.0 ft., no longer porous TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-10	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 12.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @3.0 ft., occasional sub-rounded gravel @7.0 ft., yellow brown to gray brown, increased moisture, loose to medium dense; porous @11.0 ft., with clay, moist to very moist
	12.0 – 13.0 ft.	ML/CL	Sandy SILT to Sandy CLAY, wet; occasional sub-rounded gravel to cobble
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-11	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	3.0 – 7.5 ft.	ML/SM	Sandy SILT to Silty SAND, fine-grained, dark gray brown, moist, firm to medium dense; micaceous
	7.5 – 13.0 ft.	ML	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented
	8.0 – 13.0 ft.	SM	Silty fine-grained SAND, gray brown to yellow brown, moist, dense; trace clay, micaceous, manganese oxide nodules
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-12	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, slightly moist, loose; micaceous
	3.0 – 7.0 ft.	SW	Fine- to coarse-grained SAND with Silt with sub-rounded gravel
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; micaceous, weakly cemented
			TOTAL DEPTH = 14.0 ft. NO WATER, CAVING FROM 0 to 7 ft.

Excavation No.	Depth	USCS	Description
T-13	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @2.0 ft., moist; occasional gravel, micaceous
	7.5 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @10.0 ft., increased density TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-14	0.0 – 2.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.0 – 11.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous @5.0 ft., abundant sub-rounded gravel to cobble TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-15	0.0 – 4.0 ft.	SW	**Alluvium (Qal)** Fine- to coarse-grained SAND, yellow brown to gray brown, dry to slightly moist, loose; with sub-angular gravel
	4.0 – 9.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, moist, medium dense to dense; micaceous
			TOTAL DEPTH = 9.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-16	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense; trace clay
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, minor porosity
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, yellow brown to gray brown, moist, dense to moderately hard; trace clay, micaceous TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-17	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark gray brown, slightly moist, loose to medium dense; occasional sub-angular gravel to cobble
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, micaceous, manganese oxide
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, dense to moderately hard; trace clay and gravel @13.0 becomes fine- to coarse-grained TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-18	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 6.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, red brown, slightly moist, medium dense
	6.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor porosity @11.0 ft., decreasing moisture TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-19	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, medium dense; trace clay
	6.5 – 11.0 ft.	SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to medium-grained SAND, light yellow brown to light gray brown, very dense; iron oxide staining
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING





Excavation No.	Depth	USCS	Description
T-20	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 10.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, slightly moist, medium dense; trace gravel
	10.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-21	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist, loose; roots
	1.0 – 3.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, moist, medium dense; minor porosity
	3.5.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to gray brown, moist, dense; minor iron oxide staining, manganese oxide nodules
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-22	0.0 – 9.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	9.0 – 13.0 ft.	SM	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, stiff; occasional fine gravel, minor porosity, weakly cemented
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

BORING NUMBER AGS-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to orange brown, moist, medium dense; trace coarse sand, micaceous										
5				SPT	5-7-9 (16)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; iron oxide staining, micaceous										
10			@10.0 ft., very dense	MC	24-38-50/3"	112	2.9	16	Consol				
15			@15.0 ft., Silty fine-grained SAND, orange brown to red brown, moist, very dense; trace clay, iron oxide staining, micaceous	SPT	40-47-50/5"								
20				MC	47-50/3"	124	6.1	46					
25			@25.0 ft., Silty fine- to coarse-grained, orange brown, slightly moist, very dense; iron oxide staining, micaceous	SPT	37-50/5"								

Total depth = 25.9 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to brown, moist, medium dense; trace coarse sand, micaceous										
5				MC	4-4-5 (9)								
10		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND, yellow brown, slightly moist, dense; iron oxide staining, calcium carbonate development, micaceous	SPT	8-12-16 (28)								
15			@15.0 ft., occasional gray brown to blue gray siltstone fragments	MC	50								
20				SPT	25-50								
25		SM	@25.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown, moist, very dense; trace clay, occasional quartz fragments, iron oxide development, micaceous	MC	50	117	10.2	62	Shear				
			Total depth = 25.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2228 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 11.00 ft / Elev 2217.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5				MC	3-3-5 (8)	105	7.5	33					
10		ML	▽ @10.0 ft., Fine-grained Sandy SILT with Clay, dark gray brown, wet, soft; micaceous, mottled, minor iron oxide development	SPT	1-1-1 (2)								74
15			@15.0 ft., becomes gray brown	MC	3-4-6 (10)	106	16.9	77	Consol				
20			@20.0 ft., increased clay content; minor iron oxide development	SPT	3-3-3 (6)					46	29	17	71
25		CL	@25.0 ft., Silty CLAY with fine-grained Sand, brown to gray brown, wet, soft; minor iron oxide development	MC	5-7-9 (16)	95	25.6	89	Consol				
30		SC	@30.0 ft., Clayey SAND, blue gray to gray brown; occasional fine quartz fragments, trace root fibers	SPT	2-3-7 (10)					32	22	10	36
35													

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ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	@35.0 ft., Clayey SILT grades down to Silty fine-grained SAND, dark gray to dark olive brown, wet, stiff to medium dense	MC	6-9-12 (21)	89	17.0	51					
40		CL	@40.0 ft., Silty to Sandy CLAY, dark gray, wet, stiff	SPT	3-5-8 (13)								
45		SM	@45 ft., Silty fine-grained SAND with clay, blue gray to gray brown, wet, medium dense	MC	6-12-20 (32)	121	12.4	86					
50			@50.0 ft., Interbedded: from Silty fine- to coarse-grained SAND with fine quartz fragments to Clayey SILT with fine-grained Sand	SPT	4-4-7 (11)								59
55			@55.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown, wet, medium dense	SPT	6-5-11 (16)								
60		SC-SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to Clayey fine-grained SAND, dark yellow brown, wet, dense; iron oxide staining, micaceous	MC	11-22-35 (57)								
65			@65.0 ft., Sand becomes fine- to coarse-grained	SPT	8-10-10 (20)								
70		SP	@70.0 ft., Coarse-grained SAND with rock fragments	MC	30-20-26 (46)	115	13.3	78					
			@71.0 ft., Silty fine-grained SAND with Clay										
		SM	Total depth = 71.5 feet Groundwater encountered at 11 feet Backfilled with soil cuttings										

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2197 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND with Clay, dark gray brown, dry to slightly moist, loose										
5			@5.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown to olive, moist, medium dense to firm; micaceous	MC	10-12-14 (26)	103	19.4	83	Consol				
10		CL	@10.0 ft., Silty CLAY with fine-grained Sand, yellow brow to gray brown to black, moist, soft; abundant decomposing organic matter, minor iron oxide staining, micaceous	SPT	2-2-3 (5)								
15		CL-ML	@15.0 ft., Fine-grained Sandy SILT, yellow brown to gray brown with Silty CLAY, black, moist, medium dense to stiff; abundant decomposing organic matter, iron oxide staining, micaceous	MC	3-5-10 (15)	93	18.3	61	Consol				
20		OL	@20.0 ft., Organic SILT/PEAT, blue gray to black, moist, soft; abundant decomposing organic matter	SPT	1-2-4 (6)								
25			@25.0 ft., Silty CLAY to Clayey SILT with Peat layers, dark gray to blue gray to black, moist, soft; abundant decomposing organic matter	MC	4-5-6 (11)	60	37.8	57	Consol				
30		CL-ML	@30.0 ft., With fine-grained sand, very moist; trace fine root fibers	SPT	3-5-5 (10)								
35													

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	**Older Alluvium (Qoa)** Fine- to coarse-grained Sandy SILT with Clay, yellow brown to gray brown to olive, moist, very stiff; iron oxide staining, micaceous	MC	7-10-13 (23)	121	12.2	84					
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to orange brown, slightly moist, very dense; trace fine gravel, iron oxide staining, micaceous	SPT	17-21-21 (42)								
45				MC	50	110	4.8	24					

Total depth = 45.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
5		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, light yellow brown to light gray brown, slightly moist, dense; minor iron oxide staining, micaceous, weakly cemented	MC	25-34-35 (69)	103	5.1	21	Consol				
10		SM	@10.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, medium dense to very stiff; iron oxide staining, micaceous	SPT	5-7-9 (16)								
15			@15.0 ft., becomes dark yellow brown to orange brown, increased fines and moisture content	MC	9-13-16 (29)	119	9.5	62	Shear				
20		SM	@20.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to orange brown, moist, dense; trace gravel, iron oxide staining, micaceous	SPT	9-14-11 (25)								
25				MC	18-50	126	6.5	52					

Total depth = 26.0 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2190 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to olive brown, slightly moist, medium dense; micaceous										
5				MC	15-13-20 (33)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND with gravel, yellow brown to gray brown, slightly moist, dense; iron oxide staining, micaceous										
10				SPT	4-8-14 (22)								
15		ML	@15.0 ft., Clayey SILT with fine-grained Sand, gray brown to olive, moist, hard; iron oxide staining, manganese oxide nodules, micaceous	MC	9-15-26 (41)	120	11.7	24	Shear				
20		ML	@20.0 ft., Fine-grained Sandy SILT, blue green to gray, moist, very stiff; minor iron oxide staining, micaceous	SPT	5-5-8 (13)								
25				MC	17-22-30 (52)	122	8.6	61	Shear				
30		ML	@30.0 ft., with Clay, very moist; occasional quartz fragments	SPT	8-8-7 (15)								
35													

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Silty fine-grained SAND, blue gray, slightly moist to moist, dense; iron oxide staining, micaceous	MC	9-19-24 (43)	110	11.4	58					
40		CL-ML	@40.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, blue gray, moist to very moist, very stiff; micaceous, trace root fibers	SPT	3-5-9 (14)								
45		SM	@45.0 ft., Silty fine-grained SAND	MC	20-36-50 (86)	127	7.6	63					
50		CL-ML	@50.0 ft., Silty CLAY to Clayey SILT	SPT	4-4-5 (9)								

Total depth = 51.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2238 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND with Clay, dark gray brown to black, moist, medium dense; micaceous										
5				MC	5-7-14 (21)	120	7.1	47					
10		SM	**Older Alluvium (Qoa)** Silty fine- to medium-grained SAND, dark yellow brown to olive brown, slightly moist, dense; iron oxide staining, carbonate, micaceous	SPT	5-11-12 (23)								
15		SM	@15.0 ft., Silty fine-grained SAND to fine-grained SILT, olive, moist, dense to hard; trace clay, iron oxide staining, micaceous	MC	10-26-49 (75)	122	11.4	81	Shear, Consol				
20			@20.0 ft., becomes yellow brown to orange brown to olive, increased clay content	SPT	8-11-25 (36)								
25				MC	18-40-50/4"	115	11.6	68					
			Total depth = 26.3 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-9

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	1-1-0 (1)								
10			@10.0 ft., trace coarse sand, trace fine gravel, micaceous	MC	10-15-15 (30)								
15		ML	Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, loose to stiff; trace coarse sand, trace fine gravel, micaceous	SPT	3-3-4 (7)								
20		ML	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, dense to hard; trace coarse sand, trace fine gravel, iron oxide staining, micaceous	MC	12-19-26 (45)	128	8.5	71	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND, yellow brown to gray brown, slightly moist, medium dense; trace fine gravel, iron oxide staining, micaceous	SPT	9-7-8 (15)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	5-6-7 (13)								
10		SM	**Older Alluvium (Qoa)** Silty fine-gained SAND with gravel, yellow brown to gray brown, slightly moist, dense; trace fine sand, iron oxide staining, micaceous	MC	20-20-30 (50)	126	2.0	16	Consol				
15			@15.0 ft., becomes dark yellow brown to orange brown, moist, trace clay	SPT	7-11-11 (22)								
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, dense to hard; trace clay, trace fine gravel, iron oxide staining, micaceous	MC	21-25-29 (54)	120	7.2	48					
25		SW	@25.0 ft., Fine- to coarse-grained SAND with gravel, light yellow brown to light gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	SPT	11-16-17 (33)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-11

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2220 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		ML	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine-grained SAND to fine-grained Sandy SILT, yellow brown to orange brown, slightly moist, medium dense to very stiff; iron oxide staining, micaceous										
5				SPT	7-7-8 (15)								
10		SM	@10.0 ft., Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	22-50/5"	113	9.3	51					
15		ML	@15.0 ft., Clayey SILT with fine-grained SAND, dark yellow brown to gray brown to olive, moist, hard; iron oxide, micaceous	SPT	9-16-18 (34)								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with fine Gravel, yellow brown to gray, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	20-34-50/5"	115	3.1	18					
25				SPT	20-27-33 (60)								

Total depth = 26.5 feet
No groundwater encountered
backfilled with soil cuttings

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2320 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND with gravel to cobble, yellow brown, dry to slightly moist, dense										
5			@5.0 ft., Sand becomes fine-grained, minor iron oxide staining	SPT	16-22-26 (48)								
10				MC	50/4"	99	2.4	9					
15			@15.0 ft., quartz fragments	SPT	50/5"								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50	113	2.5	14					
25		SP	@25.0 ft., Fine-grained SAND with Silt, dark yellow brown to gray brown to olive, moist, dense; trace clay, iron oxide staining, micaceous	SPT	12-17-20 (37)								
30		SW	@30.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50/5"	111	1.7	9					
35													

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW		SPT	50/5"								
40		SM	@40.0 ft., Silty fine-grained SAND, yellow brown to orange brown to gray brown, moist very dense; trace clay, iron oxide staining, micaceous	MC	50	105	12.8	58					
45			@45.5 ft., occasional quartz fragments	SPT	11-26-36 (62)								
50			@50.0 ft., increased clay content, manganese oxide nodules	MC	50/5"	115	9.5	55					

Total depth = 50.4 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/7/20
GROUND ELEVATION 2235 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, slightly moist, loose; trace fine gravel, micaceous										
		SP	@5.0 ft., Coarse-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose; trace fine gravel	SPT	3-2-5 (7)								
10				MC	11-19-29 (48)	122	2.4	17	Consol				
15		SM	@15.0 ft., Silty fine- to coarse-grained SAND, dark gray brown, moist, loose; trace clay, trace fine gravel, micaceous	SPT	1-2-4 (6)								
20		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to olive, dense; trace fine gravel, iron oxide staining, micaceous	MC	11-21-31 (52)	129	9.0	79	Consol				
25				SPT	8-10-14 (24)								
30		SM	@30.0 ft., becomes dark yellow brown to orange brown, moist, very dense; iron oxide staining, micaceous, weakly cemented	MC	30-50/5"	131	6.2	59					
35													

(Continued Next Page)

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW	@35.0 ft., Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, slightly moist, dense; trace gravel	SPT	15-16-17 (33)								
40				MC	25-47-50/5"	120	4.3	28					
45				SPT	10-13-23 (36)								
50				MC	50	115	3.9	22					
			Total depth = 50.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-14

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2275 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; trace fine gravel, micaceous										
5			SPT	1-1-3 (4)								
10		@10.0 ft., medium dense	MC	9-11-13 (24)	102	3.5	14					
15	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-9-9 (18)								
20	ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	MC	8-11-12 (23)	128	5.1	43	Consol				
25		@25.0 ft., with gravel	SPT	7-8-12 (20)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-15

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2254 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, medium dense; micaceous										
5				MC	10-6-9 (15)	107	6.7	32					
10		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-10-8 (18)								
15				MC	13-21-23 (44)	108	5.7	28					
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	SPT	6-8-8 (16)								
25			@25.0 ft., with gravel	MC	11-17-20 (37)	126	9.8	79	Consol				

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 15.00 ft / Elev 2208.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 22.25 ft / Elev 2200.75 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SP	**Alluvium (Qal)** Coarse-grained SAND with fine gravel, light yellow brown to light gray brown, slightly moist, loose; trace fine gravel, micaceous @0.5 ft., becomes fine-grained, dark gray brown to dark yellow brown, moist										
5		ML	@5.0 ft., Silty fine-grained SAND to Sandy SILT with Clay, gray brown to olive to dark yellow brown, moist, loose to soft; micaceous	SPT	3-1-2 (3)								
10		CL-ML	@10.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, dark gray brown, moist, stiff; micaceous	MC	3-6-8 (14)	92	21.2	68	Consol				
15		CL	▽ @15.0 ft., Silty CLAY with fine-grained Sand, gray brown, wet, stiff	SPT	1-2-4 (6)								78
20			@20.0 ft., brown to dark gray brown, mottled	MC	4-5-6 (11)	93	25.3	84	Consol				
25			▼	SPT	3-3-5 (8)					43	23	20	54
30		SC	@30.0 ft., Clayey fine- to coarse-grained SAND, gray brown to dark olive, saturated, medium dense; minor iron oxide staining, micaceous, trace organics	MC	10-8-13 (21)	122	12.3	88	Consol				
35													

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	**Older Alluvium (Qoa)** Clayey fine- to coarse-grained SAND to fine- to coarse-grained Sandy CLAY	SPT	5-5-6 (11)								
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to gray brown, mottled, saturated, medium dense; trace fine gravel, iron oxide development	MC	6-8-12 (20)	118	14.9	95					
45		SC-SM	@45.0 ft., becomes Silty fine- to coarse-grained SAND to Clayey fine- to coarse-grained SAND; manganese oxide nodules	SPT	4-6-8 (14)								
50				MC	13-17-20 (37)	123	9.8	72					
55				SPT	9-11-13 (24)								

Total depth = 56.5 feet
Seepage @ 15 feet
groundwater measured at 22.25 feet
Backfilled with soil cuttings

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2252 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark red brown, slightly moist, loose										
5				MC	4-10-12 (22)	111	4.5	23					
10			@8.0 ft., becomes dark red brown to dark yellow brown, minor porosity	SPT	4-5-7 (12)								
15		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, dense; iron oxide staining	MC	21-27-41 (68)	127	4.5	37	Consol				
20			@20.0 ft., trace clay	SPT	7-9-10 (19)								
25				MC	18-50/5"	123	4.1	30					
30		SM	@30.0 ft., becomes yellow brown to orange brown, slightly moist, dense; iron oxide staining, minor carbonate development	SPT	13-17-18 (35)								
35													

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Sand becomes more fine-grained; weakly cemented, micaceous	MC	12-24-35 (59)	120	3.2	21					
40			@40.0 ft., becomes dark yellow brown to gray brown, dry to slightly moist, very dense; occasional gravel, micaceous	SPT	13-29-50/3"								
45				MC	50/5"	110	1.6	8					
50				SPT	50/1"								
			Total depth = 50.1 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2219 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, brown to gray brown, slightly moist, loose										
5		SW	@5.0 ft., Fine- to coarse-grained SAND with Gravel, light yellow brown, light gray brown, dry to slightly moist, medium dense	SPT	4-7-7 (14)								
10		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT with Clay, gray brown to olive, moist, medium dense to very stiff; occasional gravel, iron oxide staining, micaceous	MC	13-16-21 (37)	124	8.9	67					
15				SPT	6-12-21 (33)								
20		CL-ML	@20.0 ft., Silty CLAY to Clayey SILT with fine-grained SAND, blue green to blue gray, moist, very stiff; occasional fine quartz fragments, iron oxide staining, micaceous	MC	3-7-15 (22)	117	12.3	75	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND with Gravel, blue gray, moist, very dense; micaceous	SPT	32-40-15 (55)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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APPENDIX B-2

DRAFT SUBSURFACE LOGS (SCG)

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium Sand, trace fine root fibers, slightly porous, medium dense-damp							
5		15				106	6					
10		15			@ 8.5', little medium to coarse Sand, trace fine Gravel, medium dense-damp		4					
15		34			Light Red Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp	112	3			27		
20		81			Light Gray Brown Silty fine Sand, trace medium Sand, very dense-damp		5					
25		50/5"			Light Gray Brown fine to coarse Sand, trace fine Gravel, trace Silt, very dense-dry	105	2					
30		89			Light Gray Brown fine Sandy Silt, trace medium Sand, very dense-damp		7					
		50/5"			Light Red Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, very dense-damp	108	4					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, very dense-moist							
40		50/4"					12					
		50/3"				118	11					
45					Light Gray Silty fine to coarse Sand, trace fine Gravel, very dense-dry to damp							
		50/4"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-2

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Orange Brown fine Sandy Silt, trace Clay, very dense-moist							
5		54					14					
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, very dense-moist							
10		50/5"				126	12					
15		50/5"					10					
					Red Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, very dense-damp							
20		50/5"				124	10					
					Red Brown fine Sandy Silt, trace Clay, very dense-moist							
25		67					15					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					COLLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, slightly porous, trace fine root fibers, medium dense-damp							
5		16				81	4					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
10		10					5					
15		39			@ 13.5', trace Clay	108	4					
20		18					4			33		
					OLDER ALLUVIUM: Orange Brown Silty fine to medium Sand, trace coarse Sand, very dense-dry to damp							
25		50/6"				92	3					
					LIVE OAK CANYON FORMATION: Light Gray Silty fine-grained Sandstone to fine-grained Siltstone, highly weathered, friable, weakly cemented, very dense-damp							
30		67					6			51		
					Gray Brown Silty fine to coarse-grained Conglomeratic Sandstone, little fine to coarse Gravel, highly weathered, friable, weakly cemented, very dense-dry to damp							
		50/3"					2					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/6"					5					
					Light Gray Brown Silty fine-grained Sandstone, some Iron Oxide staining, highly weathered, friable, weakly cemented, very dense-damp							
45		50/6"				103	5					
		50/5"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-4

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		16			ALLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace to little fine Gravel, trace Clay, medium dense-damp	107	6					
10		17			Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		2					
15		39			Brown Silty fine Sand, trace medium to coarse Sand, trace Clay, medium dense-damp	117	4					
20		26			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense to very dense-dry to damp		4					
25		50/6"				116	3					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		17	3.5		POSSIBLE FILL: Black to Dark Brown Clayey Silt, trace fine to medium Sand, slightly organic, very stiff-damp to moist	111	9					
10		13	3.5		ALLUVIUM: Light Gray Clayey Silt to Silty Clay, trace fine Sand, stiff-damp		8					
15		50/6"			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace clay, very dense-damp	124	7					
20		14			Brown Silty fine Sand, little medium to coarse Sand, medium dense-moist		13			44		
25		50			Gray Brown Silty Clay, little fine to medium Sand, abundant Calcareous veining, hard-moist to very moist	116	17			72		
30		50/6"			Light Gray Brown Gravelly fine to coarse Sand, little Silt, very dense-damp		6					
		59			Gray Brown Clayey Silt, trace fine Sand, hard-moist	115	16					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium to coarse Sand, dense-damp							
		40					6			30		
40												
					Light Gray Brown Gravelly fine to coarse Sand, very dense-damp							
		50/4"				114	4					
45												
		56					5					
50												
					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-6

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Light Gray Clayey Silt, trace fine Sand, stiff-moist		18					
10		17	4.5		Dark Brown Silty Clay, trace fine Sand, stiff-moist	107	15					
15		12	4.5		Gray Brown Clayey Silt, trace fine Sand, stiff-moist		16					
20		22			Light Brown Silty fine Sand, medium dense-damp to moist	94	11					
25		22			Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		8					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Dark Brown Clayey Silt, trace fine to coarse Sand, trace Iron Oxide staining, loose-moist	113	14					
10		7			Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, trace fine Gravel, loose-very moist		17					
15		13	4.5		Light Brown to Dark Brown Clayey Silt, trace fine Sand, trace fine root fibers, loose-moist	112	15			74		
20		10	1.0				19	29	17	66		
25		21	3.0			110	20	27	14	77		
30		16			Dark Gray fine Sandy Silt interbedded with 5" Dark Gray Silty Clay lenses, medium dense-moist		16			76		
		28				116	16			57		

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Light Brown to Brown fine Sandy Silt interbedded with Brown Silty fine to coarse Sand with trace fine Gravel and 3" lenses of Dark Gray Silty Clay, medium dense to very stiff-wet							
40		19					32			48		
					Gray Brown Silty fine to coarse Sand, trace Silt, trace fine Gravel, dense-dry to damp							
45		61				111	3			10		
					Dark Gray Silty Clay with lenses of Dark Gray Silty fine Sand, very stiff-very moist							
50		16	1.5				26	40	24	73		
					Dark Gray Clayey fine Sand, trace medium to coarse Sand, trace fine root fibers, very stiff-moist to very moist							
55		43	4.5			113	16					
					Boring Terminated at 55'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-8

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		9			ALLUVIUM: Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, loose to medium dense-damp		7					
10		36				118	13					
15		15			@ 13.5,' trace Iron Oxide staining		9					
20		24			Dark Brown Clayey fine Sand, trace medium to coarse Sand, little Silt, little Iron Oxide staining, medium dense-damp to moist	114	14					
25		18			Dark Gray fine Sandy Silt with 3" lenses of Dark Gray Silty fine Sand, trace to little fine to coarse Sand, trace to little fine Gravel, medium dense-damp to moist		13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-9

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine Sand, trace fine root fibers, trace Clay, trace Calcareous nodules and veining, medium dense-damp to moist							
5		21				115	9					
10		29					9					
15		38				122	8					
20		20					11					
25		56				122	13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		7			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-damp		6					
10		58			Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, dense-damp	126	10			40		
15		14			Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Clay, medium dense-damp to moist		14					
20		50/6"			OLDER ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous nodules, trace to little fine Gravel, dense to very dense-damp	130	8					
25		34					7					
30		41			@ 28.5', medium dense-very moist	114	17					
		28			Brown Silty fine Sand, trace medium Sand, medium dense-damp		5					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		24				105	10					
40												
					Dark Gray Silty fine Sand, trace to little medium to coarse Sand, trace Clay, trace fine Gravel, medium dense-very moist							
		25					24					
45												
		34				116	14					
50												
					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10b

APPENDIX B-3

SUBSURFACE LOGS (PSE)

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-037
DATE STARTED	4/8/04	GROUND ELEV.	2268	LOGGED BY	DMP
DATE FINISHED	4/9/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ALLUVIUM** (Qal): SANDY SILT, fine grained, light brown, slightly moist, firm, trace coarse grains, visible porosity.				
	2265									
						@ 4.0 ft. color change to yellow brown.				
5		R	Push				5.4	100	22	
	2260					@ 8.0 ft. trace gravel.				
10		R	3		SM	@ 10.0 ft. SILTY SAND, fine grained, yellow brown, slightly moist to moist, medium dense, visible porosity, trace coarse grains, gravel.	4.4	115	27	
	2255	B								
						SAN TIMOTEO FORMATION (QTst): SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard to hard.				
15		R	9				8.6	131	85	CON, HY
						TOTAL DEPTH 16.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=49911b.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=38411b.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=24461b.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2275				CL	**TOPSOIL** (No Map Symbol): SANDY CLAY, sand is fine to coarse grained, dark red brown, moist, stiff, trace gravel, secondary clay development.				
						SAN TIMOTEO FORMATION (QTst): CONGLOMERATE, matrix supported, mostly granule sized clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard some secondary clay, calcium carbonate cementation.				
5	2270					@ 3.0 ft. SANDY SILTSTONE, fine grained, light yellow brown, dry, moderately hard, pinches out, interfingered contact with below.				
						@ 4.0 ft. PEBBLE CONGLOMERATE, matrix supported, 1/4-3" clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard, clasts are igneous and metamorphic, subrounded, occasional 4-5" clasts.				
						@ 6.0 ft. low cohesion, slight caving.				
10	2265					@ 8.0 ft. SILTY SAND matrix, greater cohesion, fewer clasts.				
						@ 11.0 ft. coarser grained, mostly medium to coarse grained SAND and granules, visible porosity, low cohesion.				
						@ 13.0 ft. occasional interfingered lenses of SANDY SILTSTONE, and SILTY SANDSTONE, fine grained, yellow brown, moist, moderately hard.				
15	2260									
						@ 17.0 ft. gradational change to SILTY SANDSTONE, fine to coarse grained, (coarse grained locally), yellow brown to reddish brown, moist, moderately hard, trace pebbles and granules.				
20	2255					@ 20.0 ft. 1.5' thick CONGLOMERATE bed, clast supported, up to 9" clasts.				
						@ 22.0 ft. N78W , 10NE-approximate attitude of bedding on coarse grained SANDSTONE bed, 6" thick.				
25	2250									
						@ 28.0 ft. SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard, trace granules and pebbles, locally SILTY SANDSTONE.				
30	2245	R B	6				11.3	123	87	
						@ 33.0 ft. 2' thick SANDSTONE bed, fine to coarse grained, light gray, moist, moderately hard, trace pebbles and granules.				
35	2240									
	2235					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2235					**SAN TIMOTEO FORMATION** (QTst): Continued. @ 38.0 ft. interfingered contact with below, gradational change, alternating SANDY SILTSTONE and PEBBLE CONGLOMERATE, 3"-1' thick.				
45	2230	R	19			@ 43.0 ft. PEBBLE CONGLOMERATE, matrix supported, mostly 1/2-2" in diameter clasts in a fine to coarse grained sand matrix, yellow brown to yellow gray, moist, hard.	3.9	132	41	
						@ 46.0 ft. faint biotite rich laminations in sandy lenses, cross bedded, discontinuous, overall decrease in clast size to mostly granules for 3'.				
50	2225	R	22				2.3	128	21	
55	2220	B				@ 56.0 ft. increased cohesion/cementation, hard.				
						@ 57.0 ft. greater abundance of clasts, mostly 1/2-1" in diameter, subangular to subrounded, igneous and metamorphic.				
60	2215									
65	2210					TOTAL DEPTH 65.0 FT NO GROUNDWATER ENCOUNTERED CAVING OBSERVED @ 6.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind		
DATE STARTED	7/22/04	GROUND ELEV.	2280	BORING DESIG.	B-081
DATE FINISHED	7/22/04	GW DEPTH (FT)		LOGGED BY	SJD
DRILLER	Al Roy Drilling	DRIVE WT.	SEE NOTE	NOTE	0-24'=2150 lb
TYPE OF DRILL RIG	18" Bucket Auger	DROP	12 in.		25-44'=1350 lb
					45-65=650lb/65+=1150lb

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2280				SM	ALLUVIUM (Qal): SILTY SAND, fine to coarse-grained, trace gravel, reddish brown, dry to slightly moist.				
5	2275	R	4			@ 5 ft. slightly moist, medium dense.	5.2	96	19	
10	2270	R	3				5.0	110	26	
15	2265	R	5				5.5	112	31	CON, HY
						@ 17 ft. slightly moist to moist, fine-grained.				
20	2260	R/B	3			@ 20 ft. moist.	6.1	110	32	
25	2255	R	30 for 11"		SM	OLDER ALLUVIUM (QTst): SILTY SAND, fine-grained, trace medium to coarse-grained, reddish brown to yellowish brown, moist, dense.	6.8	128	61	
30	2250	R	32 for 8"			@ 30 ft. coarse-grained, reddish brown.	5.6	119	38	
					ML	@ 32 ft. SANDY SILT, fine-grained SAND, yellowish brown to reddish brown, moist, stiff.				
35	2245	R	30 for 8"		SM	@ 35 ft. SILTY SAND, fine to coarse-grained, some GRAVEL, reddish brown, slightly moist, dense.	5.3	118	35	
						TOTAL DEPTH 36 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-47

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-095
DATE STARTED	9/15/04	GROUND ELEV.	2225	LOGGED BY	FE
DATE FINISHED	9/15/04	GW DEPTH (FT)	15	NOTE	0-22'=2400lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		23-42'=
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		1200lb.43-65'=850lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2225				SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SAND, light yellow brown, dry, loose.				
5	2220	R	1				3.0			
					SM	ALLUVIUM (Qal): SILTY SAND, medium gray brown, moist, moderately dense, fine to medium grained.				
10	2215	R B	1			@ 10.0 ft. moist to very moist.	13.2	113	75	CON, HY MAX. CHEM HY
15	2210	R	2		SM	INTERMEDIATE-AGE ALLUVIUM (Qia): SILTY SAND, fine grained, dense, very moist to wet, some clay, brown and olive gray, slightly mottled, water entering boring @ 15.0 ft and 24.0 ft.	14.6	121	95	
20	2205	R	Push		ML	@ 20.0 ft. SANDY SILT to CLAYEY SILT, brown, very moist, soft, some fine grained sand.	19.1	110	95	
25	2200	R B	1			@ 25.0 ft. interlensed SAND and CLAYEY SILT, light gray to brown, soft, very moist to wet, sand is fine to coarse grained.	21.0	105	92	
30	2195	R	1				22.4	104	94	
35	2190					@ 34.0 ft. dark blueish gray.				
40	2185					TOTAL DEPTH 40.0 FT GROUNDWATER ENCOUNTERED @ 15.0 & 20.0 FT CAVING @ 40.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-54

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-096
DATE STARTED	9/16/04	GROUND ELEV.	2232	LOGGED BY	FE
DATE FINISHED	9/16/04	GW DEPTH (FT)		NOTE	0-22'=2400lb, 23-42'=1200lb, 43-65'=850lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	2230				SM/SP	**ALLUVIUM** (Qal): interlensed SAND and SILTY SAND, light brown to light gray, fine to coarse grained, dry to slightly moist, abundant visible porosity, some clay, trace of gravel, loose, trace gravel.				
5		R	Push				3.9	103	17	CON, HY
	2225									
10						@ 10.0 ft. subrounded metamorphic clasts to 2" in diameter.				
		R	1			@ 11.0 ft. sharp contact, dark gray to black, moist, firm, some visible porosity.	14.4	112	79	CON, HY
	2220	B								DSR, MAX, HY, CHEM
					SM	**INTERMEDIATE-AGE ALLUVIUM** (Qia): SILTY SAND, light brown and olive gray, slightly mottled, moist, moderately dense, fine to medium gray, iron oxide, some clay, weathered.				
15		R	1				12.3	115	75	
						@ 16.0 ft. less weathered, dense.				
	2215									
20		R	4			@ 20.0 ft. brown and olive gray, mottled, moist, very dense, fine to coarse grained.	6.6	123	50	
	2210				SP	@ 22.0 ft. SAND, light yellow brown, fine to coarse grained, slightly moist, dense, some gravel to 1/8" in diameter.				
25		B								
					SM	@ 26.0 ft. SILTY SAND, light yellow brown, fine to coarse grained, slightly moist, dense.				
	2205					@ 26.0 ft. N35E, 20SE - erosional surface.				
30		R	3				12.5	118	82	
						SAN TIMOTEO FORMATION (QTst): fine SANDY SILTSTONE, light yellow brown, moist to very moist, moderately hard, massive, trace gravel.				
	2200					@ 31.0 ft. N30E, 15SE - contact.				
35						@ 33.0 ft. CLAYEY SILTSTONE, light olive gray, moist to very moist, very stiff, massive, some fine grained SAND.				
	2195	B								
40		R	10				12.5	118	82	
						TOTAL DEPTH 41.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-55

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C-1

LABORATORY TEST RESULTS (AGS)

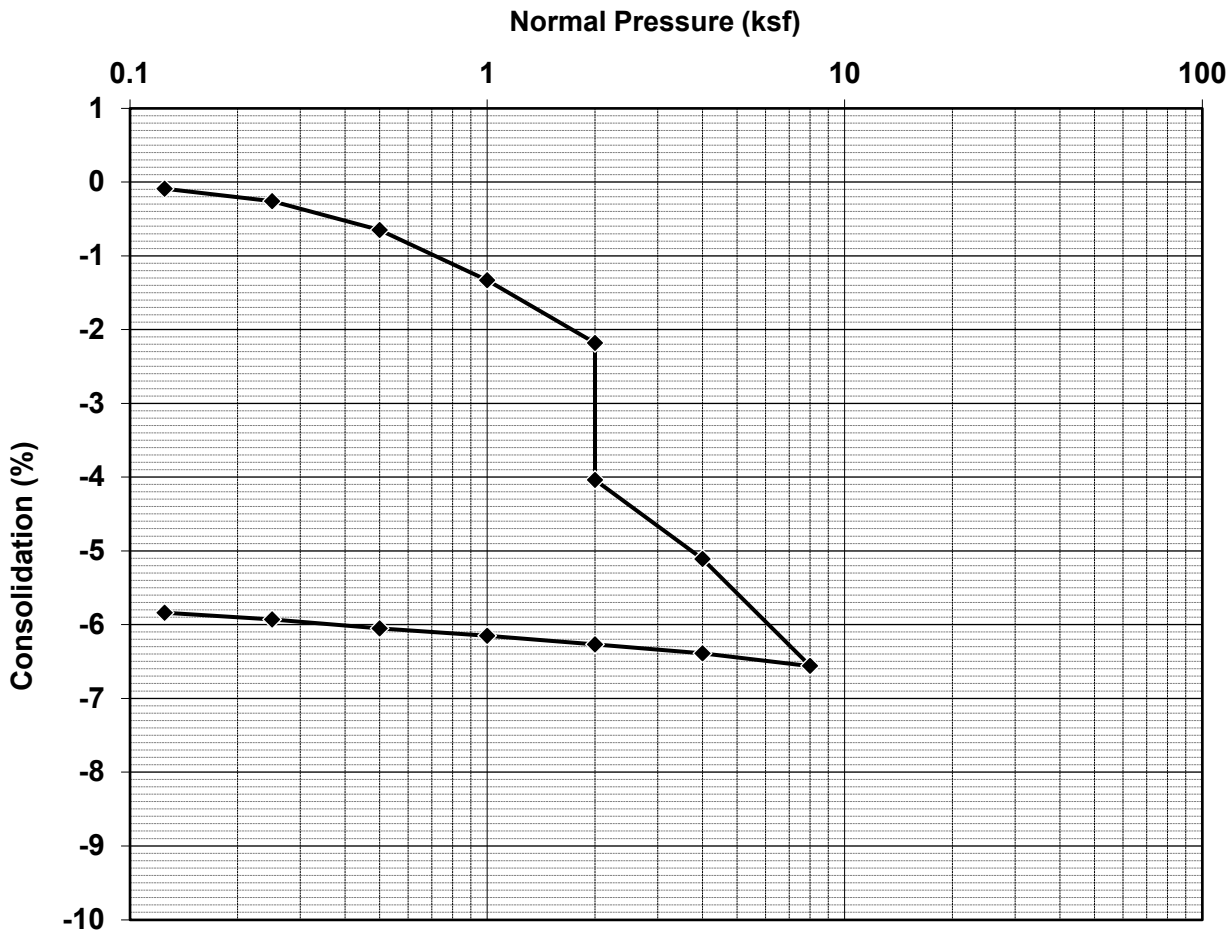
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-1
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.9%	15.3%
Void Ratio, e	0.57	0.48
Saturation, S	14%	86%
Dry Density (pcf)	107.4	114.1
Wet Density (pcf)	110.5	131.5

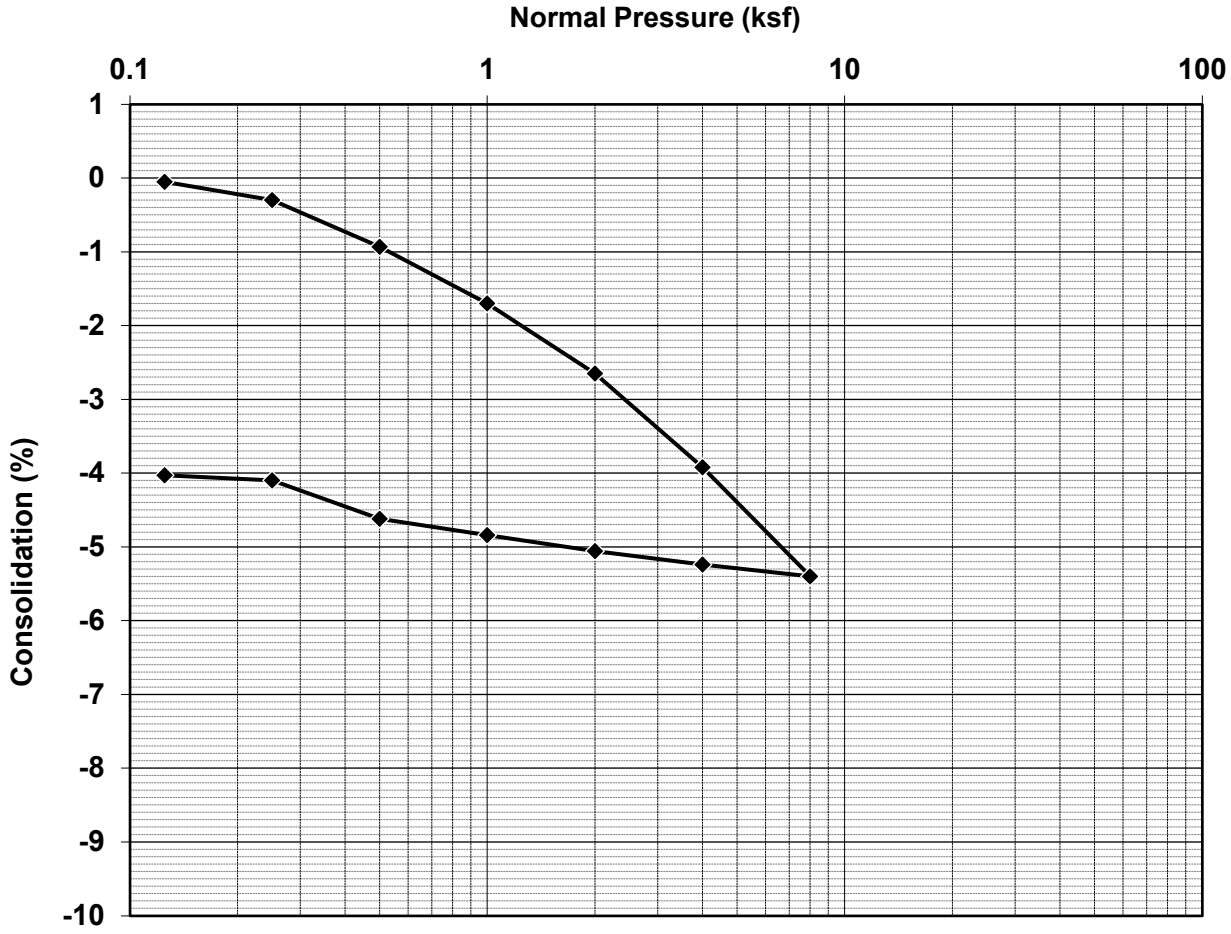
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	15 ft
Project No:	2001-04	Description:	Qal- Sandy Silt with Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	16.9%	22.2%
Void Ratio, e	0.64	0.57
Saturation, S	72%	105%
Dry Density (pcf)	102.8	107.1
Wet Density (pcf)	120.2	131.0

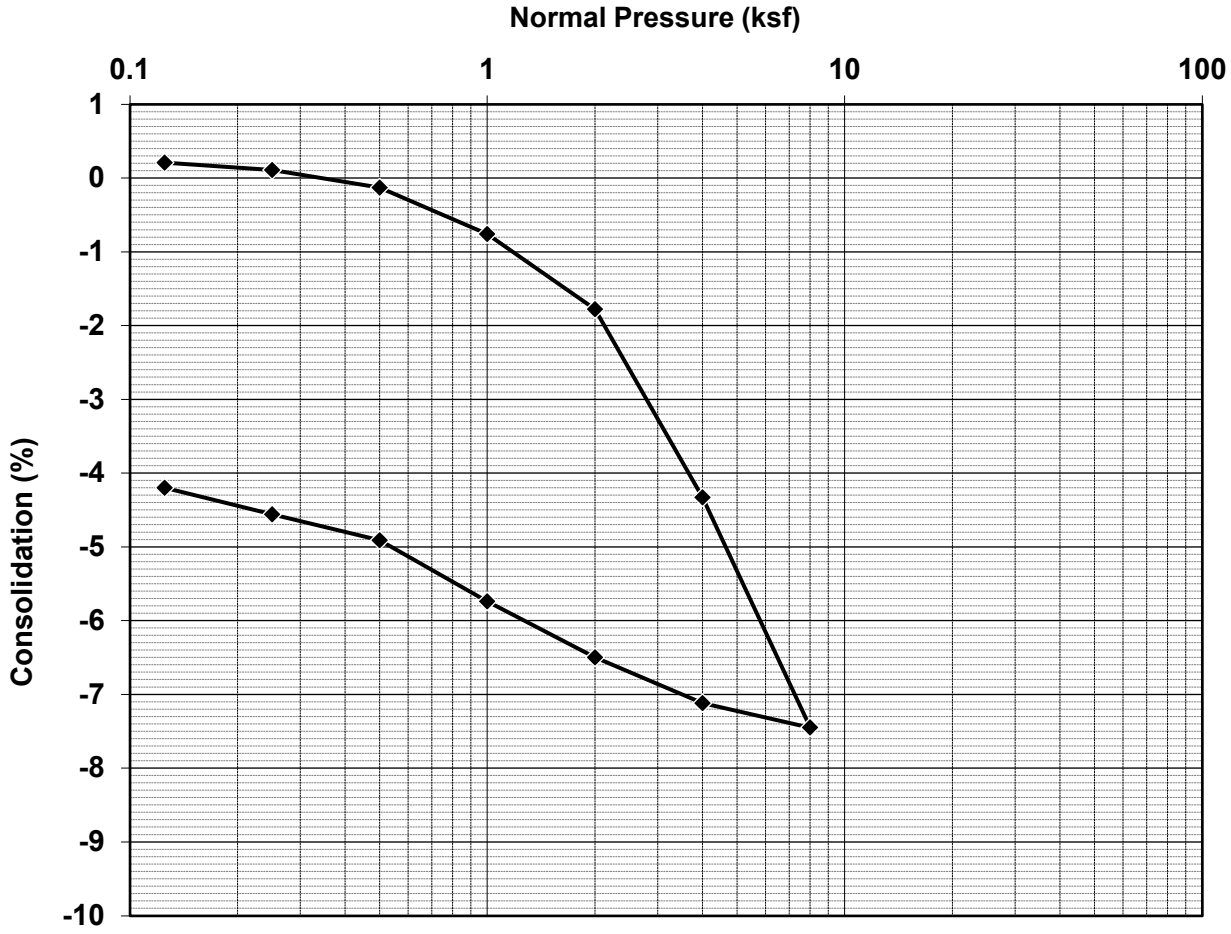
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	25 ft
Project No:	2001-04	Description:	Qal- Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.6%	27.4%
Void Ratio, e	0.82	0.74
Saturation, S	85%	100%
Dry Density (pcf)	92.7	96.8
Wet Density (pcf)	116.5	123.2

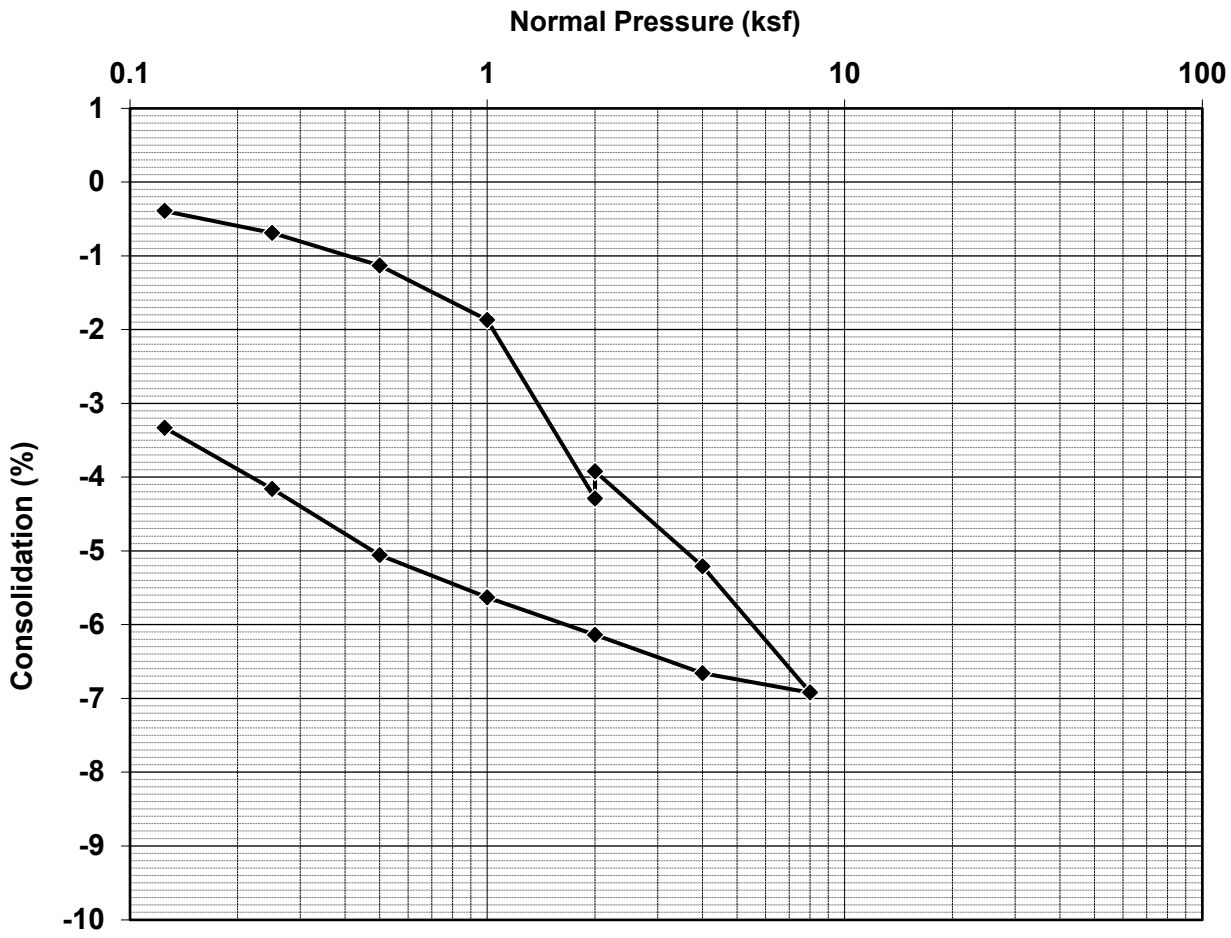
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qal- Sandy Silt
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	19.4%	34.5%
Void Ratio, e	0.91	0.84
Saturation, S	58%	111%
Dry Density (pcf)	88.4	91.5
Wet Density (pcf)	105.5	123.0

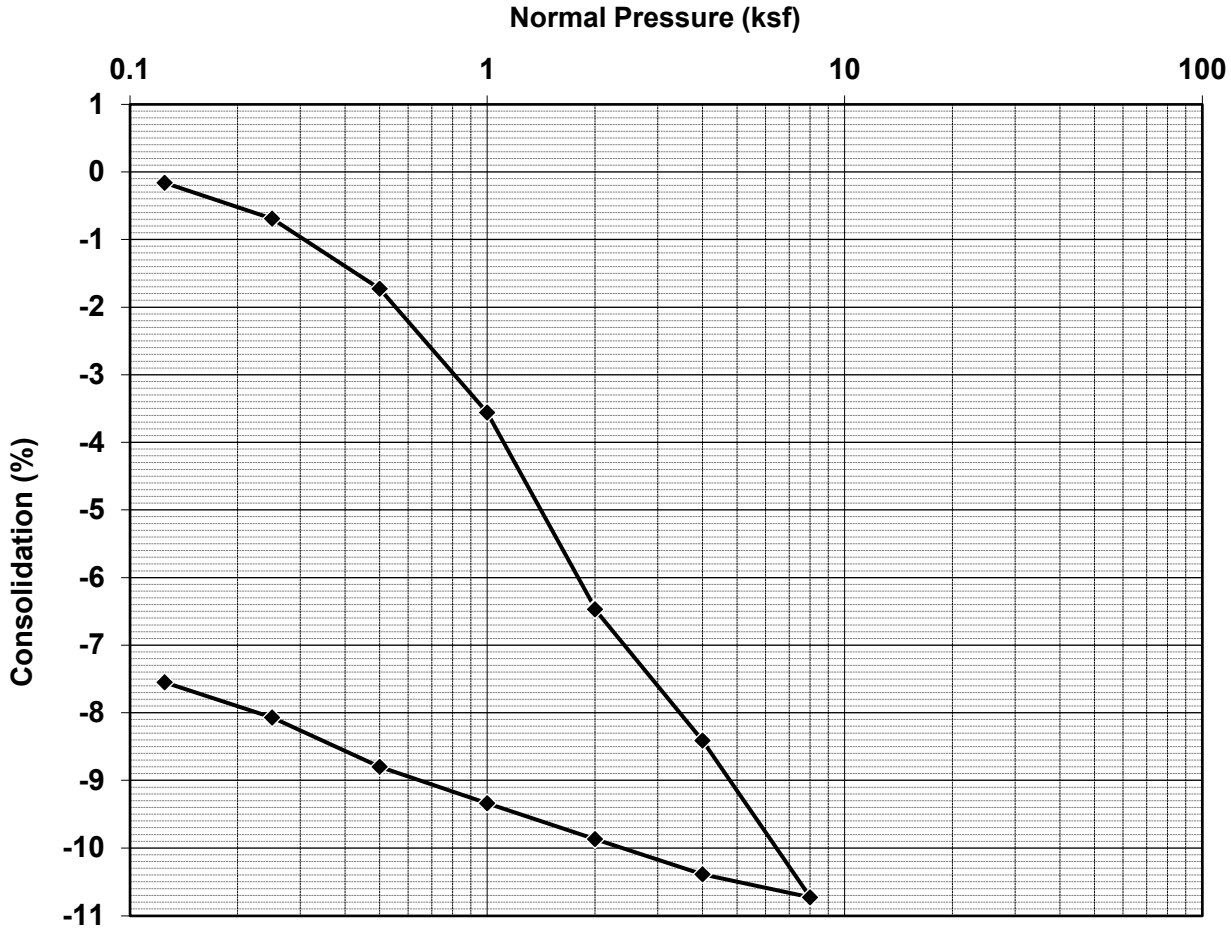
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qal- Sandy Silt with Peat
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	18.3%	34.0%
Void Ratio, e	0.81	0.67
Saturation, S	61%	137%
Dry Density (pcf)	93.3	100.9
Wet Density (pcf)	110.4	135.3

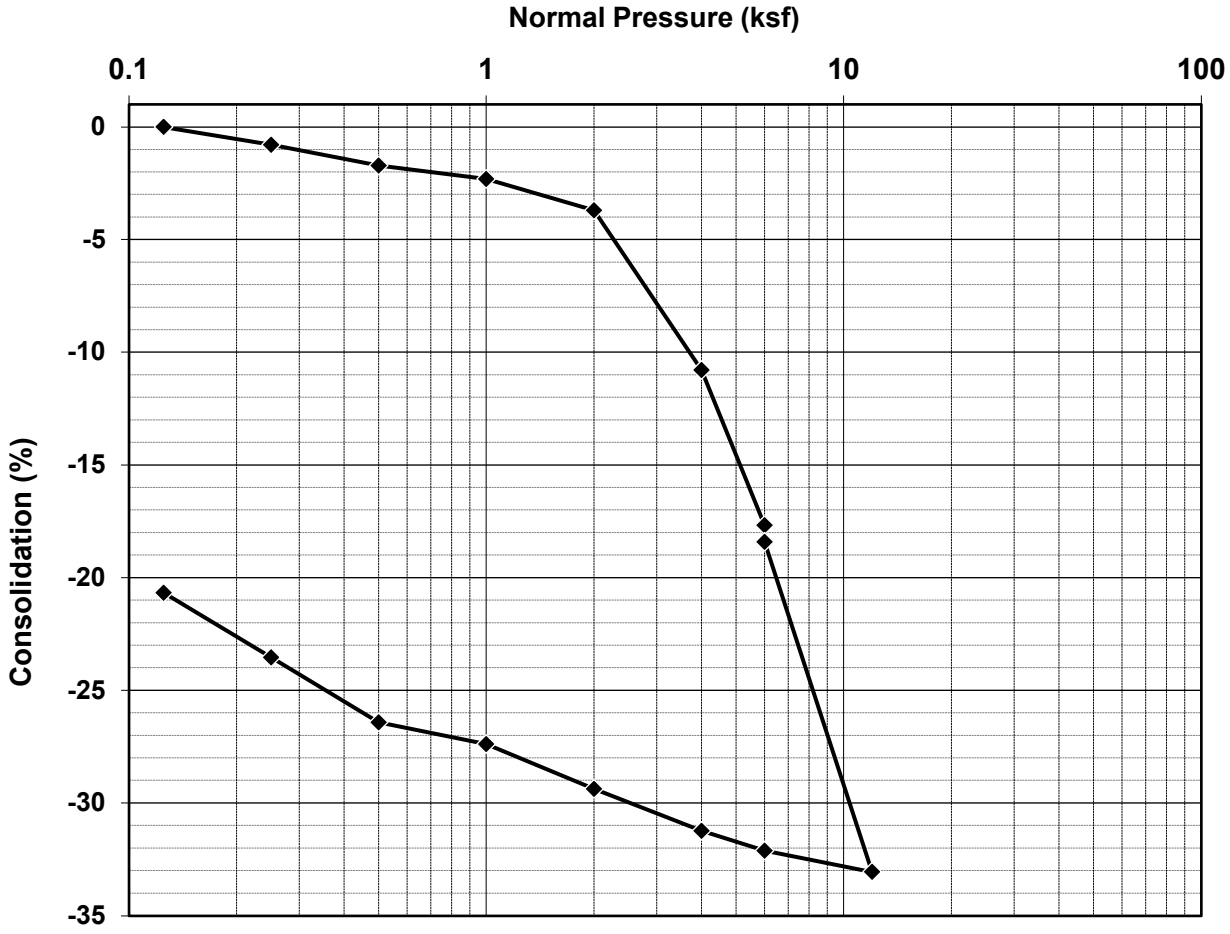
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Black Peat
Date:	9/10/2011	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w		143.9%
Void Ratio, e		
Saturation, S		
Dry Density (pcf)		33.1
Wet Density (pcf)	75.6	80.7

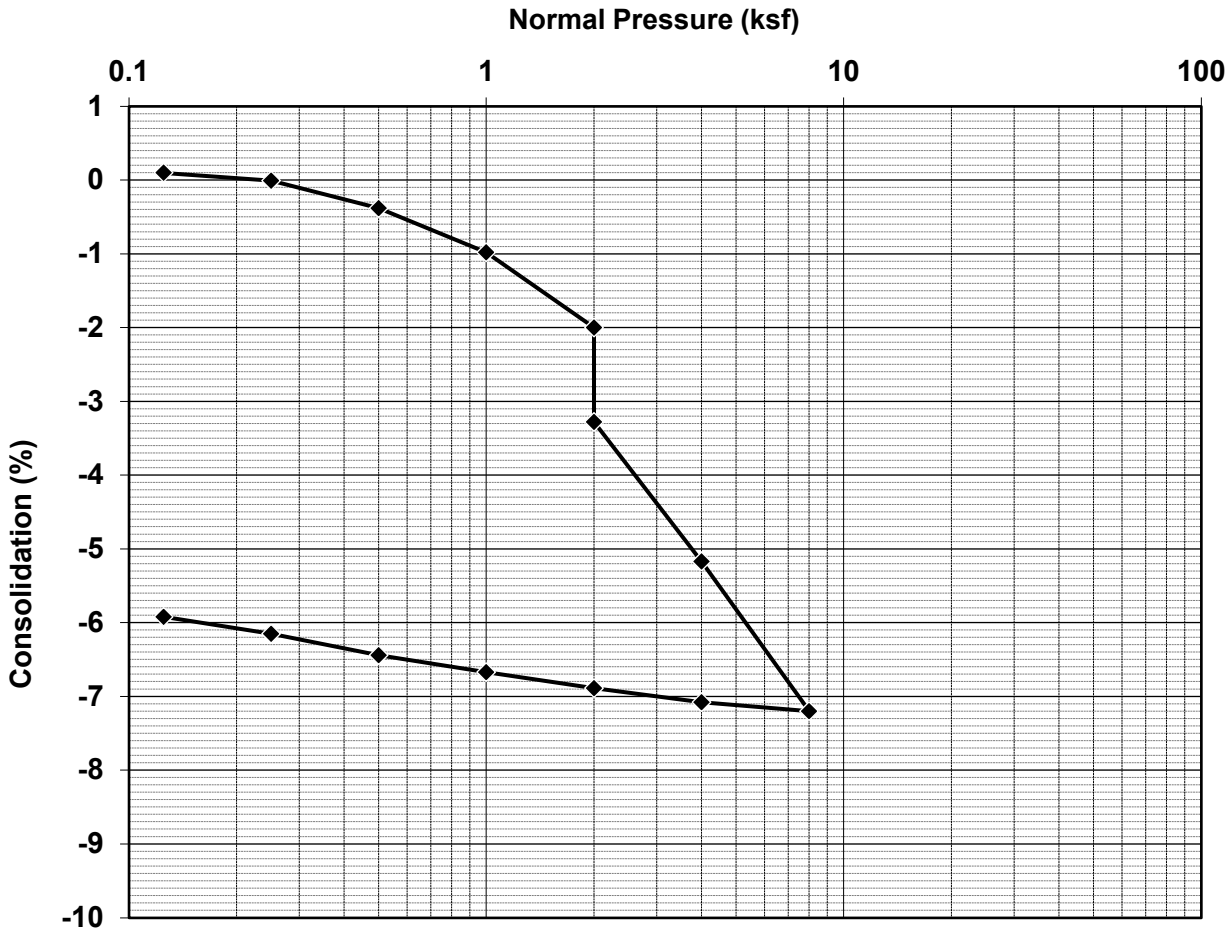
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	15.0%
Void Ratio, e	0.53	0.43
Saturation, S	26%	93%
Dry Density (pcf)	110.5	117.4
Wet Density (pcf)	116.1	135.0

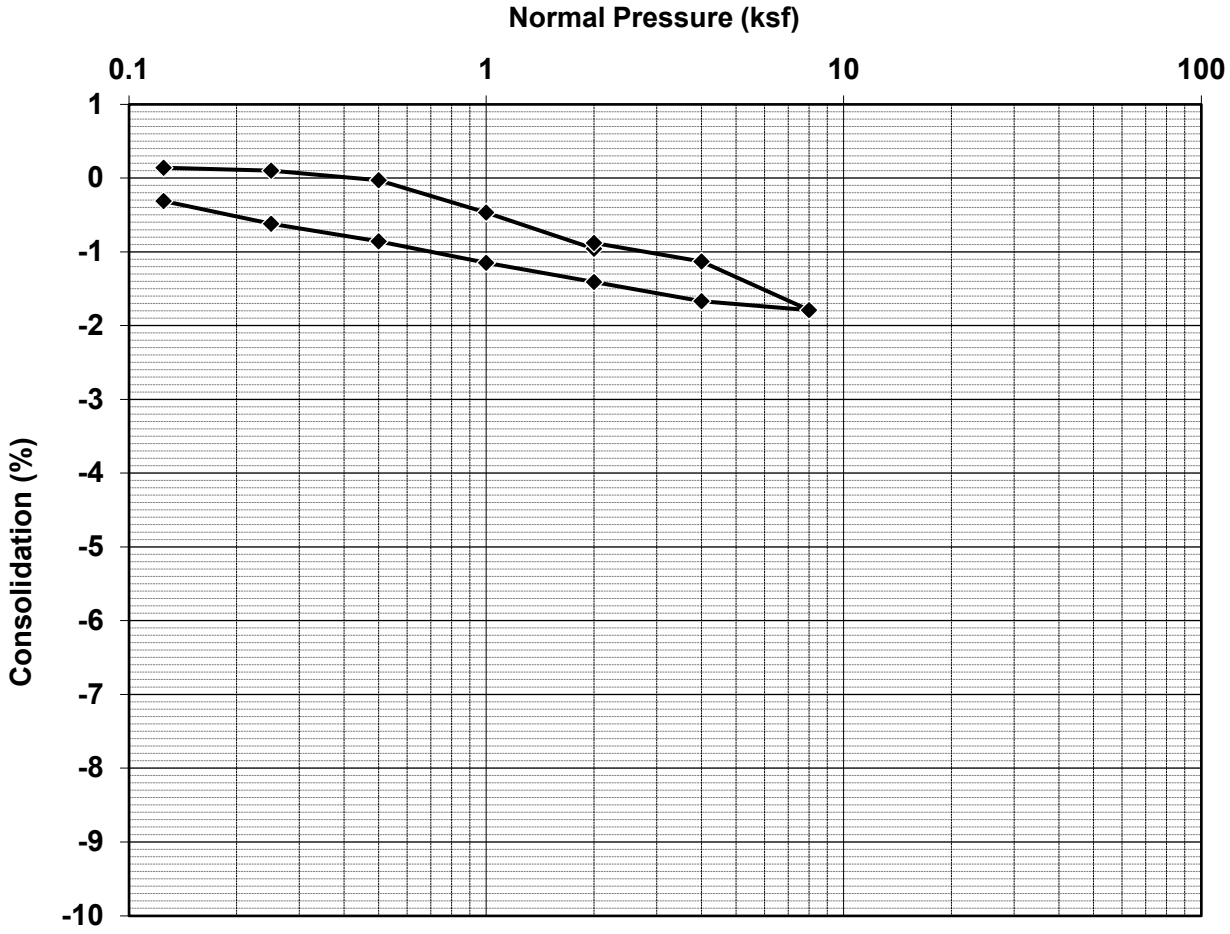
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/10/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	11.4%	17.0%
Void Ratio, e	0.46	0.46
Saturation, S	66%	100%
Dry Density (pcf)	115.1	115.5
Wet Density (pcf)	128.3	135.1

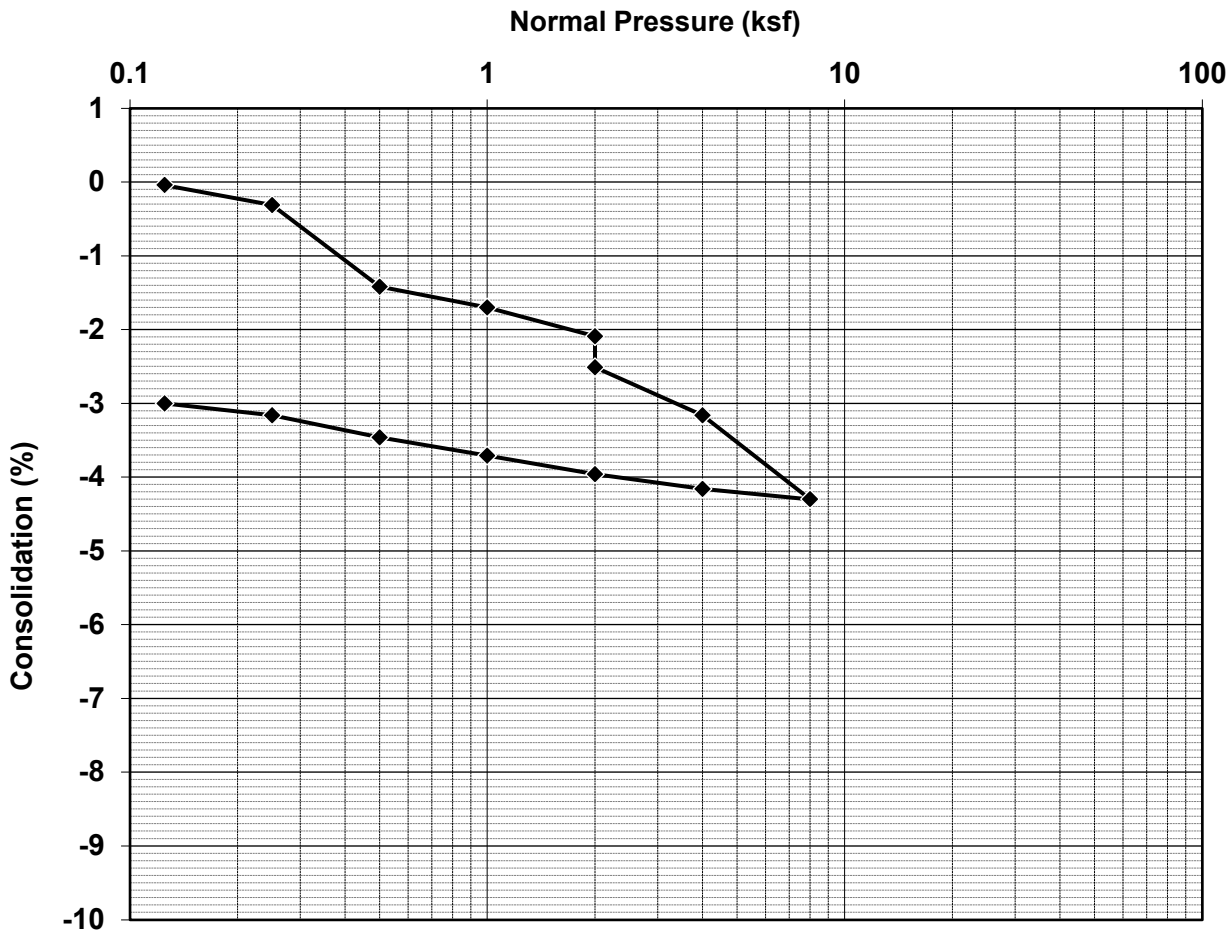
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-9
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand/Sandy Silt
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	8.5%	16.5%
Void Ratio, e	0.37	0.33
Saturation, S	62%	135%
Dry Density (pcf)	122.9	126.7
Wet Density (pcf)	133.4	147.6

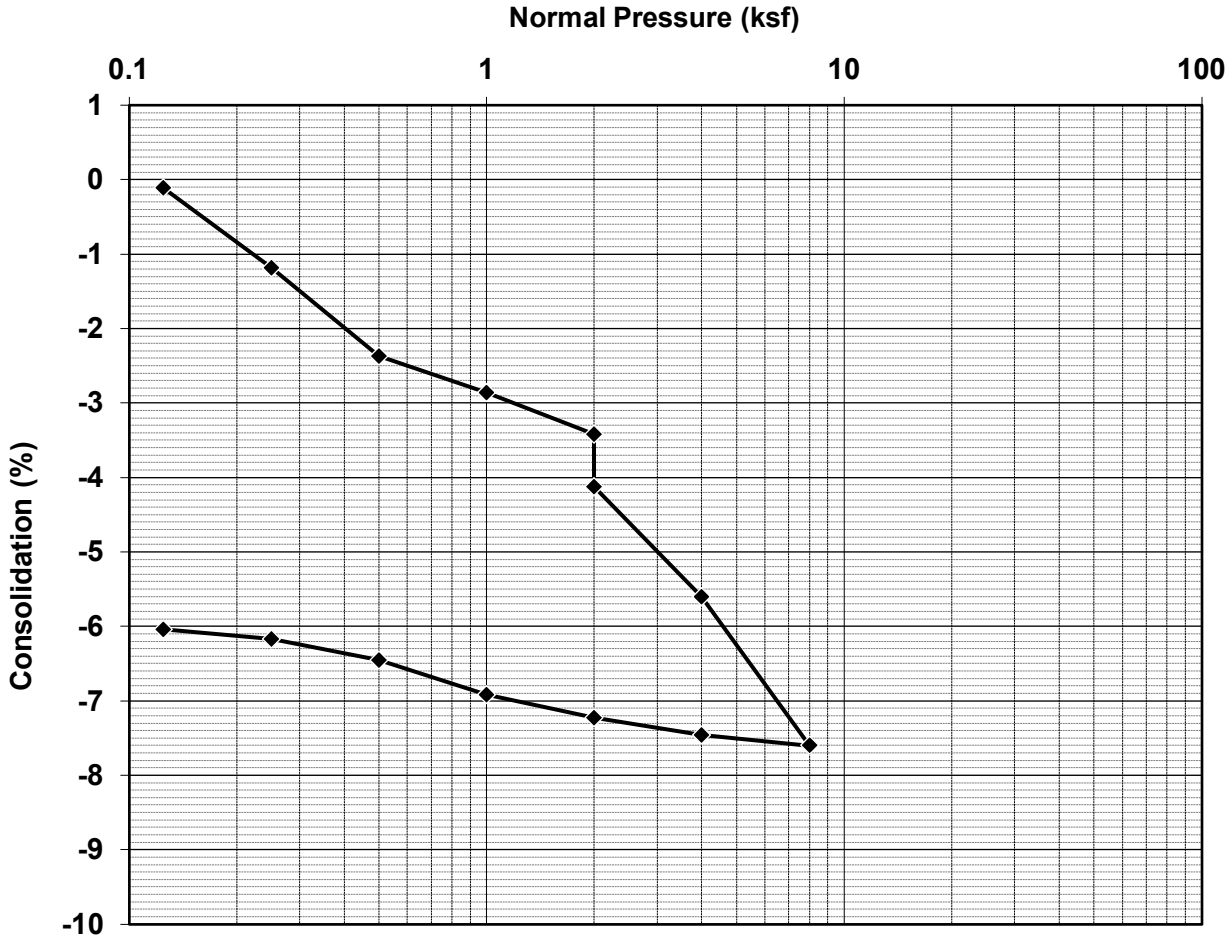
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-10
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.0%	15.9%
Void Ratio, e	0.40	0.31
Saturation, S	14%	138%
Dry Density (pcf)	120.7	128.5
Wet Density (pcf)	123.2	149.0

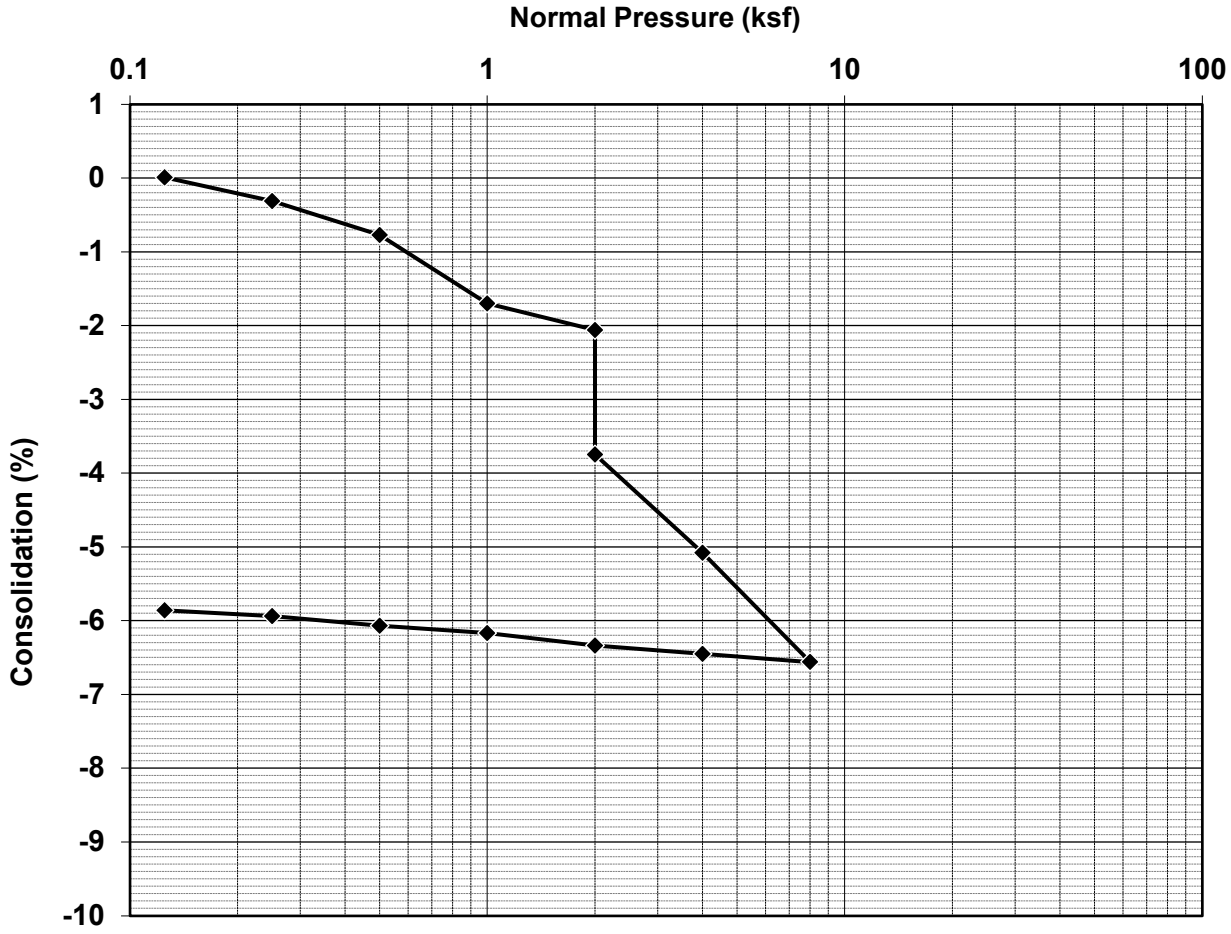
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qal- Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.4%	13.0%
Void Ratio, e	0.48	0.39
Saturation, S	13%	89%
Dry Density (pcf)	113.9	121.0
Wet Density (pcf)	116.6	136.7

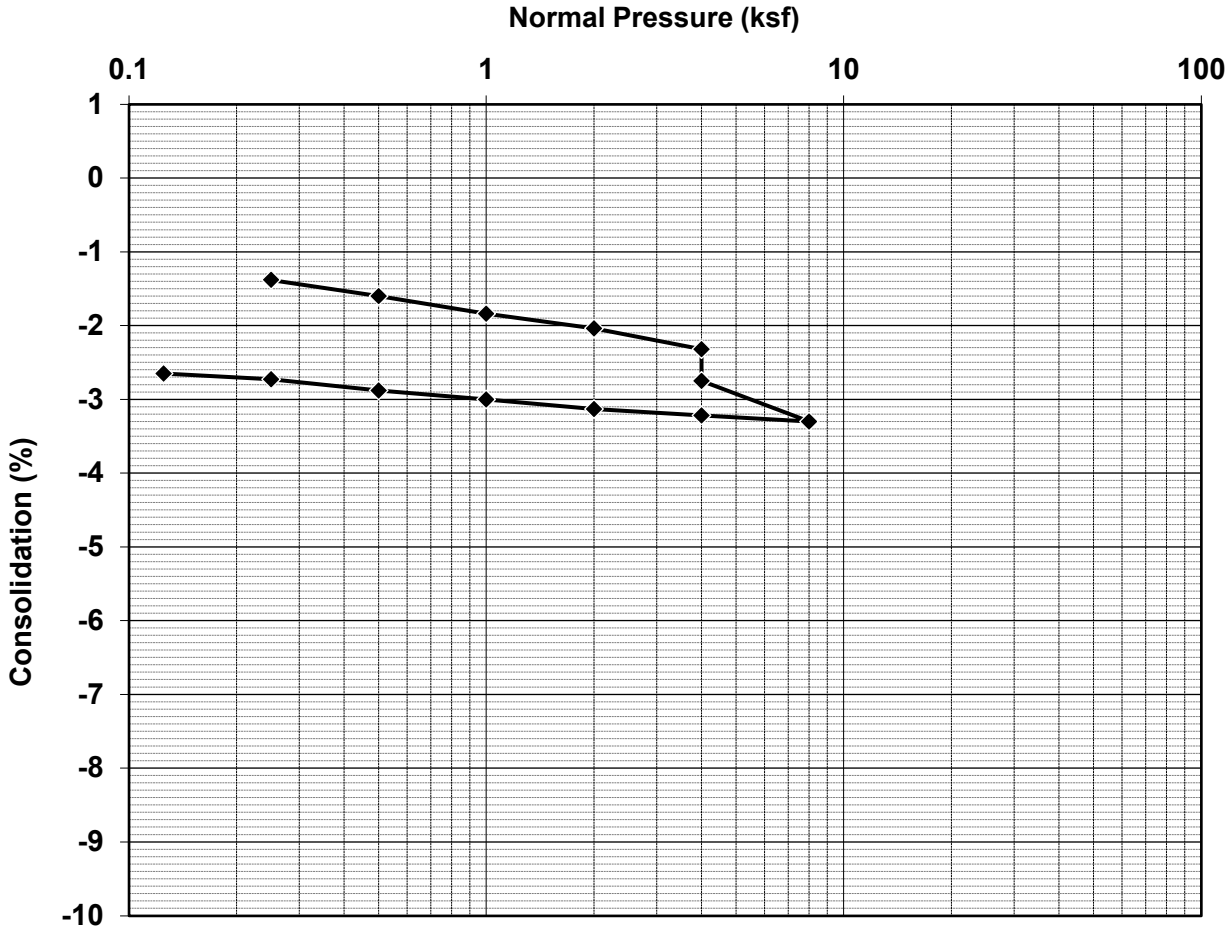
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.0%	12.0%
Void Ratio, e	0.34	0.31
Saturation, S	71%	106%
Dry Density (pcf)	125.6	129.0
Wet Density (pcf)	136.9	144.5

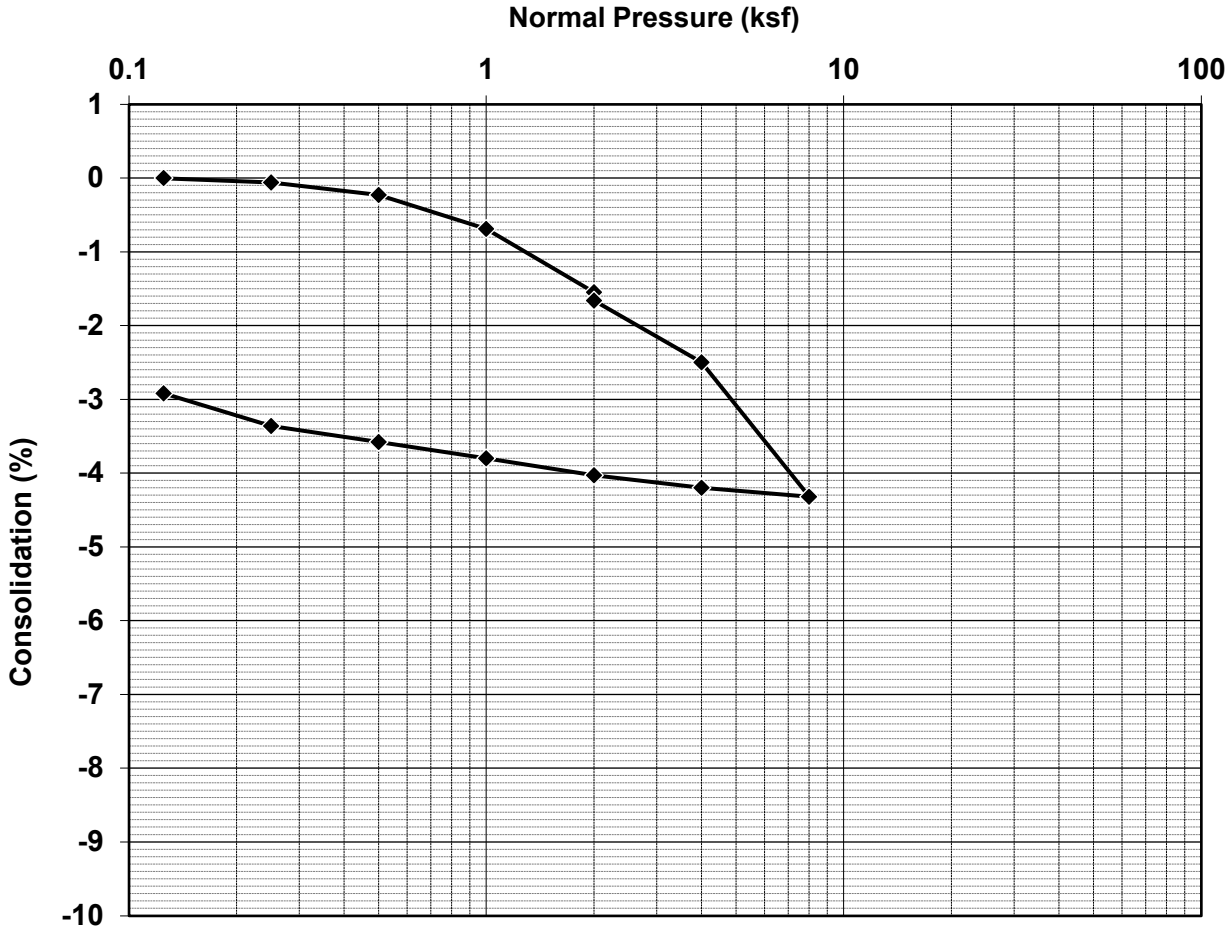
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS -14
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/22/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	14.9%
Void Ratio, e	0.40	0.36
Saturation, S	34%	111%
Dry Density (pcf)	120.0	123.6
Wet Density (pcf)	126.1	142.0

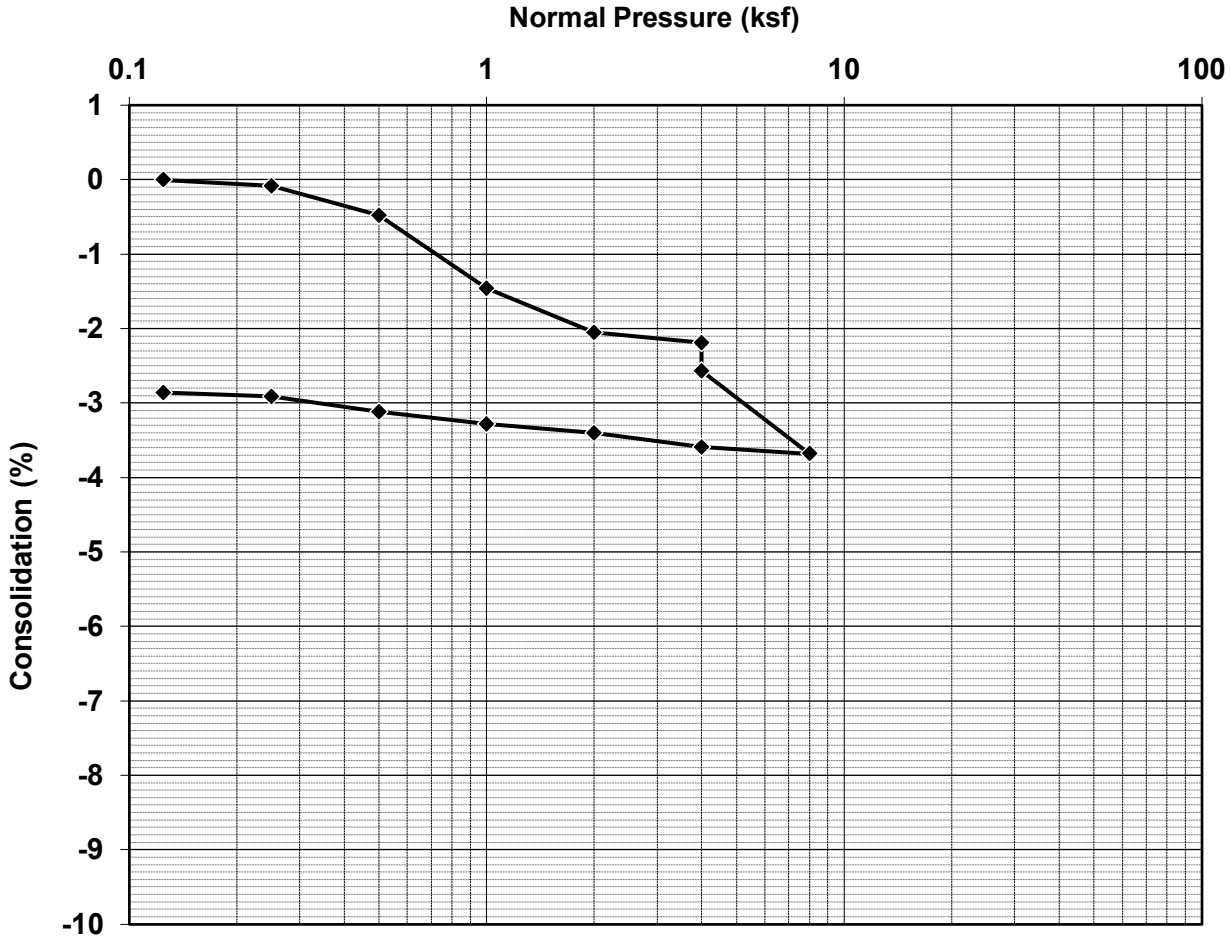
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-15
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Silty to Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.8%	12.5%
Void Ratio, e	0.36	0.32
Saturation, S	74%	106%
Dry Density (pcf)	124.1	127.8
Wet Density (pcf)	136.3	143.8

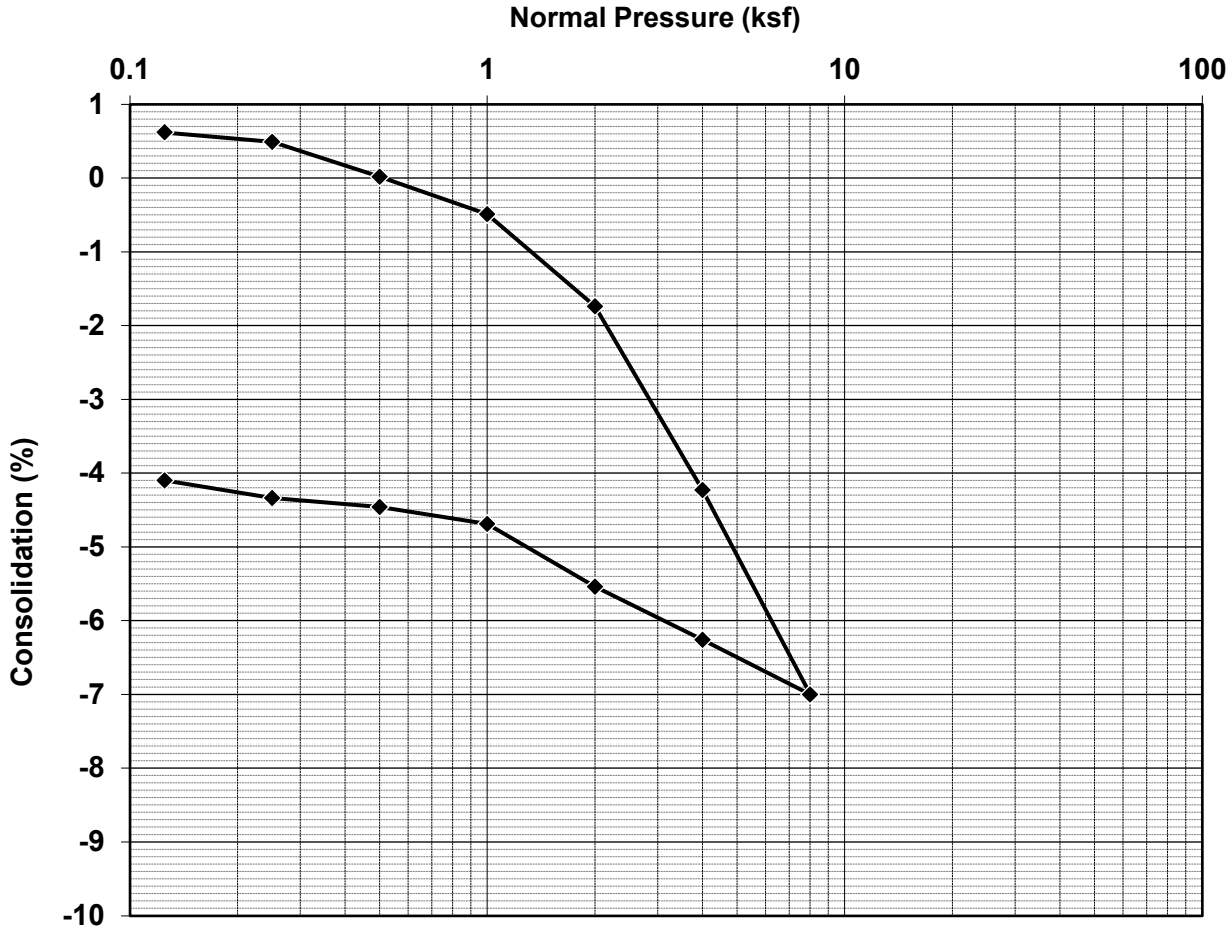
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	10 ft
Project No:	2001-04	Description:	Qal- Silty Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	21.2%	28.0%
Void Ratio, e	0.86	0.78
Saturation, S	67%	97%
Dry Density (pcf)	90.7	94.6
Wet Density (pcf)	109.9	121.1

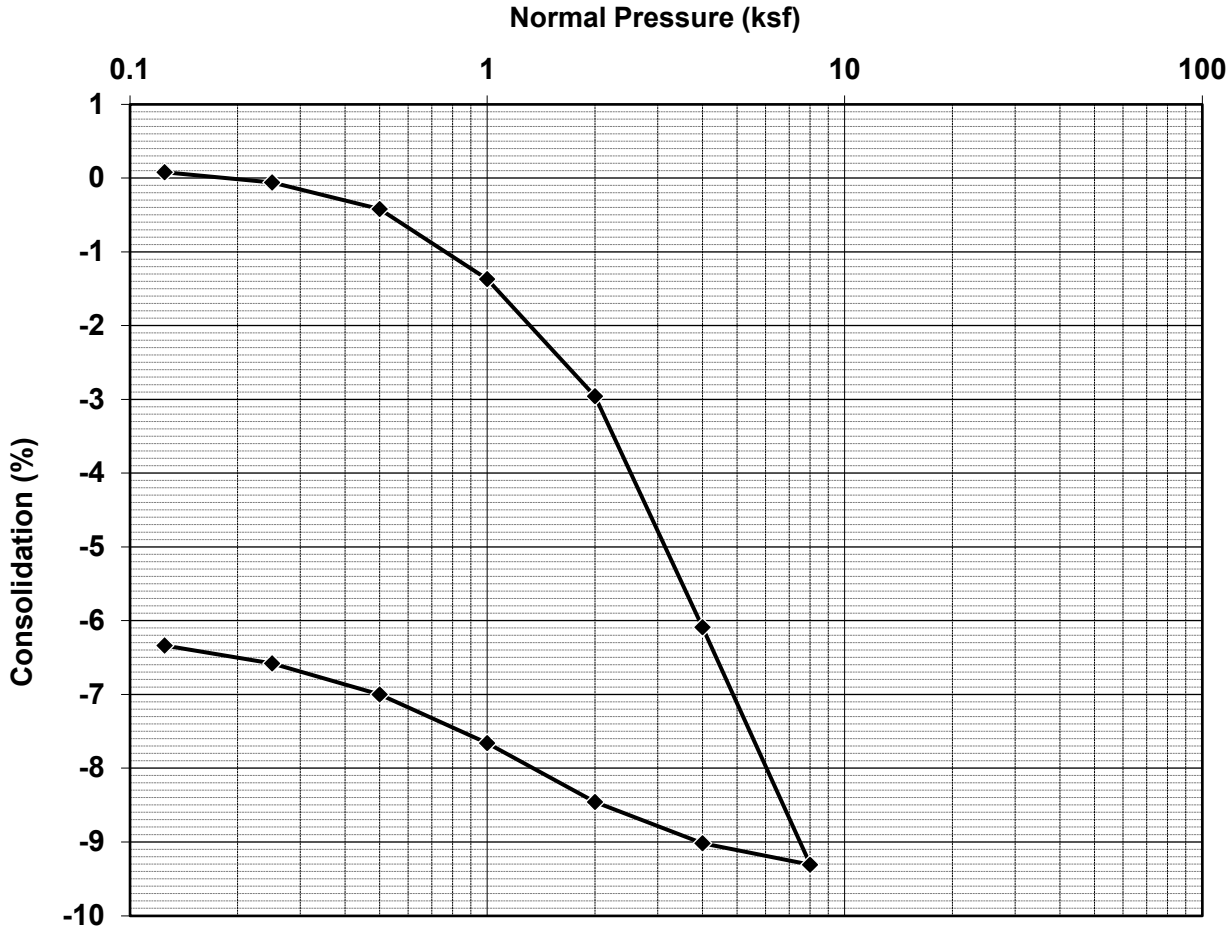
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	20 ft
Project No:	2001-04	Description:	Qal- Silty Clay with Sand
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.3%	25.5%
Void Ratio, e	0.99	0.86
Saturation, S	69%	80%
Dry Density (pcf)	84.8	90.5
Wet Density (pcf)	106.3	113.6

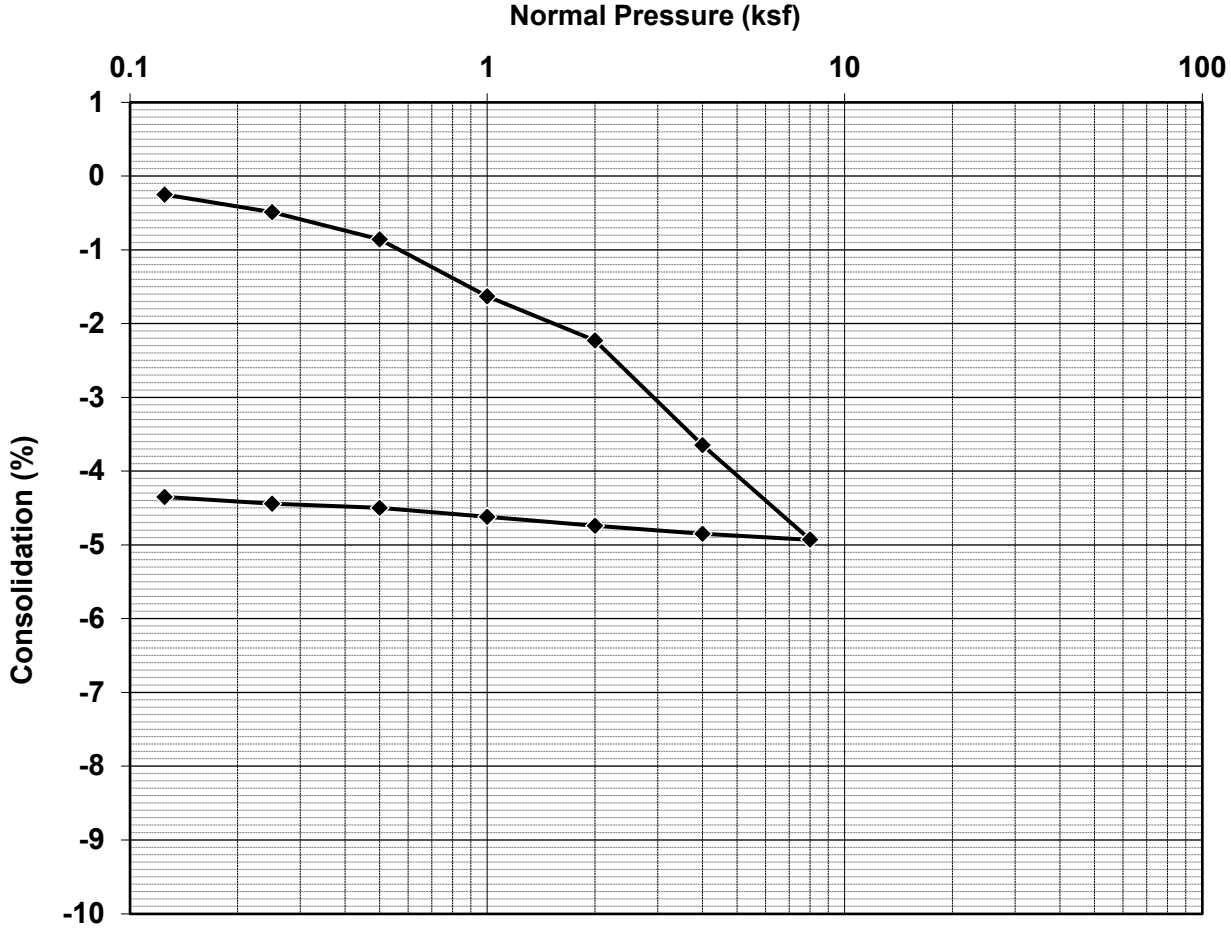
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No:	2004-01	Description:	Qoa- Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	13.9%
Void Ratio, e	0.40	0.34
Saturation, S	84%	112%
Dry Density (pcf)	120.6	126.1
Wet Density (pcf)	135.5	143.6

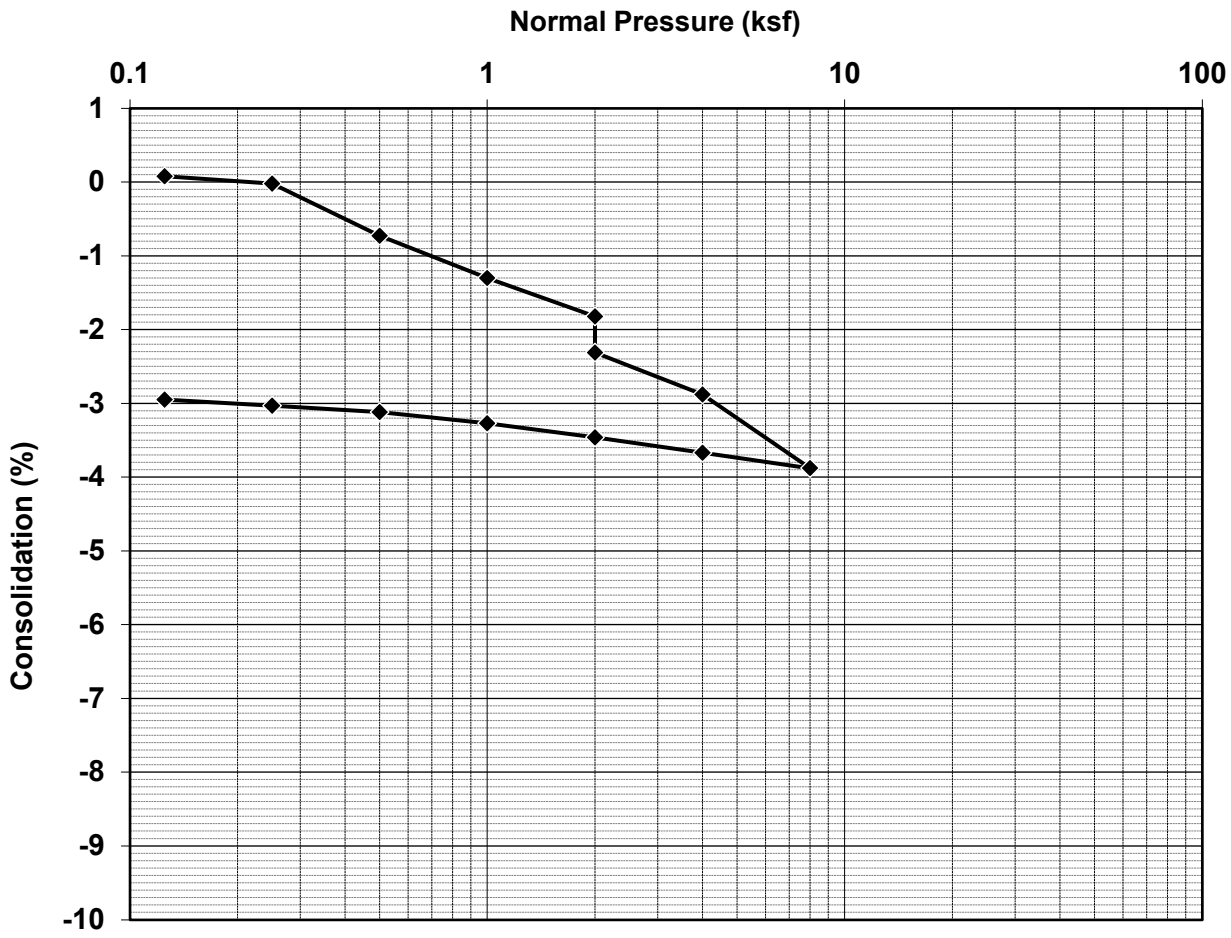
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-17
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	4.5%	14.1%
Void Ratio, e	0.41	0.37
Saturation, S	30%	104%
Dry Density (pcf)	119.6	123.3
Wet Density (pcf)	125.0	140.6

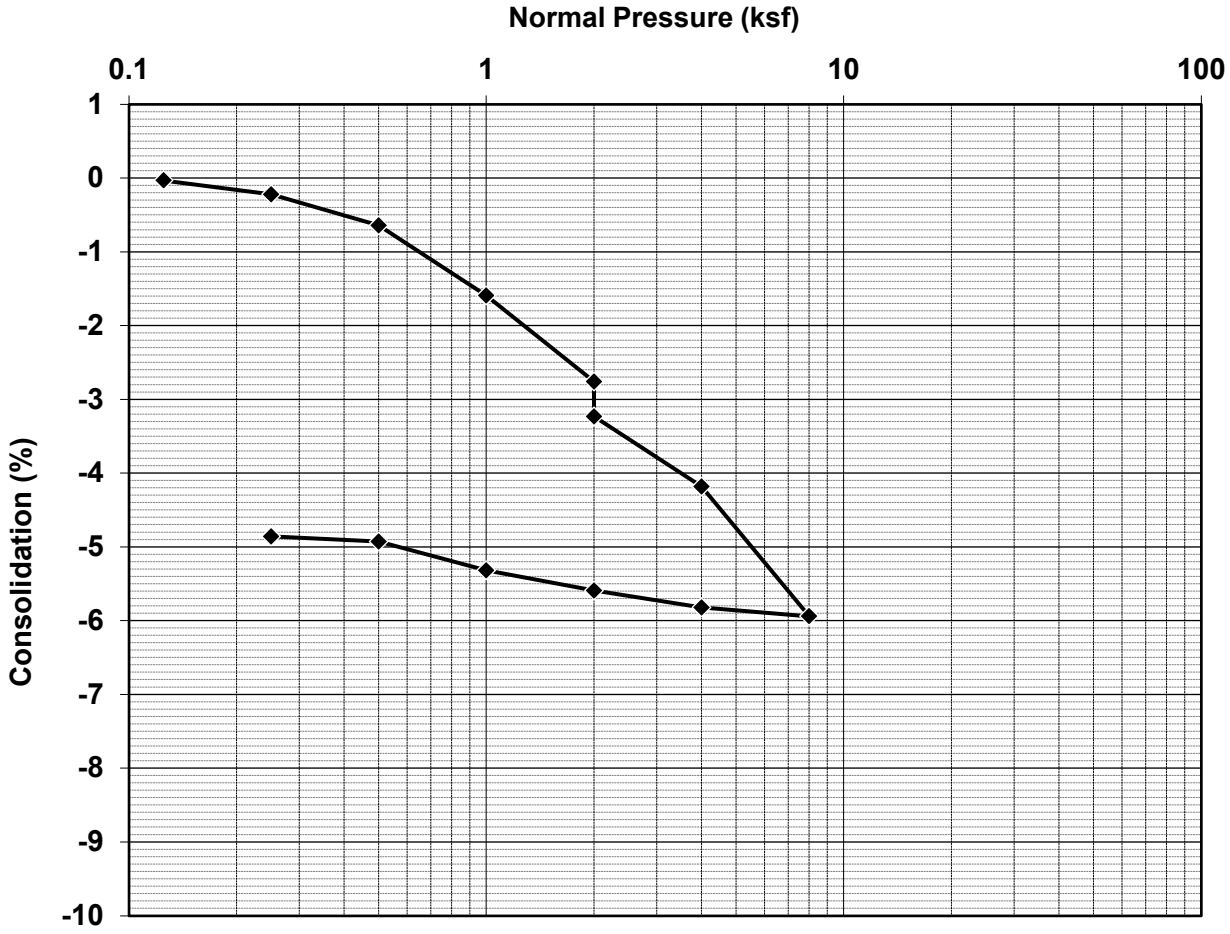
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-18
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qal- Silty Clay
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	19.0%
Void Ratio, e	0.57	0.50
Saturation, S	58%	103%
Dry Density (pcf)	107.1	112.6
Wet Density (pcf)	120.3	134.0

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

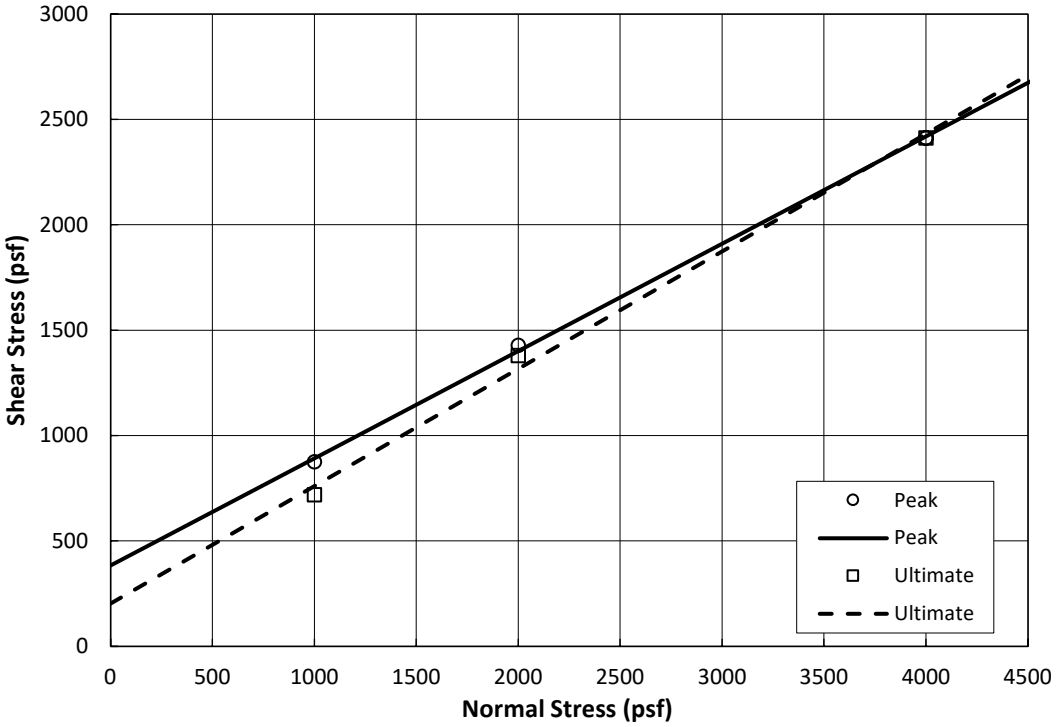
DIRECT SHEAR - ASTM D3080

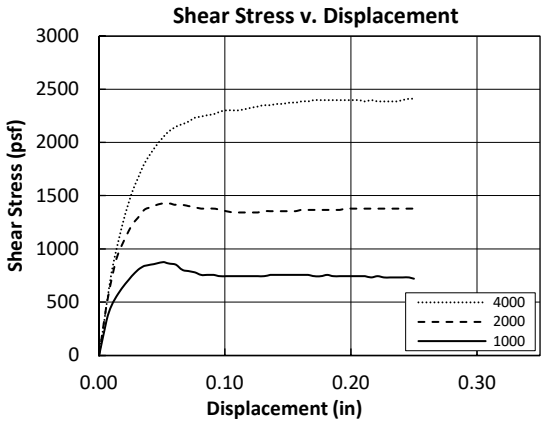
Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/19/2020	Reviewed by:	JC

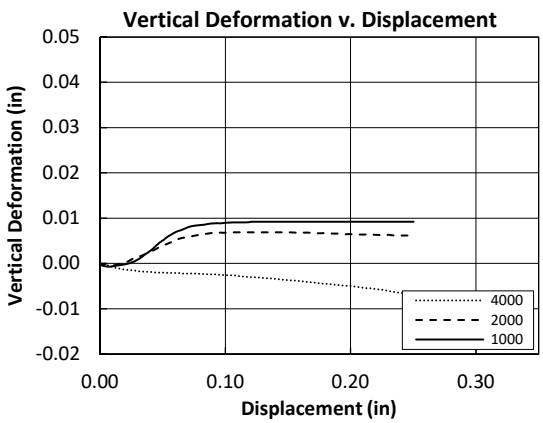
Samples Tested	1	2	3
Intial Moisture (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.5	111.5	111.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	876	1428	2412
Ult. Shear Stress (psf)	720	1380	2412

Soil Type:	Qya
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	27	29
Cohesion (psf)	384	204







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

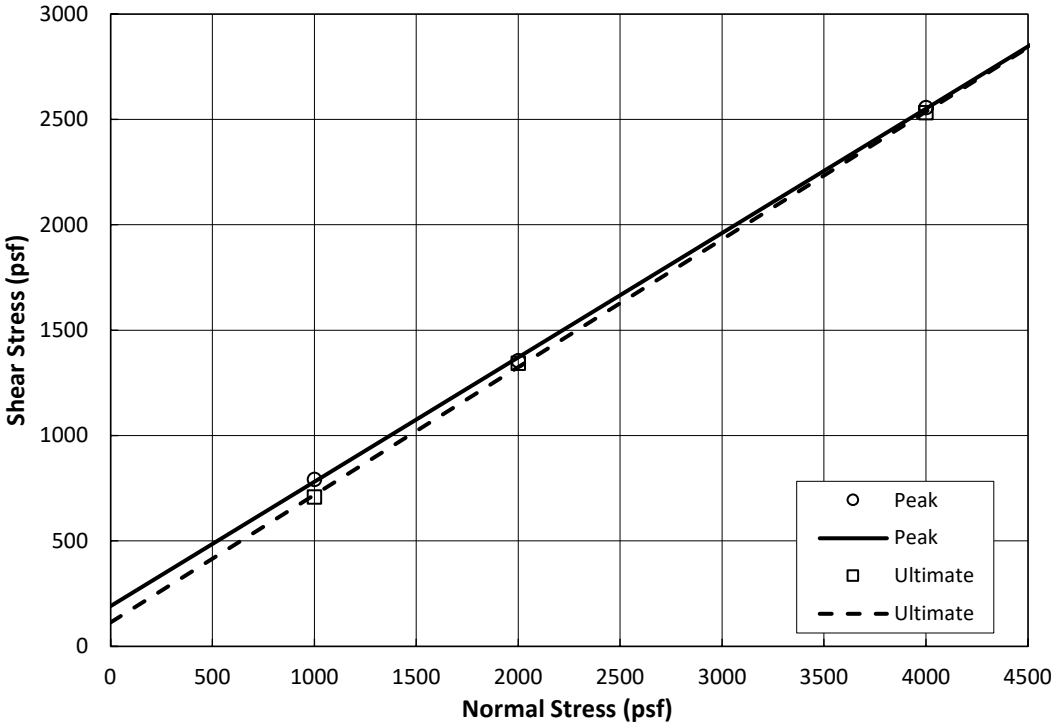
DIRECT SHEAR - ASTM D3080

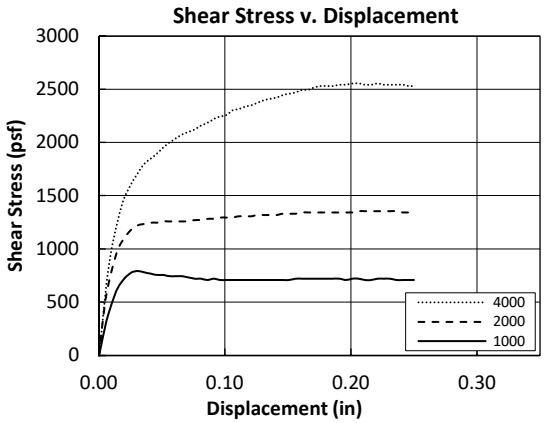
Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/20/2020	Reviewed by:	JC

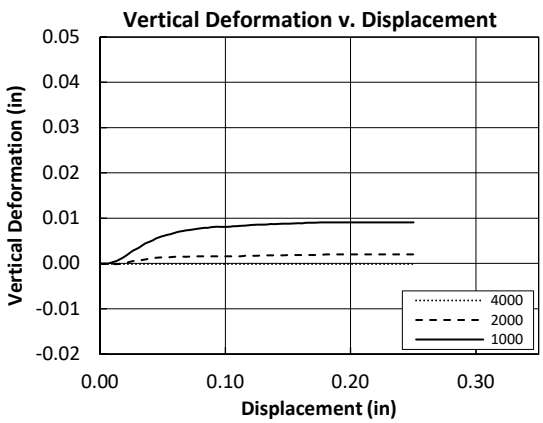
Samples Tested	1	2	3
Intial Moisture (%)	10.5	10.5	10.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	792	1356	2556
Ult. Shear Stress (psf)	708	1344	2532

Soil Type:	Qoa
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	31	31
Cohesion (psf)	192	114







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

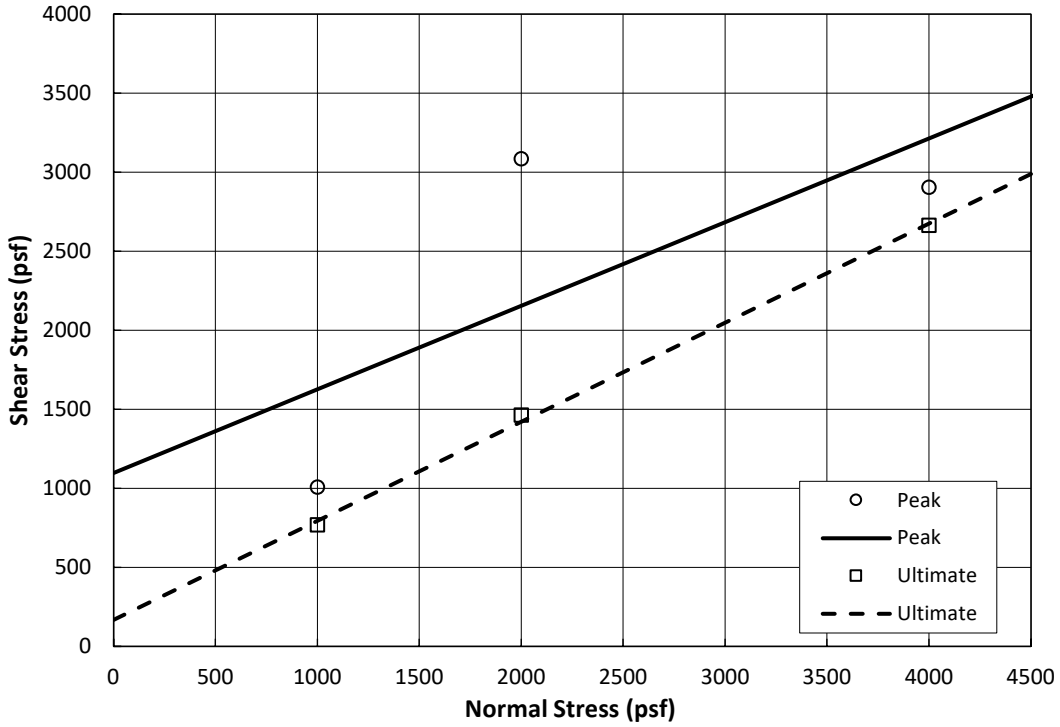
DIRECT SHEAR - ASTM D3080

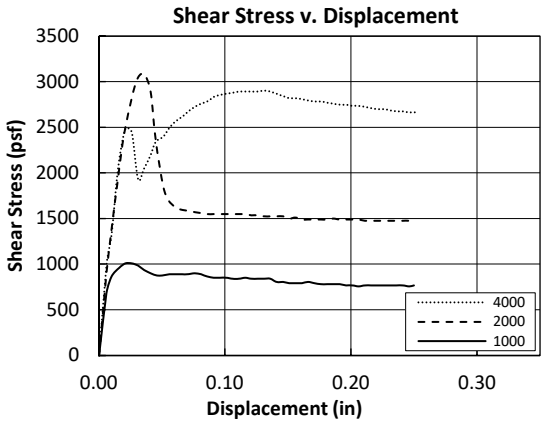
Project Name:	Oak Valley Town Center	Excavation:	AGS-2
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/3/2020	Reviewed by:	SS

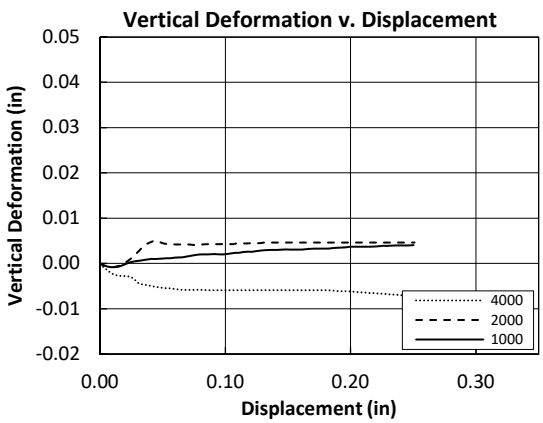
Samples Tested	1	2	3
Intial Moisture (%)	10.2	10.2	10.2
Initial Dry Density (pcf)	113.8	123.7	111.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	3084	2904
Ult. Shear Stress (psf)	768	1464	2664

Soil Type:	Yellowish SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	32
Cohesion (psf)	1098	168







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

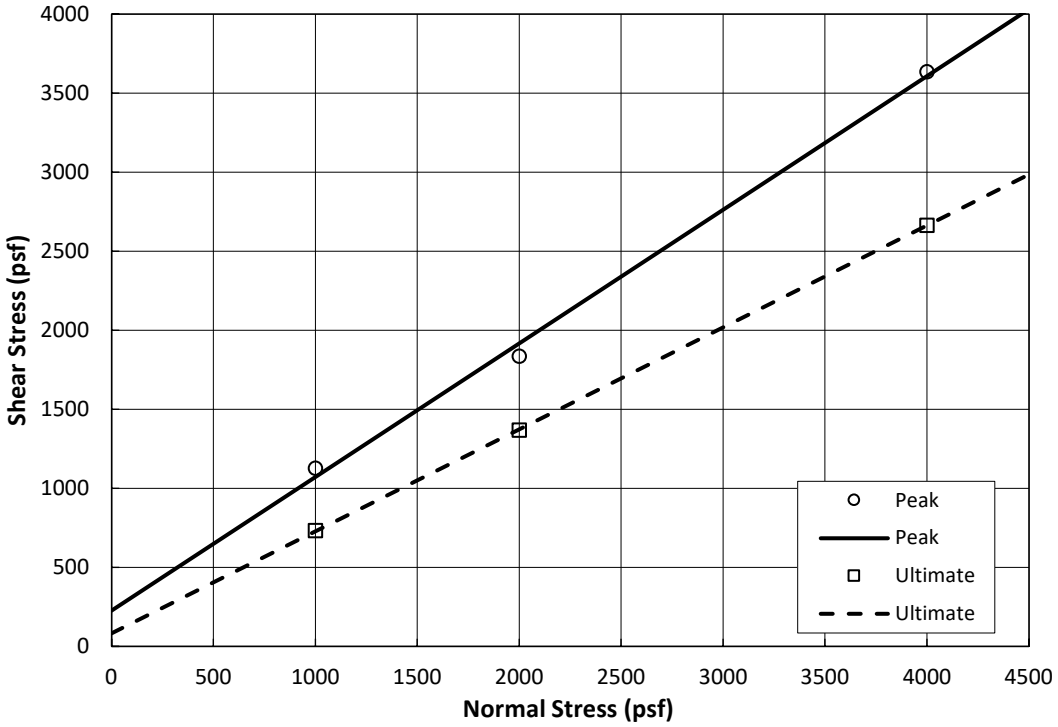
DIRECT SHEAR - ASTM D3080

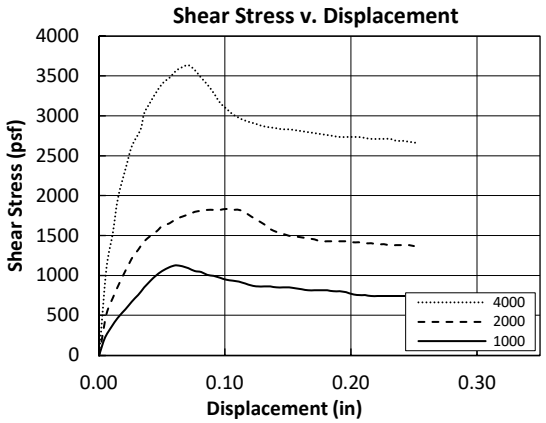
Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/31/2020	Reviewed by:	SS

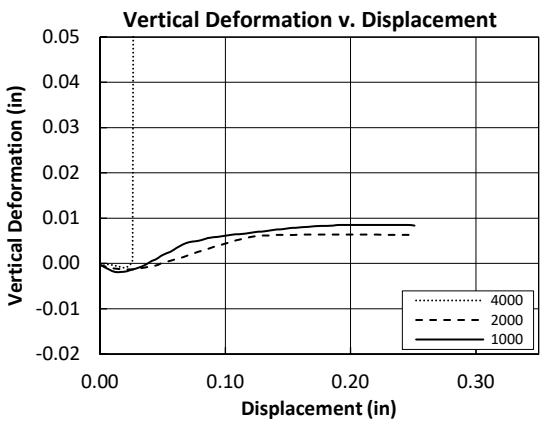
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	122.9	121.1	117.9
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1128	1836	3636
Ult. Shear Stress (psf)	732	1368	2664

Soil Type:	Light Brn SC-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	33
Cohesion (psf)	228	84







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

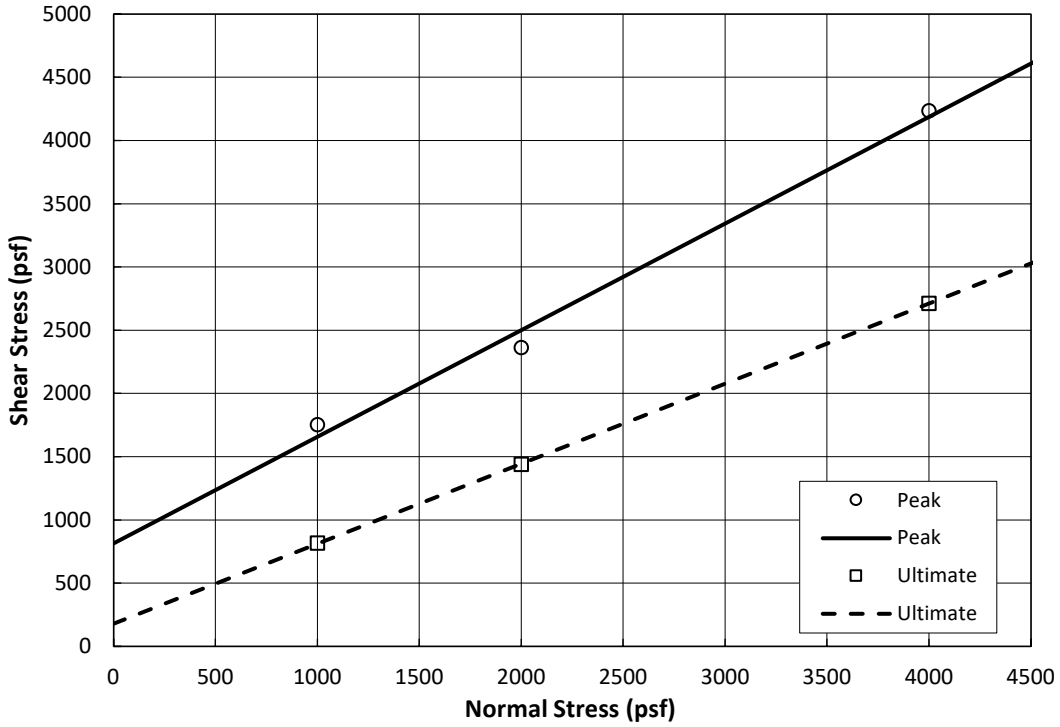
DIRECT SHEAR - ASTM D3080

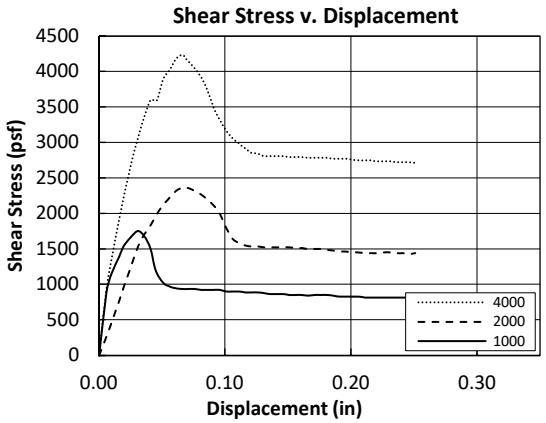
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/10/2020	Reviewed by:	SS

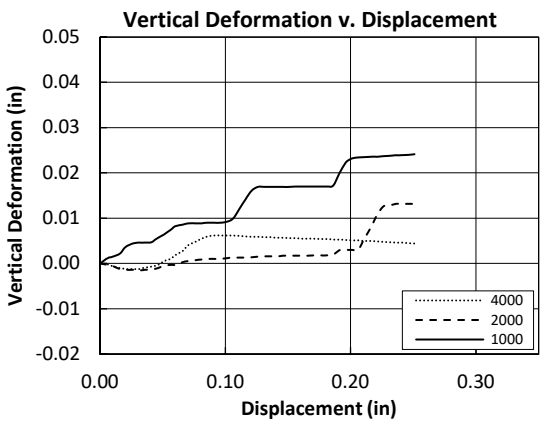
Samples Tested	1	2	3
Intial Moisture (%)	8.6	8.6	8.6
Initial Dry Density (pcf)	121.0	121.8	121.0
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1752	2364	4236
Ult. Shear Stress (psf)	816	1440	2712

Soil Type:	Blue SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	32
Cohesion (psf)	816	180







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

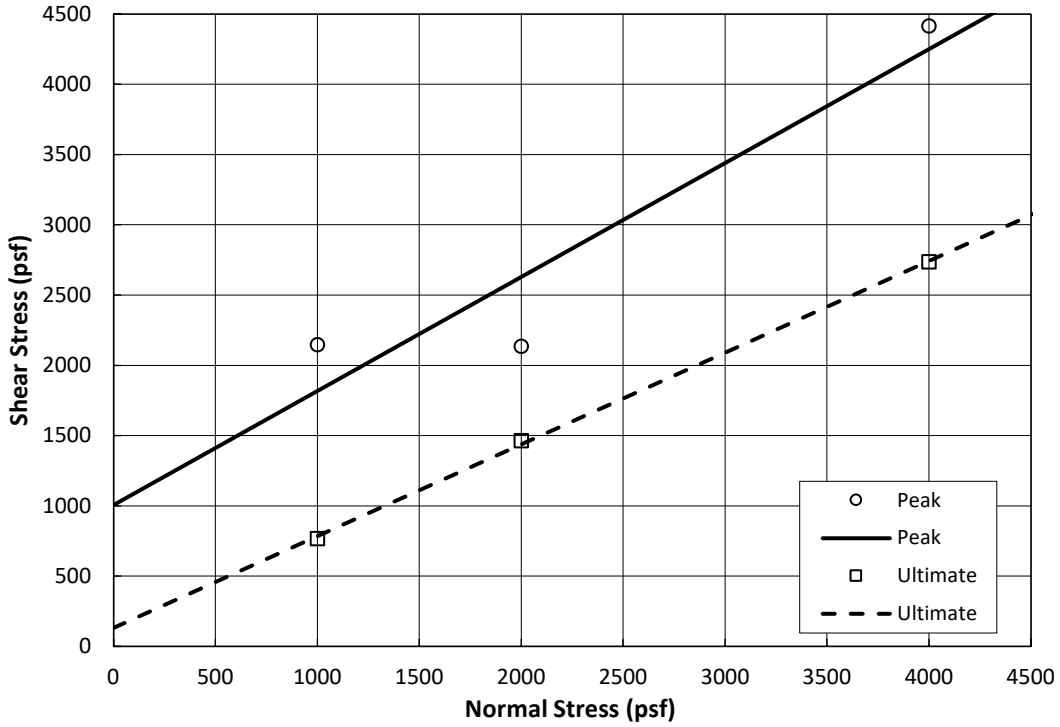
DIRECT SHEAR - ASTM D3080

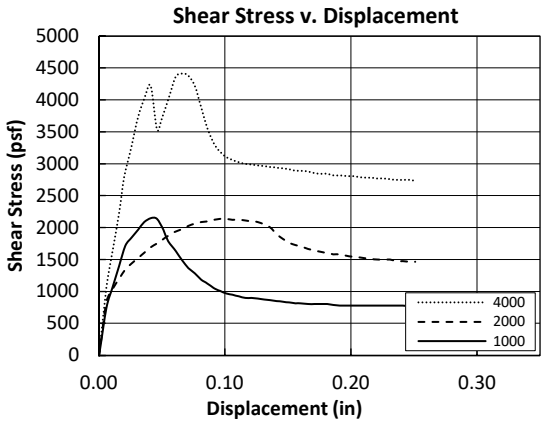
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/4/2020	Reviewed by:	SS

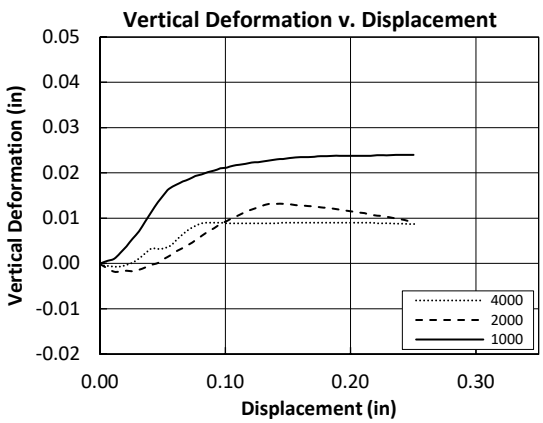
Samples Tested	1	2	3
Intial Moisture (%)	11.7	11.7	11.7
Initial Dry Density (pcf)	120.0	118.0	119.1
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	2148	2136	4416
Ult. Shear Stress (psf)	768	1464	2736

Soil Type:	Olive ML-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	39	33
Cohesion (psf)	1008	132







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

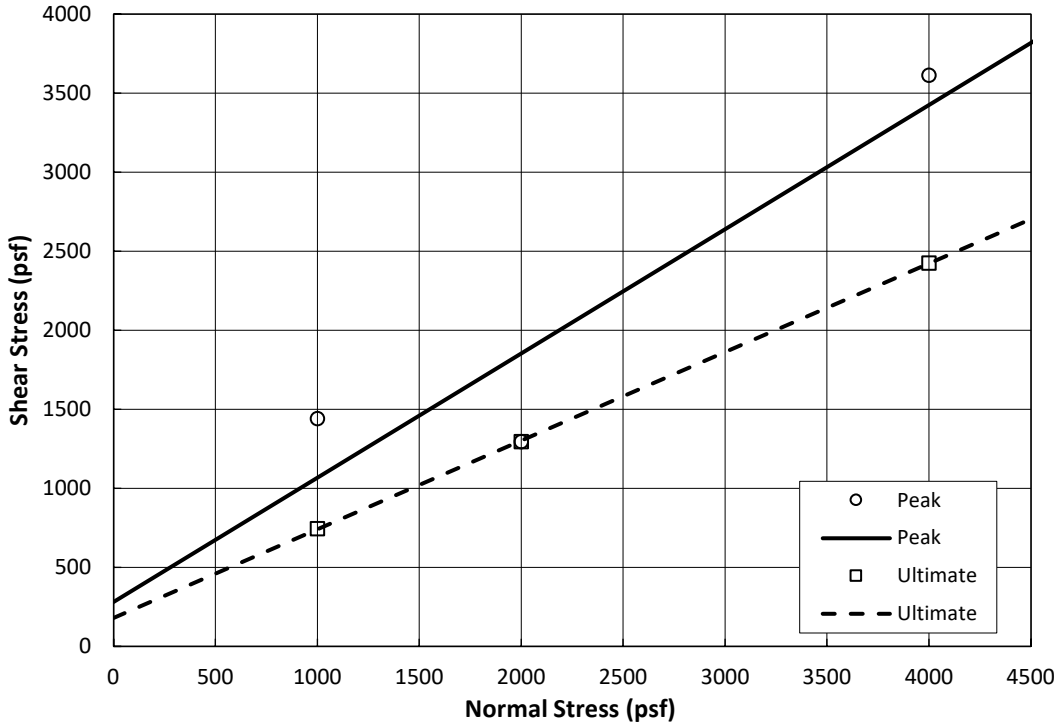
DIRECT SHEAR - ASTM D3080

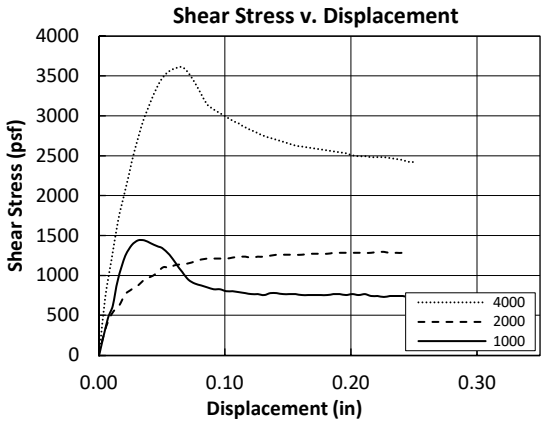
Project Name:	Oak Valeey Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/28/2020	Reviewed by:	SS

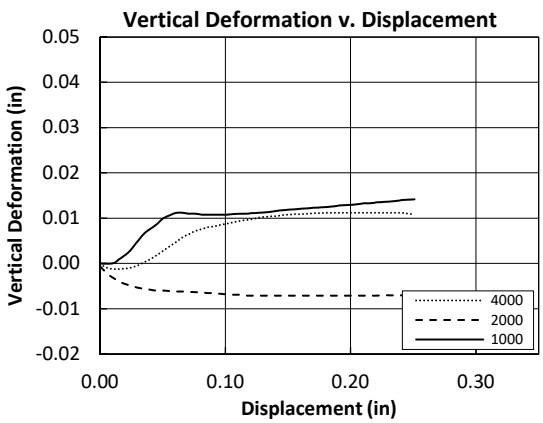
Samples Tested	1	2	3
Intial Moisture (%)	11.4	11.4	11.4
Initial Dry Density (pcf)	120.5	120.9	121.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1440	1296	3612
Ult. Shear Stress (psf)	744	1296	2424

Soil Type:	Olive SM-ML
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	38	29
Cohesion (psf)	282	180







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 05/20/2020

P.O. NO.: Chain of Custody

LAB NO.: C-3816

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 2004-01
Project: Oak Valley Town Center
Date sampled: 05/18/2020
Sample ID: T-2 @ 8'-9'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
7.5	7,600	292	111

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Oak Valley Town Center	Excavation/Tract:	T-2
Location:	Calimesa	Depth/Lot:	6-9 ft
P/W:	2004-01	Description:	Qya
Date:	5/21/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	108.3
Initial Moisture Content (%):	10.4
Initial Saturation (%):	50.6
Final Dry Density (pcf):	106.8
Final Moisture Content (%):	20.1
Final Saturation (%):	93.9
Expansion Index:	14
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

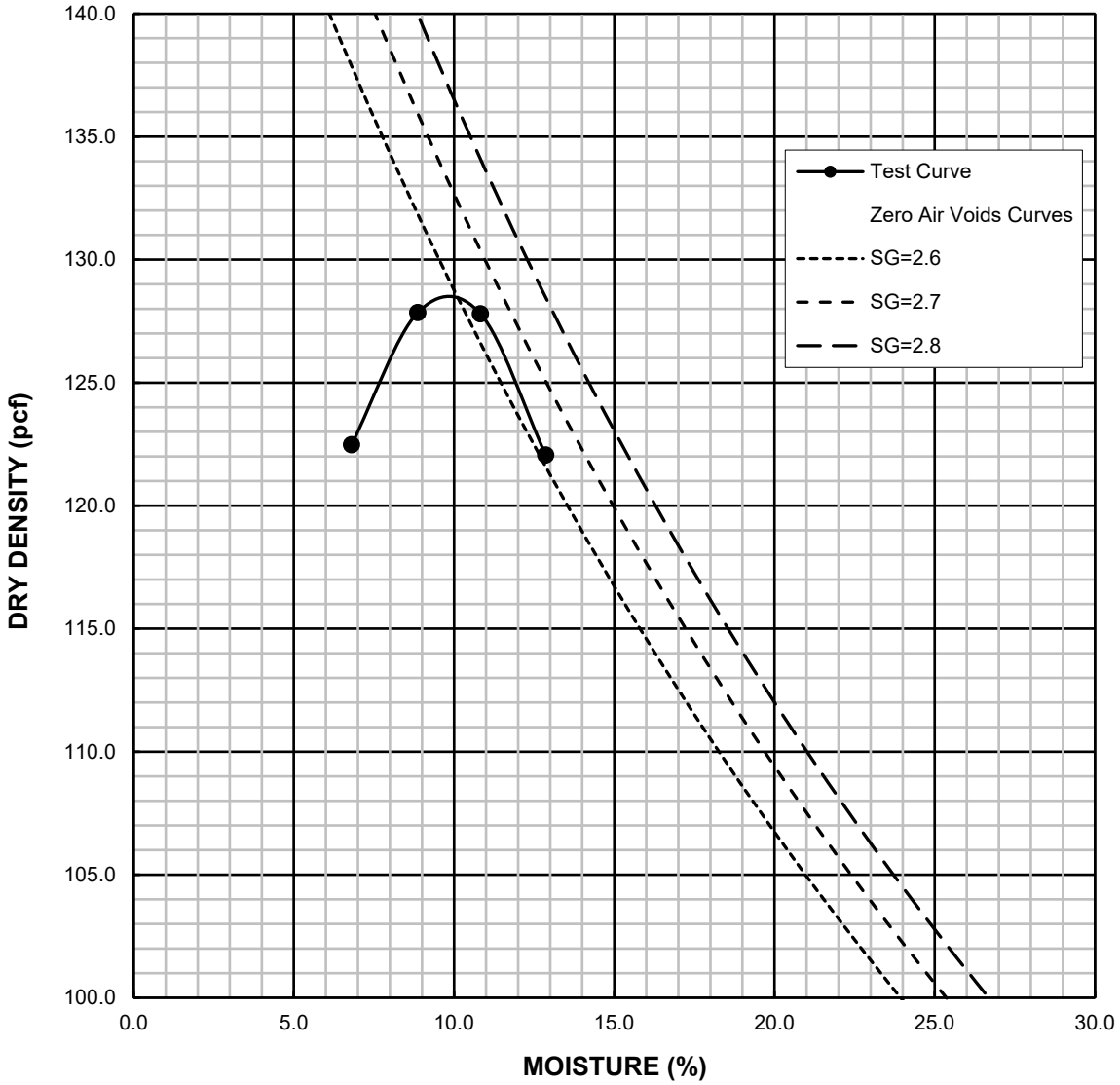
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-3
Location:	Calimesa	Depth:	8-10 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	FV
		Checked by:	SS

Method:	A	Oversize Retained: 25 %		
Point No.	1	2	3	4
Dry Density (pcf)	122.5	127.9	127.8	122.1
Moisture Content (%)	6.8	8.9	10.8	12.9

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**136.3 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**128.5 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

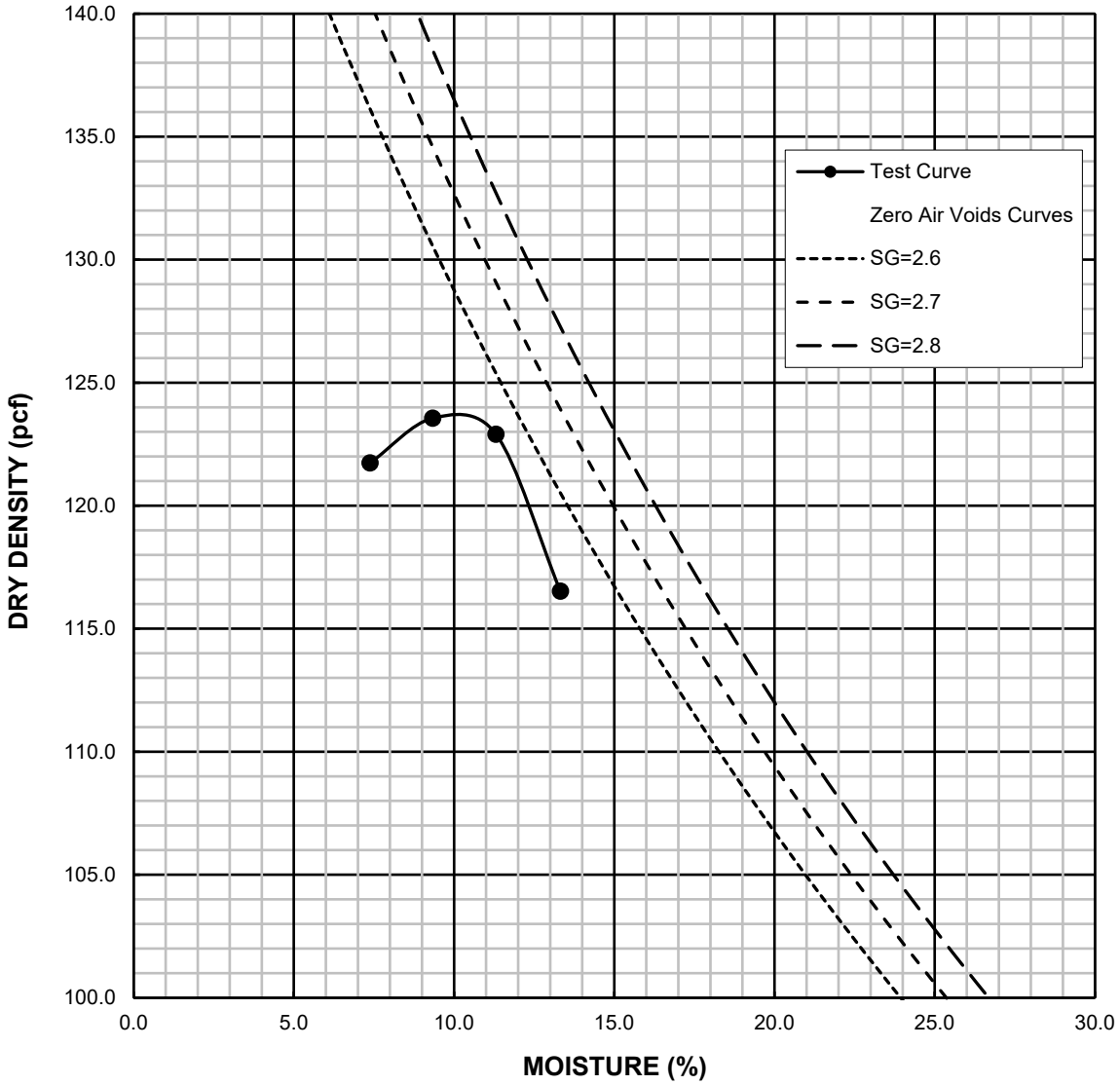
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 2.9 %		
Point No.	1	2	3	4
Dry Density (pcf)	121.7	123.6	122.9	116.5
Moisture Content (%)	7.4	9.3	11.3	13.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**124.8 pcf**	Corrected Moisture	**9.7** %
Max. Dry Density	**123.9 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

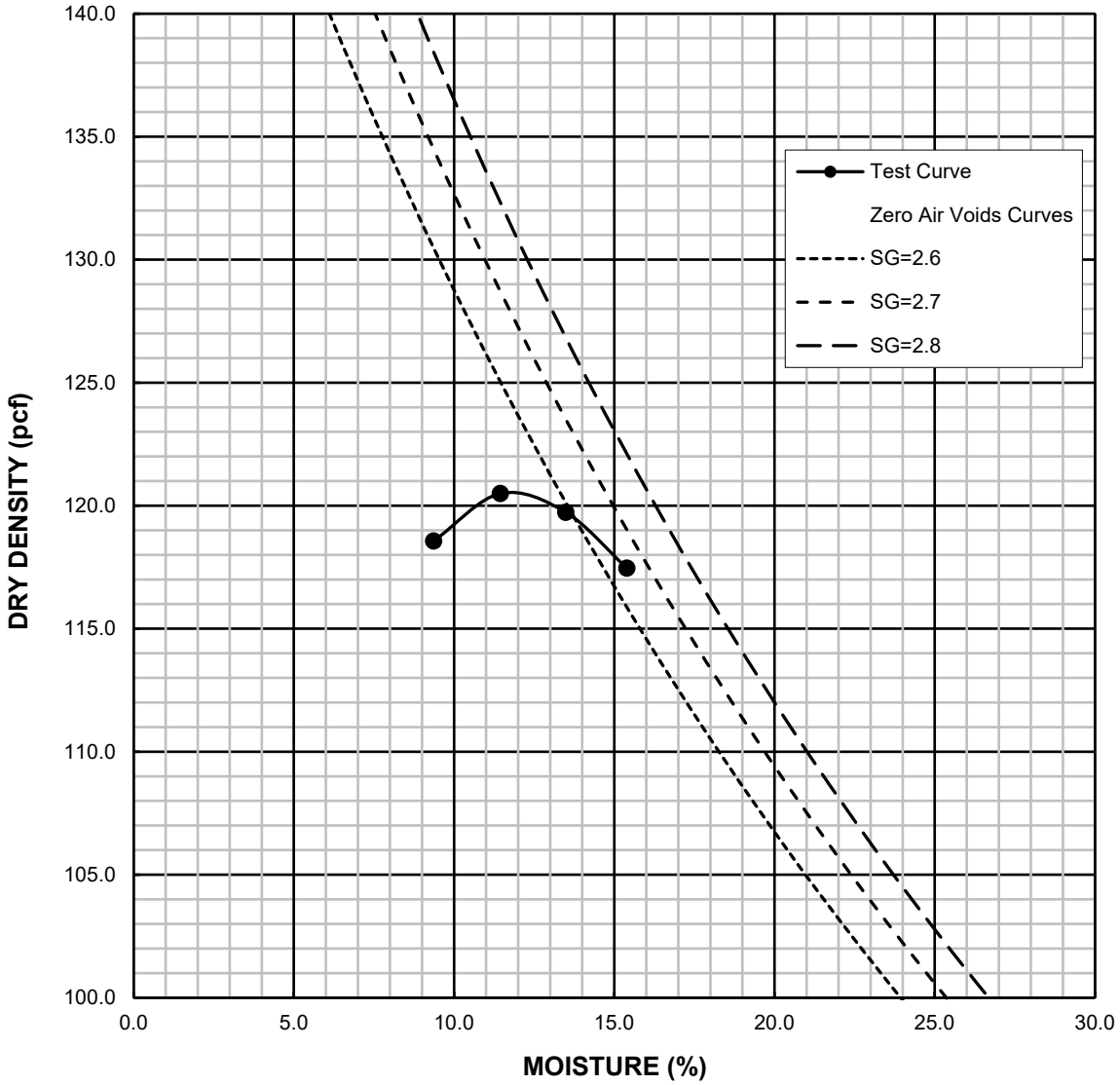
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-16
Location:	Calimesa	Depth:	7-9 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.6	120.5	119.7	117.5
Moisture Content (%)	9.4	11.4	13.5	15.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**123.9 pcf**	Corrected Moisture	**9.9** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

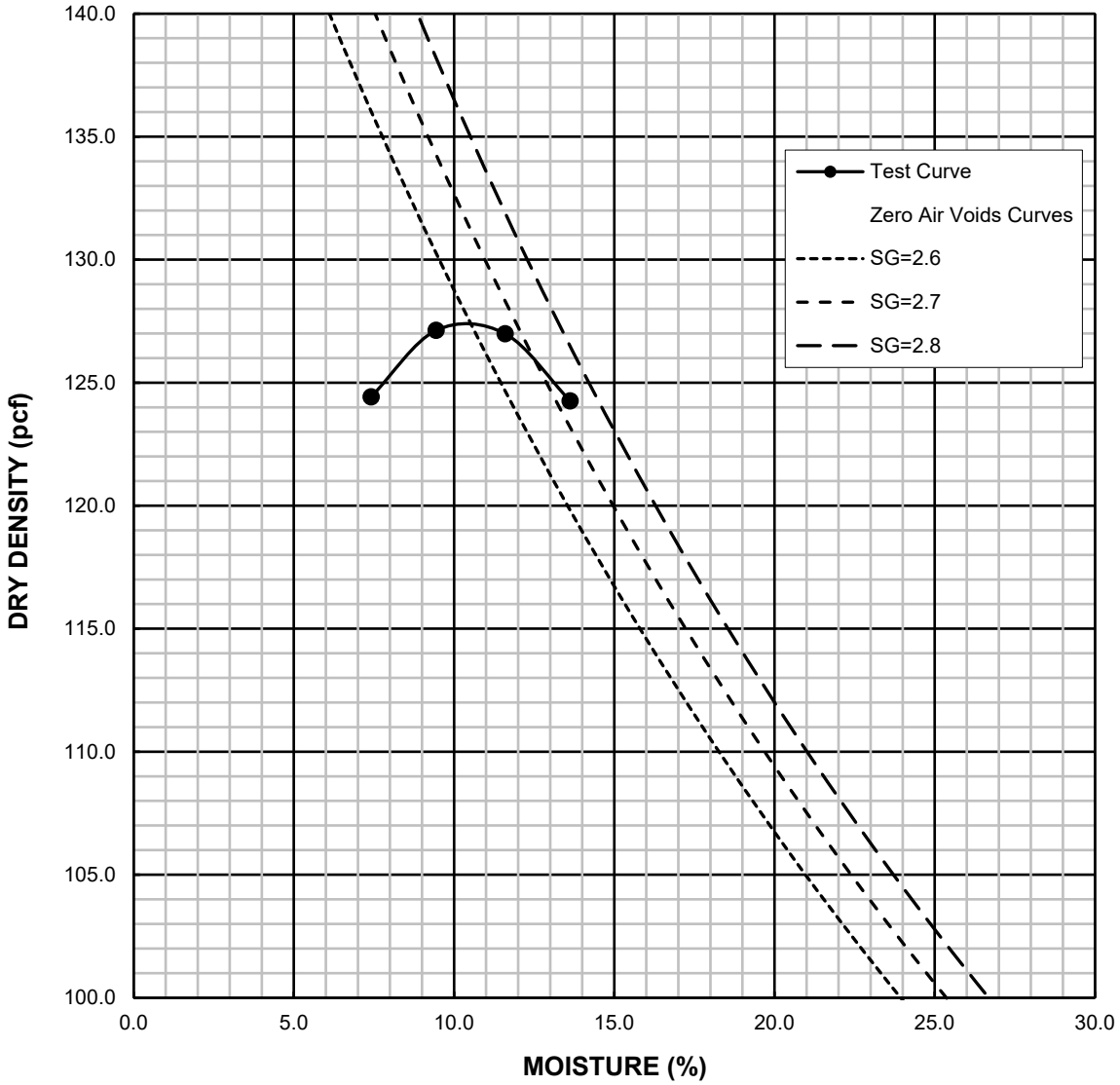
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	124.4	127.1	127.0	124.3
Moisture Content (%)	7.4	9.4	11.6	13.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**130.6 pcf**	Corrected Moisture	**9.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**10.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

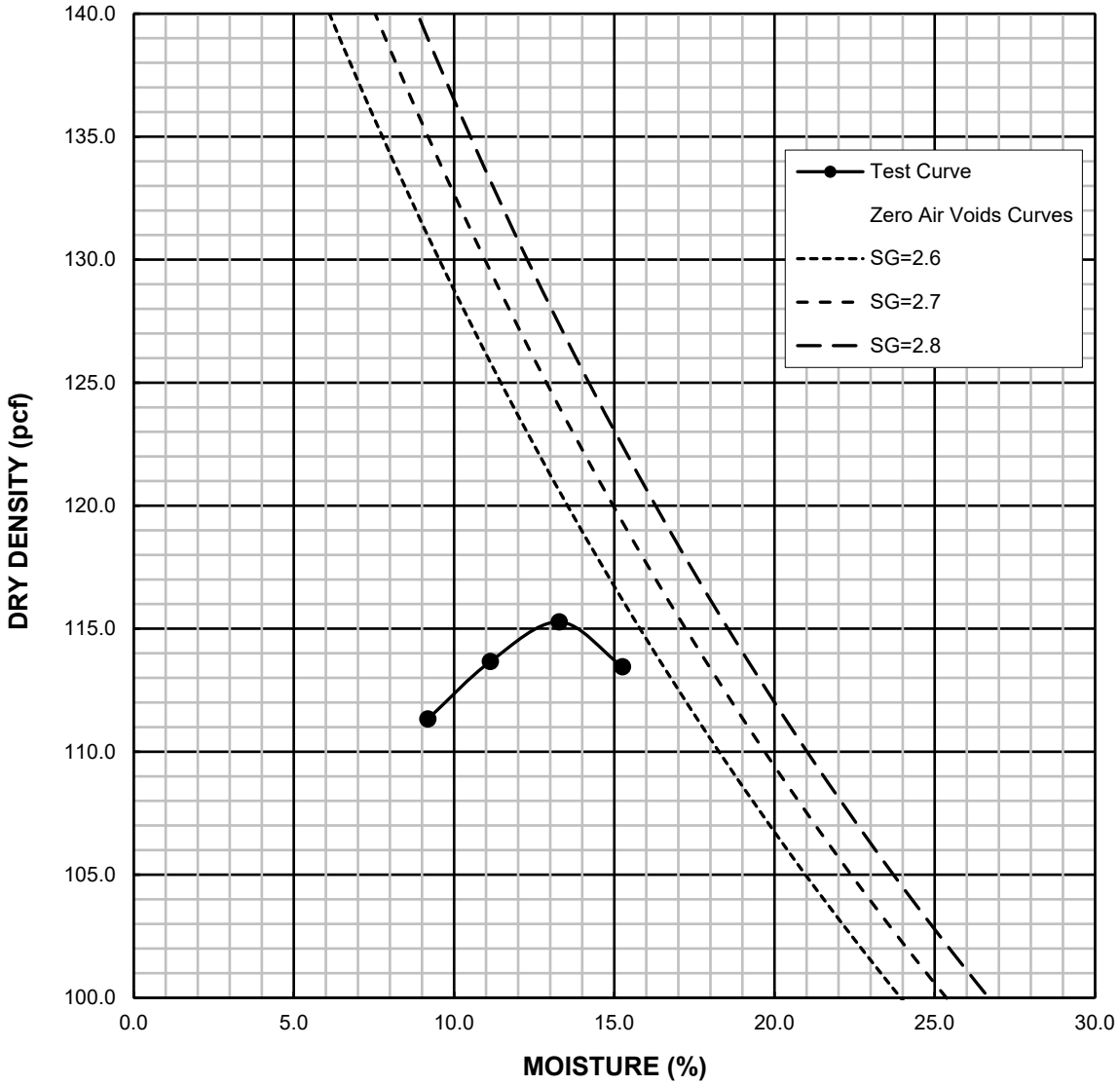
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-19
Location:	Calimesa	Depth:	6-9 ft
P/W No.:	2004-01	Soil Type:	Qlo
Date:	05-2019	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	111.3	113.7	115.3	113.5
Moisture Content (%)	9.2	11.1	13.3	15.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**118.7 pcf**	Corrected Moisture	**12.2** %
Max. Dry Density	**115 pcf**	Optimum Moisture	**13.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/24/2020

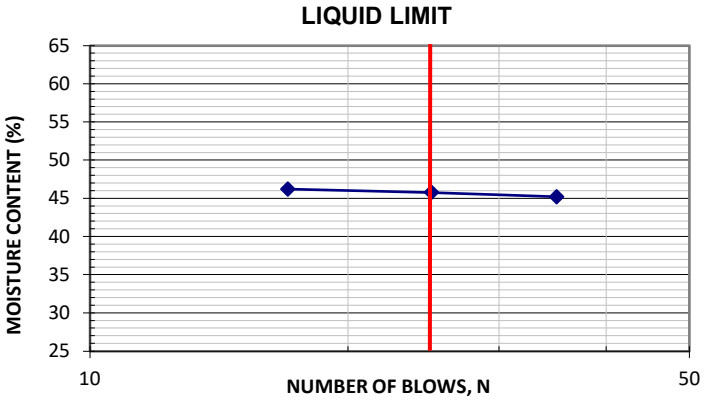
Excavation: AGS-3
Depth: 20 ft
Description: ML
By: FV

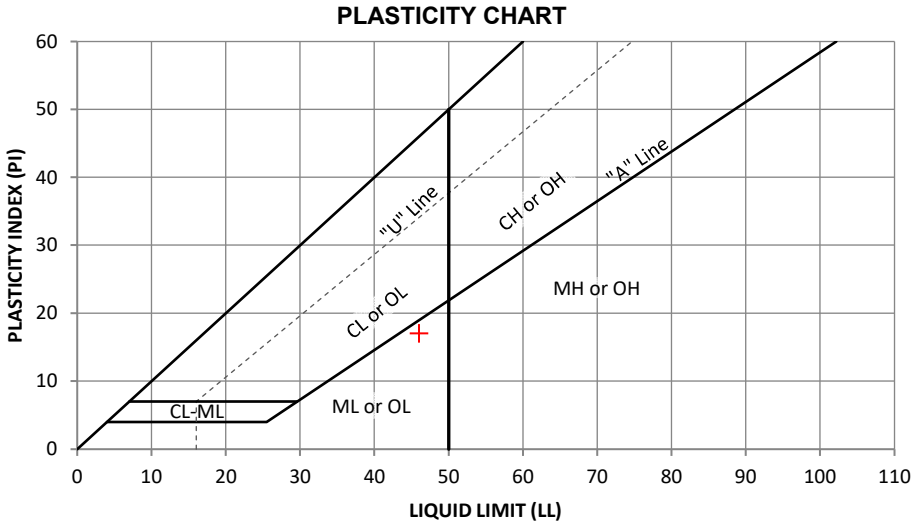
LIQUID LIMIT

Can No.	16	4	2
Wt. wet soil+can (g)	19.20	18.37	19.24
Wt. dry soil+can (g)	16.70	16.09	16.68
Wt. can (g)	11.17	11.11	11.14
Wt. mosture (g)	2.50	2.28	2.56
Wt. dry soil (g)	5.53	4.98	5.54
Water Content %	45.21	45.78	46.21
No. of Blows	35	25	17

PLASTIC LIMIT

101	105
58.85	57.22
57.12	55.77
51.09	50.74
1.73	1.45
6.03	5.03
28.69	28.83





Liquid Limit (LL) 46 Plastic Limit (PL) 29 Plasticity Index (PI) 17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

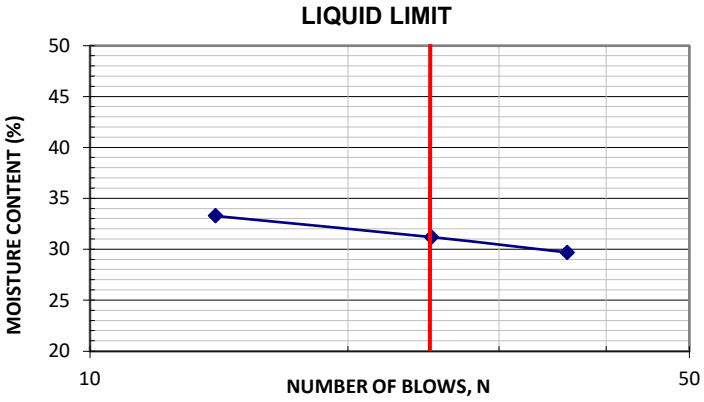
AGS Form E-2

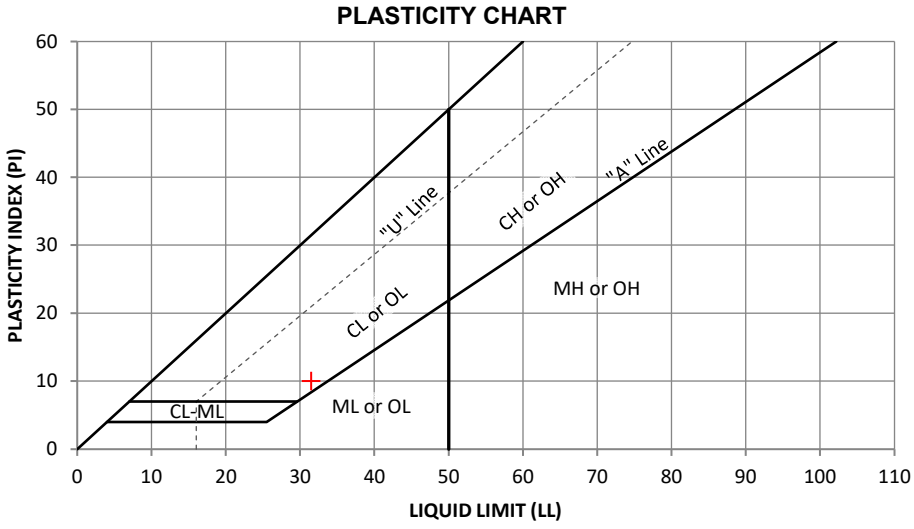
ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/21/2020

Excavation: AGS-3
Depth: 30 ft
Description: Grey Brn SC-SM
By: FV

	LIQUID LIMIT			PLASTIC LIMIT	
Can No.	3	11	1	108	102
Wt. wet soil+can (g)	21.32	23.11	23.84	60.31	62.31
Wt. dry soil+can (g)	18.80	20.29	20.96	58.63	60.41
Wt. can (g)	11.23	11.25	11.26	50.93	51.44
Wt. mosture (g)	2.52	2.82	2.88	1.68	1.90
Wt. dry soil (g)	7.57	9.04	9.70	7.70	8.97
Water Content %	33.29	31.19	29.69	21.82	21.18
No. of Blows	14	25	36		





Liquid Limit (LL) 31.5 Plastic Limit (PL) 21.5 Plasticity Index (PI) 10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

Excavation: AGS-3
Depth: 35 ft
Description: ML
By: FV

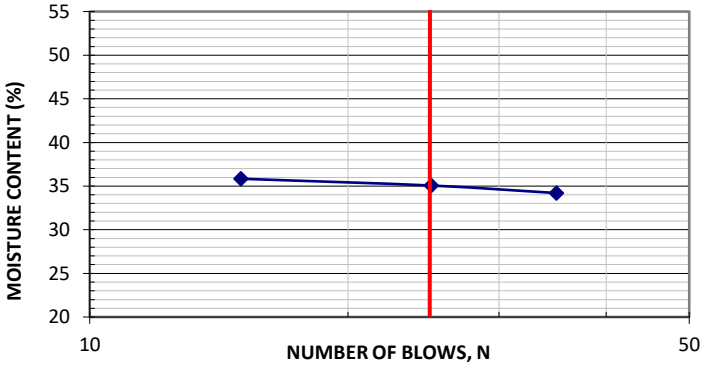
LIQUID LIMIT

Can No.	1	5	11
Wt. wet soil+can (g)	18.84	23.79	24.65
Wt. dry soil+can (g)	16.84	20.55	21.24
Wt. can (g)	11.26	11.31	11.27
Wt. mosture (g)	2.00	3.24	3.41
Wt. dry soil (g)	5.58	9.24	9.97
Water Content %	35.84	35.06	34.20
No. of Blows	15	25	35

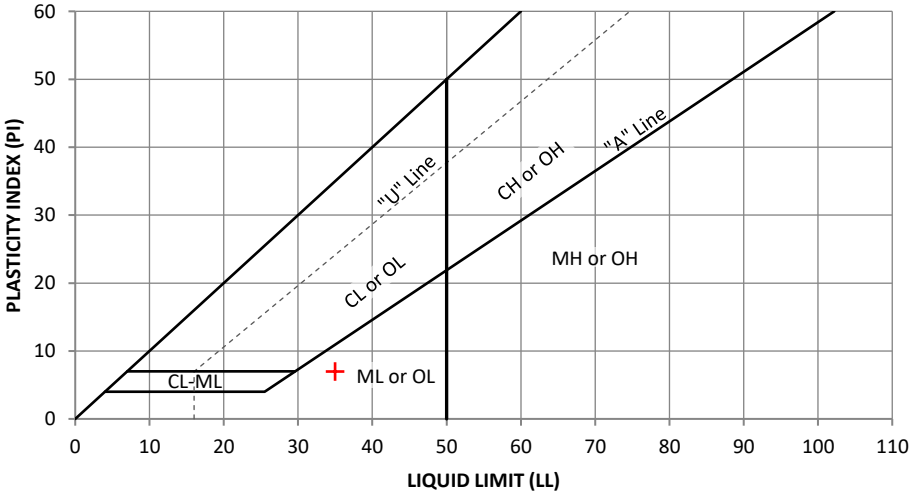
PLASTIC LIMIT

108	105
59.98	61.77
57.85	59.50
50.96	50.73
2.13	2.27
6.89	8.77
30.91	25.88

LIQUID LIMIT



PLASTICITY CHART



Liquid Limit (LL) 35 Plastic Limit (PL) 28 Plasticity Index (PI) 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

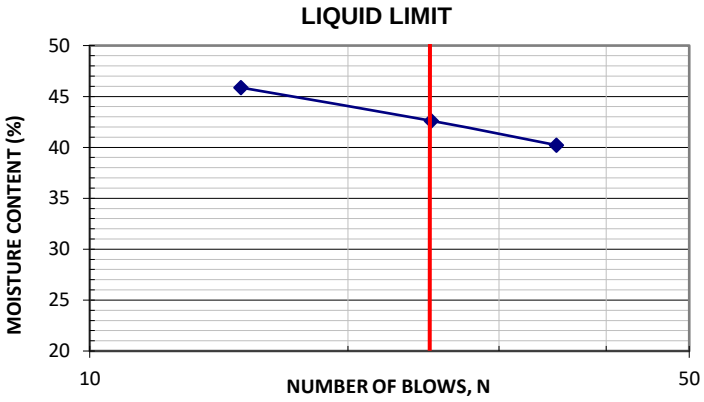
Excavation: AGS-3
Depth: 40 ft
Description: CL (Fine portion)
By: FV

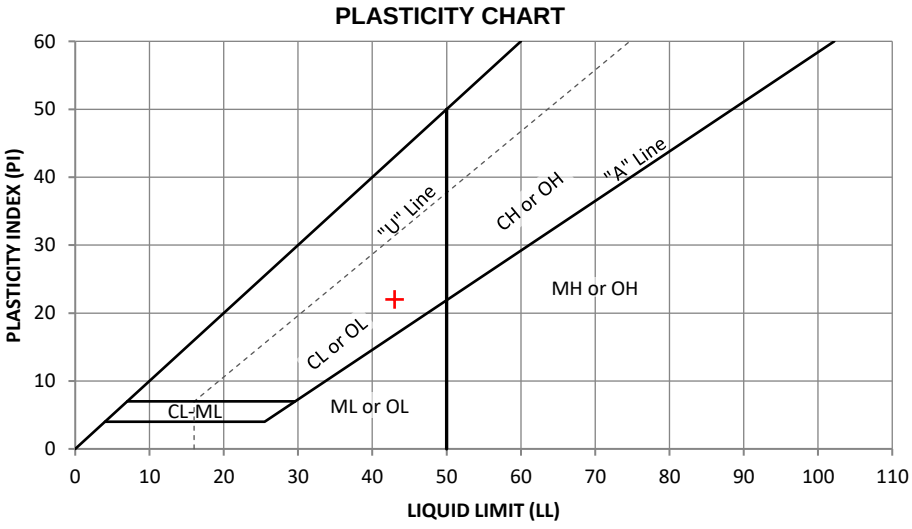
LIQUID LIMIT

Can No.	15	14	3
Wt. wet soil+can (g)	20.42	20.43	19.94
Wt. dry soil+can (g)	17.53	17.69	17.39
Wt. can (g)	11.23	11.26	11.05
Wt. mosture (g)	2.89	2.74	2.55
Wt. dry soil (g)	6.30	6.43	6.34
Water Content %	45.87	42.61	40.22
No. of Blows	15	25	35

PLASTIC LIMIT

104	102
59.27	57.85
57.87	56.74
51.04	51.47
1.40	1.11
6.83	5.27
20.50	21.06





Liquid Limit (LL) 43 Plastic Limit (PL) 21 Plasticity Index (PI) 22

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley town Center
Location: Calimesa
Project No: 2004-01
Date: 9/23/2020

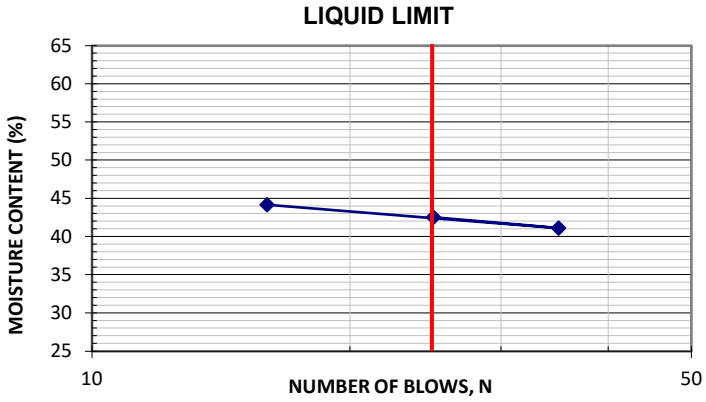
Excavation: AGS-16
Depth: 25 ft
Description: CL
By: FV

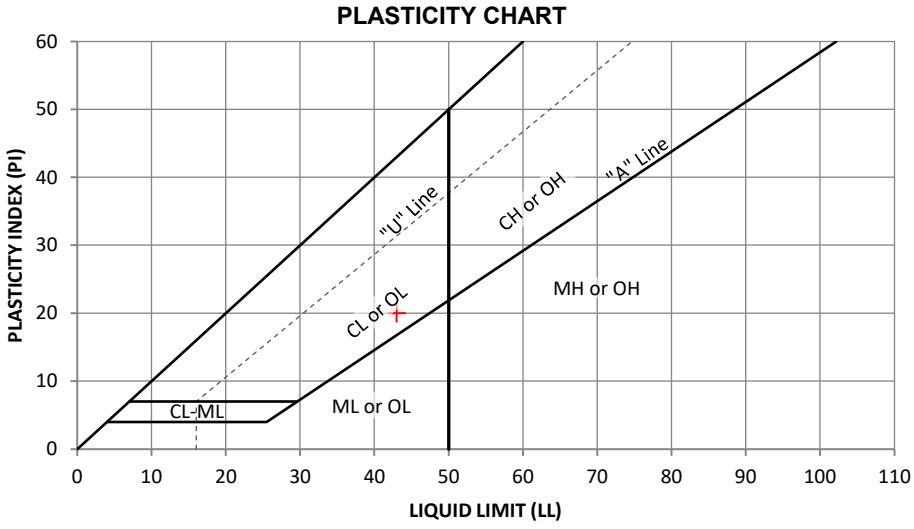
LIQUID LIMIT

Can No.	15	11	5
Wt. wet soil+can (g)	20.10	19.65	18.21
Wt. dry soil+can (g)	17.45	17.20	16.09
Wt. can (g)	11.22	11.24	11.29
Wt. mosture (g)	2.65	2.45	2.12
Wt. dry soil (g)	6.23	5.96	4.80
Water Content %	42.54	41.11	44.17
No. of Blows	25	35	16

PLASTIC LIMIT

109	106
56.91	58.04
55.89	56.78
51.56	51.34
1.02	1.26
4.33	5.44
23.56	23.16





Liquid Limit (LL) 43 Plastic Limit (PL) 23 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

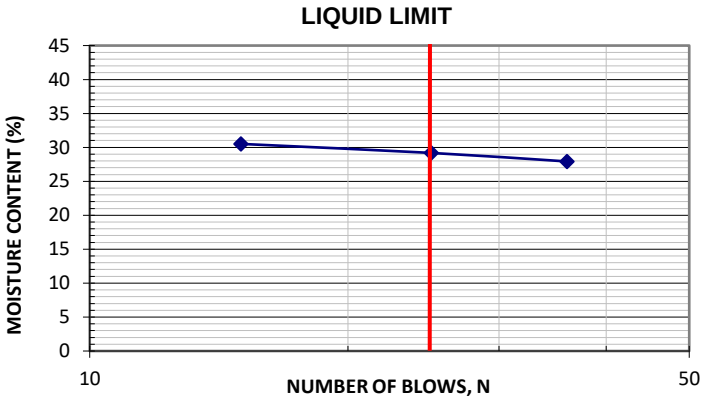
Excavation: AGS-16
Depth: 30 ft
Description: CL (Fine portion)
By: FV

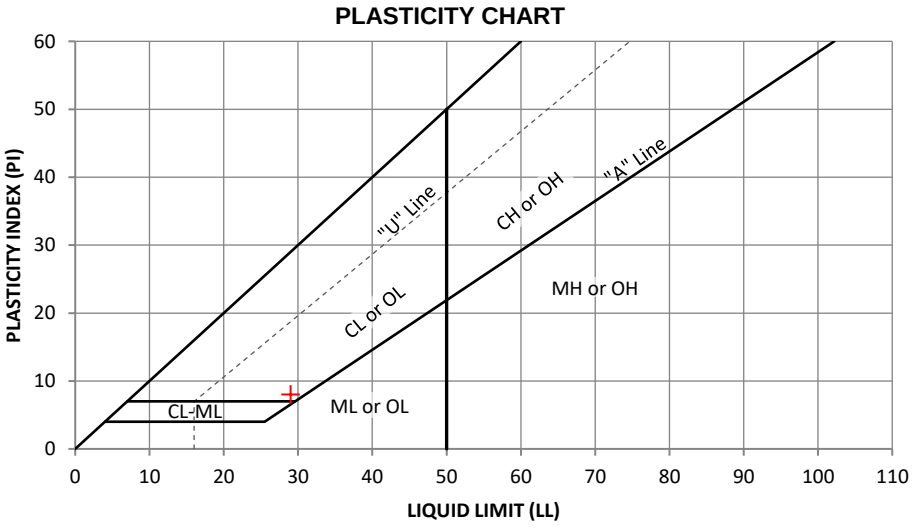
LIQUID LIMIT

Can No.	14	3	15
Wt. wet soil+can (g)	22.98	22.43	21.44
Wt. dry soil+can (g)	20.24	19.90	19.22
Wt. can (g)	11.26	11.23	11.27
Wt. mosture (g)	2.74	2.53	2.22
Wt. dry soil (g)	8.98	8.67	7.95
Water Content %	30.51	29.18	27.92
No. of Blows	15	25	36

PLASTIC LIMIT

101	109
58.25	58.32
56.94	57.20
51.08	51.55
1.31	1.12
5.86	5.65
22.35	19.82





Liquid Limit (LL) 29 Plastic Limit (PL) 21 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

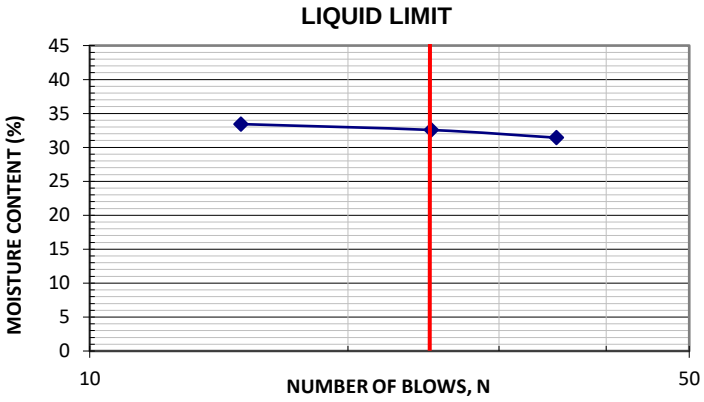
Excavation: AGS-16
Depth: 35 ft
Description: CL (Fine portion)
By: FV

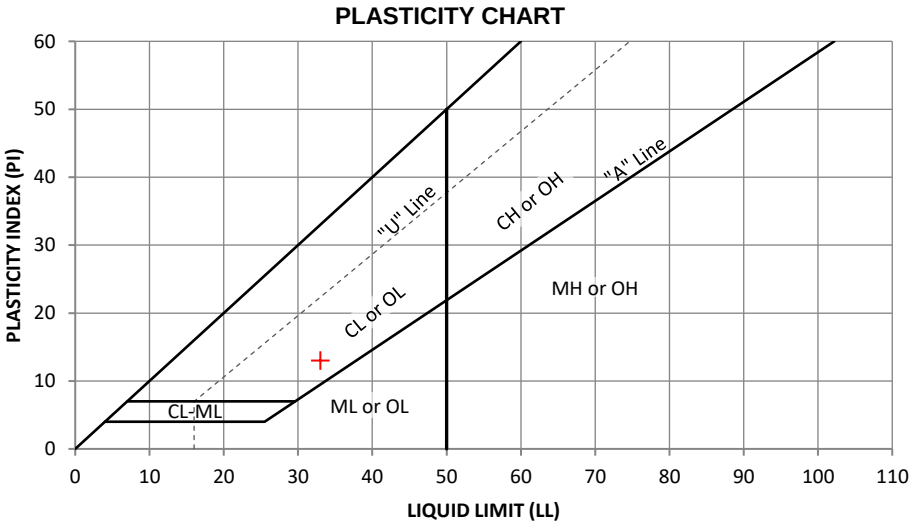
LIQUID LIMIT

Can No.	16	11	5
Wt. wet soil+can (g)	20.66	21.55	22.08
Wt. dry soil+can (g)	18.29	19.02	19.50
Wt. can (g)	11.20	11.25	11.29
Wt. mosture (g)	2.37	2.53	2.58
Wt. dry soil (g)	7.09	7.77	8.21
Water Content %	33.43	32.56	31.43
No. of Blows	15	25	35

PLASTIC LIMIT

106	111
57.80	57.64
56.66	56.63
51.34	51.42
1.14	1.01
5.32	5.21
21.43	19.39





Liquid Limit (LL) 33 Plastic Limit (PL) 20 Plasticity Index (PI) 13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

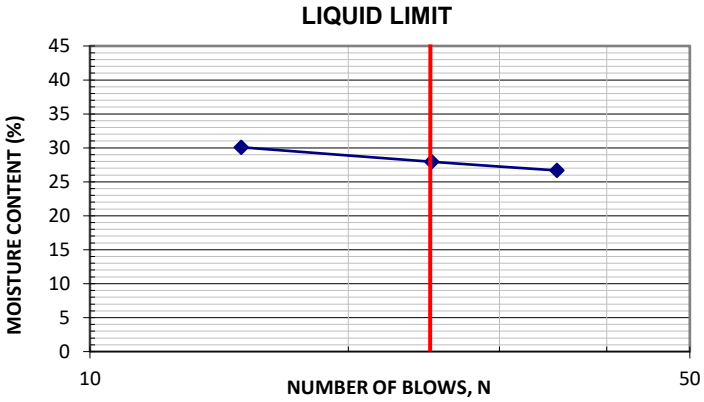
Excavation: AGS-16
Depth: 45 ft
Description: CL (Fine portion)
By: FV

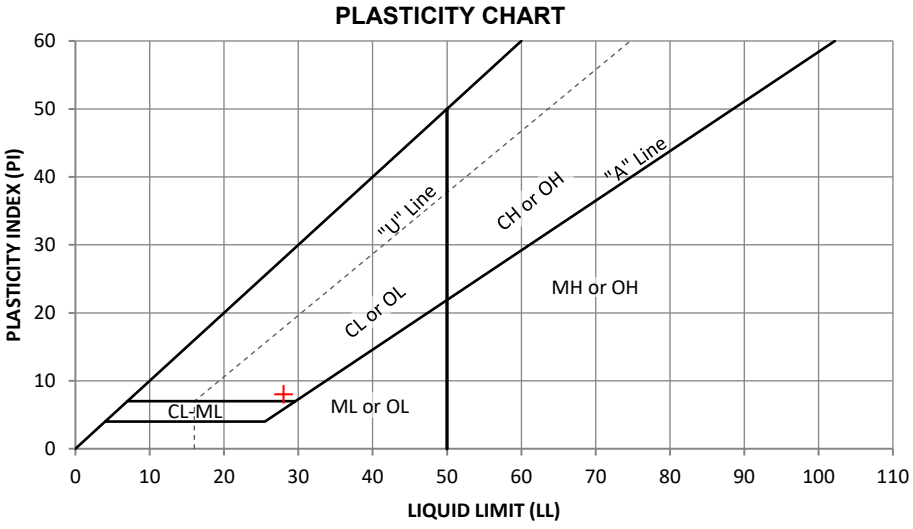
LIQUID LIMIT

Can No.	4	2	10
Wt. wet soil+can (g)	20.75	20.88	21.44
Wt. dry soil+can (g)	18.72	18.75	19.06
Wt. can (g)	11.11	11.13	11.15
Wt. mosture (g)	2.03	2.13	2.38
Wt. dry soil (g)	7.61	7.62	7.91
Water Content %	26.68	27.95	30.09
No. of Blows	35	25	15

PLASTIC LIMIT

100	103
58.69	58.58
57.45	57.40
51.53	51.47
1.24	1.18
5.92	5.93
20.95	19.90





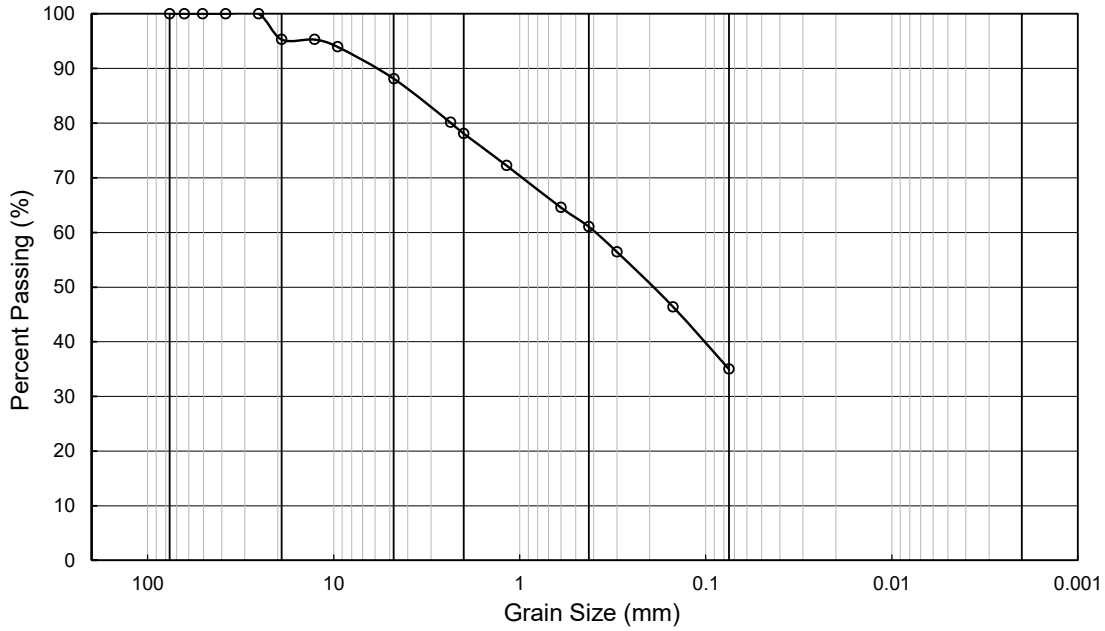
Liquid Limit (LL) 28 Plastic Limit (PL) 20 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-5
Location:	Calimesa	Depth:	4 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	95
1/2 "	12.70	95
3/8 "	9.53	94
# 4	4.75	88.1
# 8	2.36	80.1
#10	2.00	78.1
#16	1.18	72.3
# 30	0.60	64.5
# 40	0.425	61.0
# 50	0.30	56.4
# 100	0.15	46.4
# 200	0.075	35.0

Summary	
% Gravel =	11.9
% Sand =	53.1
% Fines =	35.0
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

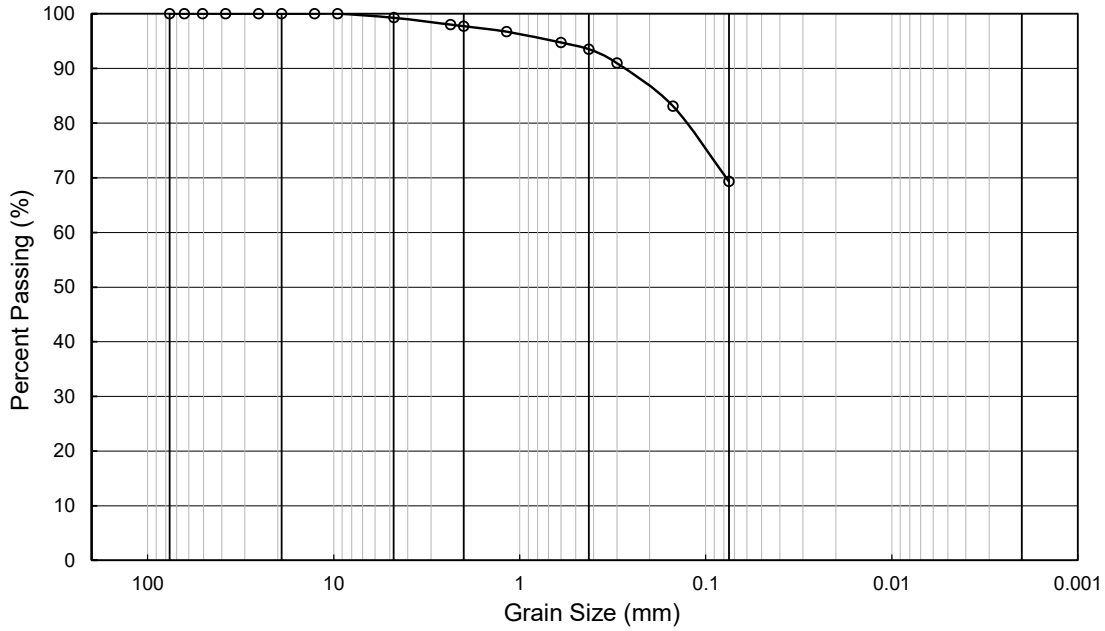
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-10
Location:	Calimesa	Depth:	12 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.3
# 8	2.36	98.0
#10	2.00	97.7
#16	1.18	96.7
# 30	0.60	94.7
# 40	0.425	93.5
# 50	0.30	91.0
# 100	0.15	83.1
# 200	0.075	69.3

Summary	
% Gravel =	0.7
% Sand =	30.0
% Fines =	69.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

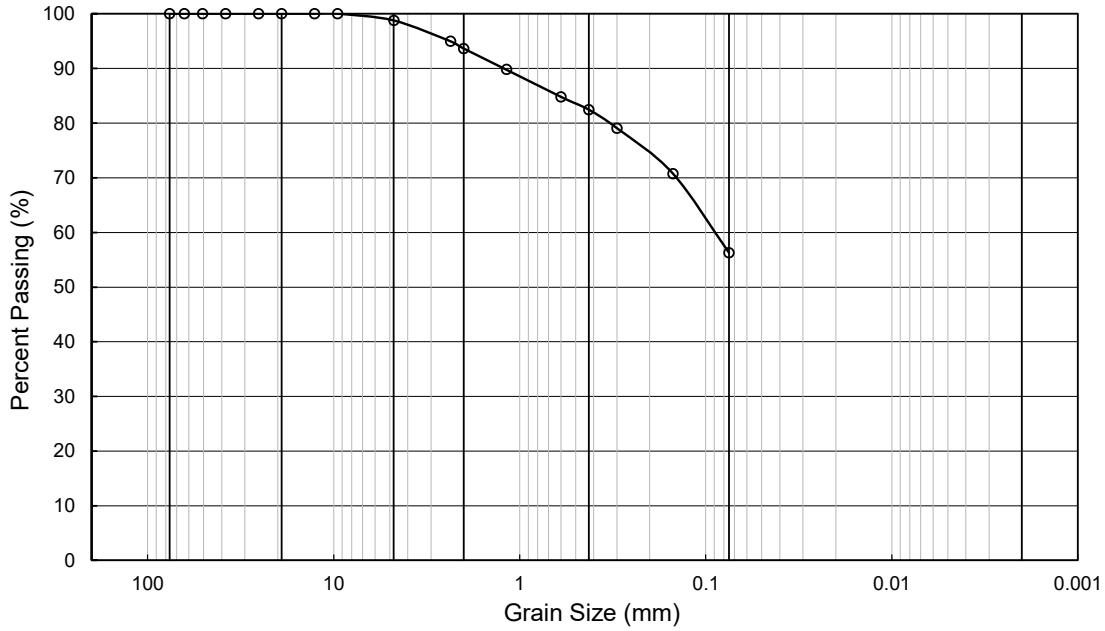
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-11
Location:	Calimesa	Depth:	7.5 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.8
# 8	2.36	95.0
#10	2.00	93.6
#16	1.18	89.8
# 30	0.60	84.8
# 40	0.425	82.4
# 50	0.30	79.1
# 100	0.15	70.7
# 200	0.075	56.3

Summary	
% Gravel =	1.2
% Sand =	42.5
% Fines =	56.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

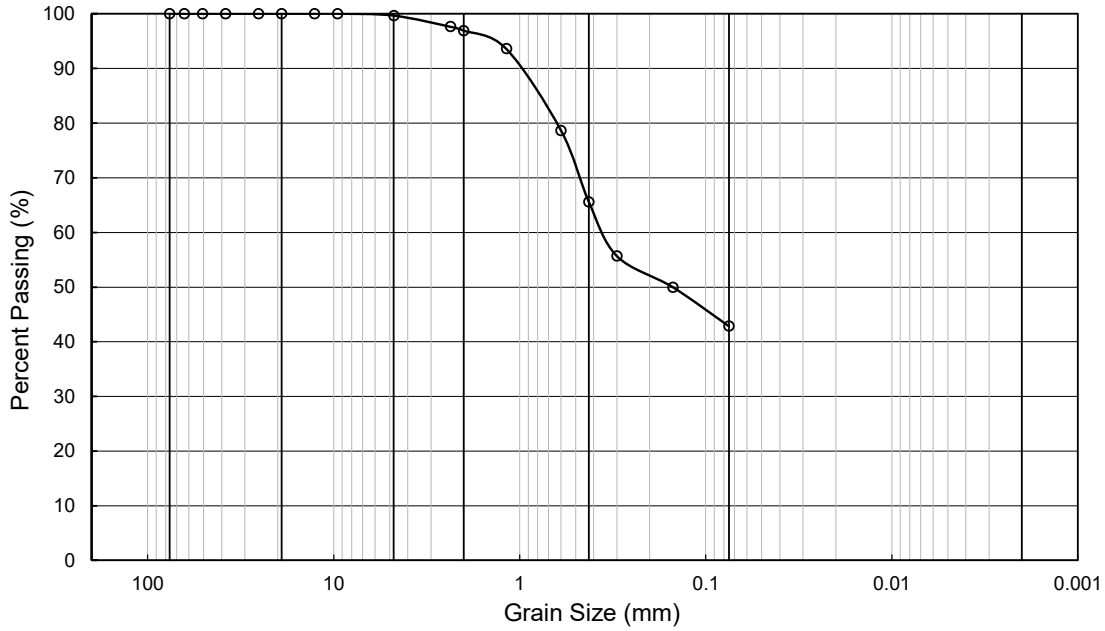
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-17
Location:	Calimesa	Depth:	13-14 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.6
# 8	2.36	97.6
#10	2.00	96.9
#16	1.18	93.6
# 30	0.60	78.6
# 40	0.425	65.6
# 50	0.30	55.7
# 100	0.15	50.0
# 200	0.075	42.8

Summary	
% Gravel =	0.4
% Sand =	56.8
% Fines =	42.8
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

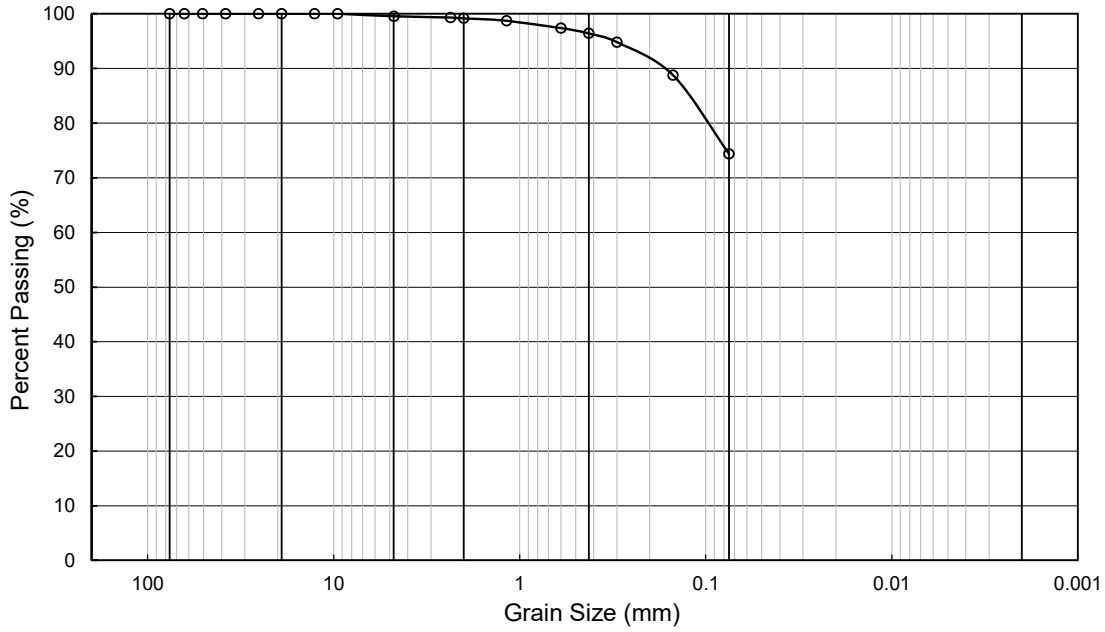
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	10 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.5
# 8	2.36	99.3
#10	2.00	99.2
#16	1.18	98.7
# 30	0.60	97.4
# 40	0.425	96.4
# 50	0.30	94.8
# 100	0.15	88.8
# 200	0.075	74.3

Summary	
% Gravel =	0.5
% Sand =	25.2
% Fines =	74.3
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

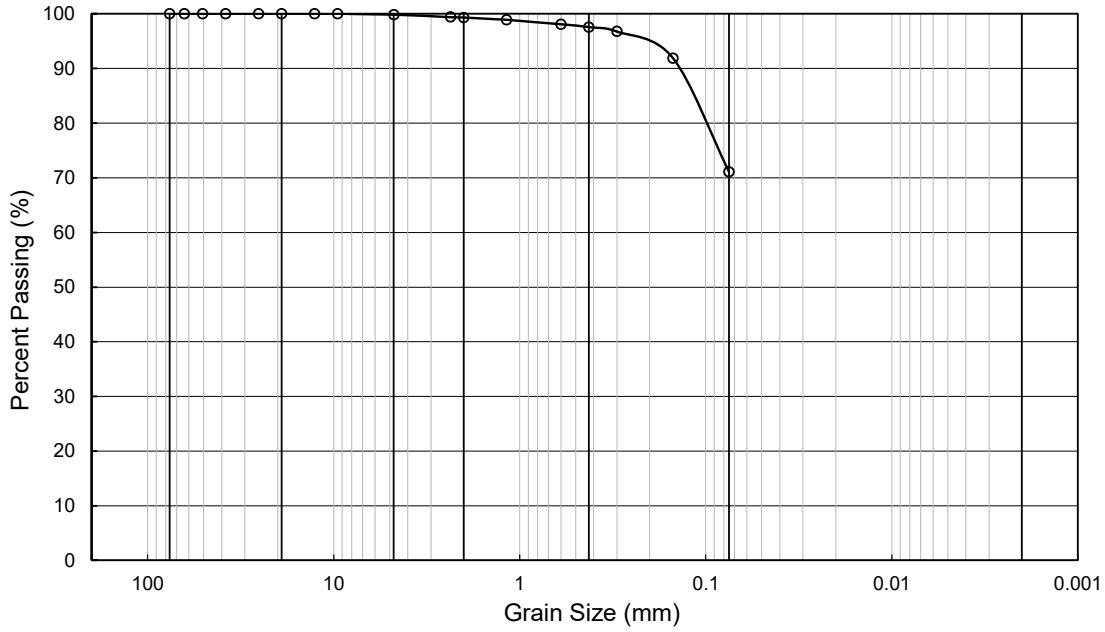
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	20 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.8
# 8	2.36	99.4
#10	2.00	99.3
#16	1.18	98.9
# 30	0.60	98.1
# 40	0.425	97.5
# 50	0.30	96.8
# 100	0.15	91.9
# 200	0.075	71.1

Summary	
% Gravel =	0.2
% Sand =	28.7
% Fines =	71.1
Sum =	100.0

LL=	46
PL=	29
PI =	17

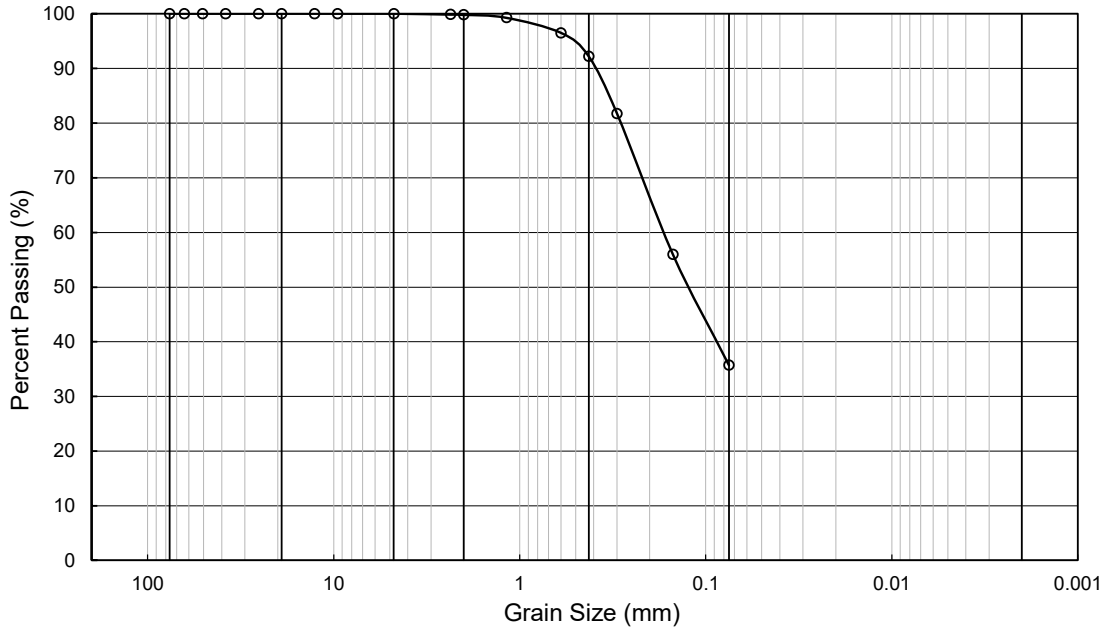
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.9
#10	2.00	99.8
#16	1.18	99.3
# 30	0.60	96.5
# 40	0.425	92.2
# 50	0.30	81.7
# 100	0.15	55.9
# 200	0.075	35.7

Summary	
% Gravel =	0.0
% Sand =	64.3
% Fines =	35.7
Sum =	100.0

LL=	31.5
PL=	21.5
PI =	10

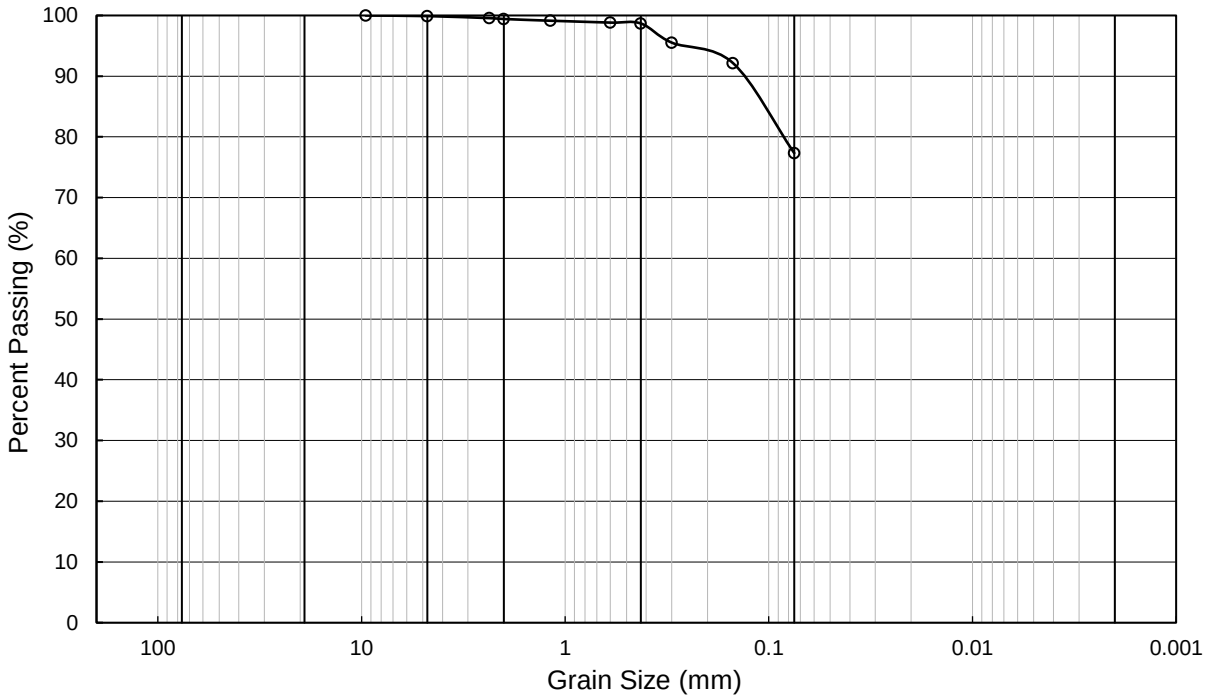
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	99.9
# 8	2.36	99.6
#10	2.00	99.4
#16	1.18	99.1
# 30	0.60	98.8
# 40	0.425	98.7
# 50	0.30	95.5
# 100	0.15	92.2
# 200	0.075	77.3

Summary	
% Gravel =	0.1
% Sand =	22.6
% Fines =	77.3
Sum =	100.0

LL=	35
PL=	28
PI =	7

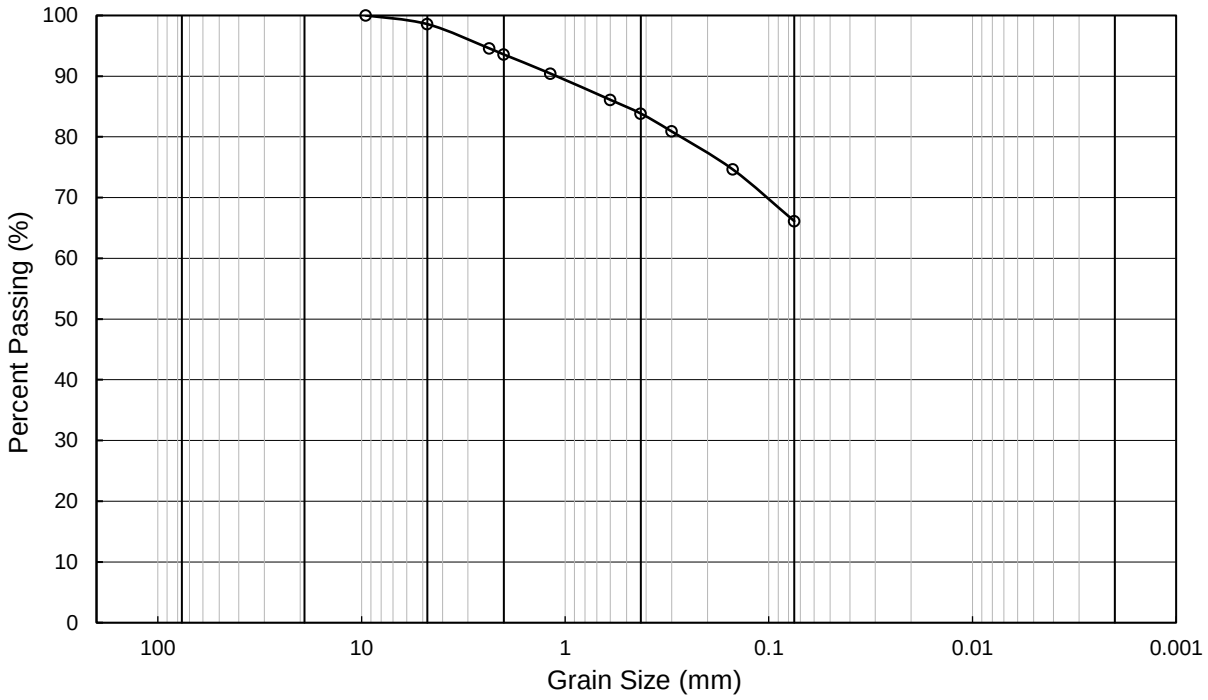
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	40 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	98.6
# 8	2.36	94.6
#10	2.00	93.6
#16	1.18	90.4
# 30	0.60	86.1
# 40	0.425	83.8
# 50	0.30	80.9
# 100	0.15	74.6
# 200	0.075	66.1

Summary	
% Gravel =	1.4
% Sand =	32.4
% Fines =	66.1
Sum =	100.0

LL=	43
PL=	21
PI =	22

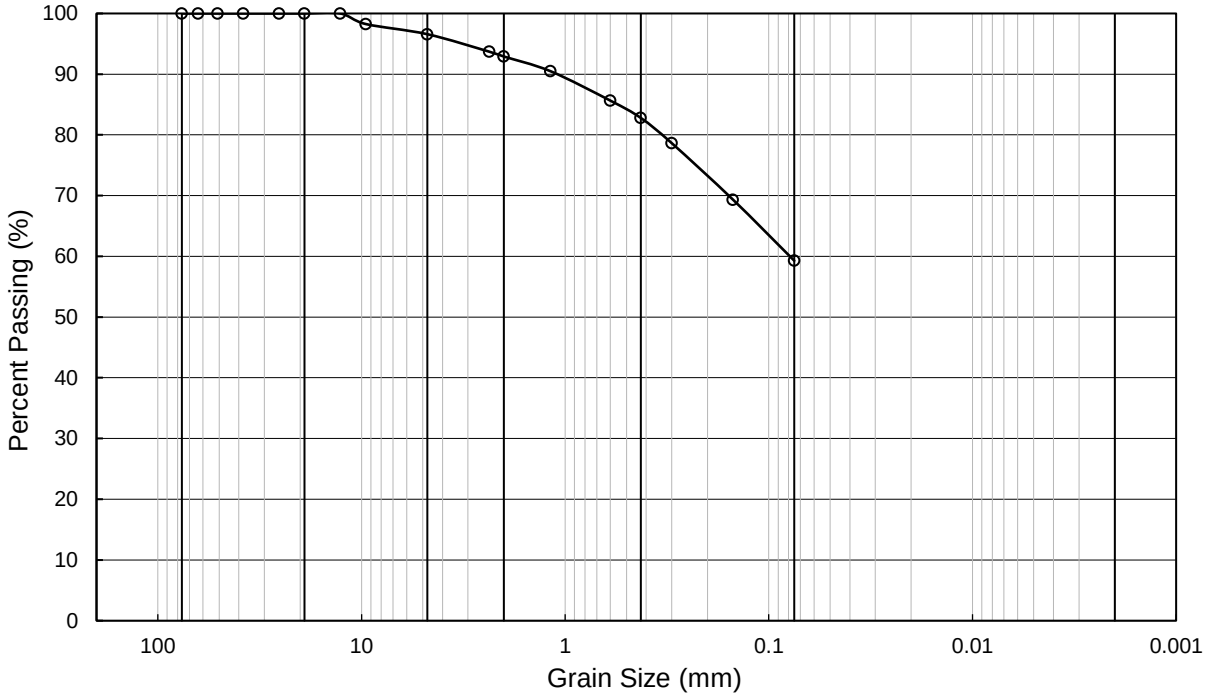
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	50 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	98
# 4	4.75	96.6
# 8	2.36	93.7
#10	2.00	92.9
#16	1.18	90.5
# 30	0.60	85.6
# 40	0.425	82.8
# 50	0.30	78.7
# 100	0.15	69.3
# 200	0.075	59.3

Summary	
% Gravel =	3.4
% Sand =	37.3
% Fines =	59.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

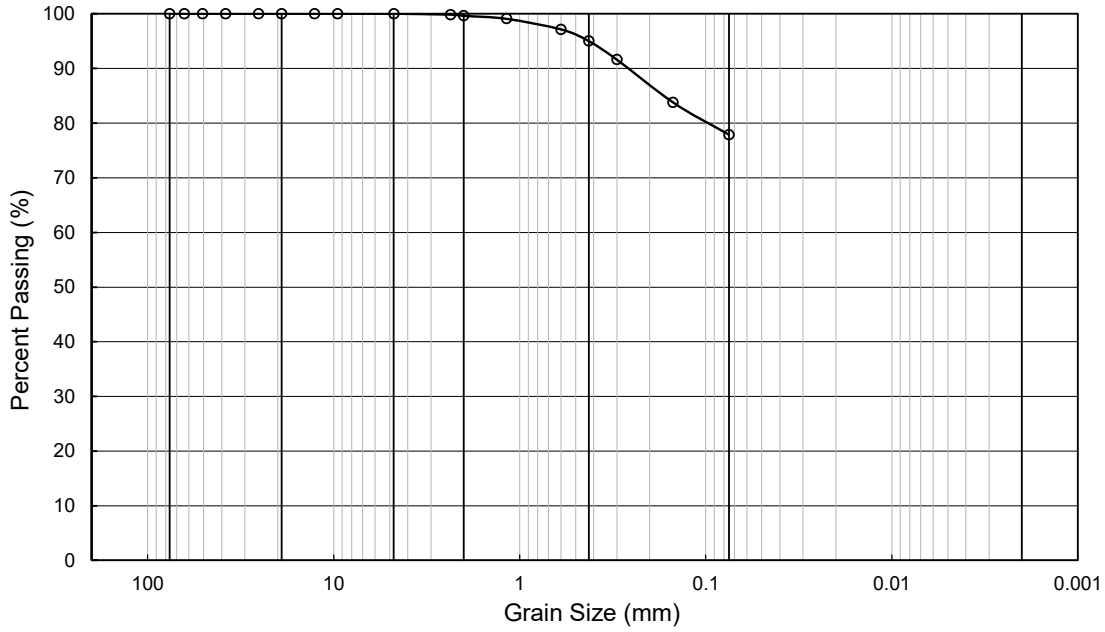
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.8
#10	2.00	99.6
#16	1.18	99.1
# 30	0.60	97.1
# 40	0.425	95.0
# 50	0.30	91.6
# 100	0.15	83.8
# 200	0.075	77.9

Summary	
% Gravel =	0.0
% Sand =	22.1
% Fines =	77.9
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

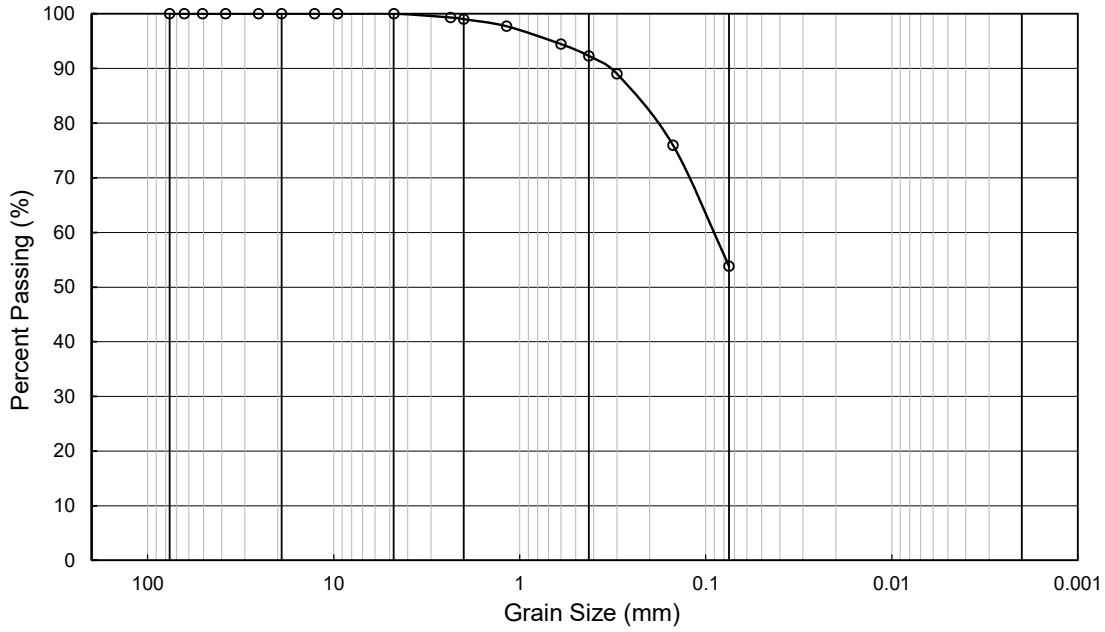
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.3
#10	2.00	99.0
#16	1.18	97.7
# 30	0.60	94.4
# 40	0.425	92.3
# 50	0.30	89.0
# 100	0.15	75.9
# 200	0.075	53.8

Summary	
% Gravel =	0.0
% Sand =	46.2
% Fines =	53.8
Sum =	100.0

LL=	43
PL=	23
PI =	20

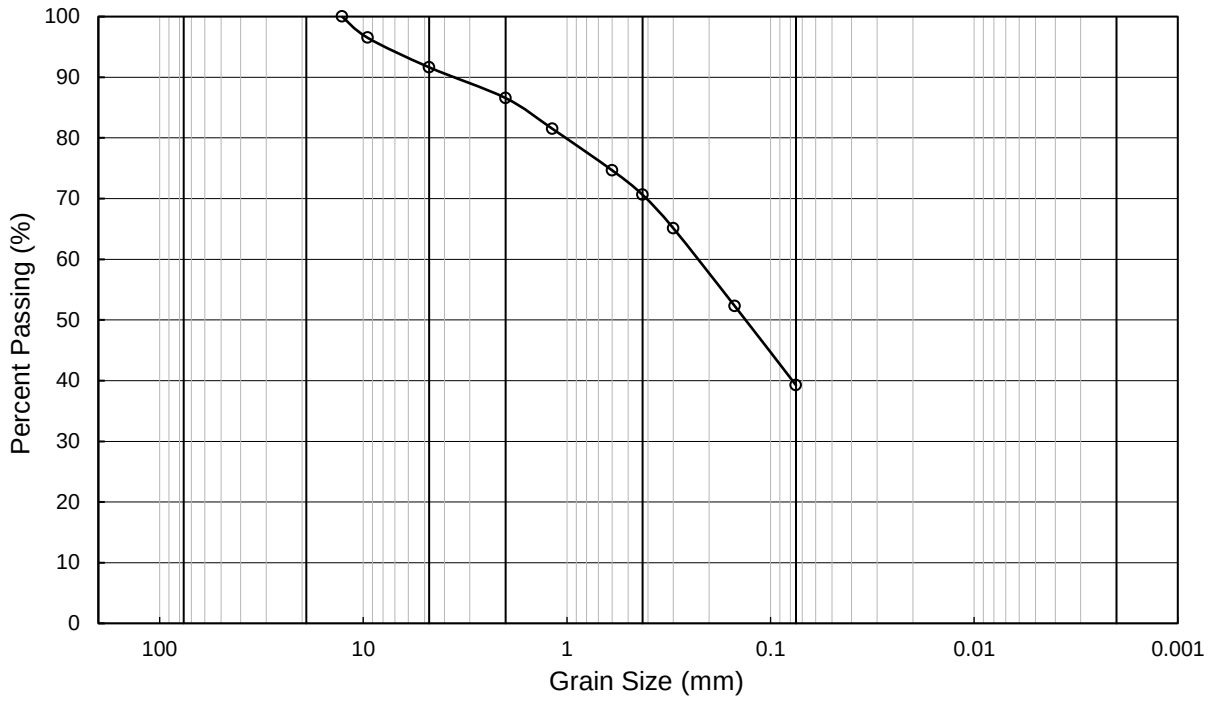
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	100
3/8 "	9.53	97
# 4	4.75	91.6
#10	2.00	86.6
#16	1.18	81.5
# 30	0.60	74.7
# 40	0.425	70.6
# 50	0.30	65.1
# 100	0.15	52.3
# 200	0.075	39.3

Summary	
% Gravel =	8.4
% Sand =	52.4
% Fines =	39.3
Sum =	100.0

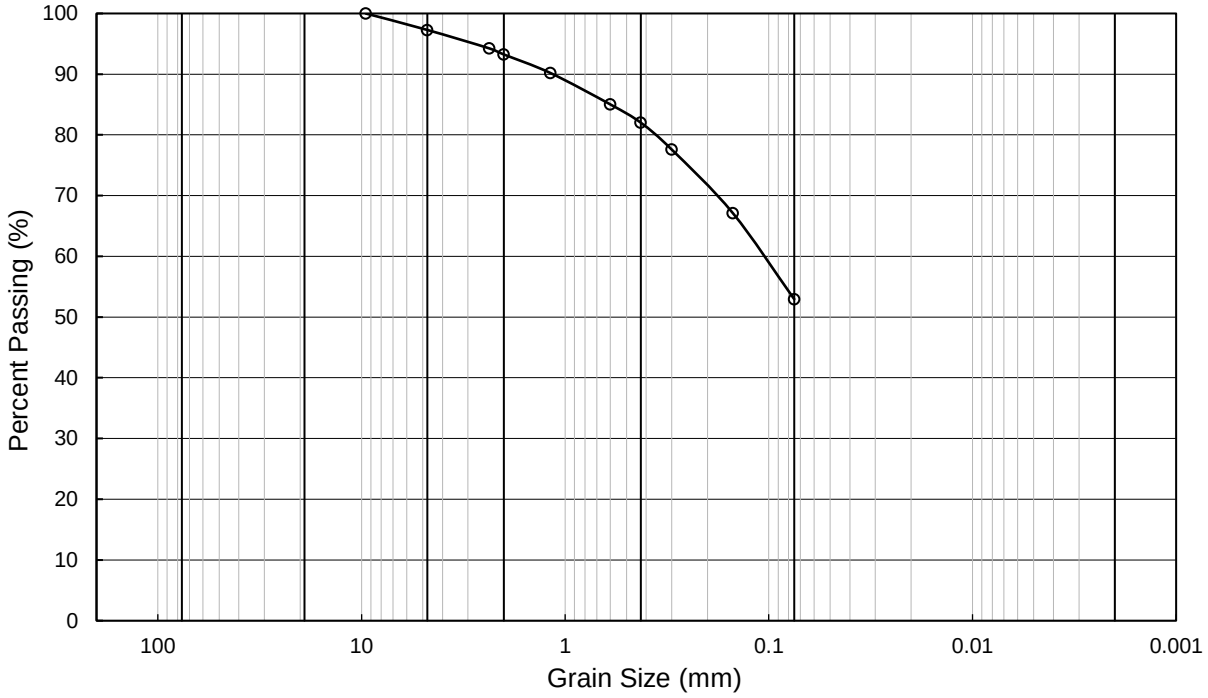
LL=	29
PL=	21
PI =	8
Soil Type:	SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.3
#10	2.00	93.2
#16	1.18	90.2
# 30	0.60	85.0
# 40	0.425	82.0
# 50	0.30	77.6
# 100	0.15	67.1
# 200	0.075	52.9

Summary	
% Gravel =	2.7
% Sand =	44.3
% Fines =	52.9
Sum =	100.0

LL=	33
PL=	20
PI =	13

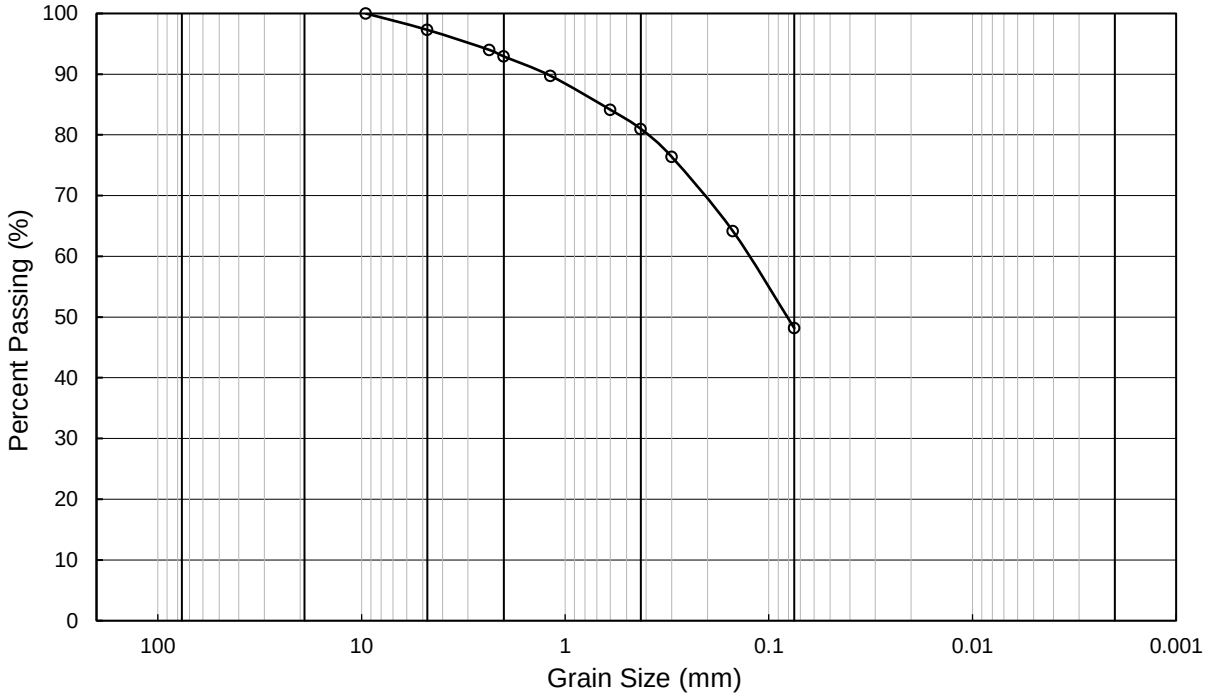
Soil Type: SC-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	45 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.0
#10	2.00	92.9
#16	1.18	89.7
# 30	0.60	84.1
# 40	0.425	81.0
# 50	0.30	76.4
# 100	0.15	64.1
# 200	0.075	48.2

Summary	
% Gravel =	2.7
% Sand =	49.1
% Fines =	48.2
Sum =	100.0

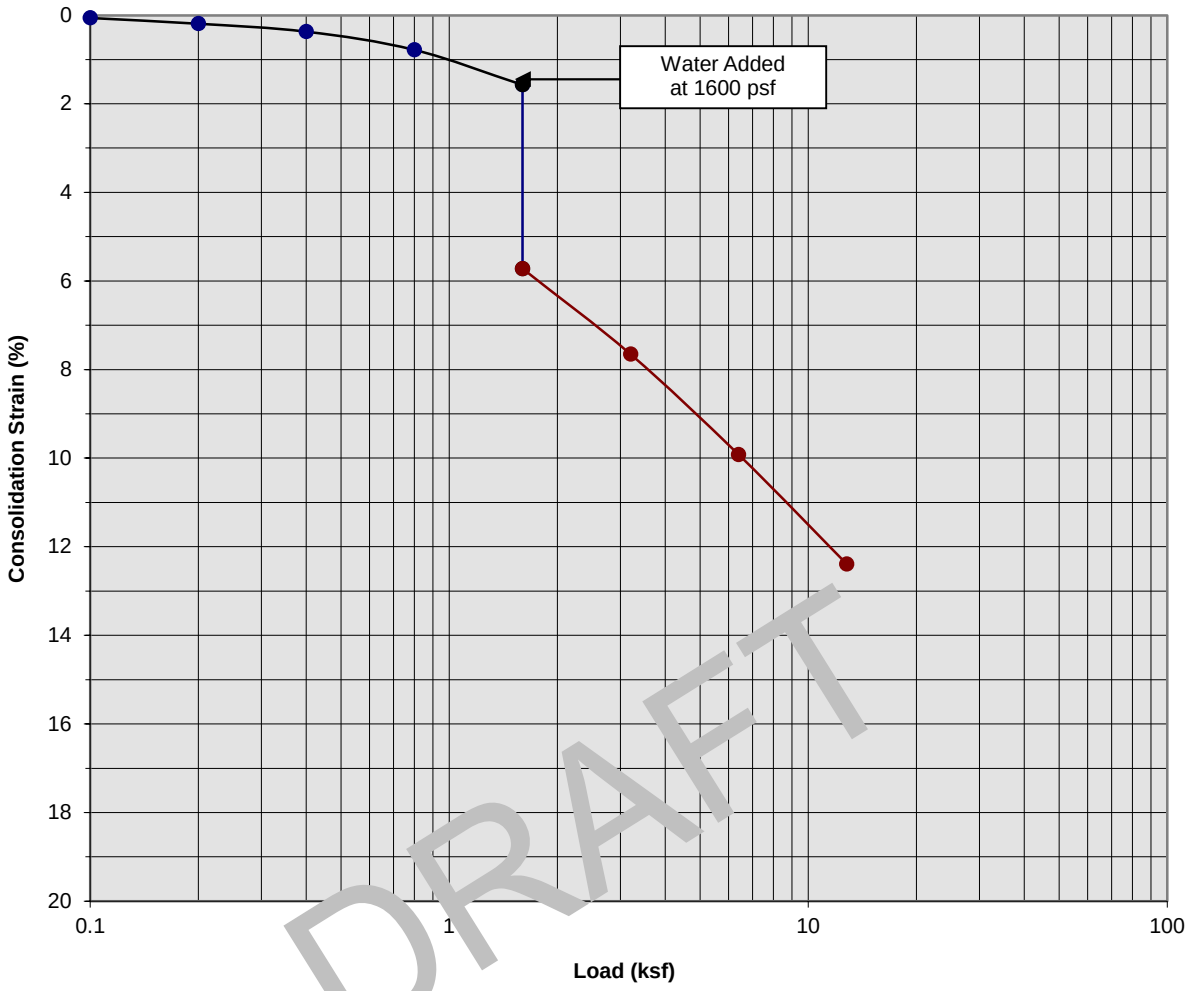
LL=	28
PL=	20
PI =	8

Soil Type: SC-CL

APPENDIX C-2

DRAFT LABORATORY TEST RESULTS (SCG)

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Light Red Brown Silty fine to coarse Sand

Boring Number:	SCG-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 1

SoCalGeo
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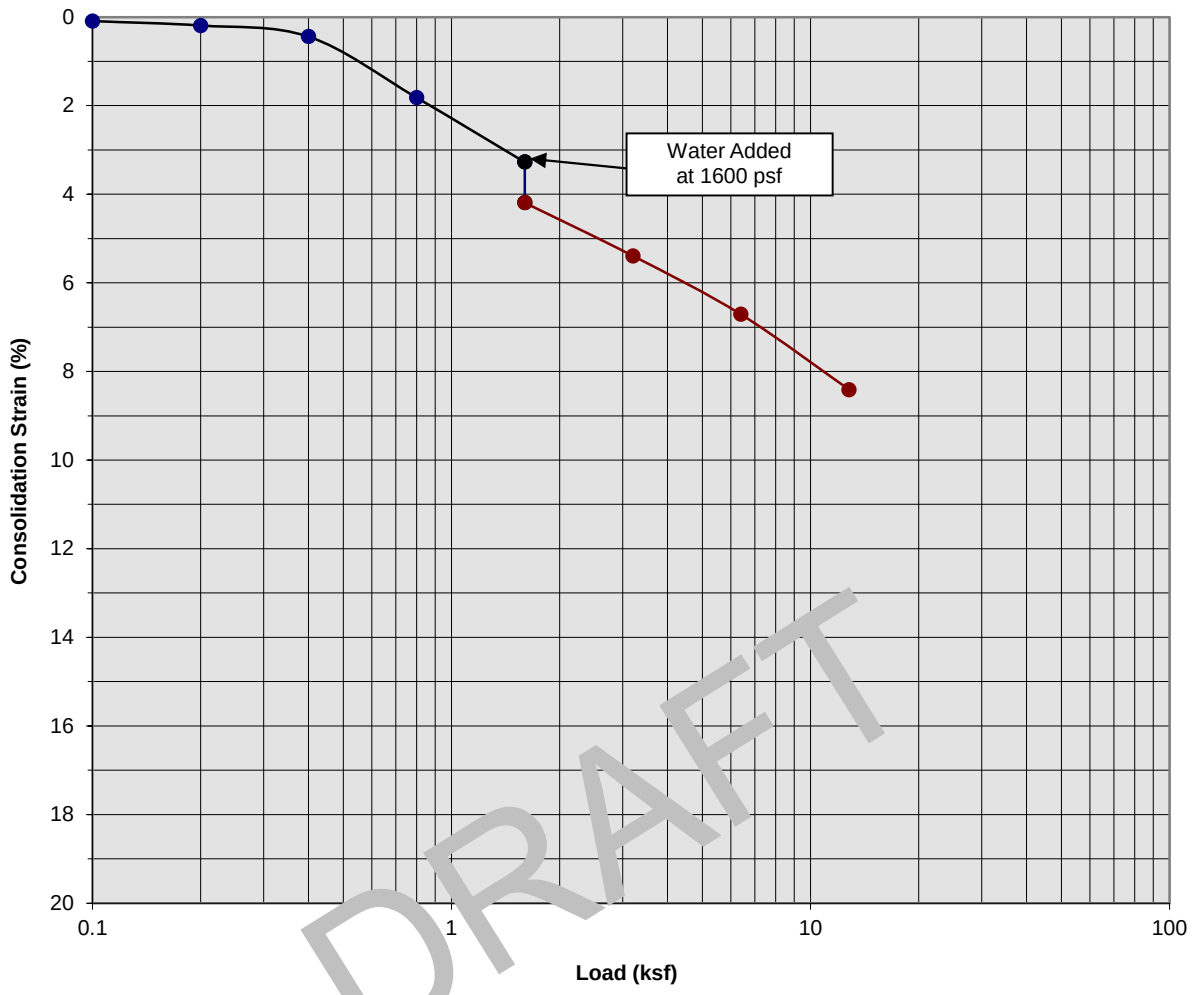
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Red Brown Silty fine Sand, trace medium to coarse Sand

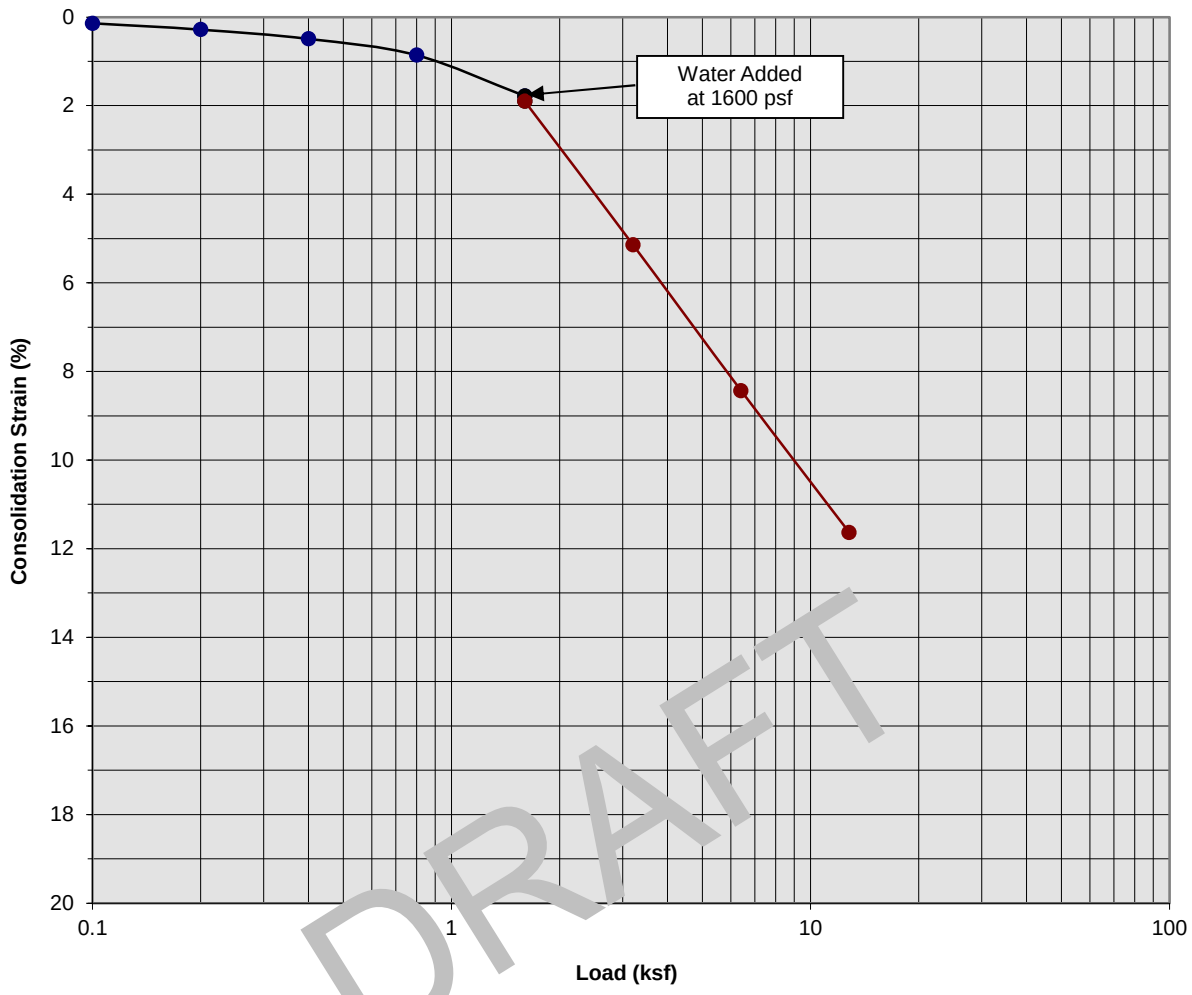
Boring Number:	SCG-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	121.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Colluvium: Dark Gray Brown Silty fine to medium Sand

Boring Number:	SCG-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	99.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 3

SoCalGeo
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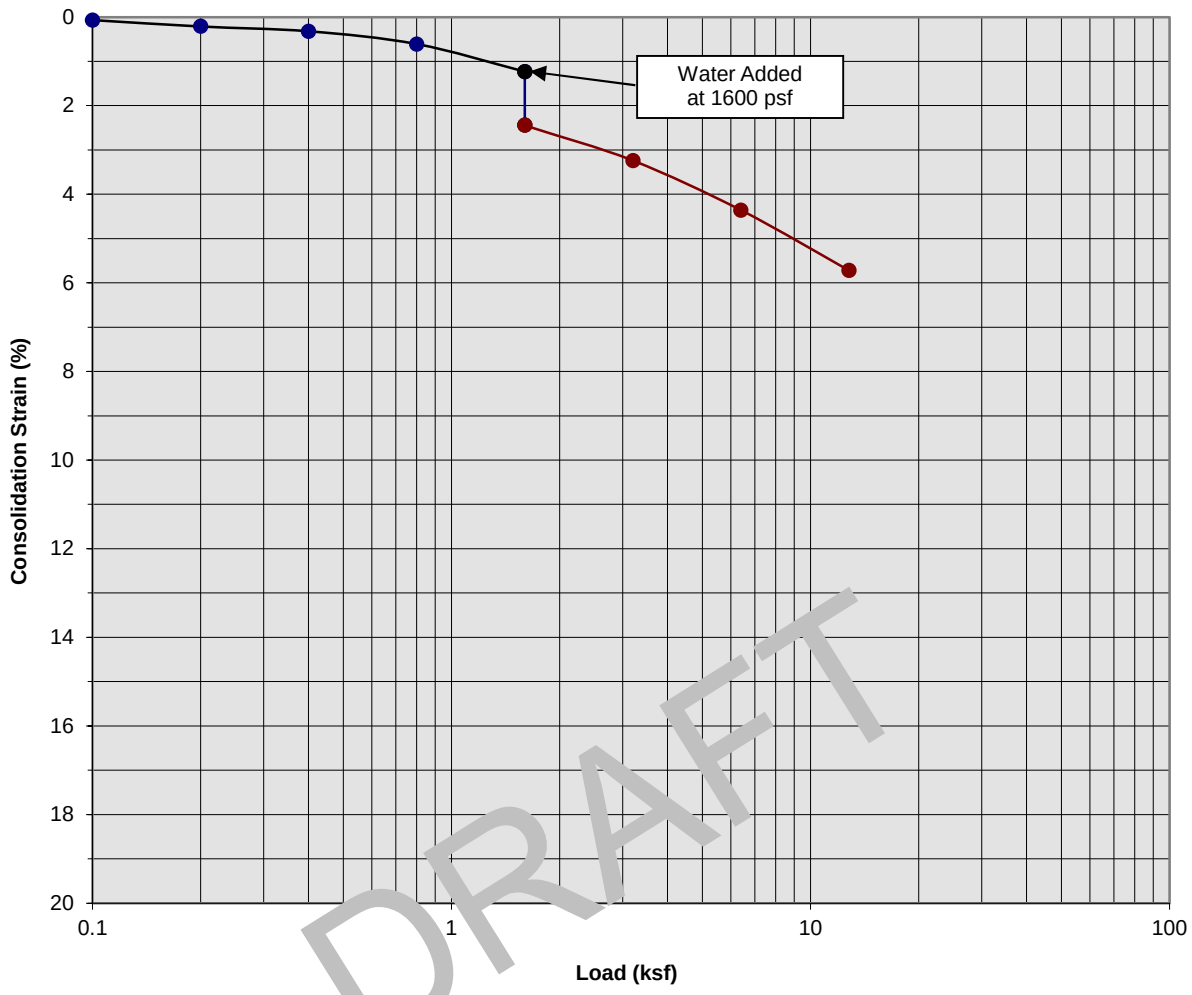
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace medium to coarse Sand

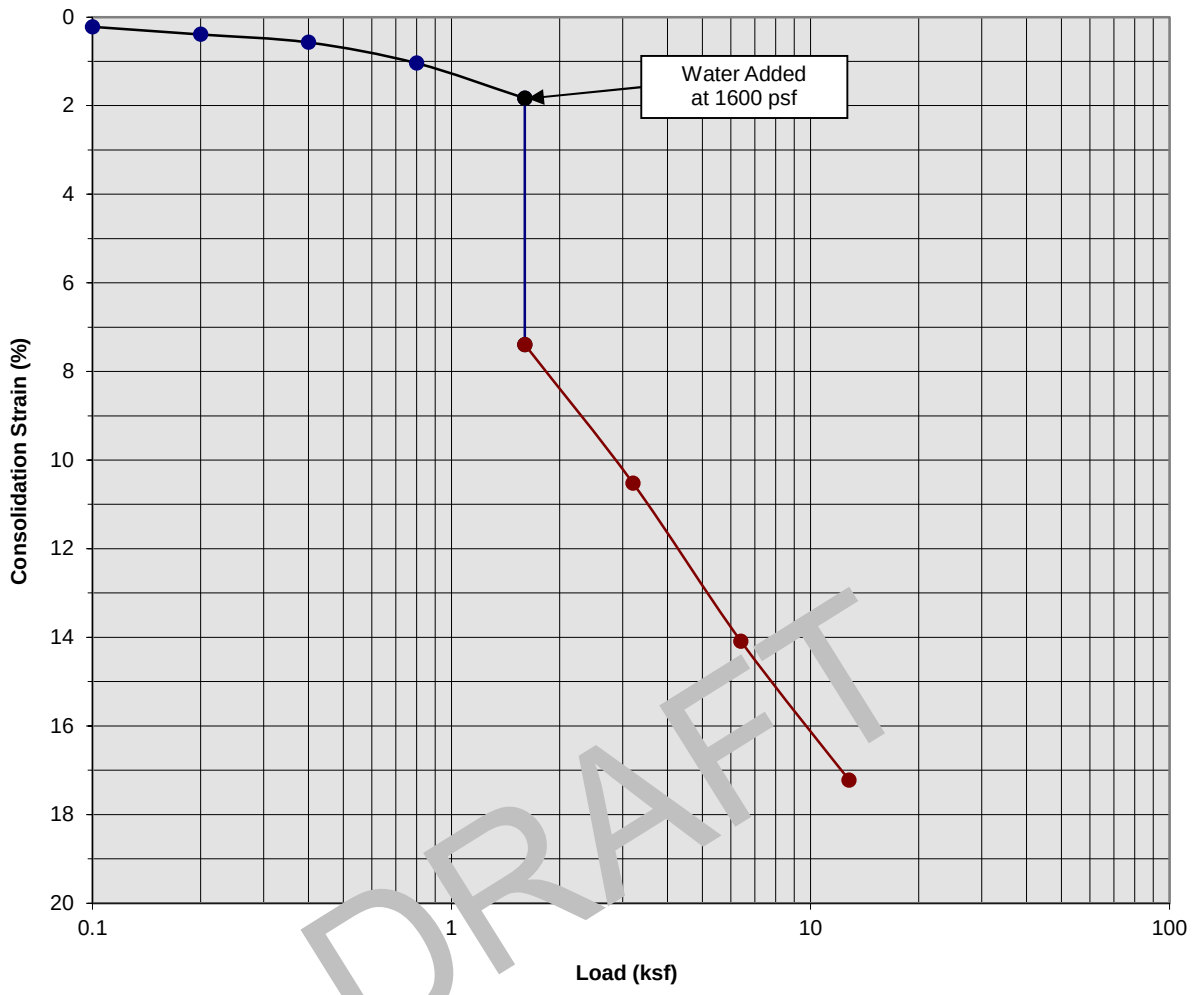
Boring Number:	SCG-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	125.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Gray Brown Silty fine to medium Sand

Boring Number:	SCG-4	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	102.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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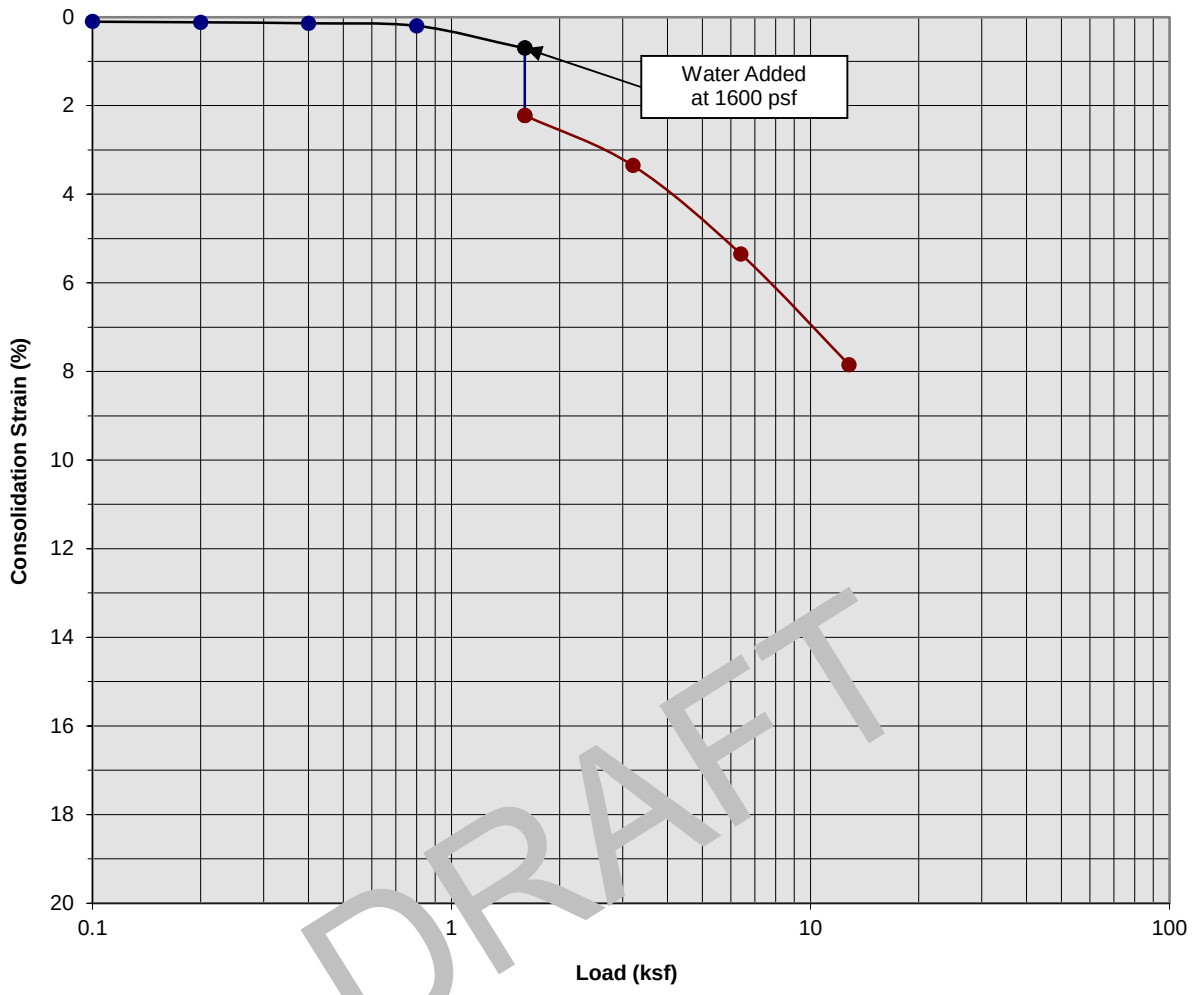
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

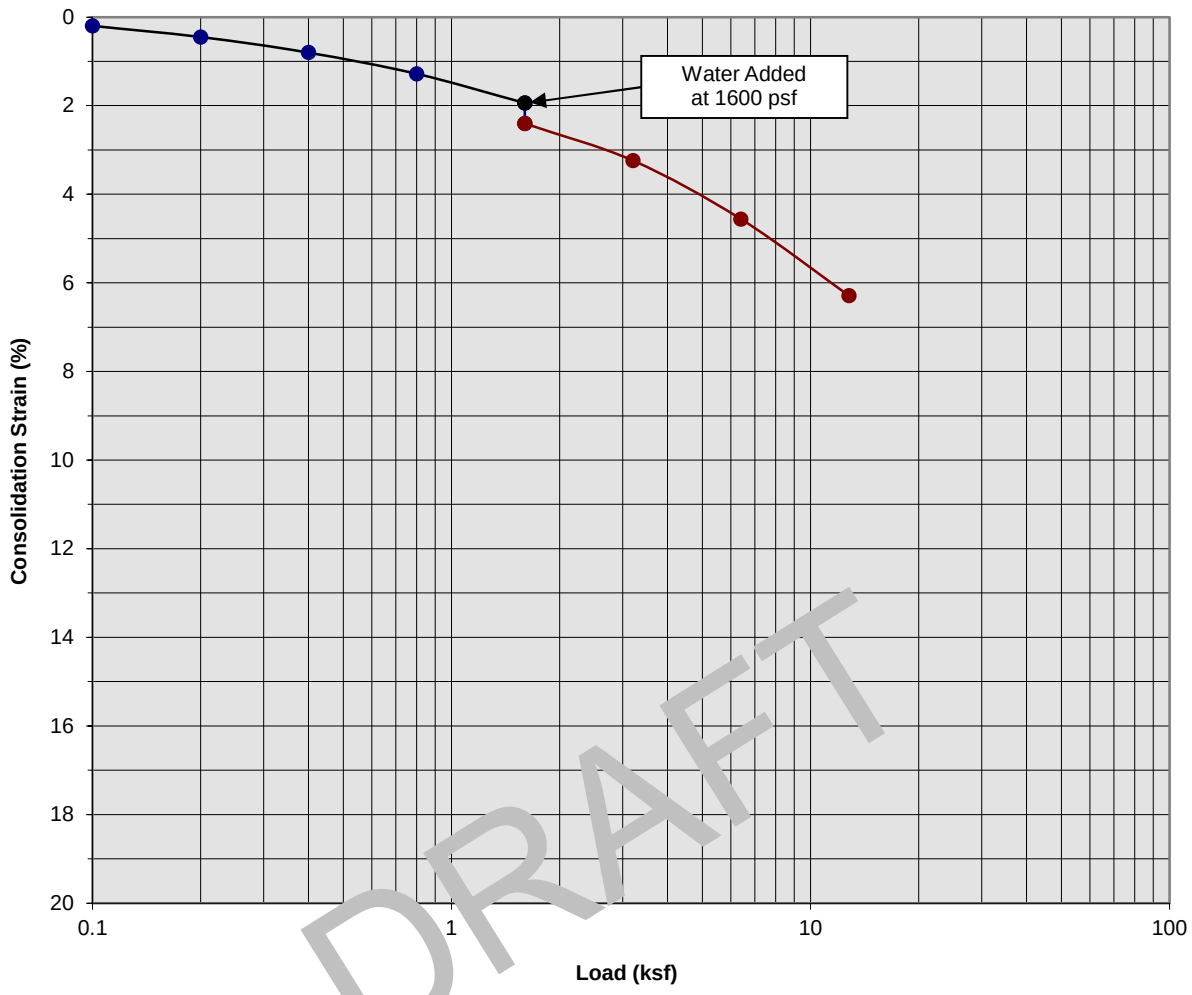
Boring Number:	SCG-4	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	126.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.52

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: FILL: Black to Dark Brown Clayey Silt

Boring Number:	SCG-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	115.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 7

SoCalGeo
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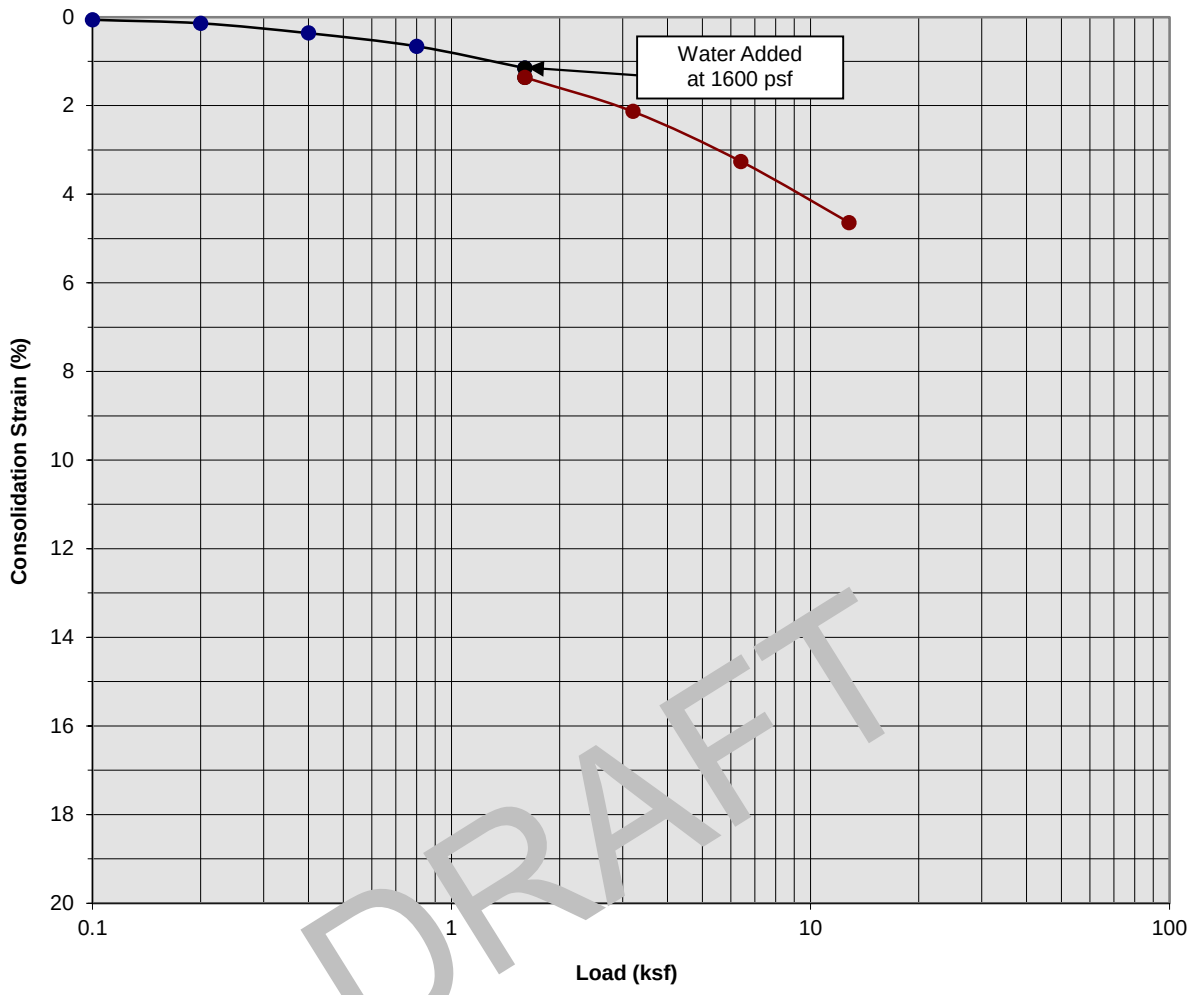
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Bray Brown Silty Clay, little fine to medium Sand

Boring Number:	SCG-5	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	131.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 8

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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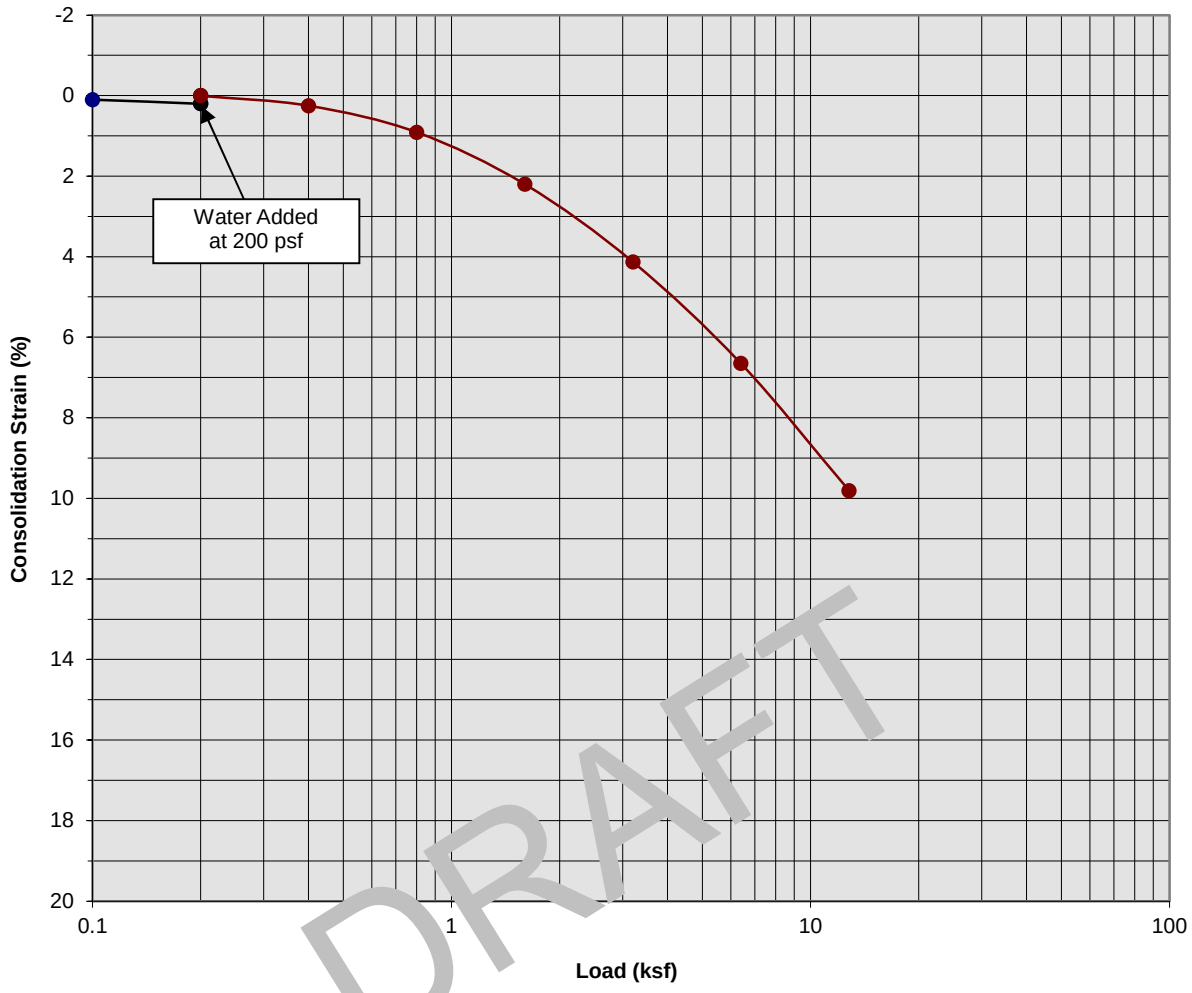
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Silty Clay, trace fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	102.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.20

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 9

SoCalGeo
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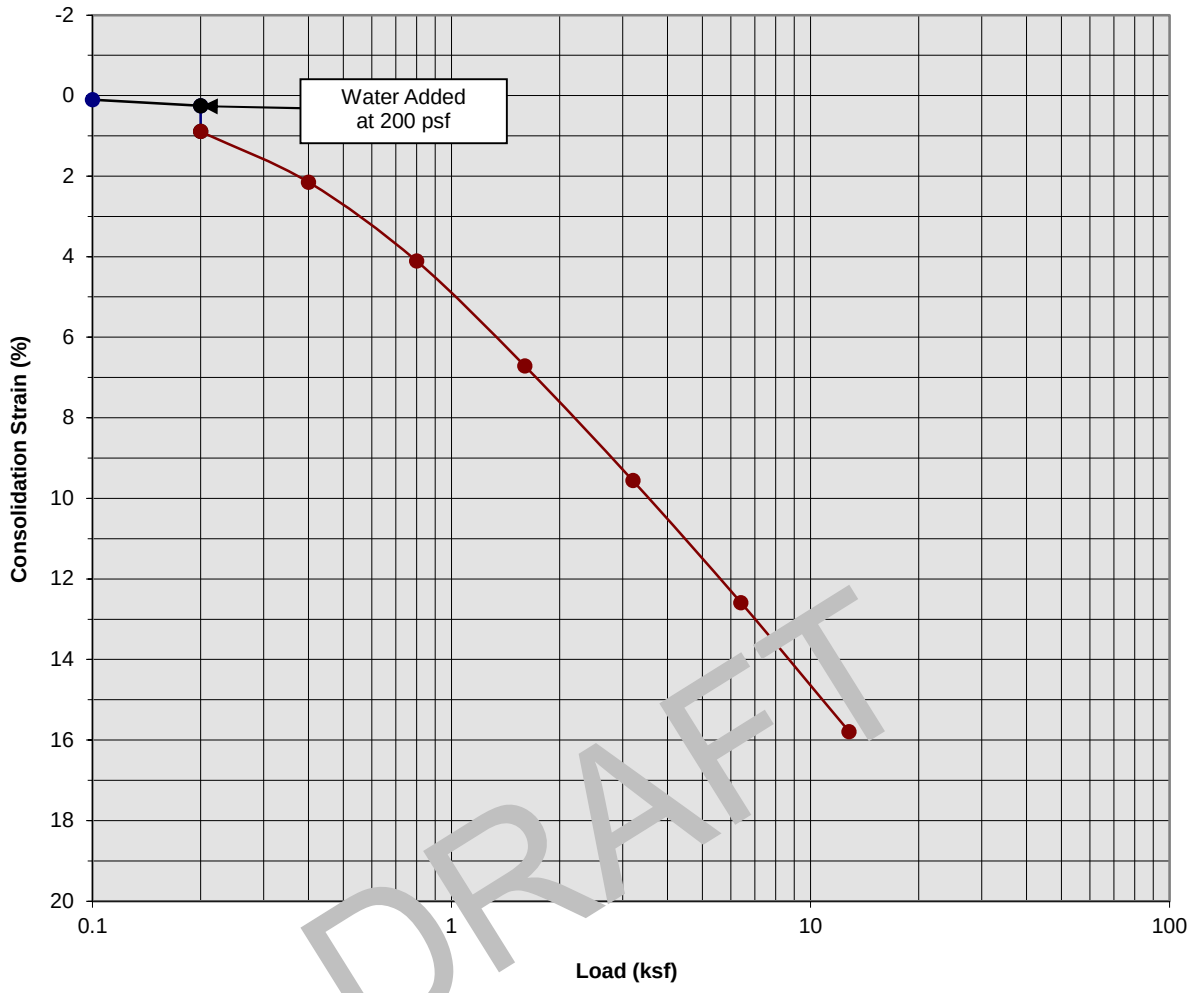
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light Brown Silty fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	95.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.64

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 10

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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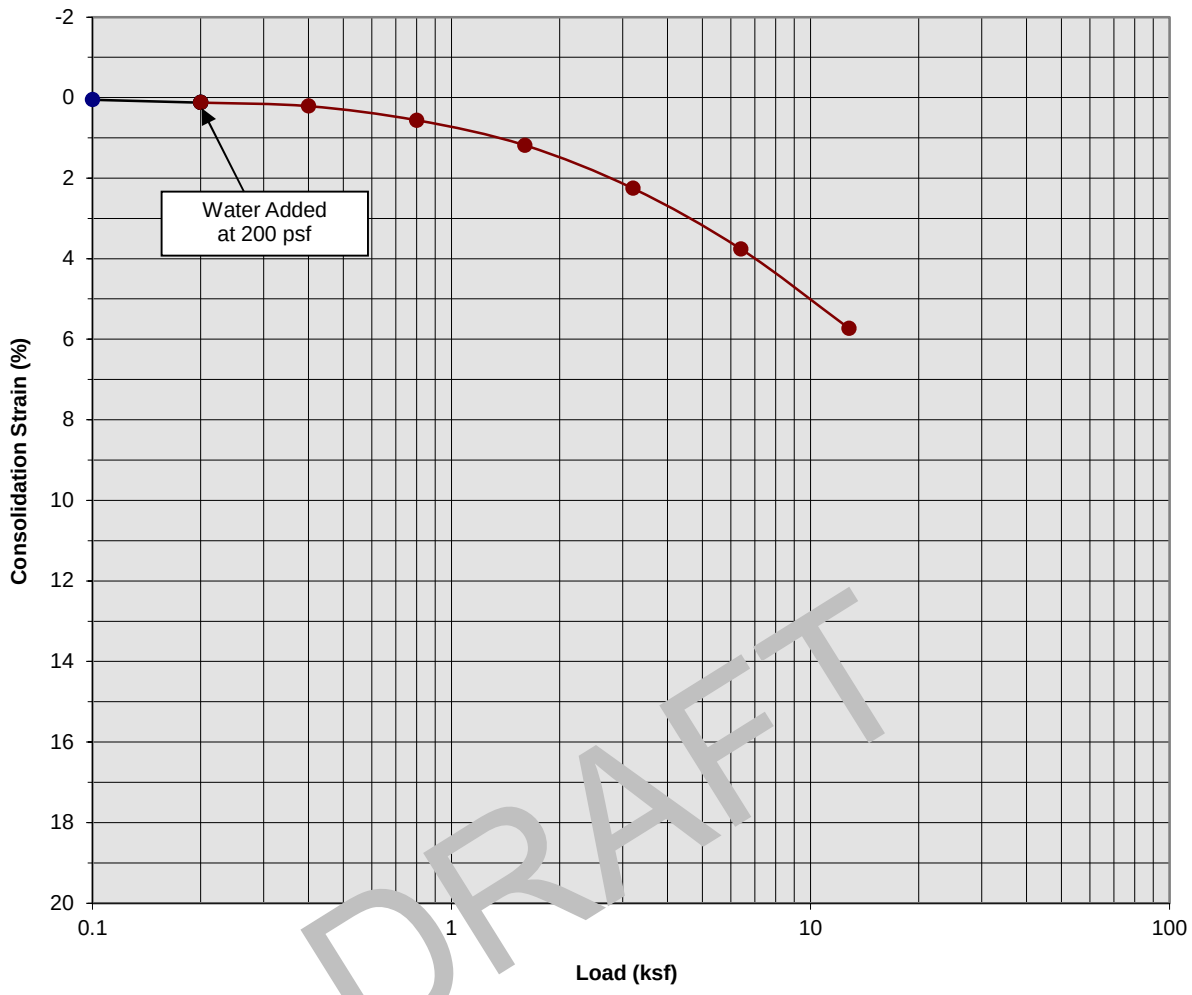
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Clayey Silt, trace fine to coarse Sand

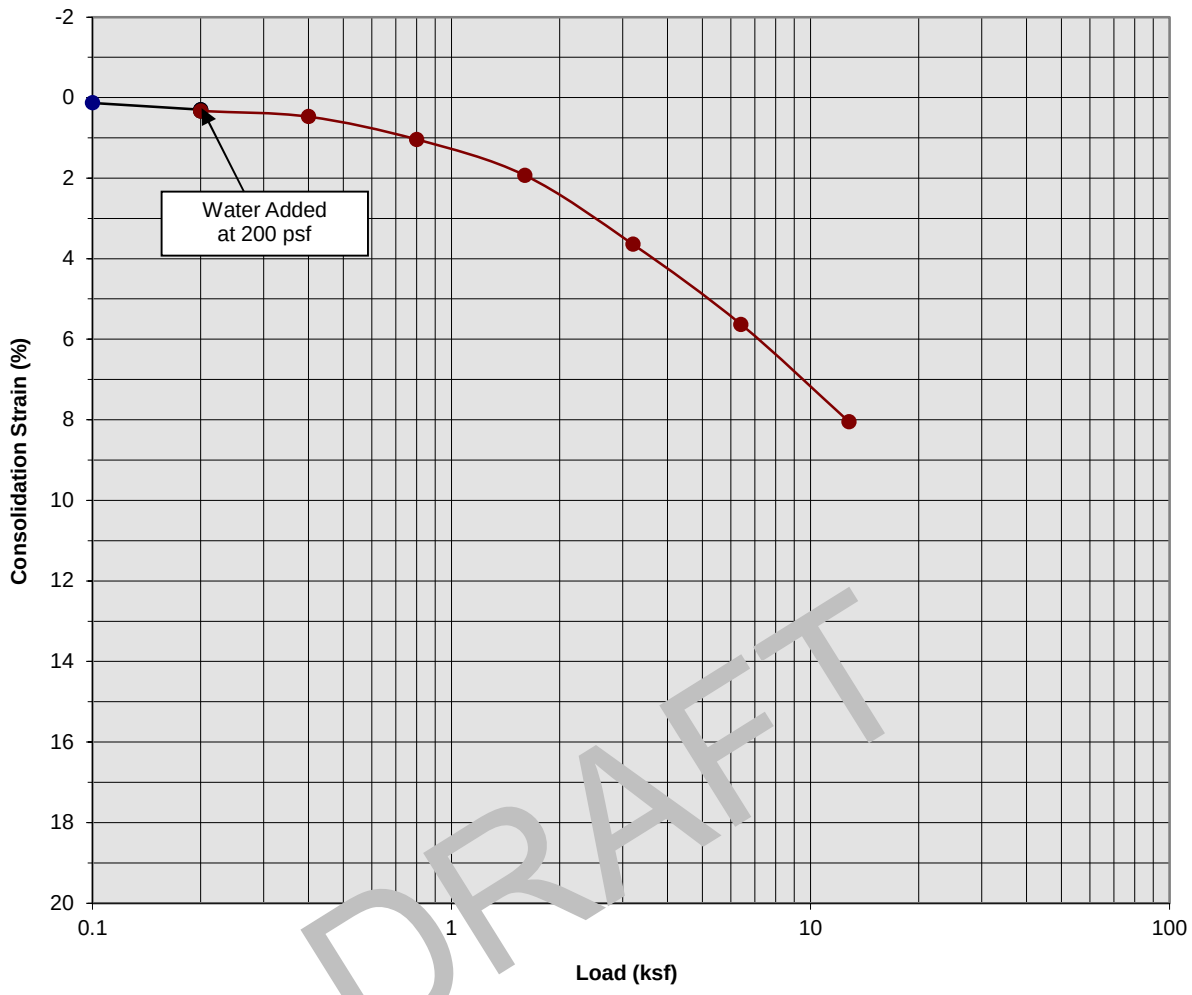
Boring Number:	SCG-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 11

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light to Dark Brown Clayey Silt, trace fine Sand

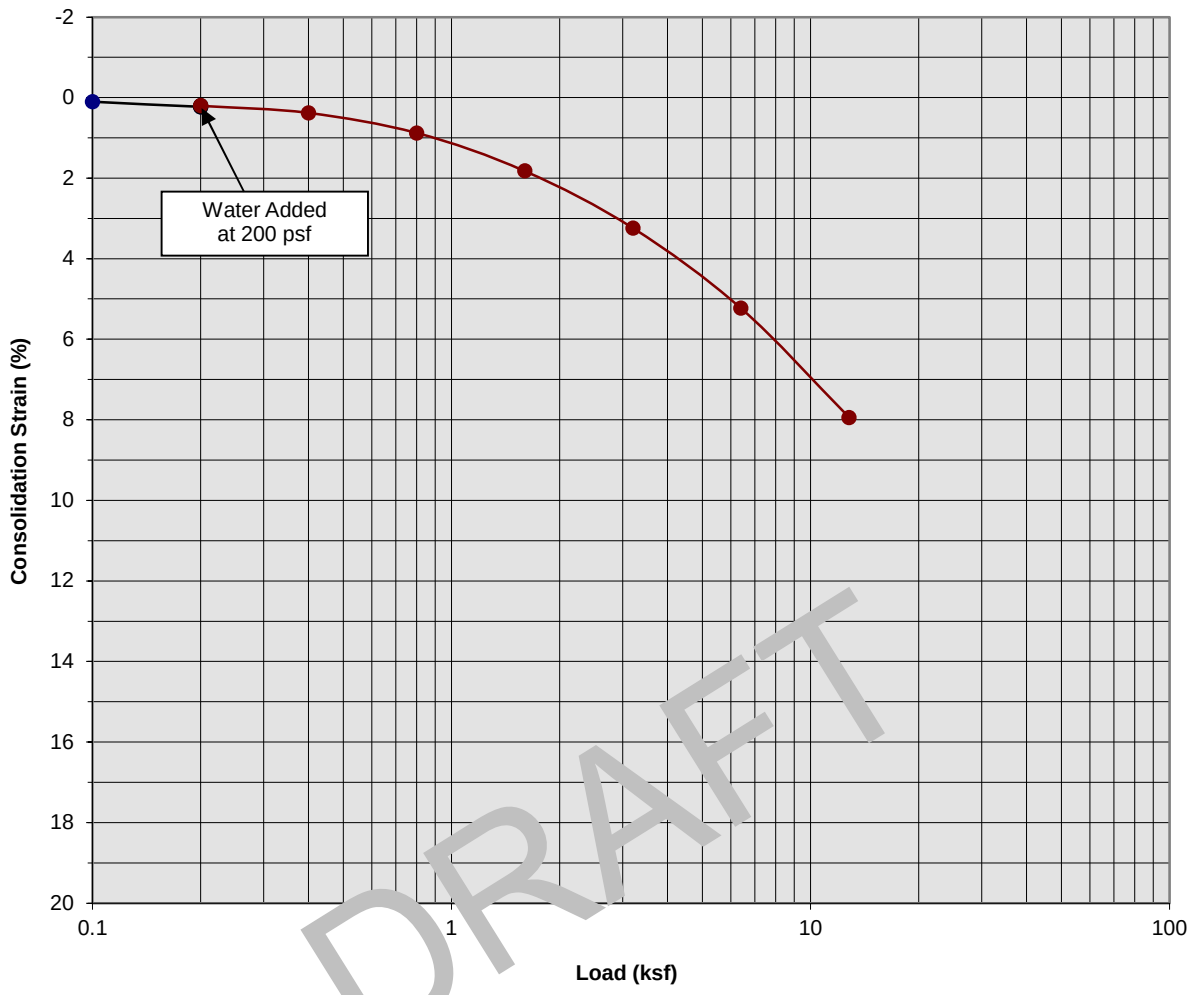
Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 12

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Light to Dark Brown Clayey Silt, trace fine Sand

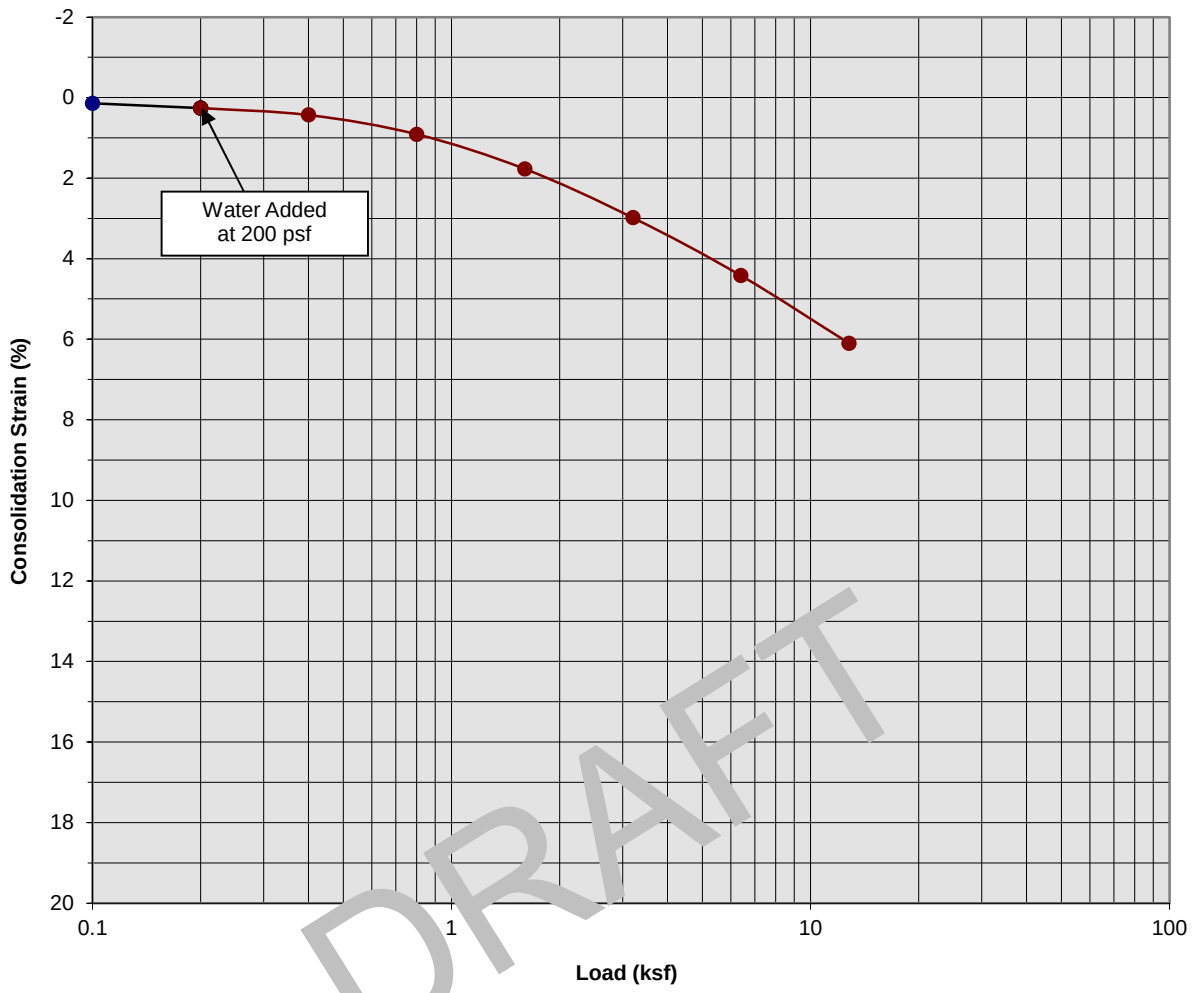
Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	109.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 13

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Green Blue Silty fine Sand

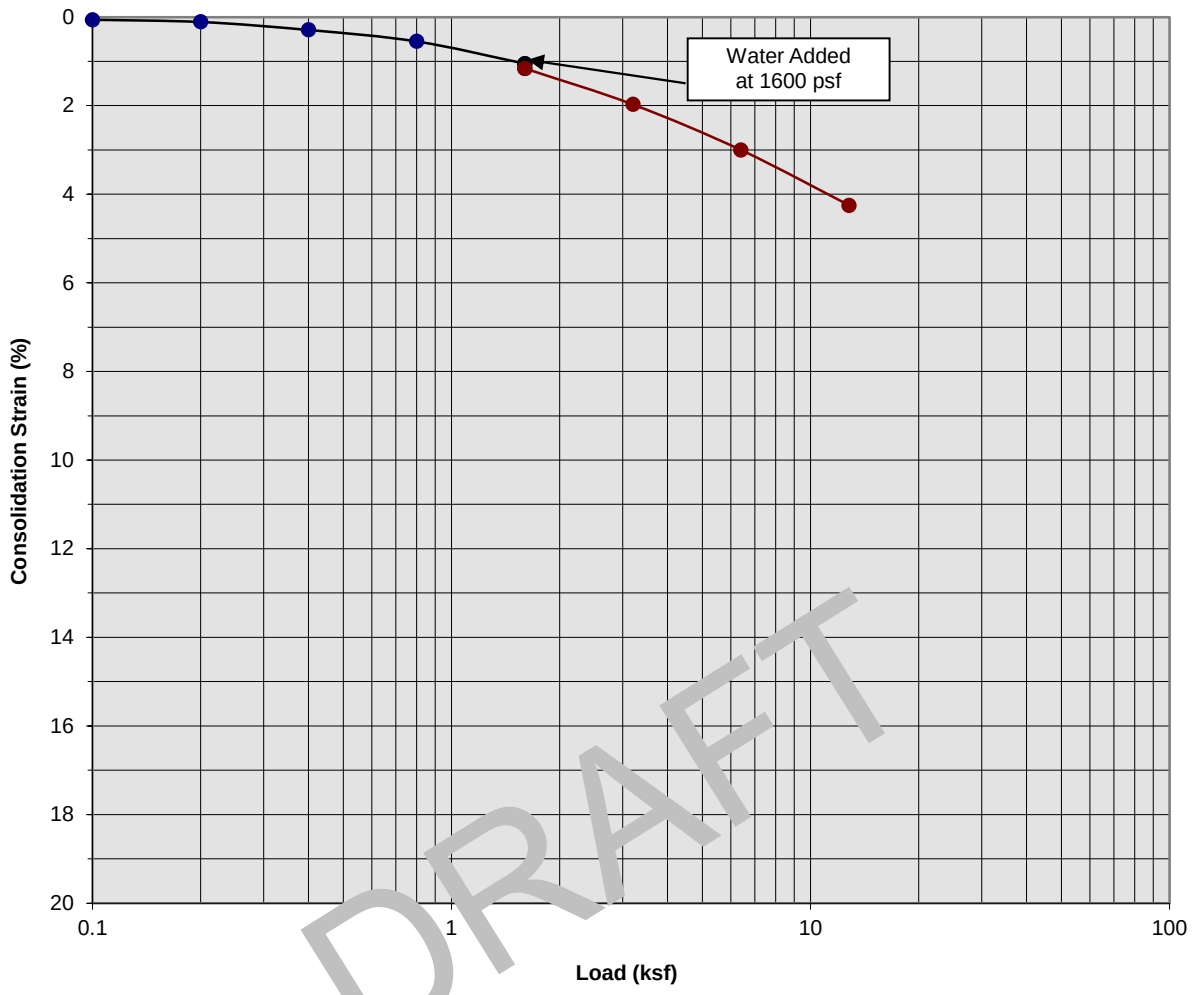
Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	33.5 to 34.5	Initial Dry Density (pcf)	113.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 14

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Gray Brown Silty fine to coarse Sand

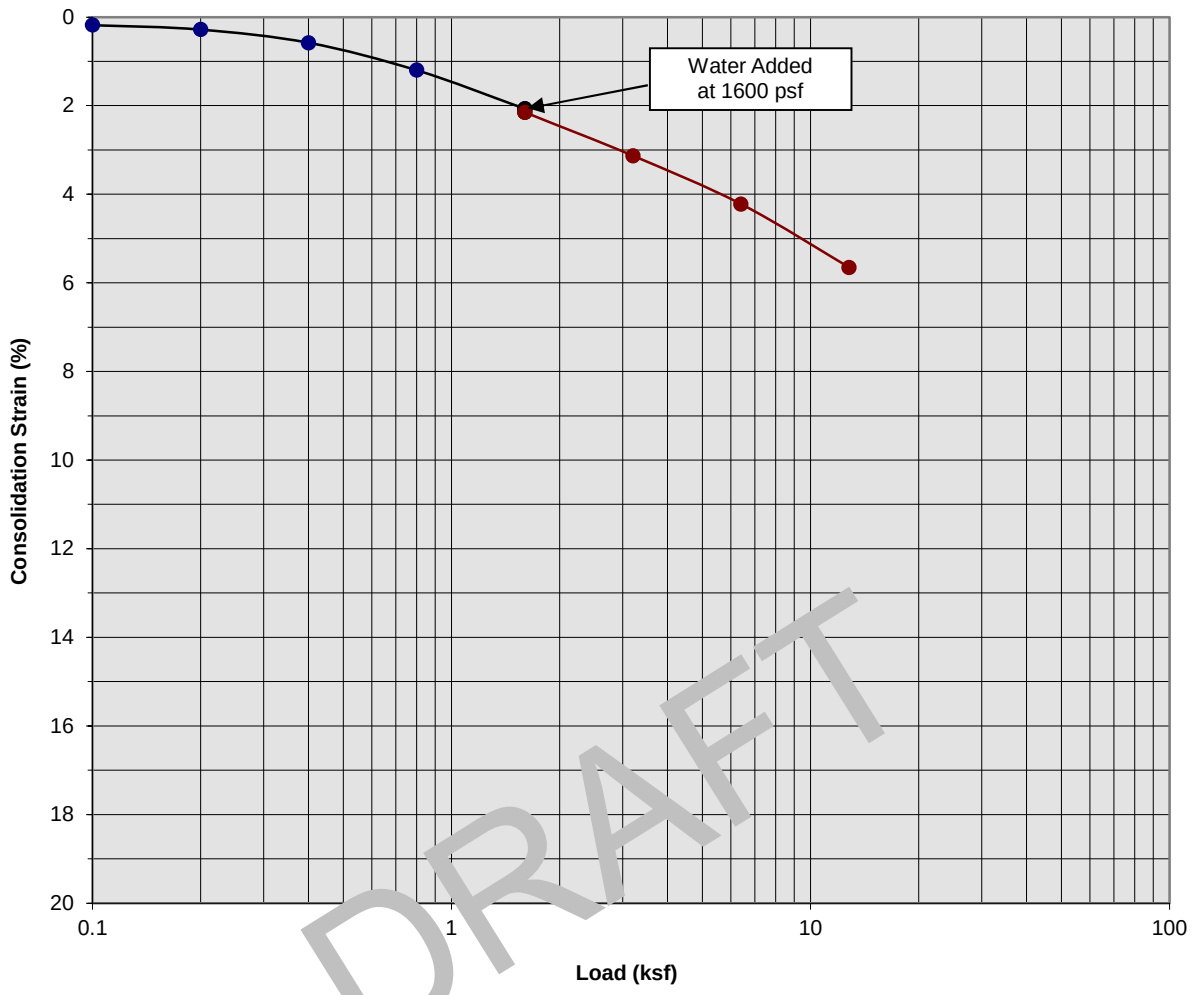
Boring Number:	SCG-7	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	43.5 to 44.5	Initial Dry Density (pcf)	114.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.11

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 15

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Blue Green Clayey fine Sand, trace medium to coarse Sand

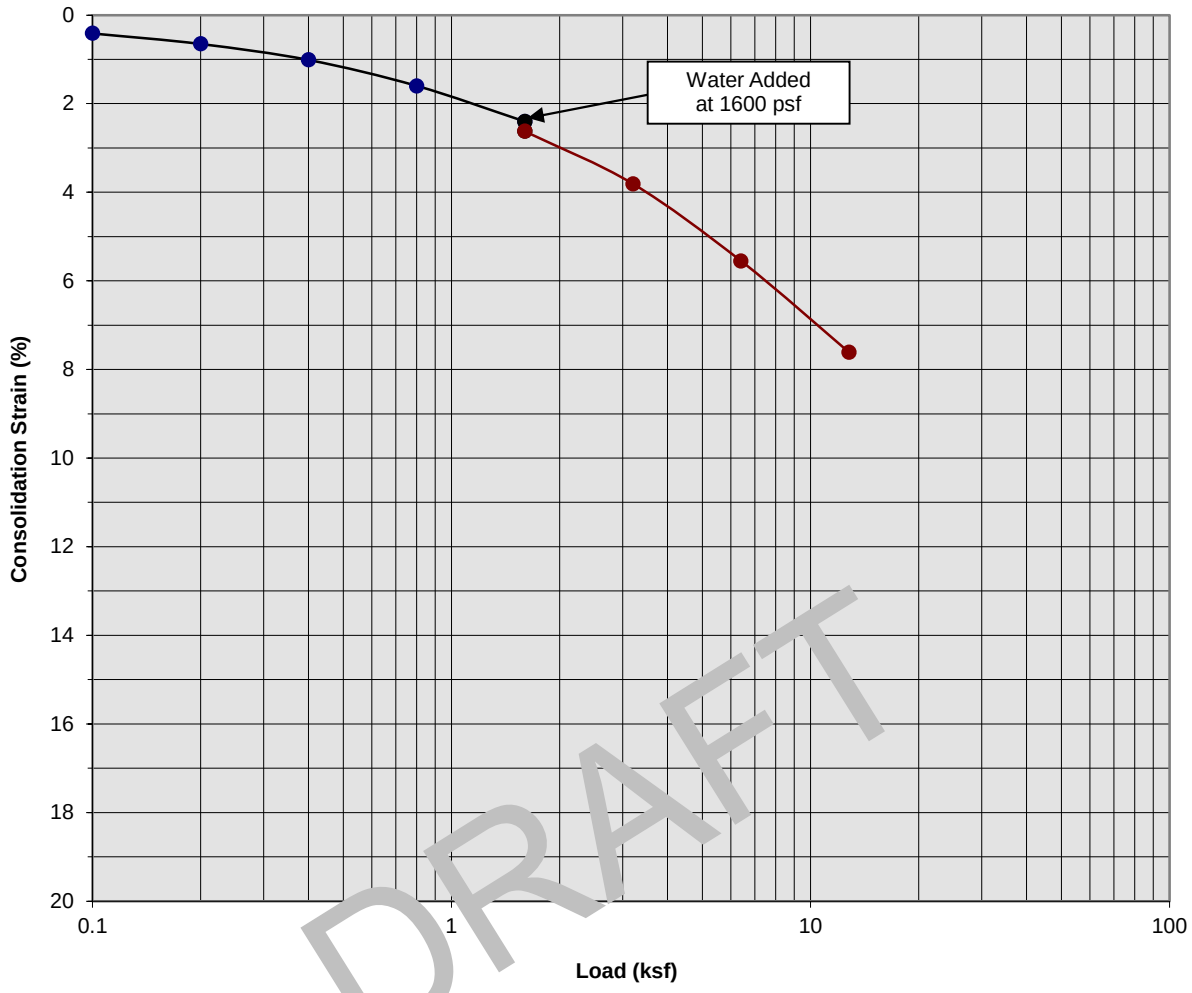
Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	53.5 to 54.5	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 16

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

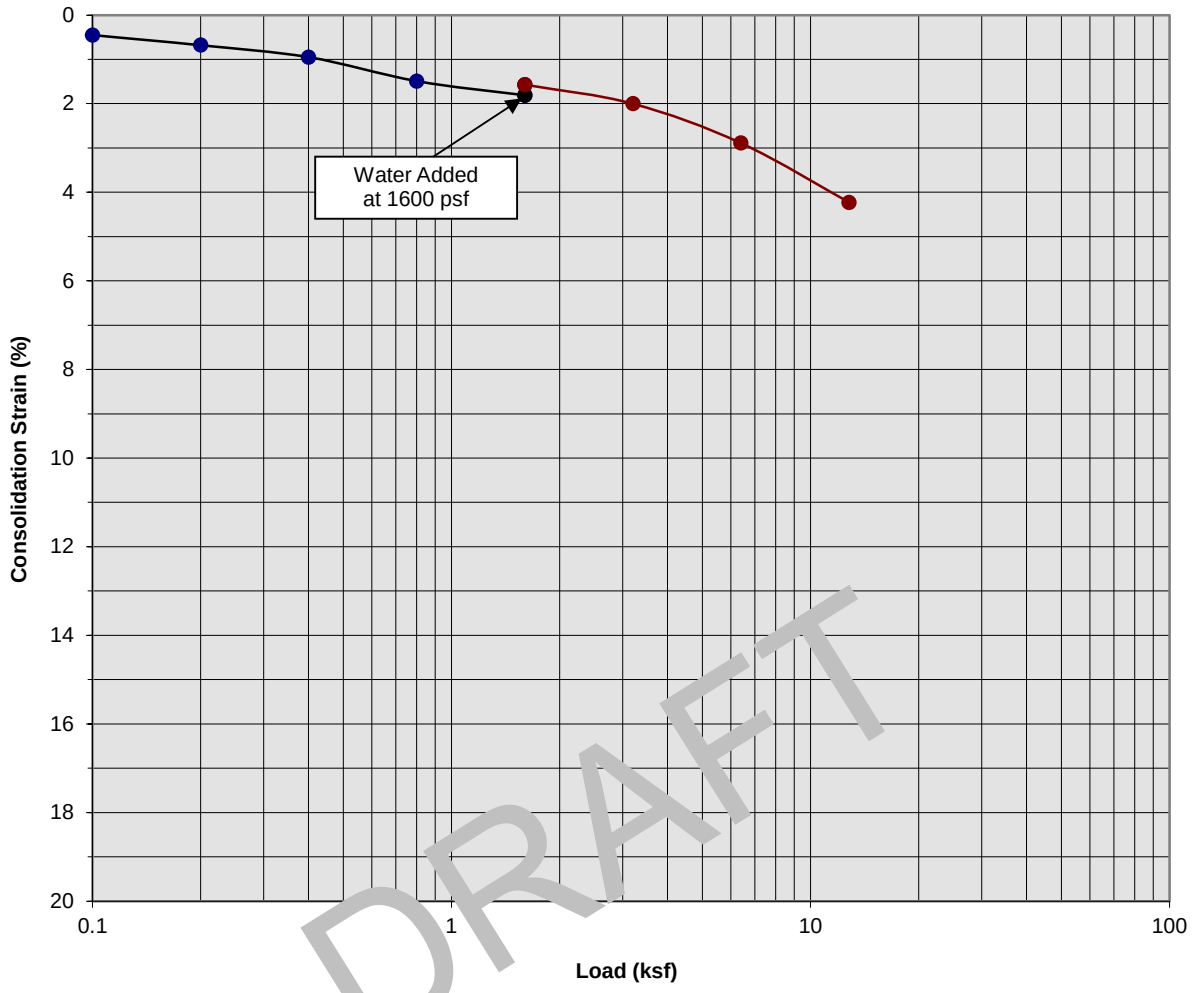
Boring Number:	SCG-8	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.22

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 17

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Clayey fine Sand, trace medium to coarse Sand

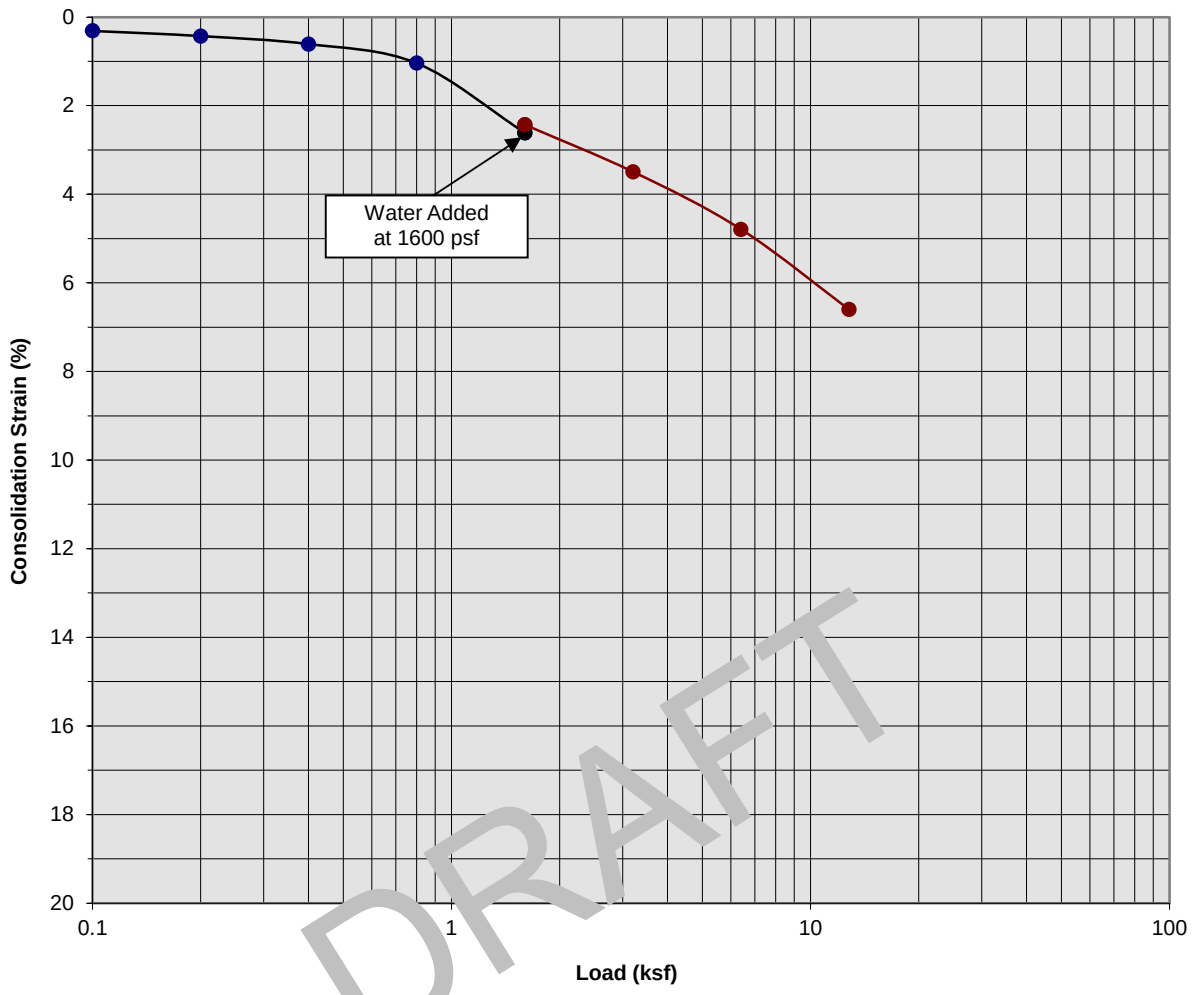
Boring Number:	SCG-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	122.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.24

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 18

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

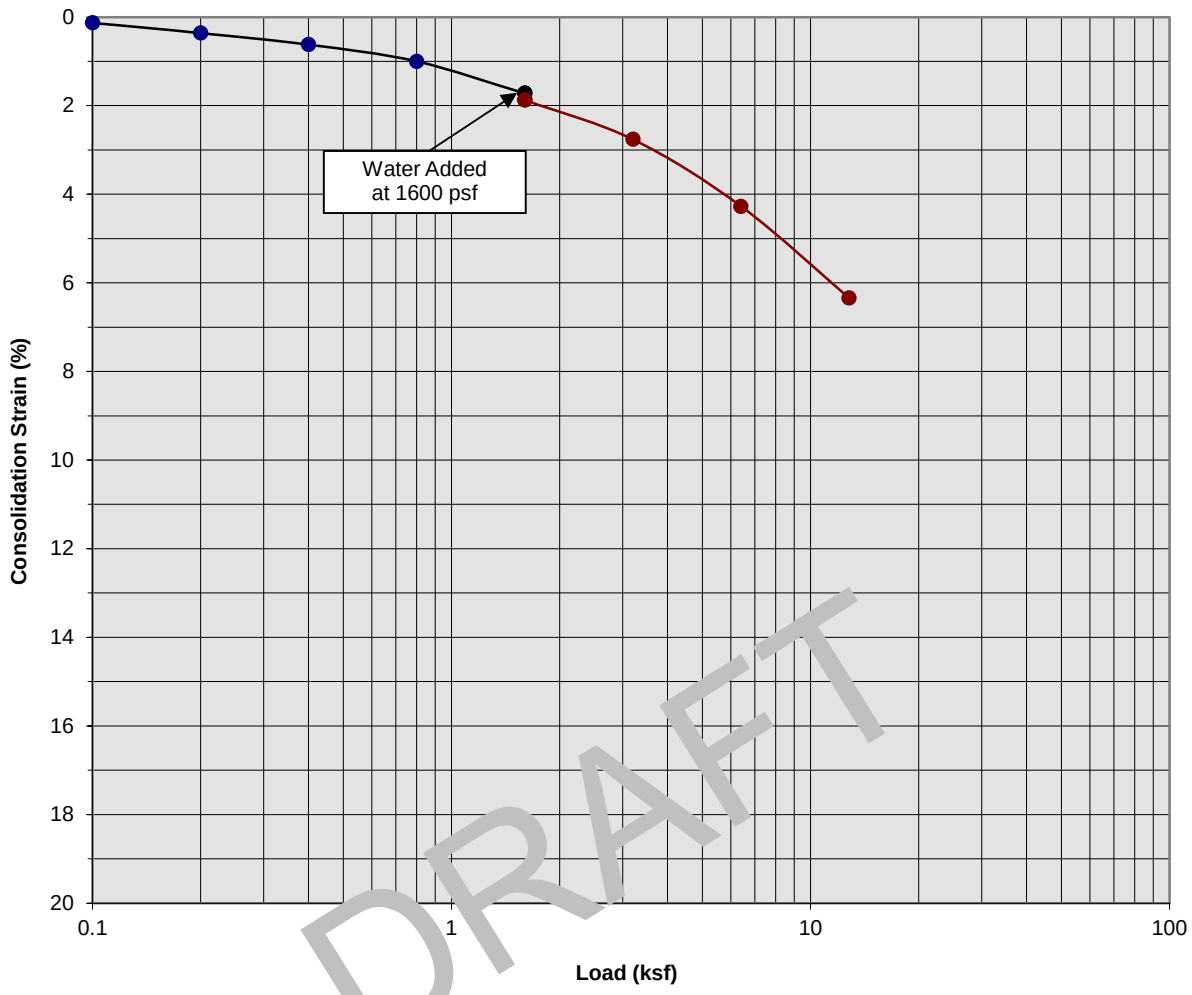
Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.18

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 19

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	131.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 20

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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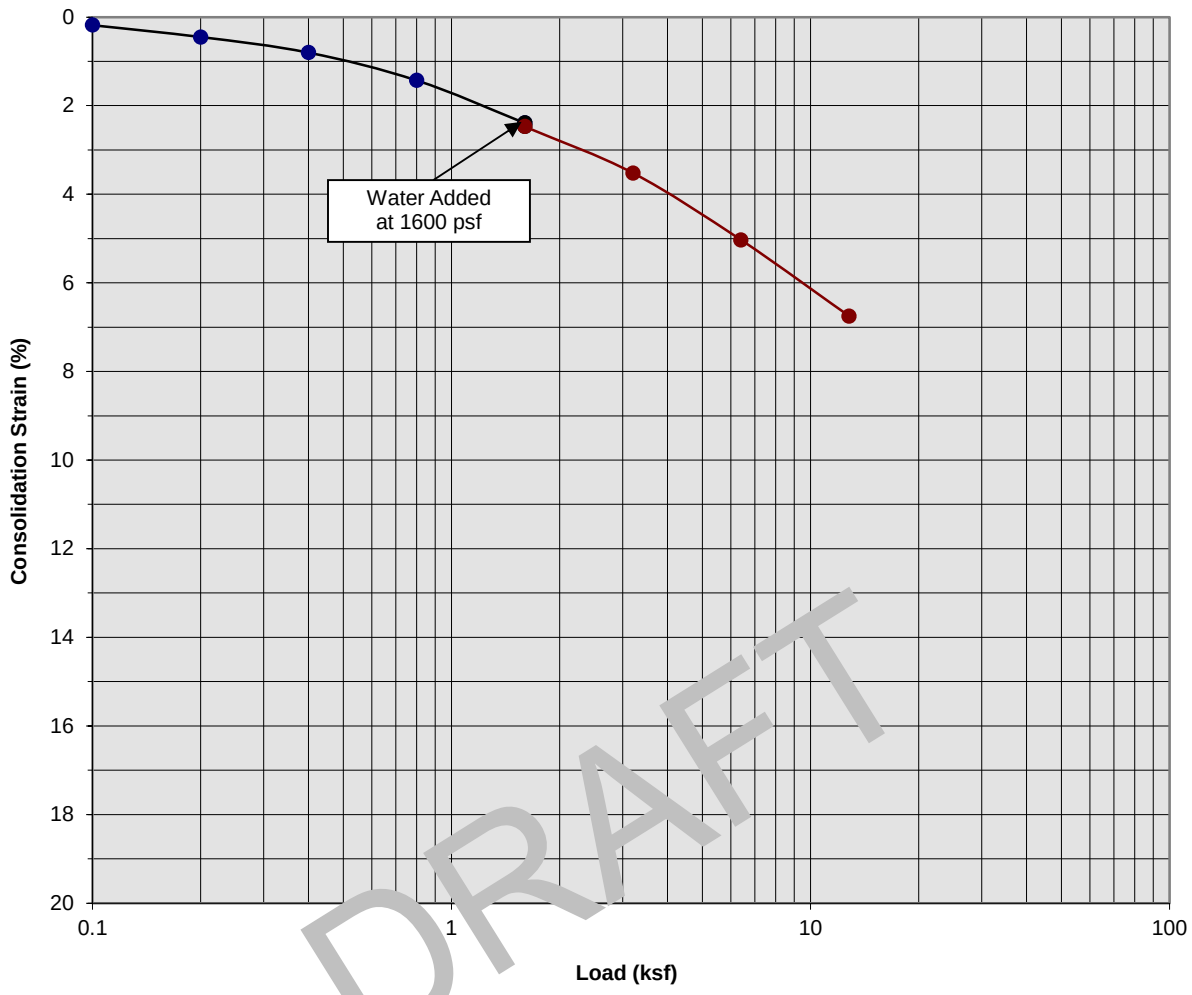
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

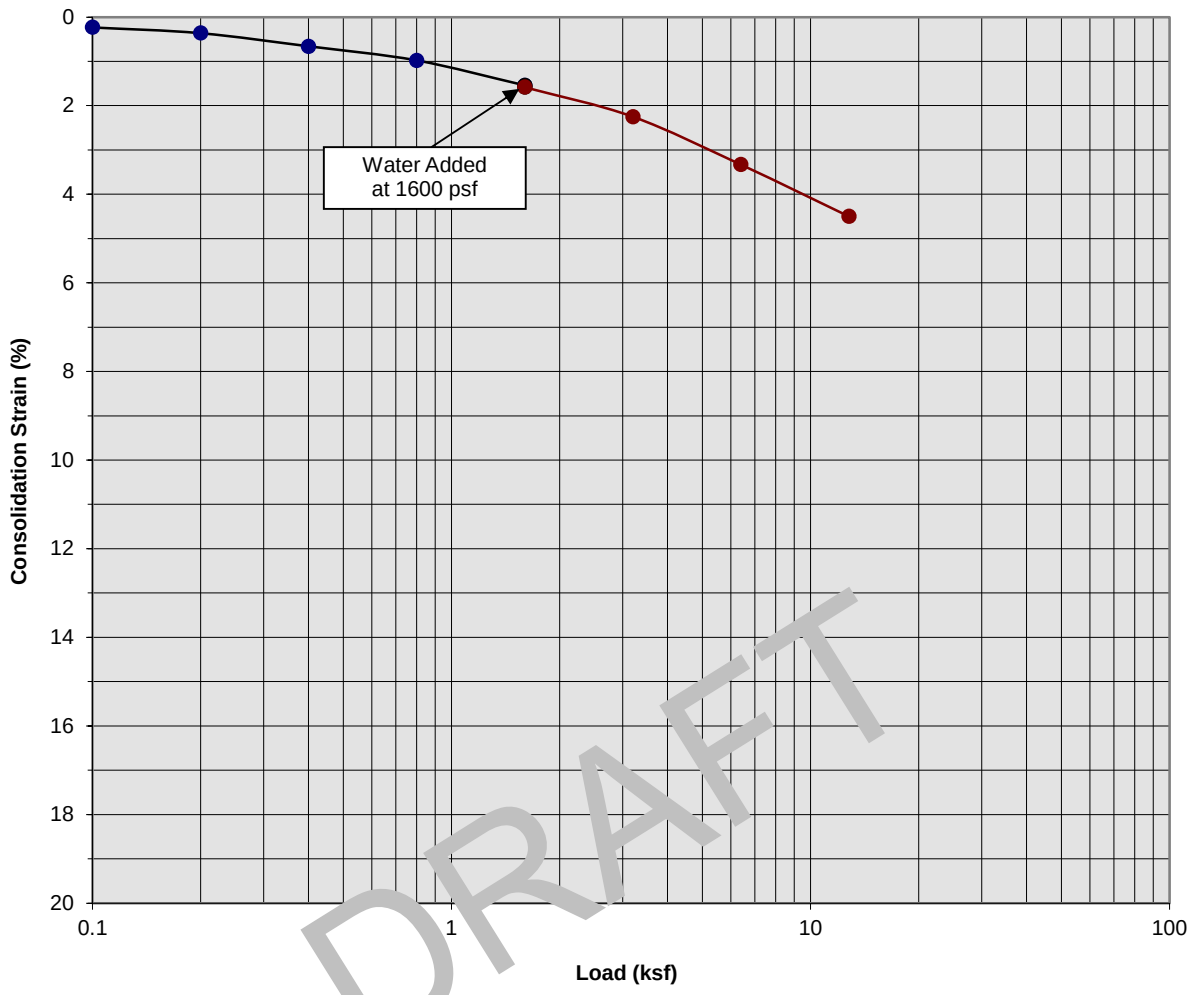
Boring Number:	SCG-9	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	117.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 21

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand

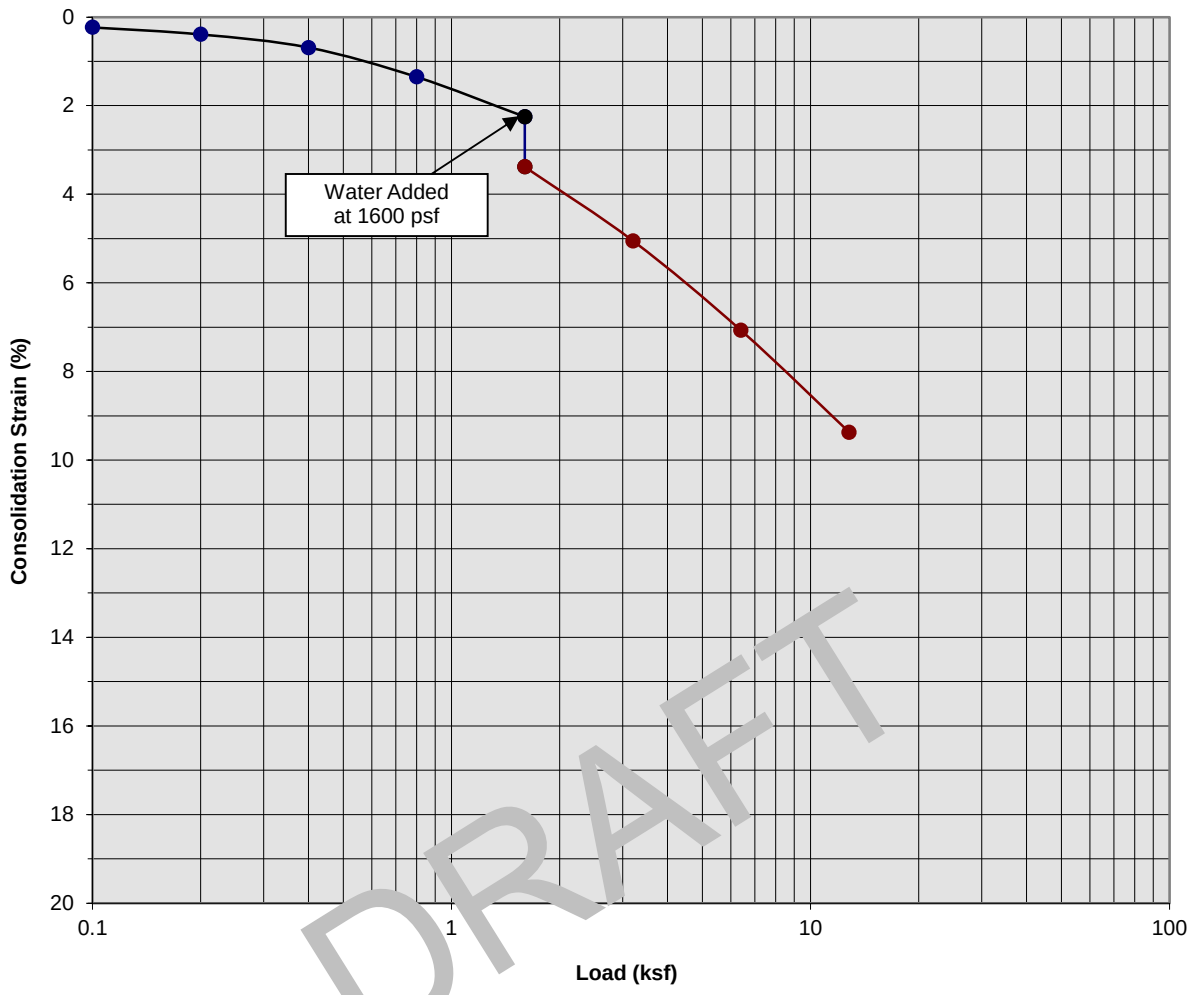
Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	28.5 to 29.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.04

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 22

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand, trace medium Sand

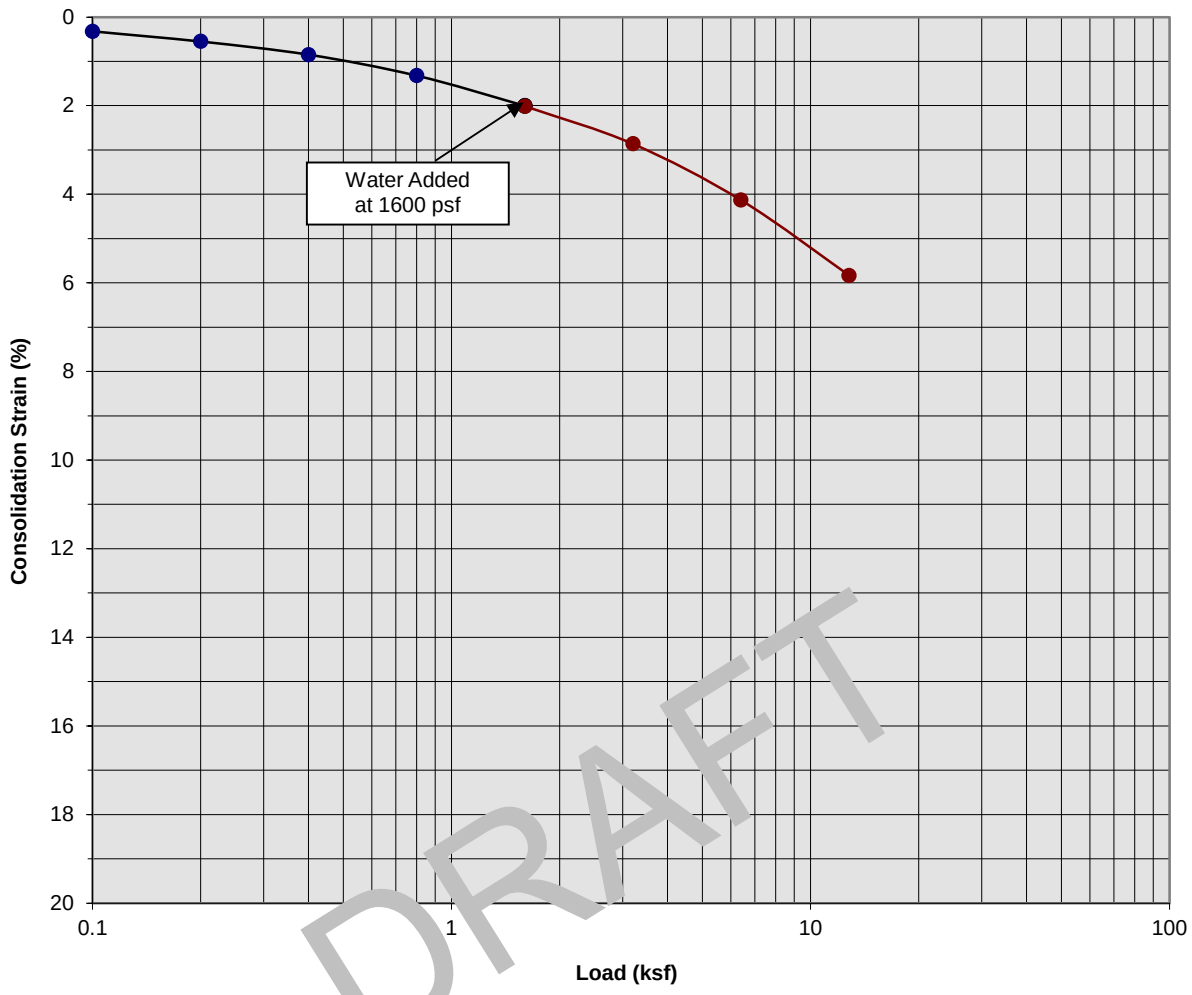
Boring Number:	SCG-10	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	38.5 to 39.5	Initial Dry Density (pcf)	103.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 23

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Green Blue Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	48.5 to 49.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 24

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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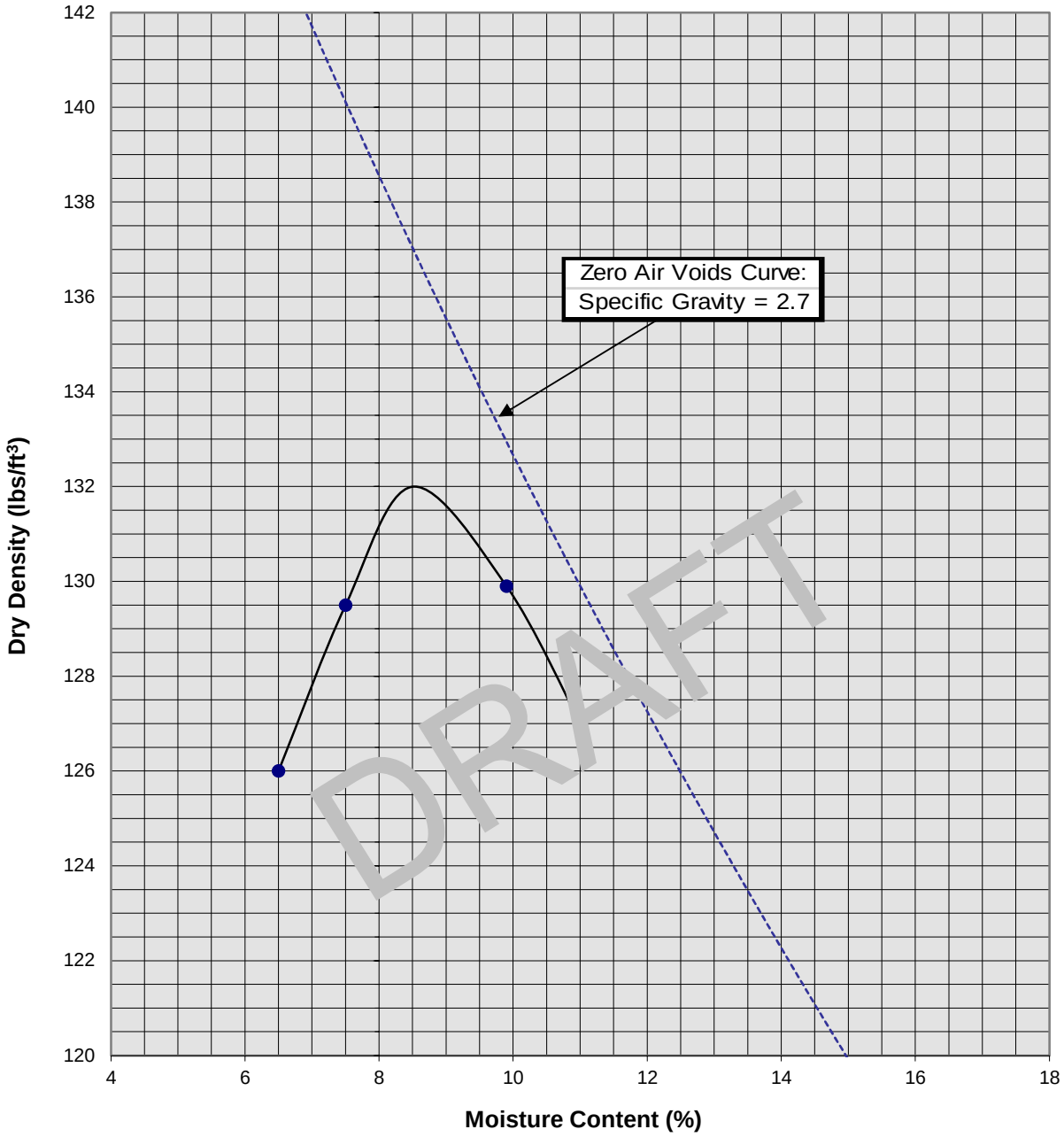
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-2 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	132
Soil Classification	Orange Brown fine Sandy Silt, trace Clay

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-25

SoCalGeo
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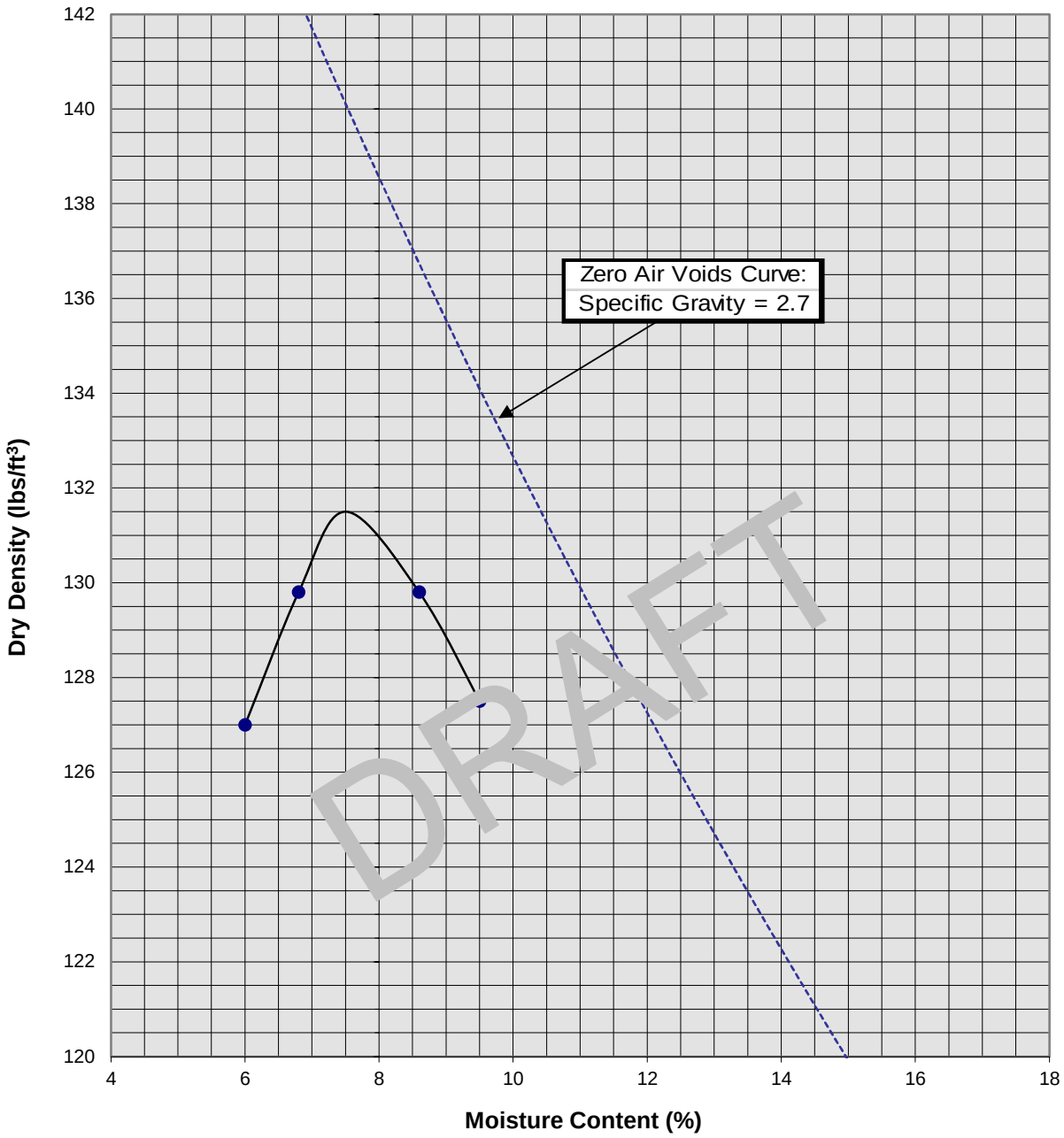
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-4 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	131.5
Soil Classification	Dark Gray Brown Silty fine to medium Sand, trace to little course Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-26

SoCalGeo
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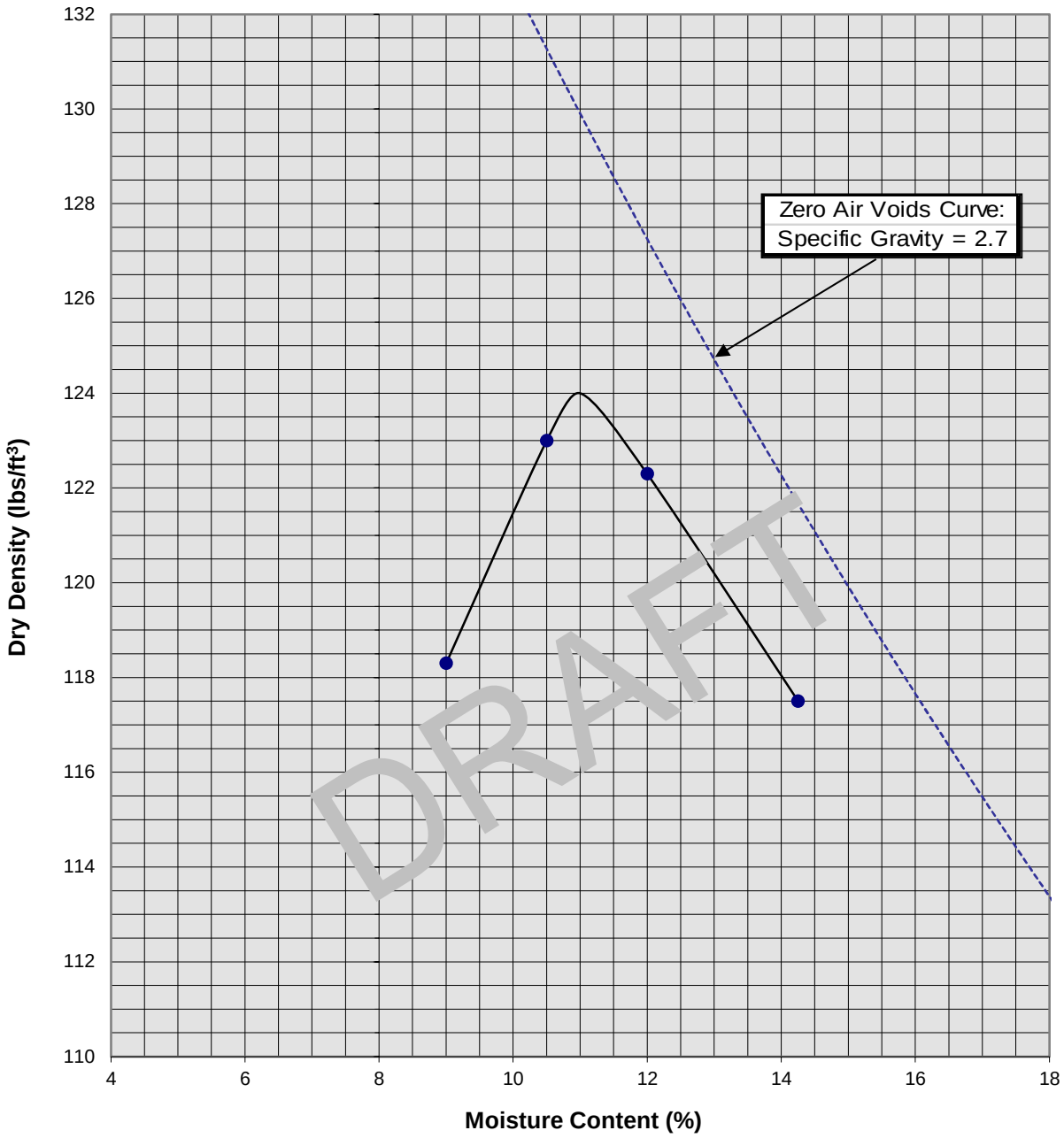
Moisture/Density Relationship
ASTM D-1557



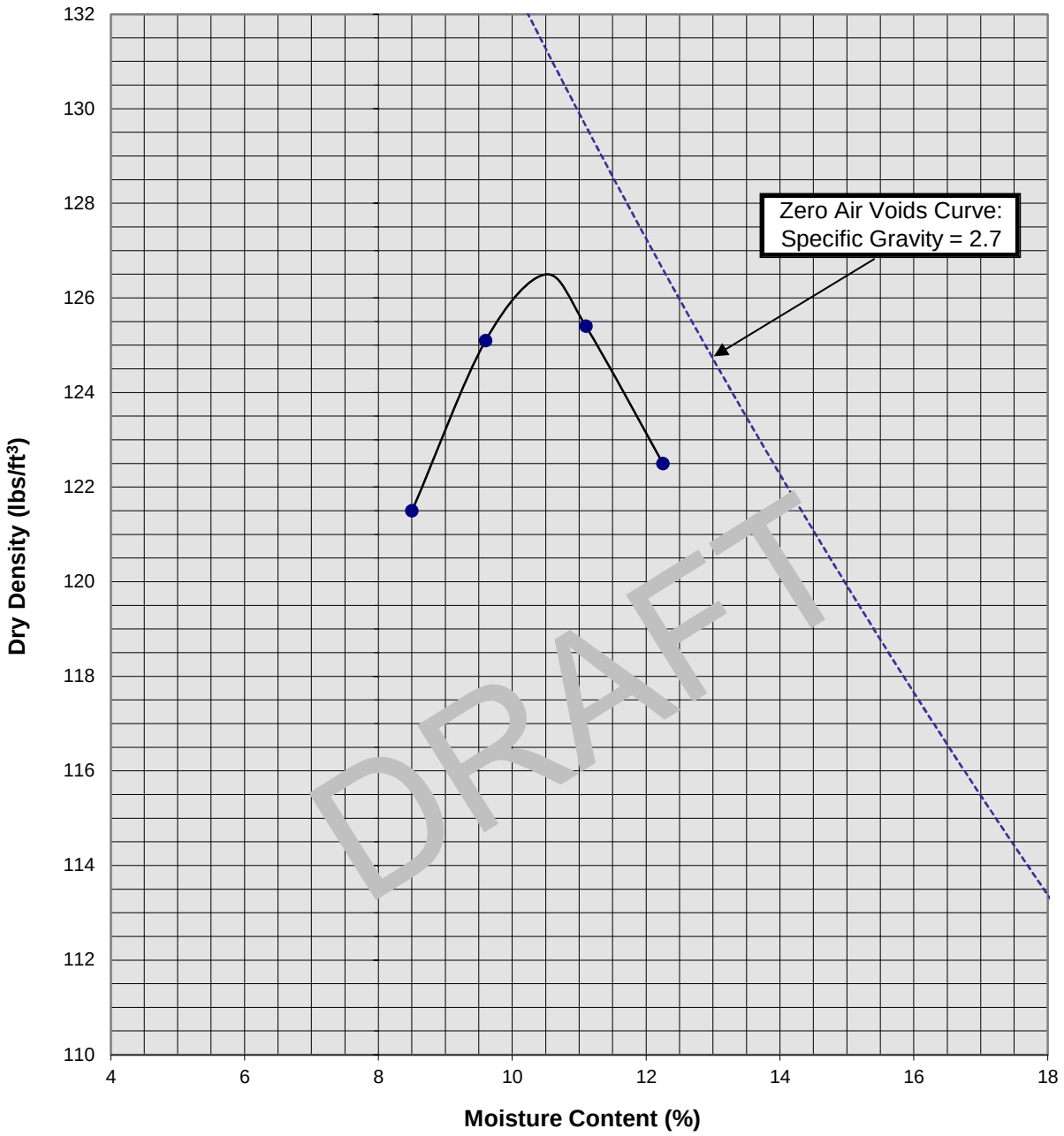
Soil ID Number	SCG-5 @ 0-5'
Optimum Moisture (%)	11
Maximum Dry Density (pcf)	124
Soil Classification	Dark Brown Clayey Silt, trace fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-27

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-10 @ 0-5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-28

SoCalGeo
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APPENDIX C-3

LABORATORY TEST RESULTS (PSE)

Expansion Index Tests

Expansion Index tests were performed to evaluate the expansion potential of typical on-site soils. Testing was carried out according to UBC Method 18-2. The results are presented in Table C-1.

Corrosivity Testing

Corrosivity tests were performed to analyze the corrosion potential of the on-site soils on ferrous metals and concrete. Sulfate contents were determined and are shown on Plates 243 through 253.

The pH and electrical resistivity were also determined and are summarized in the following table.

Electrical Resistivity and pH			
Boring/Trench	**Depth**	**pH**	**Resistivity (ohms-cm)**
B-039	25	7.7	2360
B-039	55	7.0	3470
B-040	24	8.0	2090
B-054	20	7.8	3920
B-059	20	7.8	6130
B-067	5	6.6	3570
B-070	5	7.4	4200
B-073	10	7.3	4260
B-079	45	6.5	2180
B-093	6	6.8	6960
B-095	11	6.8	4090
B-096	12	6.8	3050
BB-01	16	8.2	4550
BB-03	11	8.3	4480
BB-05	11	8.3	4080
BB-08	4	8.4	3270
H-01	3	6.9	3950
H-04	3	6.9	3950
H-06	9	7.7	4100

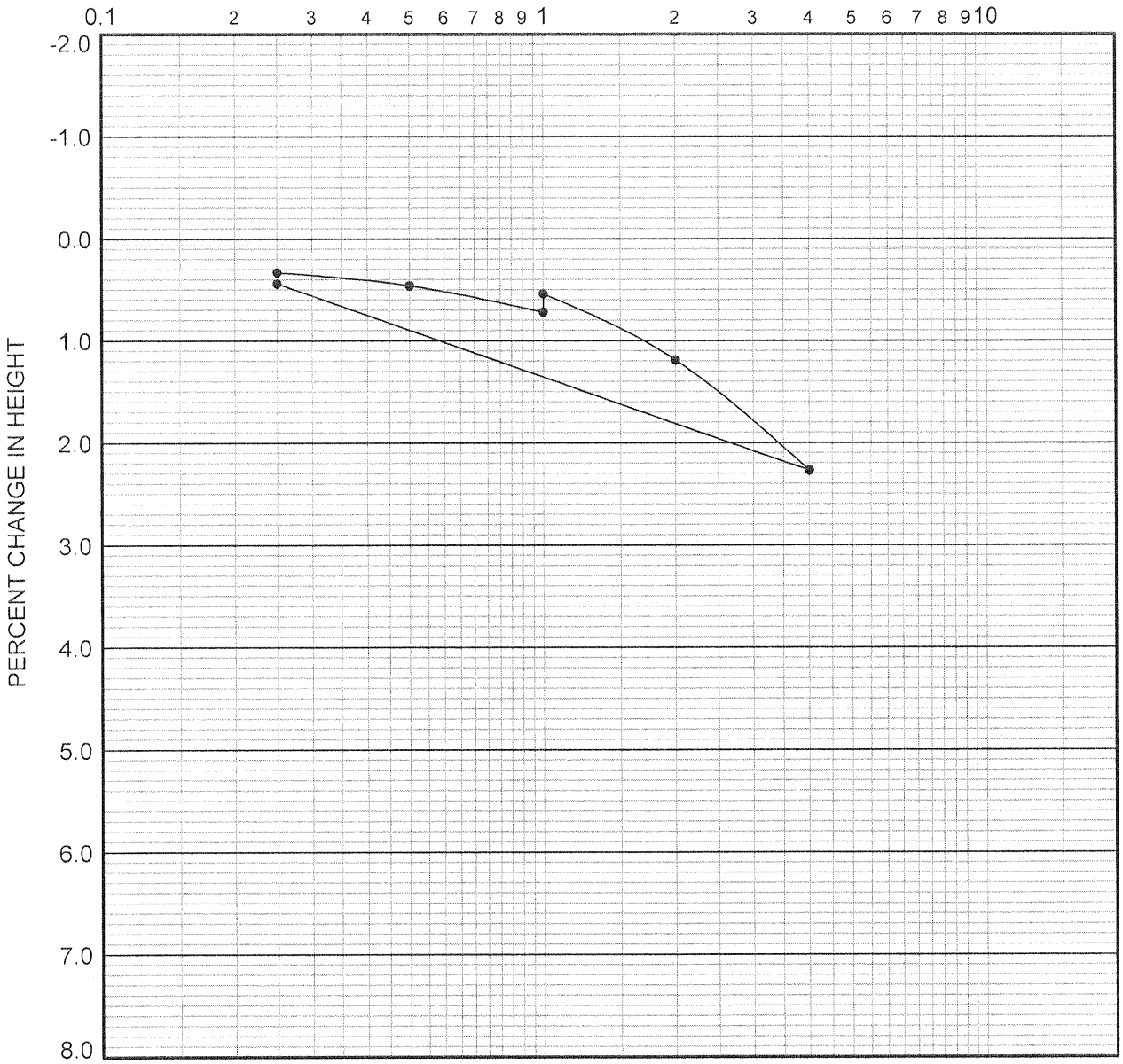
TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-035	20	Silty Sand (Qal)	SM				0	58	30	12		Consolidation-Plate C-1
B-035	27	Silty Sand (Qal)	SM	130.2	8.6		10	58	25	7		
B-035	30	Silty Sand (Qal)	SM				3	55	32	10		Consolidation-Plate C-2
B-036	21	Silty Sand (Qal)	SM	122.7	10.8		2	59	31	8		
B-037	15	Sandy Siltstone (QTst)					5	45	40	10		Consolidation-Plate C-3
B-038	20	Silty Sand (Qoa)	SM				0	76	17	7		Consolidation-Plate C-4
B-039	25	Sandy Siltstone (QTst)		120.4	12.5	SEE PLATE C-161	7	51	31	11	32	Chemical-Plate C-243 Resistivity = 2360, pH = 7.7
B-039	50	Sandy Siltstone (QTst)				SEE PLATE C-162	0	42	46	12		
B-039	55	Sandy Siltstone (QTst)		122.4	11.1	SEE PLATE C-163	5	52	33	10	11	Chemical-Plate C-243 Resistivity = 3470, pH = 7.0
B-040	24	Sandy Siltstone (QTst)		117.8	13.3	SEE PLATE C-164	5	55	29	11	42	Chemical-Plate C-243 Resistivity = 2090, pH = 8.0
B-041	30	Pebble Conglomerate (QTst)				SEE PLATE C-165	16	60	20	4		
B-041	51	Sandy Siltstone (QTst)				SEE PLATE C-166	2	51	34	13		
B-041	70	Silty Sandstone (QTst)					0	64	32	4		Consolidation - Plate C-5
B-041	71	Silty Sandstone (QTst)		125.0	9.0	SEE PLATE C-167	0	73	22	5	0	Chemical-Plate C-244
B-042	30	Sandy Siltstone (QTst)					0	63	28	9		Consolidation - Plate C-6
B-044	25	Silty Sand (Qal)	SM				14	66	16	4		Consolidation - Plate C-7
B-045	20	Gravelly Sand (Qal)	SP				17	72	8	3		Consolidation - Plate C-8
B-045	30	Silty Sand (Qal)	SM				16	52	25	7		Consolidation - Plate C-9
B-046	30	Silty Sand (Qal)	SM				9	62	21	8		Consolidation - Plate C-10
B-047	30	Silty Sand (Qal)	SM				0	53	32	15		Consolidation - Plate C-11
B-047	31	Silty Sand (Qal)	SM	128.8	9.5		2	58	30	10		
B-047	35	Silty Sand (Qal)	SM				2	53	30	15		Consolidation - Plate C-12

TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-079	70	Silty Sandstone (Qtst)		120.0	11.9	SEE PLATE C-186	0	33	44	23		
B-080	20	Silty Sand (Qoa)	SM	132.3	8.3		6	64	22	8		
B-081	15	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-58
B-082	10	Sand with Silt (Qal)	SP-SM				8	78	11	3		Consolidation-Plate C-59
B-082	20	Sandy Siltstone (Qtst)		126.2	9.1	SEE PLATE C-187	0	70	20	10		
B-082	35	Sandy Siltstone (Qtst)				SEE PLATE C-188	0	56	27	17		
B-082	45	Sandy Siltstone (Qtst)				SEE PLATE C-189	0	70	15	15		
B-083	20	Silty Sand (Qoa)	SM			SEE PLATE C-190	0	53	30	17		
B-084	20	Silty Sandstone (Qtst)				SEE PLATE C-191	0	60	30	10		
B-084	35	Sandy Siltstone (Qtst)				SEE PLATE C-192	0	45	42	13		
B-085	15	Silty Sand (Qoa)	SM	130.6	8.7		0	79	18	3		Consolidation-Plate C-60
B-090	26	Gravelly Sand (Qoa)	SP			SEE PLATE C-193						
B-093	6	Silty Sandstone (Qtst)		125.9	10.0	SEE PLATE C-194	0	71	20	9		Chemical-Plate C-249 Resistivity = 6960, pH = 6.8
B-093	13	Silty Sandstone (Qtst)				SEE PLATE C-195	0	58	22	10		
B-093	20	Sandy Siltstone (Qtst)					0	40	48	12		Consolidation-Plate C-61
B-095	10	Silty Sand (Qal)	SM				0	70	20	10		Consolidation-Plate C-62
B-095	11	Silty Sand (Qal)	SM	126.6	10.7							Chemical-Plate C-249 Resistivity = 4090, pH = 6.8
B-096	5	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-63
B-096	11	Silty Sand (Qal)	SM				0	60	20	20		Consolidation-Plate C-64
B-096	12	Silty Sand (Qal)	SM	125.1	11.9	SEE PLATE C-196	0	72	16	12		Chemical-Plate C-250 Resistivity = 3050, pH = 6.8
B-099	15	Silty Sand (Qal)	SM				10	69	12	9		Consolidation-Plate C-65
B-099	21	Gravelly Sand (Qal)	SP	130.2	7.9	SEE PLATE C-197	18	71	8	3	0	

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-037	15.0	131	8.6	85	49		Sandy Siltstone (QTst)

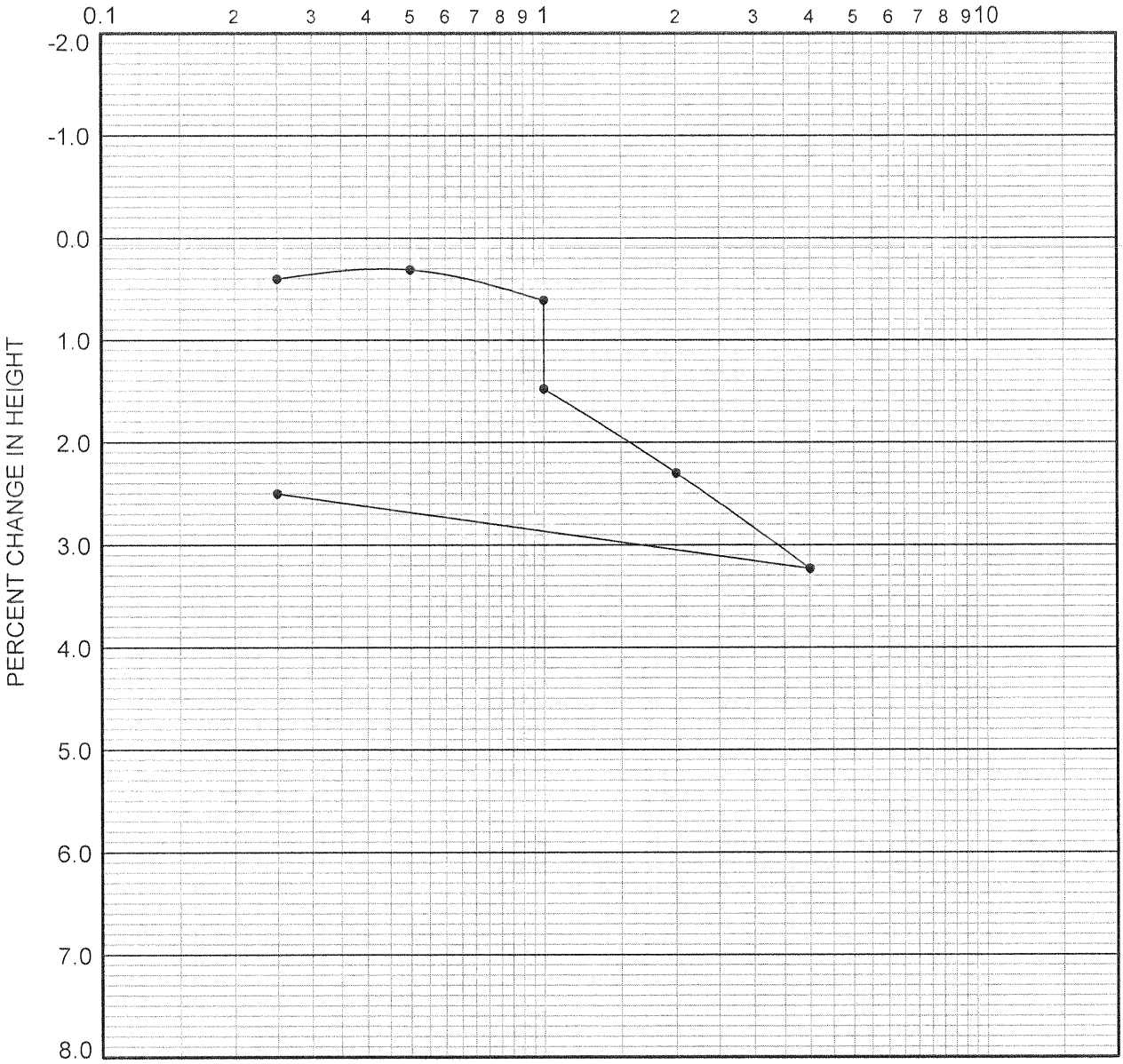
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-3

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-081	15.0	112	5.5	31	29	SM	Silty Sand (Qal)

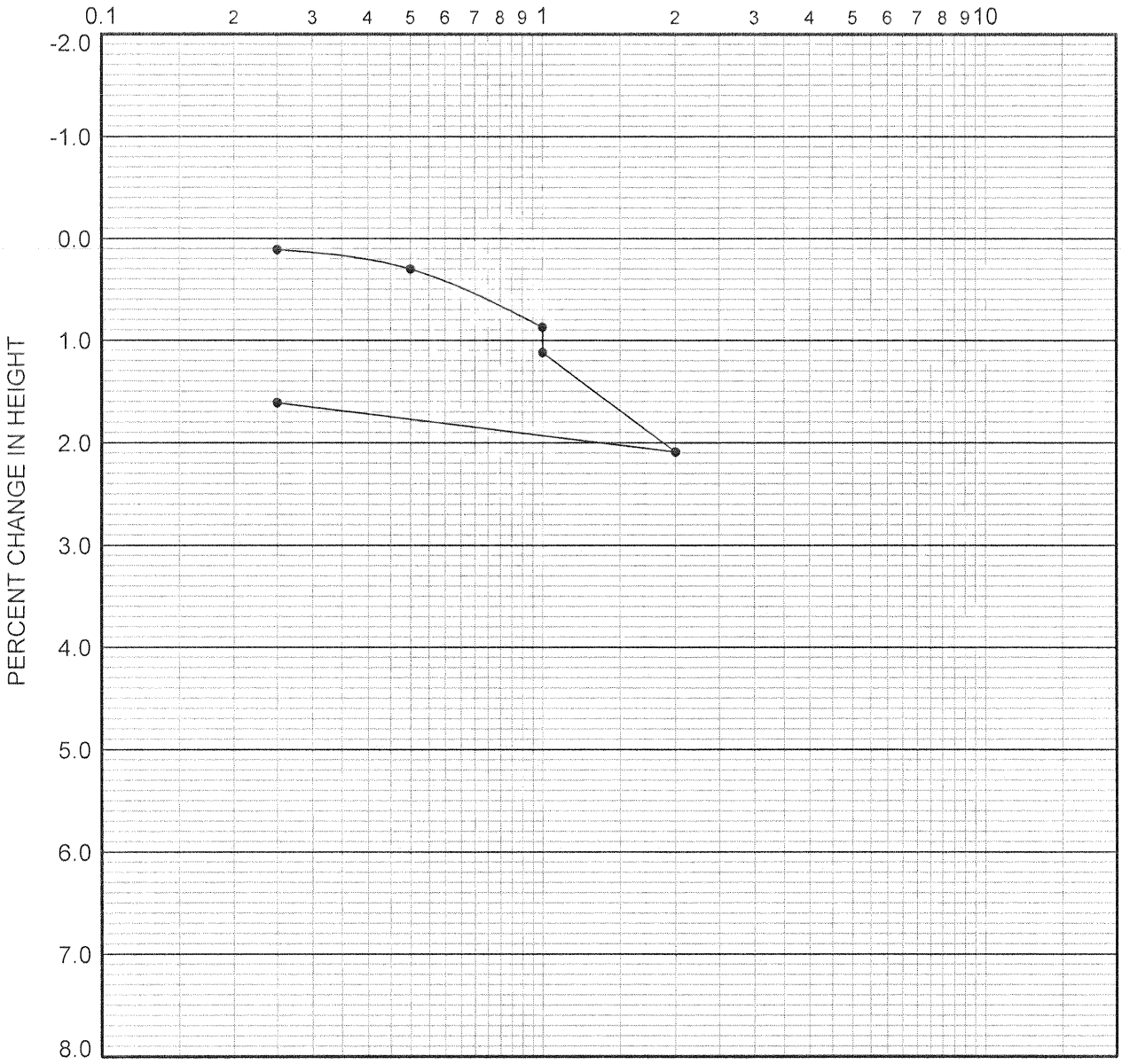
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-58

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-095	10.0	113	13.2	75	30	SM	Silty Sand (Qal)

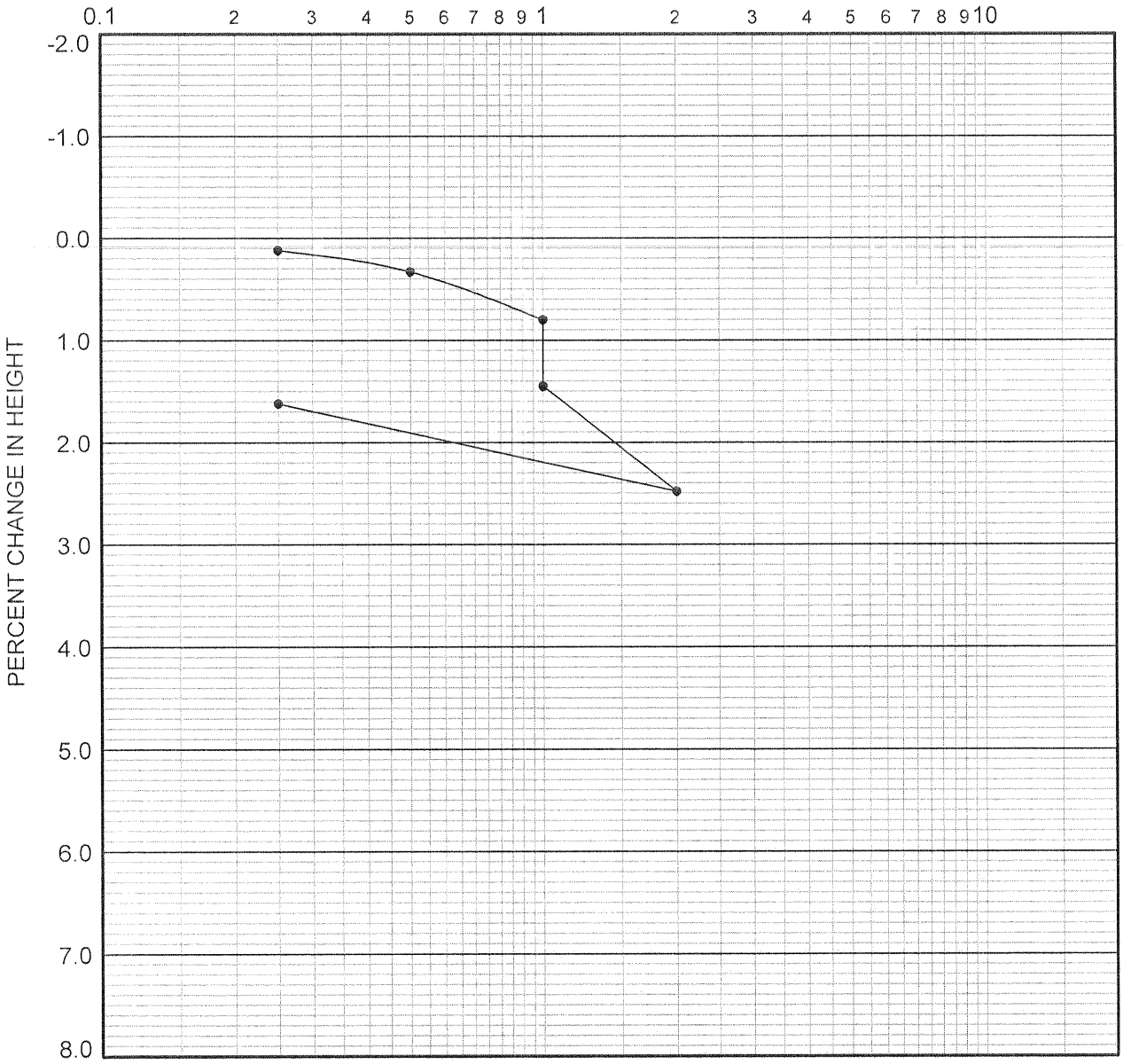
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-62

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	5.0	103	3.9	17	29	SM	Silty Sand (Qal)

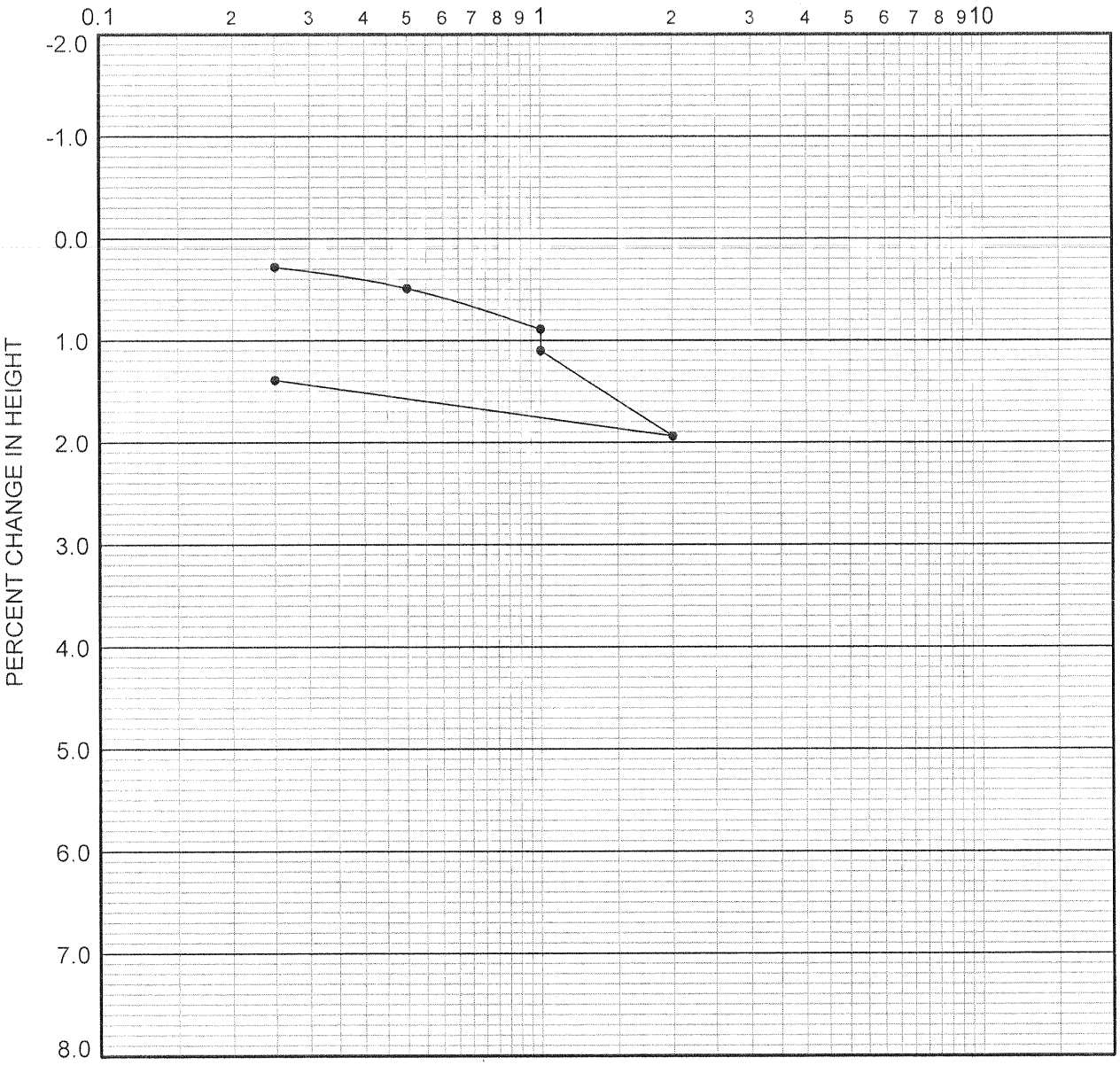
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-63

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	11.0	112	14.4	79	40	SM	Silty Sand (Qal)

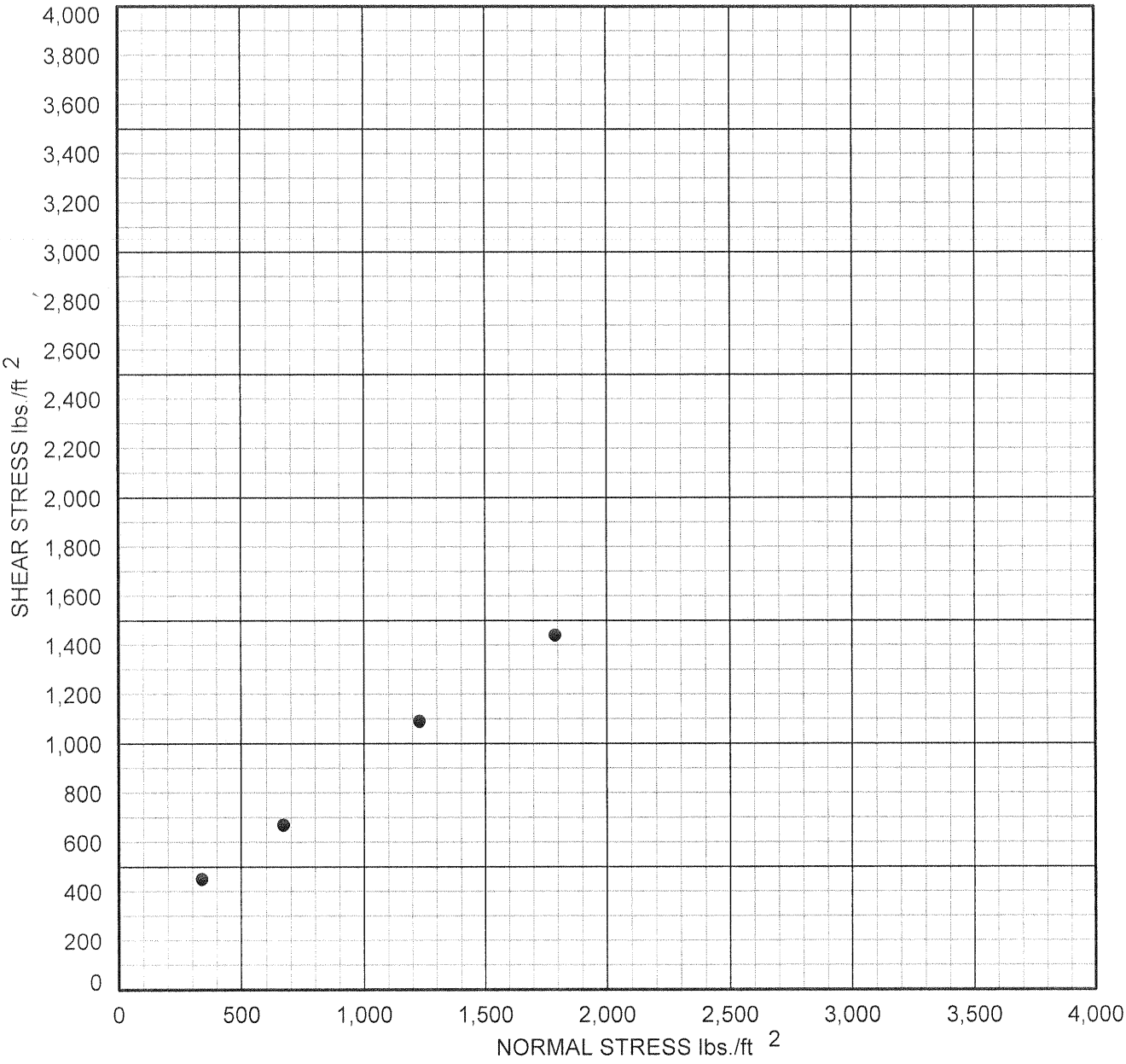
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-64

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
B-096	12.0			28	SM	Silty Sand (Qal)

COHESION	220	psf.
FRICTION ANGLE	35.0	degrees

DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-196

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 Tel: (714) 549-5824 Fax: (714) 549-8375

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246199R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.005~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.004~~	~~0.001~~
B-93 (6)	20979	11-1-2004	Chloride Content	CalTrans 422	0.002	0.001
B-93 (6)	20979	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-93 (6)	20979	11-1-2004	Alkalinity	EPA 310.1	0.002	0.001
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.001~~	~~0.001~~
B-95 (11)	20981	11-1-2004	Chloride Content	CalTrans 422	0.001	0.001
B-95 (11)	20981	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-95 (11)	20981	11-1-2004	Alkalinity	EPA 310.1	0.007	0.001

Authorized Signature

November 3, 2004
Report Date

PLATE C-249

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 *Tel: (714) 549-5824* *Fax: (714) 549-8375*

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246148R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.005~~	~~0.001~~
B-96 (12)	20856	10-5-2004	Chloride Content	CalTrans 422	0.001	0.001
B-96 (12)	20856	10-5-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-96 (12)	20856	10-5-2004	Alkalinity	EPA 310.1	0.006	0.001
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.002~~	~~0.001~~

Authorized Signature

October 11, 2004
Report Date

PLATE C-250

APPENDIX D

ENGINEERING ANALYSES

APPENDIX D-1

LIQEFACTION ANALYSIS

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

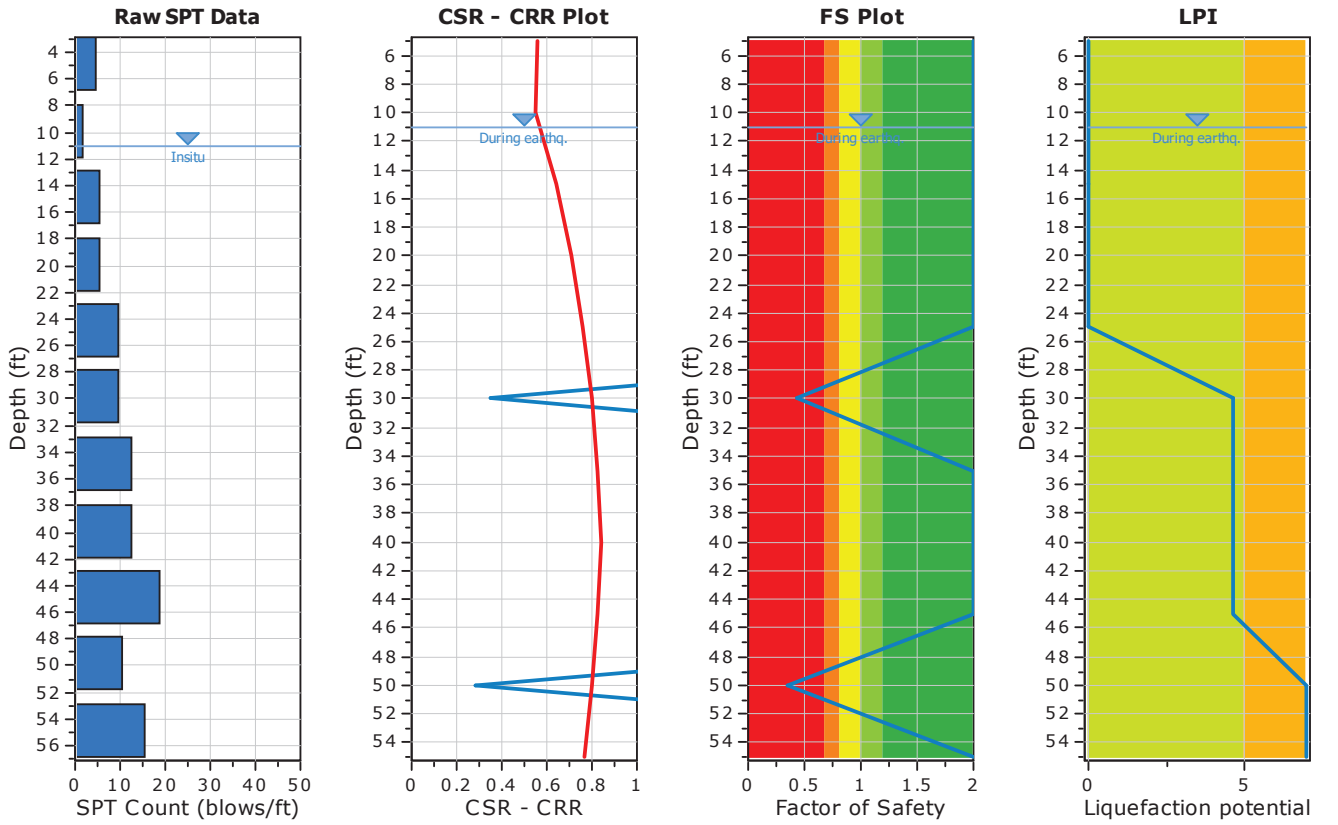
SPT BASED LIQUEFACTION ANALYSIS REPORT

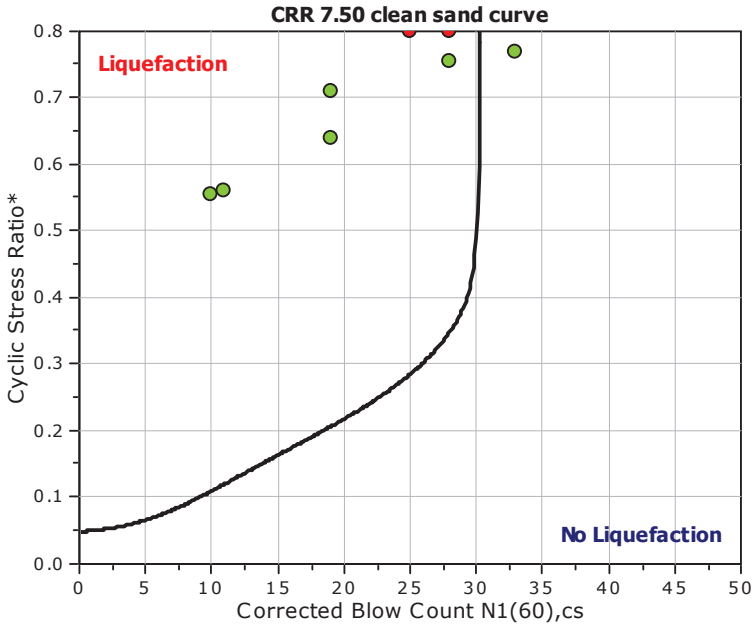
Project title : 2004-01 OVTC **SPT Name: AGS-3**

Location : Calimesa, CA

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	11.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	11.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	7.50
Borehole diameter:	200mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.42		

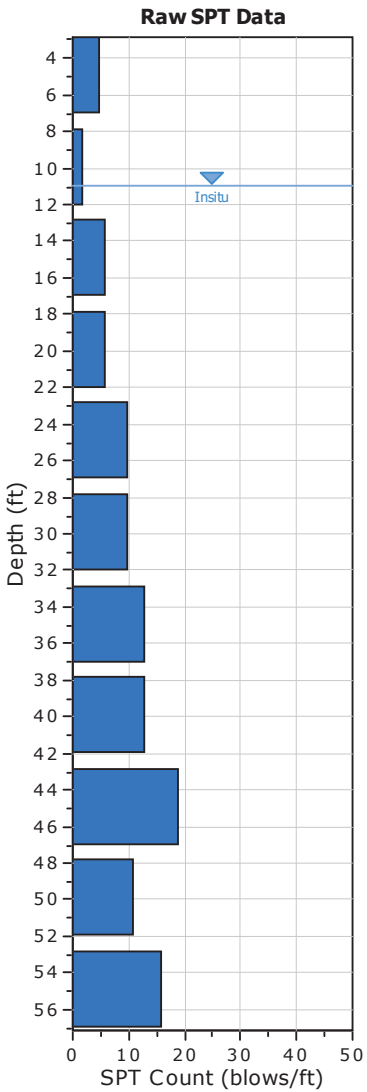


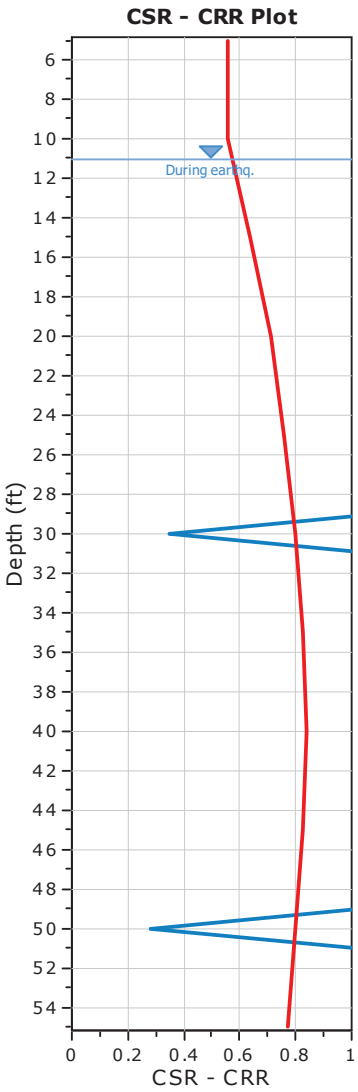


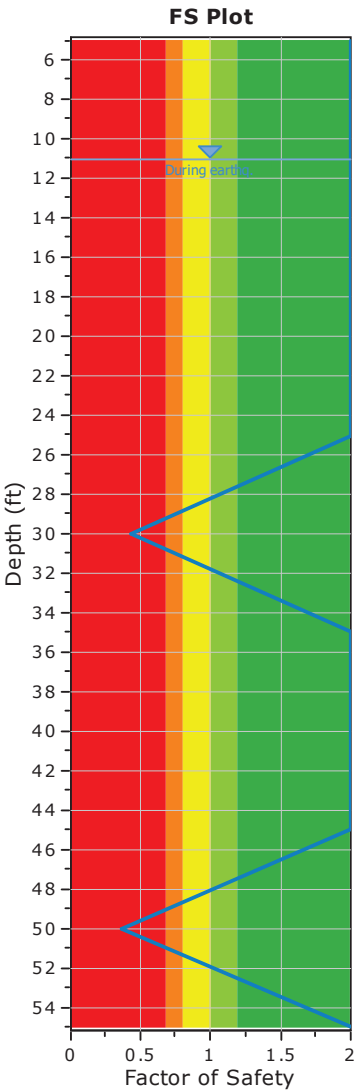
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

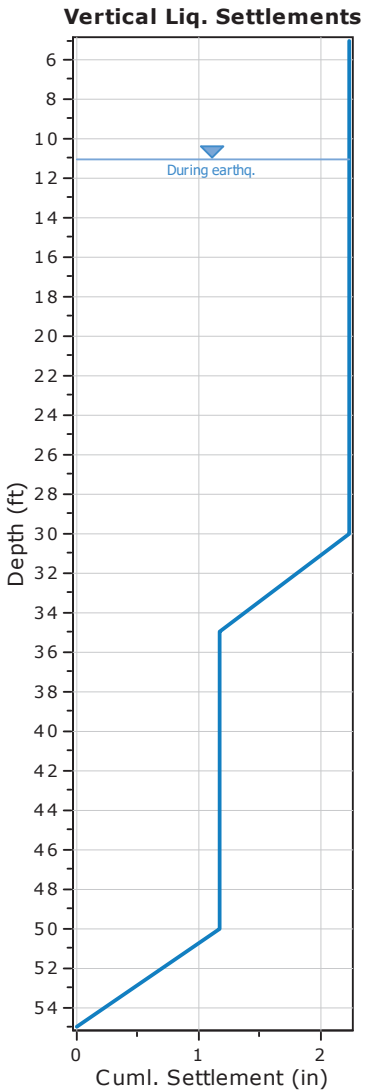
LPI color scheme
- Very high risk
- High risk
- Low risk

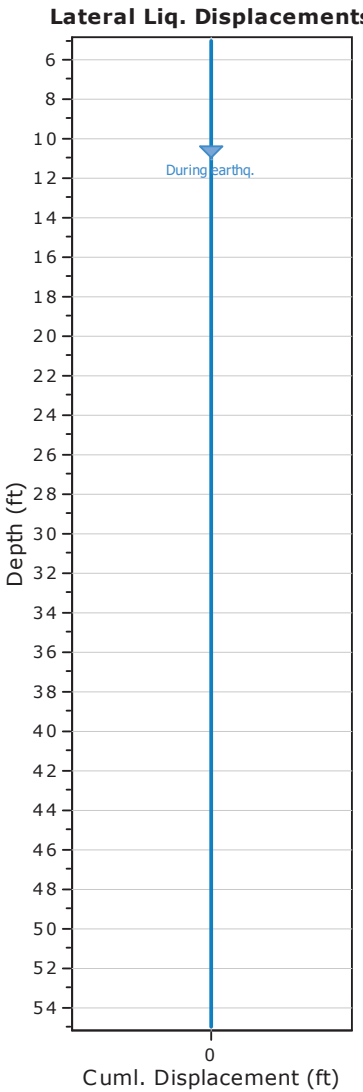
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	5	0.00	113.00	5.00	No
10.00	2	74.30	113.00	5.00	No
15.00	6	74.30	124.00	5.00	No
20.00	6	71.10	124.00	5.00	No
25.00	10	71.10	119.00	5.00	No
30.00	10	35.70	119.00	5.00	Yes
35.00	13	77.30	104.00	5.00	No
40.00	13	66.10	104.00	5.00	No
45.00	19	66.10	136.00	5.00	Yes
50.00	11	59.30	125.00	5.00	Yes
55.00	16	59.30	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	5	113.00	0.28	0.00	0.28	1.50	1.42	1.15	0.75	1.20	11	0.00	0.00	1.00	11	4.000
10.00	2	113.00	0.56	0.00	0.56	1.27	1.42	1.15	0.85	1.20	4	74.30	5.00	1.20	10	4.000
15.00	6	124.00	0.88	0.12	0.75	1.15	1.42	1.15	0.85	1.20	12	74.30	5.00	1.20	19	4.000
20.00	6	124.00	1.19	0.28	0.90	1.07	1.42	1.15	0.95	1.20	12	71.10	5.00	1.20	19	4.000
25.00	10	119.00	1.48	0.44	1.05	1.01	1.42	1.15	0.95	1.20	19	71.10	5.00	1.20	28	4.000
30.00	10	119.00	1.78	0.59	1.19	0.95	1.42	1.15	1.00	1.20	19	35.70	5.00	1.20	28	0.348
35.00	13	104.00	2.04	0.75	1.29	0.91	1.42	1.15	1.00	1.20	23	77.30	5.00	1.20	33	4.000
40.00	13	104.00	2.30	0.91	1.39	0.87	1.42	1.15	1.00	1.20	22	66.10	5.00	1.20	31	4.000
45.00	19	136.00	2.64	1.06	1.58	0.82	1.42	1.15	1.00	1.20	30	66.10	5.00	1.20	41	4.000
50.00	11	125.00	2.95	1.22	1.73	0.77	1.42	1.15	1.00	1.20	17	59.30	5.00	1.20	25	0.285
55.00	16	130.00	3.28	1.37	1.90	0.73	1.42	1.15	1.00	1.20	23	59.30	5.00	1.20	33	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	113.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	113.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	124.00	0.88	0.12	0.75	0.97	1.00	0.639	1.00	0.639	1.00	0.639	2.000	●
20.00	124.00	1.19	0.28	0.90	0.96	1.00	0.709	1.00	0.710	1.00	0.710	2.000	●
25.00	119.00	1.48	0.44	1.05	0.94	1.00	0.755	1.00	0.756	1.00	0.756	2.000	●
30.00	119.00	1.78	0.59	1.19	0.92	1.00	0.781	1.00	0.781	0.98	0.799	0.436	●
35.00	104.00	2.04	0.75	1.29	0.89	1.00	0.796	1.00	0.796	0.96	0.829	2.000	●
40.00	104.00	2.30	0.91	1.39	0.85	1.00	0.794	1.00	0.794	0.95	0.839	2.000	●
45.00	136.00	2.64	1.06	1.58	0.80	1.00	0.760	1.00	0.760	0.92	0.824	2.000	●
50.00	125.00	2.95	1.22	1.73	0.75	1.00	0.724	1.00	0.725	0.91	0.800	0.356	●
55.00	130.00	3.28	1.37	1.90	0.70	1.00	0.685	1.00	0.685	0.89	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.436	0.56	5.43	5.00	4.67
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	0.356	0.64	2.38	5.00	2.33
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 7.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
10.00	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.77	5.00	1.064
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	0.00	5.00	0.000
45.00	0.00	5.00	0.00	5.00	0.000
50.00	0.00	5.00	1.95	5.00	1.168
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 2.232

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	11	46.43	0.00	5.00	0.000	0.00
10.00	4	28.00	0.00	5.00	0.000	0.00
15.00	12	48.50	0.00	5.00	0.000	0.00
20.00	12	48.50	0.00	5.00	0.000	0.00
25.00	19	61.02	0.00	5.00	0.000	0.00
30.00	19	61.02	22.70	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	22	65.67	0.00	5.00	0.000	0.00
45.00	30	76.68	0.00	5.00	0.000	0.00
50.00	17	57.72	22.70	5.00	0.000	0.00
55.00	23	67.14	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
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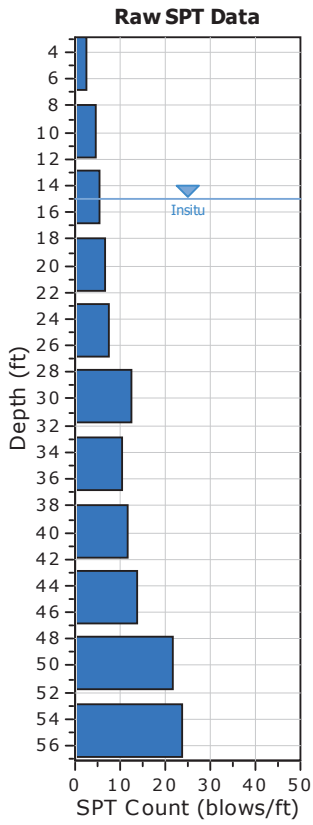
SPT BASED LIQUEFACTION ANALYSIS REPORT

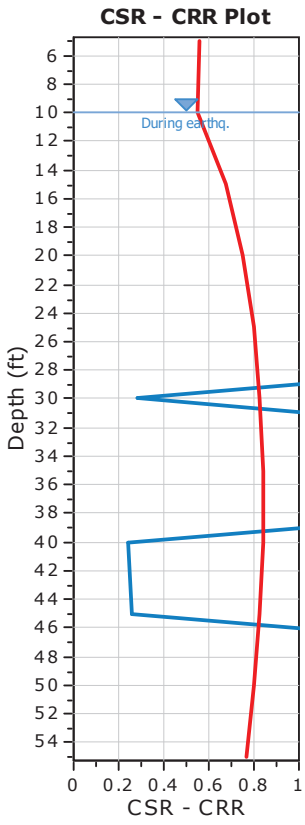
Project title : 2004-01 OVTC **SPT Name: AGS-16**

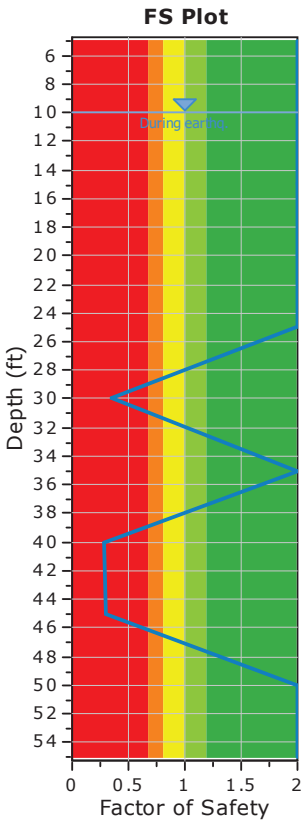
Location : Calimesa, CA

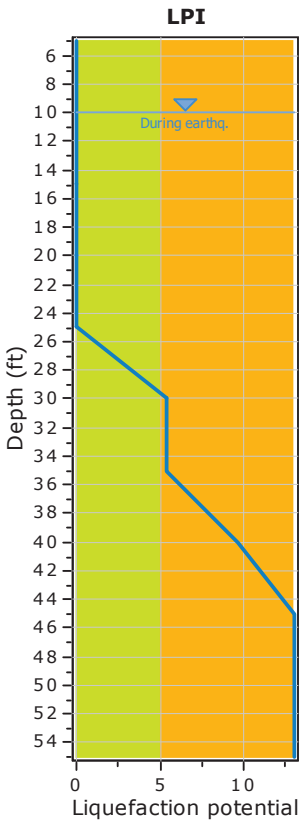
:: Input parameters and analysis properties ::

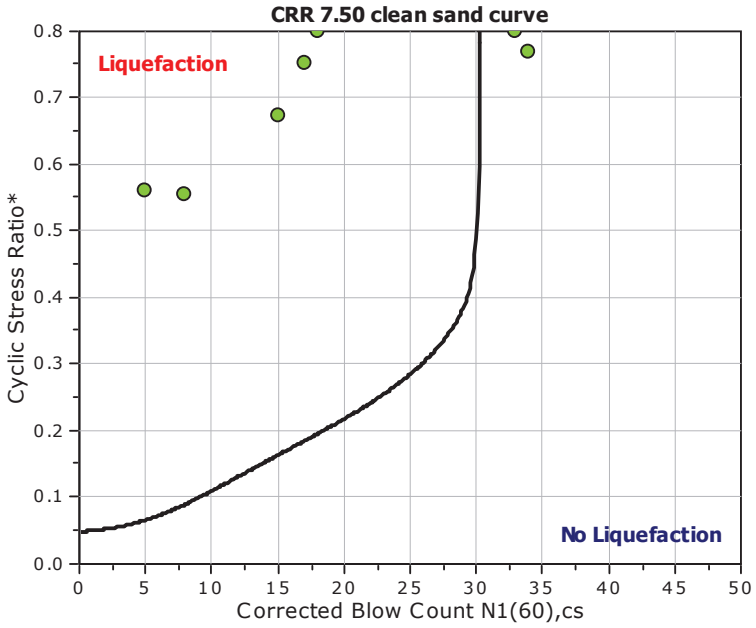
Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.50
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.45		







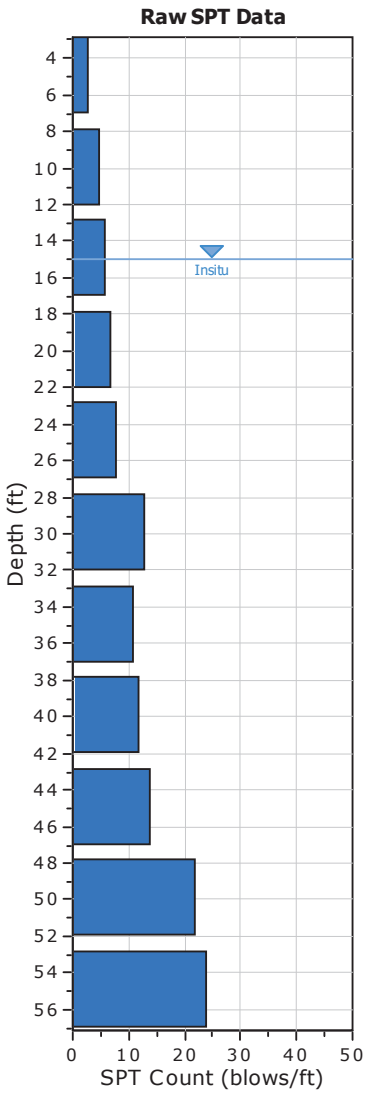


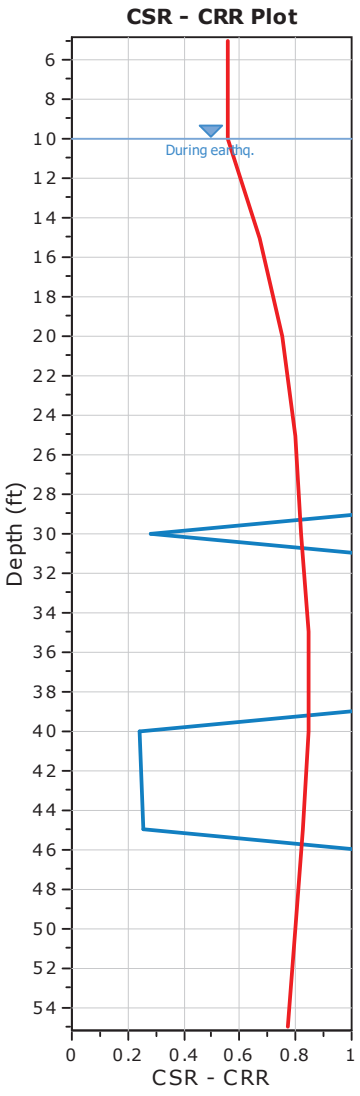


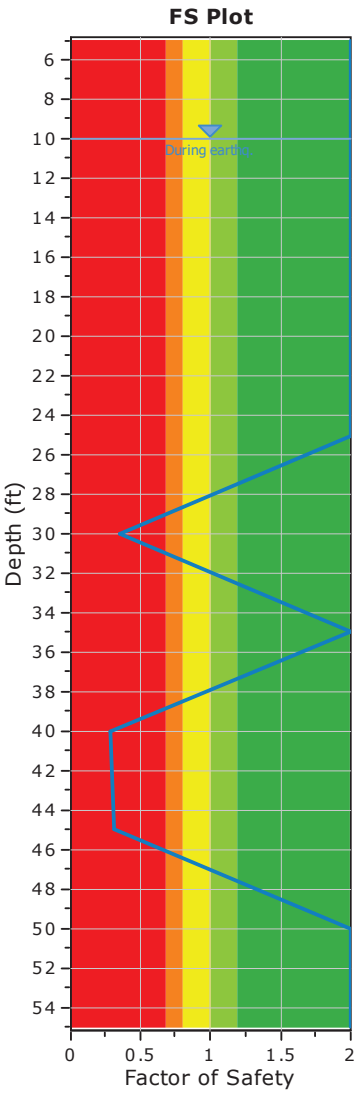
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

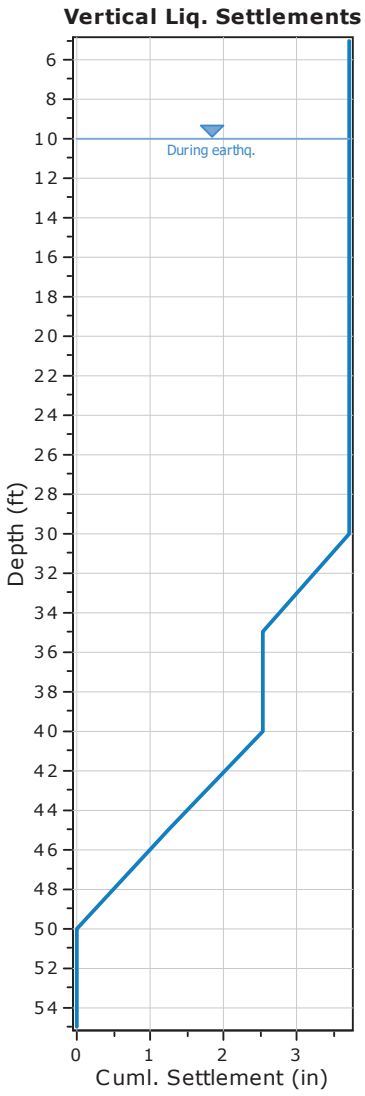
LPI color scheme
- Very high risk
- High risk
- Low risk

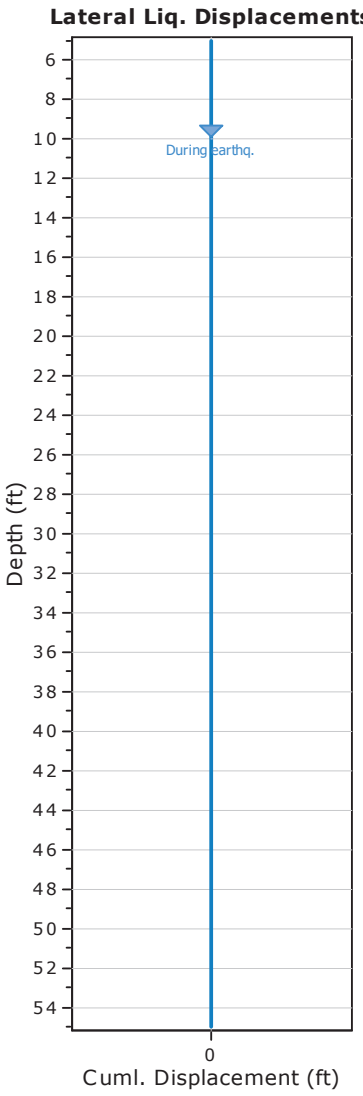
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	3	0.00	111.00	5.00	No
10.00	5	0.00	111.00	5.00	No
15.00	6	77.90	111.00	5.00	No
20.00	7	77.90	113.00	5.00	No
25.00	8	53.80	113.00	5.00	No
30.00	13	34.00	134.00	5.00	Yes
35.00	11	52.90	125.00	5.00	No
40.00	12	52.90	135.00	5.00	Yes
45.00	14	48.20	135.00	5.00	Yes
50.00	22	48.20	135.00	5.00	Yes
55.00	24	48.20	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	3	111.00	0.28	0.00	0.28	1.50	1.45	1.00	0.75	1.00	5	0.00	0.00	1.00	5	4.000
10.00	5	111.00	0.56	0.00	0.56	1.28	1.45	1.00	0.85	1.00	8	0.00	0.00	1.00	8	4.000
15.00	6	111.00	0.83	0.00	0.83	1.11	1.45	1.00	0.85	1.00	8	77.90	5.00	1.20	15	4.000
20.00	7	113.00	1.12	0.16	0.96	1.04	1.45	1.00	0.95	1.00	10	77.90	5.00	1.20	17	4.000
25.00	8	113.00	1.40	0.31	1.09	0.99	1.45	1.00	0.95	1.00	11	53.80	5.00	1.20	18	4.000
30.00	13	134.00	1.73	0.47	1.26	0.92	1.45	1.00	1.00	1.00	17	34.00	4.93	1.19	25	0.285
35.00	11	125.00	2.05	0.62	1.42	0.87	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	4.000
40.00	12	135.00	2.38	0.78	1.60	0.81	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	0.242
45.00	14	135.00	2.72	0.94	1.78	0.76	1.45	1.00	1.00	1.00	15	48.20	5.00	1.20	23	0.255
50.00	22	135.00	3.06	1.09	1.97	0.72	1.45	1.00	1.00	1.00	23	48.20	5.00	1.20	33	4.000
55.00	24	135.00	3.40	1.25	2.15	0.68	1.45	1.00	1.00	1.00	24	48.20	5.00	1.20	34	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	111.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	111.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	111.00	0.83	0.16	0.68	0.97	1.00	0.674	1.00	0.674	1.00	0.674	2.000	●
20.00	113.00	1.12	0.31	0.80	0.96	1.00	0.751	1.00	0.752	1.00	0.752	2.000	●
25.00	113.00	1.40	0.47	0.93	0.94	1.00	0.801	1.00	0.801	1.00	0.801	2.000	●
30.00	134.00	1.73	0.62	1.11	0.92	1.00	0.814	1.00	0.814	0.99	0.822	0.347	●
35.00	125.00	2.05	0.78	1.26	0.89	1.00	0.814	1.00	0.814	0.96	0.844	2.000	●
40.00	135.00	2.38	0.94	1.45	0.85	1.00	0.793	1.00	0.793	0.94	0.844	0.286	●
45.00	135.00	2.72	1.09	1.63	0.80	1.00	0.759	1.00	0.760	0.92	0.828	0.308	●
50.00	135.00	3.06	1.25	1.81	0.75	1.00	0.719	1.00	0.719	0.90	0.801	2.000	●
55.00	135.00	3.40	1.40	1.99	0.70	1.00	0.678	1.00	0.678	0.88	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.347	0.65	5.43	5.00	5.40
35.00	2.000	0.00	4.67	5.00	0.00
40.00	0.286	0.71	3.90	5.00	4.25
45.00	0.308	0.69	3.14	5.00	3.31
50.00	2.000	0.00	2.38	5.00	0.00
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 12.96

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
10.00	0.00	5.00	0.00	5.00	0.000
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.95	5.00	1.168
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	2.16	5.00	1.297
45.00	0.00	5.00	2.08	5.00	1.250
50.00	0.00	5.00	0.00	5.00	0.000
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 3.714

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	5	31.30	0.00	5.00	0.000	0.00
10.00	8	39.60	0.00	5.00	0.000	0.00
15.00	8	39.60	0.00	5.00	0.000	0.00
20.00	10	44.27	0.00	5.00	0.000	0.00
25.00	11	46.43	0.00	5.00	0.000	0.00
30.00	17	57.72	22.70	5.00	0.000	0.00
35.00	14	52.38	0.00	5.00	0.000	0.00
40.00	14	52.38	34.10	5.00	0.000	0.00
45.00	15	54.22	34.10	5.00	0.000	0.00
50.00	23	67.14	0.00	5.00	0.000	0.00
55.00	24	68.59	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX D-2

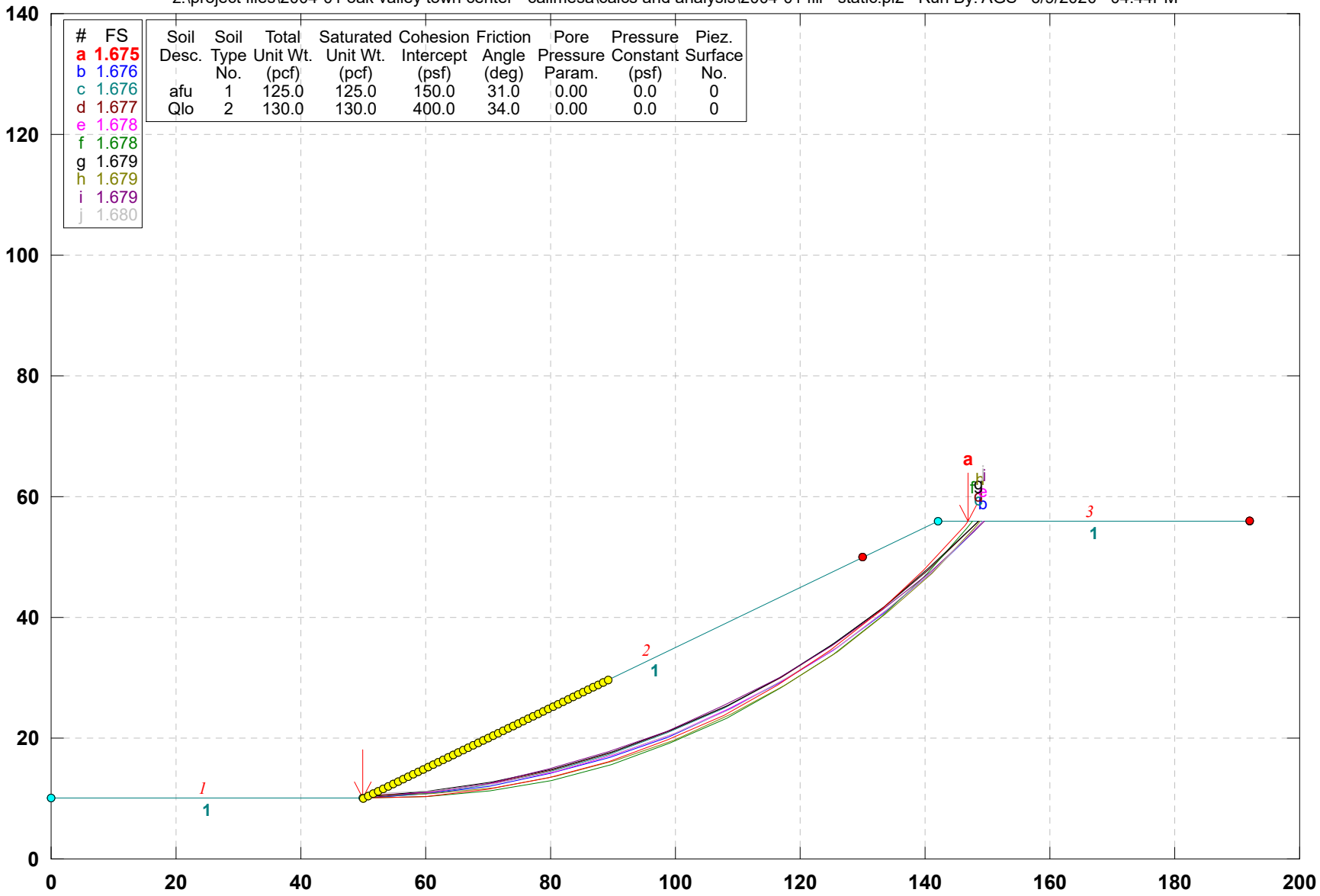
SLOPE STABILITY ANALYSIS

2004-01 OVTC 46 ft. Fill Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static.pl2 Run By: AGS 6/9/2020 04:44PM

#	FS
a	1.675
b	1.676
c	1.676
d	1.677
e	1.678
f	1.678
g	1.679
h	1.679
i	1.679
j	1.680

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.675

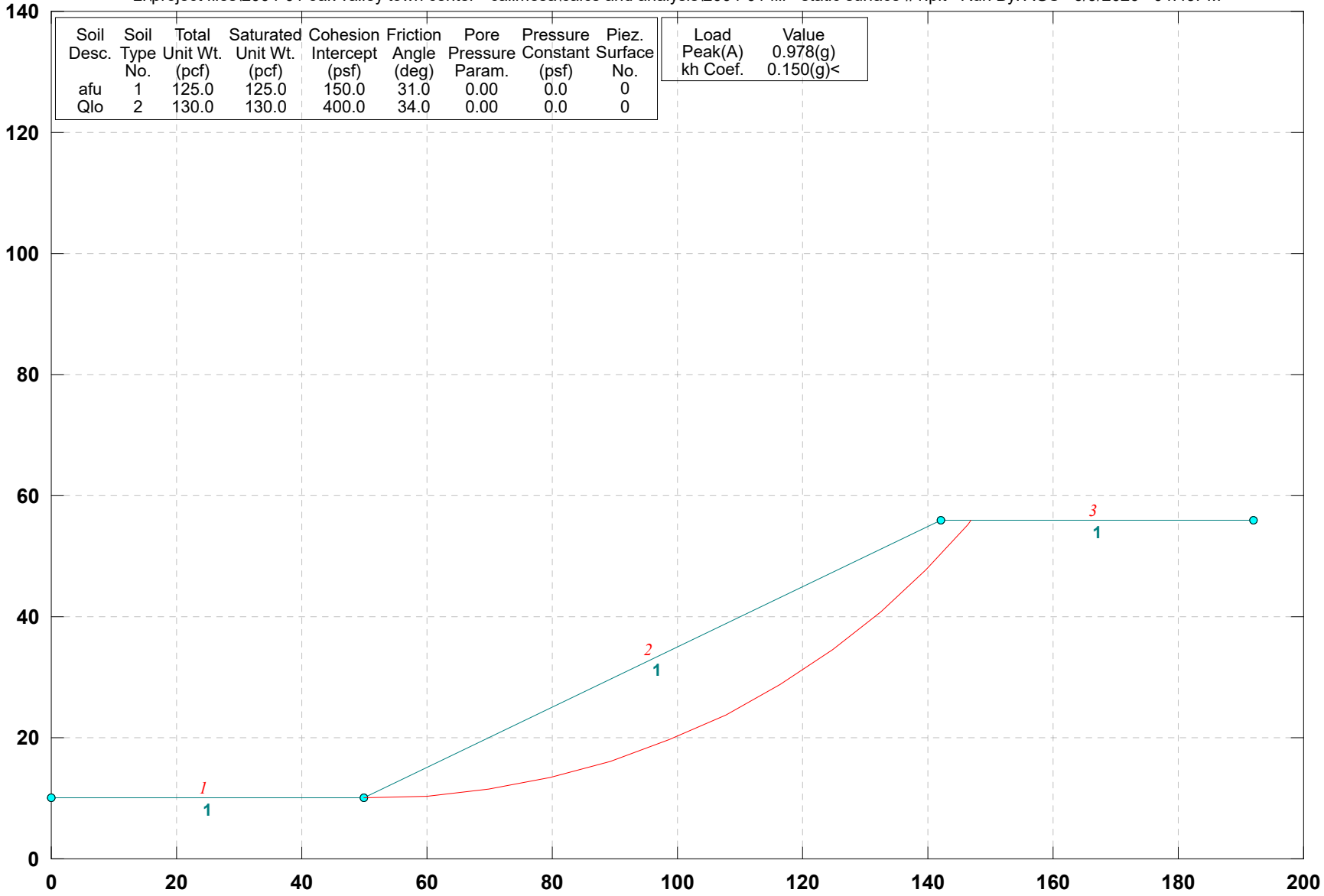
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 46 ft. Fill Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static surface #1.plt Run By: AGS 6/9/2020 04:49PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

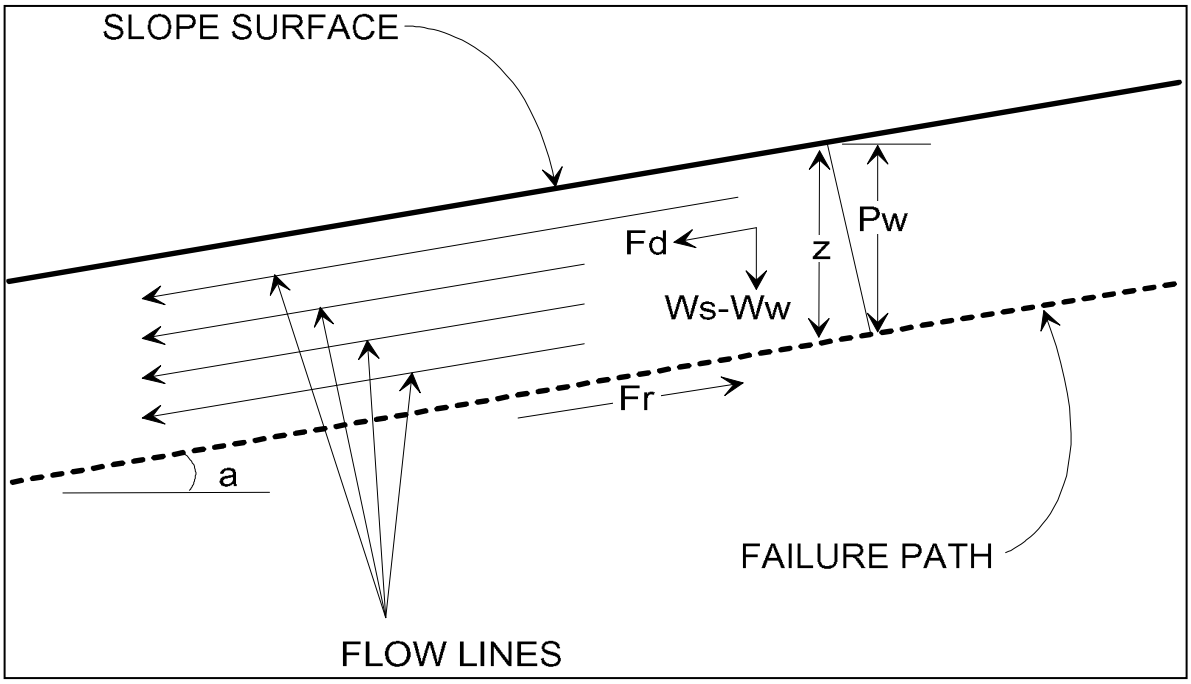
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.221

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
125	3	26.56505	0.463648	31	0.541052	150

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	240.27	**1.60**

2004-01 OVTC 72 ft Cut Slope - Static

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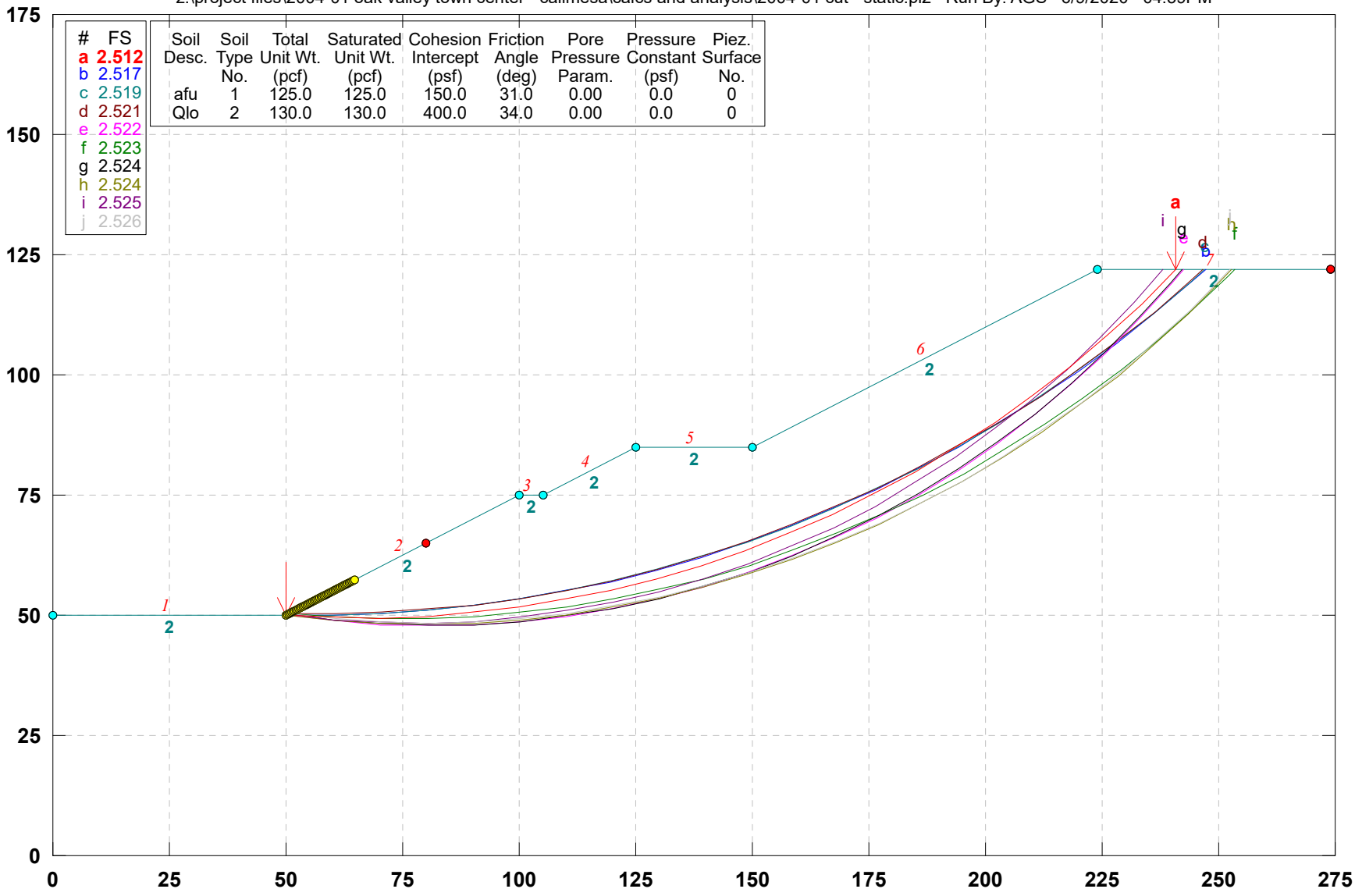


GSTABL7 v.2 FSmin=2.512

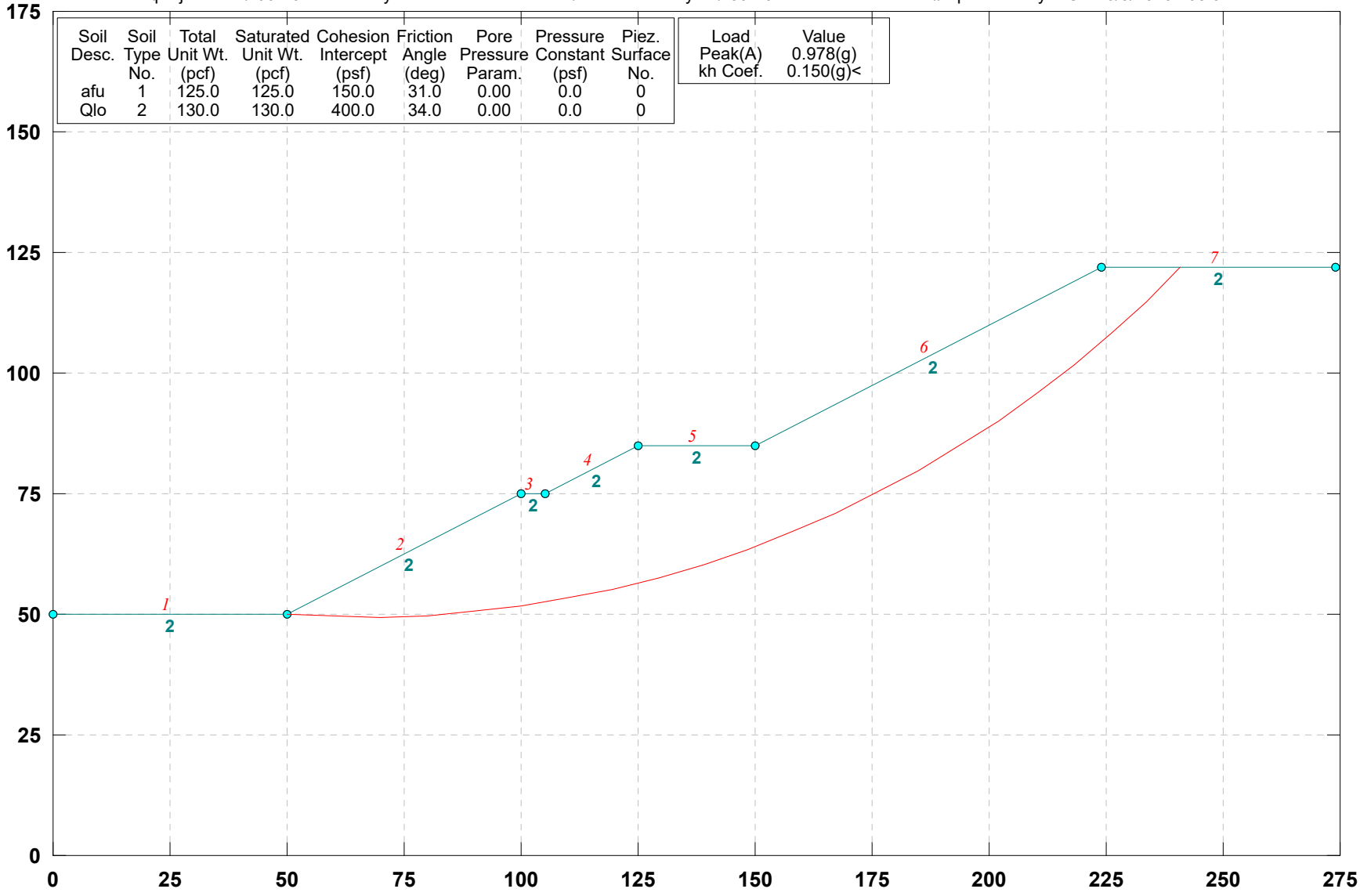
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 72 ft Cut Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static surface #1.plt Run By: AGS 6/9/2020 05:01PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

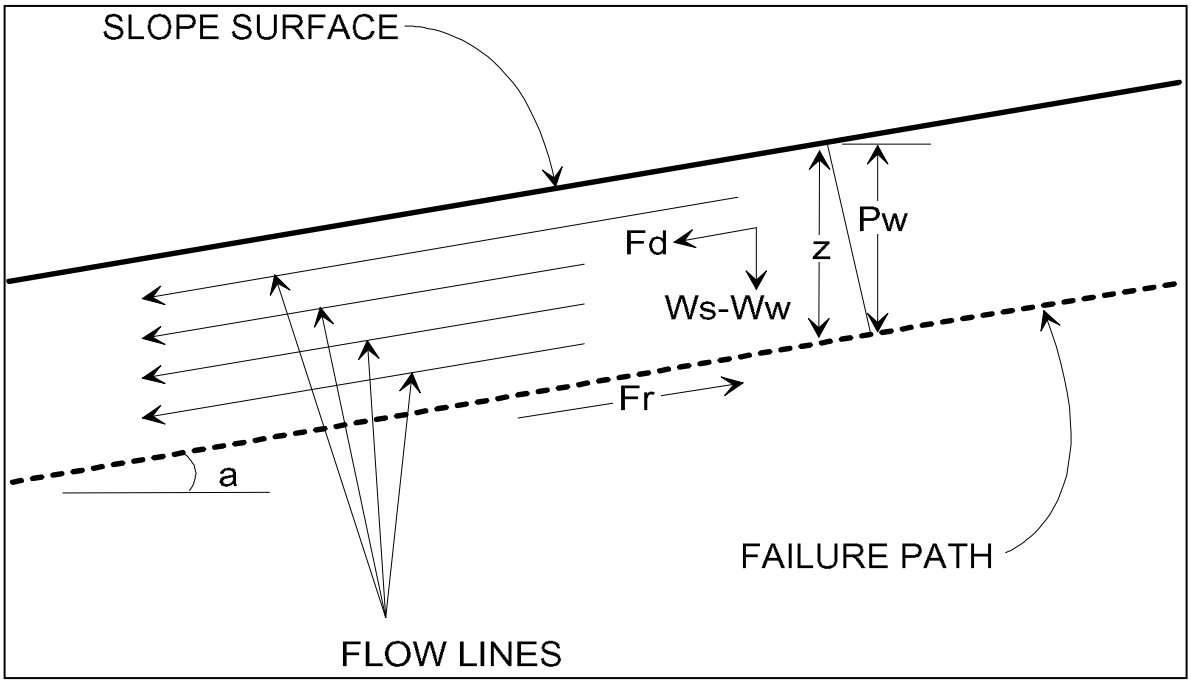
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.727

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
130	3	26.56505	0.463648	34	0.593412	400

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	156.00	509.43	**3.27**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All clearing and grubbing, remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be

properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspoles, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant. Environmental evaluation of existing conditions is not the responsibility of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be processed or scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 12 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant and do not inhibit the ability to properly compact fill materials.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to ½ the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall observe all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Civil Engineer.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation

by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials to achieve compaction is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill will be tested and evaluated by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content is not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

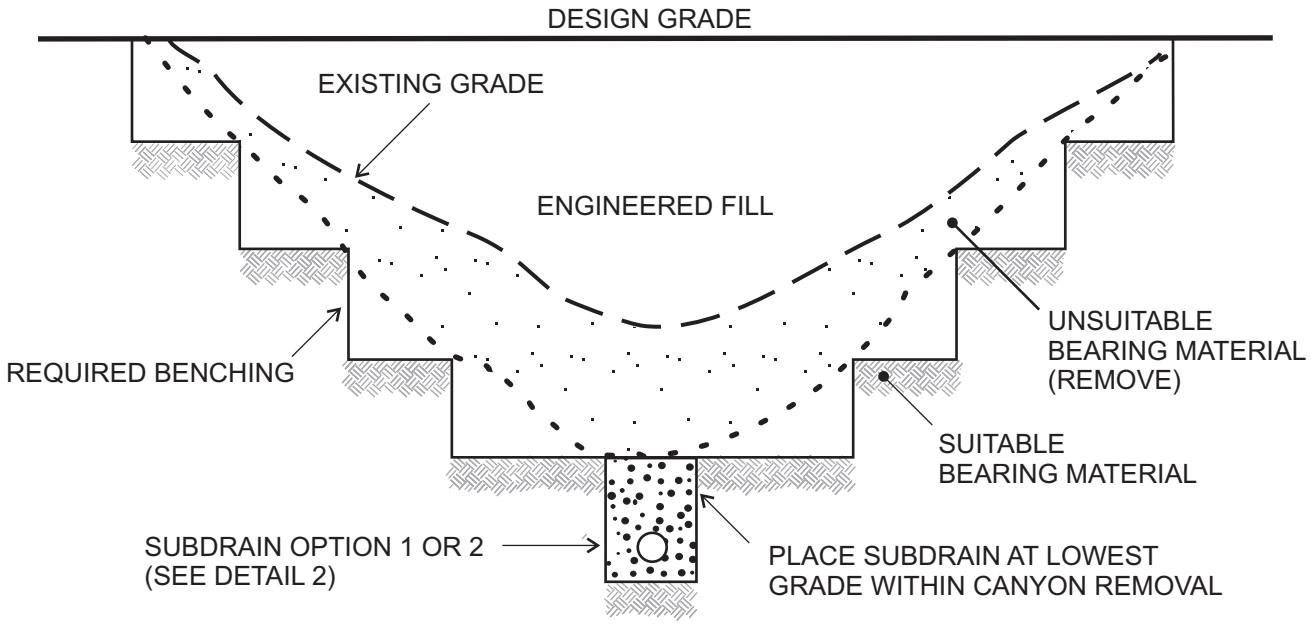
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals approximately two feet in fill height.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

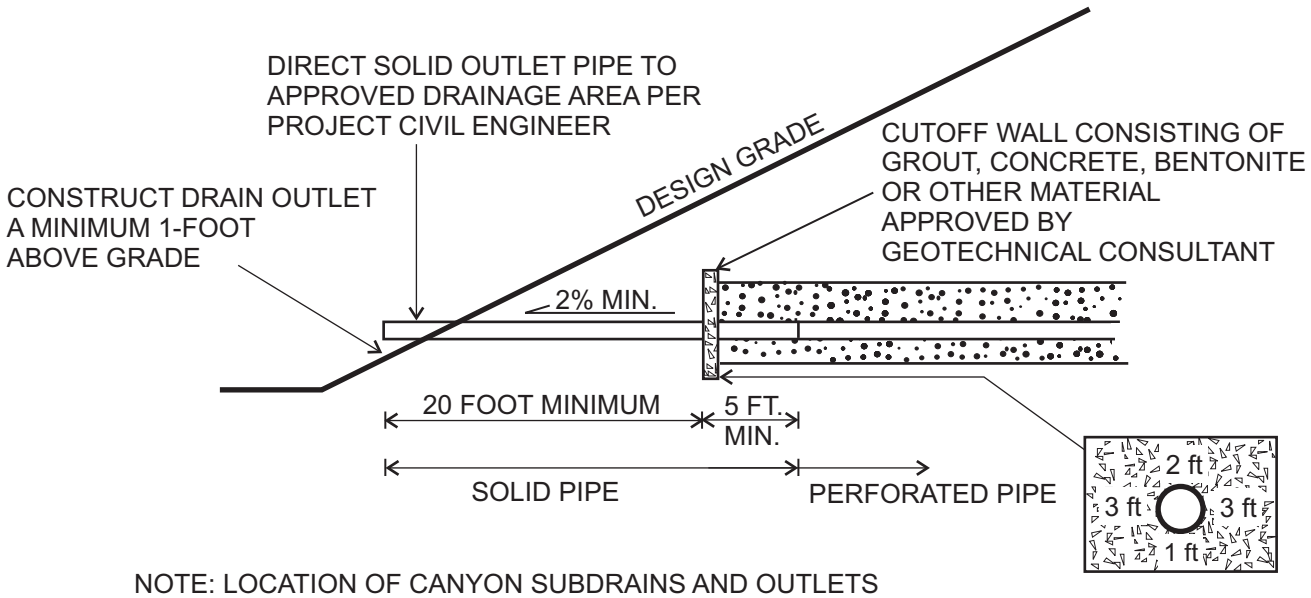
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results.



CANYON SUBDRAIN PROFILE



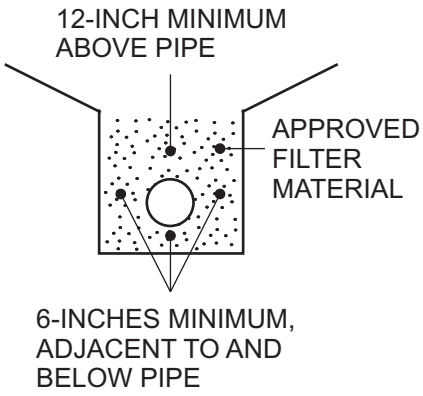
NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

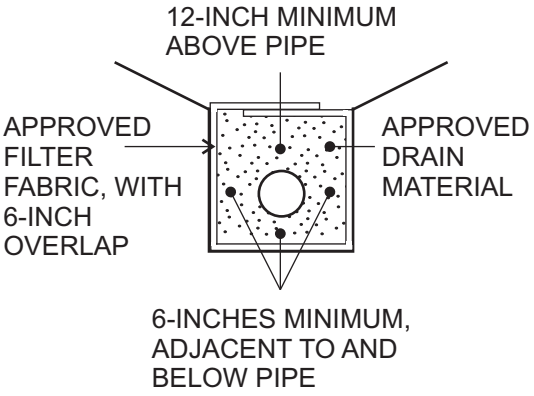
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

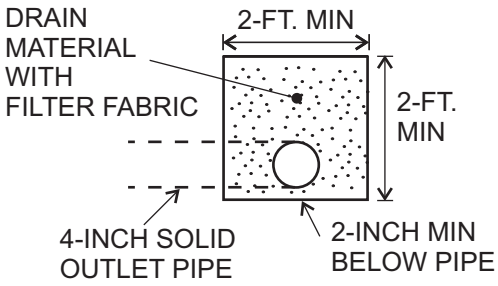
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

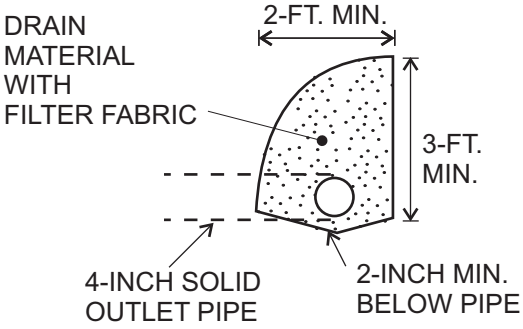
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

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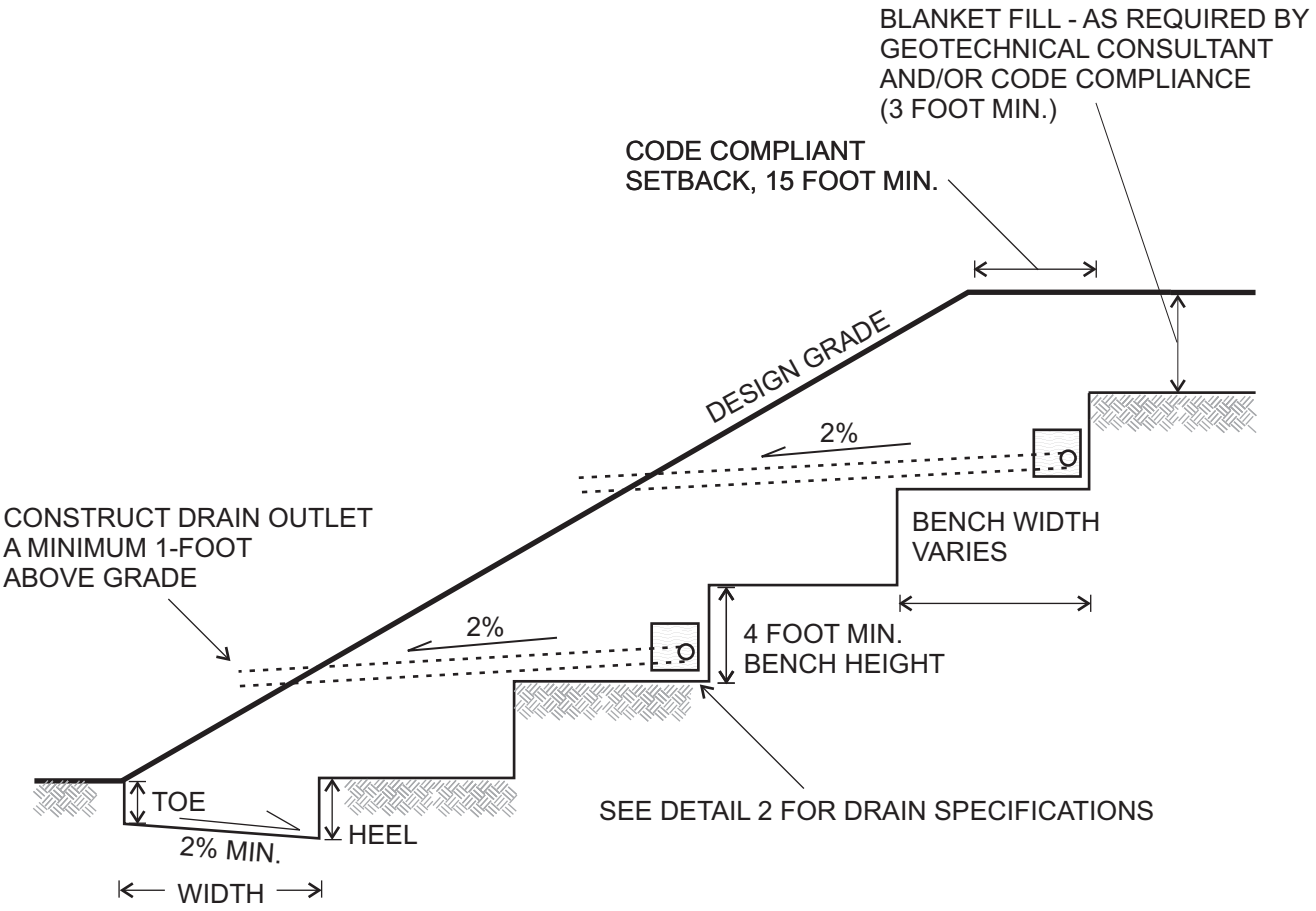
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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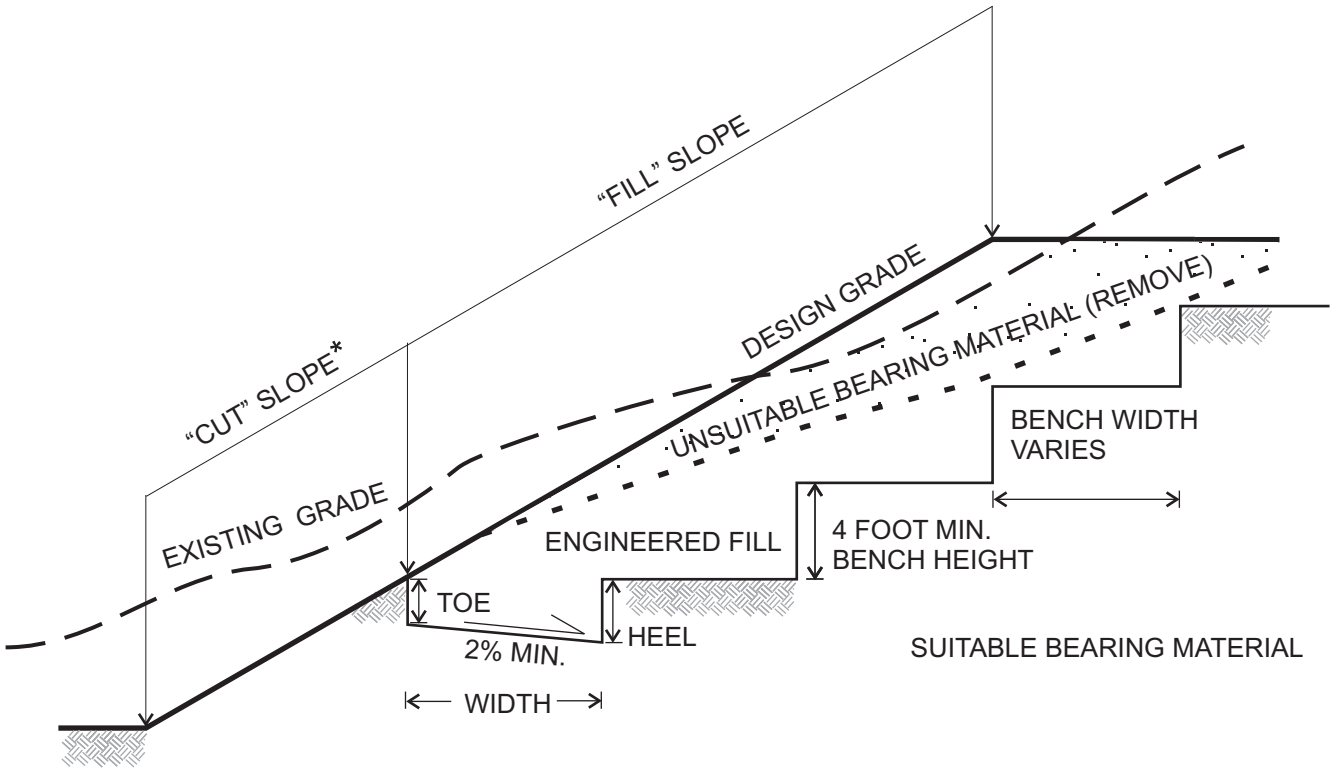
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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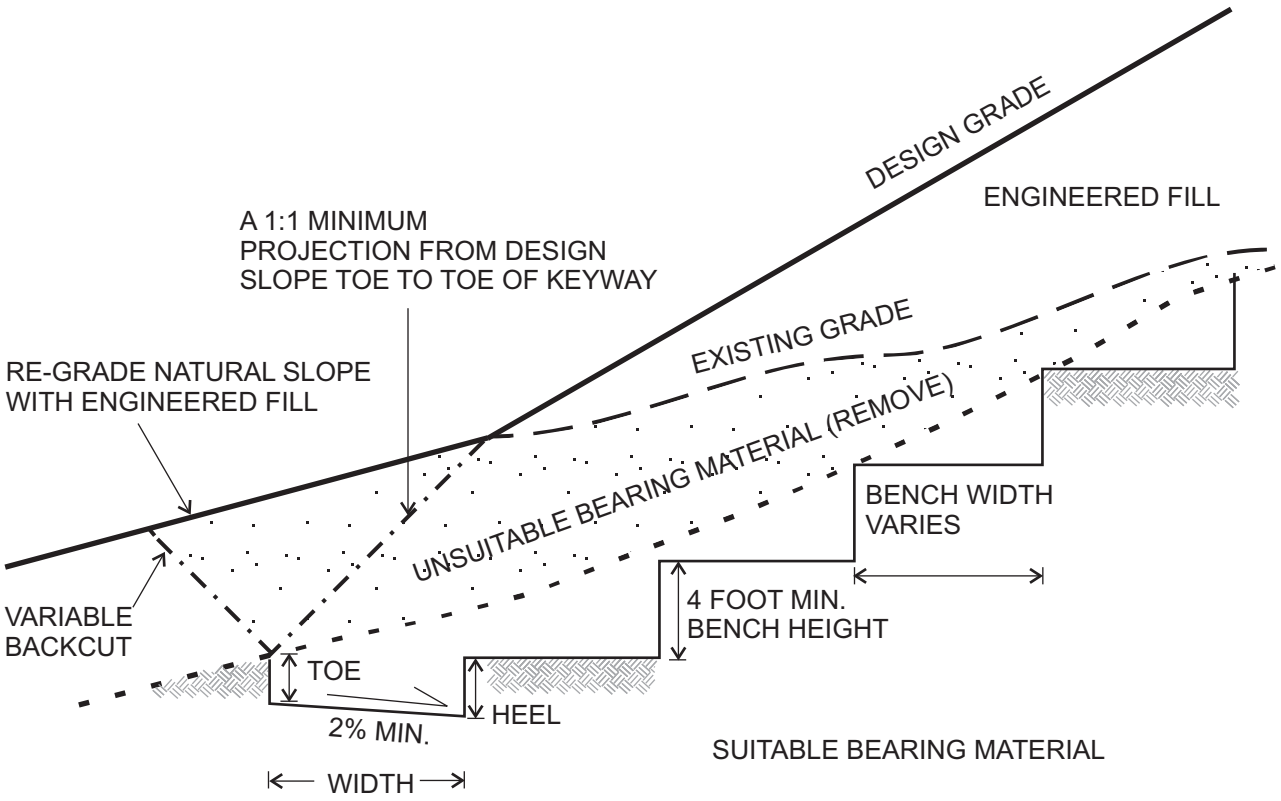
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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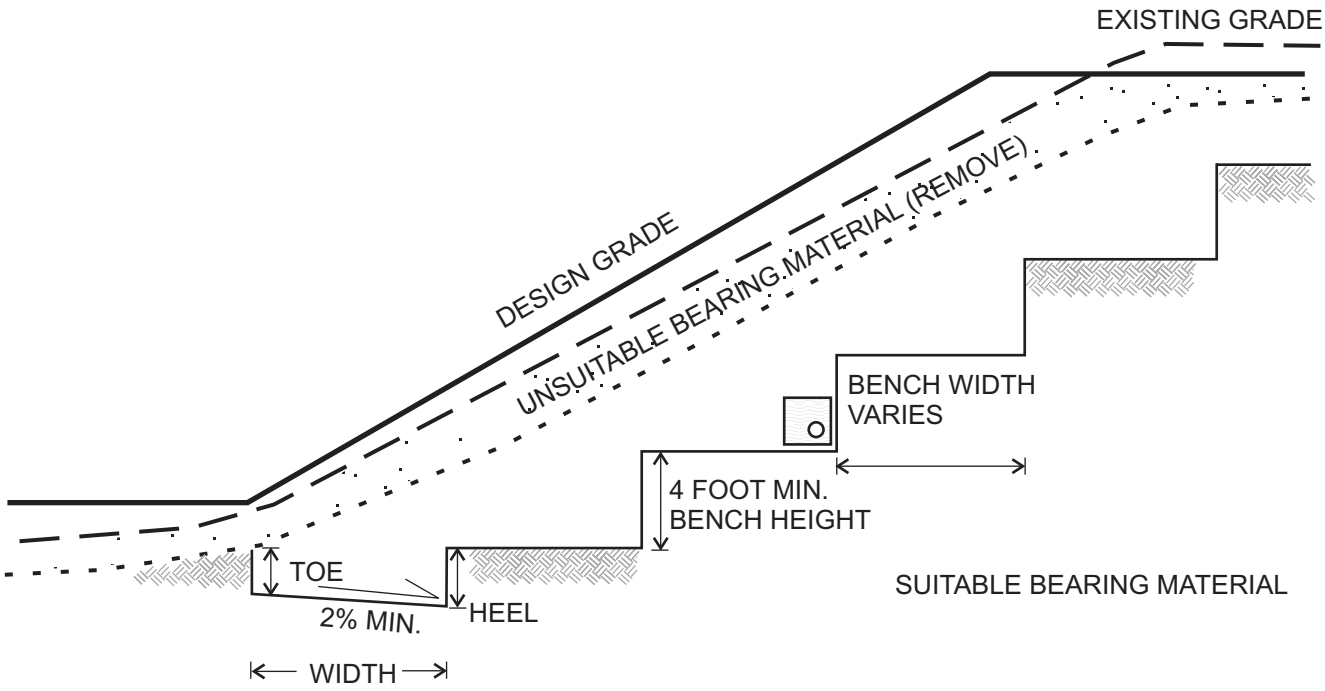
FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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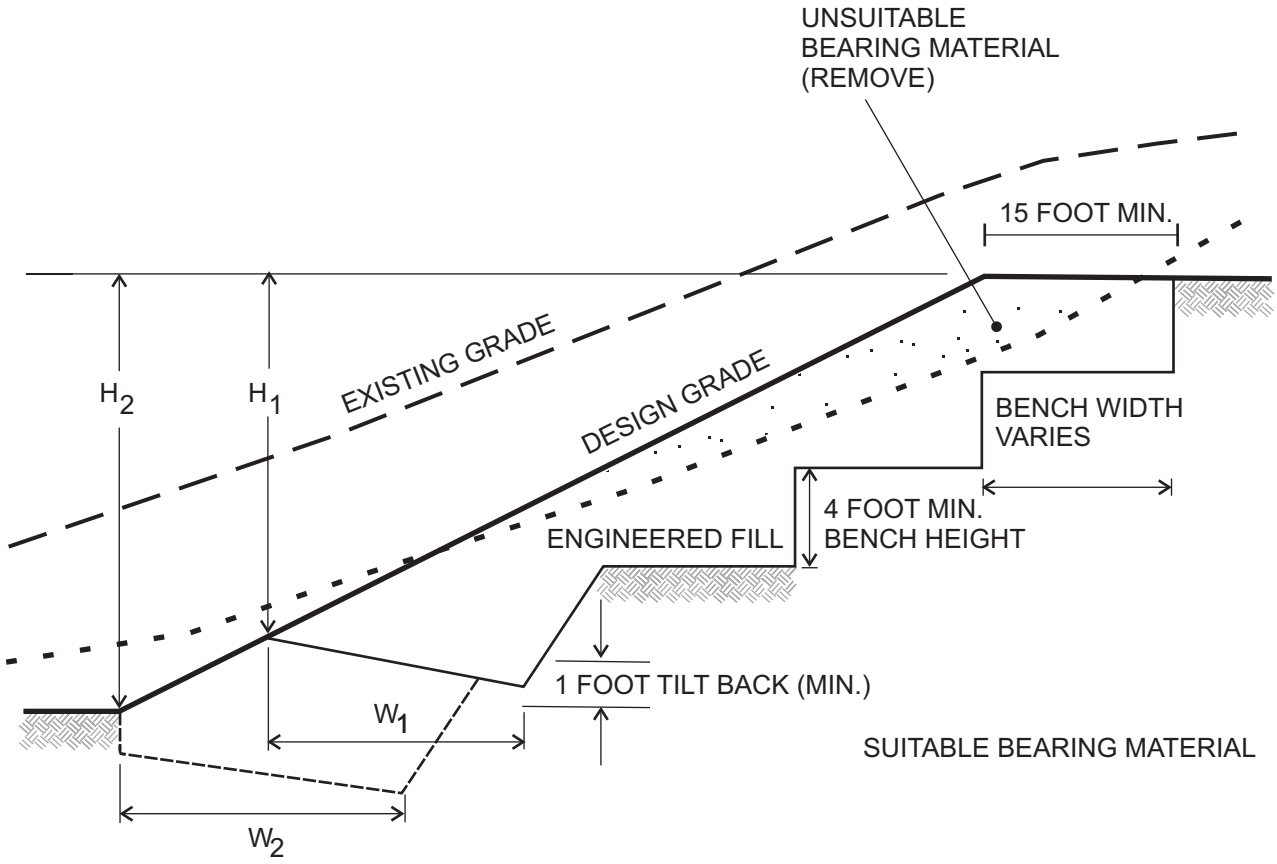
SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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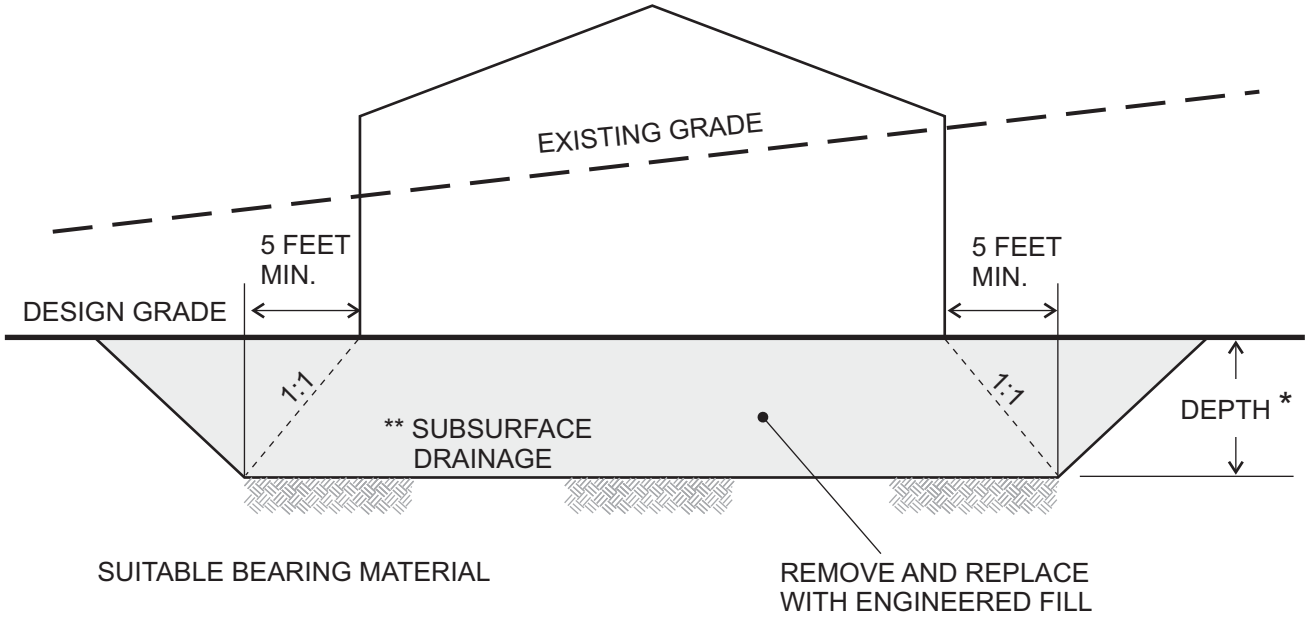
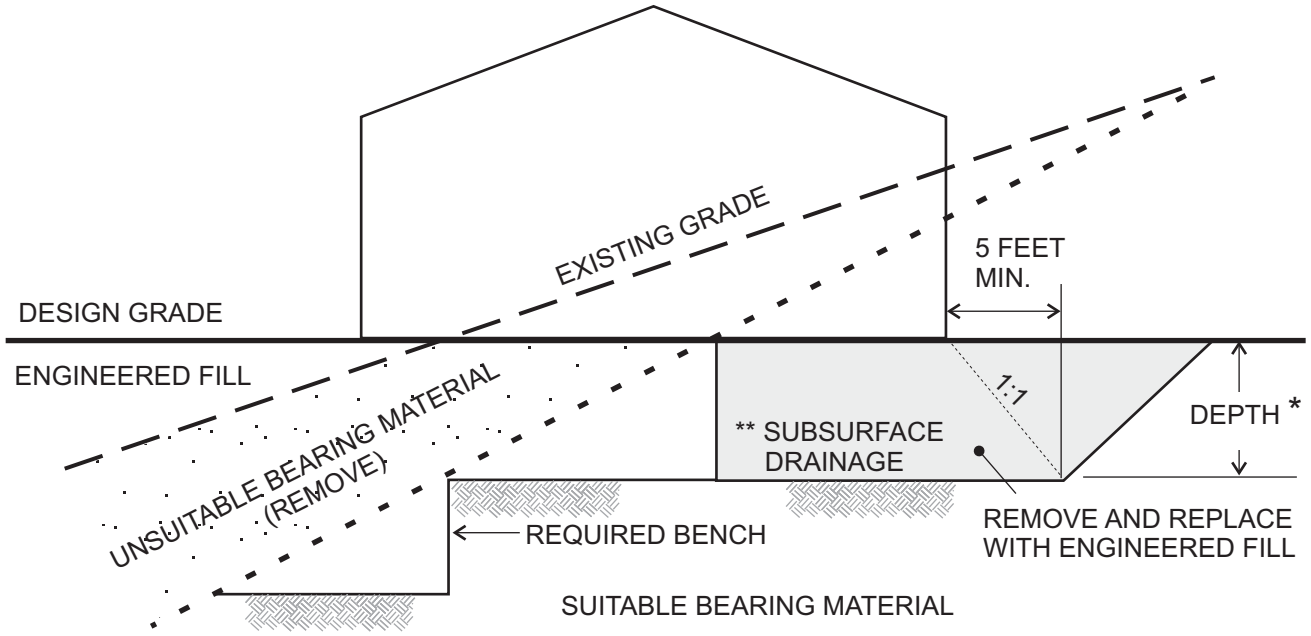
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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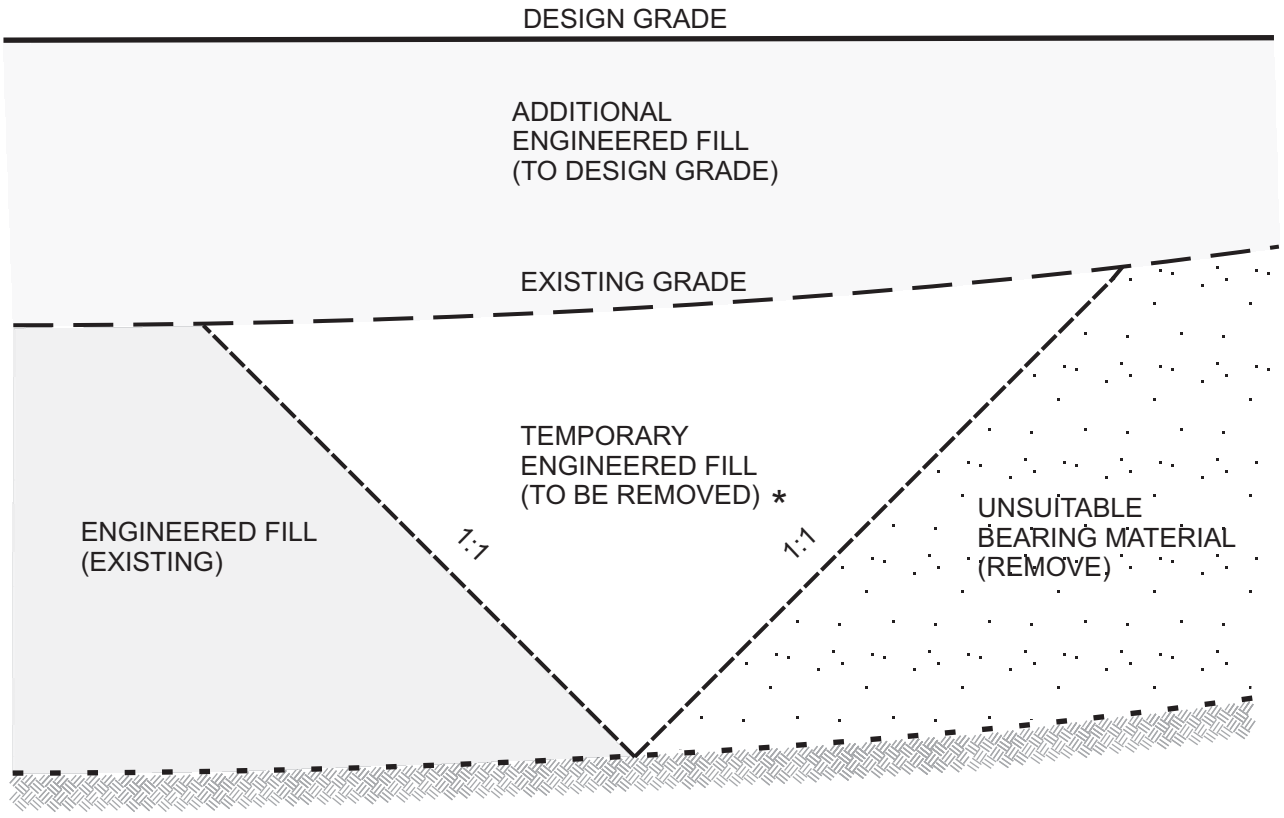
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

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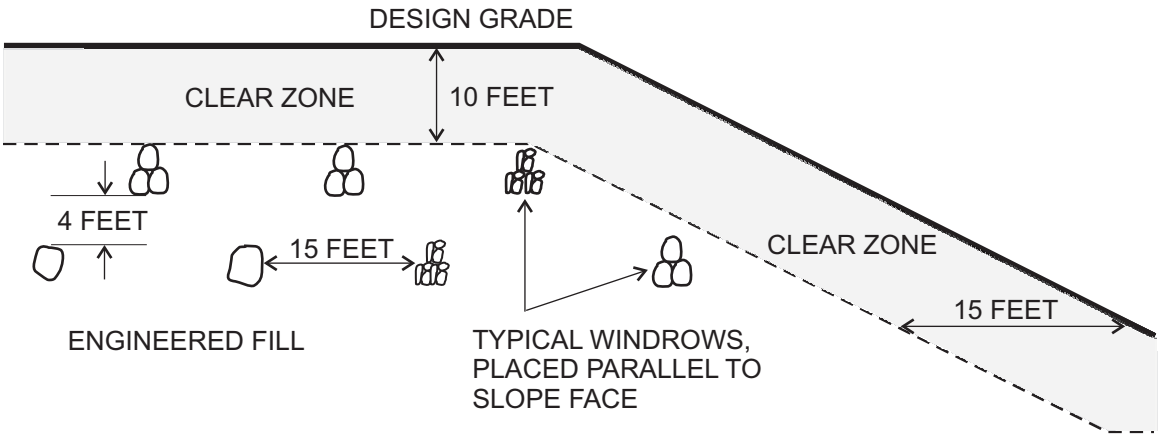
ADVANCED GEOTECHNICAL SOLUTIONS

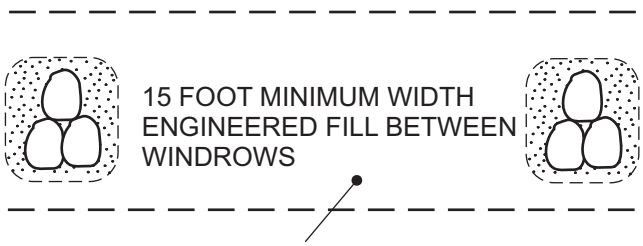
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

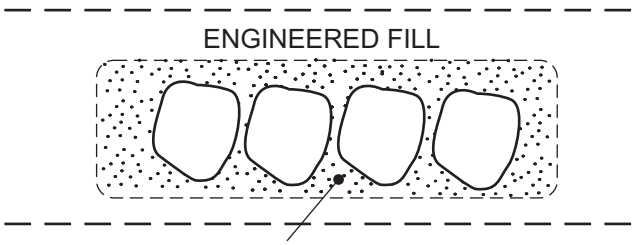
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

VER 1.0

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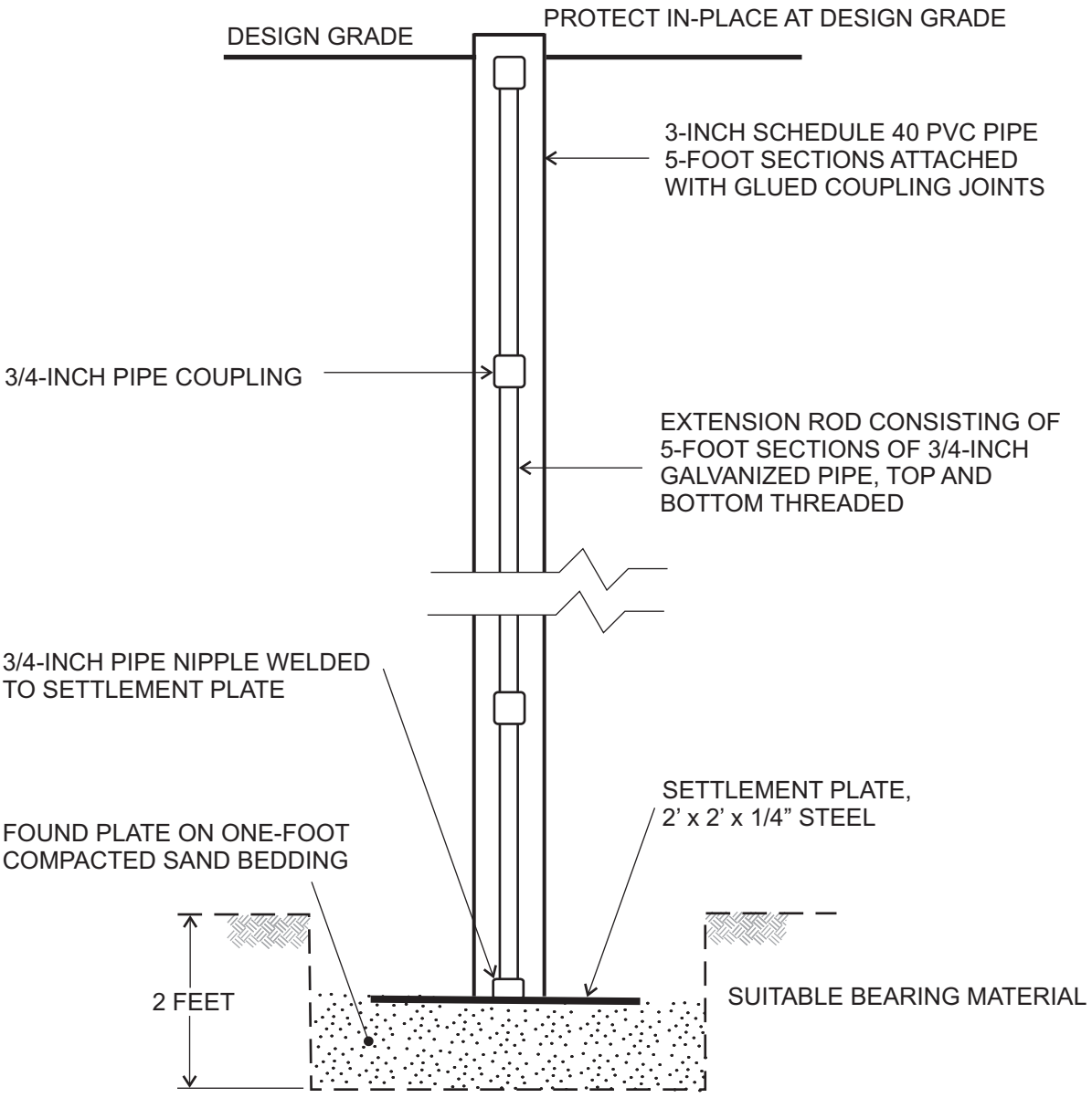
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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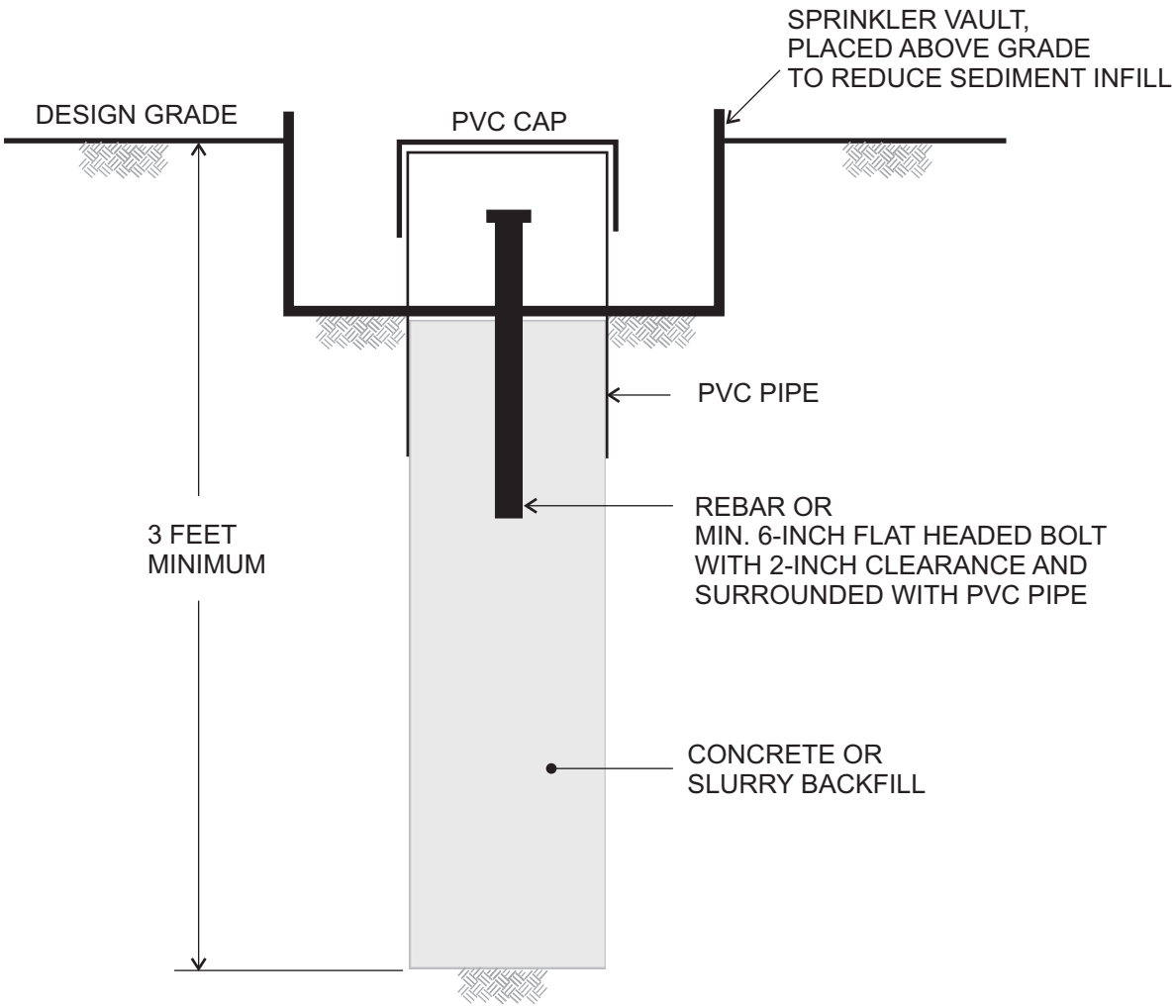
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT MONUMENT

DETAIL 12

LEGEND

afu	ARTIFICAL FILL - UNDOCUMENTED
Qya	YOUNG ALLUVIUM (DESIGNATION FOR ALL HOLOCENE, ALLUVIUMS ENCOUNTERED ONSITE)
Qoa	OLDER ALLUVIUM
$Qvof_3$	VERY OLD ALLUVIAL-FAN DEPOSITS
Qlo	SEDIMENTARY DEPOSITS OF LIVE OAK CANYON
T-22	APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (AGS, 2020)
B-37	APPROXIMATE LOCATION OF EXPLORATORY BORING (PSE)
AGS-18	APPROXIMATE LOCATION OF EXPLORATORY BORING (AGS, 2020)
SCG-10	APPROXIMATE LOCATION OF EXPLORATORY BORING (SCG, 2020)
	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
15	ESTIMATED REMOVAL DEPTH (IN FEET)
O.X. 5	PROPOSED BUILDING OVEREXCAVATION DEPTH (IN FEET)
	POSSIBLE INFILTRATION AREAS TO BE VERIFIED BY TESTING
	PROPOSED KEYWAY
8	PROPOSED SUBDRAIN WITH SIZE IN INCHES

PARCEL "A"
LLA. 05-002
INST. NO. 2005-0324926 O.R.

B-81 B

0-25.0' Qal
25.0-36.0' Qoa
T.D.=36.0'
No Water
No Caving

Install Stub for Future Development?

PROJECT BOUNDARY

15X2X3 Keyway

B'

$Qvof_3$

O.X. 5

T-15

0-8.0' Qal
8.0-25.0' Qoa
T.D.=26.0
No Water

GRADING AVOIDANCE AREA, TYP.

AGS-1

0-4.0' Qal
4.0-9.5' $Qvof_3$
T.D.=9.5'
No Water
No Caving

Qal

afu

Install Stub for Future Development?

$Qvof_3$

EXISTING STRUCTURES TO BE REMOVED, TYP.

0-15.0' Qal
15.0-50.1' Qoa
T.D.=50.1'
No Water

AGS-17

EXISTING MISC. ITEMS TO BE REMOVED & DISPOSED

0.0-25.0' $Qvof_3$
T.D.=25.0'
No Water

SCG-2

T-1

0-6.5' Qal
6.5-11.0' $Qvof_3$
T.D.=11.0'
No Water
No Caving

EXISTING WALLS TO BE REMOVED

EXISTING STRUCTURES REMOVED

SCG-1

0-13.5' Qal
13.5-49.3' Qoa
T.D.=49.3'
No Water
No Caving

Install Subdrain in Future

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

GRADING AND PROPOSED FUTURE FREEWAY OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

15X2X3 Keyway

EXISTING 30" RCP

EXISTING 36" RCP

EXISTING 48" RCP

GRADING LIMITS

CALTRANS R/W & PROJECT BOUNDARY

40' ±

WRITTEN GRADING PERMIT CLEARANCE OR PERMITS REQUIRED FROM CALTRANS PRIOR TO START OF GRADING

15X2X3 Keyway

A A'

GRADING AND OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

GRADING LIMITS

APN 413-190-006

40' WIDE ROAD & UTILITY EASEMENT (WOODHOUSE RD.)

ROBERTS ROAD

Qlo

Qal

afu

EXISTING DIRT ROAD

CAUTION: EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING POLES AND POWER LINES TO BE REMOVED, TYP.

0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

0-2.0 Topsoil

R/W

SEE SHEET 12

SEE SHEET 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
3. PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE

EXISTING EASEMENT NOTES:

24. EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
    - GRANTED TO: RIVERSIDE COUNTY
    - PURPOSE: PUBLIC HIGHWAY AND PUBLIC UTILITIES
    - RECORDED: NOVEMBER 20, 1945, IN BOOK 714 PAGE 216 O.R.
    - AFFECTS: AS SET FORTH IN SAID DOCUMENT

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
	ENGINEER		REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

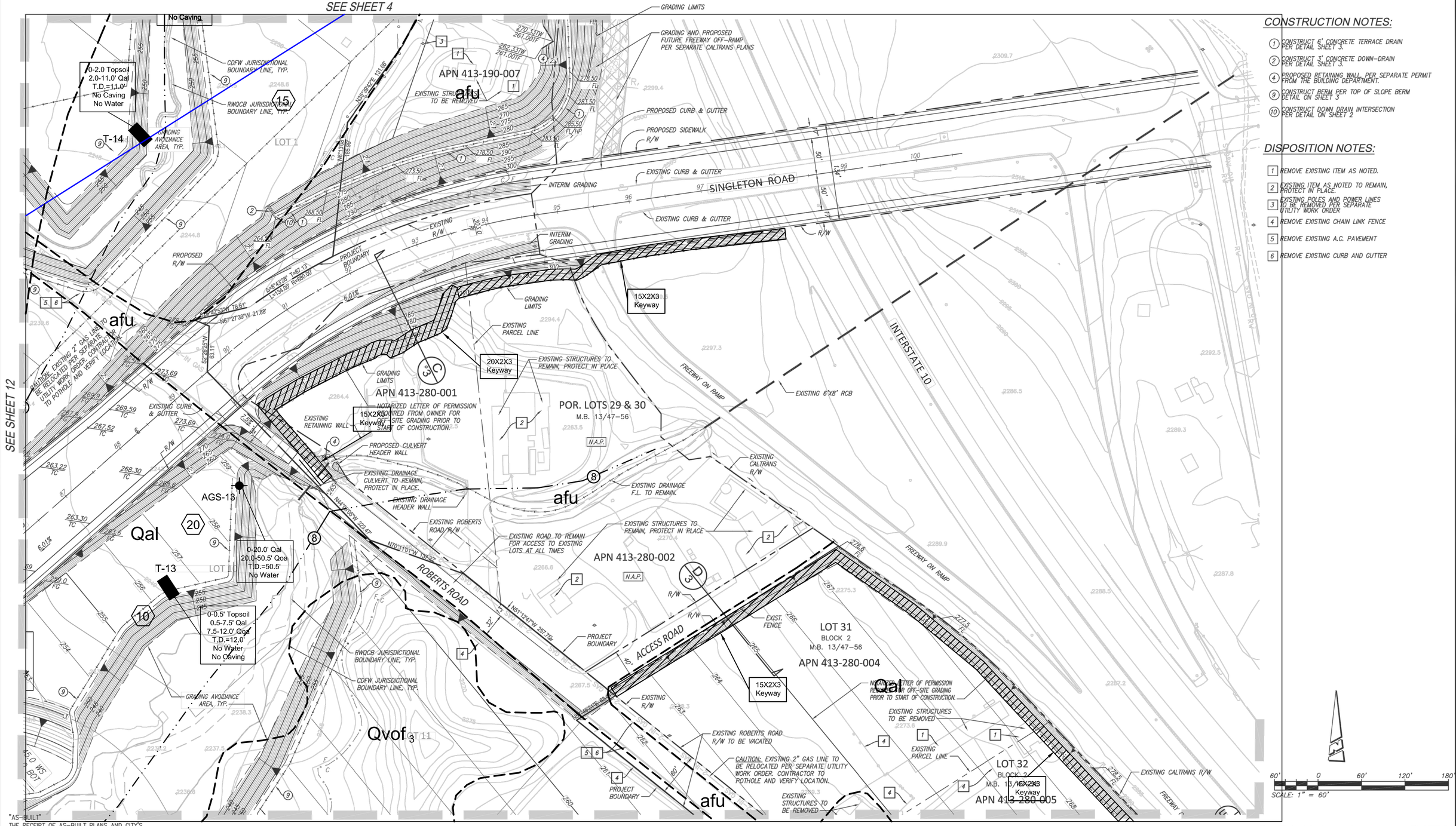
4 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg



CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
9. CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP: _____

See Plate 1 for Legend — PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
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NAVD 29 DATUM — ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

5 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberto
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 5

SEE SHEET 11

SEE SHEET 7

SEE SHEET 9

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING WEST
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 28.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

6 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

Plotted: Dec 10, 2020 - 10:42am By: gherta
DWG: N:\01_169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

LOT 32
BLOCK 2
M.B. 13/47–56

APN 413-280-005

APN 413-280-006

APN 413-280-007

APN 413-280-008

EXISTING PARCEL LINE

PROJECT BOUNDARY

INTERSTATE 10

EXISTING 30" RCP

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

A.P.N.413-280-009

A.P.N.413-280-010

EXISTING CALTRANS R/W

EXISTING DOUBLE 48" CMP

EXISTING BORING PIT PER CROSSING I-10 PLANS PERMIT NO. 08-05-6-UU-1116

EXISTING 48" CMP

N64°25'37"W 396.38'

N.A.P.

EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 4" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 2" GAS LINE TO BE RELOCATED PER / SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING COPPER DRIVE R/W TO BE VACATED

EXISTING ROBERTS ROAD R/W TO BE VACATED

EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING TELEPHONE LINE, PRIOR TO CONSTRUCTION CONTRACTOR TO VERIFY LOCATION.

EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

LOT 18
PARCEL MAP 19207
P.M. 127/10–11

A.P.N.413-280-034

A.P.N.413-280-035

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

CAUTION: EXISTING 24" DIP (CLASS 300) ZONE 11 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

CAUTION: EXISTING 16" DIP (CLASS 300) ZONE 12 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

EXISTING PARCEL LINE

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXIST. ROBERTS ROAD R/W TO BE VACATED

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXISTING PARCEL LINE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

LOT 14

LOT 15

LOT 16

LOT 17

ROBERTS ROAD

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY

RWQCB JURISDICTIONAL BOUNDARY

CUT/FILL LINE

EXISTING 90' SCE 20.00' SDGE FORCE MAIN EASEMENT

PROJECT BOUNDARY

PARCEL 9
P.M. NO. 33105
P.M. 243/99–111

TRACT BOUNDARY

TRACT 32702

N36°55'25"W 170.0

N84°30'34"W 299.43

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. NOTARIZED LETTER OF PERMISSION REQUIRED FROM SEWER AGENCY FOR GRADING OVER EXISTING SEWER PIPE PRIOR TO START OF CONSTRUCTION.

SEE SHEET 6

SEE SHEET 8

SEE SHEET 9

AGS-14

AGS-15

AGS-10

0-0.5' Topsoil
0.5-8.0' Qal
8.0-12.0' Qvof
T.D.=12.0'
No Water
No Caving

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-1.0' Topsoil
1.0-13.0' Qal
T.D.=13.0'
No Water
No Caving

0-0.5' Topsoil
0.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

60' 0 60' 120' 180'
SCALE: 1" = 60'

See Plate 1 for Legend PLATE 4

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

811 Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

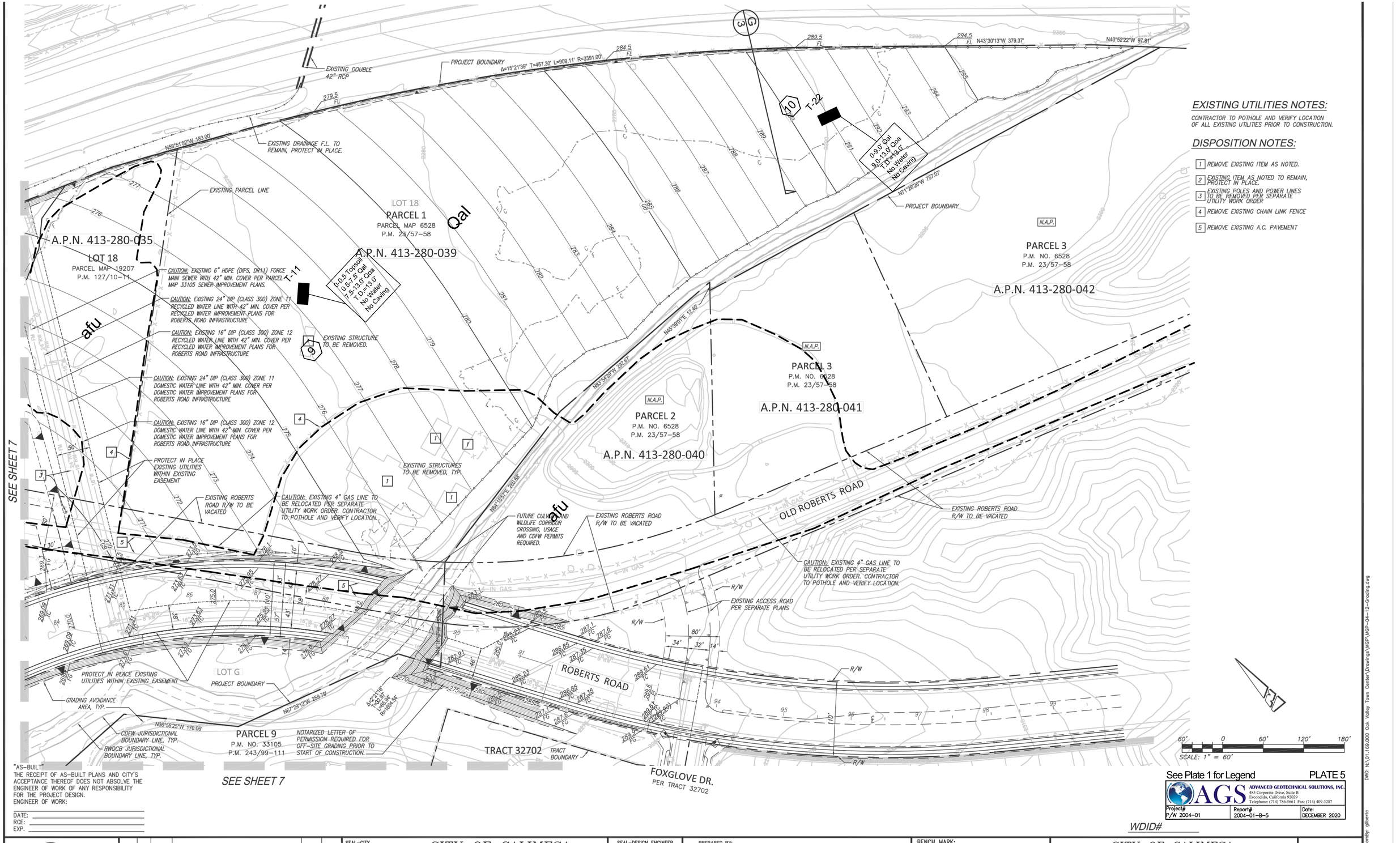
7 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 – 10:43am By: gilberta
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg



EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 5

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

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Know what's below. Call before you dig. 811

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ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

8 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:43am By: gilberto DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 6

SEE SHEET 10

SEE SHEET 7

SCG-9
0-10.0' Qal
10.0-25.0' Qoa
T.D.=25.0'
No Water

T-17
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-5
0-4.0' Qya
4.0-26.0' Qoa
T.D.=26.0'
No Water

B-94
0-12' Qal
12-50.0' Qoa
T.D.=50.0'
No Water

T-8
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-15

AGS-10
0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

T-21
0-3.5' Qal
3.5-11.0' Qoa
T.D.=11.0'
No Water
No Caving

15X2X3 Keyway

15X2X3 Keyway

afu

EXISTING STRUCTURES TO BE REMOVED, TYP.

EXISTING STRUCTURES TO BE REMOVED, TYP.

45.0 WS
37.0 BOT

LOT 9
LOT C
LOT 3
LOT 15
LOT 16
LOT 5

Qal

Qal

Qal

ST4

ROBERTS ROAD

ROBERTS

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 9
P.M. NO. 33105
P.M. 243/99-111

TRACT 32702
TRACT BOUNDARY

TRACT 32702
TRACT BOUNDARY

GRADING AVOIDANCE AREA, TYP.

PROJECT BOUNDARY

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

EXISTING PARCEL LIINE

PROJECT BOUNDARY

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. CONTRACTOR TO POTHOLE AND VERIFY.

EXISTING 20.00' FORCE MAIN EASEMENT

M

M'

N

N'

L=140.57'
T=94.17'
R=350.00'
N40°35'10"E 164.17'
N12°03'25"E 150.84'
N1°43'09"E 133.04'
N0°10'01"E 161.34'

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1 REMOVE EXISTING ITEM AS NOTED.

4 REMOVE EXISTING CHAIN LINK FENCE

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

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ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

9 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01\169.000 Oak Valley Town Center\Drawings\MGP\04-12-Grading.dwg

SEE SHEET 11

Qlo
CUT/FILL LINE
Qal
Qlo
SCG-5
0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water
0-26.5' Qlo
T.D.=26.5'
No Water
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
Qal
AGS-4
0-35.0' Qal
35.0-45.5' Qoa
T.D.=45.5'
No Water
PAD=223.9
afu
EXISTING STRUCTURES TO BE REMOVED, TYP.
SCG-9
SCG-7
0-8.5' Qal
8.5-55.0' Qoa
T.D.=55.0'
No Water
ST5
ST7
ST6
T-16
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving
LOT 4
SCG-6
0-25.0' Qoa ?
T.D.=25.0'
No Water
0-4.0' Qal
4.0-8.0' Qoa
8.0-12.0' Qya
T.D.=12.0'
No Water
No Caving
Qlo
TEMP. SEWER LIFT STATION PAD
PAD=186.0
T-4
Qal
0-18.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water
AGS-18
GRADING AVOIDANCE AREA, TYP.
0-8.5' Qal
8.5-25.0' Qoa
T.D.=25.0'
No Water
SCG-8
15X2X3 Keyway
PROJECT BOUNDARY
EXISTING 100' WIDE DRAINAGE, GRADING & SLOPES EASEMENT
Δ=67°29'06" T=801.59'
L=1413.40' R=1200.00'
C.L. 4' WIDE
NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF-SITE GRADING PRIOR TO START OF CONSTRUCTION.
0-7.0' Qal
7.0-51.5' Qoa
T.D.=51.6'
No Water
AGS-6
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.

[4] REMOVE EXISTING CHAIN LINK FENCE

SEE SHEET 9

EXISTING EASEMENT NOTES:

(21) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: MARCH 9, 1971, INSTRUMENT NO. 23255 OF OFFICIAL RECORDS
AFFECTS: AS SET FORTH IN SAID DOCUMENT

(23) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: SUNCAL SUMMERWIND RANCH LLC
PURPOSE: DRAINAGE, GRADING & SLOPE EASEMENT
RECORDED: AUGUST 28, 2006, INSTRUMENT NO. 2006-0632646
AFFECTS: AS SET FORTH IN SAID DOCUMENT

S-BUILT"
E RECEIPT OF AS-BUILT PLANS AND CITY'S
CCEPTANCE THEREOF DOES NOT ABSOLVE THE
GINEER OF WORK OF ANY RESPONSIBILITY
R THE PROJECT DESIGN.
GINEER OF WORK:

TE: _____
E: _____
P. _____

See Plate 1 for Legend PLATE 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

60' 0 60' 120' 180'
SCALE: 1" = 60'

WDID#

811 now what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER MICHAEL THORNTON No. C44226 Exp. 6/30/21 CIVIL STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER GEORGE ALAN LENFESTEY No. 45920 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

10 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 12

SEE SHEET 6

SEE SHEET 10

CONSTRUCTION NOTES:

(2) CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
(3) PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
(4) PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
(5) CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
(8) CONSTRUCT 3' CONCRETE BROW DITCH PER DETAIL ON SHEET 3
(9) CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.
[4] REMOVE EXISTING CHAIN LINK FENCE

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

0-1.0' Topsoil
1.0-10.0' Qal
10.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

0-8.5' Qal
8.5-18.5' Qoa
18.5-24.0' Qlo
T.D.=24.0'
No Water

0-2.0' Topsoil
2.0-65.0' Qlo
T.D.=65.0'
No Water
Caving @ 5'

0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water

0-26.5' Qlo
T.D.=26.5'
No Water

0-30.0' Qal
30.0-56.5' Qoa
T.D.=56.5'
Seepage @
46.0-56.5'

0-11.5' Qal
T.D.=11.5'
Seepage @10'
Caving below 10

0-60.0' Qal
60.0-71.5' Qoa
T.D.=71.5'
Seepage
11.0-71.5'

0-6.5' afu
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Seepage @
15.0-42'
Caving @ 40'

Stabilize Saturated Removal Bottom

Install Subdrain for Future Development?

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 1
VACANT
RLC PHASE 1
INST. NO. 732045 O.R.

FUTURE SINGLETON ROAD EXTENSION

PROJECT BOUNDARY

EXISTING 100' WIDE DRAINAGE, ROADWAY & SLOPES EASEMENT

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE, SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020
12/10/20 DATE

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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

11 OF 23 SHEETS

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 4

PARCEL 14
P.M. NO. 33105
P.M. 243/99–111

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

PROJECT BOUNDARY

CAUTION: EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

B-37
0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

15X2X3 Keyway

AGS-8
0-9.0' Qal
9.0-26.3' Qoa
T.D.=26.3'
No Water

AGS-12
0-50.4' Qlo
T.D.=54.4'
No Water

T-3
0-1.0' Topsoil
1.0-8.0' Qal
8.0-14.0' Qlo
T.D.=14.0'
No Water
No Caving

T-19
0-0.5' Topsoil
0.5-6.5' Qal
6.5-11.0' Qlo
T.D.=11.0'
No Water
No Caving

T-18
PAD=251.9

AGS-2
0-10' Qal
10-25.5' Qlo
T.D.=25.5'
No Water

0-1.0' Topsoil
1.0-6.0' Qal
6.0-12.0' Qoa
T.D.=12.0'
No Water
No Caving

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

B-96
0-6.5 Topsoil
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Water @ 15to42'
Caving @ 40'

Qal
Qlo
Qoa
afu
Qvof 3

ST10
ST11
ST12
ST13
ST9

LOT 2
LOT A
LOT 7

ROBARTS ROAD
SINGLETON ROAD

O.X. 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN–DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V–DITCH PER DETAIL ON SHEET 3
6. CONSTRUCT 12" DRAIN AND PIPE PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2
13. INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

SEE SHEET 5

SEE SHEET 11

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS–BUILT"
THE RECEIPT OF AS–BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 9

WDID# _____

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004–01	2004–01–B–5	DECEMBER 2020

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL–CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL–DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12–31–2020

BENCH MARK:
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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

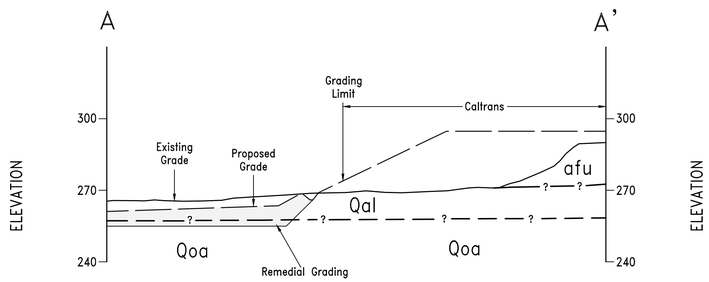
12 OF 23 SHEETS

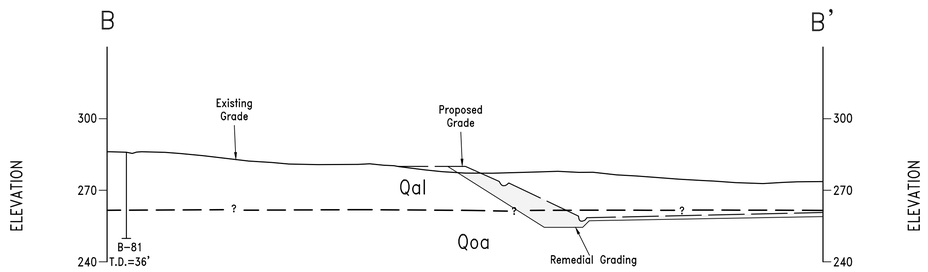
FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

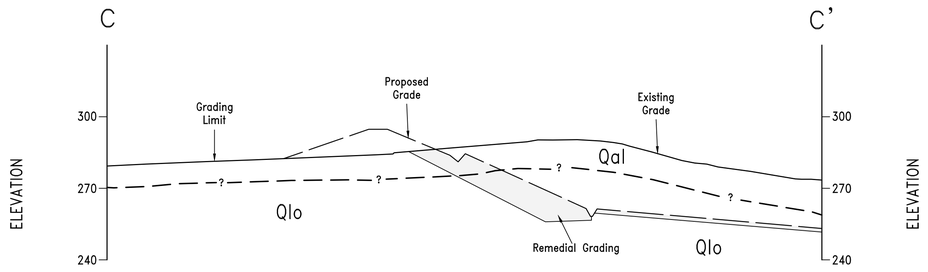
PLAN No. _____

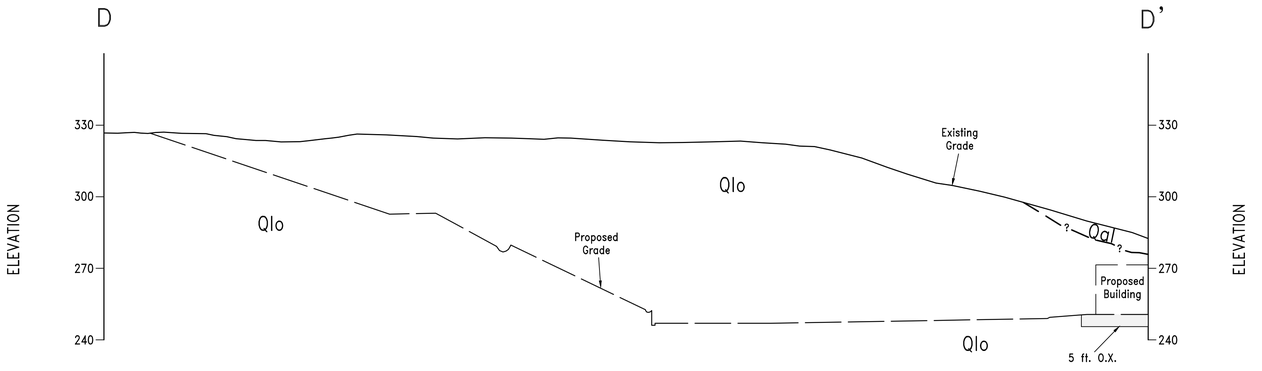
NOT FOR CONSTRUCTION

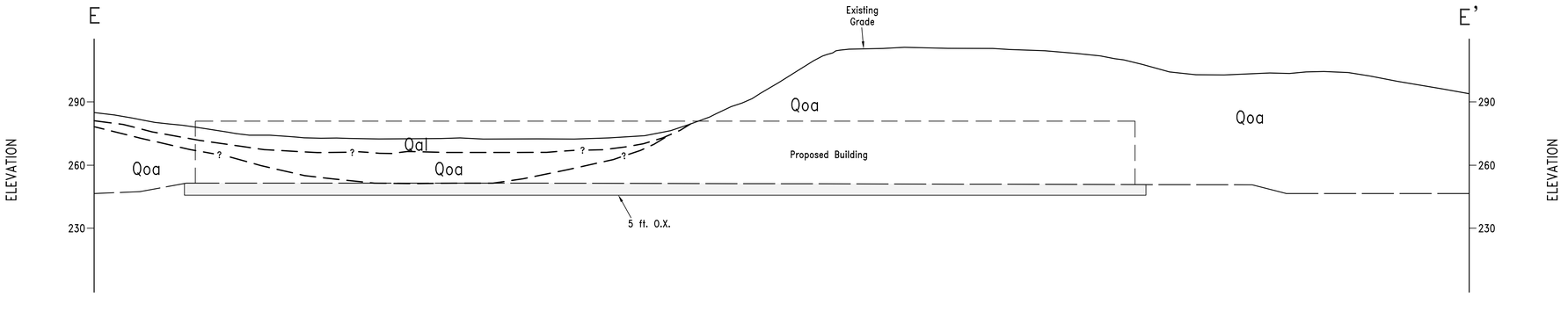
Plotted: Dec 10, 2020 – 10:45am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg











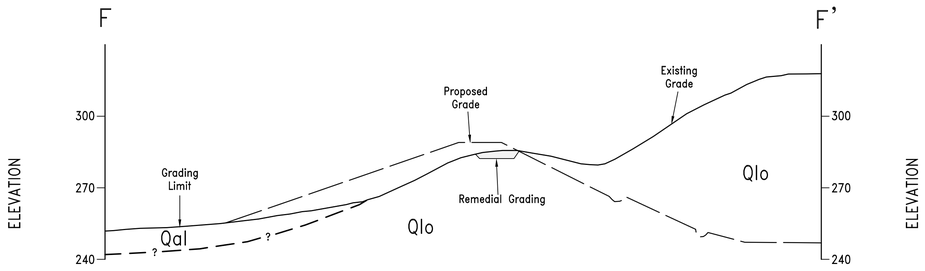
Scale: 1"=30'

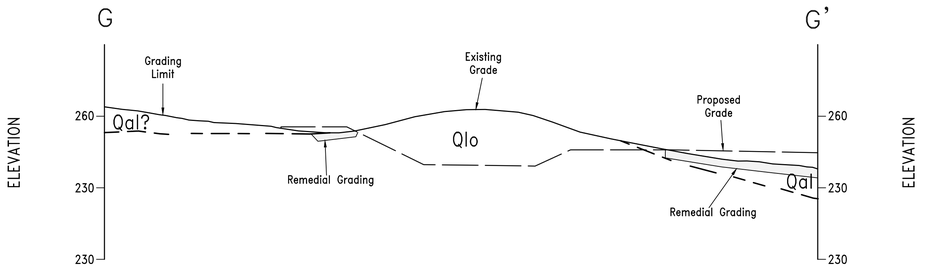
See Plate 1 for Legend

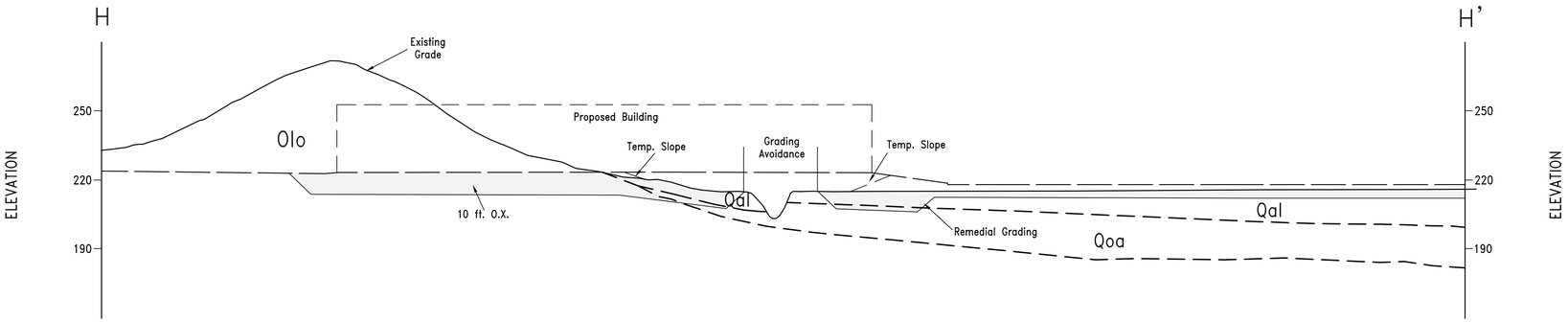
PLATE 10

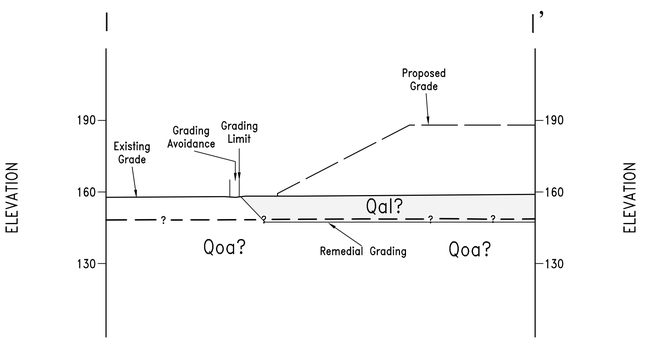
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

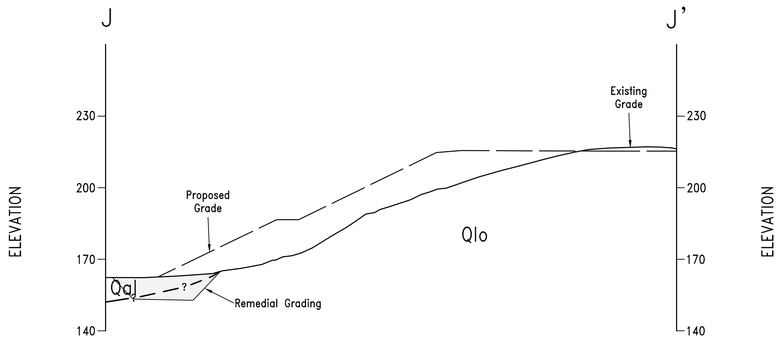
Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020











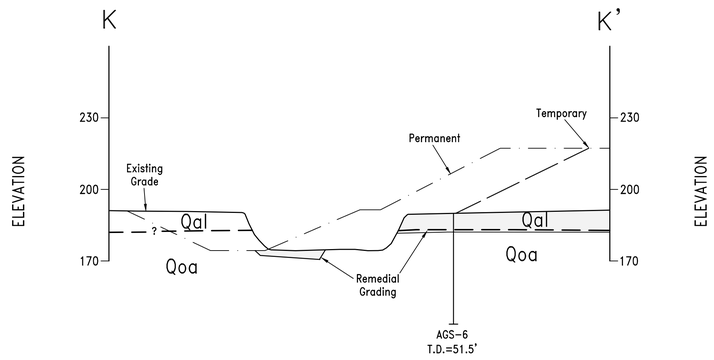
Scale: 1"=30'

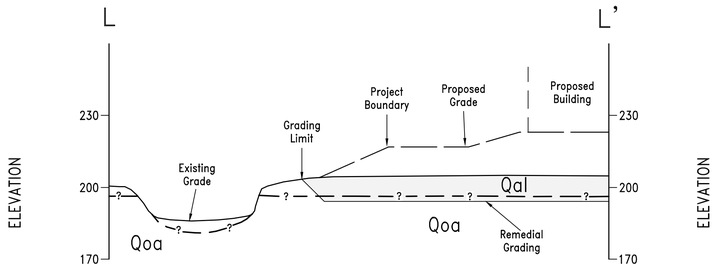
See Plate 1 for Legend

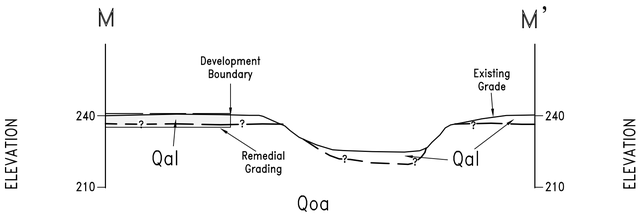
PLATE 11

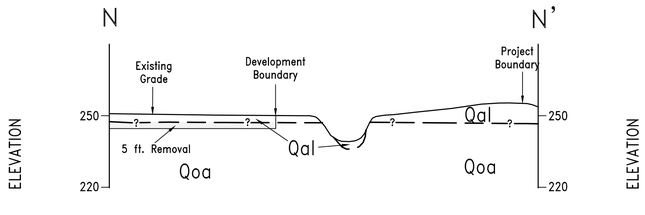
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020









Scale: 1"=30'

See Plate 1 for Legend PLATE 12

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/1/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Building A

BMP Identification

BMP NAME / ID: DMA A-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*191432*	*Roofs*	*1*	*0.89*	*170757.3*			
CONC	*88329*	*Concrete or Asphalt*	*1*	*0.892*	*78789.5*			
LS	*16559*	*Ornamental Landscaping*	*0.1*	*0.11046*	*1829.1*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/1/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Building A

BMP Identification

BMP NAME / ID: DMA A-2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*181913*	*Roofs*	*1*	*0.89*	*162266.4*			
CONC	*128962*	*Concrete or Asphalt*	*1*	*0.892*	*115034.1*			
LS	*42071*	*Ornamental Landscaping*	*0.1*	*0.11046*	*4647.1*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Albert A. Webb Associates	Date	12/1/2021
Designed by	EP	Case No	
Company Project Number/Name	BCCOV - Building A		

BMP Identification

BMP NAME / ID: DMA A-3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
DMAs	CONC	122352	Concrete or Asphalt	1	0.89	109138			
	LS	55635	Ornamental Landscaping	0.1	0.11046	6145.3			
		177987	Total			115283.3	0.20	0.5	0.5

Notes: 8' x 20' MWS Vault

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/1/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Building A

BMP Identification

BMP NAME / ID: DMA A-4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*129621*	*Roofs*	*1*	*0.89*	*115621.9*			
CONC	*74424*	*Concrete or Asphalt*	*1*	*0.892*	*66386.2*			
LS	*9990*	*Ornamental Landscaping*	*0.1*	*0.11046*	*1103.5*			
	214035	***Total***			**183111.6**	**0.20**	***0.8***	***0.8***

Notes: 2 - 8' x 16' MWS Vaults

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/1/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Building A

BMP Identification

BMP NAME / ID: DMA A-5

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

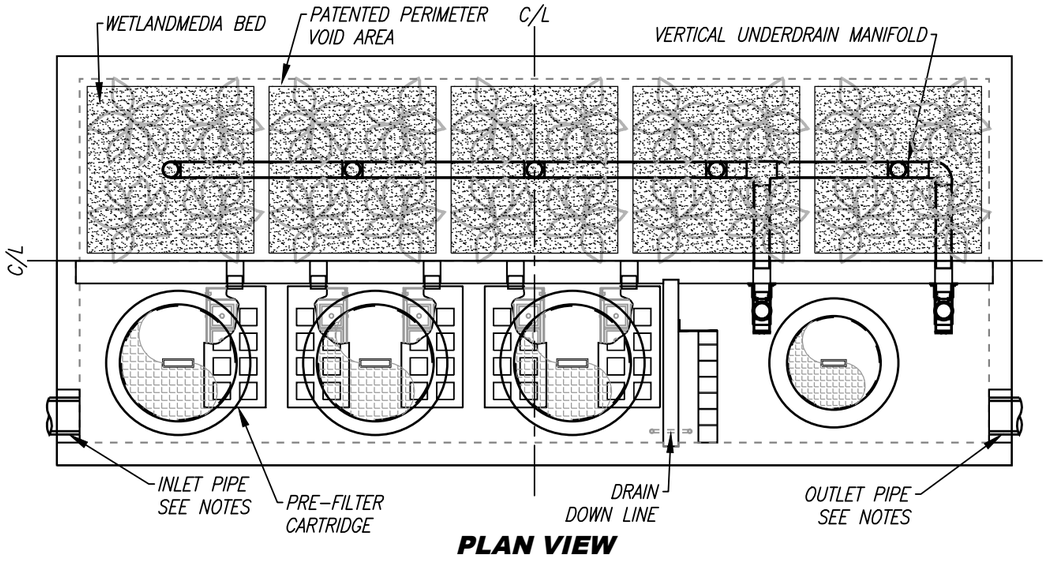
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

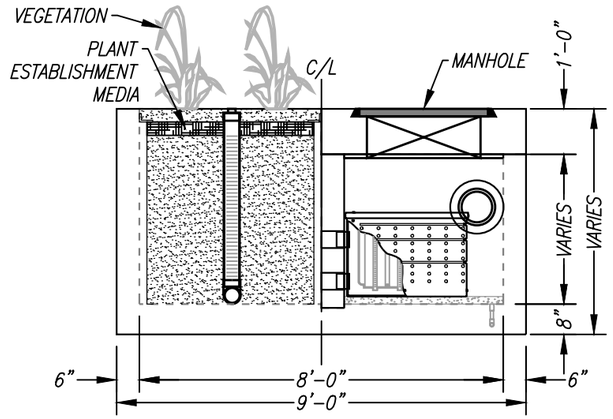
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*204060*	*Roofs*	*1*	*0.89*	*182021.5*			
CONC	*178620*	*Concrete or Asphalt*	*1*	*0.892*	*159329*			
LS	*32315*	*Ornamental Landscaping*	*0.1*	*0.11046*	*3569.5*			

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			22
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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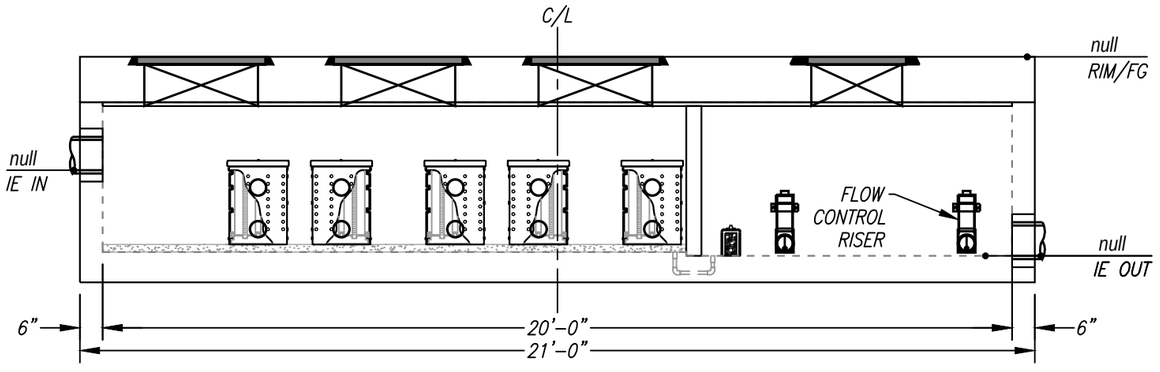
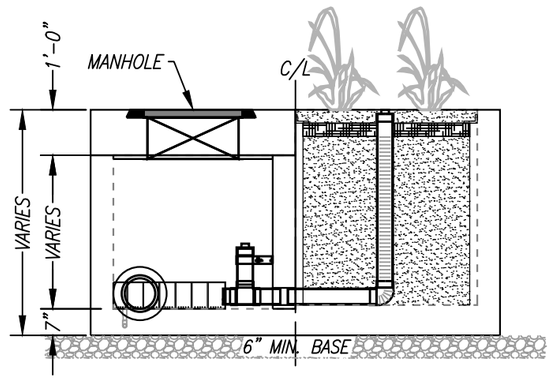


ELEVATION VIEW



RIGHT END VIEW

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.2 CFS

DMA A-1

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

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Bio Clean
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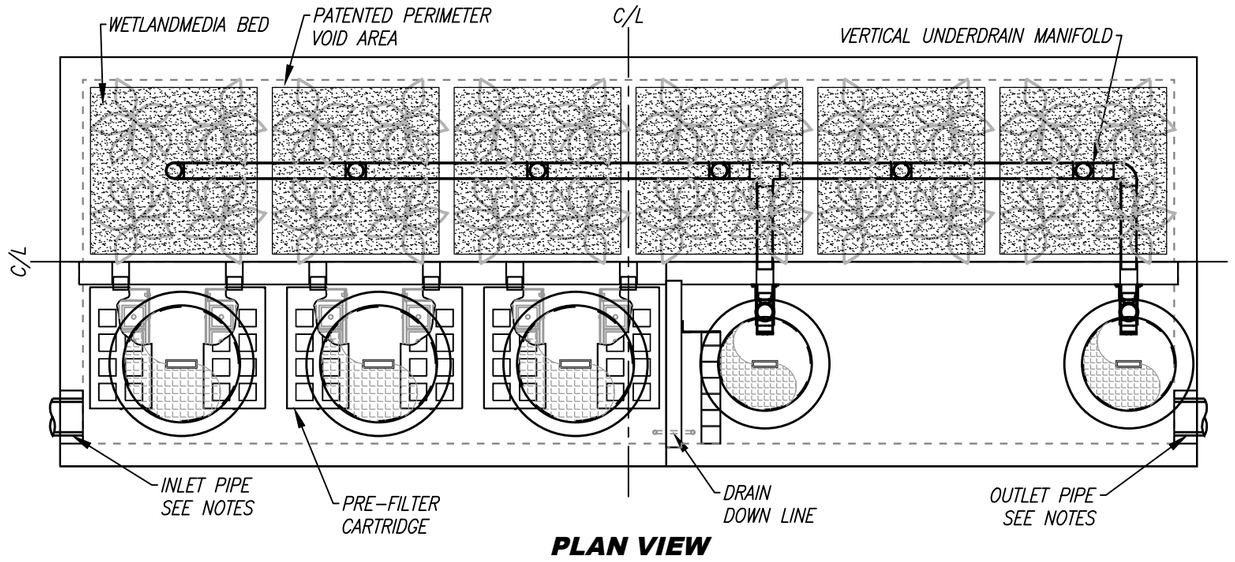
MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

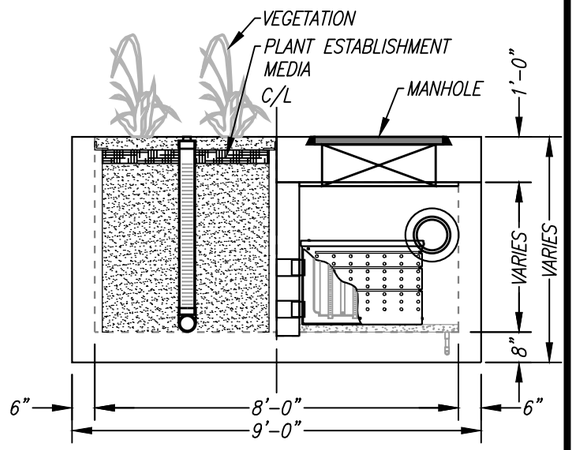
5/23/19 10:LEE

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.693	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			26
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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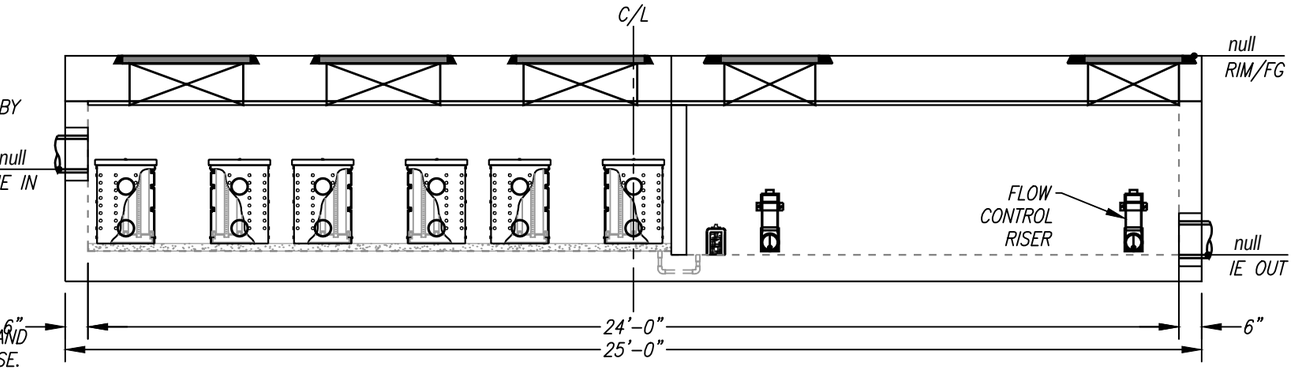
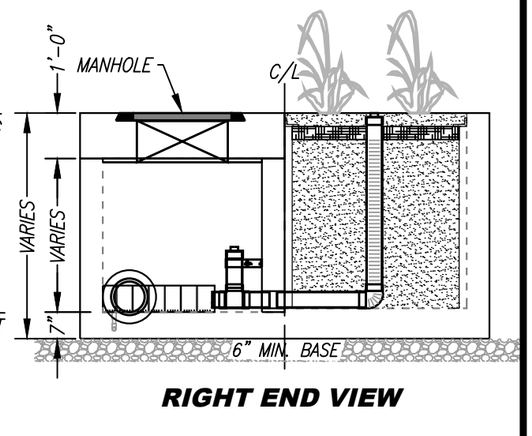


ELEVATION VIEW



RIGHT END VIEW

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.3 CFS

DMA A-2

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
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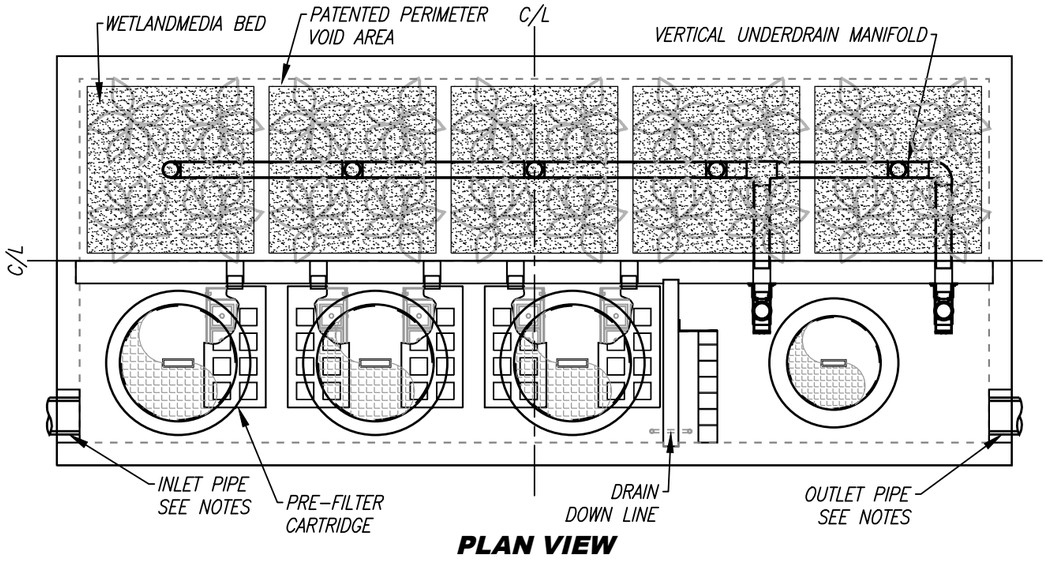
MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

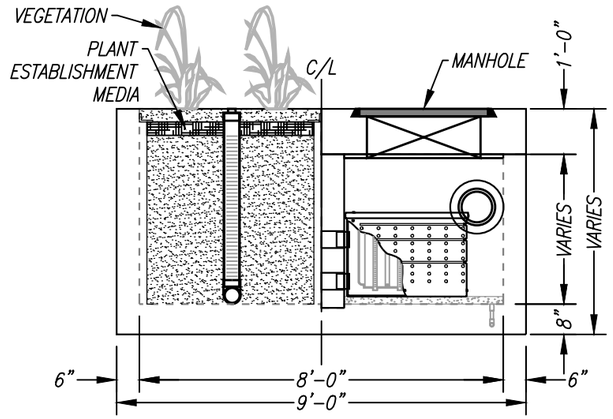
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			12
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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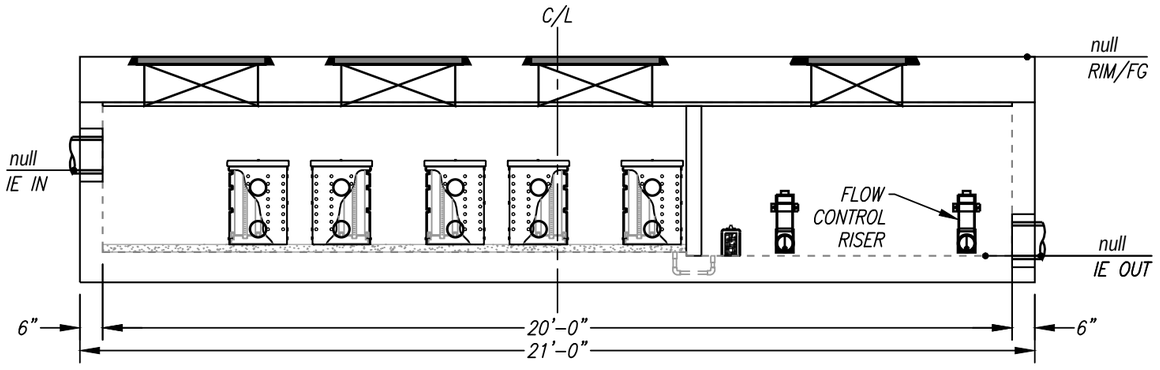
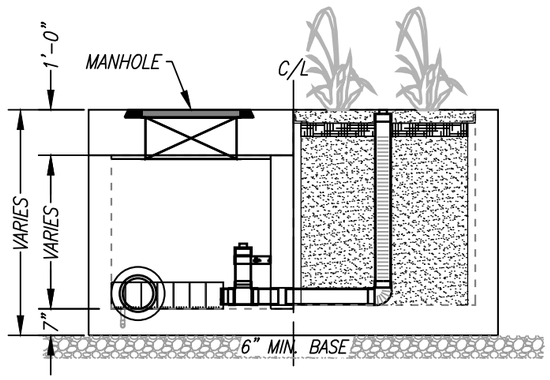


ELEVATION VIEW



RIGHT END VIEW

DMA A-3

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
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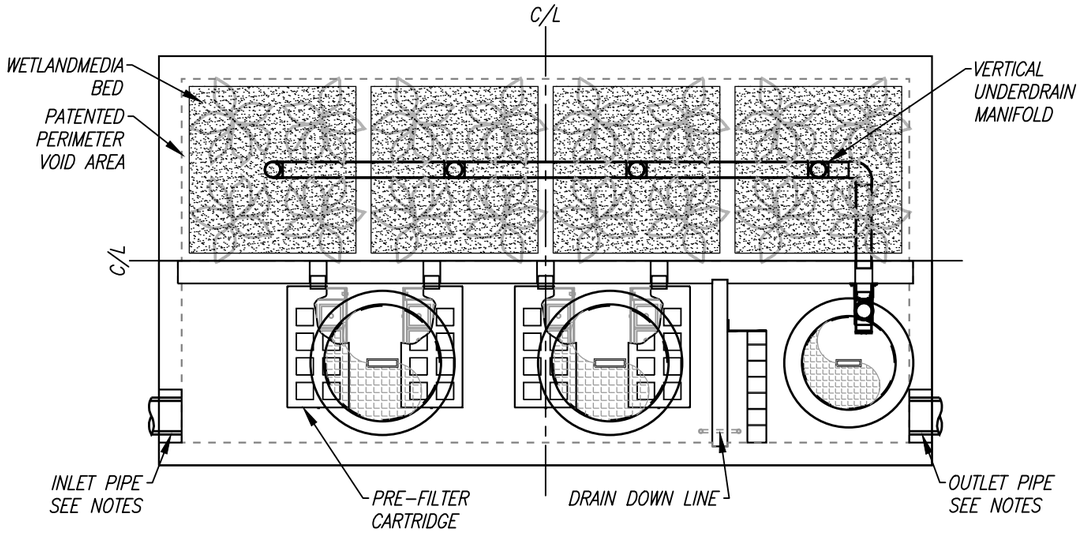
MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

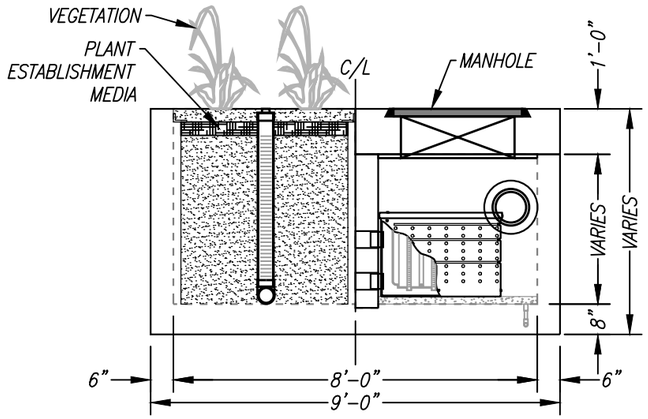
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.462	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			18
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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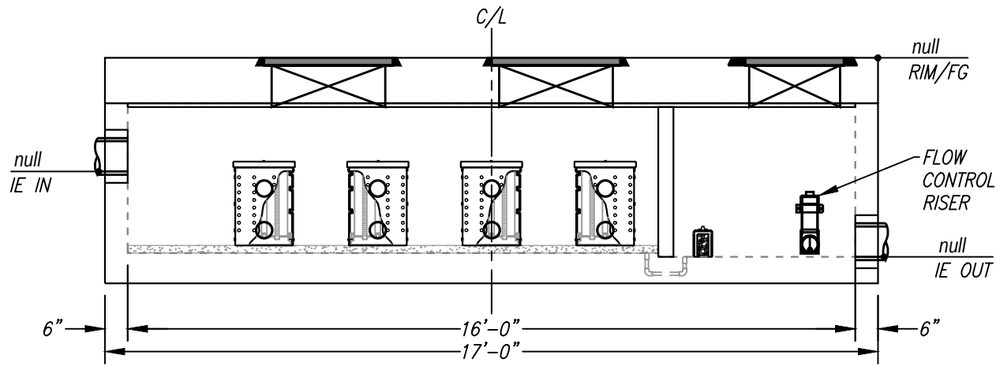
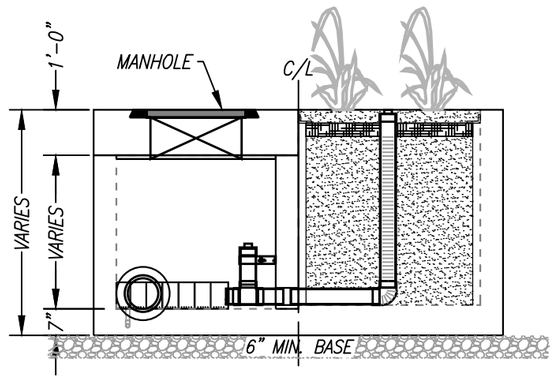


ELEVATION VIEW



RIGHT END VIEW

DMA A-4

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 0.8 CFS

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

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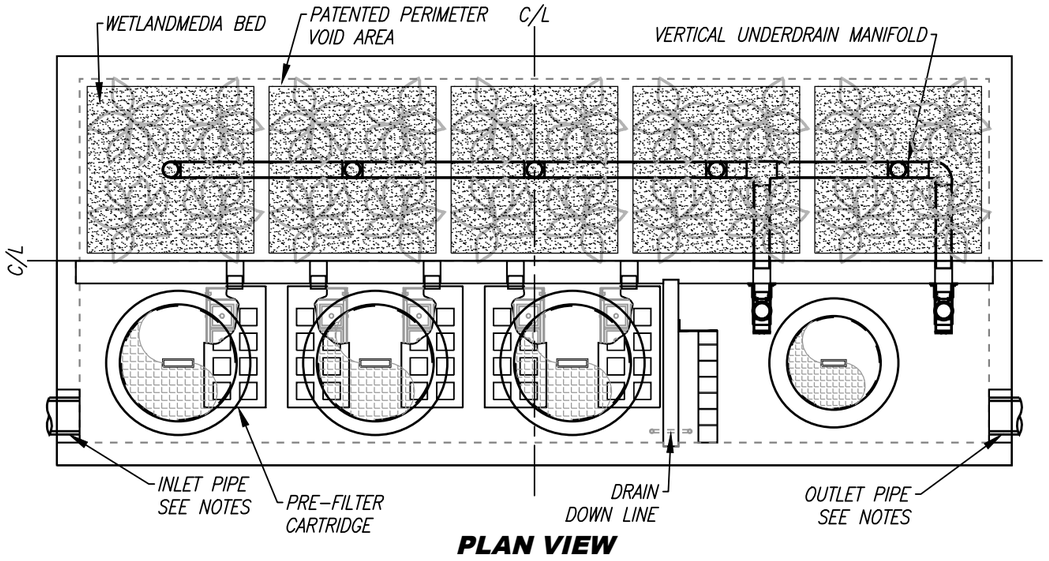
MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

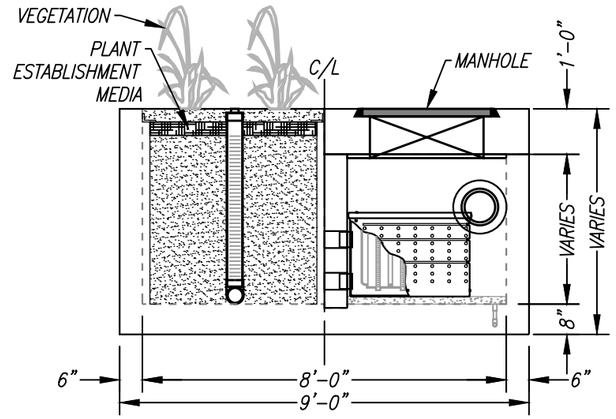
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			12
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



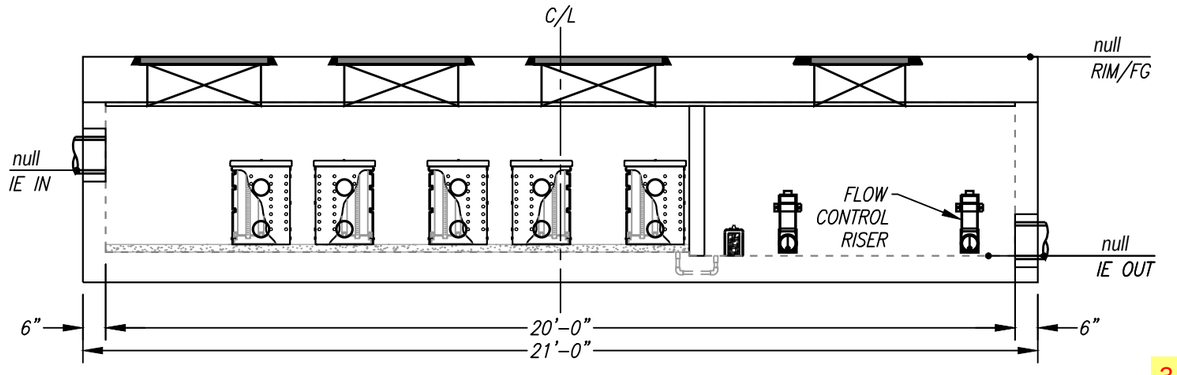
LEFT END VIEW

INSTALLATION NOTES

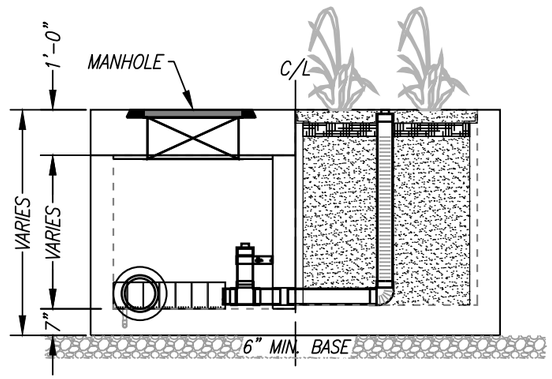
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

3 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.6 CFS

DMA A-5

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

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MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEE

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Modular Wetlands® System Linear

A Stormwater Biofiltration Solution



OVERVIEW

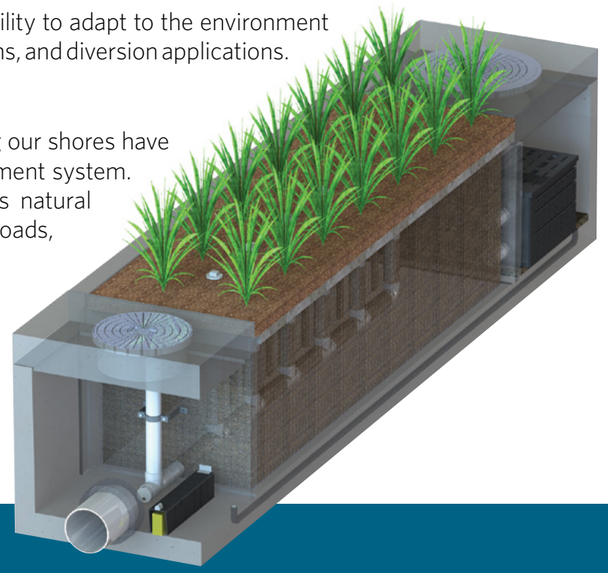
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

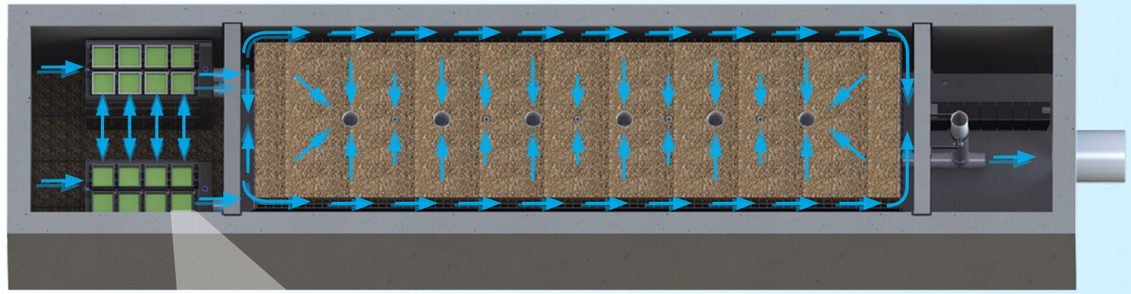


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



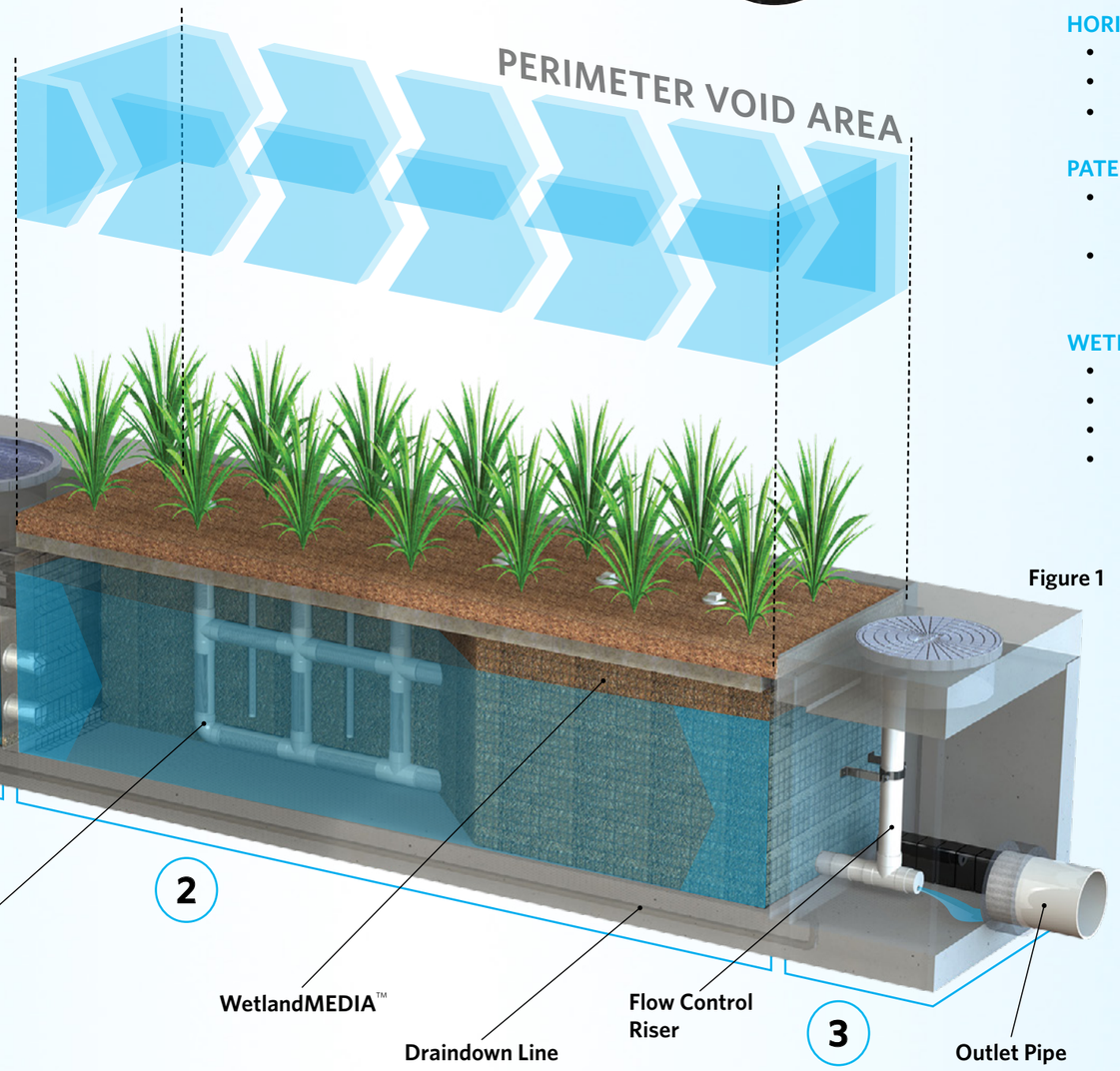


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

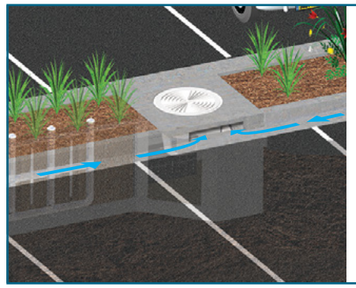
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





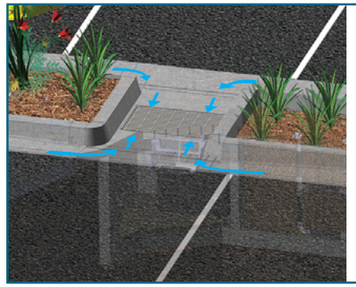
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



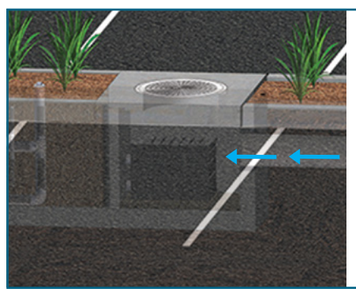
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

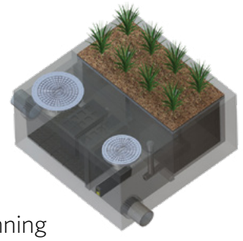


DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

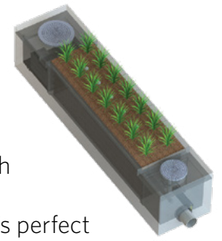
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

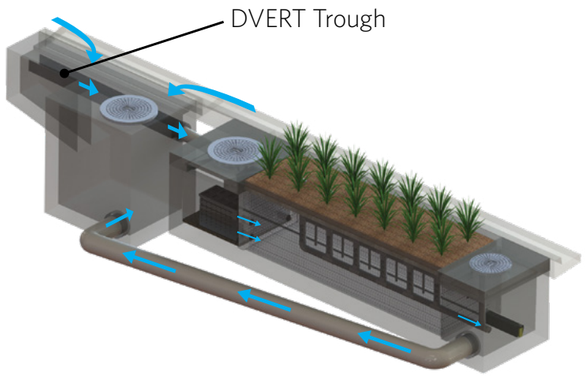
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



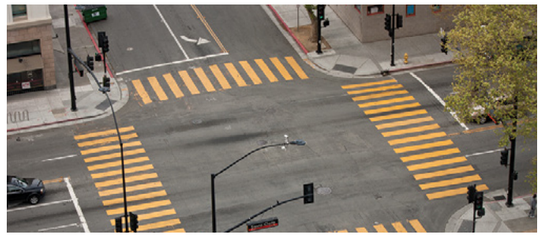
INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



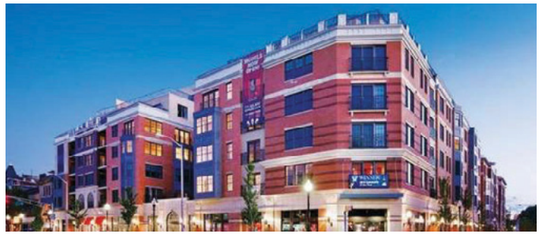
PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION



Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



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01172020

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/24/21 File: EX2YRA1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A1 EXISTING CONDITION
2-YEAR 24 HOUR STORM EVENT
21-0034
2021-11-22 EP

Drainage Area = 37.70(Ac.) = 0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.70(Ac.) = 0.059 Sq. Mi.
Length along longest watercourse = 3231.00(Ft.)
Length along longest watercourse measured to centroid = 1394.00(Ft.)
Length along longest watercourse = 0.612 Mi.
Length along longest watercourse measured to centroid = 0.264 Mi.
Difference in elevation = 45.30(Ft.)
Slope along watercourse = 74.0279 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.159 Hr.
Lag time = 9.54 Min.
25% of lag time = 2.38 Min.
40% of lag time = 3.82 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	2.40	90.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	6.20	233.74

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
37.700	86.20	0.000

Total Area Entered = 37.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

86.2	71.9	0.339	0.000	0.339	1.000	0.339
					Sum (F) =	0.339

Area averaged mean soil loss (F) (In/Hr) = 0.339
Minimum soil loss rate ((In/Hr)) = 0.170
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	52.421	4.579	1.740
2	0.167	104.842	23.119	8.784
3	0.250	157.263	37.515	14.254
4	0.333	209.684	13.955	5.302
5	0.417	262.105	8.053	3.060
6	0.500	314.526	5.188	1.971
7	0.583	366.947	3.309	1.257
8	0.667	419.368	1.927	0.732
9	0.750	471.789	0.794	0.302
10	0.833	524.210	0.520	0.197
11	0.917	576.631	0.358	0.136
12	1.000	629.052	0.374	0.142
13	1.083	681.473	0.212	0.080
14	1.167	733.894	0.098	0.037
			Sum = 100.000	Sum= 37.995

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.602)	0.017	0.002
2	0.17	0.07	0.019	(0.599)	0.017	0.002
3	0.25	0.07	0.019	(0.597)	0.017	0.002
4	0.33	0.10	0.029	(0.595)	0.026	0.003
5	0.42	0.10	0.029	(0.592)	0.026	0.003
6	0.50	0.10	0.029	(0.590)	0.026	0.003
7	0.58	0.10	0.029	(0.588)	0.026	0.003
8	0.67	0.10	0.029	(0.585)	0.026	0.003
9	0.75	0.10	0.029	(0.583)	0.026	0.003
10	0.83	0.13	0.038	(0.581)	0.035	0.004
11	0.92	0.13	0.038	(0.579)	0.035	0.004
12	1.00	0.13	0.038	(0.576)	0.035	0.004
13	1.08	0.10	0.029	(0.574)	0.026	0.003
14	1.17	0.10	0.029	(0.572)	0.026	0.003
15	1.25	0.10	0.029	(0.569)	0.026	0.003
16	1.33	0.10	0.029	(0.567)	0.026	0.003
17	1.42	0.10	0.029	(0.565)	0.026	0.003
18	1.50	0.10	0.029	(0.563)	0.026	0.003
19	1.58	0.10	0.029	(0.560)	0.026	0.003
20	1.67	0.10	0.029	(0.558)	0.026	0.003
21	1.75	0.10	0.029	(0.556)	0.026	0.003
22	1.83	0.13	0.038	(0.554)	0.035	0.004
23	1.92	0.13	0.038	(0.551)	0.035	0.004
24	2.00	0.13	0.038	(0.549)	0.035	0.004
25	2.08	0.13	0.038	(0.547)	0.035	0.004
26	2.17	0.13	0.038	(0.545)	0.035	0.004
27	2.25	0.13	0.038	(0.543)	0.035	0.004
28	2.33	0.13	0.038	(0.540)	0.035	0.004
29	2.42	0.13	0.038	(0.538)	0.035	0.004
30	2.50	0.13	0.038	(0.536)	0.035	0.004
31	2.58	0.17	0.048	(0.534)	0.043	0.005
32	2.67	0.17	0.048	(0.532)	0.043	0.005
33	2.75	0.17	0.048	(0.529)	0.043	0.005
34	2.83	0.17	0.048	(0.527)	0.043	0.005
35	2.92	0.17	0.048	(0.525)	0.043	0.005
36	3.00	0.17	0.048	(0.523)	0.043	0.005

37	3.08	0.17	0.048	(0.521)	0.043	0.005
38	3.17	0.17	0.048	(0.519)	0.043	0.005
39	3.25	0.17	0.048	(0.516)	0.043	0.005
40	3.33	0.17	0.048	(0.514)	0.043	0.005
41	3.42	0.17	0.048	(0.512)	0.043	0.005
42	3.50	0.17	0.048	(0.510)	0.043	0.005
43	3.58	0.17	0.048	(0.508)	0.043	0.005
44	3.67	0.17	0.048	(0.506)	0.043	0.005
45	3.75	0.17	0.048	(0.504)	0.043	0.005
46	3.83	0.20	0.058	(0.501)	0.052	0.006
47	3.92	0.20	0.058	(0.499)	0.052	0.006
48	4.00	0.20	0.058	(0.497)	0.052	0.006
49	4.08	0.20	0.058	(0.495)	0.052	0.006
50	4.17	0.20	0.058	(0.493)	0.052	0.006
51	4.25	0.20	0.058	(0.491)	0.052	0.006
52	4.33	0.23	0.067	(0.489)	0.060	0.007
53	4.42	0.23	0.067	(0.487)	0.060	0.007
54	4.50	0.23	0.067	(0.485)	0.060	0.007
55	4.58	0.23	0.067	(0.483)	0.060	0.007
56	4.67	0.23	0.067	(0.480)	0.060	0.007
57	4.75	0.23	0.067	(0.478)	0.060	0.007
58	4.83	0.27	0.077	(0.476)	0.069	0.008
59	4.92	0.27	0.077	(0.474)	0.069	0.008
60	5.00	0.27	0.077	(0.472)	0.069	0.008
61	5.08	0.20	0.058	(0.470)	0.052	0.006
62	5.17	0.20	0.058	(0.468)	0.052	0.006
63	5.25	0.20	0.058	(0.466)	0.052	0.006
64	5.33	0.23	0.067	(0.464)	0.060	0.007
65	5.42	0.23	0.067	(0.462)	0.060	0.007
66	5.50	0.23	0.067	(0.460)	0.060	0.007
67	5.58	0.27	0.077	(0.458)	0.069	0.008
68	5.67	0.27	0.077	(0.456)	0.069	0.008
69	5.75	0.27	0.077	(0.454)	0.069	0.008
70	5.83	0.27	0.077	(0.452)	0.069	0.008
71	5.92	0.27	0.077	(0.450)	0.069	0.008
72	6.00	0.27	0.077	(0.448)	0.069	0.008
73	6.08	0.30	0.086	(0.446)	0.078	0.009
74	6.17	0.30	0.086	(0.444)	0.078	0.009
75	6.25	0.30	0.086	(0.442)	0.078	0.009
76	6.33	0.30	0.086	(0.440)	0.078	0.009
77	6.42	0.30	0.086	(0.438)	0.078	0.009
78	6.50	0.30	0.086	(0.436)	0.078	0.009
79	6.58	0.33	0.096	(0.434)	0.086	0.010
80	6.67	0.33	0.096	(0.432)	0.086	0.010
81	6.75	0.33	0.096	(0.430)	0.086	0.010
82	6.83	0.33	0.096	(0.428)	0.086	0.010
83	6.92	0.33	0.096	(0.426)	0.086	0.010
84	7.00	0.33	0.096	(0.424)	0.086	0.010
85	7.08	0.33	0.096	(0.422)	0.086	0.010
86	7.17	0.33	0.096	(0.421)	0.086	0.010
87	7.25	0.33	0.096	(0.419)	0.086	0.010
88	7.33	0.37	0.106	(0.417)	0.095	0.011
89	7.42	0.37	0.106	(0.415)	0.095	0.011
90	7.50	0.37	0.106	(0.413)	0.095	0.011
91	7.58	0.40	0.115	(0.411)	0.104	0.012
92	7.67	0.40	0.115	(0.409)	0.104	0.012
93	7.75	0.40	0.115	(0.407)	0.104	0.012
94	7.83	0.43	0.125	(0.405)	0.112	0.012
95	7.92	0.43	0.125	(0.403)	0.112	0.012
96	8.00	0.43	0.125	(0.402)	0.112	0.012
97	8.08	0.50	0.144	(0.400)	0.130	0.014
98	8.17	0.50	0.144	(0.398)	0.130	0.014
99	8.25	0.50	0.144	(0.396)	0.130	0.014
100	8.33	0.50	0.144	(0.394)	0.130	0.014
101	8.42	0.50	0.144	(0.392)	0.130	0.014
102	8.50	0.50	0.144	(0.390)	0.130	0.014
103	8.58	0.53	0.154	(0.389)	0.138	0.015
104	8.67	0.53	0.154	(0.387)	0.138	0.015
105	8.75	0.53	0.154	(0.385)	0.138	0.015
106	8.83	0.57	0.163	(0.383)	0.147	0.016
107	8.92	0.57	0.163	(0.381)	0.147	0.016
108	9.00	0.57	0.163	(0.380)	0.147	0.016
109	9.08	0.63	0.182	(0.378)	0.164	0.018
110	9.17	0.63	0.182	(0.376)	0.164	0.018
111	9.25	0.63	0.182	(0.374)	0.164	0.018

112	9.33	0.67	0.192	(0.372)	0.173	0.019
113	9.42	0.67	0.192	(0.371)	0.173	0.019
114	9.50	0.67	0.192	(0.369)	0.173	0.019
115	9.58	0.70	0.202	(0.367)	0.181	0.020
116	9.67	0.70	0.202	(0.365)	0.181	0.020
117	9.75	0.70	0.202	(0.364)	0.181	0.020
118	9.83	0.73	0.211	(0.362)	0.190	0.021
119	9.92	0.73	0.211	(0.360)	0.190	0.021
120	10.00	0.73	0.211	(0.358)	0.190	0.021
121	10.08	0.50	0.144	(0.357)	0.130	0.014
122	10.17	0.50	0.144	(0.355)	0.130	0.014
123	10.25	0.50	0.144	(0.353)	0.130	0.014
124	10.33	0.50	0.144	(0.351)	0.130	0.014
125	10.42	0.50	0.144	(0.350)	0.130	0.014
126	10.50	0.50	0.144	(0.348)	0.130	0.014
127	10.58	0.67	0.192	(0.346)	0.173	0.019
128	10.67	0.67	0.192	(0.345)	0.173	0.019
129	10.75	0.67	0.192	(0.343)	0.173	0.019
130	10.83	0.67	0.192	(0.341)	0.173	0.019
131	10.92	0.67	0.192	(0.340)	0.173	0.019
132	11.00	0.67	0.192	(0.338)	0.173	0.019
133	11.08	0.63	0.182	(0.336)	0.164	0.018
134	11.17	0.63	0.182	(0.335)	0.164	0.018
135	11.25	0.63	0.182	(0.333)	0.164	0.018
136	11.33	0.63	0.182	(0.331)	0.164	0.018
137	11.42	0.63	0.182	(0.330)	0.164	0.018
138	11.50	0.63	0.182	(0.328)	0.164	0.018
139	11.58	0.57	0.163	(0.326)	0.147	0.016
140	11.67	0.57	0.163	(0.325)	0.147	0.016
141	11.75	0.57	0.163	(0.323)	0.147	0.016
142	11.83	0.60	0.173	(0.322)	0.156	0.017
143	11.92	0.60	0.173	(0.320)	0.156	0.017
144	12.00	0.60	0.173	(0.318)	0.156	0.017
145	12.08	0.83	0.240	(0.317)	0.216	0.024
146	12.17	0.83	0.240	(0.315)	0.216	0.024
147	12.25	0.83	0.240	(0.314)	0.216	0.024
148	12.33	0.87	0.250	(0.312)	0.225	0.025
149	12.42	0.87	0.250	(0.310)	0.225	0.025
150	12.50	0.87	0.250	(0.309)	0.225	0.025
151	12.58	0.93	0.269	(0.307)	0.242	0.027
152	12.67	0.93	0.269	(0.306)	0.242	0.027
153	12.75	0.93	0.269	(0.304)	0.242	0.027
154	12.83	0.97	0.278	(0.303)	0.251	0.028
155	12.92	0.97	0.278	(0.301)	0.251	0.028
156	13.00	0.97	0.278	(0.300)	0.251	0.028
157	13.08	1.13	0.326	(0.298)	0.294	0.033
158	13.17	1.13	0.326	(0.297)	0.294	0.033
159	13.25	1.13	0.326	(0.295)	0.294	0.033
160	13.33	1.13	0.326	0.294	(0.294)	0.033
161	13.42	1.13	0.326	0.292	(0.294)	0.034
162	13.50	1.13	0.326	0.291	(0.294)	0.036
163	13.58	0.77	0.221	(0.289)	0.199	0.022
164	13.67	0.77	0.221	(0.288)	0.199	0.022
165	13.75	0.77	0.221	(0.286)	0.199	0.022
166	13.83	0.77	0.221	(0.285)	0.199	0.022
167	13.92	0.77	0.221	(0.283)	0.199	0.022
168	14.00	0.77	0.221	(0.282)	0.199	0.022
169	14.08	0.90	0.259	(0.280)	0.233	0.026
170	14.17	0.90	0.259	(0.279)	0.233	0.026
171	14.25	0.90	0.259	(0.278)	0.233	0.026
172	14.33	0.87	0.250	(0.276)	0.225	0.025
173	14.42	0.87	0.250	(0.275)	0.225	0.025
174	14.50	0.87	0.250	(0.273)	0.225	0.025
175	14.58	0.87	0.250	(0.272)	0.225	0.025
176	14.67	0.87	0.250	(0.271)	0.225	0.025
177	14.75	0.87	0.250	(0.269)	0.225	0.025
178	14.83	0.83	0.240	(0.268)	0.216	0.024
179	14.92	0.83	0.240	(0.266)	0.216	0.024
180	15.00	0.83	0.240	(0.265)	0.216	0.024
181	15.08	0.80	0.230	(0.264)	0.207	0.023
182	15.17	0.80	0.230	(0.262)	0.207	0.023
183	15.25	0.80	0.230	(0.261)	0.207	0.023
184	15.33	0.77	0.221	(0.260)	0.199	0.022
185	15.42	0.77	0.221	(0.258)	0.199	0.022
186	15.50	0.77	0.221	(0.257)	0.199	0.022

187	15.58	0.63	0.182	(0.256)	0.164	0.018
188	15.67	0.63	0.182	(0.254)	0.164	0.018
189	15.75	0.63	0.182	(0.253)	0.164	0.018
190	15.83	0.63	0.182	(0.252)	0.164	0.018
191	15.92	0.63	0.182	(0.250)	0.164	0.018
192	16.00	0.63	0.182	(0.249)	0.164	0.018
193	16.08	0.13	0.038	(0.248)	0.035	0.004
194	16.17	0.13	0.038	(0.247)	0.035	0.004
195	16.25	0.13	0.038	(0.245)	0.035	0.004
196	16.33	0.13	0.038	(0.244)	0.035	0.004
197	16.42	0.13	0.038	(0.243)	0.035	0.004
198	16.50	0.13	0.038	(0.242)	0.035	0.004
199	16.58	0.10	0.029	(0.240)	0.026	0.003
200	16.67	0.10	0.029	(0.239)	0.026	0.003
201	16.75	0.10	0.029	(0.238)	0.026	0.003
202	16.83	0.10	0.029	(0.237)	0.026	0.003
203	16.92	0.10	0.029	(0.236)	0.026	0.003
204	17.00	0.10	0.029	(0.234)	0.026	0.003
205	17.08	0.17	0.048	(0.233)	0.043	0.005
206	17.17	0.17	0.048	(0.232)	0.043	0.005
207	17.25	0.17	0.048	(0.231)	0.043	0.005
208	17.33	0.17	0.048	(0.230)	0.043	0.005
209	17.42	0.17	0.048	(0.229)	0.043	0.005
210	17.50	0.17	0.048	(0.227)	0.043	0.005
211	17.58	0.17	0.048	(0.226)	0.043	0.005
212	17.67	0.17	0.048	(0.225)	0.043	0.005
213	17.75	0.17	0.048	(0.224)	0.043	0.005
214	17.83	0.13	0.038	(0.223)	0.035	0.004
215	17.92	0.13	0.038	(0.222)	0.035	0.004
216	18.00	0.13	0.038	(0.221)	0.035	0.004
217	18.08	0.13	0.038	(0.220)	0.035	0.004
218	18.17	0.13	0.038	(0.219)	0.035	0.004
219	18.25	0.13	0.038	(0.217)	0.035	0.004
220	18.33	0.13	0.038	(0.216)	0.035	0.004
221	18.42	0.13	0.038	(0.215)	0.035	0.004
222	18.50	0.13	0.038	(0.214)	0.035	0.004
223	18.58	0.10	0.029	(0.213)	0.026	0.003
224	18.67	0.10	0.029	(0.212)	0.026	0.003
225	18.75	0.10	0.029	(0.211)	0.026	0.003
226	18.83	0.07	0.019	(0.210)	0.017	0.002
227	18.92	0.07	0.019	(0.209)	0.017	0.002
228	19.00	0.07	0.019	(0.208)	0.017	0.002
229	19.08	0.10	0.029	(0.207)	0.026	0.003
230	19.17	0.10	0.029	(0.206)	0.026	0.003
231	19.25	0.10	0.029	(0.205)	0.026	0.003
232	19.33	0.13	0.038	(0.204)	0.035	0.004
233	19.42	0.13	0.038	(0.203)	0.035	0.004
234	19.50	0.13	0.038	(0.202)	0.035	0.004
235	19.58	0.10	0.029	(0.202)	0.026	0.003
236	19.67	0.10	0.029	(0.201)	0.026	0.003
237	19.75	0.10	0.029	(0.200)	0.026	0.003
238	19.83	0.07	0.019	(0.199)	0.017	0.002
239	19.92	0.07	0.019	(0.198)	0.017	0.002
240	20.00	0.07	0.019	(0.197)	0.017	0.002
241	20.08	0.10	0.029	(0.196)	0.026	0.003
242	20.17	0.10	0.029	(0.195)	0.026	0.003
243	20.25	0.10	0.029	(0.194)	0.026	0.003
244	20.33	0.10	0.029	(0.194)	0.026	0.003
245	20.42	0.10	0.029	(0.193)	0.026	0.003
246	20.50	0.10	0.029	(0.192)	0.026	0.003
247	20.58	0.10	0.029	(0.191)	0.026	0.003
248	20.67	0.10	0.029	(0.190)	0.026	0.003
249	20.75	0.10	0.029	(0.190)	0.026	0.003
250	20.83	0.07	0.019	(0.189)	0.017	0.002
251	20.92	0.07	0.019	(0.188)	0.017	0.002
252	21.00	0.07	0.019	(0.187)	0.017	0.002
253	21.08	0.10	0.029	(0.187)	0.026	0.003
254	21.17	0.10	0.029	(0.186)	0.026	0.003
255	21.25	0.10	0.029	(0.185)	0.026	0.003
256	21.33	0.07	0.019	(0.184)	0.017	0.002
257	21.42	0.07	0.019	(0.184)	0.017	0.002
258	21.50	0.07	0.019	(0.183)	0.017	0.002
259	21.58	0.10	0.029	(0.182)	0.026	0.003
260	21.67	0.10	0.029	(0.182)	0.026	0.003
261	21.75	0.10	0.029	(0.181)	0.026	0.003

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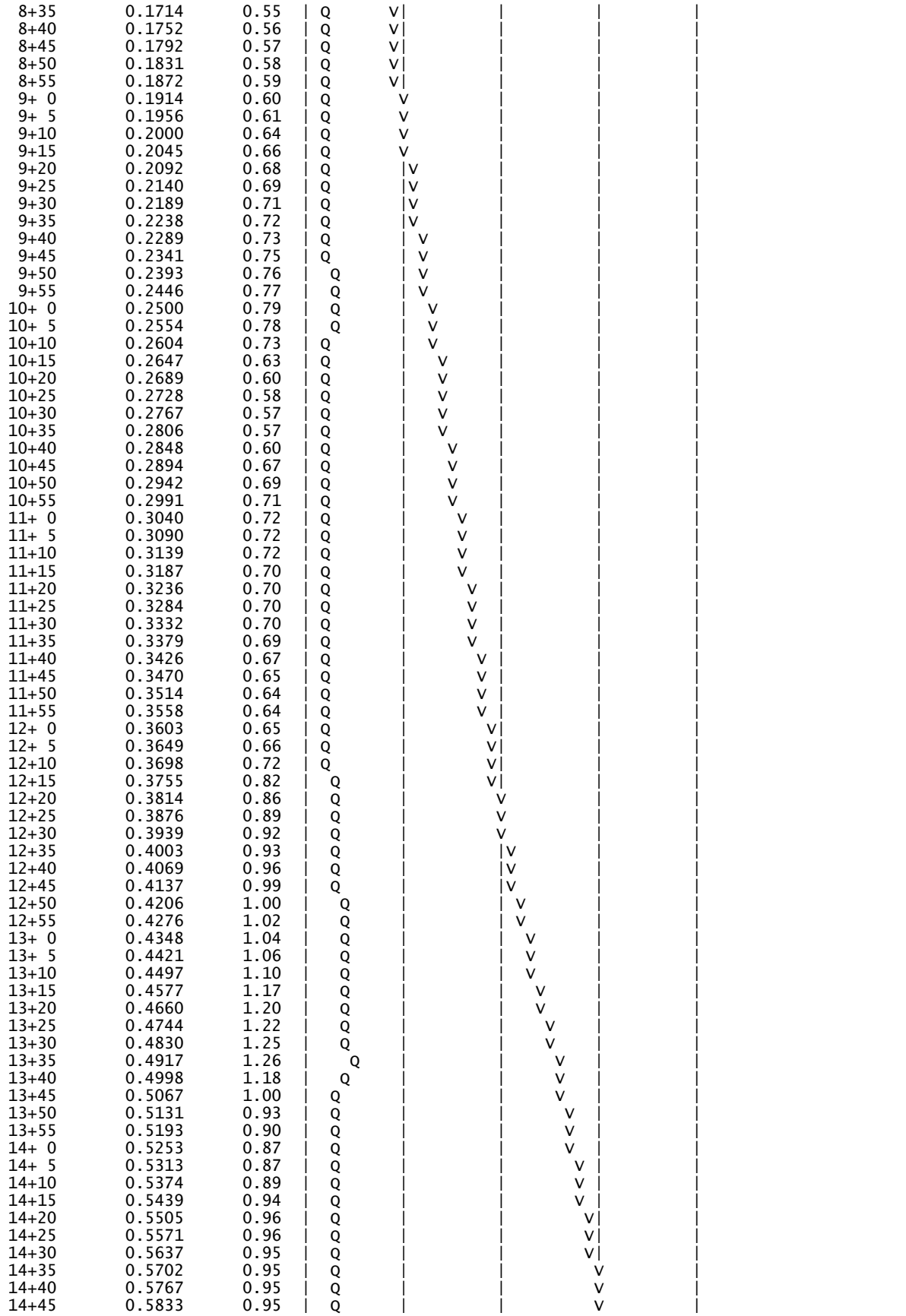
262  21.83     0.07      0.019       (  0.180)       0.017        0.002
263  21.92     0.07      0.019       (  0.180)       0.017        0.002
264  22.00     0.07      0.019       (  0.179)       0.017        0.002
265  22.08     0.10      0.029       (  0.179)       0.026        0.003
266  22.17     0.10      0.029       (  0.178)       0.026        0.003
267  22.25     0.10      0.029       (  0.177)       0.026        0.003
268  22.33     0.07      0.019       (  0.177)       0.017        0.002
269  22.42     0.07      0.019       (  0.176)       0.017        0.002
270  22.50     0.07      0.019       (  0.176)       0.017        0.002
271  22.58     0.07      0.019       (  0.175)       0.017        0.002
272  22.67     0.07      0.019       (  0.175)       0.017        0.002
273  22.75     0.07      0.019       (  0.174)       0.017        0.002
274  22.83     0.07      0.019       (  0.174)       0.017        0.002
275  22.92     0.07      0.019       (  0.173)       0.017        0.002
276  23.00     0.07      0.019       (  0.173)       0.017        0.002
277  23.08     0.07      0.019       (  0.173)       0.017        0.002
278  23.17     0.07      0.019       (  0.172)       0.017        0.002
279  23.25     0.07      0.019       (  0.172)       0.017        0.002
280  23.33     0.07      0.019       (  0.172)       0.017        0.002
281  23.42     0.07      0.019       (  0.171)       0.017        0.002
282  23.50     0.07      0.019       (  0.171)       0.017        0.002
283  23.58     0.07      0.019       (  0.171)       0.017        0.002
284  23.67     0.07      0.019       (  0.170)       0.017        0.002
285  23.75     0.07      0.019       (  0.170)       0.017        0.002
286  23.83     0.07      0.019       (  0.170)       0.017        0.002
287  23.92     0.07      0.019       (  0.170)       0.017        0.002
288  24.00     0.07      0.019       (  0.170)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.9
      Flood volume = Effective rainfall      0.24(In)
       times area      37.7(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
      Total soil loss =      2.16(In)
      Total soil loss =     6.784(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       32896.4 Cubic Feet
      Total soil loss =      295521.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.264(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0005      0.05  Q         |         |         |         |
   0+20       0.0009      0.06  Q         |         |         |         |
   0+25       0.0014      0.07  Q         |         |         |         |
   0+30       0.0020      0.09  Q         |         |         |         |
   0+35       0.0027      0.10  Q         |         |         |         |
   0+40       0.0034      0.10  Q         |         |         |         |
   0+45       0.0042      0.11  Q         |         |         |         |
   0+50       0.0049      0.11  Q         |         |         |         |
   0+55       0.0057      0.12  Q         |         |         |         |
   1+ 0       0.0066      0.13  Q         |         |         |         |
   1+ 5       0.0076      0.14  Q         |         |         |         |
   1+10       0.0085      0.13  Q         |         |         |         |
   1+15       0.0093      0.12  Q         |         |         |         |
   1+20       0.0101      0.12  Q         |         |         |         |
   1+25       0.0109      0.11  Q         |         |         |         |
   1+30       0.0116      0.11  Q         |         |         |         |
   1+35       0.0124      0.11  Q         |         |         |         |
   1+40       0.0132      0.11  Q         |         |         |         |
   1+45       0.0139      0.11  Q         |         |         |         |
   1+50       0.0147      0.11  Q         |         |         |         |
   1+55       0.0155      0.12  Q         |         |         |         |
   2+ 0       0.0164      0.13  Q         |         |         |         |
   2+ 5       0.0174      0.14  Q         |         |         |         |
   2+10       0.0184      0.14  Q         |         |         |         |
   2+15       0.0193      0.14  QV        |         |         |         |
```

```
2+20       0.0203      0.14  QV        |         |         |         |
2+25       0.0213      0.15  QV        |         |         |         |
2+30       0.0223      0.15  QV        |         |         |         |
2+35       0.0233      0.15  QV        |         |         |         |
2+40       0.0244      0.16  QV        |         |         |         |
2+45       0.0256      0.17  QV        |         |         |         |
2+50       0.0268      0.17  QV        |         |         |         |
2+55       0.0280      0.18  QV        |         |         |         |
3+ 0       0.0293      0.18  QV        |         |         |         |
3+ 5       0.0305      0.18  QV        |         |         |         |
3+10       0.0317      0.18  QV        |         |         |         |
3+15       0.0330      0.18  QV        |         |         |         |
3+20       0.0343      0.18  QV        |         |         |         |
3+25       0.0355      0.18  QV        |         |         |         |
3+30       0.0368      0.18  QV        |         |         |         |
3+35       0.0380      0.18  Q V       |         |         |         |
3+40       0.0393      0.18  Q V       |         |         |         |
3+45       0.0405      0.18  Q V       |         |         |         |
3+50       0.0418      0.18  Q V       |         |         |         |
3+55       0.0431      0.19  Q V       |         |         |         |
4+ 0       0.0446      0.21  Q V       |         |         |         |
4+ 5       0.0460      0.21  Q V       |         |         |         |
4+10       0.0475      0.21  Q V       |         |         |         |
4+15       0.0490      0.22  Q V       |         |         |         |
4+20       0.0505      0.22  Q V       |         |         |         |
4+25       0.0521      0.23  Q V       |         |         |         |
4+30       0.0537      0.24  Q V       |         |         |         |
4+35       0.0554      0.25  Q V       |         |         |         |
4+40       0.0571      0.25  |Q V       |         |         |         |
4+45       0.0589      0.25  |Q V       |         |         |         |
4+50       0.0606      0.26  |Q V       |         |         |         |
4+55       0.0625      0.26  |Q V       |         |         |         |
5+ 0       0.0644      0.28  |Q V       |         |         |         |
5+ 5       0.0663      0.28  |Q V       |         |         |         |
5+10       0.0682      0.27  |Q V       |         |         |         |
5+15       0.0698      0.24  Q  V       |         |         |         |
5+20       0.0714      0.23  Q  V       |         |         |         |
5+25       0.0731      0.24  Q  V       |         |         |         |
5+30       0.0748      0.25  Q  V       |         |         |         |
5+35       0.0765      0.25  |Q  V       |         |         |         |
5+40       0.0783      0.26  |Q  V       |         |         |         |
5+45       0.0802      0.28  |Q  V       |         |         |         |
5+50       0.0822      0.28  |Q  V       |         |         |         |
5+55       0.0842      0.29  |Q  V       |         |         |         |
6+ 0       0.0862      0.29  |Q  V       |         |         |         |
6+ 5       0.0882      0.29  |Q  V       |         |         |         |
6+10       0.0902      0.30  |Q  V       |         |         |         |
6+15       0.0924      0.32  |Q  V       |         |         |         |
6+20       0.0946      0.32  |Q   V      |         |         |         |
6+25       0.0968      0.32  |Q   V      |         |         |         |
6+30       0.0991      0.33  |Q   V      |         |         |         |
6+35       0.1013      0.33  |Q   V      |         |         |         |
6+40       0.1037      0.34  |Q   V      |         |         |         |
6+45       0.1061      0.35  |Q   V      |         |         |         |
6+50       0.1085      0.36  |Q   V      |         |         |         |
6+55       0.1110      0.36  |Q   V      |         |         |         |
7+ 0       0.1135      0.36  |Q    V     |         |         |         |
7+ 5       0.1160      0.36  |Q    V     |         |         |         |
7+10       0.1185      0.36  |Q    V     |         |         |         |
7+15       0.1210      0.36  |Q    V     |         |         |         |
7+20       0.1236      0.37  |Q    V     |         |         |         |
7+25       0.1261      0.37  |Q    V     |         |         |         |
7+30       0.1288      0.39  |Q    V     |         |         |         |
7+35       0.1315      0.40  |Q    V     |         |         |         |
7+40       0.1343      0.41  |Q     V    |         |         |         |
7+45       0.1373      0.42  |Q     V    |         |         |         |
7+50       0.1402      0.43  |Q     V    |         |         |         |
7+55       0.1433      0.44  |Q     V    |         |         |         |
8+ 0       0.1464      0.46  |Q     V    |         |         |         |
8+ 5       0.1496      0.47  |Q     V    |         |         |         |
8+10       0.1530      0.49  |Q      V   |         |         |         |
8+15       0.1566      0.52  | Q     V   |         |         |         |
8+20       0.1602      0.53  | Q     V   |         |         |         |
8+25       0.1639      0.54  | Q     V   |         |         |         |
8+30       0.1677      0.54  | Q     V   |         |         |         |
```



```
14+50       0.5898      0.95  |  Q      |         |         |V        |
14+55       0.5963      0.94  |  Q      |         |         |V        |
15+ 0       0.6026      0.93  |  Q      |         |         |V        |
15+ 5       0.6090      0.92  |  Q      |         |         | V       |
15+10       0.6152      0.91  |  Q      |         |         | V       |
15+15       0.6213      0.89  |  Q      |         |         | V       |
15+20       0.6274      0.88  |  Q      |         |         |  V      |
15+25       0.6334      0.87  |  Q      |         |         |  V      |
15+30       0.6393      0.86  |  Q      |         |         |  V      |
15+35       0.6451      0.84  |  Q      |         |         |   V     |
15+40       0.6507      0.80  |  Q      |         |         |   V     |
15+45       0.6558      0.75  | Q       |         |         |   V     |
15+50       0.6608      0.73  | Q       |         |         |    V    |
15+55       0.6657      0.71  | Q       |         |         |    V    |
16+ 0       0.6706      0.71  | Q       |         |         |    V    |
16+ 5       0.6752      0.67  | Q       |         |         |    V    |
16+10       0.6790      0.55  | Q       |         |         |    V    |
16+15       0.6813      0.34  |Q        |         |         |     V   |
16+20       0.6831      0.26  |Q        |         |         |     V   |
16+25       0.6846      0.22  Q         |         |         |     V   |
16+30       0.6859      0.19  Q         |         |         |     V   |
16+35       0.6871      0.17  Q         |         |         |     V   |
16+40       0.6881      0.15  Q         |         |         |     V   |
16+45       0.6890      0.13  Q         |         |         |     V   |
16+50       0.6898      0.12  Q         |         |         |     V   |
16+55       0.6906      0.12  Q         |         |         |     V   |
17+ 0       0.6914      0.11  Q         |         |         |     V   |
17+ 5       0.6922      0.11  Q         |         |         |     V   |
17+10       0.6931      0.13  Q         |         |         |     V   |
17+15       0.6942      0.16  Q         |         |         |     V   |
17+20       0.6954      0.17  Q         |         |         |     V   |
17+25       0.6966      0.17  Q         |         |         |     V   |
17+30       0.6978      0.18  Q         |         |         |     V   |
17+35       0.6990      0.18  Q         |         |         |      V  |
17+40       0.7003      0.18  Q         |         |         |      V  |
17+45       0.7015      0.18  Q         |         |         |      V  |
17+50       0.7027      0.18  Q         |         |         |      V  |
17+55       0.7039      0.17  Q         |         |         |      V  |
18+ 0       0.7050      0.16  Q         |         |         |      V  |
18+ 5       0.7061      0.15  Q         |         |         |      V  |
18+10       0.7071      0.15  Q         |         |         |      V  |
18+15       0.7081      0.15  Q         |         |         |      V  |
18+20       0.7092      0.15  Q         |         |         |      V  |
18+25       0.7102      0.15  Q         |         |         |      V  |
18+30       0.7112      0.15  Q         |         |         |      V  |
18+35       0.7122      0.14  Q         |         |         |      V  |
18+40       0.7131      0.14  Q         |         |         |      V  |
18+45       0.7139      0.12  Q         |         |         |      V  |
18+50       0.7147      0.12  Q         |         |         |      V  |
18+55       0.7155      0.10  Q         |         |         |      V  |
19+ 0       0.7161      0.09  Q         |         |         |      V  |
19+ 5       0.7166      0.08  Q         |         |         |      V  |
19+10       0.7173      0.09  Q         |         |         |      V  |
19+15       0.7179      0.10  Q         |         |         |       V |
19+20       0.7187      0.11  Q         |         |         |       V |
19+25       0.7195      0.12  Q         |         |         |       V |
19+30       0.7204      0.13  Q         |         |         |       V |
19+35       0.7213      0.14  Q         |         |         |       V |
19+40       0.7222      0.13  Q         |         |         |       V |
19+45       0.7230      0.12  Q         |         |         |       V |
19+50       0.7238      0.11  Q         |         |         |       V |
19+55       0.7245      0.10  Q         |         |         |       V |
20+ 0       0.7251      0.09  Q         |         |         |       V |
20+ 5       0.7257      0.08  Q         |         |         |       V |
20+10       0.7263      0.09  Q         |         |         |       V |
20+15       0.7270      0.10  Q         |         |         |       V |
20+20       0.7277      0.10  Q         |         |         |       V |
20+25       0.7284      0.11  Q         |         |         |       V |
20+30       0.7292      0.11  Q         |         |         |       V |
20+35       0.7299      0.11  Q         |         |         |       V |
20+40       0.7307      0.11  Q         |         |         |       V |
20+45       0.7314      0.11  Q         |         |         |       V |
20+50       0.7322      0.11  Q         |         |         |       V |
20+55       0.7328      0.10  Q         |         |         |       V |
21+ 0       0.7334      0.09  Q         |         |         |       V |
```

21+ 5	0.7340	0.08	Q				V
21+10	0.7346	0.09	Q				V
21+15	0.7353	0.10	Q				V
21+20	0.7360	0.10	Q				V
21+25	0.7366	0.10	Q				V
21+30	0.7372	0.08	Q				V
21+35	0.7378	0.08	Q				V
21+40	0.7384	0.09	Q				V
21+45	0.7391	0.10	Q				V
21+50	0.7398	0.10	Q				V
21+55	0.7404	0.10	Q				V
22+ 0	0.7410	0.08	Q				V
22+ 5	0.7416	0.08	Q				V
22+10	0.7422	0.09	Q				V
22+15	0.7428	0.10	Q				V
22+20	0.7435	0.10	Q				V
22+25	0.7442	0.10	Q				V
22+30	0.7448	0.08	Q				V
22+35	0.7453	0.08	Q				V
22+40	0.7458	0.08	Q				V
22+45	0.7464	0.08	Q				V
22+50	0.7469	0.07	Q				V
22+55	0.7474	0.07	Q				V
23+ 0	0.7479	0.07	Q				V
23+ 5	0.7484	0.07	Q				V
23+10	0.7489	0.07	Q				V
23+15	0.7494	0.07	Q				V
23+20	0.7499	0.07	Q				V
23+25	0.7504	0.07	Q				V
23+30	0.7509	0.07	Q				V
23+35	0.7514	0.07	Q				V
23+40	0.7519	0.07	Q				V
23+45	0.7524	0.07	Q				V
23+50	0.7529	0.07	Q				V
23+55	0.7534	0.07	Q				V
24+ 0	0.7539	0.07	Q				V
24+ 5	0.7544	0.07	Q				V
24+10	0.7548	0.05	Q				V
24+15	0.7549	0.03	Q				V
24+20	0.7550	0.02	Q				V
24+25	0.7551	0.01	Q				V
24+30	0.7551	0.01	Q				V
24+35	0.7552	0.00	Q				V
24+40	0.7552	0.00	Q				V
24+45	0.7552	0.00	Q				V
24+50	0.7552	0.00	Q				V
24+55	0.7552	0.00	Q				V
25+ 0	0.7552	0.00	Q				V
25+ 5	0.7552	0.00	Q				V

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/08/21 File: A1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A2 EXISTING CONDITION
2 YEAR STORM EVENT
21-00034
2021-11-08 EP

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 526.00(Ft.)
Length along longest watercourse measured to centroid = 234.00(Ft.)
Length along longest watercourse = 0.100 Mi.
Length along longest watercourse measured to centroid = 0.044 Mi.
Difference in elevation = 6.90(Ft.)
Slope along watercourse = 69.2624 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.041 Hr.
Lag time = 2.46 Min.
25% of lag time = 0.61 Min.
40% of lag time = 0.98 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.40	18.00

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	6.20	46.50

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	88.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

88.0	74.8	0.305	0.000	0.305	1.000	0.305
					Sum (F) =	0.305

Area averaged mean soil loss (F) (In/Hr) = 0.305
Minimum soil loss rate ((In/Hr)) = 0.153
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	203.285	42.931	3.245
2	0.167	406.571	49.701	3.757
3	0.250	609.856	6.338	0.479
4	0.333	813.141	1.029	0.078
			Sum = 100.000 Sum=	7.559

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.541)	0.017	0.002
2	0.17	0.07	0.019	(0.539)	0.017	0.002
3	0.25	0.07	0.019	(0.537)	0.017	0.002
4	0.33	0.10	0.029	(0.535)	0.026	0.003
5	0.42	0.10	0.029	(0.533)	0.026	0.003
6	0.50	0.10	0.029	(0.531)	0.026	0.003
7	0.58	0.10	0.029	(0.529)	0.026	0.003
8	0.67	0.10	0.029	(0.527)	0.026	0.003
9	0.75	0.10	0.029	(0.525)	0.026	0.003
10	0.83	0.13	0.038	(0.523)	0.035	0.004
11	0.92	0.13	0.038	(0.521)	0.035	0.004
12	1.00	0.13	0.038	(0.519)	0.035	0.004
13	1.08	0.10	0.029	(0.516)	0.026	0.003
14	1.17	0.10	0.029	(0.514)	0.026	0.003
15	1.25	0.10	0.029	(0.512)	0.026	0.003
16	1.33	0.10	0.029	(0.510)	0.026	0.003
17	1.42	0.10	0.029	(0.508)	0.026	0.003
18	1.50	0.10	0.029	(0.506)	0.026	0.003
19	1.58	0.10	0.029	(0.504)	0.026	0.003
20	1.67	0.10	0.029	(0.502)	0.026	0.003
21	1.75	0.10	0.029	(0.500)	0.026	0.003
22	1.83	0.13	0.038	(0.498)	0.035	0.004
23	1.92	0.13	0.038	(0.496)	0.035	0.004
24	2.00	0.13	0.038	(0.494)	0.035	0.004
25	2.08	0.13	0.038	(0.492)	0.035	0.004
26	2.17	0.13	0.038	(0.490)	0.035	0.004
27	2.25	0.13	0.038	(0.488)	0.035	0.004
28	2.33	0.13	0.038	(0.486)	0.035	0.004
29	2.42	0.13	0.038	(0.484)	0.035	0.004
30	2.50	0.13	0.038	(0.482)	0.035	0.004
31	2.58	0.17	0.048	(0.480)	0.043	0.005
32	2.67	0.17	0.048	(0.478)	0.043	0.005
33	2.75	0.17	0.048	(0.476)	0.043	0.005
34	2.83	0.17	0.048	(0.474)	0.043	0.005
35	2.92	0.17	0.048	(0.472)	0.043	0.005
36	3.00	0.17	0.048	(0.470)	0.043	0.005
37	3.08	0.17	0.048	(0.469)	0.043	0.005
38	3.17	0.17	0.048	(0.467)	0.043	0.005
39	3.25	0.17	0.048	(0.465)	0.043	0.005
40	3.33	0.17	0.048	(0.463)	0.043	0.005
41	3.42	0.17	0.048	(0.461)	0.043	0.005
42	3.50	0.17	0.048	(0.459)	0.043	0.005
43	3.58	0.17	0.048	(0.457)	0.043	0.005
44	3.67	0.17	0.048	(0.455)	0.043	0.005
45	3.75	0.17	0.048	(0.453)	0.043	0.005
46	3.83	0.20	0.058	(0.451)	0.052	0.006

47	3.92	0.20	0.058	(0.449)	0.052	0.006
48	4.00	0.20	0.058	(0.447)	0.052	0.006
49	4.08	0.20	0.058	(0.445)	0.052	0.006
50	4.17	0.20	0.058	(0.444)	0.052	0.006
51	4.25	0.20	0.058	(0.442)	0.052	0.006
52	4.33	0.23	0.067	(0.440)	0.060	0.007
53	4.42	0.23	0.067	(0.438)	0.060	0.007
54	4.50	0.23	0.067	(0.436)	0.060	0.007
55	4.58	0.23	0.067	(0.434)	0.060	0.007
56	4.67	0.23	0.067	(0.432)	0.060	0.007
57	4.75	0.23	0.067	(0.430)	0.060	0.007
58	4.83	0.27	0.077	(0.429)	0.069	0.008
59	4.92	0.27	0.077	(0.427)	0.069	0.008
60	5.00	0.27	0.077	(0.425)	0.069	0.008
61	5.08	0.20	0.058	(0.423)	0.052	0.006
62	5.17	0.20	0.058	(0.421)	0.052	0.006
63	5.25	0.20	0.058	(0.419)	0.052	0.006
64	5.33	0.23	0.067	(0.418)	0.060	0.007
65	5.42	0.23	0.067	(0.416)	0.060	0.007
66	5.50	0.23	0.067	(0.414)	0.060	0.007
67	5.58	0.27	0.077	(0.412)	0.069	0.008
68	5.67	0.27	0.077	(0.410)	0.069	0.008
69	5.75	0.27	0.077	(0.408)	0.069	0.008
70	5.83	0.27	0.077	(0.407)	0.069	0.008
71	5.92	0.27	0.077	(0.405)	0.069	0.008
72	6.00	0.27	0.077	(0.403)	0.069	0.008
73	6.08	0.30	0.086	(0.401)	0.078	0.009
74	6.17	0.30	0.086	(0.399)	0.078	0.009
75	6.25	0.30	0.086	(0.398)	0.078	0.009
76	6.33	0.30	0.086	(0.396)	0.078	0.009
77	6.42	0.30	0.086	(0.394)	0.078	0.009
78	6.50	0.30	0.086	(0.392)	0.078	0.009
79	6.58	0.33	0.096	(0.391)	0.086	0.010
80	6.67	0.33	0.096	(0.389)	0.086	0.010
81	6.75	0.33	0.096	(0.387)	0.086	0.010
82	6.83	0.33	0.096	(0.385)	0.086	0.010
83	6.92	0.33	0.096	(0.384)	0.086	0.010
84	7.00	0.33	0.096	(0.382)	0.086	0.010
85	7.08	0.33	0.096	(0.380)	0.086	0.010
86	7.17	0.33	0.096	(0.378)	0.086	0.010
87	7.25	0.33	0.096	(0.377)	0.086	0.010
88	7.33	0.37	0.106	(0.375)	0.095	0.011
89	7.42	0.37	0.106	(0.373)	0.095	0.011
90	7.50	0.37	0.106	(0.372)	0.095	0.011
91	7.58	0.40	0.115	(0.370)	0.104	0.012
92	7.67	0.40	0.115	(0.368)	0.104	0.012
93	7.75	0.40	0.115	(0.366)	0.104	0.012
94	7.83	0.43	0.125	(0.365)	0.112	0.012
95	7.92	0.43	0.125	(0.363)	0.112	0.012
96	8.00	0.43	0.125	(0.361)	0.112	0.012
97	8.08	0.50	0.144	(0.360)	0.130	0.014
98	8.17	0.50	0.144	(0.358)	0.130	0.014
99	8.25	0.50	0.144	(0.356)	0.130	0.014
100	8.33	0.50	0.144	(0.355)	0.130	0.014
101	8.42	0.50	0.144	(0.353)	0.130	0.014
102	8.50	0.50	0.144	(0.351)	0.130	0.014
103	8.58	0.53	0.154	(0.350)	0.138	0.015
104	8.67	0.53	0.154	(0.348)	0.138	0.015
105	8.75	0.53	0.154	(0.346)	0.138	0.015
106	8.83	0.57	0.163	(0.345)	0.147	0.016
107	8.92	0.57	0.163	(0.343)	0.147	0.016
108	9.00	0.57	0.163	(0.342)	0.147	0.016
109	9.08	0.63	0.182	(0.340)	0.164	0.018
110	9.17	0.63	0.182	(0.338)	0.164	0.018
111	9.25	0.63	0.182	(0.337)	0.164	0.018
112	9.33	0.67	0.192	(0.335)	0.173	0.019
113	9.42	0.67	0.192	(0.334)	0.173	0.019
114	9.50	0.67	0.192	(0.332)	0.173	0.019
115	9.58	0.70	0.202	(0.330)	0.181	0.020
116	9.67	0.70	0.202	(0.329)	0.181	0.020
117	9.75	0.70	0.202	(0.327)	0.181	0.020
118	9.83	0.73	0.211	(0.326)	0.190	0.021
119	9.92	0.73	0.211	(0.324)	0.190	0.021
120	10.00	0.73	0.211	(0.322)	0.190	0.021
121	10.08	0.50	0.144	(0.321)	0.130	0.014

122	10.17	0.50	0.144	(0.319)	0.130	0.014
123	10.25	0.50	0.144	(0.318)	0.130	0.014
124	10.33	0.50	0.144	(0.316)	0.130	0.014
125	10.42	0.50	0.144	(0.315)	0.130	0.014
126	10.50	0.50	0.144	(0.313)	0.130	0.014
127	10.58	0.67	0.192	(0.312)	0.173	0.019
128	10.67	0.67	0.192	(0.310)	0.173	0.019
129	10.75	0.67	0.192	(0.309)	0.173	0.019
130	10.83	0.67	0.192	(0.307)	0.173	0.019
131	10.92	0.67	0.192	(0.306)	0.173	0.019
132	11.00	0.67	0.192	(0.304)	0.173	0.019
133	11.08	0.63	0.182	(0.303)	0.164	0.018
134	11.17	0.63	0.182	(0.301)	0.164	0.018
135	11.25	0.63	0.182	(0.300)	0.164	0.018
136	11.33	0.63	0.182	(0.298)	0.164	0.018
137	11.42	0.63	0.182	(0.297)	0.164	0.018
138	11.50	0.63	0.182	(0.295)	0.164	0.018
139	11.58	0.57	0.163	(0.294)	0.147	0.016
140	11.67	0.57	0.163	(0.292)	0.147	0.016
141	11.75	0.57	0.163	(0.291)	0.147	0.016
142	11.83	0.60	0.173	(0.289)	0.156	0.017
143	11.92	0.60	0.173	(0.288)	0.156	0.017
144	12.00	0.60	0.173	(0.286)	0.156	0.017
145	12.08	0.83	0.240	(0.285)	0.216	0.024
146	12.17	0.83	0.240	(0.284)	0.216	0.024
147	12.25	0.83	0.240	(0.282)	0.216	0.024
148	12.33	0.87	0.250	(0.281)	0.225	0.025
149	12.42	0.87	0.250	(0.279)	0.225	0.025
150	12.50	0.87	0.250	(0.278)	0.225	0.025
151	12.58	0.93	0.269	(0.277)	0.242	0.027
152	12.67	0.93	0.269	(0.275)	0.242	0.027
153	12.75	0.93	0.269	(0.274)	0.242	0.027
154	12.83	0.97	0.278	(0.272)	0.251	0.028
155	12.92	0.97	0.278	(0.271)	0.251	0.028
156	13.00	0.97	0.278	(0.270)	0.251	0.028
157	13.08	1.13	0.326	0.268	(0.294)	0.058
158	13.17	1.13	0.326	0.267	(0.294)	0.059
159	13.25	1.13	0.326	0.266	(0.294)	0.061
160	13.33	1.13	0.326	0.264	(0.294)	0.062
161	13.42	1.13	0.326	0.263	(0.294)	0.064
162	13.50	1.13	0.326	0.262	(0.294)	0.065
163	13.58	0.77	0.221	(0.260)	0.199	0.022
164	13.67	0.77	0.221	(0.259)	0.199	0.022
165	13.75	0.77	0.221	(0.258)	0.199	0.022
166	13.83	0.77	0.221	(0.256)	0.199	0.022
167	13.92	0.77	0.221	(0.255)	0.199	0.022
168	14.00	0.77	0.221	(0.254)	0.199	0.022
169	14.08	0.90	0.259	(0.252)	0.233	0.026
170	14.17	0.90	0.259	(0.251)	0.233	0.026
171	14.25	0.90	0.259	(0.250)	0.233	0.026
172	14.33	0.87	0.250	(0.249)	0.225	0.025
173	14.42	0.87	0.250	(0.247)	0.225	0.025
174	14.50	0.87	0.250	(0.246)	0.225	0.025
175	14.58	0.87	0.250	(0.245)	0.225	0.025
176	14.67	0.87	0.250	(0.243)	0.225	0.025
177	14.75	0.87	0.250	(0.242)	0.225	0.025
178	14.83	0.83	0.240	(0.241)	0.216	0.024
179	14.92	0.83	0.240	(0.240)	0.216	0.024
180	15.00	0.83	0.240	(0.238)	0.216	0.024
181	15.08	0.80	0.230	(0.237)	0.207	0.023
182	15.17	0.80	0.230	(0.236)	0.207	0.023
183	15.25	0.80	0.230	(0.235)	0.207	0.023
184	15.33	0.77	0.221	(0.234)	0.199	0.022
185	15.42	0.77	0.221	(0.232)	0.199	0.022
186	15.50	0.77	0.221	(0.231)	0.199	0.022
187	15.58	0.63	0.182	(0.230)	0.164	0.018
188	15.67	0.63	0.182	(0.229)	0.164	0.018
189	15.75	0.63	0.182	(0.228)	0.164	0.018
190	15.83	0.63	0.182	(0.227)	0.164	0.018
191	15.92	0.63	0.182	(0.225)	0.164	0.018
192	16.00	0.63	0.182	(0.224)	0.164	0.018
193	16.08	0.13	0.038	(0.223)	0.035	0.004
194	16.17	0.13	0.038	(0.222)	0.035	0.004
195	16.25	0.13	0.038	(0.221)	0.035	0.004
196	16.33	0.13	0.038	(0.220)	0.035	0.004

197	16.42	0.13	0.038	(0.219)	0.035	0.004
198	16.50	0.13	0.038	(0.217)	0.035	0.004
199	16.58	0.10	0.029	(0.216)	0.026	0.003
200	16.67	0.10	0.029	(0.215)	0.026	0.003
201	16.75	0.10	0.029	(0.214)	0.026	0.003
202	16.83	0.10	0.029	(0.213)	0.026	0.003
203	16.92	0.10	0.029	(0.212)	0.026	0.003
204	17.00	0.10	0.029	(0.211)	0.026	0.003
205	17.08	0.17	0.048	(0.210)	0.043	0.005
206	17.17	0.17	0.048	(0.209)	0.043	0.005
207	17.25	0.17	0.048	(0.208)	0.043	0.005
208	17.33	0.17	0.048	(0.207)	0.043	0.005
209	17.42	0.17	0.048	(0.206)	0.043	0.005
210	17.50	0.17	0.048	(0.205)	0.043	0.005
211	17.58	0.17	0.048	(0.204)	0.043	0.005
212	17.67	0.17	0.048	(0.203)	0.043	0.005
213	17.75	0.17	0.048	(0.202)	0.043	0.005
214	17.83	0.13	0.038	(0.201)	0.035	0.004
215	17.92	0.13	0.038	(0.200)	0.035	0.004
216	18.00	0.13	0.038	(0.199)	0.035	0.004
217	18.08	0.13	0.038	(0.198)	0.035	0.004
218	18.17	0.13	0.038	(0.197)	0.035	0.004
219	18.25	0.13	0.038	(0.196)	0.035	0.004
220	18.33	0.13	0.038	(0.195)	0.035	0.004
221	18.42	0.13	0.038	(0.194)	0.035	0.004
222	18.50	0.13	0.038	(0.193)	0.035	0.004
223	18.58	0.10	0.029	(0.192)	0.026	0.003
224	18.67	0.10	0.029	(0.191)	0.026	0.003
225	18.75	0.10	0.029	(0.190)	0.026	0.003
226	18.83	0.07	0.019	(0.189)	0.017	0.002
227	18.92	0.07	0.019	(0.188)	0.017	0.002
228	19.00	0.07	0.019	(0.187)	0.017	0.002
229	19.08	0.10	0.029	(0.186)	0.026	0.003
230	19.17	0.10	0.029	(0.186)	0.026	0.003
231	19.25	0.10	0.029	(0.185)	0.026	0.003
232	19.33	0.13	0.038	(0.184)	0.035	0.004
233	19.42	0.13	0.038	(0.183)	0.035	0.004
234	19.50	0.13	0.038	(0.182)	0.035	0.004
235	19.58	0.10	0.029	(0.181)	0.026	0.003
236	19.67	0.10	0.029	(0.181)	0.026	0.003
237	19.75	0.10	0.029	(0.180)	0.026	0.003
238	19.83	0.07	0.019	(0.179)	0.017	0.002
239	19.92	0.07	0.019	(0.178)	0.017	0.002
240	20.00	0.07	0.019	(0.177)	0.017	0.002
241	20.08	0.10	0.029	(0.177)	0.026	0.003
242	20.17	0.10	0.029	(0.176)	0.026	0.003
243	20.25	0.10	0.029	(0.175)	0.026	0.003
244	20.33	0.10	0.029	(0.174)	0.026	0.003
245	20.42	0.10	0.029	(0.173)	0.026	0.003
246	20.50	0.10	0.029	(0.173)	0.026	0.003
247	20.58	0.10	0.029	(0.172)	0.026	0.003
248	20.67	0.10	0.029	(0.171)	0.026	0.003
249	20.75	0.10	0.029	(0.171)	0.026	0.003
250	20.83	0.07	0.019	(0.170)	0.017	0.002
251	20.92	0.07	0.019	(0.169)	0.017	0.002
252	21.00	0.07	0.019	(0.169)	0.017	0.002
253	21.08	0.10	0.029	(0.168)	0.026	0.003
254	21.17	0.10	0.029	(0.167)	0.026	0.003
255	21.25	0.10	0.029	(0.167)	0.026	0.003
256	21.33	0.07	0.019	(0.166)	0.017	0.002
257	21.42	0.07	0.019	(0.165)	0.017	0.002
258	21.50	0.07	0.019	(0.165)	0.017	0.002
259	21.58	0.10	0.029	(0.164)	0.026	0.003
260	21.67	0.10	0.029	(0.163)	0.026	0.003
261	21.75	0.10	0.029	(0.163)	0.026	0.003
262	21.83	0.07	0.019	(0.162)	0.017	0.002
263	21.92	0.07	0.019	(0.162)	0.017	0.002
264	22.00	0.07	0.019	(0.161)	0.017	0.002
265	22.08	0.10	0.029	(0.161)	0.026	0.003
266	22.17	0.10	0.029	(0.160)	0.026	0.003
267	22.25	0.10	0.029	(0.160)	0.026	0.003
268	22.33	0.07	0.019	(0.159)	0.017	0.002
269	22.42	0.07	0.019	(0.159)	0.017	0.002
270	22.50	0.07	0.019	(0.158)	0.017	0.002
271	22.58	0.07	0.019	(0.158)	0.017	0.002

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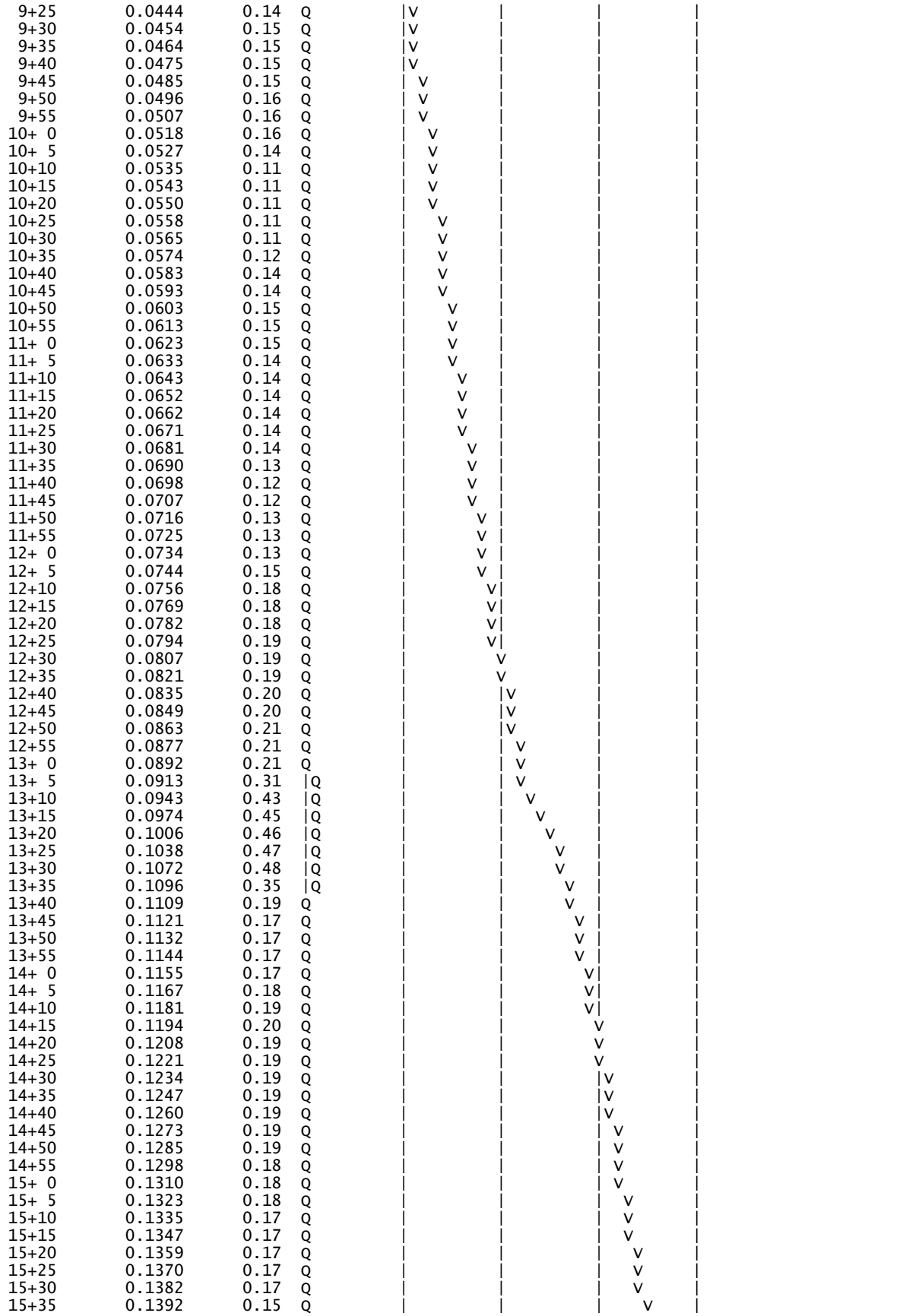
272  22.67     0.07      0.019       (  0.157)       0.017        0.002
273  22.75     0.07      0.019       (  0.157)       0.017        0.002
274  22.83     0.07      0.019       (  0.156)       0.017        0.002
275  22.92     0.07      0.019       (  0.156)       0.017        0.002
276  23.00     0.07      0.019       (  0.156)       0.017        0.002
277  23.08     0.07      0.019       (  0.155)       0.017        0.002
278  23.17     0.07      0.019       (  0.155)       0.017        0.002
279  23.25     0.07      0.019       (  0.155)       0.017        0.002
280  23.33     0.07      0.019       (  0.154)       0.017        0.002
281  23.42     0.07      0.019       (  0.154)       0.017        0.002
282  23.50     0.07      0.019       (  0.154)       0.017        0.002
283  23.58     0.07      0.019       (  0.154)       0.017        0.002
284  23.67     0.07      0.019       (  0.153)       0.017        0.002
285  23.75     0.07      0.019       (  0.153)       0.017        0.002
286  23.83     0.07      0.019       (  0.153)       0.017        0.002
287  23.92     0.07      0.019       (  0.153)       0.017        0.002
288  24.00     0.07      0.019       (  0.153)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     3.1
      Flood volume = Effective rainfall      0.25(In)
       times area       7.5(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      2.15(In)
      Total soil loss =     1.341(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =        6926.6 Cubic Feet
      Total soil loss =       58412.5 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.484(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5        5.0        7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.01  Q          |          |          |          |
   0+10       0.0001      0.01  Q          |          |          |          |
   0+15       0.0002      0.01  Q          |          |          |          |
   0+20       0.0004      0.02  Q          |          |          |          |
   0+25       0.0005      0.02  Q          |          |          |          |
   0+30       0.0007      0.02  Q          |          |          |          |
   0+35       0.0008      0.02  Q          |          |          |          |
   0+40       0.0010      0.02  Q          |          |          |          |
   0+45       0.0011      0.02  Q          |          |          |          |
   0+50       0.0013      0.02  Q          |          |          |          |
   0+55       0.0015      0.03  Q          |          |          |          |
   1+ 0       0.0017      0.03  Q          |          |          |          |
   1+ 5       0.0018      0.03  Q          |          |          |          |
   1+10       0.0020      0.02  Q          |          |          |          |
   1+15       0.0022      0.02  Q          |          |          |          |
   1+20       0.0023      0.02  Q          |          |          |          |
   1+25       0.0025      0.02  Q          |          |          |          |
   1+30       0.0026      0.02  Q          |          |          |          |
   1+35       0.0028      0.02  Q          |          |          |          |
   1+40       0.0029      0.02  Q          |          |          |          |
   1+45       0.0031      0.02  Q          |          |          |          |
   1+50       0.0032      0.02  Q          |          |          |          |
   1+55       0.0034      0.03  Q          |          |          |          |
   2+ 0       0.0036      0.03  Q          |          |          |          |
   2+ 5       0.0038      0.03  Q          |          |          |          |
   2+10       0.0040      0.03  QV         |          |          |          |
   2+15       0.0042      0.03  QV         |          |          |          |
   2+20       0.0044      0.03  QV         |          |          |          |
   2+25       0.0046      0.03  QV         |          |          |          |
   2+30       0.0048      0.03  QV         |          |          |          |
   2+35       0.0050      0.03  QV         |          |          |          |
   2+40       0.0053      0.04  QV         |          |          |          |
   2+45       0.0055      0.04  QV         |          |          |          |
   2+50       0.0058      0.04  QV         |          |          |          |
   2+55       0.0060      0.04  QV         |          |          |          |
   3+ 0       0.0063      0.04  QV         |          |          |          |
   3+ 5       0.0065      0.04  QV         |          |          |          |
```

```
3+10       0.0068      0.04  QV          |           |           |           |
3+15       0.0070      0.04  QV          |           |           |           |
3+20       0.0073      0.04  QV          |           |           |           |
3+25       0.0075      0.04  QV          |           |           |           |
3+30       0.0078      0.04  QV          |           |           |           |
3+35       0.0080      0.04  Q V         |           |           |           |
3+40       0.0083      0.04  Q V         |           |           |           |
3+45       0.0085      0.04  Q V         |           |           |           |
3+50       0.0088      0.04  Q V         |           |           |           |
3+55       0.0091      0.04  Q V         |           |           |           |
4+ 0       0.0094      0.04  Q V         |           |           |           |
4+ 5       0.0097      0.04  Q V         |           |           |           |
4+10       0.0100      0.04  Q V         |           |           |           |
4+15       0.0103      0.04  Q V         |           |           |           |
4+20       0.0106      0.05  Q V         |           |           |           |
4+25       0.0110      0.05  Q V         |           |           |           |
4+30       0.0113      0.05  Q V         |           |           |           |
4+35       0.0117      0.05  Q V         |           |           |           |
4+40       0.0120      0.05  Q  V        |           |           |           |
4+45       0.0124      0.05  Q  V        |           |           |           |
4+50       0.0127      0.05  Q  V        |           |           |           |
4+55       0.0131      0.06  Q  V        |           |           |           |
5+ 0       0.0135      0.06  Q  V        |           |           |           |
5+ 5       0.0139      0.05  Q  V        |           |           |           |
5+10       0.0142      0.04  Q  V        |           |           |           |
5+15       0.0145      0.04  Q  V        |           |           |           |
5+20       0.0148      0.05  Q  V        |           |           |           |
5+25       0.0152      0.05  Q  V        |           |           |           |
5+30       0.0155      0.05  Q  V        |           |           |           |
5+35       0.0159      0.05  Q  V        |           |           |           |
5+40       0.0163      0.06  Q   V       |           |           |           |
5+45       0.0167      0.06  Q   V       |           |           |           |
5+50       0.0171      0.06  Q   V       |           |           |           |
5+55       0.0175      0.06  Q   V       |           |           |           |
6+ 0       0.0179      0.06  Q   V       |           |           |           |
6+ 5       0.0183      0.06  Q   V       |           |           |           |
6+10       0.0188      0.06  Q   V       |           |           |           |
6+15       0.0192      0.07  Q   V       |           |           |           |
6+20       0.0197      0.07  Q   V       |           |           |           |
6+25       0.0201      0.07  Q    V      |           |           |           |
6+30       0.0206      0.07  Q    V      |           |           |           |
6+35       0.0210      0.07  Q    V      |           |           |           |
6+40       0.0215      0.07  Q    V      |           |           |           |
6+45       0.0220      0.07  Q    V      |           |           |           |
6+50       0.0225      0.07  Q    V      |           |           |           |
6+55       0.0230      0.07  Q    V      |           |           |           |
7+ 0       0.0235      0.07  Q    V      |           |           |           |
7+ 5       0.0240      0.07  Q     V     |           |           |           |
7+10       0.0245      0.07  Q     V     |           |           |           |
7+15       0.0250      0.07  Q     V     |           |           |           |
7+20       0.0255      0.08  Q     V     |           |           |           |
7+25       0.0261      0.08  Q     V     |           |           |           |
7+30       0.0266      0.08  Q     V     |           |           |           |
7+35       0.0272      0.08  Q     V     |           |           |           |
7+40       0.0278      0.09  Q     V     |           |           |           |
7+45       0.0284      0.09  Q      V    |           |           |           |
7+50       0.0290      0.09  Q      V    |           |           |           |
7+55       0.0297      0.09  Q      V    |           |           |           |
8+ 0       0.0303      0.09  Q      V    |           |           |           |
8+ 5       0.0310      0.10  Q      V    |           |           |           |
8+10       0.0318      0.11  Q      V    |           |           |           |
8+15       0.0325      0.11  Q       V   |           |           |           |
8+20       0.0333      0.11  Q       V   |           |           |           |
8+25       0.0340      0.11  Q       V   |           |           |           |
8+30       0.0348      0.11  Q       V   |           |           |           |
8+35       0.0355      0.11  Q       V   |           |           |           |
8+40       0.0363      0.12  Q        V  |           |           |           |
8+45       0.0371      0.12  Q        V  |           |           |           |
8+50       0.0379      0.12  Q        V  |           |           |           |
8+55       0.0388      0.12  Q        V  |           |           |           |
9+ 0       0.0396      0.12  Q        V  |           |           |           |
9+ 5       0.0405      0.13  Q         V |           |           |           |
9+10       0.0415      0.14  Q         V |           |           |           |
9+15       0.0424      0.14  Q         V |           |           |           |
9+20       0.0434      0.14  Q         V |           |           |           |
```



15+40	0.1402	0.14	Q	|	|	|	V |
15+45	0.1411	0.14	Q	|	|	|	V |
15+50	0.1421	0.14	Q	|	|	|	V |
15+55	0.1430	0.14	Q	|	|	|	V |
16+ 0	0.1440	0.14	Q	|	|	|	V |
16+ 5	0.1446	0.09	Q	|	|	|	V |
16+10	0.1449	0.04	Q	|	|	|	V |
16+15	0.1451	0.03	Q	|	|	|	V |
16+20	0.1453	0.03	Q	|	|	|	V |
16+25	0.1455	0.03	Q	|	|	|	V |
16+30	0.1457	0.03	Q	|	|	|	V |
16+35	0.1459	0.03	Q	|	|	|	V |
16+40	0.1460	0.02	Q	|	|	|	V |
16+45	0.1462	0.02	Q	|	|	|	V |
16+50	0.1463	0.02	Q	|	|	|	V |
16+55	0.1465	0.02	Q	|	|	|	V |
17+ 0	0.1466	0.02	Q	|	|	|	V |
17+ 5	0.1468	0.03	Q	|	|	|	V |
17+10	0.1471	0.04	Q	|	|	|	V |
17+15	0.1473	0.04	Q	|	|	|	V |
17+20	0.1475	0.04	Q	|	|	|	V |
17+25	0.1478	0.04	Q	|	|	|	V |
17+30	0.1480	0.04	Q	|	|	|	V |
17+35	0.1483	0.04	Q	|	|	|	V |
17+40	0.1485	0.04	Q	|	|	|	V |
17+45	0.1488	0.04	Q	|	|	|	V |
17+50	0.1490	0.03	Q	|	|	|	V |
17+55	0.1492	0.03	Q	|	|	|	V |
18+ 0	0.1494	0.03	Q	|	|	|	V |
18+ 5	0.1496	0.03	Q	|	|	|	V |
18+10	0.1498	0.03	Q	|	|	|	V |
18+15	0.1500	0.03	Q	|	|	|	V |
18+20	0.1502	0.03	Q	|	|	|	V |
18+25	0.1504	0.03	Q	|	|	|	V |
18+30	0.1506	0.03	Q	|	|	|	V |
18+35	0.1508	0.03	Q	|	|	|	V |
18+40	0.1510	0.02	Q	|	|	|	V |
18+45	0.1511	0.02	Q	|	|	|	V |
18+50	0.1512	0.02	Q	|	|	|	V |
18+55	0.1513	0.02	Q	|	|	|	V |
19+ 0	0.1514	0.01	Q	|	|	|	V |
19+ 5	0.1516	0.02	Q	|	|	|	V |
19+10	0.1517	0.02	Q	|	|	|	V |
19+15	0.1519	0.02	Q	|	|	|	V |
19+20	0.1520	0.02	Q	|	|	|	V |
19+25	0.1522	0.03	Q	|	|	|	V |
19+30	0.1524	0.03	Q	|	|	|	V |
19+35	0.1526	0.03	Q	|	|	|	V |
19+40	0.1528	0.02	Q	|	|	|	V |
19+45	0.1529	0.02	Q	|	|	|	V |
19+50	0.1530	0.02	Q	|	|	|	V |
19+55	0.1531	0.02	Q	|	|	|	V |
20+ 0	0.1532	0.01	Q	|	|	|	V |
20+ 5	0.1534	0.02	Q	|	|	|	V |
20+10	0.1535	0.02	Q	|	|	|	V |
20+15	0.1537	0.02	Q	|	|	|	V |
20+20	0.1538	0.02	Q	|	|	|	V |
20+25	0.1540	0.02	Q	|	|	|	V |
20+30	0.1541	0.02	Q	|	|	|	V |
20+35	0.1543	0.02	Q	|	|	|	V |
20+40	0.1544	0.02	Q	|	|	|	V |
20+45	0.1546	0.02	Q	|	|	|	V |
20+50	0.1547	0.02	Q	|	|	|	V |
20+55	0.1548	0.02	Q	|	|	|	V |
21+ 0	0.1549	0.01	Q	|	|	|	V |
21+ 5	0.1550	0.02	Q	|	|	|	V |
21+10	0.1552	0.02	Q	|	|	|	V|
21+15	0.1553	0.02	Q	|	|	|	V|
21+20	0.1554	0.02	Q	|	|	|	V|
21+25	0.1555	0.02	Q	|	|	|	V|
21+30	0.1556	0.01	Q	|	|	|	V|
21+35	0.1558	0.02	Q	|	|	|	V|
21+40	0.1559	0.02	Q	|	|	|	V|
21+45	0.1561	0.02	Q	|	|	|	V|
21+50	0.1562	0.02	Q	|	|	|	V|

```
   21+55       0.1563      0.02  Q          |          |          |         v|
   22+ 0       0.1564      0.01  Q          |          |          |         v|
   22+ 5       0.1565      0.02  Q          |          |          |         v|
   22+10       0.1567      0.02  Q          |          |          |         v|
   22+15       0.1568      0.02  Q          |          |          |         v|
   22+20       0.1569      0.02  Q          |          |          |         v|
   22+25       0.1570      0.02  Q          |          |          |         v|
   22+30       0.1571      0.01  Q          |          |          |         v|
   22+35       0.1572      0.01  Q          |          |          |         v|
   22+40       0.1573      0.01  Q          |          |          |         v|
   22+45       0.1574      0.01  Q          |          |          |         v|
   22+50       0.1575      0.01  Q          |          |          |         v|
   22+55       0.1576      0.01  Q          |          |          |         v|
   23+ 0       0.1577      0.01  Q          |          |          |         v|
   23+ 5       0.1578      0.01  Q          |          |          |         v|
   23+10       0.1579      0.01  Q          |          |          |         v|
   23+15       0.1580      0.01  Q          |          |          |         v|
   23+20       0.1581      0.01  Q          |          |          |         v|
   23+25       0.1582      0.01  Q          |          |          |         v|
   23+30       0.1583      0.01  Q          |          |          |         v|
   23+35       0.1584      0.01  Q          |          |          |         v|
   23+40       0.1585      0.01  Q          |          |          |         v|
   23+45       0.1586      0.01  Q          |          |          |         v|
   23+50       0.1587      0.01  Q          |          |          |         v|
   23+55       0.1588      0.01  Q          |          |          |         v|
   24+ 0       0.1589      0.01  Q          |          |          |         v|
   24+ 5       0.1590      0.01  Q          |          |          |         v|
   24+10       0.1590      0.00  Q          |          |          |         v|
   24+15       0.1590      0.00  Q          |          |          |         v|
-------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/24/21 File: EX2YRA3242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A3 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
2021-11-08 EP

Drainage Area = 21.70(Ac.) = 0.034 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 21.70(Ac.) = 0.034 Sq. Mi.
Length along longest watercourse = 1790.00(Ft.)
Length along longest watercourse measured to centroid = 939.00(Ft.)
Length along longest watercourse = 0.339 Mi.
Length along longest watercourse measured to centroid = 0.178 Mi.
Difference in elevation = 21.70(Ft.)
Slope along watercourse = 64.0089 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.112 Hr.
Lag time = 6.74 Min.
25% of lag time = 1.69 Min.
40% of lag time = 2.70 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
21.70	2.40	52.08

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
21.70	6.20	134.54

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
21.700	87.60	0.000

Total Area Entered = 21.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

87.6	74.2	0.313	0.000	0.313	1.000	0.313
					Sum (F) =	0.313

Area averaged mean soil loss (F) (In/Hr) = 0.313
Minimum soil loss rate ((In/Hr)) = 0.156
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	74.161	7.891	1.726
2	0.167	148.322	44.381	9.706
3	0.250	222.484	27.055	5.917
4	0.333	296.645	10.417	2.278
5	0.417	370.806	5.563	1.217
6	0.500	444.967	2.594	0.567
7	0.583	519.128	0.909	0.199
8	0.667	593.290	0.552	0.121
9	0.750	667.451	0.454	0.099
10	0.833	741.612	0.184	0.040
			Sum = 100.000	Sum= 21.870

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.555)	0.017	0.002
2	0.17	0.07	0.019	(0.553)	0.017	0.002
3	0.25	0.07	0.019	(0.550)	0.017	0.002
4	0.33	0.10	0.029	(0.548)	0.026	0.003
5	0.42	0.10	0.029	(0.546)	0.026	0.003
6	0.50	0.10	0.029	(0.544)	0.026	0.003
7	0.58	0.10	0.029	(0.542)	0.026	0.003
8	0.67	0.10	0.029	(0.540)	0.026	0.003
9	0.75	0.10	0.029	(0.538)	0.026	0.003
10	0.83	0.13	0.038	(0.536)	0.035	0.004
11	0.92	0.13	0.038	(0.533)	0.035	0.004
12	1.00	0.13	0.038	(0.531)	0.035	0.004
13	1.08	0.10	0.029	(0.529)	0.026	0.003
14	1.17	0.10	0.029	(0.527)	0.026	0.003
15	1.25	0.10	0.029	(0.525)	0.026	0.003
16	1.33	0.10	0.029	(0.523)	0.026	0.003
17	1.42	0.10	0.029	(0.521)	0.026	0.003
18	1.50	0.10	0.029	(0.519)	0.026	0.003
19	1.58	0.10	0.029	(0.517)	0.026	0.003
20	1.67	0.10	0.029	(0.515)	0.026	0.003
21	1.75	0.10	0.029	(0.513)	0.026	0.003
22	1.83	0.13	0.038	(0.511)	0.035	0.004
23	1.92	0.13	0.038	(0.508)	0.035	0.004
24	2.00	0.13	0.038	(0.506)	0.035	0.004
25	2.08	0.13	0.038	(0.504)	0.035	0.004
26	2.17	0.13	0.038	(0.502)	0.035	0.004
27	2.25	0.13	0.038	(0.500)	0.035	0.004
28	2.33	0.13	0.038	(0.498)	0.035	0.004
29	2.42	0.13	0.038	(0.496)	0.035	0.004
30	2.50	0.13	0.038	(0.494)	0.035	0.004
31	2.58	0.17	0.048	(0.492)	0.043	0.005
32	2.67	0.17	0.048	(0.490)	0.043	0.005
33	2.75	0.17	0.048	(0.488)	0.043	0.005
34	2.83	0.17	0.048	(0.486)	0.043	0.005
35	2.92	0.17	0.048	(0.484)	0.043	0.005
36	3.00	0.17	0.048	(0.482)	0.043	0.005
37	3.08	0.17	0.048	(0.480)	0.043	0.005
38	3.17	0.17	0.048	(0.478)	0.043	0.005
39	3.25	0.17	0.048	(0.476)	0.043	0.005
40	3.33	0.17	0.048	(0.474)	0.043	0.005

41	3.42	0.17	0.048	(0.472)	0.043	0.005
42	3.50	0.17	0.048	(0.470)	0.043	0.005
43	3.58	0.17	0.048	(0.468)	0.043	0.005
44	3.67	0.17	0.048	(0.466)	0.043	0.005
45	3.75	0.17	0.048	(0.464)	0.043	0.005
46	3.83	0.20	0.058	(0.462)	0.052	0.006
47	3.92	0.20	0.058	(0.460)	0.052	0.006
48	4.00	0.20	0.058	(0.458)	0.052	0.006
49	4.08	0.20	0.058	(0.457)	0.052	0.006
50	4.17	0.20	0.058	(0.455)	0.052	0.006
51	4.25	0.20	0.058	(0.453)	0.052	0.006
52	4.33	0.23	0.067	(0.451)	0.060	0.007
53	4.42	0.23	0.067	(0.449)	0.060	0.007
54	4.50	0.23	0.067	(0.447)	0.060	0.007
55	4.58	0.23	0.067	(0.445)	0.060	0.007
56	4.67	0.23	0.067	(0.443)	0.060	0.007
57	4.75	0.23	0.067	(0.441)	0.060	0.007
58	4.83	0.27	0.077	(0.439)	0.069	0.008
59	4.92	0.27	0.077	(0.437)	0.069	0.008
60	5.00	0.27	0.077	(0.435)	0.069	0.008
61	5.08	0.20	0.058	(0.434)	0.052	0.006
62	5.17	0.20	0.058	(0.432)	0.052	0.006
63	5.25	0.20	0.058	(0.430)	0.052	0.006
64	5.33	0.23	0.067	(0.428)	0.060	0.007
65	5.42	0.23	0.067	(0.426)	0.060	0.007
66	5.50	0.23	0.067	(0.424)	0.060	0.007
67	5.58	0.27	0.077	(0.422)	0.069	0.008
68	5.67	0.27	0.077	(0.420)	0.069	0.008
69	5.75	0.27	0.077	(0.419)	0.069	0.008
70	5.83	0.27	0.077	(0.417)	0.069	0.008
71	5.92	0.27	0.077	(0.415)	0.069	0.008
72	6.00	0.27	0.077	(0.413)	0.069	0.008
73	6.08	0.30	0.086	(0.411)	0.078	0.009
74	6.17	0.30	0.086	(0.409)	0.078	0.009
75	6.25	0.30	0.086	(0.408)	0.078	0.009
76	6.33	0.30	0.086	(0.406)	0.078	0.009
77	6.42	0.30	0.086	(0.404)	0.078	0.009
78	6.50	0.30	0.086	(0.402)	0.078	0.009
79	6.58	0.33	0.096	(0.400)	0.086	0.010
80	6.67	0.33	0.096	(0.398)	0.086	0.010
81	6.75	0.33	0.096	(0.397)	0.086	0.010
82	6.83	0.33	0.096	(0.395)	0.086	0.010
83	6.92	0.33	0.096	(0.393)	0.086	0.010
84	7.00	0.33	0.096	(0.391)	0.086	0.010
85	7.08	0.33	0.096	(0.390)	0.086	0.010
86	7.17	0.33	0.096	(0.388)	0.086	0.010
87	7.25	0.33	0.096	(0.386)	0.086	0.010
88	7.33	0.37	0.106	(0.384)	0.095	0.011
89	7.42	0.37	0.106	(0.382)	0.095	0.011
90	7.50	0.37	0.106	(0.381)	0.095	0.011
91	7.58	0.40	0.115	(0.379)	0.104	0.012
92	7.67	0.40	0.115	(0.377)	0.104	0.012
93	7.75	0.40	0.115	(0.376)	0.104	0.012
94	7.83	0.43	0.125	(0.374)	0.112	0.012
95	7.92	0.43	0.125	(0.372)	0.112	0.012
96	8.00	0.43	0.125	(0.370)	0.112	0.012
97	8.08	0.50	0.144	(0.369)	0.130	0.014
98	8.17	0.50	0.144	(0.367)	0.130	0.014
99	8.25	0.50	0.144	(0.365)	0.130	0.014
100	8.33	0.50	0.144	(0.363)	0.130	0.014
101	8.42	0.50	0.144	(0.362)	0.130	0.014
102	8.50	0.50	0.144	(0.360)	0.130	0.014
103	8.58	0.53	0.154	(0.358)	0.138	0.015
104	8.67	0.53	0.154	(0.357)	0.138	0.015
105	8.75	0.53	0.154	(0.355)	0.138	0.015
106	8.83	0.57	0.163	(0.353)	0.147	0.016
107	8.92	0.57	0.163	(0.352)	0.147	0.016
108	9.00	0.57	0.163	(0.350)	0.147	0.016
109	9.08	0.63	0.182	(0.348)	0.164	0.018
110	9.17	0.63	0.182	(0.347)	0.164	0.018
111	9.25	0.63	0.182	(0.345)	0.164	0.018
112	9.33	0.67	0.192	(0.343)	0.173	0.019
113	9.42	0.67	0.192	(0.342)	0.173	0.019
114	9.50	0.67	0.192	(0.340)	0.173	0.019
115	9.58	0.70	0.202	(0.339)	0.181	0.020

116	9.67	0.70	0.202	(0.337)	0.181	0.020
117	9.75	0.70	0.202	(0.335)	0.181	0.020
118	9.83	0.73	0.211	(0.334)	0.190	0.021
119	9.92	0.73	0.211	(0.332)	0.190	0.021
120	10.00	0.73	0.211	(0.330)	0.190	0.021
121	10.08	0.50	0.144	(0.329)	0.130	0.014
122	10.17	0.50	0.144	(0.327)	0.130	0.014
123	10.25	0.50	0.144	(0.326)	0.130	0.014
124	10.33	0.50	0.144	(0.324)	0.130	0.014
125	10.42	0.50	0.144	(0.322)	0.130	0.014
126	10.50	0.50	0.144	(0.321)	0.130	0.014
127	10.58	0.67	0.192	(0.319)	0.173	0.019
128	10.67	0.67	0.192	(0.318)	0.173	0.019
129	10.75	0.67	0.192	(0.316)	0.173	0.019
130	10.83	0.67	0.192	(0.315)	0.173	0.019
131	10.92	0.67	0.192	(0.313)	0.173	0.019
132	11.00	0.67	0.192	(0.312)	0.173	0.019
133	11.08	0.63	0.182	(0.310)	0.164	0.018
134	11.17	0.63	0.182	(0.309)	0.164	0.018
135	11.25	0.63	0.182	(0.307)	0.164	0.018
136	11.33	0.63	0.182	(0.306)	0.164	0.018
137	11.42	0.63	0.182	(0.304)	0.164	0.018
138	11.50	0.63	0.182	(0.302)	0.164	0.018
139	11.58	0.57	0.163	(0.301)	0.147	0.016
140	11.67	0.57	0.163	(0.299)	0.147	0.016
141	11.75	0.57	0.163	(0.298)	0.147	0.016
142	11.83	0.60	0.173	(0.297)	0.156	0.017
143	11.92	0.60	0.173	(0.295)	0.156	0.017
144	12.00	0.60	0.173	(0.294)	0.156	0.017
145	12.08	0.83	0.240	(0.292)	0.216	0.024
146	12.17	0.83	0.240	(0.291)	0.216	0.024
147	12.25	0.83	0.240	(0.289)	0.216	0.024
148	12.33	0.87	0.250	(0.288)	0.225	0.025
149	12.42	0.87	0.250	(0.286)	0.225	0.025
150	12.50	0.87	0.250	(0.285)	0.225	0.025
151	12.58	0.93	0.269	(0.283)	0.242	0.027
152	12.67	0.93	0.269	(0.282)	0.242	0.027
153	12.75	0.93	0.269	(0.281)	0.242	0.027
154	12.83	0.97	0.278	(0.279)	0.251	0.028
155	12.92	0.97	0.278	(0.278)	0.251	0.028
156	13.00	0.97	0.278	(0.276)	0.251	0.028
157	13.08	1.13	0.326	0.275	(0.294)	0.051
158	13.17	1.13	0.326	0.274	(0.294)	0.053
159	13.25	1.13	0.326	0.272	(0.294)	0.054
160	13.33	1.13	0.326	0.271	(0.294)	0.056
161	13.42	1.13	0.326	0.269	(0.294)	0.057
162	13.50	1.13	0.326	0.268	(0.294)	0.058
163	13.58	0.77	0.221	(0.267)	0.199	0.022
164	13.67	0.77	0.221	(0.265)	0.199	0.022
165	13.75	0.77	0.221	(0.264)	0.199	0.022
166	13.83	0.77	0.221	(0.263)	0.199	0.022
167	13.92	0.77	0.221	(0.261)	0.199	0.022
168	14.00	0.77	0.221	(0.260)	0.199	0.022
169	14.08	0.90	0.259	(0.259)	0.233	0.026
170	14.17	0.90	0.259	(0.257)	0.233	0.026
171	14.25	0.90	0.259	(0.256)	0.233	0.026
172	14.33	0.87	0.250	(0.255)	0.225	0.025
173	14.42	0.87	0.250	(0.253)	0.225	0.025
174	14.50	0.87	0.250	(0.252)	0.225	0.025
175	14.58	0.87	0.250	(0.251)	0.225	0.025
176	14.67	0.87	0.250	(0.249)	0.225	0.025
177	14.75	0.87	0.250	(0.248)	0.225	0.025
178	14.83	0.83	0.240	(0.247)	0.216	0.024
179	14.92	0.83	0.240	(0.246)	0.216	0.024
180	15.00	0.83	0.240	(0.244)	0.216	0.024
181	15.08	0.80	0.230	(0.243)	0.207	0.023
182	15.17	0.80	0.230	(0.242)	0.207	0.023
183	15.25	0.80	0.230	(0.241)	0.207	0.023
184	15.33	0.77	0.221	(0.239)	0.199	0.022
185	15.42	0.77	0.221	(0.238)	0.199	0.022
186	15.50	0.77	0.221	(0.237)	0.199	0.022
187	15.58	0.63	0.182	(0.236)	0.164	0.018
188	15.67	0.63	0.182	(0.235)	0.164	0.018
189	15.75	0.63	0.182	(0.233)	0.164	0.018
190	15.83	0.63	0.182	(0.232)	0.164	0.018

191	15.92	0.63	0.182	(0.231)	0.164	0.018
192	16.00	0.63	0.182	(0.230)	0.164	0.018
193	16.08	0.13	0.038	(0.229)	0.035	0.004
194	16.17	0.13	0.038	(0.227)	0.035	0.004
195	16.25	0.13	0.038	(0.226)	0.035	0.004
196	16.33	0.13	0.038	(0.225)	0.035	0.004
197	16.42	0.13	0.038	(0.224)	0.035	0.004
198	16.50	0.13	0.038	(0.223)	0.035	0.004
199	16.58	0.10	0.029	(0.222)	0.026	0.003
200	16.67	0.10	0.029	(0.221)	0.026	0.003
201	16.75	0.10	0.029	(0.219)	0.026	0.003
202	16.83	0.10	0.029	(0.218)	0.026	0.003
203	16.92	0.10	0.029	(0.217)	0.026	0.003
204	17.00	0.10	0.029	(0.216)	0.026	0.003
205	17.08	0.17	0.048	(0.215)	0.043	0.005
206	17.17	0.17	0.048	(0.214)	0.043	0.005
207	17.25	0.17	0.048	(0.213)	0.043	0.005
208	17.33	0.17	0.048	(0.212)	0.043	0.005
209	17.42	0.17	0.048	(0.211)	0.043	0.005
210	17.50	0.17	0.048	(0.210)	0.043	0.005
211	17.58	0.17	0.048	(0.209)	0.043	0.005
212	17.67	0.17	0.048	(0.208)	0.043	0.005
213	17.75	0.17	0.048	(0.207)	0.043	0.005
214	17.83	0.13	0.038	(0.206)	0.035	0.004
215	17.92	0.13	0.038	(0.205)	0.035	0.004
216	18.00	0.13	0.038	(0.204)	0.035	0.004
217	18.08	0.13	0.038	(0.203)	0.035	0.004
218	18.17	0.13	0.038	(0.202)	0.035	0.004
219	18.25	0.13	0.038	(0.201)	0.035	0.004
220	18.33	0.13	0.038	(0.200)	0.035	0.004
221	18.42	0.13	0.038	(0.199)	0.035	0.004
222	18.50	0.13	0.038	(0.198)	0.035	0.004
223	18.58	0.10	0.029	(0.197)	0.026	0.003
224	18.67	0.10	0.029	(0.196)	0.026	0.003
225	18.75	0.10	0.029	(0.195)	0.026	0.003
226	18.83	0.07	0.019	(0.194)	0.017	0.002
227	18.92	0.07	0.019	(0.193)	0.017	0.002
228	19.00	0.07	0.019	(0.192)	0.017	0.002
229	19.08	0.10	0.029	(0.191)	0.026	0.003
230	19.17	0.10	0.029	(0.190)	0.026	0.003
231	19.25	0.10	0.029	(0.189)	0.026	0.003
232	19.33	0.13	0.038	(0.188)	0.035	0.004
233	19.42	0.13	0.038	(0.188)	0.035	0.004
234	19.50	0.13	0.038	(0.187)	0.035	0.004
235	19.58	0.10	0.029	(0.186)	0.026	0.003
236	19.67	0.10	0.029	(0.185)	0.026	0.003
237	19.75	0.10	0.029	(0.184)	0.026	0.003
238	19.83	0.07	0.019	(0.183)	0.017	0.002
239	19.92	0.07	0.019	(0.183)	0.017	0.002
240	20.00	0.07	0.019	(0.182)	0.017	0.002
241	20.08	0.10	0.029	(0.181)	0.026	0.003
242	20.17	0.10	0.029	(0.180)	0.026	0.003
243	20.25	0.10	0.029	(0.179)	0.026	0.003
244	20.33	0.10	0.029	(0.179)	0.026	0.003
245	20.42	0.10	0.029	(0.178)	0.026	0.003
246	20.50	0.10	0.029	(0.177)	0.026	0.003
247	20.58	0.10	0.029	(0.176)	0.026	0.003
248	20.67	0.10	0.029	(0.176)	0.026	0.003
249	20.75	0.10	0.029	(0.175)	0.026	0.003
250	20.83	0.07	0.019	(0.174)	0.017	0.002
251	20.92	0.07	0.019	(0.173)	0.017	0.002
252	21.00	0.07	0.019	(0.173)	0.017	0.002
253	21.08	0.10	0.029	(0.172)	0.026	0.003
254	21.17	0.10	0.029	(0.171)	0.026	0.003
255	21.25	0.10	0.029	(0.171)	0.026	0.003
256	21.33	0.07	0.019	(0.170)	0.017	0.002
257	21.42	0.07	0.019	(0.169)	0.017	0.002
258	21.50	0.07	0.019	(0.169)	0.017	0.002
259	21.58	0.10	0.029	(0.168)	0.026	0.003
260	21.67	0.10	0.029	(0.168)	0.026	0.003
261	21.75	0.10	0.029	(0.167)	0.026	0.003
262	21.83	0.07	0.019	(0.166)	0.017	0.002
263	21.92	0.07	0.019	(0.166)	0.017	0.002
264	22.00	0.07	0.019	(0.165)	0.017	0.002
265	22.08	0.10	0.029	(0.165)	0.026	0.003

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266  22.17     0.10      0.029       (  0.164)       0.026        0.003
267  22.25     0.10      0.029       (  0.164)       0.026        0.003
268  22.33     0.07      0.019       (  0.163)       0.017        0.002
269  22.42     0.07      0.019       (  0.163)       0.017        0.002
270  22.50     0.07      0.019       (  0.162)       0.017        0.002
271  22.58     0.07      0.019       (  0.162)       0.017        0.002
272  22.67     0.07      0.019       (  0.161)       0.017        0.002
273  22.75     0.07      0.019       (  0.161)       0.017        0.002
274  22.83     0.07      0.019       (  0.160)       0.017        0.002
275  22.92     0.07      0.019       (  0.160)       0.017        0.002
276  23.00     0.07      0.019       (  0.160)       0.017        0.002
277  23.08     0.07      0.019       (  0.159)       0.017        0.002
278  23.17     0.07      0.019       (  0.159)       0.017        0.002
279  23.25     0.07      0.019       (  0.158)       0.017        0.002
280  23.33     0.07      0.019       (  0.158)       0.017        0.002
281  23.42     0.07      0.019       (  0.158)       0.017        0.002
282  23.50     0.07      0.019       (  0.158)       0.017        0.002
283  23.58     0.07      0.019       (  0.157)       0.017        0.002
284  23.67     0.07      0.019       (  0.157)       0.017        0.002
285  23.75     0.07      0.019       (  0.157)       0.017        0.002
286  23.83     0.07      0.019       (  0.157)       0.017        0.002
287  23.92     0.07      0.019       (  0.157)       0.017        0.002
288  24.00     0.07      0.019       (  0.156)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area      21.7(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      2.15(In)
      Total soil loss =     3.886(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       19782.0 Cubic Feet
      Total soil loss =      169260.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.214(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q          |         |         |         |
  0+10       0.0002      0.02  Q          |         |         |         |
  0+15       0.0004      0.03  Q          |         |         |         |
  0+20       0.0007      0.04  Q          |         |         |         |
  0+25       0.0010      0.05  Q          |         |         |         |
  0+30       0.0014      0.06  Q          |         |         |         |
  0+35       0.0018      0.06  Q          |         |         |         |
  0+40       0.0023      0.06  Q          |         |         |         |
  0+45       0.0027      0.06  Q          |         |         |         |
  0+50       0.0031      0.06  Q          |         |         |         |
  0+55       0.0036      0.07  Q          |         |         |         |
  1+ 0       0.0042      0.08  Q          |         |         |         |
  1+ 5       0.0047      0.08  Q          |         |         |         |
  1+10       0.0052      0.07  Q          |         |         |         |
  1+15       0.0057      0.07  Q          |         |         |         |
  1+20       0.0062      0.06  Q          |         |         |         |
  1+25       0.0066      0.06  Q          |         |         |         |
  1+30       0.0070      0.06  Q          |         |         |         |
  1+35       0.0075      0.06  Q          |         |         |         |
  1+40       0.0079      0.06  Q          |         |         |         |
  1+45       0.0083      0.06  Q          |         |         |         |
  1+50       0.0088      0.06  Q          |         |         |         |
  1+55       0.0093      0.07  Q          |         |         |         |
  2+ 0       0.0098      0.08  Q          |         |         |         |
  2+ 5       0.0104      0.08  Q          |         |         |         |
  2+10       0.0110      0.08  Q          |         |         |         |
  2+15       0.0115      0.08  QV         |         |         |         |
  2+20       0.0121      0.08  QV         |         |         |         |
  2+25       0.0127      0.08  QV         |         |         |         |
  2+30       0.0133      0.08  QV         |         |         |         |
  2+35       0.0139      0.09  QV         |         |         |         |
```

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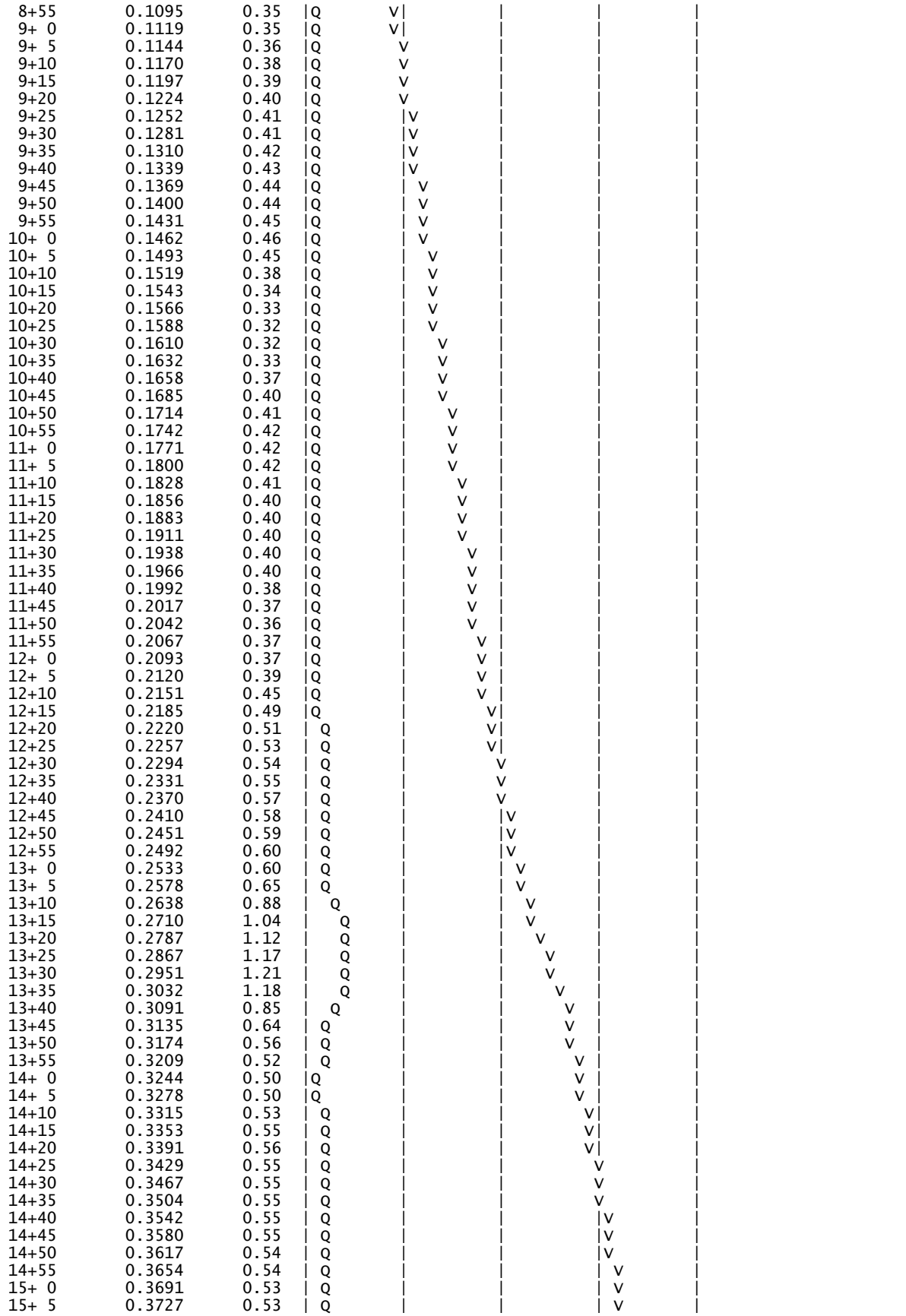
2+40       0.0145      0.09  QV        |         |         |         |
2+45       0.0152      0.10  QV        |         |         |         |
2+50       0.0159      0.10  QV        |         |         |         |
2+55       0.0166      0.10  QV        |         |         |         |
3+ 0       0.0174      0.10  QV        |         |         |         |
3+ 5       0.0181      0.10  QV        |         |         |         |
3+10       0.0188      0.10  QV        |         |         |         |
3+15       0.0195      0.10  QV        |         |         |         |
3+20       0.0203      0.11  QV        |         |         |         |
3+25       0.0210      0.11  QV        |         |         |         |
3+30       0.0217      0.11  QV        |         |         |         |
3+35       0.0224      0.11  QV        |         |         |         |
3+40       0.0231      0.11  Q V       |         |         |         |
3+45       0.0239      0.11  Q V       |         |         |         |
3+50       0.0246      0.11  Q V       |         |         |         |
3+55       0.0254      0.12  Q V       |         |         |         |
4+ 0       0.0262      0.12  Q V       |         |         |         |
4+ 5       0.0271      0.12  Q V       |         |         |         |
4+10       0.0280      0.13  Q V       |         |         |         |
4+15       0.0288      0.13  Q V       |         |         |         |
4+20       0.0297      0.13  Q V       |         |         |         |
4+25       0.0306      0.14  Q V       |         |         |         |
4+30       0.0316      0.14  Q V       |         |         |         |
4+35       0.0326      0.14  Q V       |         |         |         |
4+40       0.0336      0.15  Q V       |         |         |         |
4+45       0.0346      0.15  Q  V      |         |         |         |
4+50       0.0357      0.15  Q  V      |         |         |         |
4+55       0.0367      0.16  Q  V      |         |         |         |
5+ 0       0.0379      0.16  Q  V      |         |         |         |
5+ 5       0.0390      0.16  Q  V      |         |         |         |
5+10       0.0400      0.15  Q  V      |         |         |         |
5+15       0.0409      0.13  Q  V      |         |         |         |
5+20       0.0418      0.13  Q  V      |         |         |         |
5+25       0.0428      0.14  Q  V      |         |         |         |
5+30       0.0438      0.14  Q  V      |         |         |         |
5+35       0.0448      0.15  Q  V      |         |         |         |
5+40       0.0459      0.16  Q   V     |         |         |         |
5+45       0.0470      0.16  Q   V     |         |         |         |
5+50       0.0481      0.17  Q   V     |         |         |         |
5+55       0.0493      0.17  Q   V     |         |         |         |
6+ 0       0.0504      0.17  Q   V     |         |         |         |
6+ 5       0.0516      0.17  Q   V     |         |         |         |
6+10       0.0528      0.18  Q   V     |         |         |         |
6+15       0.0541      0.18  Q   V     |         |         |         |
6+20       0.0554      0.19  Q   V     |         |         |         |
6+25       0.0567      0.19  Q   V     |         |         |         |
6+30       0.0580      0.19  Q    V    |         |         |         |
6+35       0.0593      0.19  Q    V    |         |         |         |
6+40       0.0607      0.20  Q    V    |         |         |         |
6+45       0.0621      0.21  Q    V    |         |         |         |
6+50       0.0635      0.21  Q    V    |         |         |         |
6+55       0.0650      0.21  Q    V    |         |         |         |
7+ 0       0.0664      0.21  Q    V    |         |         |         |
7+ 5       0.0679      0.21  Q    V    |         |         |         |
7+10       0.0693      0.21  Q     V   |         |         |         |
7+15       0.0707      0.21  Q     V   |         |         |         |
7+20       0.0722      0.21  Q     V   |         |         |         |
7+25       0.0737      0.22  Q     V   |         |         |         |
7+30       0.0753      0.23  Q     V   |         |         |         |
7+35       0.0769      0.23  Q     V   |         |         |         |
7+40       0.0785      0.24  Q     V   |         |         |         |
7+45       0.0802      0.25  Q      V  |         |         |         |
7+50       0.0820      0.25  |Q     V  |         |         |         |
7+55       0.0838      0.26  |Q     V  |         |         |         |
8+ 0       0.0856      0.27  |Q     V  |         |         |         |
8+ 5       0.0875      0.27  |Q     V  |         |         |         |
8+10       0.0895      0.29  |Q     V  |         |         |         |
8+15       0.0916      0.31  |Q      V |         |         |         |
8+20       0.0938      0.31  |Q      V |         |         |         |
8+25       0.0959      0.31  |Q      V |         |         |         |
8+30       0.0981      0.31  |Q      V |         |         |         |
8+35       0.1003      0.32  |Q      V |         |         |         |
8+40       0.1025      0.33  |Q       V|         |         |         |
8+45       0.1048      0.33  |Q       V|         |         |         |
8+50       0.1071      0.34  |Q       V|         |         |         |
```



15+10	0.3762	0.52	| Q	|	|	|	V |
15+15	0.3797	0.51	| Q	|	|	|	V |
15+20	0.3832	0.50	| Q	|	|	|	V |
15+25	0.3866	0.49	|Q	|	|	|	V |
15+30	0.3900	0.49	|Q	|	|	|	V |
15+35	0.3933	0.48	|Q	|	|	|	V |
15+40	0.3963	0.44	|Q	|	|	|	V |
15+45	0.3992	0.42	|Q	|	|	|	V |
15+50	0.4020	0.41	|Q	|	|	|	V |
15+55	0.4048	0.40	|Q	|	|	|	V |
16+ 0	0.4075	0.40	|Q	|	|	|	V |
16+ 5	0.4101	0.38	|Q	|	|	|	V |
16+10	0.4117	0.23	Q	|	|	|	V |
16+15	0.4128	0.15	Q	|	|	|	V |
16+20	0.4136	0.12	Q	|	|	|	V |
16+25	0.4142	0.10	Q	|	|	|	V |
16+30	0.4149	0.09	Q	|	|	|	V |
16+35	0.4155	0.09	Q	|	|	|	V |
16+40	0.4160	0.08	Q	|	|	|	V |
16+45	0.4164	0.07	Q	|	|	|	V |
16+50	0.4169	0.07	Q	|	|	|	V |
16+55	0.4173	0.06	Q	|	|	|	V |
17+ 0	0.4178	0.06	Q	|	|	|	V |
17+ 5	0.4182	0.07	Q	|	|	|	V |
17+10	0.4188	0.09	Q	|	|	|	V |
17+15	0.4195	0.10	Q	|	|	|	V |
17+20	0.4202	0.10	Q	|	|	|	V |
17+25	0.4209	0.10	Q	|	|	|	V |
17+30	0.4216	0.10	Q	|	|	|	V |
17+35	0.4223	0.10	Q	|	|	|	V |
17+40	0.4230	0.10	Q	|	|	|	V |
17+45	0.4238	0.10	Q	|	|	|	V |
17+50	0.4245	0.10	Q	|	|	|	V |
17+55	0.4251	0.09	Q	|	|	|	V |
18+ 0	0.4257	0.09	Q	|	|	|	V |
18+ 5	0.4263	0.09	Q	|	|	|	V |
18+10	0.4269	0.09	Q	|	|	|	V |
18+15	0.4275	0.08	Q	|	|	|	V |
18+20	0.4281	0.08	Q	|	|	|	V |
18+25	0.4286	0.08	Q	|	|	|	V |
18+30	0.4292	0.08	Q	|	|	|	V |
18+35	0.4298	0.08	Q	|	|	|	V |
18+40	0.4303	0.07	Q	|	|	|	V |
18+45	0.4308	0.07	Q	|	|	|	V |
18+50	0.4312	0.06	Q	|	|	|	V |
18+55	0.4316	0.05	Q	|	|	|	V |
19+ 0	0.4319	0.05	Q	|	|	|	V |
19+ 5	0.4322	0.05	Q	|	|	|	V |
19+10	0.4326	0.05	Q	|	|	|	V |
19+15	0.4330	0.06	Q	|	|	|	V |
19+20	0.4334	0.06	Q	|	|	|	V |
19+25	0.4339	0.07	Q	|	|	|	V |
19+30	0.4345	0.08	Q	|	|	|	V |
19+35	0.4350	0.08	Q	|	|	|	V |
19+40	0.4355	0.07	Q	|	|	|	V |
19+45	0.4360	0.07	Q	|	|	|	V |
19+50	0.4364	0.06	Q	|	|	|	V |
19+55	0.4368	0.05	Q	|	|	|	V |
20+ 0	0.4371	0.05	Q	|	|	|	V |
20+ 5	0.4374	0.05	Q	|	|	|	V |
20+10	0.4378	0.05	Q	|	|	|	V |
20+15	0.4382	0.06	Q	|	|	|	V |
20+20	0.4386	0.06	Q	|	|	|	V |
20+25	0.4390	0.06	Q	|	|	|	V |
20+30	0.4395	0.06	Q	|	|	|	V |
20+35	0.4399	0.06	Q	|	|	|	V |
20+40	0.4403	0.06	Q	|	|	|	V |
20+45	0.4408	0.06	Q	|	|	|	V |
20+50	0.4412	0.06	Q	|	|	|	V |
20+55	0.4415	0.05	Q	|	|	|	V |
21+ 0	0.4419	0.05	Q	|	|	|	V |
21+ 5	0.4422	0.05	Q	|	|	|	V |
21+10	0.4426	0.05	Q	|	|	|	V |
21+15	0.4430	0.06	Q	|	|	|	V|
21+20	0.4434	0.06	Q	|	|	|	V|

21+25	0.4437	0.05	Q	|	|	|	v|
21+30	0.4440	0.05	Q	|	|	|	v|
21+35	0.4444	0.05	Q	|	|	|	v|
21+40	0.4447	0.05	Q	|	|	|	v|
21+45	0.4451	0.06	Q	|	|	|	v|
21+50	0.4455	0.06	Q	|	|	|	v|
21+55	0.4459	0.05	Q	|	|	|	v|
22+ 0	0.4462	0.05	Q	|	|	|	v|
22+ 5	0.4465	0.05	Q	|	|	|	v|
22+10	0.4469	0.05	Q	|	|	|	v|
22+15	0.4473	0.06	Q	|	|	|	v|
22+20	0.4477	0.06	Q	|	|	|	v|
22+25	0.4481	0.05	Q	|	|	|	v|
22+30	0.4484	0.05	Q	|	|	|	v|
22+35	0.4487	0.04	Q	|	|	|	v|
22+40	0.4490	0.04	Q	|	|	|	v|
22+45	0.4493	0.04	Q	|	|	|	v|
22+50	0.4496	0.04	Q	|	|	|	v|
22+55	0.4499	0.04	Q	|	|	|	v|
23+ 0	0.4501	0.04	Q	|	|	|	v|
23+ 5	0.4504	0.04	Q	|	|	|	v|
23+10	0.4507	0.04	Q	|	|	|	v|
23+15	0.4510	0.04	Q	|	|	|	v|
23+20	0.4513	0.04	Q	|	|	|	v|
23+25	0.4516	0.04	Q	|	|	|	v|
23+30	0.4519	0.04	Q	|	|	|	v|
23+35	0.4522	0.04	Q	|	|	|	v|
23+40	0.4525	0.04	Q	|	|	|	v|
23+45	0.4527	0.04	Q	|	|	|	v|
23+50	0.4530	0.04	Q	|	|	|	v|
23+55	0.4533	0.04	Q	|	|	|	v|
24+ 0	0.4536	0.04	Q	|	|	|	v|
24+ 5	0.4539	0.04	Q	|	|	|	v|
24+10	0.4540	0.02	Q	|	|	|	v|
24+15	0.4541	0.01	Q	|	|	|	v|
24+20	0.4541	0.00	Q	|	|	|	v|
24+25	0.4541	0.00	Q	|	|	|	v|
24+30	0.4541	0.00	Q	|	|	|	v|
24+35	0.4541	0.00	Q	|	|	|	v|
24+40	0.4541	0.00	Q	|	|	|	v|
24+45	0.4541	0.00	Q	|	|	|	v|

PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/23/21 File: PROP2YR1A242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG A AREA 1 DEVELOPED CONDITION
2-YEAR 24-HOUR STORM EVENT
21-0034
2021-11-23 EP

Drainage Area = 6.80(Ac.) = 0.011 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 6.80(Ac.) = 0.011 Sq. Mi.
Length along longest watercourse = 1116.00(Ft.)
Length along longest watercourse measured to centroid = 860.00(Ft.)
Length along longest watercourse = 0.211 Mi.
Length along longest watercourse measured to centroid = 0.163 Mi.
Difference in elevation = 6.50(Ft.)
Slope along watercourse = 30.7527 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.052 Hr.
Lag time = 3.13 Min.
25% of lag time = 0.78 Min.
40% of lag time = 1.25 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
6.80	2.40	16.32

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
6.80	6.20	42.16

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
6.800	58.50	0.850

Total Area Entered = 6.80(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

58.5	38.5	0.684	0.850	0.161	1.000	0.161
					Sum (F) =	0.161

Area averaged mean soil loss (F) (In/Hr) = 0.161
Minimum soil loss rate ((In/Hr)) = 0.080
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %		Unit Hydrograph (CFS)
1	0.083	159.659	33.117		2.270
2	0.167	319.318	53.580		3.672
3	0.250	478.978	10.719		0.735
4	0.333	638.637	1.961		0.134
5	0.417	798.296	0.622		0.043
			Sum = 100.000	Sum=	6.853

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time		Pattern	Storm Rain	Loss rate(In./Hr)		Effective
	(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	0.07	0.019	(0.285)	0.004	0.015
2	0.17	0.07	0.019	(0.284)	0.004	0.015
3	0.25	0.07	0.019	(0.283)	0.004	0.015
4	0.33	0.10	0.029	(0.281)	0.006	0.022
5	0.42	0.10	0.029	(0.280)	0.006	0.022
6	0.50	0.10	0.029	(0.279)	0.006	0.022
7	0.58	0.10	0.029	(0.278)	0.006	0.022
8	0.67	0.10	0.029	(0.277)	0.006	0.022
9	0.75	0.10	0.029	(0.276)	0.006	0.022
10	0.83	0.13	0.038	(0.275)	0.008	0.030
11	0.92	0.13	0.038	(0.274)	0.008	0.030
12	1.00	0.13	0.038	(0.273)	0.008	0.030
13	1.08	0.10	0.029	(0.272)	0.006	0.022
14	1.17	0.10	0.029	(0.271)	0.006	0.022
15	1.25	0.10	0.029	(0.270)	0.006	0.022
16	1.33	0.10	0.029	(0.268)	0.006	0.022
17	1.42	0.10	0.029	(0.267)	0.006	0.022
18	1.50	0.10	0.029	(0.266)	0.006	0.022
19	1.58	0.10	0.029	(0.265)	0.006	0.022
20	1.67	0.10	0.029	(0.264)	0.006	0.022
21	1.75	0.10	0.029	(0.263)	0.006	0.022
22	1.83	0.13	0.038	(0.262)	0.008	0.030
23	1.92	0.13	0.038	(0.261)	0.008	0.030
24	2.00	0.13	0.038	(0.260)	0.008	0.030
25	2.08	0.13	0.038	(0.259)	0.008	0.030
26	2.17	0.13	0.038	(0.258)	0.008	0.030
27	2.25	0.13	0.038	(0.257)	0.008	0.030
28	2.33	0.13	0.038	(0.256)	0.008	0.030
29	2.42	0.13	0.038	(0.255)	0.008	0.030
30	2.50	0.13	0.038	(0.254)	0.008	0.030
31	2.58	0.17	0.048	(0.253)	0.011	0.037
32	2.67	0.17	0.048	(0.252)	0.011	0.037
33	2.75	0.17	0.048	(0.251)	0.011	0.037
34	2.83	0.17	0.048	(0.250)	0.011	0.037
35	2.92	0.17	0.048	(0.249)	0.011	0.037
36	3.00	0.17	0.048	(0.247)	0.011	0.037
37	3.08	0.17	0.048	(0.246)	0.011	0.037
38	3.17	0.17	0.048	(0.245)	0.011	0.037
39	3.25	0.17	0.048	(0.244)	0.011	0.037
40	3.33	0.17	0.048	(0.243)	0.011	0.037
41	3.42	0.17	0.048	(0.242)	0.011	0.037
42	3.50	0.17	0.048	(0.241)	0.011	0.037
43	3.58	0.17	0.048	(0.240)	0.011	0.037
44	3.67	0.17	0.048	(0.239)	0.011	0.037
45	3.75	0.17	0.048	(0.238)	0.011	0.037

46	3.83	0.20	0.058	(0.237)	0.013	0.045
47	3.92	0.20	0.058	(0.236)	0.013	0.045
48	4.00	0.20	0.058	(0.235)	0.013	0.045
49	4.08	0.20	0.058	(0.234)	0.013	0.045
50	4.17	0.20	0.058	(0.233)	0.013	0.045
51	4.25	0.20	0.058	(0.232)	0.013	0.045
52	4.33	0.23	0.067	(0.231)	0.015	0.052
53	4.42	0.23	0.067	(0.230)	0.015	0.052
54	4.50	0.23	0.067	(0.229)	0.015	0.052
55	4.58	0.23	0.067	(0.228)	0.015	0.052
56	4.67	0.23	0.067	(0.227)	0.015	0.052
57	4.75	0.23	0.067	(0.226)	0.015	0.052
58	4.83	0.27	0.077	(0.225)	0.017	0.060
59	4.92	0.27	0.077	(0.224)	0.017	0.060
60	5.00	0.27	0.077	(0.224)	0.017	0.060
61	5.08	0.20	0.058	(0.223)	0.013	0.045
62	5.17	0.20	0.058	(0.222)	0.013	0.045
63	5.25	0.20	0.058	(0.221)	0.013	0.045
64	5.33	0.23	0.067	(0.220)	0.015	0.052
65	5.42	0.23	0.067	(0.219)	0.015	0.052
66	5.50	0.23	0.067	(0.218)	0.015	0.052
67	5.58	0.27	0.077	(0.217)	0.017	0.060
68	5.67	0.27	0.077	(0.216)	0.017	0.060
69	5.75	0.27	0.077	(0.215)	0.017	0.060
70	5.83	0.27	0.077	(0.214)	0.017	0.060
71	5.92	0.27	0.077	(0.213)	0.017	0.060
72	6.00	0.27	0.077	(0.212)	0.017	0.060
73	6.08	0.30	0.086	(0.211)	0.019	0.067
74	6.17	0.30	0.086	(0.210)	0.019	0.067
75	6.25	0.30	0.086	(0.209)	0.019	0.067
76	6.33	0.30	0.086	(0.208)	0.019	0.067
77	6.42	0.30	0.086	(0.207)	0.019	0.067
78	6.50	0.30	0.086	(0.206)	0.019	0.067
79	6.58	0.33	0.096	(0.205)	0.021	0.075
80	6.67	0.33	0.096	(0.205)	0.021	0.075
81	6.75	0.33	0.096	(0.204)	0.021	0.075
82	6.83	0.33	0.096	(0.203)	0.021	0.075
83	6.92	0.33	0.096	(0.202)	0.021	0.075
84	7.00	0.33	0.096	(0.201)	0.021	0.075
85	7.08	0.33	0.096	(0.200)	0.021	0.075
86	7.17	0.33	0.096	(0.199)	0.021	0.075
87	7.25	0.33	0.096	(0.198)	0.021	0.075
88	7.33	0.37	0.106	(0.197)	0.023	0.082
89	7.42	0.37	0.106	(0.196)	0.023	0.082
90	7.50	0.37	0.106	(0.195)	0.023	0.082
91	7.58	0.40	0.115	(0.195)	0.025	0.090
92	7.67	0.40	0.115	(0.194)	0.025	0.090
93	7.75	0.40	0.115	(0.193)	0.025	0.090
94	7.83	0.43	0.125	(0.192)	0.027	0.097
95	7.92	0.43	0.125	(0.191)	0.027	0.097
96	8.00	0.43	0.125	(0.190)	0.027	0.097
97	8.08	0.50	0.144	(0.189)	0.032	0.112
98	8.17	0.50	0.144	(0.188)	0.032	0.112
99	8.25	0.50	0.144	(0.187)	0.032	0.112
100	8.33	0.50	0.144	(0.187)	0.032	0.112
101	8.42	0.50	0.144	(0.186)	0.032	0.112
102	8.50	0.50	0.144	(0.185)	0.032	0.112
103	8.58	0.53	0.154	(0.184)	0.034	0.120
104	8.67	0.53	0.154	(0.183)	0.034	0.120
105	8.75	0.53	0.154	(0.182)	0.034	0.120
106	8.83	0.57	0.163	(0.181)	0.036	0.127
107	8.92	0.57	0.163	(0.181)	0.036	0.127
108	9.00	0.57	0.163	(0.180)	0.036	0.127
109	9.08	0.63	0.182	(0.179)	0.040	0.142
110	9.17	0.63	0.182	(0.178)	0.040	0.142
111	9.25	0.63	0.182	(0.177)	0.040	0.142
112	9.33	0.67	0.192	(0.176)	0.042	0.150
113	9.42	0.67	0.192	(0.175)	0.042	0.150
114	9.50	0.67	0.192	(0.175)	0.042	0.150
115	9.58	0.70	0.202	(0.174)	0.044	0.157
116	9.67	0.70	0.202	(0.173)	0.044	0.157
117	9.75	0.70	0.202	(0.172)	0.044	0.157
118	9.83	0.73	0.211	(0.171)	0.046	0.165
119	9.92	0.73	0.211	(0.170)	0.046	0.165
120	10.00	0.73	0.211	(0.170)	0.046	0.165

121	10.08	0.50	0.144	(0.169)	0.032	0.112
122	10.17	0.50	0.144	(0.168)	0.032	0.112
123	10.25	0.50	0.144	(0.167)	0.032	0.112
124	10.33	0.50	0.144	(0.166)	0.032	0.112
125	10.42	0.50	0.144	(0.166)	0.032	0.112
126	10.50	0.50	0.144	(0.165)	0.032	0.112
127	10.58	0.67	0.192	(0.164)	0.042	0.150
128	10.67	0.67	0.192	(0.163)	0.042	0.150
129	10.75	0.67	0.192	(0.162)	0.042	0.150
130	10.83	0.67	0.192	(0.162)	0.042	0.150
131	10.92	0.67	0.192	(0.161)	0.042	0.150
132	11.00	0.67	0.192	(0.160)	0.042	0.150
133	11.08	0.63	0.182	(0.159)	0.040	0.142
134	11.17	0.63	0.182	(0.158)	0.040	0.142
135	11.25	0.63	0.182	(0.158)	0.040	0.142
136	11.33	0.63	0.182	(0.157)	0.040	0.142
137	11.42	0.63	0.182	(0.156)	0.040	0.142
138	11.50	0.63	0.182	(0.155)	0.040	0.142
139	11.58	0.57	0.163	(0.155)	0.036	0.127
140	11.67	0.57	0.163	(0.154)	0.036	0.127
141	11.75	0.57	0.163	(0.153)	0.036	0.127
142	11.83	0.60	0.173	(0.152)	0.038	0.135
143	11.92	0.60	0.173	(0.151)	0.038	0.135
144	12.00	0.60	0.173	(0.151)	0.038	0.135
145	12.08	0.83	0.240	(0.150)	0.053	0.187
146	12.17	0.83	0.240	(0.149)	0.053	0.187
147	12.25	0.83	0.240	(0.148)	0.053	0.187
148	12.33	0.87	0.250	(0.148)	0.055	0.195
149	12.42	0.87	0.250	(0.147)	0.055	0.195
150	12.50	0.87	0.250	(0.146)	0.055	0.195
151	12.58	0.93	0.269	(0.145)	0.059	0.210
152	12.67	0.93	0.269	(0.145)	0.059	0.210
153	12.75	0.93	0.269	(0.144)	0.059	0.210
154	12.83	0.97	0.278	(0.143)	0.061	0.217
155	12.92	0.97	0.278	(0.143)	0.061	0.217
156	13.00	0.97	0.278	(0.142)	0.061	0.217
157	13.08	1.13	0.326	(0.141)	0.072	0.255
158	13.17	1.13	0.326	(0.140)	0.072	0.255
159	13.25	1.13	0.326	(0.140)	0.072	0.255
160	13.33	1.13	0.326	(0.139)	0.072	0.255
161	13.42	1.13	0.326	(0.138)	0.072	0.255
162	13.50	1.13	0.326	(0.138)	0.072	0.255
163	13.58	0.77	0.221	(0.137)	0.049	0.172
164	13.67	0.77	0.221	(0.136)	0.049	0.172
165	13.75	0.77	0.221	(0.135)	0.049	0.172
166	13.83	0.77	0.221	(0.135)	0.049	0.172
167	13.92	0.77	0.221	(0.134)	0.049	0.172
168	14.00	0.77	0.221	(0.133)	0.049	0.172
169	14.08	0.90	0.259	(0.133)	0.057	0.202
170	14.17	0.90	0.259	(0.132)	0.057	0.202
171	14.25	0.90	0.259	(0.131)	0.057	0.202
172	14.33	0.87	0.250	(0.131)	0.055	0.195
173	14.42	0.87	0.250	(0.130)	0.055	0.195
174	14.50	0.87	0.250	(0.129)	0.055	0.195
175	14.58	0.87	0.250	(0.129)	0.055	0.195
176	14.67	0.87	0.250	(0.128)	0.055	0.195
177	14.75	0.87	0.250	(0.127)	0.055	0.195
178	14.83	0.83	0.240	(0.127)	0.053	0.187
179	14.92	0.83	0.240	(0.126)	0.053	0.187
180	15.00	0.83	0.240	(0.125)	0.053	0.187
181	15.08	0.80	0.230	(0.125)	0.051	0.180
182	15.17	0.80	0.230	(0.124)	0.051	0.180
183	15.25	0.80	0.230	(0.124)	0.051	0.180
184	15.33	0.77	0.221	(0.123)	0.049	0.172
185	15.42	0.77	0.221	(0.122)	0.049	0.172
186	15.50	0.77	0.221	(0.122)	0.049	0.172
187	15.58	0.63	0.182	(0.121)	0.040	0.142
188	15.67	0.63	0.182	(0.120)	0.040	0.142
189	15.75	0.63	0.182	(0.120)	0.040	0.142
190	15.83	0.63	0.182	(0.119)	0.040	0.142
191	15.92	0.63	0.182	(0.119)	0.040	0.142
192	16.00	0.63	0.182	(0.118)	0.040	0.142
193	16.08	0.13	0.038	(0.117)	0.008	0.030
194	16.17	0.13	0.038	(0.117)	0.008	0.030
195	16.25	0.13	0.038	(0.116)	0.008	0.030

196	16.33	0.13	0.038	(0.116)	0.008	0.030
197	16.42	0.13	0.038	(0.115)	0.008	0.030
198	16.50	0.13	0.038	(0.114)	0.008	0.030
199	16.58	0.10	0.029	(0.114)	0.006	0.022
200	16.67	0.10	0.029	(0.113)	0.006	0.022
201	16.75	0.10	0.029	(0.113)	0.006	0.022
202	16.83	0.10	0.029	(0.112)	0.006	0.022
203	16.92	0.10	0.029	(0.112)	0.006	0.022
204	17.00	0.10	0.029	(0.111)	0.006	0.022
205	17.08	0.17	0.048	(0.110)	0.011	0.037
206	17.17	0.17	0.048	(0.110)	0.011	0.037
207	17.25	0.17	0.048	(0.109)	0.011	0.037
208	17.33	0.17	0.048	(0.109)	0.011	0.037
209	17.42	0.17	0.048	(0.108)	0.011	0.037
210	17.50	0.17	0.048	(0.108)	0.011	0.037
211	17.58	0.17	0.048	(0.107)	0.011	0.037
212	17.67	0.17	0.048	(0.107)	0.011	0.037
213	17.75	0.17	0.048	(0.106)	0.011	0.037
214	17.83	0.13	0.038	(0.106)	0.008	0.030
215	17.92	0.13	0.038	(0.105)	0.008	0.030
216	18.00	0.13	0.038	(0.104)	0.008	0.030
217	18.08	0.13	0.038	(0.104)	0.008	0.030
218	18.17	0.13	0.038	(0.103)	0.008	0.030
219	18.25	0.13	0.038	(0.103)	0.008	0.030
220	18.33	0.13	0.038	(0.102)	0.008	0.030
221	18.42	0.13	0.038	(0.102)	0.008	0.030
222	18.50	0.13	0.038	(0.101)	0.008	0.030
223	18.58	0.10	0.029	(0.101)	0.006	0.022
224	18.67	0.10	0.029	(0.100)	0.006	0.022
225	18.75	0.10	0.029	(0.100)	0.006	0.022
226	18.83	0.07	0.019	(0.100)	0.004	0.015
227	18.92	0.07	0.019	(0.099)	0.004	0.015
228	19.00	0.07	0.019	(0.099)	0.004	0.015
229	19.08	0.10	0.029	(0.098)	0.006	0.022
230	19.17	0.10	0.029	(0.098)	0.006	0.022
231	19.25	0.10	0.029	(0.097)	0.006	0.022
232	19.33	0.13	0.038	(0.097)	0.008	0.030
233	19.42	0.13	0.038	(0.096)	0.008	0.030
234	19.50	0.13	0.038	(0.096)	0.008	0.030
235	19.58	0.10	0.029	(0.095)	0.006	0.022
236	19.67	0.10	0.029	(0.095)	0.006	0.022
237	19.75	0.10	0.029	(0.095)	0.006	0.022
238	19.83	0.07	0.019	(0.094)	0.004	0.015
239	19.92	0.07	0.019	(0.094)	0.004	0.015
240	20.00	0.07	0.019	(0.093)	0.004	0.015
241	20.08	0.10	0.029	(0.093)	0.006	0.022
242	20.17	0.10	0.029	(0.092)	0.006	0.022
243	20.25	0.10	0.029	(0.092)	0.006	0.022
244	20.33	0.10	0.029	(0.092)	0.006	0.022
245	20.42	0.10	0.029	(0.091)	0.006	0.022
246	20.50	0.10	0.029	(0.091)	0.006	0.022
247	20.58	0.10	0.029	(0.090)	0.006	0.022
248	20.67	0.10	0.029	(0.090)	0.006	0.022
249	20.75	0.10	0.029	(0.090)	0.006	0.022
250	20.83	0.07	0.019	(0.089)	0.004	0.015
251	20.92	0.07	0.019	(0.089)	0.004	0.015
252	21.00	0.07	0.019	(0.089)	0.004	0.015
253	21.08	0.10	0.029	(0.088)	0.006	0.022
254	21.17	0.10	0.029	(0.088)	0.006	0.022
255	21.25	0.10	0.029	(0.088)	0.006	0.022
256	21.33	0.07	0.019	(0.087)	0.004	0.015
257	21.42	0.07	0.019	(0.087)	0.004	0.015
258	21.50	0.07	0.019	(0.087)	0.004	0.015
259	21.58	0.10	0.029	(0.086)	0.006	0.022
260	21.67	0.10	0.029	(0.086)	0.006	0.022
261	21.75	0.10	0.029	(0.086)	0.006	0.022
262	21.83	0.07	0.019	(0.085)	0.004	0.015
263	21.92	0.07	0.019	(0.085)	0.004	0.015
264	22.00	0.07	0.019	(0.085)	0.004	0.015
265	22.08	0.10	0.029	(0.085)	0.006	0.022
266	22.17	0.10	0.029	(0.084)	0.006	0.022
267	22.25	0.10	0.029	(0.084)	0.006	0.022
268	22.33	0.07	0.019	(0.084)	0.004	0.015
269	22.42	0.07	0.019	(0.083)	0.004	0.015
270	22.50	0.07	0.019	(0.083)	0.004	0.015

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271  22.58     0.07      0.019       (  0.083)       0.004        0.015
272  22.67     0.07      0.019       (  0.083)       0.004        0.015
273  22.75     0.07      0.019       (  0.083)       0.004        0.015
274  22.83     0.07      0.019       (  0.082)       0.004        0.015
275  22.92     0.07      0.019       (  0.082)       0.004        0.015
276  23.00     0.07      0.019       (  0.082)       0.004        0.015
277  23.08     0.07      0.019       (  0.082)       0.004        0.015
278  23.17     0.07      0.019       (  0.082)       0.004        0.015
279  23.25     0.07      0.019       (  0.081)       0.004        0.015
280  23.33     0.07      0.019       (  0.081)       0.004        0.015
281  23.42     0.07      0.019       (  0.081)       0.004        0.015
282  23.50     0.07      0.019       (  0.081)       0.004        0.015
283  23.58     0.07      0.019       (  0.081)       0.004        0.015
284  23.67     0.07      0.019       (  0.081)       0.004        0.015
285  23.75     0.07      0.019       (  0.081)       0.004        0.015
286  23.83     0.07      0.019       (  0.080)       0.004        0.015
287  23.92     0.07      0.019       (  0.080)       0.004        0.015
288  24.00     0.07      0.019       (  0.080)       0.004        0.015
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    22.5
      Flood volume = Effective rainfall      1.87(In)
       times area       6.8(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
      Total soil loss =      0.53(In)
      Total soil loss =     0.299(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       46207.8 Cubic Feet
      Total soil loss =       13033.0 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.746(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0002      0.03  Q         |         |         |         |
   0+10       0.0008      0.09  Q         |         |         |         |
   0+15       0.0015      0.10  Q         |         |         |         |
   0+20       0.0024      0.12  Q         |         |         |         |
   0+25       0.0034      0.15  Q         |         |         |         |
   0+30       0.0044      0.15  Q         |         |         |         |
   0+35       0.0055      0.15  Q         |         |         |         |
   0+40       0.0065      0.15  Q         |         |         |         |
   0+45       0.0076      0.15  Q         |         |         |         |
   0+50       0.0088      0.17  Q         |         |         |         |
   0+55       0.0101      0.20  Q         |         |         |         |
   1+ 0       0.0116      0.20  Q         |         |         |         |
   1+ 5       0.0128      0.19  Q         |         |         |         |
   1+10       0.0140      0.16  Q         |         |         |         |
   1+15       0.0150      0.16  Q         |         |         |         |
   1+20       0.0161      0.15  Q         |         |         |         |
   1+25       0.0171      0.15  Q         |         |         |         |
   1+30       0.0182      0.15  Q         |         |         |         |
   1+35       0.0193      0.15  Q         |         |         |         |
   1+40       0.0203      0.15  Q         |         |         |         |
   1+45       0.0214      0.15  Q         |         |         |         |
   1+50       0.0226      0.17  Q         |         |         |         |
   1+55       0.0239      0.20  Q         |         |         |         |
   2+ 0       0.0253      0.20  Q         |         |         |         |
   2+ 5       0.0268      0.21  QV        |         |         |         |
   2+10       0.0282      0.21  QV        |         |         |         |
   2+15       0.0296      0.21  QV        |         |         |         |
   2+20       0.0310      0.21  QV        |         |         |         |
   2+25       0.0324      0.21  QV        |         |         |         |
   2+30       0.0338      0.21  QV        |         |         |         |
   2+35       0.0354      0.22  QV        |         |         |         |
   2+40       0.0371      0.25  QV        |         |         |         |
   2+45       0.0388      0.26  |Q        |         |         |         |
   2+50       0.0406      0.26  |Q        |         |         |         |
   2+55       0.0424      0.26  |Q        |         |         |         |
   3+ 0       0.0441      0.26  |Q        |         |         |         |
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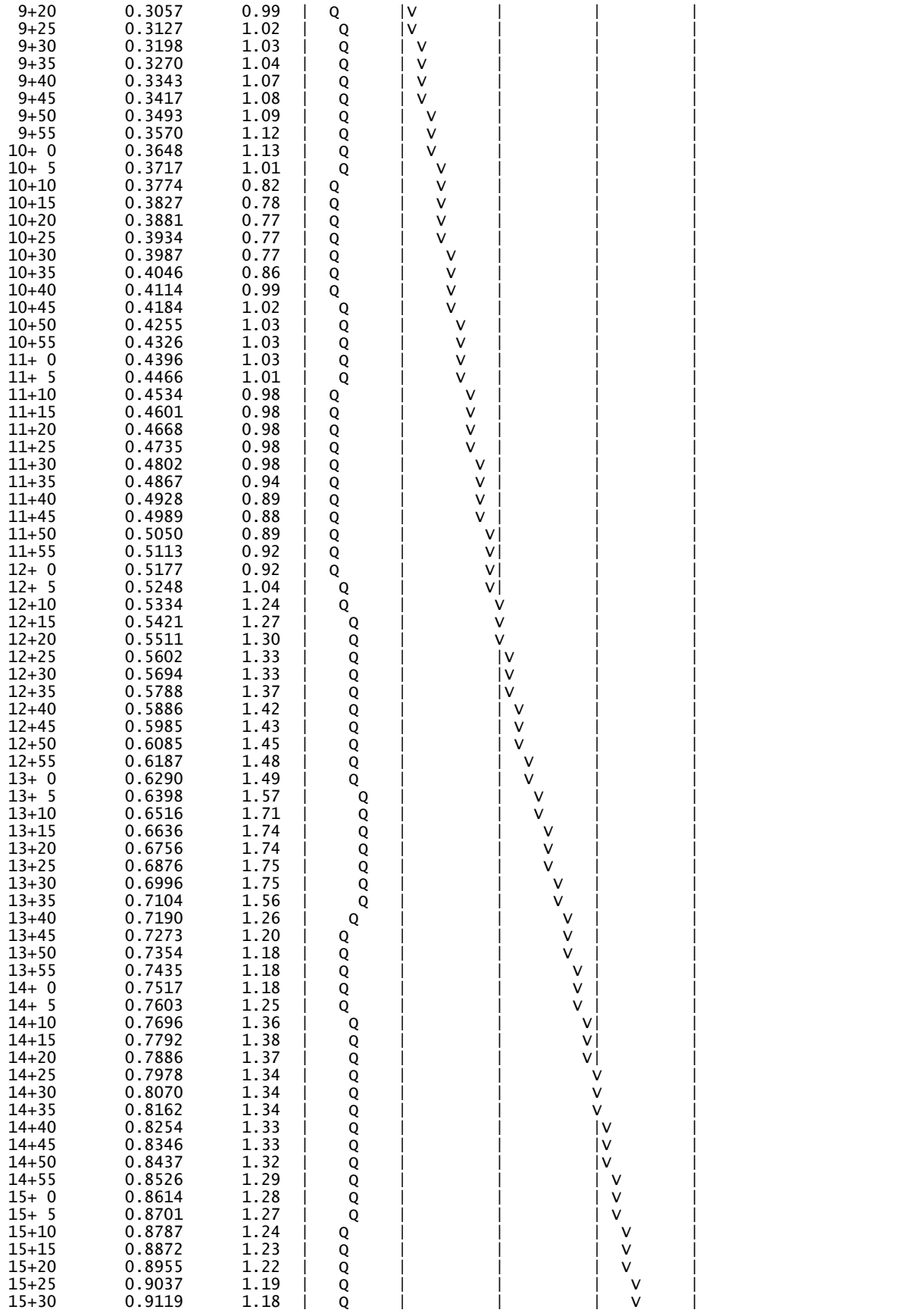
3+ 5       0.0459      0.26  |Q        |         |         |         |
3+10       0.0477      0.26  |Q        |         |         |         |
3+15       0.0494      0.26  |Q        |         |         |         |
3+20       0.0512      0.26  |Q        |         |         |         |
3+25       0.0530      0.26  |Q        |         |         |         |
3+30       0.0547      0.26  |QV       |         |         |         |
3+35       0.0565      0.26  |QV       |         |         |         |
3+40       0.0583      0.26  |QV       |         |         |         |
3+45       0.0601      0.26  |QV       |         |         |         |
3+50       0.0619      0.27  |QV       |         |         |         |
3+55       0.0640      0.30  |QV       |         |         |         |
4+ 0       0.0661      0.31  |QV       |         |         |         |
4+ 5       0.0682      0.31  |QV       |         |         |         |
4+10       0.0704      0.31  |QV       |         |         |         |
4+15       0.0725      0.31  |QV       |         |         |         |
4+20       0.0747      0.33  |QV       |         |         |         |
4+25       0.0772      0.35  |QV       |         |         |         |
4+30       0.0796      0.36  |Q V      |         |         |         |
4+35       0.0821      0.36  |Q V      |         |         |         |
4+40       0.0846      0.36  |Q V      |         |         |         |
4+45       0.0870      0.36  |Q V      |         |         |         |
4+50       0.0896      0.38  |Q V      |         |         |         |
4+55       0.0924      0.40  |Q V      |         |         |         |
5+ 0       0.0952      0.41  |Q V      |         |         |         |
5+ 5       0.0978      0.38  |Q V      |         |         |         |
5+10       0.1000      0.32  |Q V      |         |         |         |
5+15       0.1022      0.31  |Q V      |         |         |         |
5+20       0.1044      0.33  |Q V      |         |         |         |
5+25       0.1069      0.35  |Q  V     |         |         |         |
5+30       0.1093      0.36  |Q  V     |         |         |         |
5+35       0.1119      0.38  |Q  V     |         |         |         |
5+40       0.1147      0.40  |Q  V     |         |         |         |
5+45       0.1175      0.41  |Q  V     |         |         |         |
5+50       0.1203      0.41  |Q  V     |         |         |         |
5+55       0.1232      0.41  |Q  V     |         |         |         |
6+ 0       0.1260      0.41  |Q  V     |         |         |         |
6+ 5       0.1289      0.43  |Q  V     |         |         |         |
6+10       0.1321      0.46  |Q  V     |         |         |         |
6+15       0.1353      0.46  |Q   V    |         |         |         |
6+20       0.1384      0.46  |Q   V    |         |         |         |
6+25       0.1416      0.46  |Q   V    |         |         |         |
6+30       0.1448      0.46  |Q   V    |         |         |         |
6+35       0.1481      0.48  |Q   V    |         |         |         |
6+40       0.1516      0.51  | Q  V    |         |         |         |
6+45       0.1551      0.51  | Q  V    |         |         |         |
6+50       0.1586      0.51  | Q  V    |         |         |         |
6+55       0.1622      0.51  | Q   V   |         |         |         |
7+ 0       0.1657      0.51  | Q   V   |         |         |         |
7+ 5       0.1693      0.51  | Q   V   |         |         |         |
7+10       0.1728      0.51  | Q   V   |         |         |         |
7+15       0.1763      0.51  | Q   V   |         |         |         |
7+20       0.1800      0.53  | Q   V   |         |         |         |
7+25       0.1838      0.56  | Q   V   |         |         |         |
7+30       0.1877      0.56  | Q    V  |         |         |         |
7+35       0.1917      0.58  | Q    V  |         |         |         |
7+40       0.1959      0.61  | Q    V  |         |         |         |
7+45       0.2001      0.61  | Q    V  |         |         |         |
7+50       0.2045      0.63  | Q    V  |         |         |         |
7+55       0.2090      0.66  | Q    V  |         |         |         |
8+ 0       0.2136      0.67  | Q     V |         |         |         |
8+ 5       0.2185      0.70  | Q     V |         |         |         |
8+10       0.2237      0.76  |  Q    V |         |         |         |
8+15       0.2290      0.77  |  Q    V |         |         |         |
8+20       0.2343      0.77  |  Q    V |         |         |         |
8+25       0.2396      0.77  |  Q     V|         |         |         |
8+30       0.2449      0.77  |  Q     V|         |         |         |
8+35       0.2503      0.79  |  Q     V|         |         |         |
8+40       0.2559      0.81  |  Q     V|         |         |         |
8+45       0.2615      0.82  |  Q     V|         |         |         |
8+50       0.2673      0.84  |  Q      V         |         |         |
8+55       0.2733      0.87  |  Q      V         |         |         |
9+ 0       0.2793      0.87  |  Q      V         |         |         |
9+ 5       0.2855      0.91  |  Q      V         |         |         |
9+10       0.2921      0.96  |  Q      |V        |         |         |
9+15       0.2988      0.97  |  Q      |V        |         |         |
```



15+35	0.9195	1.11	| Q	|	|	| V	|
15+40	0.9264	1.00	| Q	|	|	| V	|
15+45	0.9332	0.98	| Q	|	|	| V	|
15+50	0.9399	0.98	| Q	|	|	| V	|
15+55	0.9466	0.98	| Q	|	|	| V	|
16+ 0	0.9533	0.98	| Q	|	|	| V	|
16+ 5	0.9583	0.72	| Q	|	|	| V	|
16+10	0.9604	0.31	|Q	|	|	| V	|
16+15	0.9620	0.23	Q	|	|	| V	|
16+20	0.9634	0.21	Q	|	|	| V	|
16+25	0.9648	0.21	Q	|	|	| V	|
16+30	0.9663	0.21	Q	|	|	| V	|
16+35	0.9676	0.19	Q	|	|	| V	|
16+40	0.9687	0.16	Q	|	|	| V	|
16+45	0.9697	0.16	Q	|	|	| V	|
16+50	0.9708	0.15	Q	|	|	| V	|
16+55	0.9719	0.15	Q	|	|	| V	|
17+ 0	0.9729	0.15	Q	|	|	| V	|
17+ 5	0.9742	0.19	Q	|	|	| V	|
17+10	0.9759	0.24	Q	|	|	| V	|
17+15	0.9776	0.25	|Q	|	|	| V	|
17+20	0.9794	0.26	|Q	|	|	| V	|
17+25	0.9812	0.26	|Q	|	|	| V	|
17+30	0.9829	0.26	|Q	|	|	| V	|
17+35	0.9847	0.26	|Q	|	|	| V	|
17+40	0.9865	0.26	|Q	|	|	| V	|
17+45	0.9882	0.26	|Q	|	|	| V	|
17+50	0.9899	0.24	Q	|	|	| V	|
17+55	0.9914	0.21	Q	|	|	| V	|
18+ 0	0.9928	0.21	Q	|	|	| V	|
18+ 5	0.9942	0.21	Q	|	|	| V	|
18+10	0.9956	0.21	Q	|	|	| V	|
18+15	0.9970	0.21	Q	|	|	| V	|
18+20	0.9984	0.21	Q	|	|	| V	|
18+25	0.9998	0.21	Q	|	|	| V	|
18+30	1.0013	0.21	Q	|	|	| V	|
18+35	1.0026	0.19	Q	|	|	| V	|
18+40	1.0037	0.16	Q	|	|	| V	|
18+45	1.0047	0.16	Q	|	|	| V	|
18+50	1.0057	0.14	Q	|	|	| V	|
18+55	1.0064	0.11	Q	|	|	| V	|
19+ 0	1.0072	0.10	Q	|	|	| V	|
19+ 5	1.0080	0.12	Q	|	|	| V	|
19+10	1.0090	0.15	Q	|	|	| V	|
19+15	1.0100	0.15	Q	|	|	| V	|
19+20	1.0112	0.17	Q	|	|	| V	|
19+25	1.0126	0.20	Q	|	|	| V	|
19+30	1.0140	0.20	Q	|	|	| V	|
19+35	1.0153	0.19	Q	|	|	| V	|
19+40	1.0164	0.16	Q	|	|	| V	|
19+45	1.0175	0.16	Q	|	|	| V	|
19+50	1.0184	0.14	Q	|	|	| V	|
19+55	1.0192	0.11	Q	|	|	| V	|
20+ 0	1.0199	0.10	Q	|	|	| V	|
20+ 5	1.0207	0.12	Q	|	|	| V	|
20+10	1.0217	0.15	Q	|	|	| V	|
20+15	1.0228	0.15	Q	|	|	| V	|
20+20	1.0238	0.15	Q	|	|	| V	|
20+25	1.0249	0.15	Q	|	|	| V	|
20+30	1.0260	0.15	Q	|	|	| V	|
20+35	1.0270	0.15	Q	|	|	| V	|
20+40	1.0281	0.15	Q	|	|	| V	|
20+45	1.0291	0.15	Q	|	|	| V	|
20+50	1.0301	0.14	Q	|	|	| V	|
20+55	1.0308	0.11	Q	|	|	| V	|
21+ 0	1.0316	0.10	Q	|	|	| V	|
21+ 5	1.0324	0.12	Q	|	|	| V	|
21+10	1.0334	0.15	Q	|	|	| V	|
21+15	1.0344	0.15	Q	|	|	| V	|
21+20	1.0354	0.14	Q	|	|	| V	|
21+25	1.0361	0.11	Q	|	|	| V	|
21+30	1.0369	0.10	Q	|	|	| V	|
21+35	1.0377	0.12	Q	|	|	| V	|
21+40	1.0387	0.15	Q	|	|	| V	|
21+45	1.0397	0.15	Q	|	|	| V	|

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   21+50       1.0407      0.14  Q          |          |          |         v|
   21+55       1.0414      0.11  Q          |          |          |         v|
   22+ 0       1.0422      0.10  Q          |          |          |         v|
   22+ 5       1.0430      0.12  Q          |          |          |         v|
   22+10       1.0440      0.15  Q          |          |          |         v|
   22+15       1.0451      0.15  Q          |          |          |         v|
   22+20       1.0460      0.14  Q          |          |          |         v|
   22+25       1.0467      0.11  Q          |          |          |         v|
   22+30       1.0475      0.10  Q          |          |          |         v|
   22+35       1.0482      0.10  Q          |          |          |         v|
   22+40       1.0489      0.10  Q          |          |          |         v|
   22+45       1.0496      0.10  Q          |          |          |         v|
   22+50       1.0503      0.10  Q          |          |          |         v|
   22+55       1.0510      0.10  Q          |          |          |         v|
   23+ 0       1.0517      0.10  Q          |          |          |         v|
   23+ 5       1.0524      0.10  Q          |          |          |         v|
   23+10       1.0531      0.10  Q          |          |          |         v|
   23+15       1.0538      0.10  Q          |          |          |         v|
   23+20       1.0545      0.10  Q          |          |          |         v|
   23+25       1.0552      0.10  Q          |          |          |         v|
   23+30       1.0560      0.10  Q          |          |          |         v|
   23+35       1.0567      0.10  Q          |          |          |         v|
   23+40       1.0574      0.10  Q          |          |          |         v|
   23+45       1.0581      0.10  Q          |          |          |         v|
   23+50       1.0588      0.10  Q          |          |          |         v|
   23+55       1.0595      0.10  Q          |          |          |         v|
   24+ 0       1.0602      0.10  Q          |          |          |         v|
   24+ 5       1.0607      0.07  Q          |          |          |         v|
   24+10       1.0608      0.01  Q          |          |          |         v|
   24+15       1.0608      0.00  Q          |          |          |         v|
   24+20       1.0608      0.00  Q          |          |          |          v
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U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/23/21 File: PROP2YR2A242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG A AREA 2 DEVELOPED CONDITION
2-YEAR 24 HOUR STORM EVENT
21-0034
2021-11-23 EP

Drainage Area = 9.50(Ac.) = 0.015 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 9.50(Ac.) = 0.015 Sq. Mi.
Length along longest watercourse = 2462.00(Ft.)
Length along longest watercourse measured to centroid = 2251.00(Ft.)
Length along longest watercourse = 0.466 Mi.
Length along longest watercourse measured to centroid = 0.426 Mi.
Difference in elevation = 6.50(Ft.)
Slope along watercourse = 13.9399 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.118 Hr.
Lag time = 7.09 Min.
25% of lag time = 1.77 Min.
40% of lag time = 2.83 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.50	2.40	22.80

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.50	6.20	58.90

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
9.500	56.60	0.830

Total Area Entered = 9.50(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

56.6	36.6	0.701	0.830	0.177	1.000	0.177
					Sum (F) =	0.177

Area averaged mean soil loss (F) (In/Hr) = 0.177
Minimum soil loss rate ((In/Hr)) = 0.089
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.240

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	70.556	7.255	0.695
2	0.167	141.112	41.537	3.977
3	0.250	211.669	28.772	2.755
4	0.333	282.225	10.857	1.039
5	0.417	352.781	5.976	0.572
6	0.500	423.337	3.066	0.293
7	0.583	493.893	1.114	0.107
8	0.667	564.450	0.601	0.058
9	0.750	635.006	0.486	0.047
10	0.833	705.562	0.337	0.032
			Sum = 100.000	Sum= 9.574

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.314)	0.005	0.015
2	0.17	0.07	0.019	(0.313)	0.005	0.015
3	0.25	0.07	0.019	(0.312)	0.005	0.015
4	0.33	0.10	0.029	(0.311)	0.007	0.022
5	0.42	0.10	0.029	(0.309)	0.007	0.022
6	0.50	0.10	0.029	(0.308)	0.007	0.022
7	0.58	0.10	0.029	(0.307)	0.007	0.022
8	0.67	0.10	0.029	(0.306)	0.007	0.022
9	0.75	0.10	0.029	(0.305)	0.007	0.022
10	0.83	0.13	0.038	(0.303)	0.009	0.029
11	0.92	0.13	0.038	(0.302)	0.009	0.029
12	1.00	0.13	0.038	(0.301)	0.009	0.029
13	1.08	0.10	0.029	(0.300)	0.007	0.022
14	1.17	0.10	0.029	(0.299)	0.007	0.022
15	1.25	0.10	0.029	(0.297)	0.007	0.022
16	1.33	0.10	0.029	(0.296)	0.007	0.022
17	1.42	0.10	0.029	(0.295)	0.007	0.022
18	1.50	0.10	0.029	(0.294)	0.007	0.022
19	1.58	0.10	0.029	(0.293)	0.007	0.022
20	1.67	0.10	0.029	(0.292)	0.007	0.022
21	1.75	0.10	0.029	(0.290)	0.007	0.022
22	1.83	0.13	0.038	(0.289)	0.009	0.029
23	1.92	0.13	0.038	(0.288)	0.009	0.029
24	2.00	0.13	0.038	(0.287)	0.009	0.029
25	2.08	0.13	0.038	(0.286)	0.009	0.029
26	2.17	0.13	0.038	(0.285)	0.009	0.029
27	2.25	0.13	0.038	(0.283)	0.009	0.029
28	2.33	0.13	0.038	(0.282)	0.009	0.029
29	2.42	0.13	0.038	(0.281)	0.009	0.029
30	2.50	0.13	0.038	(0.280)	0.009	0.029
31	2.58	0.17	0.048	(0.279)	0.012	0.036
32	2.67	0.17	0.048	(0.278)	0.012	0.036
33	2.75	0.17	0.048	(0.277)	0.012	0.036
34	2.83	0.17	0.048	(0.275)	0.012	0.036
35	2.92	0.17	0.048	(0.274)	0.012	0.036
36	3.00	0.17	0.048	(0.273)	0.012	0.036
37	3.08	0.17	0.048	(0.272)	0.012	0.036
38	3.17	0.17	0.048	(0.271)	0.012	0.036
39	3.25	0.17	0.048	(0.270)	0.012	0.036
40	3.33	0.17	0.048	(0.269)	0.012	0.036

41	3.42	0.17	0.048	(0.267)	0.012	0.036
42	3.50	0.17	0.048	(0.266)	0.012	0.036
43	3.58	0.17	0.048	(0.265)	0.012	0.036
44	3.67	0.17	0.048	(0.264)	0.012	0.036
45	3.75	0.17	0.048	(0.263)	0.012	0.036
46	3.83	0.20	0.058	(0.262)	0.014	0.044
47	3.92	0.20	0.058	(0.261)	0.014	0.044
48	4.00	0.20	0.058	(0.260)	0.014	0.044
49	4.08	0.20	0.058	(0.259)	0.014	0.044
50	4.17	0.20	0.058	(0.257)	0.014	0.044
51	4.25	0.20	0.058	(0.256)	0.014	0.044
52	4.33	0.23	0.067	(0.255)	0.016	0.051
53	4.42	0.23	0.067	(0.254)	0.016	0.051
54	4.50	0.23	0.067	(0.253)	0.016	0.051
55	4.58	0.23	0.067	(0.252)	0.016	0.051
56	4.67	0.23	0.067	(0.251)	0.016	0.051
57	4.75	0.23	0.067	(0.250)	0.016	0.051
58	4.83	0.27	0.077	(0.249)	0.018	0.058
59	4.92	0.27	0.077	(0.248)	0.018	0.058
60	5.00	0.27	0.077	(0.247)	0.018	0.058
61	5.08	0.20	0.058	(0.246)	0.014	0.044
62	5.17	0.20	0.058	(0.245)	0.014	0.044
63	5.25	0.20	0.058	(0.243)	0.014	0.044
64	5.33	0.23	0.067	(0.242)	0.016	0.051
65	5.42	0.23	0.067	(0.241)	0.016	0.051
66	5.50	0.23	0.067	(0.240)	0.016	0.051
67	5.58	0.27	0.077	(0.239)	0.018	0.058
68	5.67	0.27	0.077	(0.238)	0.018	0.058
69	5.75	0.27	0.077	(0.237)	0.018	0.058
70	5.83	0.27	0.077	(0.236)	0.018	0.058
71	5.92	0.27	0.077	(0.235)	0.018	0.058
72	6.00	0.27	0.077	(0.234)	0.018	0.058
73	6.08	0.30	0.086	(0.233)	0.021	0.066
74	6.17	0.30	0.086	(0.232)	0.021	0.066
75	6.25	0.30	0.086	(0.231)	0.021	0.066
76	6.33	0.30	0.086	(0.230)	0.021	0.066
77	6.42	0.30	0.086	(0.229)	0.021	0.066
78	6.50	0.30	0.086	(0.228)	0.021	0.066
79	6.58	0.33	0.096	(0.227)	0.023	0.073
80	6.67	0.33	0.096	(0.226)	0.023	0.073
81	6.75	0.33	0.096	(0.225)	0.023	0.073
82	6.83	0.33	0.096	(0.224)	0.023	0.073
83	6.92	0.33	0.096	(0.223)	0.023	0.073
84	7.00	0.33	0.096	(0.222)	0.023	0.073
85	7.08	0.33	0.096	(0.221)	0.023	0.073
86	7.17	0.33	0.096	(0.220)	0.023	0.073
87	7.25	0.33	0.096	(0.219)	0.023	0.073
88	7.33	0.37	0.106	(0.218)	0.025	0.080
89	7.42	0.37	0.106	(0.217)	0.025	0.080
90	7.50	0.37	0.106	(0.216)	0.025	0.080
91	7.58	0.40	0.115	(0.215)	0.028	0.088
92	7.67	0.40	0.115	(0.214)	0.028	0.088
93	7.75	0.40	0.115	(0.213)	0.028	0.088
94	7.83	0.43	0.125	(0.212)	0.030	0.095
95	7.92	0.43	0.125	(0.211)	0.030	0.095
96	8.00	0.43	0.125	(0.210)	0.030	0.095
97	8.08	0.50	0.144	(0.209)	0.035	0.109
98	8.17	0.50	0.144	(0.208)	0.035	0.109
99	8.25	0.50	0.144	(0.207)	0.035	0.109
100	8.33	0.50	0.144	(0.206)	0.035	0.109
101	8.42	0.50	0.144	(0.205)	0.035	0.109
102	8.50	0.50	0.144	(0.204)	0.035	0.109
103	8.58	0.53	0.154	(0.203)	0.037	0.117
104	8.67	0.53	0.154	(0.202)	0.037	0.117
105	8.75	0.53	0.154	(0.201)	0.037	0.117
106	8.83	0.57	0.163	(0.200)	0.039	0.124
107	8.92	0.57	0.163	(0.199)	0.039	0.124
108	9.00	0.57	0.163	(0.198)	0.039	0.124
109	9.08	0.63	0.182	(0.197)	0.044	0.139
110	9.17	0.63	0.182	(0.196)	0.044	0.139
111	9.25	0.63	0.182	(0.195)	0.044	0.139
112	9.33	0.67	0.192	(0.195)	0.046	0.146
113	9.42	0.67	0.192	(0.194)	0.046	0.146
114	9.50	0.67	0.192	(0.193)	0.046	0.146
115	9.58	0.70	0.202	(0.192)	0.048	0.153

116	9.67	0.70	0.202	(0.191)	0.048	0.153
117	9.75	0.70	0.202	(0.190)	0.048	0.153
118	9.83	0.73	0.211	(0.189)	0.051	0.161
119	9.92	0.73	0.211	(0.188)	0.051	0.161
120	10.00	0.73	0.211	(0.187)	0.051	0.161
121	10.08	0.50	0.144	(0.186)	0.035	0.109
122	10.17	0.50	0.144	(0.185)	0.035	0.109
123	10.25	0.50	0.144	(0.184)	0.035	0.109
124	10.33	0.50	0.144	(0.184)	0.035	0.109
125	10.42	0.50	0.144	(0.183)	0.035	0.109
126	10.50	0.50	0.144	(0.182)	0.035	0.109
127	10.58	0.67	0.192	(0.181)	0.046	0.146
128	10.67	0.67	0.192	(0.180)	0.046	0.146
129	10.75	0.67	0.192	(0.179)	0.046	0.146
130	10.83	0.67	0.192	(0.178)	0.046	0.146
131	10.92	0.67	0.192	(0.177)	0.046	0.146
132	11.00	0.67	0.192	(0.177)	0.046	0.146
133	11.08	0.63	0.182	(0.176)	0.044	0.139
134	11.17	0.63	0.182	(0.175)	0.044	0.139
135	11.25	0.63	0.182	(0.174)	0.044	0.139
136	11.33	0.63	0.182	(0.173)	0.044	0.139
137	11.42	0.63	0.182	(0.172)	0.044	0.139
138	11.50	0.63	0.182	(0.171)	0.044	0.139
139	11.58	0.57	0.163	(0.170)	0.039	0.124
140	11.67	0.57	0.163	(0.170)	0.039	0.124
141	11.75	0.57	0.163	(0.169)	0.039	0.124
142	11.83	0.60	0.173	(0.168)	0.041	0.131
143	11.92	0.60	0.173	(0.167)	0.041	0.131
144	12.00	0.60	0.173	(0.166)	0.041	0.131
145	12.08	0.83	0.240	(0.165)	0.058	0.182
146	12.17	0.83	0.240	(0.165)	0.058	0.182
147	12.25	0.83	0.240	(0.164)	0.058	0.182
148	12.33	0.87	0.250	(0.163)	0.060	0.190
149	12.42	0.87	0.250	(0.162)	0.060	0.190
150	12.50	0.87	0.250	(0.161)	0.060	0.190
151	12.58	0.93	0.269	(0.161)	0.065	0.204
152	12.67	0.93	0.269	(0.160)	0.065	0.204
153	12.75	0.93	0.269	(0.159)	0.065	0.204
154	12.83	0.97	0.278	(0.158)	0.067	0.212
155	12.92	0.97	0.278	(0.157)	0.067	0.212
156	13.00	0.97	0.278	(0.157)	0.067	0.212
157	13.08	1.13	0.326	(0.156)	0.078	0.248
158	13.17	1.13	0.326	(0.155)	0.078	0.248
159	13.25	1.13	0.326	(0.154)	0.078	0.248
160	13.33	1.13	0.326	(0.153)	0.078	0.248
161	13.42	1.13	0.326	(0.153)	0.078	0.248
162	13.50	1.13	0.326	(0.152)	0.078	0.248
163	13.58	0.77	0.221	(0.151)	0.053	0.168
164	13.67	0.77	0.221	(0.150)	0.053	0.168
165	13.75	0.77	0.221	(0.150)	0.053	0.168
166	13.83	0.77	0.221	(0.149)	0.053	0.168
167	13.92	0.77	0.221	(0.148)	0.053	0.168
168	14.00	0.77	0.221	(0.147)	0.053	0.168
169	14.08	0.90	0.259	(0.146)	0.062	0.197
170	14.17	0.90	0.259	(0.146)	0.062	0.197
171	14.25	0.90	0.259	(0.145)	0.062	0.197
172	14.33	0.87	0.250	(0.144)	0.060	0.190
173	14.42	0.87	0.250	(0.144)	0.060	0.190
174	14.50	0.87	0.250	(0.143)	0.060	0.190
175	14.58	0.87	0.250	(0.142)	0.060	0.190
176	14.67	0.87	0.250	(0.141)	0.060	0.190
177	14.75	0.87	0.250	(0.141)	0.060	0.190
178	14.83	0.83	0.240	(0.140)	0.058	0.182
179	14.92	0.83	0.240	(0.139)	0.058	0.182
180	15.00	0.83	0.240	(0.138)	0.058	0.182
181	15.08	0.80	0.230	(0.138)	0.055	0.175
182	15.17	0.80	0.230	(0.137)	0.055	0.175
183	15.25	0.80	0.230	(0.136)	0.055	0.175
184	15.33	0.77	0.221	(0.136)	0.053	0.168
185	15.42	0.77	0.221	(0.135)	0.053	0.168
186	15.50	0.77	0.221	(0.134)	0.053	0.168
187	15.58	0.63	0.182	(0.134)	0.044	0.139
188	15.67	0.63	0.182	(0.133)	0.044	0.139
189	15.75	0.63	0.182	(0.132)	0.044	0.139
190	15.83	0.63	0.182	(0.132)	0.044	0.139

191	15.92	0.63	0.182	(0.131)	0.044	0.139
192	16.00	0.63	0.182	(0.130)	0.044	0.139
193	16.08	0.13	0.038	(0.129)	0.009	0.029
194	16.17	0.13	0.038	(0.129)	0.009	0.029
195	16.25	0.13	0.038	(0.128)	0.009	0.029
196	16.33	0.13	0.038	(0.128)	0.009	0.029
197	16.42	0.13	0.038	(0.127)	0.009	0.029
198	16.50	0.13	0.038	(0.126)	0.009	0.029
199	16.58	0.10	0.029	(0.126)	0.007	0.022
200	16.67	0.10	0.029	(0.125)	0.007	0.022
201	16.75	0.10	0.029	(0.124)	0.007	0.022
202	16.83	0.10	0.029	(0.124)	0.007	0.022
203	16.92	0.10	0.029	(0.123)	0.007	0.022
204	17.00	0.10	0.029	(0.122)	0.007	0.022
205	17.08	0.17	0.048	(0.122)	0.012	0.036
206	17.17	0.17	0.048	(0.121)	0.012	0.036
207	17.25	0.17	0.048	(0.121)	0.012	0.036
208	17.33	0.17	0.048	(0.120)	0.012	0.036
209	17.42	0.17	0.048	(0.119)	0.012	0.036
210	17.50	0.17	0.048	(0.119)	0.012	0.036
211	17.58	0.17	0.048	(0.118)	0.012	0.036
212	17.67	0.17	0.048	(0.118)	0.012	0.036
213	17.75	0.17	0.048	(0.117)	0.012	0.036
214	17.83	0.13	0.038	(0.116)	0.009	0.029
215	17.92	0.13	0.038	(0.116)	0.009	0.029
216	18.00	0.13	0.038	(0.115)	0.009	0.029
217	18.08	0.13	0.038	(0.115)	0.009	0.029
218	18.17	0.13	0.038	(0.114)	0.009	0.029
219	18.25	0.13	0.038	(0.114)	0.009	0.029
220	18.33	0.13	0.038	(0.113)	0.009	0.029
221	18.42	0.13	0.038	(0.112)	0.009	0.029
222	18.50	0.13	0.038	(0.112)	0.009	0.029
223	18.58	0.10	0.029	(0.111)	0.007	0.022
224	18.67	0.10	0.029	(0.111)	0.007	0.022
225	18.75	0.10	0.029	(0.110)	0.007	0.022
226	18.83	0.07	0.019	(0.110)	0.005	0.015
227	18.92	0.07	0.019	(0.109)	0.005	0.015
228	19.00	0.07	0.019	(0.109)	0.005	0.015
229	19.08	0.10	0.029	(0.108)	0.007	0.022
230	19.17	0.10	0.029	(0.108)	0.007	0.022
231	19.25	0.10	0.029	(0.107)	0.007	0.022
232	19.33	0.13	0.038	(0.107)	0.009	0.029
233	19.42	0.13	0.038	(0.106)	0.009	0.029
234	19.50	0.13	0.038	(0.106)	0.009	0.029
235	19.58	0.10	0.029	(0.105)	0.007	0.022
236	19.67	0.10	0.029	(0.105)	0.007	0.022
237	19.75	0.10	0.029	(0.104)	0.007	0.022
238	19.83	0.07	0.019	(0.104)	0.005	0.015
239	19.92	0.07	0.019	(0.103)	0.005	0.015
240	20.00	0.07	0.019	(0.103)	0.005	0.015
241	20.08	0.10	0.029	(0.102)	0.007	0.022
242	20.17	0.10	0.029	(0.102)	0.007	0.022
243	20.25	0.10	0.029	(0.102)	0.007	0.022
244	20.33	0.10	0.029	(0.101)	0.007	0.022
245	20.42	0.10	0.029	(0.101)	0.007	0.022
246	20.50	0.10	0.029	(0.100)	0.007	0.022
247	20.58	0.10	0.029	(0.100)	0.007	0.022
248	20.67	0.10	0.029	(0.099)	0.007	0.022
249	20.75	0.10	0.029	(0.099)	0.007	0.022
250	20.83	0.07	0.019	(0.099)	0.005	0.015
251	20.92	0.07	0.019	(0.098)	0.005	0.015
252	21.00	0.07	0.019	(0.098)	0.005	0.015
253	21.08	0.10	0.029	(0.097)	0.007	0.022
254	21.17	0.10	0.029	(0.097)	0.007	0.022
255	21.25	0.10	0.029	(0.097)	0.007	0.022
256	21.33	0.07	0.019	(0.096)	0.005	0.015
257	21.42	0.07	0.019	(0.096)	0.005	0.015
258	21.50	0.07	0.019	(0.096)	0.005	0.015
259	21.58	0.10	0.029	(0.095)	0.007	0.022
260	21.67	0.10	0.029	(0.095)	0.007	0.022
261	21.75	0.10	0.029	(0.095)	0.007	0.022
262	21.83	0.07	0.019	(0.094)	0.005	0.015
263	21.92	0.07	0.019	(0.094)	0.005	0.015
264	22.00	0.07	0.019	(0.094)	0.005	0.015
265	22.08	0.10	0.029	(0.093)	0.007	0.022

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266  22.17     0.10      0.029       (  0.093)       0.007        0.022
267  22.25     0.10      0.029       (  0.093)       0.007        0.022
268  22.33     0.07      0.019       (  0.092)       0.005        0.015
269  22.42     0.07      0.019       (  0.092)       0.005        0.015
270  22.50     0.07      0.019       (  0.092)       0.005        0.015
271  22.58     0.07      0.019       (  0.092)       0.005        0.015
272  22.67     0.07      0.019       (  0.091)       0.005        0.015
273  22.75     0.07      0.019       (  0.091)       0.005        0.015
274  22.83     0.07      0.019       (  0.091)       0.005        0.015
275  22.92     0.07      0.019       (  0.091)       0.005        0.015
276  23.00     0.07      0.019       (  0.090)       0.005        0.015
277  23.08     0.07      0.019       (  0.090)       0.005        0.015
278  23.17     0.07      0.019       (  0.090)       0.005        0.015
279  23.25     0.07      0.019       (  0.090)       0.005        0.015
280  23.33     0.07      0.019       (  0.090)       0.005        0.015
281  23.42     0.07      0.019       (  0.089)       0.005        0.015
282  23.50     0.07      0.019       (  0.089)       0.005        0.015
283  23.58     0.07      0.019       (  0.089)       0.005        0.015
284  23.67     0.07      0.019       (  0.089)       0.005        0.015
285  23.75     0.07      0.019       (  0.089)       0.005        0.015
286  23.83     0.07      0.019       (  0.089)       0.005        0.015
287  23.92     0.07      0.019       (  0.089)       0.005        0.015
288  24.00     0.07      0.019       (  0.089)       0.005        0.015
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    21.9
      Flood volume = Effective rainfall      1.82(In)
       times area       9.5(Ac.)/[(In)/(Ft.)] =       1.4(Ac.Ft)
      Total soil loss =      0.58(In)
      Total soil loss =     0.456(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       62899.5 Cubic Feet
      Total soil loss =       19863.0 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.367(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0001      0.01  Q          |         |         |         |
  0+10       0.0005      0.07  Q          |         |         |         |
  0+15       0.0013      0.11  Q          |         |         |         |
  0+20       0.0022      0.13  Q          |         |         |         |
  0+25       0.0033      0.17  Q          |         |         |         |
  0+30       0.0046      0.19  Q          |         |         |         |
  0+35       0.0060      0.20  Q          |         |         |         |
  0+40       0.0074      0.20  Q          |         |         |         |
  0+45       0.0088      0.21  Q          |         |         |         |
  0+50       0.0103      0.21  Q          |         |         |         |
  0+55       0.0120      0.24  Q          |         |         |         |
  1+ 0       0.0138      0.26  VQ         |         |         |         |
  1+ 5       0.0156      0.27  VQ         |         |         |         |
  1+10       0.0173      0.24  Q          |         |         |         |
  1+15       0.0188      0.22  Q          |         |         |         |
  1+20       0.0203      0.22  Q          |         |         |         |
  1+25       0.0218      0.21  Q          |         |         |         |
  1+30       0.0233      0.21  Q          |         |         |         |
  1+35       0.0247      0.21  Q          |         |         |         |
  1+40       0.0262      0.21  Q          |         |         |         |
  1+45       0.0276      0.21  Q          |         |         |         |
  1+50       0.0291      0.21  Q          |         |         |         |
  1+55       0.0308      0.24  Q          |         |         |         |
  2+ 0       0.0326      0.26  VQ         |         |         |         |
  2+ 5       0.0344      0.27  VQ         |         |         |         |
  2+10       0.0363      0.28  |Q         |         |         |         |
  2+15       0.0383      0.28  |Q         |         |         |         |
  2+20       0.0402      0.28  |Q         |         |         |         |
  2+25       0.0421      0.28  |Q         |         |         |         |
  2+30       0.0440      0.28  |Q         |         |         |         |
  2+35       0.0460      0.28  |Q         |         |         |         |
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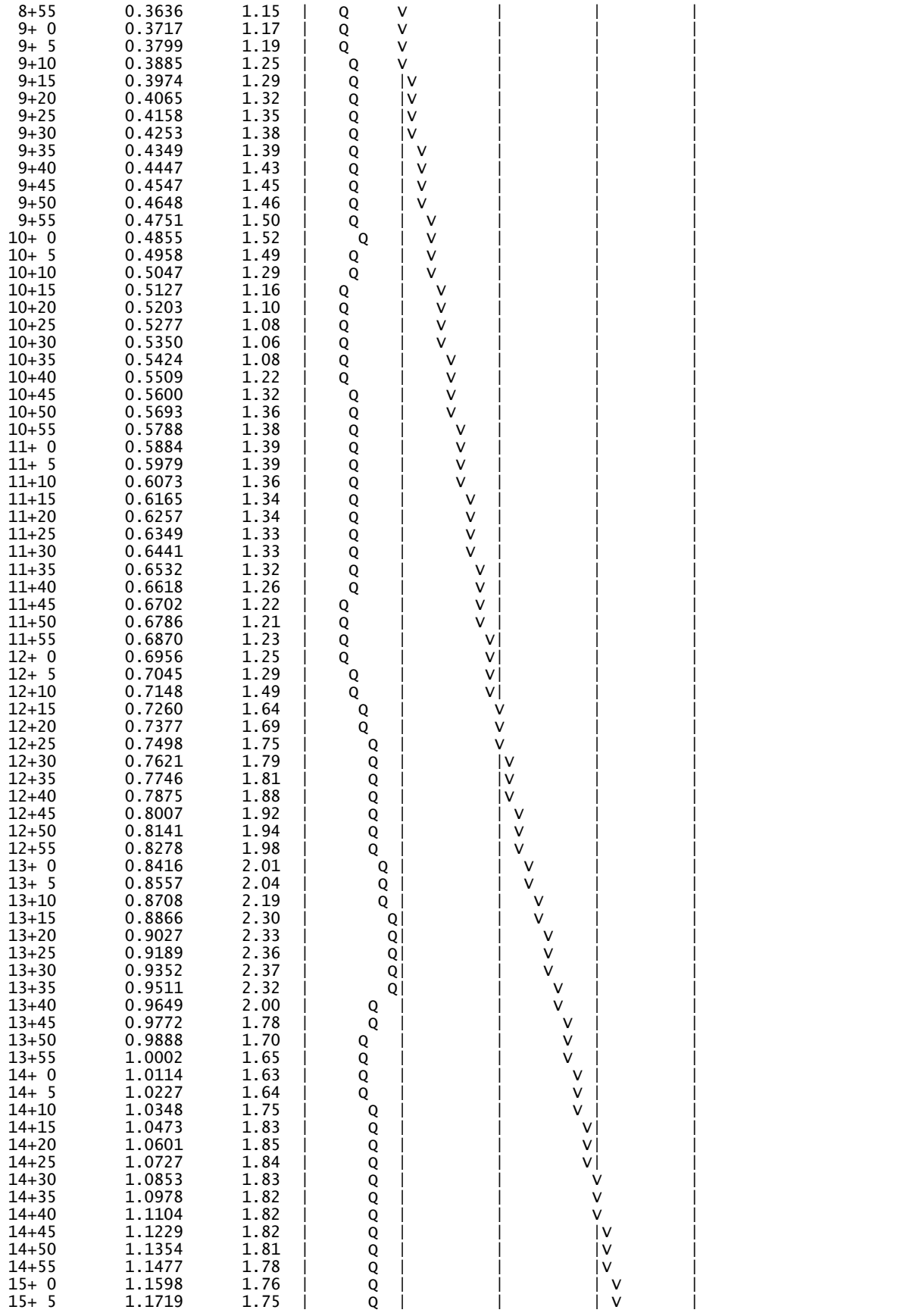
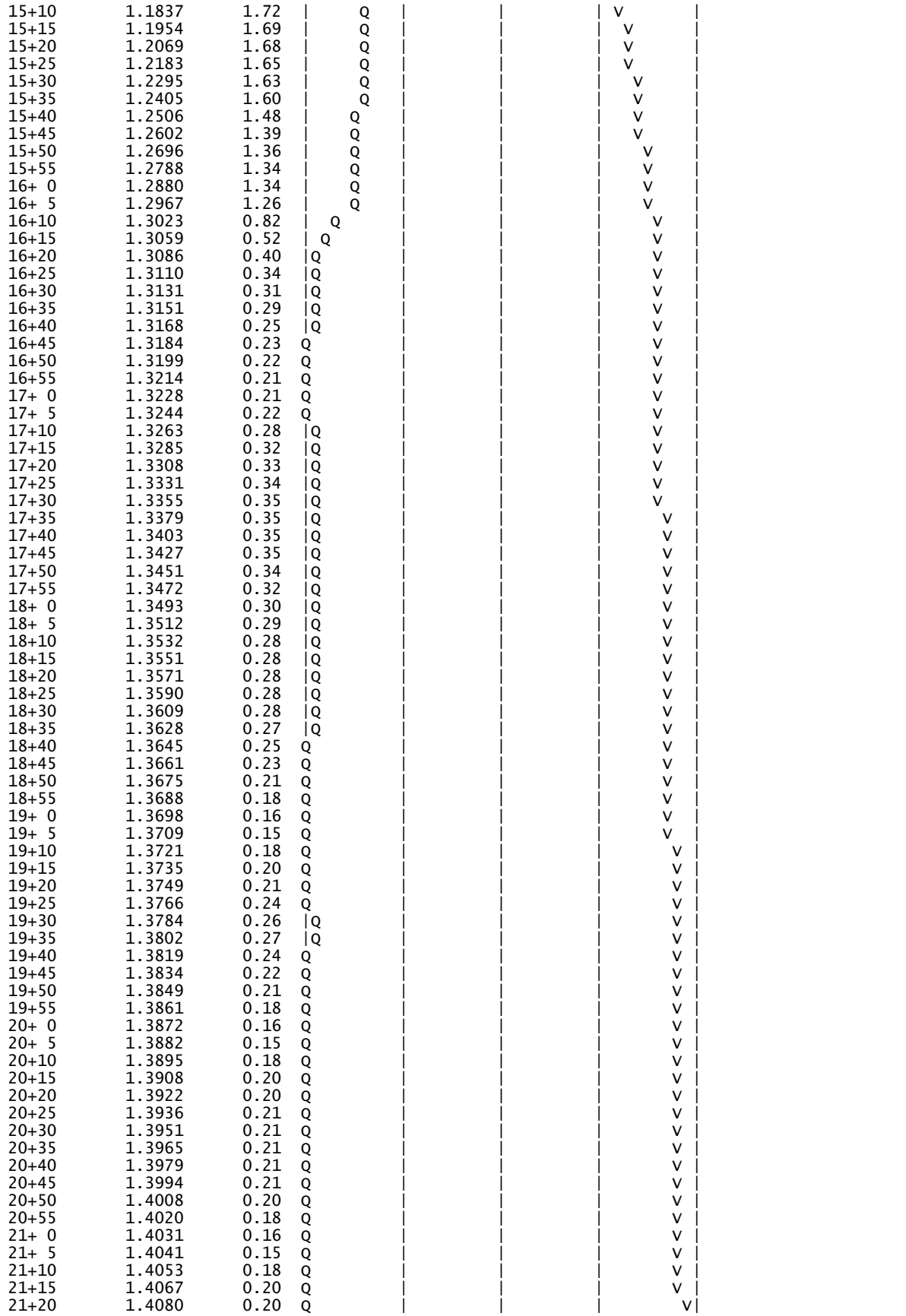
2+40	0.0481	0.31	Q			
2+45	0.0504	0.33	Q			
2+50	0.0528	0.34	Q			
2+55	0.0552	0.35	Q			
3+ 0	0.0576	0.35	Q			
3+ 5	0.0600	0.35	Q			
3+10	0.0624	0.35	Q			
3+15	0.0648	0.35	Q			
3+20	0.0672	0.35	Q			
3+25	0.0696	0.35	Q			
3+30	0.0720	0.35	Q			
3+35	0.0744	0.35	QV			
3+40	0.0768	0.35	QV			
3+45	0.0792	0.35	QV			
3+50	0.0817	0.35	QV			
3+55	0.0843	0.38	QV			
4+ 0	0.0871	0.40	QV			
4+ 5	0.0899	0.41	QV			
4+10	0.0928	0.42	QV			
4+15	0.0956	0.42	QV			
4+20	0.0986	0.42	QV			
4+25	0.1017	0.45	QV			
4+30	0.1049	0.47	QV			
4+35	0.1082	0.48	QV			
4+40	0.1116	0.49	Q V			
4+45	0.1149	0.49	Q V			
4+50	0.1183	0.49	Q V			
4+55	0.1219	0.52	QV			
5+ 0	0.1257	0.54	QV			
5+ 5	0.1294	0.54	QV			
5+10	0.1328	0.49	Q V			
5+15	0.1359	0.45	Q V			
5+20	0.1389	0.44	Q V			
5+25	0.1421	0.46	Q V			
5+30	0.1453	0.48	Q V			
5+35	0.1487	0.49	Q V			
5+40	0.1523	0.52	Q V			
5+45	0.1560	0.54	Q V			
5+50	0.1598	0.55	Q V			
5+55	0.1636	0.55	Q V			
6+ 0	0.1675	0.56	Q V			
6+ 5	0.1713	0.56	Q V			
6+10	0.1754	0.59	Q V			
6+15	0.1796	0.61	Q V			
6+20	0.1839	0.62	Q V			
6+25	0.1882	0.63	Q V			
6+30	0.1926	0.63	Q V			
6+35	0.1969	0.63	Q V			
6+40	0.2015	0.66	Q V			
6+45	0.2062	0.68	Q V			
6+50	0.2109	0.69	Q V			
6+55	0.2157	0.69	Q V			
7+ 0	0.2205	0.70	Q V			
7+ 5	0.2253	0.70	Q V			
7+10	0.2301	0.70	Q V			
7+15	0.2349	0.70	Q V			
7+20	0.2398	0.70	Q V			
7+25	0.2448	0.73	Q V			
7+30	0.2500	0.75	Q V			
7+35	0.2553	0.77	Q V			
7+40	0.2608	0.80	Q V			
7+45	0.2665	0.82	Q V			
7+50	0.2722	0.83	Q V			
7+55	0.2782	0.87	Q V			
8+ 0	0.2843	0.89	Q V			
8+ 5	0.2906	0.91	Q V			
8+10	0.2973	0.97	Q V			
8+15	0.3043	1.01	Q V			
8+20	0.3114	1.03	Q V			
8+25	0.3185	1.04	Q V			
8+30	0.3257	1.04	Q V			
8+35	0.3330	1.05	Q V			
8+40	0.3404	1.08	Q V			
8+45	0.3480	1.10	Q V			
8+50	0.3557	1.12	Q V			





21+25	1.4092	0.17	Q	|	|	|	v|
21+30	1.4103	0.15	Q	|	|	|	v|
21+35	1.4113	0.15	Q	|	|	|	v|
21+40	1.4126	0.18	Q	|	|	|	v|
21+45	1.4139	0.20	Q	|	|	|	v|
21+50	1.4153	0.20	Q	|	|	|	v|
21+55	1.4165	0.17	Q	|	|	|	v|
22+ 0	1.4175	0.15	Q	|	|	|	v|
22+ 5	1.4186	0.15	Q	|	|	|	v|
22+10	1.4198	0.18	Q	|	|	|	v|
22+15	1.4211	0.20	Q	|	|	|	v|
22+20	1.4225	0.20	Q	|	|	|	v|
22+25	1.4237	0.17	Q	|	|	|	v|
22+30	1.4247	0.15	Q	|	|	|	v|
22+35	1.4257	0.15	Q	|	|	|	v|
22+40	1.4267	0.14	Q	|	|	|	v|
22+45	1.4277	0.14	Q	|	|	|	v|
22+50	1.4287	0.14	Q	|	|	|	v|
22+55	1.4296	0.14	Q	|	|	|	v|
23+ 0	1.4306	0.14	Q	|	|	|	v|
23+ 5	1.4316	0.14	Q	|	|	|	v|
23+10	1.4325	0.14	Q	|	|	|	v|
23+15	1.4335	0.14	Q	|	|	|	v|
23+20	1.4345	0.14	Q	|	|	|	v|
23+25	1.4354	0.14	Q	|	|	|	v|
23+30	1.4364	0.14	Q	|	|	|	v|
23+35	1.4373	0.14	Q	|	|	|	v|
23+40	1.4383	0.14	Q	|	|	|	v|
23+45	1.4393	0.14	Q	|	|	|	v|
23+50	1.4402	0.14	Q	|	|	|	v|
23+55	1.4412	0.14	Q	|	|	|	v|
24+ 0	1.4422	0.14	Q	|	|	|	v|
24+ 5	1.4430	0.13	Q	|	|	|	v|
24+10	1.4435	0.07	Q	|	|	|	v|
24+15	1.4438	0.03	Q	|	|	|	v|
24+20	1.4439	0.02	Q	|	|	|	v|
24+25	1.4439	0.01	Q	|	|	|	v|
24+30	1.4439	0.00	Q	|	|	|	v|
24+35	1.4440	0.00	Q	|	|	|	v|
24+40	1.4440	0.00	Q	|	|	|	v|
24+45	1.4440	0.00	Q	|	|	|	v|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/23/21 File: PROP2YR5A242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG A AREA 5 DEVELOPED CONDITION
2-YR 24 HR STORM EVENT
21-0034
2021-11-23

Drainage Area = 8.10(Ac.) = 0.013 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 8.10(Ac.) = 0.013 Sq. Mi.
Length along longest watercourse = 899.00(Ft.)
Length along longest watercourse measured to centroid = 602.00(Ft.)
Length along longest watercourse = 0.170 Mi.
Length along longest watercourse measured to centroid = 0.114 Mi.
Difference in elevation = 6.50(Ft.)
Slope along watercourse = 38.1758 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.040 Hr.
Lag time = 2.42 Min.
25% of lag time = 0.60 Min.
40% of lag time = 0.97 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
8.10	2.40	19.44

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
8.10	6.20	50.22

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
8.100	61.60	0.790

Total Area Entered = 8.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

61.6	41.6	0.654	0.790	0.189	1.000	0.189
					Sum (F) =	0.189

Area averaged mean soil loss (F) (In/Hr) = 0.189
Minimum soil loss rate ((In/Hr)) = 0.095
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	206.815	43.617	3.561
2	0.167	413.630	49.361	4.030
3	0.250	620.445	6.065	0.495
4	0.333	827.261	0.956	0.078
			Sum = 100.000 Sum=	8.163

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.335)	0.005	0.014
2	0.17	0.07	0.019	(0.334)	0.005	0.014
3	0.25	0.07	0.019	(0.333)	0.005	0.014
4	0.33	0.10	0.029	(0.331)	0.008	0.021
5	0.42	0.10	0.029	(0.330)	0.008	0.021
6	0.50	0.10	0.029	(0.329)	0.008	0.021
7	0.58	0.10	0.029	(0.327)	0.008	0.021
8	0.67	0.10	0.029	(0.326)	0.008	0.021
9	0.75	0.10	0.029	(0.325)	0.008	0.021
10	0.83	0.13	0.038	(0.324)	0.010	0.028
11	0.92	0.13	0.038	(0.322)	0.010	0.028
12	1.00	0.13	0.038	(0.321)	0.010	0.028
13	1.08	0.10	0.029	(0.320)	0.008	0.021
14	1.17	0.10	0.029	(0.319)	0.008	0.021
15	1.25	0.10	0.029	(0.317)	0.008	0.021
16	1.33	0.10	0.029	(0.316)	0.008	0.021
17	1.42	0.10	0.029	(0.315)	0.008	0.021
18	1.50	0.10	0.029	(0.314)	0.008	0.021
19	1.58	0.10	0.029	(0.312)	0.008	0.021
20	1.67	0.10	0.029	(0.311)	0.008	0.021
21	1.75	0.10	0.029	(0.310)	0.008	0.021
22	1.83	0.13	0.038	(0.309)	0.010	0.028
23	1.92	0.13	0.038	(0.307)	0.010	0.028
24	2.00	0.13	0.038	(0.306)	0.010	0.028
25	2.08	0.13	0.038	(0.305)	0.010	0.028
26	2.17	0.13	0.038	(0.304)	0.010	0.028
27	2.25	0.13	0.038	(0.302)	0.010	0.028
28	2.33	0.13	0.038	(0.301)	0.010	0.028
29	2.42	0.13	0.038	(0.300)	0.010	0.028
30	2.50	0.13	0.038	(0.299)	0.010	0.028
31	2.58	0.17	0.048	(0.297)	0.013	0.035
32	2.67	0.17	0.048	(0.296)	0.013	0.035
33	2.75	0.17	0.048	(0.295)	0.013	0.035
34	2.83	0.17	0.048	(0.294)	0.013	0.035
35	2.92	0.17	0.048	(0.293)	0.013	0.035
36	3.00	0.17	0.048	(0.291)	0.013	0.035
37	3.08	0.17	0.048	(0.290)	0.013	0.035
38	3.17	0.17	0.048	(0.289)	0.013	0.035
39	3.25	0.17	0.048	(0.288)	0.013	0.035
40	3.33	0.17	0.048	(0.287)	0.013	0.035
41	3.42	0.17	0.048	(0.285)	0.013	0.035
42	3.50	0.17	0.048	(0.284)	0.013	0.035
43	3.58	0.17	0.048	(0.283)	0.013	0.035
44	3.67	0.17	0.048	(0.282)	0.013	0.035
45	3.75	0.17	0.048	(0.281)	0.013	0.035
46	3.83	0.20	0.058	(0.279)	0.016	0.042

47	3.92	0.20	0.058	(0.278)	0.016	0.042
48	4.00	0.20	0.058	(0.277)	0.016	0.042
49	4.08	0.20	0.058	(0.276)	0.016	0.042
50	4.17	0.20	0.058	(0.275)	0.016	0.042
51	4.25	0.20	0.058	(0.274)	0.016	0.042
52	4.33	0.23	0.067	(0.272)	0.018	0.049
53	4.42	0.23	0.067	(0.271)	0.018	0.049
54	4.50	0.23	0.067	(0.270)	0.018	0.049
55	4.58	0.23	0.067	(0.269)	0.018	0.049
56	4.67	0.23	0.067	(0.268)	0.018	0.049
57	4.75	0.23	0.067	(0.267)	0.018	0.049
58	4.83	0.27	0.077	(0.265)	0.021	0.056
59	4.92	0.27	0.077	(0.264)	0.021	0.056
60	5.00	0.27	0.077	(0.263)	0.021	0.056
61	5.08	0.20	0.058	(0.262)	0.016	0.042
62	5.17	0.20	0.058	(0.261)	0.016	0.042
63	5.25	0.20	0.058	(0.260)	0.016	0.042
64	5.33	0.23	0.067	(0.259)	0.018	0.049
65	5.42	0.23	0.067	(0.257)	0.018	0.049
66	5.50	0.23	0.067	(0.256)	0.018	0.049
67	5.58	0.27	0.077	(0.255)	0.021	0.056
68	5.67	0.27	0.077	(0.254)	0.021	0.056
69	5.75	0.27	0.077	(0.253)	0.021	0.056
70	5.83	0.27	0.077	(0.252)	0.021	0.056
71	5.92	0.27	0.077	(0.251)	0.021	0.056
72	6.00	0.27	0.077	(0.250)	0.021	0.056
73	6.08	0.30	0.086	(0.248)	0.023	0.063
74	6.17	0.30	0.086	(0.247)	0.023	0.063
75	6.25	0.30	0.086	(0.246)	0.023	0.063
76	6.33	0.30	0.086	(0.245)	0.023	0.063
77	6.42	0.30	0.086	(0.244)	0.023	0.063
78	6.50	0.30	0.086	(0.243)	0.023	0.063
79	6.58	0.33	0.096	(0.242)	0.026	0.070
80	6.67	0.33	0.096	(0.241)	0.026	0.070
81	6.75	0.33	0.096	(0.240)	0.026	0.070
82	6.83	0.33	0.096	(0.239)	0.026	0.070
83	6.92	0.33	0.096	(0.238)	0.026	0.070
84	7.00	0.33	0.096	(0.236)	0.026	0.070
85	7.08	0.33	0.096	(0.235)	0.026	0.070
86	7.17	0.33	0.096	(0.234)	0.026	0.070
87	7.25	0.33	0.096	(0.233)	0.026	0.070
88	7.33	0.37	0.106	(0.232)	0.029	0.077
89	7.42	0.37	0.106	(0.231)	0.029	0.077
90	7.50	0.37	0.106	(0.230)	0.029	0.077
91	7.58	0.40	0.115	(0.229)	0.031	0.084
92	7.67	0.40	0.115	(0.228)	0.031	0.084
93	7.75	0.40	0.115	(0.227)	0.031	0.084
94	7.83	0.43	0.125	(0.226)	0.034	0.091
95	7.92	0.43	0.125	(0.225)	0.034	0.091
96	8.00	0.43	0.125	(0.224)	0.034	0.091
97	8.08	0.50	0.144	(0.223)	0.039	0.105
98	8.17	0.50	0.144	(0.222)	0.039	0.105
99	8.25	0.50	0.144	(0.221)	0.039	0.105
100	8.33	0.50	0.144	(0.220)	0.039	0.105
101	8.42	0.50	0.144	(0.219)	0.039	0.105
102	8.50	0.50	0.144	(0.218)	0.039	0.105
103	8.58	0.53	0.154	(0.217)	0.041	0.112
104	8.67	0.53	0.154	(0.216)	0.041	0.112
105	8.75	0.53	0.154	(0.215)	0.041	0.112
106	8.83	0.57	0.163	(0.214)	0.044	0.119
107	8.92	0.57	0.163	(0.213)	0.044	0.119
108	9.00	0.57	0.163	(0.212)	0.044	0.119
109	9.08	0.63	0.182	(0.211)	0.049	0.133
110	9.17	0.63	0.182	(0.210)	0.049	0.133
111	9.25	0.63	0.182	(0.209)	0.049	0.133
112	9.33	0.67	0.192	(0.208)	0.052	0.140
113	9.42	0.67	0.192	(0.207)	0.052	0.140
114	9.50	0.67	0.192	(0.206)	0.052	0.140
115	9.58	0.70	0.202	(0.205)	0.054	0.147
116	9.67	0.70	0.202	(0.204)	0.054	0.147
117	9.75	0.70	0.202	(0.203)	0.054	0.147
118	9.83	0.73	0.211	(0.202)	0.057	0.154
119	9.92	0.73	0.211	(0.201)	0.057	0.154
120	10.00	0.73	0.211	(0.200)	0.057	0.154
121	10.08	0.50	0.144	(0.199)	0.039	0.105

122	10.17	0.50	0.144	(0.198)	0.039	0.105
123	10.25	0.50	0.144	(0.197)	0.039	0.105
124	10.33	0.50	0.144	(0.196)	0.039	0.105
125	10.42	0.50	0.144	(0.195)	0.039	0.105
126	10.50	0.50	0.144	(0.194)	0.039	0.105
127	10.58	0.67	0.192	(0.193)	0.052	0.140
128	10.67	0.67	0.192	(0.192)	0.052	0.140
129	10.75	0.67	0.192	(0.191)	0.052	0.140
130	10.83	0.67	0.192	(0.190)	0.052	0.140
131	10.92	0.67	0.192	(0.189)	0.052	0.140
132	11.00	0.67	0.192	(0.188)	0.052	0.140
133	11.08	0.63	0.182	(0.187)	0.049	0.133
134	11.17	0.63	0.182	(0.186)	0.049	0.133
135	11.25	0.63	0.182	(0.186)	0.049	0.133
136	11.33	0.63	0.182	(0.185)	0.049	0.133
137	11.42	0.63	0.182	(0.184)	0.049	0.133
138	11.50	0.63	0.182	(0.183)	0.049	0.133
139	11.58	0.57	0.163	(0.182)	0.044	0.119
140	11.67	0.57	0.163	(0.181)	0.044	0.119
141	11.75	0.57	0.163	(0.180)	0.044	0.119
142	11.83	0.60	0.173	(0.179)	0.047	0.126
143	11.92	0.60	0.173	(0.178)	0.047	0.126
144	12.00	0.60	0.173	(0.177)	0.047	0.126
145	12.08	0.83	0.240	(0.177)	0.065	0.175
146	12.17	0.83	0.240	(0.176)	0.065	0.175
147	12.25	0.83	0.240	(0.175)	0.065	0.175
148	12.33	0.87	0.250	(0.174)	0.067	0.182
149	12.42	0.87	0.250	(0.173)	0.067	0.182
150	12.50	0.87	0.250	(0.172)	0.067	0.182
151	12.58	0.93	0.269	(0.171)	0.073	0.196
152	12.67	0.93	0.269	(0.170)	0.073	0.196
153	12.75	0.93	0.269	(0.170)	0.073	0.196
154	12.83	0.97	0.278	(0.169)	0.075	0.203
155	12.92	0.97	0.278	(0.168)	0.075	0.203
156	13.00	0.97	0.278	(0.167)	0.075	0.203
157	13.08	1.13	0.326	(0.166)	0.088	0.238
158	13.17	1.13	0.326	(0.165)	0.088	0.238
159	13.25	1.13	0.326	(0.164)	0.088	0.238
160	13.33	1.13	0.326	(0.164)	0.088	0.238
161	13.42	1.13	0.326	(0.163)	0.088	0.238
162	13.50	1.13	0.326	(0.162)	0.088	0.238
163	13.58	0.77	0.221	(0.161)	0.060	0.161
164	13.67	0.77	0.221	(0.160)	0.060	0.161
165	13.75	0.77	0.221	(0.160)	0.060	0.161
166	13.83	0.77	0.221	(0.159)	0.060	0.161
167	13.92	0.77	0.221	(0.158)	0.060	0.161
168	14.00	0.77	0.221	(0.157)	0.060	0.161
169	14.08	0.90	0.259	(0.156)	0.070	0.189
170	14.17	0.90	0.259	(0.155)	0.070	0.189
171	14.25	0.90	0.259	(0.155)	0.070	0.189
172	14.33	0.87	0.250	(0.154)	0.067	0.182
173	14.42	0.87	0.250	(0.153)	0.067	0.182
174	14.50	0.87	0.250	(0.152)	0.067	0.182
175	14.58	0.87	0.250	(0.152)	0.067	0.182
176	14.67	0.87	0.250	(0.151)	0.067	0.182
177	14.75	0.87	0.250	(0.150)	0.067	0.182
178	14.83	0.83	0.240	(0.149)	0.065	0.175
179	14.92	0.83	0.240	(0.148)	0.065	0.175
180	15.00	0.83	0.240	(0.148)	0.065	0.175
181	15.08	0.80	0.230	(0.147)	0.062	0.168
182	15.17	0.80	0.230	(0.146)	0.062	0.168
183	15.25	0.80	0.230	(0.145)	0.062	0.168
184	15.33	0.77	0.221	(0.145)	0.060	0.161
185	15.42	0.77	0.221	(0.144)	0.060	0.161
186	15.50	0.77	0.221	(0.143)	0.060	0.161
187	15.58	0.63	0.182	(0.142)	0.049	0.133
188	15.67	0.63	0.182	(0.142)	0.049	0.133
189	15.75	0.63	0.182	(0.141)	0.049	0.133
190	15.83	0.63	0.182	(0.140)	0.049	0.133
191	15.92	0.63	0.182	(0.140)	0.049	0.133
192	16.00	0.63	0.182	(0.139)	0.049	0.133
193	16.08	0.13	0.038	(0.138)	0.010	0.028
194	16.17	0.13	0.038	(0.137)	0.010	0.028
195	16.25	0.13	0.038	(0.137)	0.010	0.028
196	16.33	0.13	0.038	(0.136)	0.010	0.028

197	16.42	0.13	0.038	(0.135)	0.010	0.028
198	16.50	0.13	0.038	(0.135)	0.010	0.028
199	16.58	0.10	0.029	(0.134)	0.008	0.021
200	16.67	0.10	0.029	(0.133)	0.008	0.021
201	16.75	0.10	0.029	(0.133)	0.008	0.021
202	16.83	0.10	0.029	(0.132)	0.008	0.021
203	16.92	0.10	0.029	(0.131)	0.008	0.021
204	17.00	0.10	0.029	(0.131)	0.008	0.021
205	17.08	0.17	0.048	(0.130)	0.013	0.035
206	17.17	0.17	0.048	(0.129)	0.013	0.035
207	17.25	0.17	0.048	(0.129)	0.013	0.035
208	17.33	0.17	0.048	(0.128)	0.013	0.035
209	17.42	0.17	0.048	(0.127)	0.013	0.035
210	17.50	0.17	0.048	(0.127)	0.013	0.035
211	17.58	0.17	0.048	(0.126)	0.013	0.035
212	17.67	0.17	0.048	(0.125)	0.013	0.035
213	17.75	0.17	0.048	(0.125)	0.013	0.035
214	17.83	0.13	0.038	(0.124)	0.010	0.028
215	17.92	0.13	0.038	(0.124)	0.010	0.028
216	18.00	0.13	0.038	(0.123)	0.010	0.028
217	18.08	0.13	0.038	(0.122)	0.010	0.028
218	18.17	0.13	0.038	(0.122)	0.010	0.028
219	18.25	0.13	0.038	(0.121)	0.010	0.028
220	18.33	0.13	0.038	(0.121)	0.010	0.028
221	18.42	0.13	0.038	(0.120)	0.010	0.028
222	18.50	0.13	0.038	(0.119)	0.010	0.028
223	18.58	0.10	0.029	(0.119)	0.008	0.021
224	18.67	0.10	0.029	(0.118)	0.008	0.021
225	18.75	0.10	0.029	(0.118)	0.008	0.021
226	18.83	0.07	0.019	(0.117)	0.005	0.014
227	18.92	0.07	0.019	(0.117)	0.005	0.014
228	19.00	0.07	0.019	(0.116)	0.005	0.014
229	19.08	0.10	0.029	(0.115)	0.008	0.021
230	19.17	0.10	0.029	(0.115)	0.008	0.021
231	19.25	0.10	0.029	(0.114)	0.008	0.021
232	19.33	0.13	0.038	(0.114)	0.010	0.028
233	19.42	0.13	0.038	(0.113)	0.010	0.028
234	19.50	0.13	0.038	(0.113)	0.010	0.028
235	19.58	0.10	0.029	(0.112)	0.008	0.021
236	19.67	0.10	0.029	(0.112)	0.008	0.021
237	19.75	0.10	0.029	(0.111)	0.008	0.021
238	19.83	0.07	0.019	(0.111)	0.005	0.014
239	19.92	0.07	0.019	(0.110)	0.005	0.014
240	20.00	0.07	0.019	(0.110)	0.005	0.014
241	20.08	0.10	0.029	(0.109)	0.008	0.021
242	20.17	0.10	0.029	(0.109)	0.008	0.021
243	20.25	0.10	0.029	(0.108)	0.008	0.021
244	20.33	0.10	0.029	(0.108)	0.008	0.021
245	20.42	0.10	0.029	(0.107)	0.008	0.021
246	20.50	0.10	0.029	(0.107)	0.008	0.021
247	20.58	0.10	0.029	(0.107)	0.008	0.021
248	20.67	0.10	0.029	(0.106)	0.008	0.021
249	20.75	0.10	0.029	(0.106)	0.008	0.021
250	20.83	0.07	0.019	(0.105)	0.005	0.014
251	20.92	0.07	0.019	(0.105)	0.005	0.014
252	21.00	0.07	0.019	(0.104)	0.005	0.014
253	21.08	0.10	0.029	(0.104)	0.008	0.021
254	21.17	0.10	0.029	(0.104)	0.008	0.021
255	21.25	0.10	0.029	(0.103)	0.008	0.021
256	21.33	0.07	0.019	(0.103)	0.005	0.014
257	21.42	0.07	0.019	(0.102)	0.005	0.014
258	21.50	0.07	0.019	(0.102)	0.005	0.014
259	21.58	0.10	0.029	(0.102)	0.008	0.021
260	21.67	0.10	0.029	(0.101)	0.008	0.021
261	21.75	0.10	0.029	(0.101)	0.008	0.021
262	21.83	0.07	0.019	(0.101)	0.005	0.014
263	21.92	0.07	0.019	(0.100)	0.005	0.014
264	22.00	0.07	0.019	(0.100)	0.005	0.014
265	22.08	0.10	0.029	(0.100)	0.008	0.021
266	22.17	0.10	0.029	(0.099)	0.008	0.021
267	22.25	0.10	0.029	(0.099)	0.008	0.021
268	22.33	0.07	0.019	(0.099)	0.005	0.014
269	22.42	0.07	0.019	(0.098)	0.005	0.014
270	22.50	0.07	0.019	(0.098)	0.005	0.014
271	22.58	0.07	0.019	(0.098)	0.005	0.014

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272  22.67     0.07      0.019       (  0.097)       0.005        0.014
273  22.75     0.07      0.019       (  0.097)       0.005        0.014
274  22.83     0.07      0.019       (  0.097)       0.005        0.014
275  22.92     0.07      0.019       (  0.097)       0.005        0.014
276  23.00     0.07      0.019       (  0.096)       0.005        0.014
277  23.08     0.07      0.019       (  0.096)       0.005        0.014
278  23.17     0.07      0.019       (  0.096)       0.005        0.014
279  23.25     0.07      0.019       (  0.096)       0.005        0.014
280  23.33     0.07      0.019       (  0.096)       0.005        0.014
281  23.42     0.07      0.019       (  0.095)       0.005        0.014
282  23.50     0.07      0.019       (  0.095)       0.005        0.014
283  23.58     0.07      0.019       (  0.095)       0.005        0.014
284  23.67     0.07      0.019       (  0.095)       0.005        0.014
285  23.75     0.07      0.019       (  0.095)       0.005        0.014
286  23.83     0.07      0.019       (  0.095)       0.005        0.014
287  23.92     0.07      0.019       (  0.095)       0.005        0.014
288  24.00     0.07      0.019       (  0.095)       0.005        0.014
                (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    21.0
      Flood volume = Effective rainfall      1.75(In)
       times area       8.1(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
      Total soil loss =      0.65(In)
      Total soil loss =     0.437(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       51513.2 Cubic Feet
      Total soil loss =       19052.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.946(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0003      0.05  Q          |         |         |         |
   0+10       0.0011      0.11  Q          |         |         |         |
   0+15       0.0019      0.11  Q          |         |         |         |
   0+20       0.0028      0.14  Q          |         |         |         |
   0+25       0.0040      0.17  Q          |         |         |         |
   0+30       0.0052      0.17  Q          |         |         |         |
   0+35       0.0063      0.17  Q          |         |         |         |
   0+40       0.0075      0.17  Q          |         |         |         |
   0+45       0.0087      0.17  Q          |         |         |         |
   0+50       0.0101      0.20  Q          |         |         |         |
   0+55       0.0116      0.22  Q          |         |         |         |
   1+ 0       0.0132      0.23  Q          |         |         |         |
   1+ 5       0.0146      0.20  Q          |         |         |         |
   1+10       0.0158      0.18  Q          |         |         |         |
   1+15       0.0170      0.17  Q          |         |         |         |
   1+20       0.0182      0.17  Q          |         |         |         |
   1+25       0.0193      0.17  Q          |         |         |         |
   1+30       0.0205      0.17  Q          |         |         |         |
   1+35       0.0217      0.17  Q          |         |         |         |
   1+40       0.0229      0.17  Q          |         |         |         |
   1+45       0.0241      0.17  Q          |         |         |         |
   1+50       0.0254      0.20  Q          |         |         |         |
   1+55       0.0270      0.22  Q          |         |         |         |
   2+ 0       0.0285      0.23  Q          |         |         |         |
   2+ 5       0.0301      0.23  QV         |         |         |         |
   2+10       0.0317      0.23  QV         |         |         |         |
   2+15       0.0333      0.23  QV         |         |         |         |
   2+20       0.0349      0.23  QV         |         |         |         |
   2+25       0.0364      0.23  QV         |         |         |         |
   2+30       0.0380      0.23  QV         |         |         |         |
   2+35       0.0398      0.25  |Q         |         |         |         |
   2+40       0.0417      0.28  |Q         |         |         |         |
   2+45       0.0437      0.29  |Q         |         |         |         |
   2+50       0.0456      0.29  |Q         |         |         |         |
   2+55       0.0476      0.29  |Q         |         |         |         |
   3+ 0       0.0496      0.29  |Q         |         |         |         |
   3+ 5       0.0516      0.29  |Q         |         |         |         |
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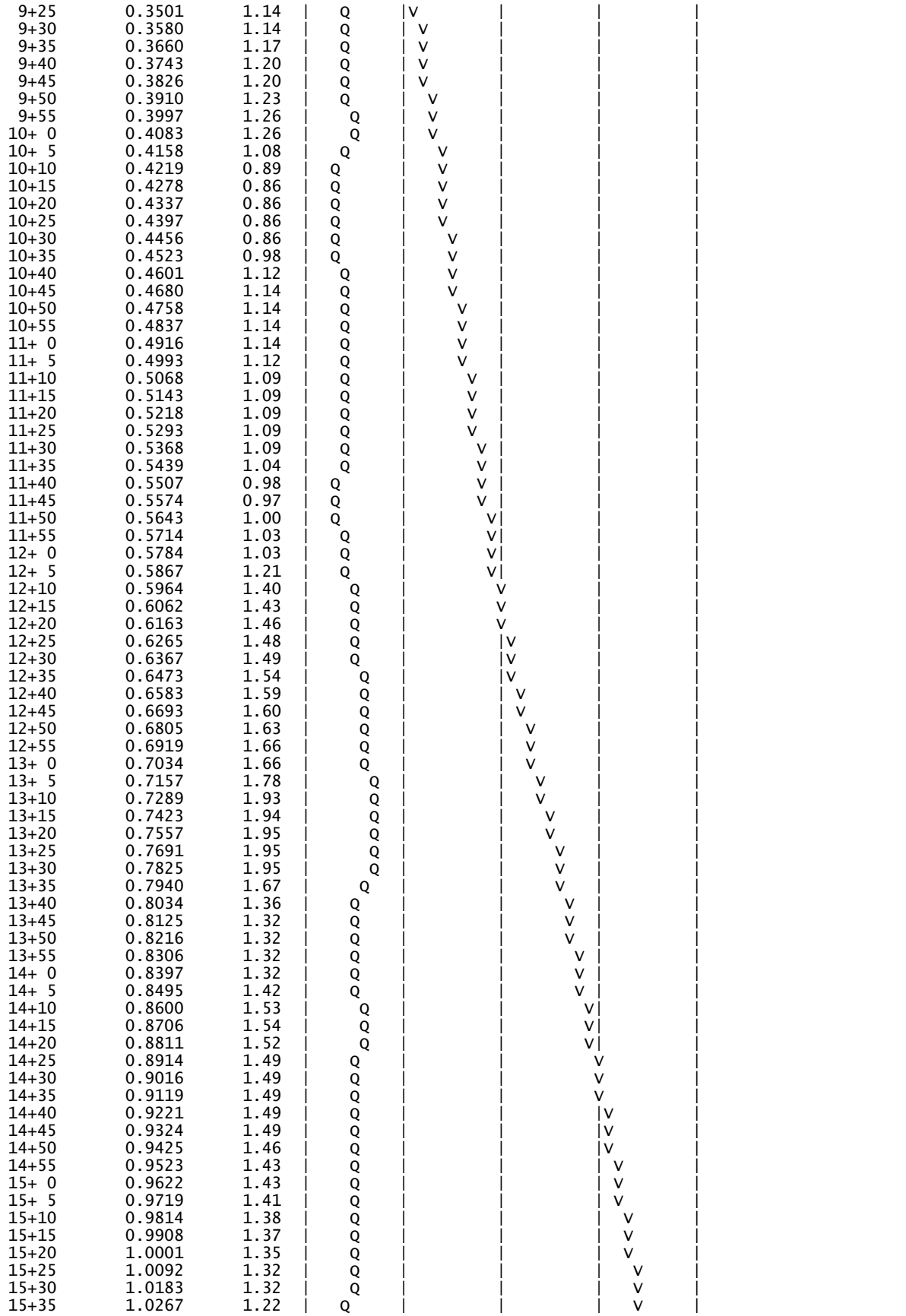
3+10       0.0535      0.29  |Q         |          |          |          |
3+15       0.0555      0.29  |Q         |          |          |          |
3+20       0.0575      0.29  |Q         |          |          |          |
3+25       0.0594      0.29  |QV        |          |          |          |
3+30       0.0614      0.29  |QV        |          |          |          |
3+35       0.0634      0.29  |QV        |          |          |          |
3+40       0.0654      0.29  |QV        |          |          |          |
3+45       0.0673      0.29  |QV        |          |          |          |
3+50       0.0695      0.31  |QV        |          |          |          |
3+55       0.0718      0.34  |QV        |          |          |          |
4+ 0       0.0742      0.34  |QV        |          |          |          |
4+ 5       0.0765      0.34  |QV        |          |          |          |
4+10       0.0789      0.34  |QV        |          |          |          |
4+15       0.0813      0.34  |QV        |          |          |          |
4+20       0.0838      0.37  |QV        |          |          |          |
4+25       0.0865      0.40  |QV        |          |          |          |
4+30       0.0893      0.40  |Q V       |          |          |          |
4+35       0.0920      0.40  |Q V       |          |          |          |
4+40       0.0948      0.40  |Q V       |          |          |          |
4+45       0.0976      0.40  |Q V       |          |          |          |
4+50       0.1005      0.43  |Q V       |          |          |          |
4+55       0.1036      0.45  |Q V       |          |          |          |
5+ 0       0.1068      0.46  |Q V       |          |          |          |
5+ 5       0.1096      0.41  |Q V       |          |          |          |
5+10       0.1120      0.35  |Q V       |          |          |          |
5+15       0.1144      0.34  |Q V       |          |          |          |
5+20       0.1169      0.37  |Q V       |          |          |          |
5+25       0.1196      0.40  |Q  V      |          |          |          |
5+30       0.1224      0.40  |Q  V      |          |          |          |
5+35       0.1253      0.43  |Q  V      |          |          |          |
5+40       0.1285      0.45  |Q  V      |          |          |          |
5+45       0.1316      0.46  |Q  V      |          |          |          |
5+50       0.1348      0.46  |Q  V      |          |          |          |
5+55       0.1379      0.46  |Q  V      |          |          |          |
6+ 0       0.1411      0.46  |Q  V      |          |          |          |
6+ 5       0.1444      0.48  |Q  V      |          |          |          |
6+10       0.1479      0.51  | Q  V     |          |          |          |
6+15       0.1515      0.51  | Q  V     |          |          |          |
6+20       0.1550      0.52  | Q  V     |          |          |          |
6+25       0.1585      0.52  | Q  V     |          |          |          |
6+30       0.1621      0.52  | Q  V     |          |          |          |
6+35       0.1658      0.54  | Q  V     |          |          |          |
6+40       0.1697      0.57  | Q  V     |          |          |          |
6+45       0.1737      0.57  | Q  V     |          |          |          |
6+50       0.1776      0.57  | Q   V    |          |          |          |
6+55       0.1816      0.57  | Q   V    |          |          |          |
7+ 0       0.1855      0.57  | Q   V    |          |          |          |
7+ 5       0.1894      0.57  | Q   V    |          |          |          |
7+10       0.1934      0.57  | Q   V    |          |          |          |
7+15       0.1973      0.57  | Q   V    |          |          |          |
7+20       0.2014      0.60  | Q   V    |          |          |          |
7+25       0.2057      0.63  | Q   V    |          |          |          |
7+30       0.2101      0.63  | Q    V   |          |          |          |
7+35       0.2146      0.65  | Q    V   |          |          |          |
7+40       0.2193      0.68  | Q    V   |          |          |          |
7+45       0.2240      0.69  | Q    V   |          |          |          |
7+50       0.2289      0.71  | Q    V   |          |          |          |
7+55       0.2340      0.74  | Q    V   |          |          |          |
8+ 0       0.2391      0.74  | Q     V  |          |          |          |
8+ 5       0.2446      0.79  |  Q    V  |          |          |          |
8+10       0.2505      0.85  |  Q    V  |          |          |          |
8+15       0.2564      0.86  |  Q    V  |          |          |          |
8+20       0.2623      0.86  |  Q    V  |          |          |          |
8+25       0.2682      0.86  |  Q     V|          |          |          |
8+30       0.2741      0.86  |  Q     V|          |          |          |
8+35       0.2802      0.88  |  Q     V|          |          |          |
8+40       0.2865      0.91  |  Q     V|          |          |          |
8+45       0.2928      0.92  |  Q     V|          |          |          |
8+50       0.2992      0.94  |  Q      V          |          |          |
8+55       0.3059      0.97  |  Q      V          |          |          |
9+ 0       0.3126      0.97  |  Q      V          |          |          |
9+ 5       0.3197      1.02  |   Q     V          |          |          |
9+10       0.3271      1.08  |   Q     |V         |          |          |
9+15       0.3346      1.09  |   Q     |V         |          |          |
9+20       0.3422      1.11  |   Q     |V         |          |          |
```



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15+40       1.0343      1.10  |    Q      |           |           |    V      |
15+45       1.0418      1.09  |    Q      |           |           |     V     |
15+50       1.0493      1.09  |    Q      |           |           |     V     |
15+55       1.0567      1.09  |    Q      |           |           |     V     |
16+ 0       1.0642      1.09  |    Q      |           |           |     V     |
16+ 5       1.0691      0.71  |  Q        |           |           |      V    |
16+10       1.0711      0.29  |Q          |           |           |      V    |
16+15       1.0728      0.24  Q           |           |           |      V    |
16+20       1.0743      0.23  Q           |           |           |      V    |
16+25       1.0759      0.23  Q           |           |           |      V    |
16+30       1.0775      0.23  Q           |           |           |      V    |
16+35       1.0789      0.20  Q           |           |           |      V    |
16+40       1.0801      0.18  Q           |           |           |      V    |
16+45       1.0813      0.17  Q           |           |           |      V    |
16+50       1.0825      0.17  Q           |           |           |      V    |
16+55       1.0837      0.17  Q           |           |           |      V    |
17+ 0       1.0848      0.17  Q           |           |           |      V    |
17+ 5       1.0864      0.22  Q           |           |           |      V    |
17+10       1.0883      0.28  |Q          |           |           |      V    |
17+15       1.0903      0.29  |Q          |           |           |      V    |
17+20       1.0922      0.29  |Q          |           |           |      V    |
17+25       1.0942      0.29  |Q          |           |           |       V   |
17+30       1.0962      0.29  |Q          |           |           |       V   |
17+35       1.0981      0.29  |Q          |           |           |       V   |
17+40       1.1001      0.29  |Q          |           |           |       V   |
17+45       1.1021      0.29  |Q          |           |           |       V   |
17+50       1.1039      0.26  |Q          |           |           |       V   |
17+55       1.1055      0.23  Q           |           |           |       V   |
18+ 0       1.1071      0.23  Q           |           |           |       V   |
18+ 5       1.1086      0.23  Q           |           |           |       V   |
18+10       1.1102      0.23  Q           |           |           |       V   |
18+15       1.1118      0.23  Q           |           |           |       V   |
18+20       1.1134      0.23  Q           |           |           |       V   |
18+25       1.1149      0.23  Q           |           |           |       V   |
18+30       1.1165      0.23  Q           |           |           |       V   |
18+35       1.1179      0.20  Q           |           |           |       V   |
18+40       1.1191      0.18  Q           |           |           |       V   |
18+45       1.1203      0.17  Q           |           |           |       V   |
18+50       1.1213      0.15  Q           |           |           |       V   |
18+55       1.1222      0.12  Q           |           |           |       V   |
19+ 0       1.1229      0.12  Q           |           |           |       V   |
19+ 5       1.1239      0.14  Q           |           |           |        V  |
19+10       1.1251      0.17  Q           |           |           |        V  |
19+15       1.1262      0.17  Q           |           |           |        V  |
19+20       1.1276      0.20  Q           |           |           |        V  |
19+25       1.1291      0.22  Q           |           |           |        V  |
19+30       1.1307      0.23  Q           |           |           |        V  |
19+35       1.1321      0.20  Q           |           |           |        V  |
19+40       1.1333      0.18  Q           |           |           |        V  |
19+45       1.1345      0.17  Q           |           |           |        V  |
19+50       1.1355      0.15  Q           |           |           |        V  |
19+55       1.1363      0.12  Q           |           |           |        V  |
20+ 0       1.1371      0.12  Q           |           |           |        V  |
20+ 5       1.1381      0.14  Q           |           |           |        V  |
20+10       1.1393      0.17  Q           |           |           |        V  |
20+15       1.1404      0.17  Q           |           |           |        V  |
20+20       1.1416      0.17  Q           |           |           |        V  |
20+25       1.1428      0.17  Q           |           |           |        V  |
20+30       1.1440      0.17  Q           |           |           |        V  |
20+35       1.1452      0.17  Q           |           |           |        V  |
20+40       1.1463      0.17  Q           |           |           |        V  |
20+45       1.1475      0.17  Q           |           |           |        V  |
20+50       1.1485      0.15  Q           |           |           |        V  |
20+55       1.1494      0.12  Q           |           |           |        V  |
21+ 0       1.1501      0.12  Q           |           |           |        V  |
21+ 5       1.1511      0.14  Q           |           |           |        V  |
21+10       1.1523      0.17  Q           |           |           |        V  |
21+15       1.1534      0.17  Q           |           |           |         V |
21+20       1.1544      0.15  Q           |           |           |         V |
21+25       1.1553      0.12  Q           |           |           |         V |
21+30       1.1561      0.12  Q           |           |           |         V |
21+35       1.1570      0.14  Q           |           |           |         V |
21+40       1.1582      0.17  Q           |           |           |         V |
21+45       1.1594      0.17  Q           |           |           |         V |
21+50       1.1604      0.15  Q           |           |           |         V |
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   21+55       1.1612      0.12  Q          |          |          |         v|
   22+ 0       1.1620      0.12  Q          |          |          |         v|
   22+ 5       1.1629      0.14  Q          |          |          |         v|
   22+10       1.1641      0.17  Q          |          |          |         v|
   22+15       1.1653      0.17  Q          |          |          |         v|
   22+20       1.1663      0.15  Q          |          |          |         v|
   22+25       1.1671      0.12  Q          |          |          |         v|
   22+30       1.1679      0.12  Q          |          |          |         v|
   22+35       1.1687      0.11  Q          |          |          |         v|
   22+40       1.1695      0.11  Q          |          |          |         v|
   22+45       1.1702      0.11  Q          |          |          |         v|
   22+50       1.1710      0.11  Q          |          |          |         v|
   22+55       1.1718      0.11  Q          |          |          |         v|
   23+ 0       1.1726      0.11  Q          |          |          |         v|
   23+ 5       1.1734      0.11  Q          |          |          |         v|
   23+10       1.1742      0.11  Q          |          |          |         v|
   23+15       1.1750      0.11  Q          |          |          |         v|
   23+20       1.1758      0.11  Q          |          |          |         v|
   23+25       1.1766      0.11  Q          |          |          |         v|
   23+30       1.1773      0.11  Q          |          |          |         v|
   23+35       1.1781      0.11  Q          |          |          |         v|
   23+40       1.1789      0.11  Q          |          |          |         v|
   23+45       1.1797      0.11  Q          |          |          |         v|
   23+50       1.1805      0.11  Q          |          |          |         v|
   23+55       1.1813      0.11  Q          |          |          |         v|
   24+ 0       1.1821      0.11  Q          |          |          |         v|
   24+ 5       1.1825      0.06  Q          |          |          |         v|
   24+10       1.1826      0.01  Q          |          |          |         v|
   24+15       1.1826      0.00  Q          |          |          |          v
---------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/23/21 File: PROP2YR6A242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG A AREA 6 DEVELOPED CONDITION
2 YR 24 HR STORM EVENT
21-0034
2021-11-23

Drainage Area = 9.00(Ac.) = 0.014 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 9.00(Ac.) = 0.014 Sq. Mi.
Length along longest watercourse = 1634.00(Ft.)
Length along longest watercourse measured to centroid = 512.00(Ft.)
Length along longest watercourse = 0.309 Mi.
Length along longest watercourse measured to centroid = 0.097 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.9253 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.058 Hr.
Lag time = 3.50 Min.
25% of lag time = 0.88 Min.
40% of lag time = 1.40 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.00	2.40	21.60

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.00	6.20	55.80

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
9.000	57.10	0.750

Total Area Entered = 9.00(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

57.1	37.1	0.696	0.750	0.226	1.000	0.226
					Sum (F) =	0.226

Area averaged mean soil loss (F) (In/Hr) = 0.226
Minimum soil loss rate ((In/Hr)) = 0.113
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.300

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	142.670	28.477	2.583
2	0.167	285.341	54.861	4.976
3	0.250	428.011	12.749	1.156
4	0.333	570.681	2.836	0.257
5	0.417	713.352	1.077	0.098
			Sum = 100.000	Sum= 9.070

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.401)	0.006	0.013
2	0.17	0.07	0.019	(0.399)	0.006	0.013
3	0.25	0.07	0.019	(0.398)	0.006	0.013
4	0.33	0.10	0.029	(0.396)	0.009	0.020
5	0.42	0.10	0.029	(0.395)	0.009	0.020
6	0.50	0.10	0.029	(0.393)	0.009	0.020
7	0.58	0.10	0.029	(0.392)	0.009	0.020
8	0.67	0.10	0.029	(0.390)	0.009	0.020
9	0.75	0.10	0.029	(0.389)	0.009	0.020
10	0.83	0.13	0.038	(0.387)	0.012	0.027
11	0.92	0.13	0.038	(0.386)	0.012	0.027
12	1.00	0.13	0.038	(0.384)	0.012	0.027
13	1.08	0.10	0.029	(0.383)	0.009	0.020
14	1.17	0.10	0.029	(0.381)	0.009	0.020
15	1.25	0.10	0.029	(0.380)	0.009	0.020
16	1.33	0.10	0.029	(0.378)	0.009	0.020
17	1.42	0.10	0.029	(0.377)	0.009	0.020
18	1.50	0.10	0.029	(0.375)	0.009	0.020
19	1.58	0.10	0.029	(0.374)	0.009	0.020
20	1.67	0.10	0.029	(0.372)	0.009	0.020
21	1.75	0.10	0.029	(0.371)	0.009	0.020
22	1.83	0.13	0.038	(0.369)	0.012	0.027
23	1.92	0.13	0.038	(0.368)	0.012	0.027
24	2.00	0.13	0.038	(0.366)	0.012	0.027
25	2.08	0.13	0.038	(0.365)	0.012	0.027
26	2.17	0.13	0.038	(0.363)	0.012	0.027
27	2.25	0.13	0.038	(0.362)	0.012	0.027
28	2.33	0.13	0.038	(0.360)	0.012	0.027
29	2.42	0.13	0.038	(0.359)	0.012	0.027
30	2.50	0.13	0.038	(0.357)	0.012	0.027
31	2.58	0.17	0.048	(0.356)	0.014	0.034
32	2.67	0.17	0.048	(0.354)	0.014	0.034
33	2.75	0.17	0.048	(0.353)	0.014	0.034
34	2.83	0.17	0.048	(0.351)	0.014	0.034
35	2.92	0.17	0.048	(0.350)	0.014	0.034
36	3.00	0.17	0.048	(0.349)	0.014	0.034
37	3.08	0.17	0.048	(0.347)	0.014	0.034
38	3.17	0.17	0.048	(0.346)	0.014	0.034
39	3.25	0.17	0.048	(0.344)	0.014	0.034
40	3.33	0.17	0.048	(0.343)	0.014	0.034
41	3.42	0.17	0.048	(0.341)	0.014	0.034
42	3.50	0.17	0.048	(0.340)	0.014	0.034
43	3.58	0.17	0.048	(0.339)	0.014	0.034
44	3.67	0.17	0.048	(0.337)	0.014	0.034
45	3.75	0.17	0.048	(0.336)	0.014	0.034

46	3.83	0.20	0.058	(0.334)	0.017	0.040
47	3.92	0.20	0.058	(0.333)	0.017	0.040
48	4.00	0.20	0.058	(0.331)	0.017	0.040
49	4.08	0.20	0.058	(0.330)	0.017	0.040
50	4.17	0.20	0.058	(0.329)	0.017	0.040
51	4.25	0.20	0.058	(0.327)	0.017	0.040
52	4.33	0.23	0.067	(0.326)	0.020	0.047
53	4.42	0.23	0.067	(0.324)	0.020	0.047
54	4.50	0.23	0.067	(0.323)	0.020	0.047
55	4.58	0.23	0.067	(0.322)	0.020	0.047
56	4.67	0.23	0.067	(0.320)	0.020	0.047
57	4.75	0.23	0.067	(0.319)	0.020	0.047
58	4.83	0.27	0.077	(0.318)	0.023	0.054
59	4.92	0.27	0.077	(0.316)	0.023	0.054
60	5.00	0.27	0.077	(0.315)	0.023	0.054
61	5.08	0.20	0.058	(0.313)	0.017	0.040
62	5.17	0.20	0.058	(0.312)	0.017	0.040
63	5.25	0.20	0.058	(0.311)	0.017	0.040
64	5.33	0.23	0.067	(0.309)	0.020	0.047
65	5.42	0.23	0.067	(0.308)	0.020	0.047
66	5.50	0.23	0.067	(0.307)	0.020	0.047
67	5.58	0.27	0.077	(0.305)	0.023	0.054
68	5.67	0.27	0.077	(0.304)	0.023	0.054
69	5.75	0.27	0.077	(0.303)	0.023	0.054
70	5.83	0.27	0.077	(0.301)	0.023	0.054
71	5.92	0.27	0.077	(0.300)	0.023	0.054
72	6.00	0.27	0.077	(0.299)	0.023	0.054
73	6.08	0.30	0.086	(0.297)	0.026	0.060
74	6.17	0.30	0.086	(0.296)	0.026	0.060
75	6.25	0.30	0.086	(0.295)	0.026	0.060
76	6.33	0.30	0.086	(0.293)	0.026	0.060
77	6.42	0.30	0.086	(0.292)	0.026	0.060
78	6.50	0.30	0.086	(0.291)	0.026	0.060
79	6.58	0.33	0.096	(0.289)	0.029	0.067
80	6.67	0.33	0.096	(0.288)	0.029	0.067
81	6.75	0.33	0.096	(0.287)	0.029	0.067
82	6.83	0.33	0.096	(0.286)	0.029	0.067
83	6.92	0.33	0.096	(0.284)	0.029	0.067
84	7.00	0.33	0.096	(0.283)	0.029	0.067
85	7.08	0.33	0.096	(0.282)	0.029	0.067
86	7.17	0.33	0.096	(0.280)	0.029	0.067
87	7.25	0.33	0.096	(0.279)	0.029	0.067
88	7.33	0.37	0.106	(0.278)	0.032	0.074
89	7.42	0.37	0.106	(0.277)	0.032	0.074
90	7.50	0.37	0.106	(0.275)	0.032	0.074
91	7.58	0.40	0.115	(0.274)	0.035	0.081
92	7.67	0.40	0.115	(0.273)	0.035	0.081
93	7.75	0.40	0.115	(0.271)	0.035	0.081
94	7.83	0.43	0.125	(0.270)	0.037	0.087
95	7.92	0.43	0.125	(0.269)	0.037	0.087
96	8.00	0.43	0.125	(0.268)	0.037	0.087
97	8.08	0.50	0.144	(0.266)	0.043	0.101
98	8.17	0.50	0.144	(0.265)	0.043	0.101
99	8.25	0.50	0.144	(0.264)	0.043	0.101
100	8.33	0.50	0.144	(0.263)	0.043	0.101
101	8.42	0.50	0.144	(0.262)	0.043	0.101
102	8.50	0.50	0.144	(0.260)	0.043	0.101
103	8.58	0.53	0.154	(0.259)	0.046	0.108
104	8.67	0.53	0.154	(0.258)	0.046	0.108
105	8.75	0.53	0.154	(0.257)	0.046	0.108
106	8.83	0.57	0.163	(0.255)	0.049	0.114
107	8.92	0.57	0.163	(0.254)	0.049	0.114
108	9.00	0.57	0.163	(0.253)	0.049	0.114
109	9.08	0.63	0.182	(0.252)	0.055	0.128
110	9.17	0.63	0.182	(0.251)	0.055	0.128
111	9.25	0.63	0.182	(0.249)	0.055	0.128
112	9.33	0.67	0.192	(0.248)	0.058	0.134
113	9.42	0.67	0.192	(0.247)	0.058	0.134
114	9.50	0.67	0.192	(0.246)	0.058	0.134
115	9.58	0.70	0.202	(0.245)	0.060	0.141
116	9.67	0.70	0.202	(0.244)	0.060	0.141
117	9.75	0.70	0.202	(0.242)	0.060	0.141
118	9.83	0.73	0.211	(0.241)	0.063	0.148
119	9.92	0.73	0.211	(0.240)	0.063	0.148
120	10.00	0.73	0.211	(0.239)	0.063	0.148

121	10.08	0.50	0.144	(0.238)	0.043	0.101
122	10.17	0.50	0.144	(0.237)	0.043	0.101
123	10.25	0.50	0.144	(0.235)	0.043	0.101
124	10.33	0.50	0.144	(0.234)	0.043	0.101
125	10.42	0.50	0.144	(0.233)	0.043	0.101
126	10.50	0.50	0.144	(0.232)	0.043	0.101
127	10.58	0.67	0.192	(0.231)	0.058	0.134
128	10.67	0.67	0.192	(0.230)	0.058	0.134
129	10.75	0.67	0.192	(0.229)	0.058	0.134
130	10.83	0.67	0.192	(0.228)	0.058	0.134
131	10.92	0.67	0.192	(0.226)	0.058	0.134
132	11.00	0.67	0.192	(0.225)	0.058	0.134
133	11.08	0.63	0.182	(0.224)	0.055	0.128
134	11.17	0.63	0.182	(0.223)	0.055	0.128
135	11.25	0.63	0.182	(0.222)	0.055	0.128
136	11.33	0.63	0.182	(0.221)	0.055	0.128
137	11.42	0.63	0.182	(0.220)	0.055	0.128
138	11.50	0.63	0.182	(0.219)	0.055	0.128
139	11.58	0.57	0.163	(0.218)	0.049	0.114
140	11.67	0.57	0.163	(0.217)	0.049	0.114
141	11.75	0.57	0.163	(0.215)	0.049	0.114
142	11.83	0.60	0.173	(0.214)	0.052	0.121
143	11.92	0.60	0.173	(0.213)	0.052	0.121
144	12.00	0.60	0.173	(0.212)	0.052	0.121
145	12.08	0.83	0.240	(0.211)	0.072	0.168
146	12.17	0.83	0.240	(0.210)	0.072	0.168
147	12.25	0.83	0.240	(0.209)	0.072	0.168
148	12.33	0.87	0.250	(0.208)	0.075	0.175
149	12.42	0.87	0.250	(0.207)	0.075	0.175
150	12.50	0.87	0.250	(0.206)	0.075	0.175
151	12.58	0.93	0.269	(0.205)	0.081	0.188
152	12.67	0.93	0.269	(0.204)	0.081	0.188
153	12.75	0.93	0.269	(0.203)	0.081	0.188
154	12.83	0.97	0.278	(0.202)	0.084	0.195
155	12.92	0.97	0.278	(0.201)	0.084	0.195
156	13.00	0.97	0.278	(0.200)	0.084	0.195
157	13.08	1.13	0.326	(0.199)	0.098	0.228
158	13.17	1.13	0.326	(0.198)	0.098	0.228
159	13.25	1.13	0.326	(0.197)	0.098	0.228
160	13.33	1.13	0.326	(0.196)	0.098	0.228
161	13.42	1.13	0.326	(0.195)	0.098	0.228
162	13.50	1.13	0.326	(0.194)	0.098	0.228
163	13.58	0.77	0.221	(0.193)	0.066	0.155
164	13.67	0.77	0.221	(0.192)	0.066	0.155
165	13.75	0.77	0.221	(0.191)	0.066	0.155
166	13.83	0.77	0.221	(0.190)	0.066	0.155
167	13.92	0.77	0.221	(0.189)	0.066	0.155
168	14.00	0.77	0.221	(0.188)	0.066	0.155
169	14.08	0.90	0.259	(0.187)	0.078	0.181
170	14.17	0.90	0.259	(0.186)	0.078	0.181
171	14.25	0.90	0.259	(0.185)	0.078	0.181
172	14.33	0.87	0.250	(0.184)	0.075	0.175
173	14.42	0.87	0.250	(0.183)	0.075	0.175
174	14.50	0.87	0.250	(0.182)	0.075	0.175
175	14.58	0.87	0.250	(0.181)	0.075	0.175
176	14.67	0.87	0.250	(0.180)	0.075	0.175
177	14.75	0.87	0.250	(0.179)	0.075	0.175
178	14.83	0.83	0.240	(0.179)	0.072	0.168
179	14.92	0.83	0.240	(0.178)	0.072	0.168
180	15.00	0.83	0.240	(0.177)	0.072	0.168
181	15.08	0.80	0.230	(0.176)	0.069	0.161
182	15.17	0.80	0.230	(0.175)	0.069	0.161
183	15.25	0.80	0.230	(0.174)	0.069	0.161
184	15.33	0.77	0.221	(0.173)	0.066	0.155
185	15.42	0.77	0.221	(0.172)	0.066	0.155
186	15.50	0.77	0.221	(0.171)	0.066	0.155
187	15.58	0.63	0.182	(0.170)	0.055	0.128
188	15.67	0.63	0.182	(0.170)	0.055	0.128
189	15.75	0.63	0.182	(0.169)	0.055	0.128
190	15.83	0.63	0.182	(0.168)	0.055	0.128
191	15.92	0.63	0.182	(0.167)	0.055	0.128
192	16.00	0.63	0.182	(0.166)	0.055	0.128
193	16.08	0.13	0.038	(0.165)	0.012	0.027
194	16.17	0.13	0.038	(0.164)	0.012	0.027
195	16.25	0.13	0.038	(0.164)	0.012	0.027

196	16.33	0.13	0.038	(0.163)	0.012	0.027
197	16.42	0.13	0.038	(0.162)	0.012	0.027
198	16.50	0.13	0.038	(0.161)	0.012	0.027
199	16.58	0.10	0.029	(0.160)	0.009	0.020
200	16.67	0.10	0.029	(0.159)	0.009	0.020
201	16.75	0.10	0.029	(0.159)	0.009	0.020
202	16.83	0.10	0.029	(0.158)	0.009	0.020
203	16.92	0.10	0.029	(0.157)	0.009	0.020
204	17.00	0.10	0.029	(0.156)	0.009	0.020
205	17.08	0.17	0.048	(0.155)	0.014	0.034
206	17.17	0.17	0.048	(0.155)	0.014	0.034
207	17.25	0.17	0.048	(0.154)	0.014	0.034
208	17.33	0.17	0.048	(0.153)	0.014	0.034
209	17.42	0.17	0.048	(0.152)	0.014	0.034
210	17.50	0.17	0.048	(0.152)	0.014	0.034
211	17.58	0.17	0.048	(0.151)	0.014	0.034
212	17.67	0.17	0.048	(0.150)	0.014	0.034
213	17.75	0.17	0.048	(0.149)	0.014	0.034
214	17.83	0.13	0.038	(0.149)	0.012	0.027
215	17.92	0.13	0.038	(0.148)	0.012	0.027
216	18.00	0.13	0.038	(0.147)	0.012	0.027
217	18.08	0.13	0.038	(0.146)	0.012	0.027
218	18.17	0.13	0.038	(0.146)	0.012	0.027
219	18.25	0.13	0.038	(0.145)	0.012	0.027
220	18.33	0.13	0.038	(0.144)	0.012	0.027
221	18.42	0.13	0.038	(0.144)	0.012	0.027
222	18.50	0.13	0.038	(0.143)	0.012	0.027
223	18.58	0.10	0.029	(0.142)	0.009	0.020
224	18.67	0.10	0.029	(0.142)	0.009	0.020
225	18.75	0.10	0.029	(0.141)	0.009	0.020
226	18.83	0.07	0.019	(0.140)	0.006	0.013
227	18.92	0.07	0.019	(0.139)	0.006	0.013
228	19.00	0.07	0.019	(0.139)	0.006	0.013
229	19.08	0.10	0.029	(0.138)	0.009	0.020
230	19.17	0.10	0.029	(0.138)	0.009	0.020
231	19.25	0.10	0.029	(0.137)	0.009	0.020
232	19.33	0.13	0.038	(0.136)	0.012	0.027
233	19.42	0.13	0.038	(0.136)	0.012	0.027
234	19.50	0.13	0.038	(0.135)	0.012	0.027
235	19.58	0.10	0.029	(0.134)	0.009	0.020
236	19.67	0.10	0.029	(0.134)	0.009	0.020
237	19.75	0.10	0.029	(0.133)	0.009	0.020
238	19.83	0.07	0.019	(0.133)	0.006	0.013
239	19.92	0.07	0.019	(0.132)	0.006	0.013
240	20.00	0.07	0.019	(0.131)	0.006	0.013
241	20.08	0.10	0.029	(0.131)	0.009	0.020
242	20.17	0.10	0.029	(0.130)	0.009	0.020
243	20.25	0.10	0.029	(0.130)	0.009	0.020
244	20.33	0.10	0.029	(0.129)	0.009	0.020
245	20.42	0.10	0.029	(0.129)	0.009	0.020
246	20.50	0.10	0.029	(0.128)	0.009	0.020
247	20.58	0.10	0.029	(0.127)	0.009	0.020
248	20.67	0.10	0.029	(0.127)	0.009	0.020
249	20.75	0.10	0.029	(0.126)	0.009	0.020
250	20.83	0.07	0.019	(0.126)	0.006	0.013
251	20.92	0.07	0.019	(0.125)	0.006	0.013
252	21.00	0.07	0.019	(0.125)	0.006	0.013
253	21.08	0.10	0.029	(0.124)	0.009	0.020
254	21.17	0.10	0.029	(0.124)	0.009	0.020
255	21.25	0.10	0.029	(0.123)	0.009	0.020
256	21.33	0.07	0.019	(0.123)	0.006	0.013
257	21.42	0.07	0.019	(0.122)	0.006	0.013
258	21.50	0.07	0.019	(0.122)	0.006	0.013
259	21.58	0.10	0.029	(0.122)	0.009	0.020
260	21.67	0.10	0.029	(0.121)	0.009	0.020
261	21.75	0.10	0.029	(0.121)	0.009	0.020
262	21.83	0.07	0.019	(0.120)	0.006	0.013
263	21.92	0.07	0.019	(0.120)	0.006	0.013
264	22.00	0.07	0.019	(0.119)	0.006	0.013
265	22.08	0.10	0.029	(0.119)	0.009	0.020
266	22.17	0.10	0.029	(0.119)	0.009	0.020
267	22.25	0.10	0.029	(0.118)	0.009	0.020
268	22.33	0.07	0.019	(0.118)	0.006	0.013
269	22.42	0.07	0.019	(0.118)	0.006	0.013
270	22.50	0.07	0.019	(0.117)	0.006	0.013

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271  22.58     0.07      0.019       (  0.117)       0.006        0.013
272  22.67     0.07      0.019       (  0.117)       0.006        0.013
273  22.75     0.07      0.019       (  0.116)       0.006        0.013
274  22.83     0.07      0.019       (  0.116)       0.006        0.013
275  22.92     0.07      0.019       (  0.116)       0.006        0.013
276  23.00     0.07      0.019       (  0.115)       0.006        0.013
277  23.08     0.07      0.019       (  0.115)       0.006        0.013
278  23.17     0.07      0.019       (  0.115)       0.006        0.013
279  23.25     0.07      0.019       (  0.115)       0.006        0.013
280  23.33     0.07      0.019       (  0.114)       0.006        0.013
281  23.42     0.07      0.019       (  0.114)       0.006        0.013
282  23.50     0.07      0.019       (  0.114)       0.006        0.013
283  23.58     0.07      0.019       (  0.114)       0.006        0.013
284  23.67     0.07      0.019       (  0.114)       0.006        0.013
285  23.75     0.07      0.019       (  0.113)       0.006        0.013
286  23.83     0.07      0.019       (  0.113)       0.006        0.013
287  23.92     0.07      0.019       (  0.113)       0.006        0.013
288  24.00     0.07      0.019       (  0.113)       0.006        0.013
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    20.2
      Flood volume = Effective rainfall      1.68(In)
       times area       9.0(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
      Total soil loss =      0.72(In)
      Total soil loss =     0.540(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       54884.6 Cubic Feet
      Total soil loss =       23522.0 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.073(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0002      0.03  Q         |         |         |         |
   0+10       0.0009      0.10  Q         |         |         |         |
   0+15       0.0017      0.12  Q         |         |         |         |
   0+20       0.0027      0.14  Q         |         |         |         |
   0+25       0.0039      0.17  Q         |         |         |         |
   0+30       0.0051      0.18  Q         |         |         |         |
   0+35       0.0064      0.18  Q         |         |         |         |
   0+40       0.0076      0.18  Q         |         |         |         |
   0+45       0.0089      0.18  Q         |         |         |         |
   0+50       0.0103      0.20  Q         |         |         |         |
   0+55       0.0119      0.23  Q         |         |         |         |
   1+ 0       0.0136      0.24  Q         |         |         |         |
   1+ 5       0.0151      0.23  Q         |         |         |         |
   1+10       0.0164      0.19  Q         |         |         |         |
   1+15       0.0177      0.19  Q         |         |         |         |
   1+20       0.0190      0.18  Q         |         |         |         |
   1+25       0.0202      0.18  Q         |         |         |         |
   1+30       0.0215      0.18  Q         |         |         |         |
   1+35       0.0228      0.18  Q         |         |         |         |
   1+40       0.0240      0.18  Q         |         |         |         |
   1+45       0.0253      0.18  Q         |         |         |         |
   1+50       0.0267      0.20  Q         |         |         |         |
   1+55       0.0283      0.23  Q         |         |         |         |
   2+ 0       0.0299      0.24  Q         |         |         |         |
   2+ 5       0.0316      0.24  QV        |         |         |         |
   2+10       0.0333      0.24  QV        |         |         |         |
   2+15       0.0350      0.24  QV        |         |         |         |
   2+20       0.0367      0.24  QV        |         |         |         |
   2+25       0.0383      0.24  QV        |         |         |         |
   2+30       0.0400      0.24  QV        |         |         |         |
   2+35       0.0418      0.26  |Q        |         |         |         |
   2+40       0.0438      0.29  |Q        |         |         |         |
   2+45       0.0459      0.30  |Q        |         |         |         |
   2+50       0.0480      0.30  |Q        |         |         |         |
   2+55       0.0501      0.30  |Q        |         |         |         |
   3+ 0       0.0522      0.30  |Q        |         |         |         |
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3+ 5       0.0543      0.30  |Q         |          |          |          |
3+10       0.0564      0.30  |Q         |          |          |          |
3+15       0.0585      0.30  |Q         |          |          |          |
3+20       0.0606      0.30  |Q         |          |          |          |
3+25       0.0627      0.30  |Q         |          |          |          |
3+30       0.0648      0.30  |QV        |          |          |          |
3+35       0.0669      0.30  |QV        |          |          |          |
3+40       0.0690      0.30  |QV        |          |          |          |
3+45       0.0711      0.30  |QV        |          |          |          |
3+50       0.0733      0.32  |QV        |          |          |          |
3+55       0.0758      0.36  |QV        |          |          |          |
4+ 0       0.0783      0.36  |QV        |          |          |          |
4+ 5       0.0808      0.37  |QV        |          |          |          |
4+10       0.0833      0.37  |QV        |          |          |          |
4+15       0.0859      0.37  |QV        |          |          |          |
4+20       0.0885      0.38  |QV        |          |          |          |
4+25       0.0914      0.42  |QV        |          |          |          |
4+30       0.0943      0.42  |QV        |          |          |          |
4+35       0.0972      0.43  |Q V       |          |          |          |
4+40       0.1002      0.43  |Q V       |          |          |          |
4+45       0.1031      0.43  |Q V       |          |          |          |
4+50       0.1062      0.44  |Q V       |          |          |          |
4+55       0.1094      0.48  |Q V       |          |          |          |
5+ 0       0.1128      0.49  |Q V       |          |          |          |
5+ 5       0.1159      0.45  |Q V       |          |          |          |
5+10       0.1186      0.39  |Q V       |          |          |          |
5+15       0.1211      0.37  |Q V       |          |          |          |
5+20       0.1238      0.38  |Q V       |          |          |          |
5+25       0.1266      0.42  |Q  V      |          |          |          |
5+30       0.1296      0.42  |Q  V      |          |          |          |
5+35       0.1326      0.44  |Q  V      |          |          |          |
5+40       0.1359      0.48  |Q  V      |          |          |          |
5+45       0.1393      0.49  |Q  V      |          |          |          |
5+50       0.1426      0.49  |Q  V      |          |          |          |
5+55       0.1460      0.49  |Q  V      |          |          |          |
6+ 0       0.1493      0.49  |Q  V      |          |          |          |
6+ 5       0.1528      0.51  | Q V      |          |          |          |
6+10       0.1565      0.54  | Q V      |          |          |          |
6+15       0.1603      0.55  | Q  V     |          |          |          |
6+20       0.1641      0.55  | Q  V     |          |          |          |
6+25       0.1678      0.55  | Q  V     |          |          |          |
6+30       0.1716      0.55  | Q  V     |          |          |          |
6+35       0.1755      0.57  | Q  V     |          |          |          |
6+40       0.1796      0.60  | Q  V     |          |          |          |
6+45       0.1838      0.61  | Q  V     |          |          |          |
6+50       0.1880      0.61  | Q  V     |          |          |          |
6+55       0.1922      0.61  | Q   V    |          |          |          |
7+ 0       0.1964      0.61  | Q   V    |          |          |          |
7+ 5       0.2006      0.61  | Q   V    |          |          |          |
7+10       0.2048      0.61  | Q   V    |          |          |          |
7+15       0.2090      0.61  | Q   V    |          |          |          |
7+20       0.2133      0.63  | Q   V    |          |          |          |
7+25       0.2179      0.66  | Q   V    |          |          |          |
7+30       0.2225      0.67  | Q    V   |          |          |          |
7+35       0.2272      0.69  | Q    V   |          |          |          |
7+40       0.2322      0.72  | Q    V   |          |          |          |
7+45       0.2372      0.73  | Q    V   |          |          |          |
7+50       0.2424      0.75  | Q    V   |          |          |          |
7+55       0.2478      0.78  |  Q   V   |          |          |          |
8+ 0       0.2532      0.79  |  Q    V  |          |          |          |
8+ 5       0.2589      0.83  |  Q    V  |          |          |          |
8+10       0.2651      0.89  |  Q    V  |          |          |          |
8+15       0.2713      0.91  |  Q    V  |          |          |          |
8+20       0.2776      0.91  |  Q    V  |          |          |          |
8+25       0.2839      0.91  |  Q     V |          |          |          |
8+30       0.2902      0.91  |  Q     V |          |          |          |
8+35       0.2966      0.93  |  Q     V |          |          |          |
8+40       0.3033      0.97  |  Q     V |          |          |          |
8+45       0.3100      0.97  |  Q     V |          |          |          |
8+50       0.3168      0.99  |  Q      V|          |          |          |
8+55       0.3239      1.03  |   Q     V|          |          |          |
9+ 0       0.3310      1.03  |   Q     V|          |          |          |
9+ 5       0.3384      1.07  |   Q     V|          |          |          |
9+10       0.3462      1.14  |   Q     V|          |          |          |
9+15       0.3542      1.15  |   Q     |V         |          |          |
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9+20	0.3623	1.17	Q	V			
9+25	0.3706	1.21	Q	V			
9+30	0.3790	1.22	Q	V			
9+35	0.3875	1.24	Q	V			
9+40	0.3963	1.27	Q	V			
9+45	0.4051	1.28	Q	V			
9+50	0.4140	1.30	Q	V			
9+55	0.4232	1.33	Q	V			
10+ 0	0.4324	1.34	Q	V			
10+ 5	0.4408	1.22	Q	V			
10+10	0.4476	0.99	Q	V			
10+15	0.4540	0.93	Q	V			
10+20	0.4603	0.92	Q	V			
10+25	0.4666	0.91	Q	V			
10+30	0.4729	0.91	Q	V			
10+35	0.4798	1.00	Q	V			
10+40	0.4879	1.17	Q	V			
10+45	0.4962	1.21	Q	V			
10+50	0.5046	1.22	Q	V			
10+55	0.5130	1.22	Q	V			
11+ 0	0.5214	1.22	Q	V			
11+ 5	0.5296	1.20	Q	V			
11+10	0.5377	1.17	Q	V			
11+15	0.5457	1.16	Q	V			
11+20	0.5537	1.16	Q	V			
11+25	0.5617	1.16	Q	V			
11+30	0.5696	1.16	Q	V			
11+35	0.5774	1.12	Q	V			
11+40	0.5847	1.06	Q	V			
11+45	0.5918	1.04	Q	V			
11+50	0.5991	1.06	Q	V			
11+55	0.6066	1.09	Q	V			
12+ 0	0.6141	1.10	Q	V			
12+ 5	0.6225	1.22	Q	V			
12+10	0.6325	1.45	Q	V			
12+15	0.6429	1.51	Q	V			
12+20	0.6535	1.54	Q	V			
12+25	0.6644	1.58	Q	V			
12+30	0.6753	1.58	Q	V			
12+35	0.6864	1.62	Q	V			
12+40	0.6980	1.69	Q	V			
12+45	0.7098	1.70	Q	V			
12+50	0.7216	1.72	Q	V			
12+55	0.7337	1.76	Q	V			
13+ 0	0.7459	1.77	Q	V			
13+ 5	0.7587	1.85	Q	V			
13+10	0.7726	2.02	Q	V			
13+15	0.7868	2.06	Q	V			
13+20	0.8011	2.07	Q	V			
13+25	0.8153	2.07	Q	V			
13+30	0.8296	2.07	Q	V			
13+35	0.8426	1.88	Q	V			
13+40	0.8530	1.51	Q	V			
13+45	0.8629	1.43	Q	V			
13+50	0.8726	1.41	Q	V			
13+55	0.8822	1.40	Q	V			
14+ 0	0.8919	1.40	Q	V			
14+ 5	0.9020	1.47	Q	V			
14+10	0.9131	1.61	Q	V			
14+15	0.9244	1.64	Q	V			
14+20	0.9356	1.63	Q	V			
14+25	0.9465	1.60	Q	V			
14+30	0.9575	1.59	Q	V			
14+35	0.9684	1.59	Q	V			
14+40	0.9793	1.59	Q	V			
14+45	0.9902	1.59	Q	V			
14+50	1.0010	1.57	Q	V			
14+55	1.0116	1.53	Q	V			
15+ 0	1.0221	1.53	Q	V			
15+ 5	1.0325	1.51	Q	V			
15+10	1.0427	1.47	Q	V			
15+15	1.0528	1.47	Q	V			
15+20	1.0627	1.45	Q	V			
15+25	1.0725	1.41	Q	V			
15+30	1.0821	1.40	Q	V			

15+35	1.0913	1.33	| Q	|	|	| V |
15+40	1.0996	1.20	| Q	|	|	| V |
15+45	1.1076	1.17	| Q	|	|	| V |
15+50	1.1156	1.16	| Q	|	|	| V |
15+55	1.1236	1.16	| Q	|	|	| V |
16+ 0	1.1316	1.16	| Q	|	|	| V |
16+ 5	1.1378	0.90	| Q	|	|	| V |
16+10	1.1405	0.40	|Q	|	|	| V |
16+15	1.1424	0.28	|Q	|	|	| V |
16+20	1.1442	0.25	|Q	|	|	| V |
16+25	1.1459	0.24	Q	|	|	| V |
16+30	1.1475	0.24	Q	|	|	| V |
16+35	1.1491	0.23	Q	|	|	| V |
16+40	1.1504	0.19	Q	|	|	| V |
16+45	1.1517	0.19	Q	|	|	| V |
16+50	1.1530	0.18	Q	|	|	| V |
16+55	1.1542	0.18	Q	|	|	| V |
17+ 0	1.1555	0.18	Q	|	|	| V |
17+ 5	1.1570	0.22	Q	|	|	| V |
17+10	1.1589	0.28	|Q	|	|	| V |
17+15	1.1610	0.30	|Q	|	|	| V |
17+20	1.1631	0.30	|Q	|	|	| V |
17+25	1.1652	0.30	|Q	|	|	| V |
17+30	1.1673	0.30	|Q	|	|	| V |
17+35	1.1694	0.30	|Q	|	|	| V |
17+40	1.1715	0.30	|Q	|	|	| V |
17+45	1.1736	0.30	|Q	|	|	| V |
17+50	1.1756	0.29	|Q	|	|	| V |
17+55	1.1773	0.25	|Q	|	|	| V |
18+ 0	1.1790	0.25	Q	|	|	| V |
18+ 5	1.1807	0.24	Q	|	|	| V |
18+10	1.1824	0.24	Q	|	|	| V |
18+15	1.1841	0.24	Q	|	|	| V |
18+20	1.1858	0.24	Q	|	|	| V |
18+25	1.1874	0.24	Q	|	|	| V |
18+30	1.1891	0.24	Q	|	|	| V |
18+35	1.1907	0.23	Q	|	|	| V |
18+40	1.1920	0.19	Q	|	|	| V |
18+45	1.1933	0.19	Q	|	|	| V |
18+50	1.1944	0.17	Q	|	|	| V |
18+55	1.1953	0.13	Q	|	|	| V |
19+ 0	1.1962	0.12	Q	|	|	| V |
19+ 5	1.1972	0.14	Q	|	|	| V |
19+10	1.1983	0.17	Q	|	|	| V |
19+15	1.1996	0.18	Q	|	|	| V |
19+20	1.2010	0.20	Q	|	|	| V |
19+25	1.2026	0.23	Q	|	|	| V |
19+30	1.2042	0.24	Q	|	|	| V |
19+35	1.2058	0.23	Q	|	|	| V |
19+40	1.2071	0.19	Q	|	|	| V |
19+45	1.2084	0.19	Q	|	|	| V |
19+50	1.2095	0.17	Q	|	|	| V |
19+55	1.2105	0.13	Q	|	|	| V |
20+ 0	1.2113	0.12	Q	|	|	| V |
20+ 5	1.2123	0.14	Q	|	|	| V |
20+10	1.2135	0.17	Q	|	|	| V |
20+15	1.2147	0.18	Q	|	|	| V |
20+20	1.2160	0.18	Q	|	|	| V |
20+25	1.2172	0.18	Q	|	|	| V |
20+30	1.2185	0.18	Q	|	|	| V |
20+35	1.2197	0.18	Q	|	|	| V |
20+40	1.2210	0.18	Q	|	|	| V |
20+45	1.2223	0.18	Q	|	|	| V |
20+50	1.2234	0.17	Q	|	|	| V |
20+55	1.2243	0.13	Q	|	|	| V |
21+ 0	1.2252	0.12	Q	|	|	| V |
21+ 5	1.2261	0.14	Q	|	|	| V |
21+10	1.2273	0.17	Q	|	|	| V |
21+15	1.2286	0.18	Q	|	|	| V|
21+20	1.2297	0.16	Q	|	|	| V|
21+25	1.2306	0.13	Q	|	|	| V|
21+30	1.2315	0.12	Q	|	|	| V|
21+35	1.2324	0.14	Q	|	|	| V|
21+40	1.2336	0.17	Q	|	|	| V|
21+45	1.2349	0.18	Q	|	|	| V|

```
   21+50       1.2360      0.16  Q          |          |          |         v|
   21+55       1.2369      0.13  Q          |          |          |         v|
   22+ 0       1.2378      0.12  Q          |          |          |         v|
   22+ 5       1.2387      0.14  Q          |          |          |         v|
   22+10       1.2399      0.17  Q          |          |          |         v|
   22+15       1.2412      0.18  Q          |          |          |         v|
   22+20       1.2423      0.16  Q          |          |          |         v|
   22+25       1.2432      0.13  Q          |          |          |         v|
   22+30       1.2441      0.12  Q          |          |          |         v|
   22+35       1.2449      0.12  Q          |          |          |         v|
   22+40       1.2458      0.12  Q          |          |          |         v|
   22+45       1.2466      0.12  Q          |          |          |         v|
   22+50       1.2474      0.12  Q          |          |          |         v|
   22+55       1.2483      0.12  Q          |          |          |         v|
   23+ 0       1.2491      0.12  Q          |          |          |         v|
   23+ 5       1.2500      0.12  Q          |          |          |         v|
   23+10       1.2508      0.12  Q          |          |          |         v|
   23+15       1.2516      0.12  Q          |          |          |         v|
   23+20       1.2525      0.12  Q          |          |          |         v|
   23+25       1.2533      0.12  Q          |          |          |         v|
   23+30       1.2542      0.12  Q          |          |          |         v|
   23+35       1.2550      0.12  Q          |          |          |         v|
   23+40       1.2558      0.12  Q          |          |          |         v|
   23+45       1.2567      0.12  Q          |          |          |         v|
   23+50       1.2575      0.12  Q          |          |          |         v|
   23+55       1.2584      0.12  Q          |          |          |         v|
   24+ 0       1.2592      0.12  Q          |          |          |         v|
   24+ 5       1.2598      0.09  Q          |          |          |         v|
   24+10       1.2599      0.02  Q          |          |          |         v|
   24+15       1.2600      0.00  Q          |          |          |         v|
   24+20       1.2600      0.00  Q          |          |          |          v
---------------------------------------------------------------------------
```

STAGE-STORAGE/OUTFLOW TABLES

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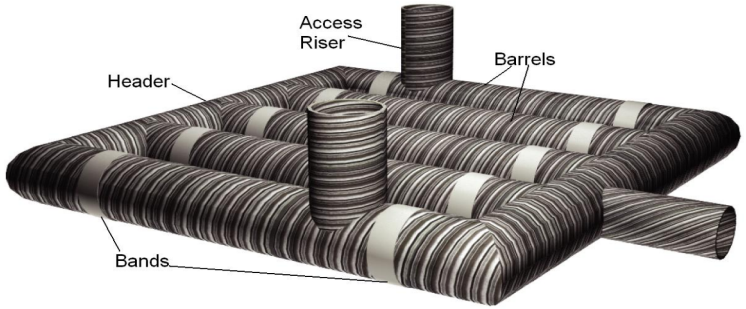


Project Summary

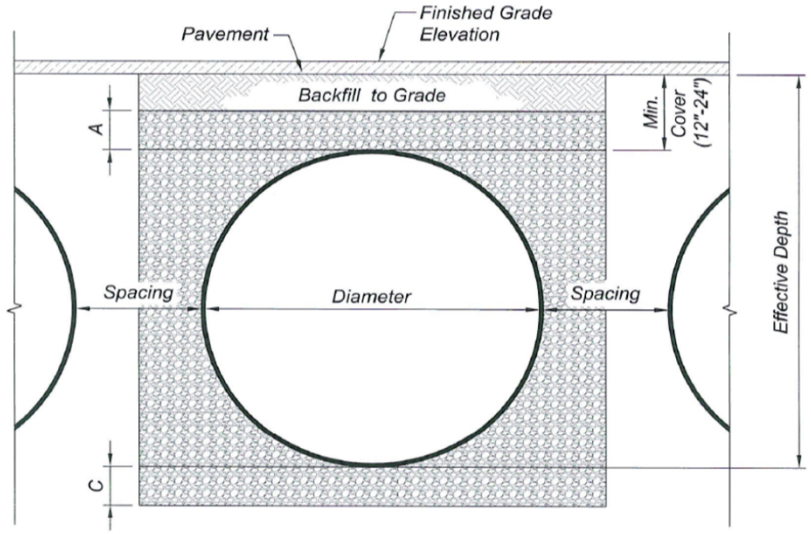
Date:	12/8/2021
Project Name:	BCCOV BLDG A AREA 1
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	44,000
Limiting Width (ft):	78.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	44,033	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	44,033	cf	100.1% Of Required Storage
Number of Barrels:	7	barrels	
Length per Barrel:	104.0	ft	
Length Per Header:	74.0	ft	
Rectangular Footprint (W x L):	77. ft x 123. ft		

CONTECH Materials

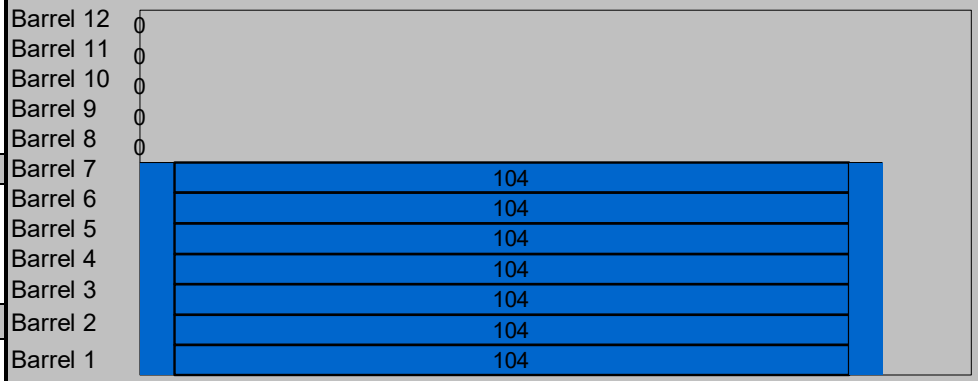
Total CMP Footage:	876	ft
Approximate Total Pieces:	43	pcs
Approximate Coupling Bands:	48	bands
Approximate Truckloads:	22	trucks

Construction Quantities**

Total Excavation:	3508	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	1877	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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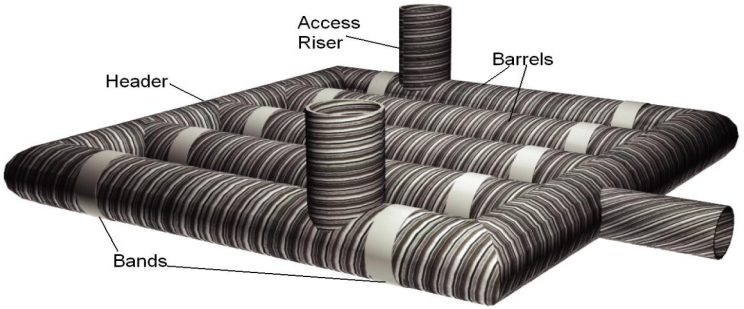


Project Summary

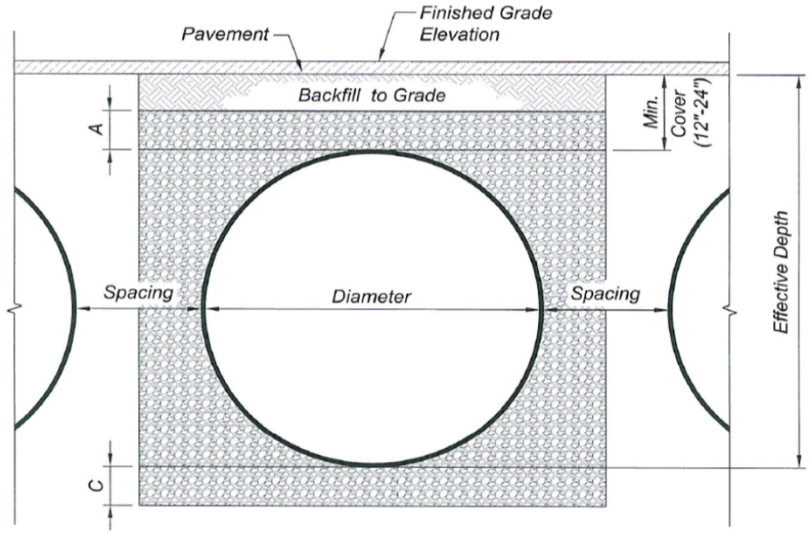
Date:	12/1/2021
Project Name:	BCCOV BLDG A AREA 2
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	55,000
Limiting Width (ft):	100.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	55,342	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	55,342	cf	100.6% Of Required Storage
Number of Barrels:	9	barrels	
Length per Barrel:	101.0	ft	
Length Per Header:	96.0	ft	
Rectangular Footprint (W x L):	99. ft x 120. ft		

CONTECH Materials

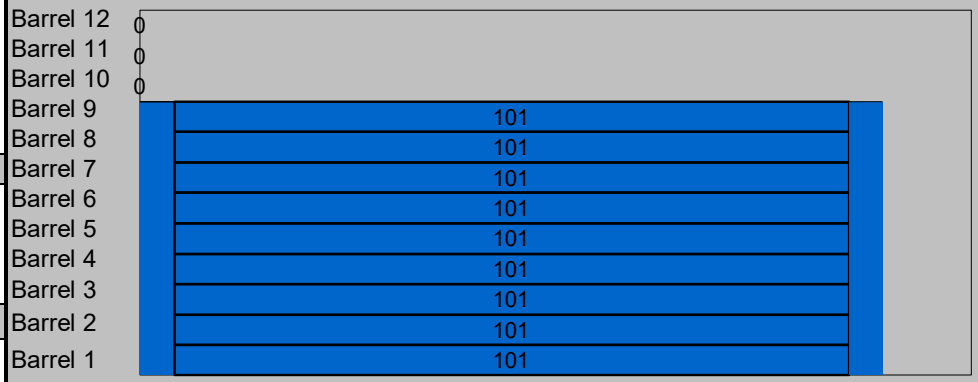
Total CMP Footage:	1,101	ft
Approximate Total Pieces:	53	pcs
Approximate Coupling Bands:	60	bands
Approximate Truckloads:	27	trucks

Construction Quantities**

Total Excavation:	4400	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	2350	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

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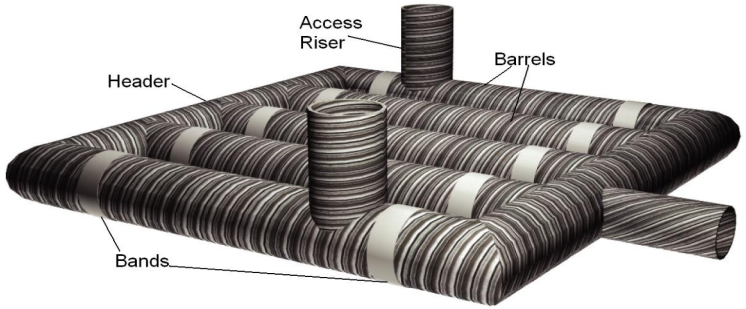


Project Summary

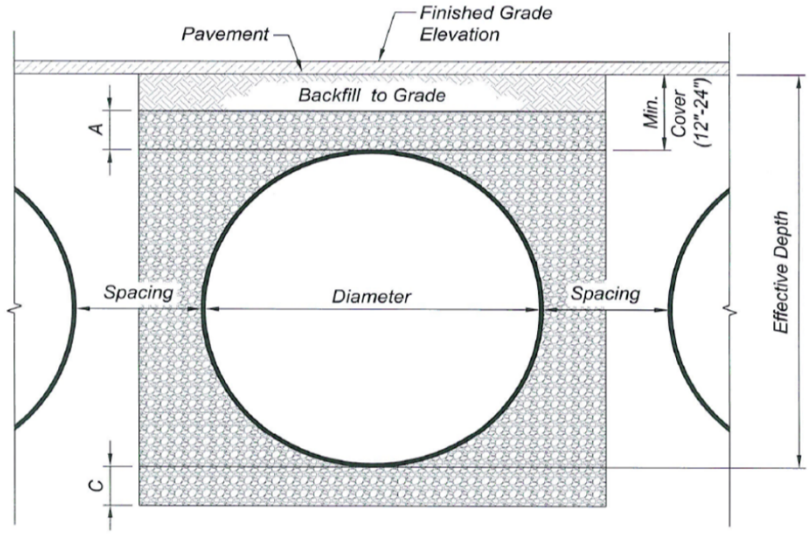
Date:	12/1/2021
Project Name:	BCCOV BLDG A AREA 5
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	48,000
Limiting Width (ft):	60.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	48,205	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	48,205	cf	100.4% Of Required Storage
Number of Barrels:	5	barrels	
Length per Barrel:	171.0	ft	
Length Per Header:	52.0	ft	
Rectangular Footprint (W x L):	55. ft x 190. ft		

CONTECH Materials

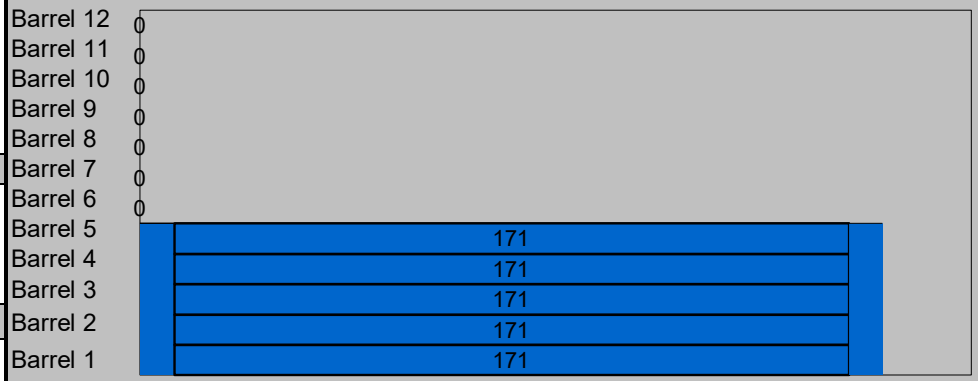
Total CMP Footage:	959	ft
Approximate Total Pieces:	46	pcs
Approximate Coupling Bands:	49	bands
Approximate Truckloads:	23	trucks

Construction Quantities**

Total Excavation:	3871	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	2086	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

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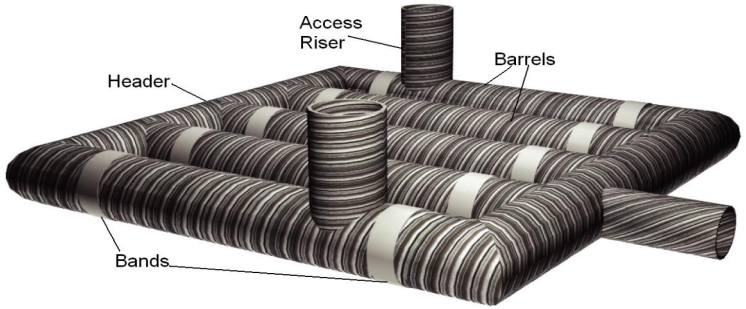


Project Summary

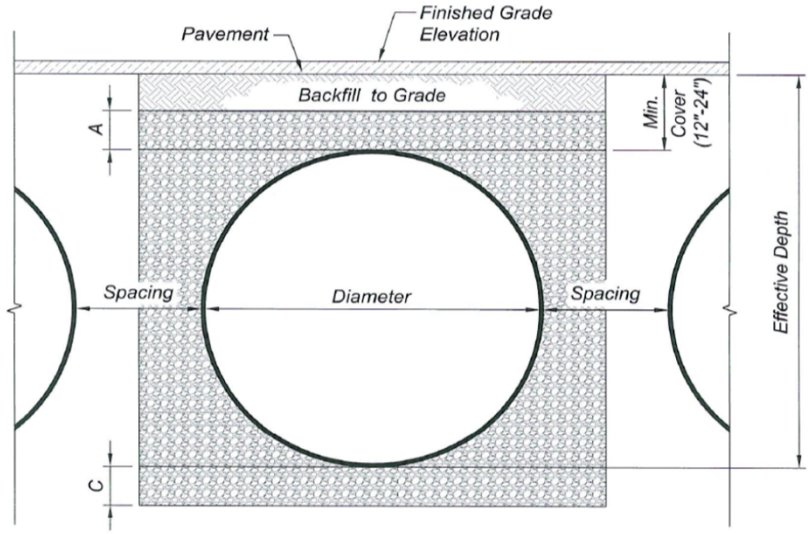
Date:	12/1/2021
Project Name:	BCCOV BLDG A AREA 6
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	25,000
Limiting Width (ft):	30.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	25,032	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	25,032	cf	100.1% Of Required Storage
Number of Barrels:	2	barrels	
Length per Barrel:	230.0	ft	
Length Per Header:	19.0	ft	
Rectangular Footprint (W x L):	22. ft x 249. ft		

CONTECH Materials

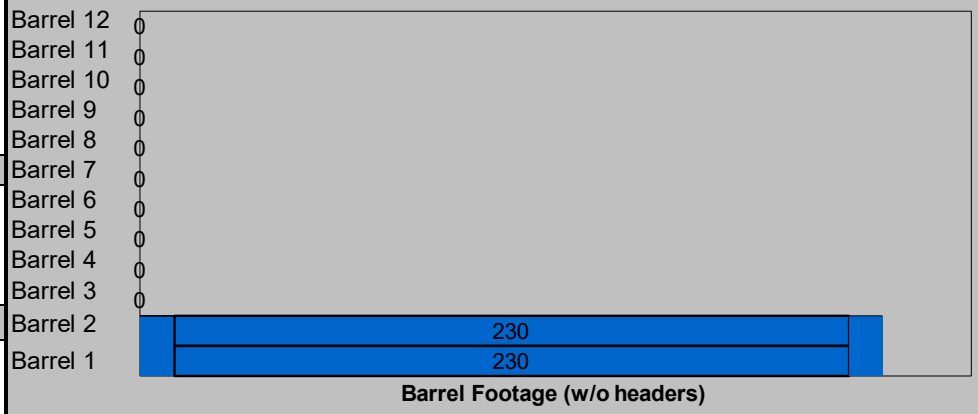
Total CMP Footage:	498	ft
Approximate Total Pieces:	22	pcs
Approximate Coupling Bands:	22	bands
Approximate Truckloads:	11	trucks

Construction Quantities**

Total Excavation:	2029	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	1102	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



TWO CHAMBER SYSTEMS CONNECTED BY AN EQUALIZER PIPE ARE PROPOSED TO DETAIN A TOTAL 50,000 CF

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BLDG A CMP CHAMBERS A1- Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP DETENTION CHAMBERS

$Q_{ORIFICE}$= Cd*Area*(2*G*H)$^{0.5}$

Q_{WEIR}= C*L*H$^{3/2}$

2-Year	ORIFICE
Q EXISTING	0.23
Opening (in)	1.5
# of Orifices	1
Area (sf)	0.0123
Opening (ft)	0.1250
Total Area (sf)	0.0123
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.063	**0.0625**	**143.23**	**0.003**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1145.85**	**0.026**	**0.4375**	0.04	0.04	
4	2209	1	**3176.81**	**0.073**	**0.9375**	0.06	0.06	
5	**2209.5**	1.5	**5715.36**	**0.131**	**1.4375**	0.08	0.08	
6	2210	2	**8608.41**	**0.198**	**1.9375**	0.09	0.09	
7	**2210.5**	2.5	**11756.13**	**0.270**	**2.4375**	0.10	0.10	
8	2211	3	**15081.98**	**0.346**	**2.9375**	0.11	0.11	
9	**2211.5**	**3.5**	**18521.43**	**0.425**	**3.4375**	**0.12**	0.12	
10	2212	4	**22016.28**	**0.505**	**3.9375**	0.13	0.13	
11	**2212.5**	4.5	**25511.13**	**0.586**	**4.4375**	0.14	0.14	
12	2213	5	**28950.58**	**0.665**	**4.9375**	0.14	0.14	
13	**2213.5**	5.5	**32276.43**	**0.741**	**5.4375**	0.15	0.15	
14	2214	6	**35424.15**	**0.813**	**5.9375**	0.16	0.16	
15	**2214.5**	6.5	**38317.20**	**0.880**	**6.4375**	0.16	0.16	
16	2215	7	**40855.75**	**0.938**	**6.9375**	0.17	0.17	
17	**2215.5**	7.50	**42886.71**	**0.985**	**7.4375**	0.18	0.18	
19	2216	8	**44032.56**	**1.011**	**7.9375**	0.18	0.18	Top of chambers

BLDG A CMP CHAMBERS A2 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

	2-Year	ORIFICE
	Q EXISTING	0.32
	Opening (in)	1.5
	# of Orifices	2
	Area (sf)	0.0123
	Opening (ft)	0.1250
	Total Area (sf)	0.0245
	G (ft/s^2)	32.2
	Cd	0.66
	Invert H (ft)	2.125

$Q_{ORIFICE}$= $Cd*Area*(2*G*H)^{0.5}$

Q_{WEIR}= $C*L*H^{3/2}$

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	2-Year Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.063	**0.0625**	**180.02**	**0.004**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1440.16**	**0.033**	**0.4375**	0.09	0.09	
4	2209	1	**3992.77**	**0.092**	**0.9375**	0.13	0.13	
5	**2209.5**	1.5	**7183.35**	**0.165**	**1.4375**	0.16	0.16	
6	2210	2	**10819.48**	**0.248**	**1.9375**	0.18	0.18	
7	**2210.5**	2.5	**14775.69**	**0.339**	**2.4375**	0.20	0.20	
8	2211	3	**18955.78**	**0.435**	**2.9375**	0.22	0.22	
9	**2211.5**	**3.5**	**23278.64**	**0.534**	**3.4375**	**0.24**	0.24	
10	2212	4	**27671.15**	**0.635**	**3.9375**	0.26	0.26	
11	**2212.5**	4.5	**32063.65**	**0.736**	**4.4375**	0.27	0.27	
12	2213	5	**36386.52**	**0.835**	**4.9375**	0.29	0.29	
13	**2213.5**	5.5	**40566.61**	**0.931**	**5.4375**	0.30	0.30	
14	2214	6	**44522.82**	**1.022**	**5.9375**	0.32	0.32	
15	**2214.5**	6.5	**48158.94**	**1.106**	**6.4375**	0.33	0.33	
16	2215	7	**51349.53**	**1.179**	**6.9375**	0.34	0.34	
17	**2215.5**	7.50	**53902.14**	**1.237**	**7.4375**	0.35	0.35	
18	2216	8	**55342.30**	**1.270**	**7.9375**	0.37	0.37	Top of chambers

BLDG A CMP CHAMBERS A3 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	0.48
Opening (in)	1.5
# of Orifices	3
Area (sf)	0.0123
Opening (ft)	0.1250
Total Area (sf)	0.0368
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= $Cd*Area*(2*G*H)^{0.5}$

Q_{WEIR}= $C*L*H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.063	**0.0625**	**156.80**	**0.004**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1254.42**	**0.029**	**0.4375**	0.13	0.13	
4	2209	1	**3477.81**	**0.080**	**0.9375**	0.19	0.19	
5	**2209.5**	1.5	**6256.89**	**0.144**	**1.4375**	0.23	0.23	
6	2210	2	**9424.05**	**0.216**	**1.9375**	0.27	0.27	
7	**2210.5**	2.5	**12870.01**	**0.295**	**2.4375**	0.30	0.30	
8	2211	3	**16510.98**	**0.379**	**2.9375**	0.33	0.33	
9	**2211.5**	**3.5**	**20276.31**	**0.465**	**3.4375**	**0.36**	0.36	
10	2212	4	**24102.30**	**0.553**	**3.9375**	0.39	0.39	
11	**2212.5**	4.5	**27928.29**	**0.641**	**4.4375**	0.41	0.41	
12	2213	5	**31693.62**	**0.728**	**4.9375**	0.43	0.43	
13	**2213.5**	5.5	**35334.58**	**0.811**	**5.4375**	0.45	0.45	
14	2214	6	**38780.55**	**0.890**	**5.9375**	0.48	0.48	
15	**2214.5**	6.5	**41947.71**	**0.963**	**6.4375**	0.49	0.49	
16	2215	7	**44726.79**	**1.027**	**6.9375**	0.51	0.51	
17	**2215.5**	7.50	**46950.18**	**1.078**	**7.4375**	0.53	0.53	
18	2216	8	**48204.60**	**1.107**	**7.9375**	0.55	0.55	Top of chambers

BLDG A CMP CHAMBERS A4 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

	2-Year	ORIFICE
Q EXISTING	0.5	
Opening (in)	2	
# of Orifices	2	
Area (sf)	0.0218	
Opening (ft)	0.1667	
Total Area (sf)	0.0436	
G (ft/s^2)	32.2	
Cd	0.66	
Invert H (ft)	2.125	

$Q_{ORIFICE}$= Cd*Area*$(2*G*H)^{0.5}$

Q_{WEIR}= C*L*$H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.083	**0.08333**	**217.14**	**0.005**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1302.82**	**0.030**	**0.416666667**	0.15	0.15	
4	2209	1	**3611.99**	**0.083**	**0.916666667**	0.22	0.22	
5	**2209.5**	1.5	**6498.29**	**0.149**	**1.416666667**	0.28	0.28	
6	2210	2	**9787.65**	**0.225**	**1.916666667**	0.32	0.32	
7	**2210.5**	2.5	**13366.56**	**0.307**	**2.416666667**	0.36	0.36	
8	2211	3	**17148.01**	**0.394**	**2.916666667**	0.39	0.39	
9	**2211.5**	**3.5**	**21058.61**	**0.483**	**3.416666667**	**0.43**	0.43	
10	2212	4	**25032.21**	**0.575**	**3.916666667**	0.46	0.46	
11	**2212.5**	4.5	**29005.81**	**0.666**	**4.416666667**	0.49	0.49	
12	2213	5	**32916.41**	**0.756**	**4.916666667**	0.51	0.51	
13	**2213.5**	5.5	**36697.86**	**0.842**	**5.416666667**	0.54	0.54	
14	2214	6	**40276.77**	**0.925**	**5.916666667**	0.56	0.56	
15	**2214.5**	6.5	**43566.13**	**1.000**	**6.416666667**	0.59	0.59	
16	2215	7	**46452.43**	**1.066**	**6.916666667**	0.61	0.61	
17	**2215.5**	7.50	**48761.61**	**1.119**	**7.416666667**	0.63	0.63	
18	2216	8	**50064.42**	**1.149**	**7.916666667**	0.65	0.65	Top of chambers

BASIN ROUTING (2-YEAR, 24-HOUR STORM EVENT)

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 11/24/21

BCCOV BLDG A AREA 1
2-YEAR 24-HOUR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR1A242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.746 (CFS)
Total volume = 1.061 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.063	0.003	0.001	0.003	0.003
0.500	0.026	0.040	0.026	0.026
1.000	0.073	0.060	0.073	0.073
1.500	0.131	0.080	0.131	0.131
2.000	0.198	0.090	0.198	0.198
2.500	0.270	0.100	0.270	0.270
3.000	0.346	0.110	0.346	0.346
3.500	0.425	0.120	0.425	0.425
4.000	0.505	0.130	0.505	0.505
4.500	0.586	0.140	0.586	0.586
5.000	0.665	0.140	0.665	0.665
5.500	0.741	0.150	0.740	0.742
6.000	0.813	0.160	0.812	0.814
6.500	0.880	0.160	0.879	0.881
7.000	0.938	0.170	0.937	0.939
7.500	0.985	0.180	0.984	0.986
8.000	1.011	0.180	1.010	1.012

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.4	0.87	1.31	1.75	Depth (Ft.)
0.083	0.03	0.00	0.000	O	|	|	|	|	0.00
0.167	0.09	0.00	0.001	OI	|	|	|	|	0.01
0.250	0.10	0.00	0.001	OI	|	|	|	|	0.02
0.333	0.12	0.00	0.002	O I	|	|	|	|	0.04
0.417	0.15	0.00	0.003	O I	|	|	|	|	0.06
0.500	0.15	0.00	0.004	O I	|	|	|	|	0.08
0.583	0.15	0.00	0.005	O I	|	|	|	|	0.10
0.667	0.15	0.01	0.006	O I	|	|	|	|	0.12
0.750	0.15	0.01	0.007	O I	|	|	|	|	0.14
0.833	0.17	0.01	0.008	O I	|	|	|	|	0.16
0.917	0.20	0.01	0.009	O I	|	|	|	|	0.18
1.000	0.20	0.01	0.011	O I	|	|	|	|	0.21
1.083	0.19	0.02	0.012	O I	|	|	|	|	0.23
1.167	0.16	0.02	0.013	O I	|	|	|	|	0.25
1.250	0.16	0.02	0.014	O I	|	|	|	|	0.27
1.333	0.15	0.02	0.015	O I	|	|	|	|	0.29
1.417	0.15	0.02	0.016	O I	|	|	|	|	0.30
1.500	0.15	0.02	0.017	O I	|	|	|	|	0.32
1.583	0.15	0.03	0.017	O I	|	|	|	|	0.34
1.667	0.15	0.03	0.018	O I	|	|	|	|	0.35
1.750	0.15	0.03	0.019	O I	|	|	|	|	0.37
1.833	0.17	0.03	0.020	O I	|	|	|	|	0.39
1.917	0.20	0.03	0.021	O I	|	|	|	|	0.41
2.000	0.20	0.03	0.022	O I	|	|	|	|	0.43
2.083	0.21	0.04	0.023	O I	|	|	|	|	0.45
2.167	0.21	0.04	0.025	O I	|	|	|	|	0.47
2.250	0.21	0.04	0.026	O I	|	|	|	|	0.50
2.333	0.21	0.04	0.027	O I	|	|	|	|	0.51
2.417	0.21	0.04	0.028	O I	|	|	|	|	0.52
2.500	0.21	0.04	0.029	O I	|	|	|	|	0.53
2.583	0.22	0.04	0.030	O I	|	|	|	|	0.55
2.667	0.25	0.04	0.032	O I	|	|	|	|	0.56
2.750	0.26	0.04	0.033	O I	|	|	|	|	0.58
2.833	0.26	0.04	0.035	O I	|	|	|	|	0.59
2.917	0.26	0.04	0.036	O I	|	|	|	|	0.61
3.000	0.26	0.04	0.038	O I	|	|	|	|	0.62
3.083	0.26	0.05	0.039	O I	|	|	|	|	0.64
3.167	0.26	0.05	0.040	O I	|	|	|	|	0.65
3.250	0.26	0.05	0.042	O I	|	|	|	|	0.67
3.333	0.26	0.05	0.043	O I	|	|	|	|	0.68
3.417	0.26	0.05	0.045	O I	|	|	|	|	0.70
3.500	0.26	0.05	0.046	O I	|	|	|	|	0.72
3.583	0.26	0.05	0.048	O I	|	|	|	|	0.73
3.667	0.26	0.05	0.049	O I	|	|	|	|	0.75
3.750	0.26	0.05	0.051	O I	|	|	|	|	0.76
3.833	0.27	0.05	0.052	O I	|	|	|	|	0.78
3.917	0.30	0.05	0.054	O I	|	|	|	|	0.79
4.000	0.31	0.05	0.055	O I	|	|	|	|	0.81
4.083	0.31	0.05	0.057	O I	|	|	|	|	0.83
4.167	0.31	0.05	0.059	O I	|	|	|	|	0.85
4.250	0.31	0.05	0.061	|O I	|	|	|	|	0.87
4.333	0.33	0.06	0.062	|O I	|	|	|	|	0.89
4.417	0.35	0.06	0.064	|O I	|	|	|	|	0.91
4.500	0.36	0.06	0.066	|O I	|	|	|	|	0.93
4.583	0.36	0.06	0.068	|O I	|	|	|	|	0.95
4.667	0.36	0.06	0.071	|O I	|	|	|	|	0.97
4.750	0.36	0.06	0.073	|O I	|	|	|	|	1.00
4.833	0.38	0.06	0.075	|O I	|	|	|	|	1.01
4.917	0.40	0.06	0.077	|O I|	|	|	|	|	1.03
5.000	0.41	0.06	0.079	|O I|	|	|	|	|	1.05
5.083	0.38	0.06	0.082	|O I	|	|	|	|	1.07
5.167	0.32	0.06	0.084	|O I	|	|	|	|	1.09
5.250	0.31	0.06	0.085	|O I	|	|	|	|	1.11
5.333	0.33	0.06	0.087	|O I	|	|	|	|	1.12
5.417	0.35	0.07	0.089	|O I	|	|	|	|	1.14
5.500	0.36	0.07	0.091	|O I	|	|	|	|	1.16
5.583	0.38	0.07	0.093	|O I	|	|	|	|	1.17
5.667	0.40	0.07	0.095	|O I|	|	|	|	|	1.19
5.750	0.41	0.07	0.098	|O I|	|	|	|	|	1.21
5.833	0.41	0.07	0.100	|O I|	|	|	|	|	1.23

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 5.917    0.41    0.07      0.102  |O     I|       |       |       |     1.25
 6.000    0.41    0.07      0.105  |O     I|       |       |       |     1.27
 6.083    0.43    0.07      0.107  |O     I|       |       |       |     1.29
 6.167    0.46    0.07      0.110  |O      I       |       |       |     1.32
 6.250    0.46    0.07      0.112  |O      I       |       |       |     1.34
 6.333    0.46    0.07      0.115  |O      I       |       |       |     1.36
 6.417    0.46    0.08      0.118  |O      I       |       |       |     1.38
 6.500    0.46    0.08      0.120  |O      I       |       |       |     1.41
 6.583    0.48    0.08      0.123  |O      I       |       |       |     1.43
 6.667    0.51    0.08      0.126  |O      |I      |       |       |     1.46
 6.750    0.51    0.08      0.129  |O      |I      |       |       |     1.48
 6.833    0.51    0.08      0.132  |O      |I      |       |       |     1.51
 6.917    0.51    0.08      0.135  |O      |I      |       |       |     1.53
 7.000    0.51    0.08      0.138  |O      |I      |       |       |     1.55
 7.083    0.51    0.08      0.141  |O      |I      |       |       |     1.57
 7.167    0.51    0.08      0.144  |O      |I      |       |       |     1.59
 7.250    0.51    0.08      0.147  |O      |I      |       |       |     1.62
 7.333    0.53    0.08      0.150  |O      |I      |       |       |     1.64
 7.417    0.56    0.08      0.153  |O      | I     |       |       |     1.66
 7.500    0.56    0.08      0.156  |O      | I     |       |       |     1.69
 7.583    0.58    0.08      0.159  |O      | I     |       |       |     1.71
 7.667    0.61    0.08      0.163  |O      |  I    |       |       |     1.74
 7.750    0.61    0.09      0.167  |O      |  I    |       |       |     1.77
 7.833    0.63    0.09      0.170  |O      |  I    |       |       |     1.79
 7.917    0.66    0.09      0.174  |O      |   I   |       |       |     1.82
 8.000    0.67    0.09      0.178  |O      |   I   |       |       |     1.85
 8.083    0.70    0.09      0.182  |O      |   I   |       |       |     1.88
 8.167    0.76    0.09      0.187  |O      |    I  |       |       |     1.92
 8.250    0.77    0.09      0.191  |O      |     I |       |       |     1.95
 8.333    0.77    0.09      0.196  |O      |     I |       |       |     1.99
 8.417    0.77    0.09      0.201  |O      |     I |       |       |     2.02
 8.500    0.77    0.09      0.205  |O      |     I |       |       |     2.05
 8.583    0.79    0.09      0.210  |O      |     I |       |       |     2.08
 8.667    0.81    0.09      0.215  |O      |     I |       |       |     2.12
 8.750    0.82    0.09      0.220  |O      |      I|       |       |     2.15
 8.833    0.84    0.09      0.225  |O      |      I|       |       |     2.19
 8.917    0.87    0.09      0.230  |O      |      I|       |       |     2.22
 9.000    0.87    0.10      0.236  |O      |      I|       |       |     2.26
 9.083    0.91    0.10      0.241  |O      |       I       |       |     2.30
 9.167    0.96    0.10      0.247  |O      |       |I      |       |     2.34
 9.250    0.97    0.10      0.253  |O      |       |I      |       |     2.38
 9.333    0.99    0.10      0.259  |O      |       | I     |       |     2.42
 9.417    1.02    0.10      0.265  |O      |       | I     |       |     2.47
 9.500    1.03    0.10      0.272  |O      |       | I     |       |     2.51
 9.583    1.04    0.10      0.278  |O      |       |  I    |       |     2.55
 9.667    1.07    0.10      0.285  |O      |       |  I    |       |     2.60
 9.750    1.08    0.10      0.291  |O      |       |  I    |       |     2.64
 9.833    1.09    0.10      0.298  |O      |       |   I   |       |     2.68
 9.917    1.12    0.10      0.305  |O      |       |   I   |       |     2.73
10.000    1.13    0.11      0.312  |O      |       |   I   |       |     2.78
10.083    1.01    0.11      0.319  |O      |       | I     |       |     2.82
10.167    0.82    0.11      0.324  |O      |     I |       |       |     2.86
10.250    0.78    0.11      0.329  |O      |     I |       |       |     2.89
10.333    0.77    0.11      0.333  |O      |     I |       |       |     2.92
10.417    0.77    0.11      0.338  |O      |     I |       |       |     2.95
10.500    0.77    0.11      0.343  | O     |     I |       |       |     2.98
10.583    0.86    0.11      0.347  | O     |      I|       |       |     3.01
10.667    0.99    0.11      0.353  | O     |       | I     |       |     3.04
10.750    1.02    0.11      0.359  | O     |       | I     |       |     3.08
10.833    1.03    0.11      0.365  | O     |       | I     |       |     3.12
10.917    1.03    0.11      0.372  | O     |       | I     |       |     3.16
11.000    1.03    0.11      0.378  | O     |       | I     |       |     3.20
11.083    1.01    0.11      0.384  | O     |       | I     |       |     3.24
11.167    0.98    0.12      0.390  | O     |       | I     |       |     3.28
11.250    0.98    0.12      0.396  | O     |       |I      |       |     3.32
11.333    0.98    0.12      0.402  | O     |       |I      |       |     3.36
11.417    0.98    0.12      0.408  | O     |       |I      |       |     3.39
11.500    0.98    0.12      0.414  | O     |       |I      |       |     3.43
11.583    0.94    0.12      0.420  | O     |       |I      |       |     3.47
11.667    0.89    0.12      0.425  | O     |       I       |       |     3.50
11.750    0.88    0.12      0.431  | O     |       I       |       |     3.53
11.833    0.89    0.12      0.436  | O     |       I       |       |     3.57
11.917    0.92    0.12      0.441  | O     |       I       |       |     3.60
12.000    0.92    0.12      0.447  | O     |       I       |       |     3.64
12.083    1.04    0.12      0.453  | O     |       |  I    |       |     3.67
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12.167	1.24	0.12	0.460	O			I		3.72
12.250	1.27	0.13	0.467	O			I		3.76
12.333	1.30	0.13	0.475	O			I		3.81
12.417	1.33	0.13	0.484	O			I		3.87
12.500	1.33	0.13	0.492	O			I		3.92
12.583	1.37	0.13	0.500	O			I		3.97
12.667	1.42	0.13	0.509	O			I		4.02
12.750	1.43	0.13	0.518	O			I		4.08
12.833	1.45	0.13	0.527	O			I		4.14
12.917	1.48	0.13	0.536	O			I		4.19
13.000	1.49	0.13	0.545	O			I		4.25
13.083	1.57	0.14	0.555	O			I		4.31
13.167	1.71	0.14	0.565	O				I	4.37
13.250	1.74	0.14	0.576	O				I	4.44
13.333	1.74	0.14	0.587	O				I	4.51
13.417	1.75	0.14	0.598	O				I	4.58
13.500	1.75	0.14	0.609	O				I	4.65
13.583	1.56	0.14	0.620	O			I		4.71
13.667	1.26	0.14	0.629	O			I		4.77
13.750	1.20	0.14	0.636	O		I			4.82
13.833	1.18	0.14	0.643	O		I			4.86
13.917	1.18	0.14	0.650	O		I			4.91
14.000	1.18	0.14	0.658	O		I			4.95
14.083	1.25	0.14	0.665	O		I			5.00
14.167	1.36	0.14	0.673	O			I		5.05
14.250	1.38	0.14	0.682	O			I		5.11
14.333	1.37	0.14	0.690	O			I		5.16
14.417	1.34	0.14	0.698	O			I		5.22
14.500	1.34	0.15	0.707	O			I		5.27
14.583	1.34	0.15	0.715	O			I		5.33
14.667	1.33	0.15	0.723	O			I		5.38
14.750	1.33	0.15	0.731	O			I		5.44
14.833	1.32	0.15	0.739	O			I		5.49
14.917	1.29	0.15	0.747	O			I		5.54
15.000	1.28	0.15	0.755	O			I		5.60
15.083	1.27	0.15	0.763	O			I		5.65
15.167	1.24	0.15	0.770	O			I		5.70
15.250	1.23	0.16	0.778	O			I		5.76
15.333	1.22	0.16	0.785	O			I		5.81
15.417	1.19	0.16	0.792	O			I		5.86
15.500	1.18	0.16	0.799	O			I		5.91
15.583	1.11	0.16	0.806	O			I		5.95
15.667	1.00	0.16	0.812	O		I			6.00
15.750	0.98	0.16	0.818	O		I			6.04
15.833	0.98	0.16	0.824	O		I			6.08
15.917	0.98	0.16	0.829	O		I			6.12
16.000	0.98	0.16	0.835	O		I			6.16
16.083	0.72	0.16	0.840	O	I				6.20
16.167	0.31	0.16	0.842	O I					6.22
16.250	0.23	0.16	0.843	O I					6.22
16.333	0.21	0.16	0.843	OI					6.23
16.417	0.21	0.16	0.844	OI					6.23
16.500	0.21	0.16	0.844	OI					6.23
16.583	0.19	0.16	0.844	OI					6.23
16.667	0.16	0.16	0.844	O					6.23
16.750	0.16	0.16	0.844	O					6.23
16.833	0.15	0.16	0.844	O					6.23
16.917	0.15	0.16	0.844	O					6.23
17.000	0.15	0.16	0.844	O					6.23
17.083	0.19	0.16	0.844	OI					6.23
17.167	0.24	0.16	0.845	O I					6.24
17.250	0.25	0.16	0.845	O I					6.24
17.333	0.26	0.16	0.846	O I					6.25
17.417	0.26	0.16	0.847	O I					6.25
17.500	0.26	0.16	0.847	O I					6.26
17.583	0.26	0.16	0.848	O I					6.26
17.667	0.26	0.16	0.849	O I					6.27
17.750	0.26	0.16	0.849	O I					6.27
17.833	0.24	0.16	0.850	O I					6.27
17.917	0.21	0.16	0.850	OI					6.28
18.000	0.21	0.16	0.851	OI					6.28
18.083	0.21	0.16	0.851	OI					6.28
18.167	0.21	0.16	0.851	OI					6.29
18.250	0.21	0.16	0.852	OI					6.29
18.333	0.21	0.16	0.852	OI					6.29

18.417	0.21	0.16	0.852	| OI	|	|	|	6.29
18.500	0.21	0.16	0.853	| OI	|	|	|	6.29
18.583	0.19	0.16	0.853	| OI	|	|	|	6.30
18.667	0.16	0.16	0.853	| O	|	|	|	6.30
18.750	0.16	0.16	0.853	| O	|	|	|	6.30
18.833	0.14	0.16	0.853	| O	|	|	|	6.30
18.917	0.11	0.16	0.853	| O	|	|	|	6.29
19.000	0.10	0.16	0.852	|IO	|	|	|	6.29
19.083	0.12	0.16	0.852	| O	|	|	|	6.29
19.167	0.15	0.16	0.852	| O	|	|	|	6.29
19.250	0.15	0.16	0.852	| O	|	|	|	6.29
19.333	0.17	0.16	0.852	| OI	|	|	|	6.29
19.417	0.20	0.16	0.852	| OI	|	|	|	6.29
19.500	0.20	0.16	0.852	| OI	|	|	|	6.29
19.583	0.19	0.16	0.852	| OI	|	|	|	6.29
19.667	0.16	0.16	0.852	| O	|	|	|	6.29
19.750	0.16	0.16	0.852	| O	|	|	|	6.29
19.833	0.14	0.16	0.852	| O	|	|	|	6.29
19.917	0.11	0.16	0.852	| O	|	|	|	6.29
20.000	0.10	0.16	0.852	|IO	|	|	|	6.29
20.083	0.12	0.16	0.851	| O	|	|	|	6.29
20.167	0.15	0.16	0.851	| O	|	|	|	6.28
20.250	0.15	0.16	0.851	| O	|	|	|	6.28
20.333	0.15	0.16	0.851	| O	|	|	|	6.28
20.417	0.15	0.16	0.851	| O	|	|	|	6.28
20.500	0.15	0.16	0.851	| O	|	|	|	6.28
20.583	0.15	0.16	0.851	| O	|	|	|	6.28
20.667	0.15	0.16	0.851	| O	|	|	|	6.28
20.750	0.15	0.16	0.851	| O	|	|	|	6.28
20.833	0.14	0.16	0.851	| O	|	|	|	6.28
20.917	0.11	0.16	0.850	| O	|	|	|	6.28
21.000	0.10	0.16	0.850	|IO	|	|	|	6.28
21.083	0.12	0.16	0.850	| O	|	|	|	6.27
21.167	0.15	0.16	0.850	| O	|	|	|	6.27
21.250	0.15	0.16	0.850	| O	|	|	|	6.27
21.333	0.14	0.16	0.849	| O	|	|	|	6.27
21.417	0.11	0.16	0.849	| O	|	|	|	6.27
21.500	0.10	0.16	0.849	|IO	|	|	|	6.27
21.583	0.12	0.16	0.848	| O	|	|	|	6.26
21.667	0.15	0.16	0.848	| O	|	|	|	6.26
21.750	0.15	0.16	0.848	| O	|	|	|	6.26
21.833	0.14	0.16	0.848	| O	|	|	|	6.26
21.917	0.11	0.16	0.848	| O	|	|	|	6.26
22.000	0.10	0.16	0.847	|IO	|	|	|	6.26
22.083	0.12	0.16	0.847	| O	|	|	|	6.25
22.167	0.15	0.16	0.847	| O	|	|	|	6.25
22.250	0.15	0.16	0.847	| O	|	|	|	6.25
22.333	0.14	0.16	0.847	| O	|	|	|	6.25
22.417	0.11	0.16	0.847	| O	|	|	|	6.25
22.500	0.10	0.16	0.846	|IO	|	|	|	6.25
22.583	0.10	0.16	0.846	|IO	|	|	|	6.24
22.667	0.10	0.16	0.845	|IO	|	|	|	6.24
22.750	0.10	0.16	0.845	|IO	|	|	|	6.24
22.833	0.10	0.16	0.845	|IO	|	|	|	6.24
22.917	0.10	0.16	0.844	|IO	|	|	|	6.23
23.000	0.10	0.16	0.844	|IO	|	|	|	6.23
23.083	0.10	0.16	0.843	|IO	|	|	|	6.23
23.167	0.10	0.16	0.843	|IO	|	|	|	6.22
23.250	0.10	0.16	0.843	|IO	|	|	|	6.22
23.333	0.10	0.16	0.842	|IO	|	|	|	6.22
23.417	0.10	0.16	0.842	|IO	|	|	|	6.22
23.500	0.10	0.16	0.841	|IO	|	|	|	6.21
23.583	0.10	0.16	0.841	|IO	|	|	|	6.21
23.667	0.10	0.16	0.841	|IO	|	|	|	6.21
23.750	0.10	0.16	0.840	|IO	|	|	|	6.20
23.833	0.10	0.16	0.840	|IO	|	|	|	6.20
23.917	0.10	0.16	0.839	|IO	|	|	|	6.20
24.000	0.10	0.16	0.839	|IO	|	|	|	6.19
24.083	0.07	0.16	0.839	|IO	|	|	|	6.19
24.167	0.01	0.16	0.838	I O	|	|	|	6.18
24.250	0.00	0.16	0.837	I O	|	|	|	6.18
24.333	0.00	0.16	0.836	I O	|	|	|	6.17
24.417	0.00	0.16	0.835	I O	|	|	|	6.16
24.500	0.00	0.16	0.833	I O	|	|	|	6.15
24.583	0.00	0.16	0.832	I O	|	|	|	6.14

24.667	0.00	0.16	0.831	I	O	|	|	|	| 6.14
24.750	0.00	0.16	0.830	I	O	|	|	|	| 6.13
24.833	0.00	0.16	0.829	I	O	|	|	|	| 6.12
24.917	0.00	0.16	0.828	I	O	|	|	|	| 6.11
25.000	0.00	0.16	0.827	I	O	|	|	|	| 6.10
25.083	0.00	0.16	0.826	I	O	|	|	|	| 6.09
25.167	0.00	0.16	0.825	I	O	|	|	|	| 6.09
25.250	0.00	0.16	0.823	I	O	|	|	|	| 6.08
25.333	0.00	0.16	0.822	I	O	|	|	|	| 6.07
25.417	0.00	0.16	0.821	I	O	|	|	|	| 6.06
25.500	0.00	0.16	0.820	I	O	|	|	|	| 6.05
25.583	0.00	0.16	0.819	I	O	|	|	|	| 6.05
25.667	0.00	0.16	0.818	I	O	|	|	|	| 6.04
25.750	0.00	0.16	0.817	I	O	|	|	|	| 6.03
25.833	0.00	0.16	0.816	I	O	|	|	|	| 6.02
25.917	0.00	0.16	0.815	I	O	|	|	|	| 6.01
26.000	0.00	0.16	0.814	I	O	|	|	|	| 6.00
26.083	0.00	0.16	0.812	I	O	|	|	|	| 6.00
26.167	0.00	0.16	0.811	I	O	|	|	|	| 5.99
26.250	0.00	0.16	0.810	I	O	|	|	|	| 5.98
26.333	0.00	0.16	0.809	I	O	|	|	|	| 5.97
26.417	0.00	0.16	0.808	I	O	|	|	|	| 5.97
26.500	0.00	0.16	0.807	I	O	|	|	|	| 5.96
26.583	0.00	0.16	0.806	I	O	|	|	|	| 5.95
26.667	0.00	0.16	0.805	I	O	|	|	|	| 5.94
26.750	0.00	0.16	0.804	I	O	|	|	|	| 5.94
26.833	0.00	0.16	0.803	I	O	|	|	|	| 5.93
26.917	0.00	0.16	0.802	I	O	|	|	|	| 5.92
27.000	0.00	0.16	0.800	I	O	|	|	|	| 5.91
27.083	0.00	0.16	0.799	I	O	|	|	|	| 5.91
27.167	0.00	0.16	0.798	I	O	|	|	|	| 5.90
27.250	0.00	0.16	0.797	I	O	|	|	|	| 5.89
27.333	0.00	0.16	0.796	I	O	|	|	|	| 5.88
27.417	0.00	0.16	0.795	I	O	|	|	|	| 5.87
27.500	0.00	0.16	0.794	I	O	|	|	|	| 5.87
27.583	0.00	0.16	0.793	I	O	|	|	|	| 5.86
27.667	0.00	0.16	0.792	I	O	|	|	|	| 5.85
27.750	0.00	0.16	0.791	I	O	|	|	|	| 5.84
27.833	0.00	0.16	0.790	I	O	|	|	|	| 5.84
27.917	0.00	0.16	0.788	I	O	|	|	|	| 5.83
28.000	0.00	0.16	0.787	I	O	|	|	|	| 5.82
28.083	0.00	0.16	0.786	I	O	|	|	|	| 5.81
28.167	0.00	0.16	0.785	I	O	|	|	|	| 5.81
28.250	0.00	0.16	0.784	I	O	|	|	|	| 5.80
28.333	0.00	0.16	0.783	I	O	|	|	|	| 5.79
28.417	0.00	0.16	0.782	I	O	|	|	|	| 5.78
28.500	0.00	0.16	0.781	I	O	|	|	|	| 5.78
28.583	0.00	0.16	0.780	I	O	|	|	|	| 5.77
28.667	0.00	0.16	0.779	I	O	|	|	|	| 5.76
28.750	0.00	0.16	0.778	I	O	|	|	|	| 5.76
28.833	0.00	0.15	0.777	I	O	|	|	|	| 5.75
28.917	0.00	0.15	0.776	I	O	|	|	|	| 5.74
29.000	0.00	0.15	0.775	I	O	|	|	|	| 5.73
29.083	0.00	0.15	0.773	I	O	|	|	|	| 5.73
29.167	0.00	0.15	0.772	I	O	|	|	|	| 5.72
29.250	0.00	0.15	0.771	I	O	|	|	|	| 5.71
29.333	0.00	0.15	0.770	I	O	|	|	|	| 5.70
29.417	0.00	0.15	0.769	I	O	|	|	|	| 5.70
29.500	0.00	0.15	0.768	I	O	|	|	|	| 5.69
29.583	0.00	0.15	0.767	I	O	|	|	|	| 5.68
29.667	0.00	0.15	0.766	I	O	|	|	|	| 5.67
29.750	0.00	0.15	0.765	I	O	|	|	|	| 5.67
29.833	0.00	0.15	0.764	I	O	|	|	|	| 5.66
29.917	0.00	0.15	0.763	I	O	|	|	|	| 5.65
30.000	0.00	0.15	0.762	I	O	|	|	|	| 5.64
30.083	0.00	0.15	0.761	I	O	|	|	|	| 5.64
30.167	0.00	0.15	0.760	I	O	|	|	|	| 5.63
30.250	0.00	0.15	0.759	I	O	|	|	|	| 5.62
30.333	0.00	0.15	0.758	I	O	|	|	|	| 5.62
30.417	0.00	0.15	0.757	I	O	|	|	|	| 5.61
30.500	0.00	0.15	0.756	I	O	|	|	|	| 5.60
30.583	0.00	0.15	0.755	I	O	|	|	|	| 5.59
30.667	0.00	0.15	0.753	I	O	|	|	|	| 5.59
30.750	0.00	0.15	0.752	I	O	|	|	|	| 5.58
30.833	0.00	0.15	0.751	I	O	|	|	|	| 5.57

30.917	0.00	0.15	0.750	I O				5.56
31.000	0.00	0.15	0.749	I O				5.56
31.083	0.00	0.15	0.748	I O				5.55
31.167	0.00	0.15	0.747	I O				5.54
31.250	0.00	0.15	0.746	I O				5.54
31.333	0.00	0.15	0.745	I O				5.53
31.417	0.00	0.15	0.744	I O				5.52
31.500	0.00	0.15	0.743	I O				5.51
31.583	0.00	0.15	0.742	I O				5.51
31.667	0.00	0.15	0.741	I O				5.50
31.750	0.00	0.15	0.740	I O				5.49
31.833	0.00	0.15	0.739	I O				5.49
31.917	0.00	0.15	0.738	I O				5.48
32.000	0.00	0.15	0.737	I O				5.47
32.083	0.00	0.15	0.736	I O				5.47
32.167	0.00	0.15	0.735	I O				5.46
32.250	0.00	0.15	0.734	I O				5.45
32.333	0.00	0.15	0.733	I O				5.45
32.417	0.00	0.15	0.732	I O				5.44
32.500	0.00	0.15	0.731	I O				5.43
32.583	0.00	0.15	0.730	I O				5.43
32.667	0.00	0.15	0.729	I O				5.42
32.750	0.00	0.15	0.728	I O				5.41
32.833	0.00	0.15	0.727	I O				5.41
32.917	0.00	0.15	0.726	I O				5.40
33.000	0.00	0.15	0.725	I O				5.39
33.083	0.00	0.15	0.724	I O				5.39
33.167	0.00	0.15	0.723	I O				5.38
33.250	0.00	0.15	0.722	I O				5.37
33.333	0.00	0.15	0.721	I O				5.37
33.417	0.00	0.15	0.719	I O				5.36
33.500	0.00	0.15	0.718	I O				5.35
33.583	0.00	0.15	0.717	I O				5.35
33.667	0.00	0.15	0.716	I O				5.34
33.750	0.00	0.15	0.715	I O				5.33
33.833	0.00	0.15	0.714	I O				5.33
33.917	0.00	0.15	0.713	I O				5.32
34.000	0.00	0.15	0.712	I O				5.31
34.083	0.00	0.15	0.711	I O				5.31
34.167	0.00	0.15	0.710	I O				5.30
34.250	0.00	0.15	0.709	I O				5.29
34.333	0.00	0.15	0.708	I O				5.29
34.417	0.00	0.15	0.707	I O				5.28
34.500	0.00	0.15	0.706	I O				5.27
34.583	0.00	0.15	0.705	I O				5.27
34.667	0.00	0.15	0.704	I O				5.26
34.750	0.00	0.15	0.703	I O				5.25
34.833	0.00	0.14	0.702	I O				5.25
34.917	0.00	0.14	0.701	I O				5.24
35.000	0.00	0.14	0.700	I O				5.23
35.083	0.00	0.14	0.699	I O				5.23
35.167	0.00	0.14	0.698	I O				5.22
35.250	0.00	0.14	0.697	I O				5.21
35.333	0.00	0.14	0.696	I O				5.21
35.417	0.00	0.14	0.695	I O				5.20
35.500	0.00	0.14	0.694	I O				5.19
35.583	0.00	0.14	0.693	I O				5.19
35.667	0.00	0.14	0.692	I O				5.18
35.750	0.00	0.14	0.691	I O				5.17
35.833	0.00	0.14	0.690	I O				5.17
35.917	0.00	0.14	0.690	I O				5.16
36.000	0.00	0.14	0.689	I O				5.15
36.083	0.00	0.14	0.688	I O				5.15
36.167	0.00	0.14	0.687	I O				5.14
36.250	0.00	0.14	0.686	I O				5.14
36.333	0.00	0.14	0.685	I O				5.13
36.417	0.00	0.14	0.684	I O				5.12
36.500	0.00	0.14	0.683	I O				5.12
36.583	0.00	0.14	0.682	I O				5.11
36.667	0.00	0.14	0.681	I O				5.10
36.750	0.00	0.14	0.680	I O				5.10
36.833	0.00	0.14	0.679	I O				5.09
36.917	0.00	0.14	0.678	I O				5.08
37.000	0.00	0.14	0.677	I O				5.08
37.083	0.00	0.14	0.676	I O				5.07

37.167	0.00	0.14	0.675	I	O	|	|	|	5.06
37.250	0.00	0.14	0.674	I	O	|	|	|	5.06
37.333	0.00	0.14	0.673	I	O	|	|	|	5.05
37.417	0.00	0.14	0.672	I	O	|	|	|	5.05
37.500	0.00	0.14	0.671	I	O	|	|	|	5.04
37.583	0.00	0.14	0.670	I	O	|	|	|	5.03
37.667	0.00	0.14	0.669	I	O	|	|	|	5.03
37.750	0.00	0.14	0.668	I	O	|	|	|	5.02
37.833	0.00	0.14	0.667	I	O	|	|	|	5.01
37.917	0.00	0.14	0.666	I	O	|	|	|	5.01
38.000	0.00	0.14	0.665	I	O	|	|	|	5.00
38.083	0.00	0.14	0.664	I	O	|	|	|	4.99
38.167	0.00	0.14	0.663	I	O	|	|	|	4.99
38.250	0.00	0.14	0.662	I	O	|	|	|	4.98
38.333	0.00	0.14	0.661	I	O	|	|	|	4.98
38.417	0.00	0.14	0.660	I	O	|	|	|	4.97
38.500	0.00	0.14	0.659	I	O	|	|	|	4.96
38.583	0.00	0.14	0.658	I	O	|	|	|	4.96
38.667	0.00	0.14	0.657	I	O	|	|	|	4.95
38.750	0.00	0.14	0.656	I	O	|	|	|	4.95
38.833	0.00	0.14	0.655	I	O	|	|	|	4.94
38.917	0.00	0.14	0.655	I	O	|	|	|	4.93
39.000	0.00	0.14	0.654	I	O	|	|	|	4.93
39.083	0.00	0.14	0.653	I	O	|	|	|	4.92
39.167	0.00	0.14	0.652	I	O	|	|	|	4.92
39.250	0.00	0.14	0.651	I	O	|	|	|	4.91
39.333	0.00	0.14	0.650	I	O	|	|	|	4.90
39.417	0.00	0.14	0.649	I	O	|	|	|	4.90
39.500	0.00	0.14	0.648	I	O	|	|	|	4.89
39.583	0.00	0.14	0.647	I	O	|	|	|	4.88
39.667	0.00	0.14	0.646	I	O	|	|	|	4.88
39.750	0.00	0.14	0.645	I	O	|	|	|	4.87
39.833	0.00	0.14	0.644	I	O	|	|	|	4.87
39.917	0.00	0.14	0.643	I	O	|	|	|	4.86
40.000	0.00	0.14	0.642	I	O	|	|	|	4.85
40.083	0.00	0.14	0.641	I	O	|	|	|	4.85
40.167	0.00	0.14	0.640	I	O	|	|	|	4.84
40.250	0.00	0.14	0.639	I	O	|	|	|	4.84
40.333	0.00	0.14	0.638	I	O	|	|	|	4.83
40.417	0.00	0.14	0.637	I	O	|	|	|	4.82
40.500	0.00	0.14	0.636	I	O	|	|	|	4.82
40.583	0.00	0.14	0.635	I	O	|	|	|	4.81
40.667	0.00	0.14	0.634	I	O	|	|	|	4.81
40.750	0.00	0.14	0.633	I	O	|	|	|	4.80
40.833	0.00	0.14	0.632	I	O	|	|	|	4.79
40.917	0.00	0.14	0.631	I	O	|	|	|	4.79
41.000	0.00	0.14	0.630	I	O	|	|	|	4.78
41.083	0.00	0.14	0.629	I	O	|	|	|	4.77
41.167	0.00	0.14	0.628	I	O	|	|	|	4.77
41.250	0.00	0.14	0.628	I	O	|	|	|	4.76
41.333	0.00	0.14	0.627	I	O	|	|	|	4.76
41.417	0.00	0.14	0.626	I	O	|	|	|	4.75
41.500	0.00	0.14	0.625	I	O	|	|	|	4.74
41.583	0.00	0.14	0.624	I	O	|	|	|	4.74
41.667	0.00	0.14	0.623	I	O	|	|	|	4.73
41.750	0.00	0.14	0.622	I	O	|	|	|	4.73
41.833	0.00	0.14	0.621	I	O	|	|	|	4.72
41.917	0.00	0.14	0.620	I	O	|	|	|	4.71
42.000	0.00	0.14	0.619	I	O	|	|	|	4.71
42.083	0.00	0.14	0.618	I	O	|	|	|	4.70
42.167	0.00	0.14	0.617	I	O	|	|	|	4.70
42.250	0.00	0.14	0.616	I	O	|	|	|	4.69
42.333	0.00	0.14	0.615	I	O	|	|	|	4.68
42.417	0.00	0.14	0.614	I	O	|	|	|	4.68
42.500	0.00	0.14	0.613	I	O	|	|	|	4.67
42.583	0.00	0.14	0.612	I	O	|	|	|	4.67
42.667	0.00	0.14	0.611	I	O	|	|	|	4.66
42.750	0.00	0.14	0.610	I	O	|	|	|	4.65
42.833	0.00	0.14	0.609	I	O	|	|	|	4.65
42.917	0.00	0.14	0.608	I	O	|	|	|	4.64
43.000	0.00	0.14	0.607	I	O	|	|	|	4.63
43.083	0.00	0.14	0.606	I	O	|	|	|	4.63
43.167	0.00	0.14	0.605	I	O	|	|	|	4.62
43.250	0.00	0.14	0.604	I	O	|	|	|	4.62
43.333	0.00	0.14	0.603	I	O	|	|	|	4.61

43.417	0.00	0.14	0.602	I	O	|	|	|	|	4.60
43.500	0.00	0.14	0.601	I	O	|	|	|	|	4.60
43.583	0.00	0.14	0.601	I	O	|	|	|	|	4.59
43.667	0.00	0.14	0.600	I	O	|	|	|	|	4.59
43.750	0.00	0.14	0.599	I	O	|	|	|	|	4.58
43.833	0.00	0.14	0.598	I	O	|	|	|	|	4.57
43.917	0.00	0.14	0.597	I	O	|	|	|	|	4.57
44.000	0.00	0.14	0.596	I	O	|	|	|	|	4.56
44.083	0.00	0.14	0.595	I	O	|	|	|	|	4.56
44.167	0.00	0.14	0.594	I	O	|	|	|	|	4.55
44.250	0.00	0.14	0.593	I	O	|	|	|	|	4.54
44.333	0.00	0.14	0.592	I	O	|	|	|	|	4.54
44.417	0.00	0.14	0.591	I	O	|	|	|	|	4.53
44.500	0.00	0.14	0.590	I	O	|	|	|	|	4.52
44.583	0.00	0.14	0.589	I	O	|	|	|	|	4.52
44.667	0.00	0.14	0.588	I	O	|	|	|	|	4.51
44.750	0.00	0.14	0.587	I	O	|	|	|	|	4.51
44.833	0.00	0.14	0.586	I	O	|	|	|	|	4.50
44.917	0.00	0.14	0.585	I	O	|	|	|	|	4.49
45.000	0.00	0.14	0.584	I	O	|	|	|	|	4.49
45.083	0.00	0.14	0.583	I	O	|	|	|	|	4.48
45.167	0.00	0.14	0.582	I	O	|	|	|	|	4.48
45.250	0.00	0.14	0.581	I	O	|	|	|	|	4.47
45.333	0.00	0.14	0.580	I	O	|	|	|	|	4.46
45.417	0.00	0.14	0.579	I	O	|	|	|	|	4.46
45.500	0.00	0.14	0.578	I	O	|	|	|	|	4.45
45.583	0.00	0.14	0.577	I	O	|	|	|	|	4.45
45.667	0.00	0.14	0.576	I	O	|	|	|	|	4.44
45.750	0.00	0.14	0.575	I	O	|	|	|	|	4.44
45.833	0.00	0.14	0.575	I	O	|	|	|	|	4.43
45.917	0.00	0.14	0.574	I	O	|	|	|	|	4.42
46.000	0.00	0.14	0.573	I	O	|	|	|	|	4.42
46.083	0.00	0.14	0.572	I	O	|	|	|	|	4.41
46.167	0.00	0.14	0.571	I	O	|	|	|	|	4.41
46.250	0.00	0.14	0.570	I	O	|	|	|	|	4.40
46.333	0.00	0.14	0.569	I	O	|	|	|	|	4.39
46.417	0.00	0.14	0.568	I	O	|	|	|	|	4.39
46.500	0.00	0.14	0.567	I	O	|	|	|	|	4.38
46.583	0.00	0.14	0.566	I	O	|	|	|	|	4.38
46.667	0.00	0.14	0.565	I	O	|	|	|	|	4.37
46.750	0.00	0.14	0.564	I	O	|	|	|	|	4.36
46.833	0.00	0.14	0.563	I	O	|	|	|	|	4.36
46.917	0.00	0.14	0.562	I	O	|	|	|	|	4.35
47.000	0.00	0.14	0.561	I	O	|	|	|	|	4.35
47.083	0.00	0.14	0.560	I	O	|	|	|	|	4.34
47.167	0.00	0.14	0.559	I	O	|	|	|	|	4.34
47.250	0.00	0.14	0.558	I	O	|	|	|	|	4.33
47.333	0.00	0.14	0.557	I	O	|	|	|	|	4.32
47.417	0.00	0.14	0.557	I	O	|	|	|	|	4.32
47.500	0.00	0.14	0.556	I	O	|	|	|	|	4.31
47.583	0.00	0.14	0.555	I	O	|	|	|	|	4.31
47.667	0.00	0.14	0.554	I	O	|	|	|	|	4.30
47.750	0.00	0.14	0.553	I	O	|	|	|	|	4.30
47.833	0.00	0.14	0.552	I	O	|	|	|	|	4.29
47.917	0.00	0.14	0.551	I	O	|	|	|	|	4.28
48.000	0.00	0.14	0.550	I	O	|	|	|	|	4.28
48.083	0.00	0.14	0.549	I	O	|	|	|	|	4.27
48.167	0.00	0.14	0.548	I	O	|	|	|	|	4.27
48.250	0.00	0.14	0.547	I	O	|	|	|	|	4.26
48.333	0.00	0.14	0.546	I	O	|	|	|	|	4.25
48.417	0.00	0.13	0.545	I	O	|	|	|	|	4.25
48.500	0.00	0.13	0.544	I	O	|	|	|	|	4.24
48.583	0.00	0.13	0.543	I	O	|	|	|	|	4.24
48.667	0.00	0.13	0.543	I	O	|	|	|	|	4.23
48.750	0.00	0.13	0.542	I	O	|	|	|	|	4.23
48.833	0.00	0.13	0.541	I	O	|	|	|	|	4.22
48.917	0.00	0.13	0.540	I	O	|	|	|	|	4.21
49.000	0.00	0.13	0.539	I	O	|	|	|	|	4.21
49.083	0.00	0.13	0.538	I	O	|	|	|	|	4.20
49.167	0.00	0.13	0.537	I	O	|	|	|	|	4.20
49.250	0.00	0.13	0.536	I	O	|	|	|	|	4.19
49.333	0.00	0.13	0.535	I	O	|	|	|	|	4.19
49.417	0.00	0.13	0.534	I	O	|	|	|	|	4.18
49.500	0.00	0.13	0.533	I	O	|	|	|	|	4.17
49.583	0.00	0.13	0.532	I	O	|	|	|	|	4.17

49.667	0.00	0.13	0.531	I	O	|	|	|	|	4.16
49.750	0.00	0.13	0.531	I	O	|	|	|	|	4.16
49.833	0.00	0.13	0.530	I	O	|	|	|	|	4.15
49.917	0.00	0.13	0.529	I	O	|	|	|	|	4.15
50.000	0.00	0.13	0.528	I	O	|	|	|	|	4.14
50.083	0.00	0.13	0.527	I	O	|	|	|	|	4.14
50.167	0.00	0.13	0.526	I	O	|	|	|	|	4.13
50.250	0.00	0.13	0.525	I	O	|	|	|	|	4.12
50.333	0.00	0.13	0.524	I	O	|	|	|	|	4.12
50.417	0.00	0.13	0.523	I	O	|	|	|	|	4.11
50.500	0.00	0.13	0.522	I	O	|	|	|	|	4.11
50.583	0.00	0.13	0.521	I	O	|	|	|	|	4.10
50.667	0.00	0.13	0.521	I	O	|	|	|	|	4.10
50.750	0.00	0.13	0.520	I	O	|	|	|	|	4.09
50.833	0.00	0.13	0.519	I	O	|	|	|	|	4.08
50.917	0.00	0.13	0.518	I	O	|	|	|	|	4.08
51.000	0.00	0.13	0.517	I	O	|	|	|	|	4.07
51.083	0.00	0.13	0.516	I	O	|	|	|	|	4.07
51.167	0.00	0.13	0.515	I	O	|	|	|	|	4.06
51.250	0.00	0.13	0.514	I	O	|	|	|	|	4.06
51.333	0.00	0.13	0.513	I	O	|	|	|	|	4.05
51.417	0.00	0.13	0.512	I	O	|	|	|	|	4.05
51.500	0.00	0.13	0.511	I	O	|	|	|	|	4.04
51.583	0.00	0.13	0.511	I	O	|	|	|	|	4.03
51.667	0.00	0.13	0.510	I	O	|	|	|	|	4.03
51.750	0.00	0.13	0.509	I	O	|	|	|	|	4.02
51.833	0.00	0.13	0.508	I	O	|	|	|	|	4.02
51.917	0.00	0.13	0.507	I	O	|	|	|	|	4.01
52.000	0.00	0.13	0.506	I	O	|	|	|	|	4.01
52.083	0.00	0.13	0.505	I	O	|	|	|	|	4.00
52.167	0.00	0.13	0.504	I	O	|	|	|	|	4.00
52.250	0.00	0.13	0.503	I	O	|	|	|	|	3.99
52.333	0.00	0.13	0.503	I	O	|	|	|	|	3.98
52.417	0.00	0.13	0.502	I	O	|	|	|	|	3.98
52.500	0.00	0.13	0.501	I	O	|	|	|	|	3.97
52.583	0.00	0.13	0.500	I	O	|	|	|	|	3.97
52.667	0.00	0.13	0.499	I	O	|	|	|	|	3.96
52.750	0.00	0.13	0.498	I	O	|	|	|	|	3.96
52.833	0.00	0.13	0.497	I	O	|	|	|	|	3.95
52.917	0.00	0.13	0.496	I	O	|	|	|	|	3.95
53.000	0.00	0.13	0.495	I	O	|	|	|	|	3.94
53.083	0.00	0.13	0.495	I	O	|	|	|	|	3.93
53.167	0.00	0.13	0.494	I	O	|	|	|	|	3.93
53.250	0.00	0.13	0.493	I	O	|	|	|	|	3.92
53.333	0.00	0.13	0.492	I	O	|	|	|	|	3.92
53.417	0.00	0.13	0.491	I	O	|	|	|	|	3.91
53.500	0.00	0.13	0.490	I	O	|	|	|	|	3.91
53.583	0.00	0.13	0.489	I	O	|	|	|	|	3.90
53.667	0.00	0.13	0.488	I	O	|	|	|	|	3.90
53.750	0.00	0.13	0.487	I	O	|	|	|	|	3.89
53.833	0.00	0.13	0.487	I	O	|	|	|	|	3.88
53.917	0.00	0.13	0.486	I	O	|	|	|	|	3.88
54.000	0.00	0.13	0.485	I	O	|	|	|	|	3.87
54.083	0.00	0.13	0.484	I	O	|	|	|	|	3.87
54.167	0.00	0.13	0.483	I	O	|	|	|	|	3.86
54.250	0.00	0.13	0.482	I	O	|	|	|	|	3.86
54.333	0.00	0.13	0.481	I	O	|	|	|	|	3.85
54.417	0.00	0.13	0.480	I	O	|	|	|	|	3.85
54.500	0.00	0.13	0.480	I	O	|	|	|	|	3.84
54.583	0.00	0.13	0.479	I	O	|	|	|	|	3.84
54.667	0.00	0.13	0.478	I	O	|	|	|	|	3.83
54.750	0.00	0.13	0.477	I	O	|	|	|	|	3.82
54.833	0.00	0.13	0.476	I	O	|	|	|	|	3.82
54.917	0.00	0.13	0.475	I	O	|	|	|	|	3.81
55.000	0.00	0.13	0.474	I	O	|	|	|	|	3.81
55.083	0.00	0.13	0.473	I	O	|	|	|	|	3.80
55.167	0.00	0.13	0.473	I	O	|	|	|	|	3.80
55.250	0.00	0.13	0.472	I	O	|	|	|	|	3.79
55.333	0.00	0.13	0.471	I	O	|	|	|	|	3.79
55.417	0.00	0.13	0.470	I	O	|	|	|	|	3.78
55.500	0.00	0.13	0.469	I	O	|	|	|	|	3.78
55.583	0.00	0.13	0.468	I	O	|	|	|	|	3.77
55.667	0.00	0.13	0.467	I	O	|	|	|	|	3.76
55.750	0.00	0.13	0.467	I	O	|	|	|	|	3.76
55.833	0.00	0.13	0.466	I	O	|	|	|	|	3.75

55.917	0.00	0.12	0.465	I	O	|	|	|	3.75
56.000	0.00	0.12	0.464	I	O	|	|	|	3.74
56.083	0.00	0.12	0.463	I	O	|	|	|	3.74
56.167	0.00	0.12	0.462	I	O	|	|	|	3.73
56.250	0.00	0.12	0.461	I	O	|	|	|	3.73
56.333	0.00	0.12	0.461	I	O	|	|	|	3.72
56.417	0.00	0.12	0.460	I	O	|	|	|	3.72
56.500	0.00	0.12	0.459	I	O	|	|	|	3.71
56.583	0.00	0.12	0.458	I	O	|	|	|	3.71
56.667	0.00	0.12	0.457	I	O	|	|	|	3.70
56.750	0.00	0.12	0.456	I	O	|	|	|	3.70
56.833	0.00	0.12	0.455	I	O	|	|	|	3.69
56.917	0.00	0.12	0.455	I	O	|	|	|	3.68
57.000	0.00	0.12	0.454	I	O	|	|	|	3.68
57.083	0.00	0.12	0.453	I	O	|	|	|	3.67
57.167	0.00	0.12	0.452	I	O	|	|	|	3.67
57.250	0.00	0.12	0.451	I	O	|	|	|	3.66
57.333	0.00	0.12	0.450	I	O	|	|	|	3.66
57.417	0.00	0.12	0.449	I	O	|	|	|	3.65
57.500	0.00	0.12	0.449	I	O	|	|	|	3.65
57.583	0.00	0.12	0.448	I	O	|	|	|	3.64
57.667	0.00	0.12	0.447	I	O	|	|	|	3.64
57.750	0.00	0.12	0.446	I	O	|	|	|	3.63
57.833	0.00	0.12	0.445	I	O	|	|	|	3.63
57.917	0.00	0.12	0.444	I	O	|	|	|	3.62
58.000	0.00	0.12	0.444	I	O	|	|	|	3.62
58.083	0.00	0.12	0.443	I	O	|	|	|	3.61
58.167	0.00	0.12	0.442	I	O	|	|	|	3.61
58.250	0.00	0.12	0.441	I	O	|	|	|	3.60
58.333	0.00	0.12	0.440	I	O	|	|	|	3.59
58.417	0.00	0.12	0.439	I	O	|	|	|	3.59
58.500	0.00	0.12	0.438	I	O	|	|	|	3.58
58.583	0.00	0.12	0.438	I	O	|	|	|	3.58
58.667	0.00	0.12	0.437	I	O	|	|	|	3.57
58.750	0.00	0.12	0.436	I	O	|	|	|	3.57
58.833	0.00	0.12	0.435	I	O	|	|	|	3.56
58.917	0.00	0.12	0.434	I	O	|	|	|	3.56
59.000	0.00	0.12	0.433	I	O	|	|	|	3.55
59.083	0.00	0.12	0.433	I	O	|	|	|	3.55
59.167	0.00	0.12	0.432	I	O	|	|	|	3.54
59.250	0.00	0.12	0.431	I	O	|	|	|	3.54
59.333	0.00	0.12	0.430	I	O	|	|	|	3.53
59.417	0.00	0.12	0.429	I	O	|	|	|	3.53
59.500	0.00	0.12	0.428	I	O	|	|	|	3.52
59.583	0.00	0.12	0.428	I	O	|	|	|	3.52
59.667	0.00	0.12	0.427	I	O	|	|	|	3.51
59.750	0.00	0.12	0.426	I	O	|	|	|	3.51
59.833	0.00	0.12	0.425	I	O	|	|	|	3.50
59.917	0.00	0.12	0.424	I	O	|	|	|	3.50
60.000	0.00	0.12	0.424	I	O	|	|	|	3.49
60.083	0.00	0.12	0.423	I	O	|	|	|	3.49
60.167	0.00	0.12	0.422	I	O	|	|	|	3.48
60.250	0.00	0.12	0.421	I	O	|	|	|	3.47
60.333	0.00	0.12	0.420	I	O	|	|	|	3.47
60.417	0.00	0.12	0.419	I	O	|	|	|	3.46
60.500	0.00	0.12	0.419	I	O	|	|	|	3.46
60.583	0.00	0.12	0.418	I	O	|	|	|	3.45
60.667	0.00	0.12	0.417	I	O	|	|	|	3.45
60.750	0.00	0.12	0.416	I	O	|	|	|	3.44
60.833	0.00	0.12	0.415	I	O	|	|	|	3.44
60.917	0.00	0.12	0.414	I	O	|	|	|	3.43
61.000	0.00	0.12	0.414	I	O	|	|	|	3.43
61.083	0.00	0.12	0.413	I	O	|	|	|	3.42
61.167	0.00	0.12	0.412	I	O	|	|	|	3.42
61.250	0.00	0.12	0.411	I	O	|	|	|	3.41
61.333	0.00	0.12	0.410	I	O	|	|	|	3.41
61.417	0.00	0.12	0.410	I	O	|	|	|	3.40
61.500	0.00	0.12	0.409	I	O	|	|	|	3.40
61.583	0.00	0.12	0.408	I	O	|	|	|	3.39
61.667	0.00	0.12	0.407	I	O	|	|	|	3.39
61.750	0.00	0.12	0.406	I	O	|	|	|	3.38
61.833	0.00	0.12	0.406	I	O	|	|	|	3.38
61.917	0.00	0.12	0.405	I	O	|	|	|	3.37
62.000	0.00	0.12	0.404	I	O	|	|	|	3.37
62.083	0.00	0.12	0.403	I	O	|	|	|	3.36

62.167	0.00	0.12	0.402	I	O	|	|	|	3.36
62.250	0.00	0.12	0.401	I	O	|	|	|	3.35
62.333	0.00	0.12	0.401	I	O	|	|	|	3.35
62.417	0.00	0.12	0.400	I	O	|	|	|	3.34
62.500	0.00	0.12	0.399	I	O	|	|	|	3.34
62.583	0.00	0.12	0.398	I	O	|	|	|	3.33
62.667	0.00	0.12	0.397	I	O	|	|	|	3.33
62.750	0.00	0.12	0.397	I	O	|	|	|	3.32
62.833	0.00	0.12	0.396	I	O	|	|	|	3.32
62.917	0.00	0.12	0.395	I	O	|	|	|	3.31
63.000	0.00	0.12	0.394	I	O	|	|	|	3.31
63.083	0.00	0.12	0.393	I	O	|	|	|	3.30
63.167	0.00	0.12	0.393	I	O	|	|	|	3.30
63.250	0.00	0.12	0.392	I	O	|	|	|	3.29
63.333	0.00	0.12	0.391	I	O	|	|	|	3.29
63.417	0.00	0.12	0.390	I	O	|	|	|	3.28
63.500	0.00	0.12	0.389	I	O	|	|	|	3.28
63.583	0.00	0.12	0.389	I	O	|	|	|	3.27
63.667	0.00	0.12	0.388	I	O	|	|	|	3.27
63.750	0.00	0.12	0.387	I	O	|	|	|	3.26
63.833	0.00	0.12	0.386	I	O	|	|	|	3.26
63.917	0.00	0.12	0.386	I	O	|	|	|	3.25
64.000	0.00	0.11	0.385	I	O	|	|	|	3.25
64.083	0.00	0.11	0.384	I	O	|	|	|	3.24
64.167	0.00	0.11	0.383	I	O	|	|	|	3.24
64.250	0.00	0.11	0.382	I	O	|	|	|	3.23
64.333	0.00	0.11	0.382	I	O	|	|	|	3.23
64.417	0.00	0.11	0.381	I	O	|	|	|	3.22
64.500	0.00	0.11	0.380	I	O	|	|	|	3.22
64.583	0.00	0.11	0.379	I	O	|	|	|	3.21
64.667	0.00	0.11	0.378	I	O	|	|	|	3.21
64.750	0.00	0.11	0.378	I	O	|	|	|	3.20
64.833	0.00	0.11	0.377	I	O	|	|	|	3.20
64.917	0.00	0.11	0.376	I	O	|	|	|	3.19
65.000	0.00	0.11	0.375	I	O	|	|	|	3.19
65.083	0.00	0.11	0.374	I	O	|	|	|	3.18
65.167	0.00	0.11	0.374	I	O	|	|	|	3.18
65.250	0.00	0.11	0.373	I	O	|	|	|	3.17
65.333	0.00	0.11	0.372	I	O	|	|	|	3.17
65.417	0.00	0.11	0.371	I	O	|	|	|	3.16
65.500	0.00	0.11	0.371	I	O	|	|	|	3.16
65.583	0.00	0.11	0.370	I	O	|	|	|	3.15
65.667	0.00	0.11	0.369	I	O	|	|	|	3.15
65.750	0.00	0.11	0.368	I	O	|	|	|	3.14
65.833	0.00	0.11	0.367	I	O	|	|	|	3.14
65.917	0.00	0.11	0.367	I	O	|	|	|	3.13
66.000	0.00	0.11	0.366	I	O	|	|	|	3.13
66.083	0.00	0.11	0.365	I	O	|	|	|	3.12
66.167	0.00	0.11	0.364	I	O	|	|	|	3.12
66.250	0.00	0.11	0.364	I	O	|	|	|	3.11
66.333	0.00	0.11	0.363	I	O	|	|	|	3.11
66.417	0.00	0.11	0.362	I	O	|	|	|	3.10
66.500	0.00	0.11	0.361	I	O	|	|	|	3.10
66.583	0.00	0.11	0.361	I	O	|	|	|	3.09
66.667	0.00	0.11	0.360	I	O	|	|	|	3.09
66.750	0.00	0.11	0.359	I	O	|	|	|	3.08
66.833	0.00	0.11	0.358	I	O	|	|	|	3.08
66.917	0.00	0.11	0.357	I	O	|	|	|	3.07
67.000	0.00	0.11	0.357	I	O	|	|	|	3.07
67.083	0.00	0.11	0.356	I	O	|	|	|	3.06
67.167	0.00	0.11	0.355	I	O	|	|	|	3.06
67.250	0.00	0.11	0.354	I	O	|	|	|	3.05
67.333	0.00	0.11	0.354	I	O	|	|	|	3.05
67.417	0.00	0.11	0.353	I	O	|	|	|	3.04
67.500	0.00	0.11	0.352	I	O	|	|	|	3.04
67.583	0.00	0.11	0.351	I	O	|	|	|	3.03
67.667	0.00	0.11	0.351	I	O	|	|	|	3.03
67.750	0.00	0.11	0.350	I	O	|	|	|	3.02
67.833	0.00	0.11	0.349	I	O	|	|	|	3.02
67.917	0.00	0.11	0.348	I	O	|	|	|	3.01
68.000	0.00	0.11	0.348	I	O	|	|	|	3.01
68.083	0.00	0.11	0.347	I	O	|	|	|	3.00
68.167	0.00	0.11	0.346	I	O	|	|	|	3.00
68.250	0.00	0.11	0.345	I	O	|	|	|	3.00
68.333	0.00	0.11	0.344	I	O	|	|	|	2.99

68.417	0.00	0.11	0.344	I O	|	|	|	2.99
68.500	0.00	0.11	0.343	I O	|	|	|	2.98
68.583	0.00	0.11	0.342	I O	|	|	|	2.98
68.667	0.00	0.11	0.341	I O	|	|	|	2.97
68.750	0.00	0.11	0.341	I O	|	|	|	2.97
68.833	0.00	0.11	0.340	I O	|	|	|	2.96
68.917	0.00	0.11	0.339	I O	|	|	|	2.96
69.000	0.00	0.11	0.338	IO	|	|	|	2.95
69.083	0.00	0.11	0.338	IO	|	|	|	2.95
69.167	0.00	0.11	0.337	IO	|	|	|	2.94
69.250	0.00	0.11	0.336	IO	|	|	|	2.94
69.333	0.00	0.11	0.335	IO	|	|	|	2.93
69.417	0.00	0.11	0.335	IO	|	|	|	2.93
69.500	0.00	0.11	0.334	IO	|	|	|	2.92
69.583	0.00	0.11	0.333	IO	|	|	|	2.92
69.667	0.00	0.11	0.332	IO	|	|	|	2.91
69.750	0.00	0.11	0.332	IO	|	|	|	2.91
69.833	0.00	0.11	0.331	IO	|	|	|	2.90
69.917	0.00	0.11	0.330	IO	|	|	|	2.90
70.000	0.00	0.11	0.330	IO	|	|	|	2.89
70.083	0.00	0.11	0.329	IO	|	|	|	2.89
70.167	0.00	0.11	0.328	IO	|	|	|	2.88
70.250	0.00	0.11	0.327	IO	|	|	|	2.88
70.333	0.00	0.11	0.327	IO	|	|	|	2.87
70.417	0.00	0.11	0.326	IO	|	|	|	2.87
70.500	0.00	0.11	0.325	IO	|	|	|	2.86
70.583	0.00	0.11	0.324	IO	|	|	|	2.86
70.667	0.00	0.11	0.324	IO	|	|	|	2.85
70.750	0.00	0.11	0.323	IO	|	|	|	2.85
70.833	0.00	0.11	0.322	IO	|	|	|	2.84
70.917	0.00	0.11	0.321	IO	|	|	|	2.84
71.000	0.00	0.11	0.321	IO	|	|	|	2.83
71.083	0.00	0.11	0.320	IO	|	|	|	2.83
71.167	0.00	0.11	0.319	IO	|	|	|	2.82
71.250	0.00	0.11	0.318	IO	|	|	|	2.82
71.333	0.00	0.11	0.318	IO	|	|	|	2.81
71.417	0.00	0.11	0.317	IO	|	|	|	2.81
71.500	0.00	0.11	0.316	IO	|	|	|	2.80
71.583	0.00	0.11	0.316	IO	|	|	|	2.80
71.667	0.00	0.11	0.315	IO	|	|	|	2.79
71.750	0.00	0.11	0.314	IO	|	|	|	2.79
71.833	0.00	0.11	0.313	IO	|	|	|	2.79
71.917	0.00	0.11	0.313	IO	|	|	|	2.78
72.000	0.00	0.11	0.312	IO	|	|	|	2.78
72.083	0.00	0.11	0.311	IO	|	|	|	2.77
72.167	0.00	0.11	0.310	IO	|	|	|	2.77
72.250	0.00	0.11	0.310	IO	|	|	|	2.76
72.333	0.00	0.11	0.309	IO	|	|	|	2.76
72.417	0.00	0.11	0.308	IO	|	|	|	2.75
72.500	0.00	0.10	0.308	IO	|	|	|	2.75
72.583	0.00	0.10	0.307	IO	|	|	|	2.74
72.667	0.00	0.10	0.306	IO	|	|	|	2.74
72.750	0.00	0.10	0.305	IO	|	|	|	2.73
72.833	0.00	0.10	0.305	IO	|	|	|	2.73
72.917	0.00	0.10	0.304	IO	|	|	|	2.72
73.000	0.00	0.10	0.303	IO	|	|	|	2.72
73.083	0.00	0.10	0.302	IO	|	|	|	2.71
73.167	0.00	0.10	0.302	IO	|	|	|	2.71
73.250	0.00	0.10	0.301	IO	|	|	|	2.70
73.333	0.00	0.10	0.300	IO	|	|	|	2.70
73.417	0.00	0.10	0.300	IO	|	|	|	2.69
73.500	0.00	0.10	0.299	IO	|	|	|	2.69
73.583	0.00	0.10	0.298	IO	|	|	|	2.69
73.667	0.00	0.10	0.297	IO	|	|	|	2.68
73.750	0.00	0.10	0.297	IO	|	|	|	2.68
73.833	0.00	0.10	0.296	IO	|	|	|	2.67
73.917	0.00	0.10	0.295	IO	|	|	|	2.67
74.000	0.00	0.10	0.295	IO	|	|	|	2.66
74.083	0.00	0.10	0.294	IO	|	|	|	2.66
74.167	0.00	0.10	0.293	IO	|	|	|	2.65
74.250	0.00	0.10	0.292	IO	|	|	|	2.65
74.333	0.00	0.10	0.292	IO	|	|	|	2.64
74.417	0.00	0.10	0.291	IO	|	|	|	2.64
74.500	0.00	0.10	0.290	IO	|	|	|	2.63
74.583	0.00	0.10	0.290	IO	|	|	|	2.63

74.667	0.00	0.10	0.289	IO				2.62
74.750	0.00	0.10	0.288	IO				2.62
74.833	0.00	0.10	0.288	IO				2.62
74.917	0.00	0.10	0.287	IO				2.61
75.000	0.00	0.10	0.286	IO				2.61
75.083	0.00	0.10	0.285	IO				2.60
75.167	0.00	0.10	0.285	IO				2.60
75.250	0.00	0.10	0.284	IO				2.59
75.333	0.00	0.10	0.283	IO				2.59
75.417	0.00	0.10	0.283	IO				2.58
75.500	0.00	0.10	0.282	IO				2.58
75.583	0.00	0.10	0.281	IO				2.57
75.667	0.00	0.10	0.281	IO				2.57
75.750	0.00	0.10	0.280	IO				2.56
75.833	0.00	0.10	0.279	IO				2.56
75.917	0.00	0.10	0.278	IO				2.56
76.000	0.00	0.10	0.278	IO				2.55
76.083	0.00	0.10	0.277	IO				2.55
76.167	0.00	0.10	0.276	IO				2.54
76.250	0.00	0.10	0.276	IO				2.54
76.333	0.00	0.10	0.275	IO				2.53
76.417	0.00	0.10	0.274	IO				2.53
76.500	0.00	0.10	0.274	IO				2.52
76.583	0.00	0.10	0.273	IO				2.52
76.667	0.00	0.10	0.272	IO				2.51
76.750	0.00	0.10	0.272	IO				2.51
76.833	0.00	0.10	0.271	IO				2.51
76.917	0.00	0.10	0.270	IO				2.50
77.000	0.00	0.10	0.269	IO				2.50
77.083	0.00	0.10	0.269	IO				2.49
77.167	0.00	0.10	0.268	IO				2.49
77.250	0.00	0.10	0.267	IO				2.48
77.333	0.00	0.10	0.267	IO				2.48
77.417	0.00	0.10	0.266	IO				2.47
77.500	0.00	0.10	0.265	IO				2.47
77.583	0.00	0.10	0.265	IO				2.46
77.667	0.00	0.10	0.264	IO				2.46
77.750	0.00	0.10	0.263	IO				2.45
77.833	0.00	0.10	0.263	IO				2.45
77.917	0.00	0.10	0.262	IO				2.44
78.000	0.00	0.10	0.261	IO				2.44
78.083	0.00	0.10	0.261	IO				2.43
78.167	0.00	0.10	0.260	IO				2.43
78.250	0.00	0.10	0.259	IO				2.42
78.333	0.00	0.10	0.259	IO				2.42
78.417	0.00	0.10	0.258	IO				2.42
78.500	0.00	0.10	0.257	IO				2.41
78.583	0.00	0.10	0.256	IO				2.41
78.667	0.00	0.10	0.256	IO				2.40
78.750	0.00	0.10	0.255	IO				2.40
78.833	0.00	0.10	0.254	IO				2.39
78.917	0.00	0.10	0.254	IO				2.39
79.000	0.00	0.10	0.253	IO				2.38
79.083	0.00	0.10	0.252	IO				2.38
79.167	0.00	0.10	0.252	IO				2.37
79.250	0.00	0.10	0.251	IO				2.37
79.333	0.00	0.10	0.250	IO				2.36
79.417	0.00	0.10	0.250	IO				2.36
79.500	0.00	0.10	0.249	IO				2.35
79.583	0.00	0.10	0.248	IO				2.35
79.667	0.00	0.10	0.248	IO				2.35
79.750	0.00	0.10	0.247	IO				2.34
79.833	0.00	0.10	0.246	IO				2.34
79.917	0.00	0.10	0.246	IO				2.33
80.000	0.00	0.10	0.245	IO				2.33
80.083	0.00	0.10	0.244	IO				2.32
80.167	0.00	0.10	0.244	IO				2.32
80.250	0.00	0.10	0.243	IO				2.31
80.333	0.00	0.10	0.242	IO				2.31
80.417	0.00	0.10	0.242	IO				2.30
80.500	0.00	0.10	0.241	IO				2.30
80.583	0.00	0.10	0.240	IO				2.29
80.667	0.00	0.10	0.240	IO				2.29
80.750	0.00	0.10	0.239	IO				2.29
80.833	0.00	0.10	0.238	IO				2.28

80.917	0.00	0.10	0.238	IO					2.28
81.000	0.00	0.10	0.237	IO					2.27
81.083	0.00	0.10	0.236	IO					2.27
81.167	0.00	0.10	0.236	IO					2.26
81.250	0.00	0.10	0.235	IO					2.26
81.333	0.00	0.10	0.235	IO					2.25
81.417	0.00	0.09	0.234	IO					2.25
81.500	0.00	0.09	0.233	IO					2.24
81.583	0.00	0.09	0.233	IO					2.24
81.667	0.00	0.09	0.232	IO					2.24
81.750	0.00	0.09	0.231	IO					2.23
81.833	0.00	0.09	0.231	IO					2.23
81.917	0.00	0.09	0.230	IO					2.22
82.000	0.00	0.09	0.229	IO					2.22
82.083	0.00	0.09	0.229	IO					2.21
82.167	0.00	0.09	0.228	IO					2.21
82.250	0.00	0.09	0.227	IO					2.20
82.333	0.00	0.09	0.227	IO					2.20
82.417	0.00	0.09	0.226	IO					2.19
82.500	0.00	0.09	0.225	IO					2.19
82.583	0.00	0.09	0.225	IO					2.19
82.667	0.00	0.09	0.224	IO					2.18
82.750	0.00	0.09	0.223	IO					2.18
82.833	0.00	0.09	0.223	IO					2.17
82.917	0.00	0.09	0.222	IO					2.17
83.000	0.00	0.09	0.222	IO					2.16
83.083	0.00	0.09	0.221	IO					2.16
83.167	0.00	0.09	0.220	IO					2.15
83.250	0.00	0.09	0.220	IO					2.15
83.333	0.00	0.09	0.219	IO					2.15
83.417	0.00	0.09	0.218	IO					2.14
83.500	0.00	0.09	0.218	IO					2.14
83.583	0.00	0.09	0.217	IO					2.13
83.667	0.00	0.09	0.216	IO					2.13
83.750	0.00	0.09	0.216	IO					2.12
83.833	0.00	0.09	0.215	IO					2.12
83.917	0.00	0.09	0.215	IO					2.11
84.000	0.00	0.09	0.214	IO					2.11
84.083	0.00	0.09	0.213	IO					2.11
84.167	0.00	0.09	0.213	IO					2.10
84.250	0.00	0.09	0.212	IO					2.10
84.333	0.00	0.09	0.211	IO					2.09
84.417	0.00	0.09	0.211	IO					2.09
84.500	0.00	0.09	0.210	IO					2.08
84.583	0.00	0.09	0.209	IO					2.08
84.667	0.00	0.09	0.209	IO					2.08
84.750	0.00	0.09	0.208	IO					2.07
84.833	0.00	0.09	0.208	IO					2.07
84.917	0.00	0.09	0.207	IO					2.06
85.000	0.00	0.09	0.206	IO					2.06
85.083	0.00	0.09	0.206	IO					2.05
85.167	0.00	0.09	0.205	IO					2.05
85.250	0.00	0.09	0.204	IO					2.04
85.333	0.00	0.09	0.204	IO					2.04
85.417	0.00	0.09	0.203	IO					2.04
85.500	0.00	0.09	0.203	IO					2.03
85.583	0.00	0.09	0.202	IO					2.03
85.667	0.00	0.09	0.201	IO					2.02
85.750	0.00	0.09	0.201	IO					2.02
85.833	0.00	0.09	0.200	IO					2.01
85.917	0.00	0.09	0.199	IO					2.01
86.000	0.00	0.09	0.199	IO					2.01
86.083	0.00	0.09	0.198	IO					2.00
86.167	0.00	0.09	0.198	IO					2.00
86.250	0.00	0.09	0.197	IO					1.99
86.333	0.00	0.09	0.196	IO					1.99
86.417	0.00	0.09	0.196	IO					1.98
86.500	0.00	0.09	0.195	IO					1.98
86.583	0.00	0.09	0.194	IO					1.97
86.667	0.00	0.09	0.194	IO					1.97
86.750	0.00	0.09	0.193	IO					1.96
86.833	0.00	0.09	0.193	IO					1.96
86.917	0.00	0.09	0.192	IO					1.96
87.000	0.00	0.09	0.191	IO					1.95
87.083	0.00	0.09	0.191	IO					1.95

87.167	0.00	0.09	0.190	IO				1.94
87.250	0.00	0.09	0.190	IO				1.94
87.333	0.00	0.09	0.189	IO				1.93
87.417	0.00	0.09	0.188	IO				1.93
87.500	0.00	0.09	0.188	IO				1.92
87.583	0.00	0.09	0.187	IO				1.92
87.667	0.00	0.09	0.187	IO				1.91
87.750	0.00	0.09	0.186	IO				1.91
87.833	0.00	0.09	0.185	IO				1.91
87.917	0.00	0.09	0.185	IO				1.90
88.000	0.00	0.09	0.184	IO				1.90
88.083	0.00	0.09	0.184	IO				1.89
88.167	0.00	0.09	0.183	IO				1.89
88.250	0.00	0.09	0.182	IO				1.88
88.333	0.00	0.09	0.182	IO				1.88
88.417	0.00	0.09	0.181	IO				1.87
88.500	0.00	0.09	0.180	IO				1.87
88.583	0.00	0.09	0.180	IO				1.86
88.667	0.00	0.09	0.179	IO				1.86
88.750	0.00	0.09	0.179	IO				1.86
88.833	0.00	0.09	0.178	IO				1.85
88.917	0.00	0.09	0.177	IO				1.85
89.000	0.00	0.09	0.177	IO				1.84
89.083	0.00	0.09	0.176	IO				1.84
89.167	0.00	0.09	0.176	IO				1.83
89.250	0.00	0.09	0.175	IO				1.83
89.333	0.00	0.09	0.174	IO				1.82
89.417	0.00	0.09	0.174	IO				1.82
89.500	0.00	0.09	0.173	IO				1.82
89.583	0.00	0.09	0.173	IO				1.81
89.667	0.00	0.09	0.172	IO				1.81
89.750	0.00	0.09	0.172	IO				1.80
89.833	0.00	0.09	0.171	IO				1.80
89.917	0.00	0.09	0.170	IO				1.79
90.000	0.00	0.09	0.170	IO				1.79
90.083	0.00	0.09	0.169	IO				1.78
90.167	0.00	0.09	0.169	IO				1.78
90.250	0.00	0.09	0.168	IO				1.78
90.333	0.00	0.09	0.167	IO				1.77
90.417	0.00	0.09	0.167	IO				1.77
90.500	0.00	0.09	0.166	IO				1.76
90.583	0.00	0.09	0.166	IO				1.76
90.667	0.00	0.09	0.165	IO				1.75
90.750	0.00	0.08	0.164	IO				1.75
90.833	0.00	0.08	0.164	IO				1.75
90.917	0.00	0.08	0.163	IO				1.74
91.000	0.00	0.08	0.163	IO				1.74
91.083	0.00	0.08	0.162	IO				1.73
91.167	0.00	0.08	0.162	IO				1.73
91.250	0.00	0.08	0.161	IO				1.72
91.333	0.00	0.08	0.160	IO				1.72
91.417	0.00	0.08	0.160	IO				1.71
91.500	0.00	0.08	0.159	IO				1.71
91.583	0.00	0.08	0.159	IO				1.71
91.667	0.00	0.08	0.158	IO				1.70
91.750	0.00	0.08	0.157	IO				1.70
91.833	0.00	0.08	0.157	IO				1.69
91.917	0.00	0.08	0.156	IO				1.69
92.000	0.00	0.08	0.156	IO				1.68
92.083	0.00	0.08	0.155	IO				1.68
92.167	0.00	0.08	0.155	IO				1.68
92.250	0.00	0.08	0.154	IO				1.67
92.333	0.00	0.08	0.153	IO				1.67
92.417	0.00	0.08	0.153	IO				1.66
92.500	0.00	0.08	0.152	IO				1.66
92.583	0.00	0.08	0.152	IO				1.65
92.667	0.00	0.08	0.151	IO				1.65
92.750	0.00	0.08	0.151	IO				1.65
92.833	0.00	0.08	0.150	IO				1.64
92.917	0.00	0.08	0.149	IO				1.64
93.000	0.00	0.08	0.149	IO				1.63
93.083	0.00	0.08	0.148	IO				1.63
93.167	0.00	0.08	0.148	IO				1.62
93.250	0.00	0.08	0.147	IO				1.62
93.333	0.00	0.08	0.147	IO				1.62

93.417	0.00	0.08	0.146	IO					1.61
93.500	0.00	0.08	0.145	IO					1.61
93.583	0.00	0.08	0.145	IO					1.60
93.667	0.00	0.08	0.144	IO					1.60
93.750	0.00	0.08	0.144	IO					1.60
93.833	0.00	0.08	0.143	IO					1.59
93.917	0.00	0.08	0.143	IO					1.59
94.000	0.00	0.08	0.142	IO					1.58
94.083	0.00	0.08	0.142	IO					1.58
94.167	0.00	0.08	0.141	IO					1.57
94.250	0.00	0.08	0.140	IO					1.57
94.333	0.00	0.08	0.140	IO					1.57
94.417	0.00	0.08	0.139	IO					1.56
94.500	0.00	0.08	0.139	IO					1.56
94.583	0.00	0.08	0.138	IO					1.55
94.667	0.00	0.08	0.138	IO					1.55
94.750	0.00	0.08	0.137	IO					1.55
94.833	0.00	0.08	0.136	IO					1.54
94.917	0.00	0.08	0.136	IO					1.54
95.000	0.00	0.08	0.135	IO					1.53
95.083	0.00	0.08	0.135	IO					1.53
95.167	0.00	0.08	0.134	IO					1.52
95.250	0.00	0.08	0.134	IO					1.52
95.333	0.00	0.08	0.133	IO					1.52
95.417	0.00	0.08	0.133	IO					1.51
95.500	0.00	0.08	0.132	IO					1.51
95.583	0.00	0.08	0.132	IO					1.50
95.667	0.00	0.08	0.131	IO					1.50
95.750	0.00	0.08	0.130	IO					1.49
95.833	0.00	0.08	0.130	IO					1.49
95.917	0.00	0.08	0.129	IO					1.49
96.000	0.00	0.08	0.129	IO					1.48
96.083	0.00	0.08	0.128	IO					1.48
96.167	0.00	0.08	0.128	IO					1.47
96.250	0.00	0.08	0.127	IO					1.47
96.333	0.00	0.08	0.127	IO					1.46
96.417	0.00	0.08	0.126	IO					1.46
96.500	0.00	0.08	0.126	IO					1.45
96.583	0.00	0.08	0.125	IO					1.45
96.667	0.00	0.08	0.124	IO					1.44
96.750	0.00	0.08	0.124	IO					1.44
96.833	0.00	0.08	0.123	IO					1.43
96.917	0.00	0.08	0.123	IO					1.43
97.000	0.00	0.08	0.122	IO					1.43
97.083	0.00	0.08	0.122	IO					1.42
97.167	0.00	0.08	0.121	IO					1.42
97.250	0.00	0.08	0.121	IO					1.41
97.333	0.00	0.08	0.120	IO					1.41
97.417	0.00	0.08	0.120	IO					1.40
97.500	0.00	0.08	0.119	IO					1.40
97.583	0.00	0.08	0.119	IO					1.39
97.667	0.00	0.08	0.118	IO					1.39
97.750	0.00	0.08	0.118	IO					1.38
97.833	0.00	0.08	0.117	IO					1.38
97.917	0.00	0.08	0.117	IO					1.38
98.000	0.00	0.07	0.116	IO					1.37
98.083	0.00	0.07	0.116	IO					1.37
98.167	0.00	0.07	0.115	IO					1.36
98.250	0.00	0.07	0.114	IO					1.36
98.333	0.00	0.07	0.114	IO					1.35
98.417	0.00	0.07	0.113	IO					1.35
98.500	0.00	0.07	0.113	IO					1.34
98.583	0.00	0.07	0.112	IO					1.34
98.667	0.00	0.07	0.112	IO					1.34
98.750	0.00	0.07	0.111	IO					1.33
98.833	0.00	0.07	0.111	IO					1.33
98.917	0.00	0.07	0.110	IO					1.32
99.000	0.00	0.07	0.110	IO					1.32
99.083	0.00	0.07	0.109	IO					1.31
99.167	0.00	0.07	0.109	IO					1.31
99.250	0.00	0.07	0.108	IO					1.31
99.333	0.00	0.07	0.108	IO					1.30
99.417	0.00	0.07	0.107	IO					1.30
99.500	0.00	0.07	0.107	IO					1.29
99.583	0.00	0.07	0.106	IO					1.29

99.667	0.00	0.07	0.106	IO					1.28
99.750	0.00	0.07	0.105	IO					1.28
99.833	0.00	0.07	0.105	IO					1.28
99.917	0.00	0.07	0.104	IO					1.27
100.000	0.00	0.07	0.104	IO					1.27
100.083	0.00	0.07	0.104	IO					1.26
100.167	0.00	0.07	0.103	IO					1.26
100.250	0.00	0.07	0.103	IO					1.25
100.333	0.00	0.07	0.102	IO					1.25
100.417	0.00	0.07	0.102	IO					1.25
100.500	0.00	0.07	0.101	IO					1.24
100.583	0.00	0.07	0.101	IO					1.24
100.667	0.00	0.07	0.100	IO					1.23
100.750	0.00	0.07	0.100	IO					1.23
100.833	0.00	0.07	0.099	IO					1.23
100.917	0.00	0.07	0.099	IO					1.22
101.000	0.00	0.07	0.098	IO					1.22
101.083	0.00	0.07	0.098	IO					1.21
101.167	0.00	0.07	0.097	IO					1.21
101.250	0.00	0.07	0.097	IO					1.21
101.333	0.00	0.07	0.096	IO					1.20
101.417	0.00	0.07	0.096	IO					1.20
101.500	0.00	0.07	0.095	IO					1.19
101.583	0.00	0.07	0.095	IO					1.19
101.667	0.00	0.07	0.094	IO					1.19
101.750	0.00	0.07	0.094	IO					1.18
101.833	0.00	0.07	0.094	IO					1.18
101.917	0.00	0.07	0.093	IO					1.17
102.000	0.00	0.07	0.093	IO					1.17
102.083	0.00	0.07	0.092	IO					1.17
102.167	0.00	0.07	0.092	IO					1.16
102.250	0.00	0.07	0.091	IO					1.16
102.333	0.00	0.07	0.091	IO					1.15
102.417	0.00	0.07	0.090	IO					1.15
102.500	0.00	0.07	0.090	IO					1.15
102.583	0.00	0.07	0.089	IO					1.14
102.667	0.00	0.07	0.089	IO					1.14
102.750	0.00	0.07	0.089	IO					1.13
102.833	0.00	0.07	0.088	IO					1.13
102.917	0.00	0.07	0.088	IO					1.13
103.000	0.00	0.06	0.087	IO					1.12
103.083	0.00	0.06	0.087	IO					1.12
103.167	0.00	0.06	0.086	IO					1.11
103.250	0.00	0.06	0.086	IO					1.11
103.333	0.00	0.06	0.085	IO					1.11
103.417	0.00	0.06	0.085	IO					1.10
103.500	0.00	0.06	0.085	IO					1.10
103.583	0.00	0.06	0.084	IO					1.10
103.667	0.00	0.06	0.084	IO					1.09
103.750	0.00	0.06	0.083	IO					1.09
103.833	0.00	0.06	0.083	IO					1.08
103.917	0.00	0.06	0.082	IO					1.08
104.000	0.00	0.06	0.082	IO					1.08
104.083	0.00	0.06	0.081	IO					1.07
104.167	0.00	0.06	0.081	IO					1.07
104.250	0.00	0.06	0.081	IO					1.07
104.333	0.00	0.06	0.080	IO					1.06
104.417	0.00	0.06	0.080	IO					1.06
104.500	0.00	0.06	0.079	IO					1.05
104.583	0.00	0.06	0.079	IO					1.05
104.667	0.00	0.06	0.078	IO					1.05
104.750	0.00	0.06	0.078	IO					1.04
104.833	0.00	0.06	0.078	IO					1.04
104.917	0.00	0.06	0.077	IO					1.04
105.000	0.00	0.06	0.077	IO					1.03
105.083	0.00	0.06	0.076	IO					1.03
105.167	0.00	0.06	0.076	IO					1.03
105.250	0.00	0.06	0.076	IO					1.02
105.333	0.00	0.06	0.075	IO					1.02
105.417	0.00	0.06	0.075	IO					1.01
105.500	0.00	0.06	0.074	IO					1.01
105.583	0.00	0.06	0.074	IO					1.01
105.667	0.00	0.06	0.073	IO					1.00
105.750	0.00	0.06	0.073	IO					1.00
105.833	0.00	0.06	0.073	IO					1.00

105.917	0.00	0.06	0.072	IO	|	|	|	|	0.99
106.000	0.00	0.06	0.072	IO	|	|	|	|	0.99
106.083	0.00	0.06	0.071	IO	|	|	|	|	0.98
106.167	0.00	0.06	0.071	IO	|	|	|	|	0.98
106.250	0.00	0.06	0.071	IO	|	|	|	|	0.97
106.333	0.00	0.06	0.070	IO	|	|	|	|	0.97
106.417	0.00	0.06	0.070	IO	|	|	|	|	0.97
106.500	0.00	0.06	0.069	IO	|	|	|	|	0.96
106.583	0.00	0.06	0.069	IO	|	|	|	|	0.96
106.667	0.00	0.06	0.069	IO	|	|	|	|	0.95
106.750	0.00	0.06	0.068	IO	|	|	|	|	0.95
106.833	0.00	0.06	0.068	IO	|	|	|	|	0.94
106.917	0.00	0.06	0.067	IO	|	|	|	|	0.94
107.000	0.00	0.06	0.067	IO	|	|	|	|	0.94
107.083	0.00	0.06	0.067	IO	|	|	|	|	0.93
107.167	0.00	0.06	0.066	IO	|	|	|	|	0.93
107.250	0.00	0.06	0.066	IO	|	|	|	|	0.92
107.333	0.00	0.06	0.065	IO	|	|	|	|	0.92
107.417	0.00	0.06	0.065	IO	|	|	|	|	0.91
107.500	0.00	0.06	0.065	IO	|	|	|	|	0.91
107.583	0.00	0.06	0.064	IO	|	|	|	|	0.91
107.667	0.00	0.06	0.064	IO	|	|	|	|	0.90
107.750	0.00	0.06	0.063	IO	|	|	|	|	0.90
107.833	0.00	0.06	0.063	IO	|	|	|	|	0.89
107.917	0.00	0.06	0.063	IO	|	|	|	|	0.89
108.000	0.00	0.06	0.062	IO	|	|	|	|	0.89
108.083	0.00	0.06	0.062	IO	|	|	|	|	0.88
108.167	0.00	0.06	0.062	IO	|	|	|	|	0.88
108.250	0.00	0.05	0.061	IO	|	|	|	|	0.87
108.333	0.00	0.05	0.061	IO	|	|	|	|	0.87
108.417	0.00	0.05	0.060	IO	|	|	|	|	0.87
108.500	0.00	0.05	0.060	O	|	|	|	|	0.86
108.583	0.00	0.05	0.060	O	|	|	|	|	0.86
108.667	0.00	0.05	0.059	O	|	|	|	|	0.85
108.750	0.00	0.05	0.059	O	|	|	|	|	0.85
108.833	0.00	0.05	0.059	O	|	|	|	|	0.85
108.917	0.00	0.05	0.058	O	|	|	|	|	0.84
109.000	0.00	0.05	0.058	O	|	|	|	|	0.84
109.083	0.00	0.05	0.057	O	|	|	|	|	0.83
109.167	0.00	0.05	0.057	O	|	|	|	|	0.83
109.250	0.00	0.05	0.057	O	|	|	|	|	0.83
109.333	0.00	0.05	0.056	O	|	|	|	|	0.82
109.417	0.00	0.05	0.056	O	|	|	|	|	0.82
109.500	0.00	0.05	0.056	O	|	|	|	|	0.81
109.583	0.00	0.05	0.055	O	|	|	|	|	0.81
109.667	0.00	0.05	0.055	O	|	|	|	|	0.81
109.750	0.00	0.05	0.055	O	|	|	|	|	0.80
109.833	0.00	0.05	0.054	O	|	|	|	|	0.80
109.917	0.00	0.05	0.054	O	|	|	|	|	0.80
110.000	0.00	0.05	0.053	O	|	|	|	|	0.79
110.083	0.00	0.05	0.053	O	|	|	|	|	0.79
110.167	0.00	0.05	0.053	O	|	|	|	|	0.78
110.250	0.00	0.05	0.052	O	|	|	|	|	0.78
110.333	0.00	0.05	0.052	O	|	|	|	|	0.78
110.417	0.00	0.05	0.052	O	|	|	|	|	0.77
110.500	0.00	0.05	0.051	O	|	|	|	|	0.77
110.583	0.00	0.05	0.051	O	|	|	|	|	0.77
110.667	0.00	0.05	0.051	O	|	|	|	|	0.76
110.750	0.00	0.05	0.050	O	|	|	|	|	0.76
110.833	0.00	0.05	0.050	O	|	|	|	|	0.75
110.917	0.00	0.05	0.050	O	|	|	|	|	0.75
111.000	0.00	0.05	0.049	O	|	|	|	|	0.75
111.083	0.00	0.05	0.049	O	|	|	|	|	0.74
111.167	0.00	0.05	0.049	O	|	|	|	|	0.74
111.250	0.00	0.05	0.048	O	|	|	|	|	0.74
111.333	0.00	0.05	0.048	O	|	|	|	|	0.73
111.417	0.00	0.05	0.048	O	|	|	|	|	0.73
111.500	0.00	0.05	0.047	O	|	|	|	|	0.73
111.583	0.00	0.05	0.047	O	|	|	|	|	0.72
111.667	0.00	0.05	0.047	O	|	|	|	|	0.72
111.750	0.00	0.05	0.046	O	|	|	|	|	0.71
111.833	0.00	0.05	0.046	O	|	|	|	|	0.71
111.917	0.00	0.05	0.046	O	|	|	|	|	0.71
112.000	0.00	0.05	0.045	O	|	|	|	|	0.70
112.083	0.00	0.05	0.045	O	|	|	|	|	0.70

112.167	0.00	0.05	0.045	o	|	|	|	|	0.70
112.250	0.00	0.05	0.044	o	|	|	|	|	0.69
112.333	0.00	0.05	0.044	o	|	|	|	|	0.69
112.417	0.00	0.05	0.044	o	|	|	|	|	0.69
112.500	0.00	0.05	0.043	o	|	|	|	|	0.68
112.583	0.00	0.05	0.043	o	|	|	|	|	0.68
112.667	0.00	0.05	0.043	o	|	|	|	|	0.68
112.750	0.00	0.05	0.042	o	|	|	|	|	0.67
112.833	0.00	0.05	0.042	o	|	|	|	|	0.67
112.917	0.00	0.05	0.042	o	|	|	|	|	0.67
113.000	0.00	0.05	0.041	o	|	|	|	|	0.66
113.083	0.00	0.05	0.041	o	|	|	|	|	0.66
113.167	0.00	0.05	0.041	o	|	|	|	|	0.66
113.250	0.00	0.05	0.040	o	|	|	|	|	0.65
113.333	0.00	0.05	0.040	o	|	|	|	|	0.65
113.417	0.00	0.05	0.040	o	|	|	|	|	0.65
113.500	0.00	0.05	0.039	o	|	|	|	|	0.64
113.583	0.00	0.05	0.039	o	|	|	|	|	0.64
113.667	0.00	0.05	0.039	o	|	|	|	|	0.64
113.750	0.00	0.05	0.038	o	|	|	|	|	0.63
113.833	0.00	0.05	0.038	o	|	|	|	|	0.63
113.917	0.00	0.05	0.038	o	|	|	|	|	0.63
114.000	0.00	0.04	0.038	o	|	|	|	|	0.62
114.083	0.00	0.04	0.037	o	|	|	|	|	0.62
114.167	0.00	0.04	0.037	o	|	|	|	|	0.62
114.250	0.00	0.04	0.037	o	|	|	|	|	0.61
114.333	0.00	0.04	0.036	o	|	|	|	|	0.61
114.417	0.00	0.04	0.036	o	|	|	|	|	0.61
114.500	0.00	0.04	0.036	o	|	|	|	|	0.60
114.583	0.00	0.04	0.035	o	|	|	|	|	0.60
114.667	0.00	0.04	0.035	o	|	|	|	|	0.60
114.750	0.00	0.04	0.035	o	|	|	|	|	0.59
114.833	0.00	0.04	0.034	o	|	|	|	|	0.59
114.917	0.00	0.04	0.034	o	|	|	|	|	0.59
115.000	0.00	0.04	0.034	o	|	|	|	|	0.58
115.083	0.00	0.04	0.034	o	|	|	|	|	0.58
115.167	0.00	0.04	0.033	o	|	|	|	|	0.58
115.250	0.00	0.04	0.033	o	|	|	|	|	0.57
115.333	0.00	0.04	0.033	o	|	|	|	|	0.57
115.417	0.00	0.04	0.032	o	|	|	|	|	0.57
115.500	0.00	0.04	0.032	o	|	|	|	|	0.56
115.583	0.00	0.04	0.032	o	|	|	|	|	0.56
115.667	0.00	0.04	0.031	o	|	|	|	|	0.56
115.750	0.00	0.04	0.031	o	|	|	|	|	0.56
115.833	0.00	0.04	0.031	o	|	|	|	|	0.55
115.917	0.00	0.04	0.031	o	|	|	|	|	0.55
116.000	0.00	0.04	0.030	o	|	|	|	|	0.55
116.083	0.00	0.04	0.030	o	|	|	|	|	0.54
116.167	0.00	0.04	0.030	o	|	|	|	|	0.54
116.250	0.00	0.04	0.029	o	|	|	|	|	0.54
116.333	0.00	0.04	0.029	o	|	|	|	|	0.53
116.417	0.00	0.04	0.029	o	|	|	|	|	0.53
116.500	0.00	0.04	0.029	o	|	|	|	|	0.53
116.583	0.00	0.04	0.028	o	|	|	|	|	0.52
116.667	0.00	0.04	0.028	o	|	|	|	|	0.52
116.750	0.00	0.04	0.028	o	|	|	|	|	0.52
116.833	0.00	0.04	0.027	o	|	|	|	|	0.52
116.917	0.00	0.04	0.027	o	|	|	|	|	0.51
117.000	0.00	0.04	0.027	o	|	|	|	|	0.51
117.083	0.00	0.04	0.027	o	|	|	|	|	0.51
117.167	0.00	0.04	0.026	o	|	|	|	|	0.50
117.250	0.00	0.04	0.026	o	|	|	|	|	0.50
117.333	0.00	0.04	0.026	o	|	|	|	|	0.50
117.417	0.00	0.04	0.026	o	|	|	|	|	0.49
117.500	0.00	0.04	0.025	o	|	|	|	|	0.49
117.583	0.00	0.04	0.025	o	|	|	|	|	0.48
117.667	0.00	0.04	0.025	o	|	|	|	|	0.48
117.750	0.00	0.04	0.025	o	|	|	|	|	0.47
117.833	0.00	0.04	0.024	o	|	|	|	|	0.47
117.917	0.00	0.04	0.024	o	|	|	|	|	0.46
118.000	0.00	0.04	0.024	o	|	|	|	|	0.46
118.083	0.00	0.04	0.023	o	|	|	|	|	0.45
118.167	0.00	0.04	0.023	o	|	|	|	|	0.45
118.250	0.00	0.03	0.023	o	|	|	|	|	0.44
118.333	0.00	0.03	0.023	o	|	|	|	|	0.44

118.417	0.00	0.03	0.023	o	|	|	|	|	0.43
118.500	0.00	0.03	0.022	o	|	|	|	|	0.43
118.583	0.00	0.03	0.022	o	|	|	|	|	0.43
118.667	0.00	0.03	0.022	o	|	|	|	|	0.42
118.750	0.00	0.03	0.022	o	|	|	|	|	0.42
118.833	0.00	0.03	0.021	o	|	|	|	|	0.41
118.917	0.00	0.03	0.021	o	|	|	|	|	0.41
119.000	0.00	0.03	0.021	o	|	|	|	|	0.40
119.083	0.00	0.03	0.021	o	|	|	|	|	0.40
119.167	0.00	0.03	0.021	o	|	|	|	|	0.40
119.250	0.00	0.03	0.020	o	|	|	|	|	0.39
119.333	0.00	0.03	0.020	o	|	|	|	|	0.39
119.417	0.00	0.03	0.020	o	|	|	|	|	0.38
119.500	0.00	0.03	0.020	o	|	|	|	|	0.38
119.583	0.00	0.03	0.020	o	|	|	|	|	0.38
119.667	0.00	0.03	0.019	o	|	|	|	|	0.37
119.750	0.00	0.03	0.019	o	|	|	|	|	0.37
119.833	0.00	0.03	0.019	o	|	|	|	|	0.37
119.917	0.00	0.03	0.019	o	|	|	|	|	0.36
120.000	0.00	0.03	0.019	o	|	|	|	|	0.36
120.083	0.00	0.03	0.018	o	|	|	|	|	0.35
120.167	0.00	0.03	0.018	o	|	|	|	|	0.35
120.250	0.00	0.03	0.018	o	|	|	|	|	0.35
120.333	0.00	0.03	0.018	o	|	|	|	|	0.34
120.417	0.00	0.03	0.018	o	|	|	|	|	0.34
120.500	0.00	0.03	0.017	o	|	|	|	|	0.34
120.583	0.00	0.03	0.017	o	|	|	|	|	0.33
120.667	0.00	0.02	0.017	o	|	|	|	|	0.33
120.750	0.00	0.02	0.017	o	|	|	|	|	0.33
120.833	0.00	0.02	0.017	o	|	|	|	|	0.32
120.917	0.00	0.02	0.017	o	|	|	|	|	0.32
121.000	0.00	0.02	0.016	o	|	|	|	|	0.32
121.083	0.00	0.02	0.016	o	|	|	|	|	0.31
121.167	0.00	0.02	0.016	o	|	|	|	|	0.31
121.250	0.00	0.02	0.016	o	|	|	|	|	0.31
121.333	0.00	0.02	0.016	o	|	|	|	|	0.31
121.417	0.00	0.02	0.016	o	|	|	|	|	0.30
121.500	0.00	0.02	0.015	o	|	|	|	|	0.30
121.583	0.00	0.02	0.015	o	|	|	|	|	0.30
121.667	0.00	0.02	0.015	o	|	|	|	|	0.29
121.750	0.00	0.02	0.015	o	|	|	|	|	0.29
121.833	0.00	0.02	0.015	o	|	|	|	|	0.29
121.917	0.00	0.02	0.015	o	|	|	|	|	0.29
122.000	0.00	0.02	0.015	o	|	|	|	|	0.28
122.083	0.00	0.02	0.014	o	|	|	|	|	0.28
122.167	0.00	0.02	0.014	o	|	|	|	|	0.28
122.250	0.00	0.02	0.014	o	|	|	|	|	0.28
122.333	0.00	0.02	0.014	o	|	|	|	|	0.27
122.417	0.00	0.02	0.014	o	|	|	|	|	0.27
122.500	0.00	0.02	0.014	o	|	|	|	|	0.27
122.583	0.00	0.02	0.014	o	|	|	|	|	0.27
122.667	0.00	0.02	0.014	o	|	|	|	|	0.26
122.750	0.00	0.02	0.013	o	|	|	|	|	0.26
122.833	0.00	0.02	0.013	o	|	|	|	|	0.26
122.917	0.00	0.02	0.013	o	|	|	|	|	0.26
123.000	0.00	0.02	0.013	o	|	|	|	|	0.25
123.083	0.00	0.02	0.013	o	|	|	|	|	0.25
123.167	0.00	0.02	0.013	o	|	|	|	|	0.25
123.250	0.00	0.02	0.013	o	|	|	|	|	0.25
123.333	0.00	0.02	0.013	o	|	|	|	|	0.24
123.417	0.00	0.02	0.012	o	|	|	|	|	0.24
123.500	0.00	0.02	0.012	o	|	|	|	|	0.24
123.583	0.00	0.02	0.012	o	|	|	|	|	0.24
123.667	0.00	0.02	0.012	o	|	|	|	|	0.24
123.750	0.00	0.02	0.012	o	|	|	|	|	0.23
123.833	0.00	0.02	0.012	o	|	|	|	|	0.23
123.917	0.00	0.02	0.012	o	|	|	|	|	0.23
124.000	0.00	0.02	0.012	o	|	|	|	|	0.23
124.083	0.00	0.02	0.012	o	|	|	|	|	0.22
124.167	0.00	0.02	0.011	o	|	|	|	|	0.22
124.250	0.00	0.02	0.011	o	|	|	|	|	0.22
124.333	0.00	0.01	0.011	o	|	|	|	|	0.22
124.417	0.00	0.01	0.011	o	|	|	|	|	0.22
124.500	0.00	0.01	0.011	o	|	|	|	|	0.21
124.583	0.00	0.01	0.011	o	|	|	|	|	0.21

124.667	0.00	0.01	0.011	o	|	|	|	|	0.21
124.750	0.00	0.01	0.011	o	|	|	|	|	0.21
124.833	0.00	0.01	0.011	o	|	|	|	|	0.21
124.917	0.00	0.01	0.011	o	|	|	|	|	0.21
125.000	0.00	0.01	0.010	o	|	|	|	|	0.20
125.083	0.00	0.01	0.010	o	|	|	|	|	0.20
125.167	0.00	0.01	0.010	o	|	|	|	|	0.20
125.250	0.00	0.01	0.010	o	|	|	|	|	0.20
125.333	0.00	0.01	0.010	o	|	|	|	|	0.20
125.417	0.00	0.01	0.010	o	|	|	|	|	0.20
125.500	0.00	0.01	0.010	o	|	|	|	|	0.19
125.583	0.00	0.01	0.010	o	|	|	|	|	0.19
125.667	0.00	0.01	0.010	o	|	|	|	|	0.19
125.750	0.00	0.01	0.010	o	|	|	|	|	0.19
125.833	0.00	0.01	0.010	o	|	|	|	|	0.19
125.917	0.00	0.01	0.009	o	|	|	|	|	0.19
126.000	0.00	0.01	0.009	o	|	|	|	|	0.18
126.083	0.00	0.01	0.009	o	|	|	|	|	0.18
126.167	0.00	0.01	0.009	o	|	|	|	|	0.18
126.250	0.00	0.01	0.009	o	|	|	|	|	0.18
126.333	0.00	0.01	0.009	o	|	|	|	|	0.18
126.417	0.00	0.01	0.009	o	|	|	|	|	0.18
126.500	0.00	0.01	0.009	o	|	|	|	|	0.17
126.583	0.00	0.01	0.009	o	|	|	|	|	0.17
126.667	0.00	0.01	0.009	o	|	|	|	|	0.17
126.750	0.00	0.01	0.009	o	|	|	|	|	0.17
126.833	0.00	0.01	0.009	o	|	|	|	|	0.17
126.917	0.00	0.01	0.009	o	|	|	|	|	0.17
127.000	0.00	0.01	0.008	o	|	|	|	|	0.17
127.083	0.00	0.01	0.008	o	|	|	|	|	0.17
127.167	0.00	0.01	0.008	o	|	|	|	|	0.16
127.250	0.00	0.01	0.008	o	|	|	|	|	0.16
127.333	0.00	0.01	0.008	o	|	|	|	|	0.16
127.417	0.00	0.01	0.008	o	|	|	|	|	0.16
127.500	0.00	0.01	0.008	o	|	|	|	|	0.16
127.583	0.00	0.01	0.008	o	|	|	|	|	0.16
127.667	0.00	0.01	0.008	o	|	|	|	|	0.16
127.750	0.00	0.01	0.008	o	|	|	|	|	0.16
127.833	0.00	0.01	0.008	o	|	|	|	|	0.15
127.917	0.00	0.01	0.008	o	|	|	|	|	0.15
128.000	0.00	0.01	0.008	o	|	|	|	|	0.15
128.083	0.00	0.01	0.008	o	|	|	|	|	0.15
128.167	0.00	0.01	0.008	o	|	|	|	|	0.15
128.250	0.00	0.01	0.007	o	|	|	|	|	0.15
128.333	0.00	0.01	0.007	o	|	|	|	|	0.15
128.417	0.00	0.01	0.007	o	|	|	|	|	0.15
128.500	0.00	0.01	0.007	o	|	|	|	|	0.14
128.583	0.00	0.01	0.007	o	|	|	|	|	0.14
128.667	0.00	0.01	0.007	o	|	|	|	|	0.14
128.750	0.00	0.01	0.007	o	|	|	|	|	0.14
128.833	0.00	0.01	0.007	o	|	|	|	|	0.14
128.917	0.00	0.01	0.007	o	|	|	|	|	0.14
129.000	0.00	0.01	0.007	o	|	|	|	|	0.14
129.083	0.00	0.01	0.007	o	|	|	|	|	0.14
129.167	0.00	0.01	0.007	o	|	|	|	|	0.14
129.250	0.00	0.01	0.007	o	|	|	|	|	0.14
129.333	0.00	0.01	0.007	o	|	|	|	|	0.13
129.417	0.00	0.01	0.007	o	|	|	|	|	0.13
129.500	0.00	0.01	0.007	o	|	|	|	|	0.13
129.583	0.00	0.01	0.007	o	|	|	|	|	0.13
129.667	0.00	0.01	0.007	o	|	|	|	|	0.13
129.750	0.00	0.01	0.007	o	|	|	|	|	0.13
129.833	0.00	0.01	0.006	o	|	|	|	|	0.13
129.917	0.00	0.01	0.006	o	|	|	|	|	0.13
130.000	0.00	0.01	0.006	o	|	|	|	|	0.13
130.083	0.00	0.01	0.006	o	|	|	|	|	0.13
130.167	0.00	0.01	0.006	o	|	|	|	|	0.13
130.250	0.00	0.01	0.006	o	|	|	|	|	0.12
130.333	0.00	0.01	0.006	o	|	|	|	|	0.12
130.417	0.00	0.01	0.006	o	|	|	|	|	0.12
130.500	0.00	0.01	0.006	o	|	|	|	|	0.12
130.583	0.00	0.01	0.006	o	|	|	|	|	0.12
130.667	0.00	0.01	0.006	o	|	|	|	|	0.12
130.750	0.00	0.01	0.006	o	|	|	|	|	0.12
130.833	0.00	0.01	0.006	o	|	|	|	|	0.12

130.917	0.00	0.01	0.006	o	|	|	|	|	0.12
131.000	0.00	0.01	0.006	o	|	|	|	|	0.12
131.083	0.00	0.01	0.006	o	|	|	|	|	0.12
131.167	0.00	0.01	0.006	o	|	|	|	|	0.12
131.250	0.00	0.01	0.006	o	|	|	|	|	0.12
131.333	0.00	0.01	0.006	o	|	|	|	|	0.11
131.417	0.00	0.01	0.006	o	|	|	|	|	0.11
131.500	0.00	0.01	0.006	o	|	|	|	|	0.11
131.583	0.00	0.01	0.006	o	|	|	|	|	0.11
131.667	0.00	0.01	0.006	o	|	|	|	|	0.11
131.750	0.00	0.01	0.006	o	|	|	|	|	0.11
131.833	0.00	0.01	0.005	o	|	|	|	|	0.11
131.917	0.00	0.01	0.005	o	|	|	|	|	0.11
132.000	0.00	0.01	0.005	o	|	|	|	|	0.11
132.083	0.00	0.01	0.005	o	|	|	|	|	0.11
132.167	0.00	0.00	0.005	o	|	|	|	|	0.11
132.250	0.00	0.00	0.005	o	|	|	|	|	0.11
132.333	0.00	0.00	0.005	o	|	|	|	|	0.11
132.417	0.00	0.00	0.005	o	|	|	|	|	0.11
132.500	0.00	0.00	0.005	o	|	|	|	|	0.10
132.583	0.00	0.00	0.005	o	|	|	|	|	0.10
132.667	0.00	0.00	0.005	o	|	|	|	|	0.10
132.750	0.00	0.00	0.005	o	|	|	|	|	0.10
132.833	0.00	0.00	0.005	o	|	|	|	|	0.10
132.917	0.00	0.00	0.005	o	|	|	|	|	0.10
133.000	0.00	0.00	0.005	o	|	|	|	|	0.10
133.083	0.00	0.00	0.005	o	|	|	|	|	0.10
133.167	0.00	0.00	0.005	o	|	|	|	|	0.10
133.250	0.00	0.00	0.005	o	|	|	|	|	0.10
133.333	0.00	0.00	0.005	o	|	|	|	|	0.10
133.417	0.00	0.00	0.005	o	|	|	|	|	0.10
133.500	0.00	0.00	0.005	o	|	|	|	|	0.10
133.583	0.00	0.00	0.005	o	|	|	|	|	0.10
133.667	0.00	0.00	0.005	o	|	|	|	|	0.10
133.750	0.00	0.00	0.005	o	|	|	|	|	0.10
133.833	0.00	0.00	0.005	o	|	|	|	|	0.10
133.917	0.00	0.00	0.005	o	|	|	|	|	0.10
134.000	0.00	0.00	0.005	o	|	|	|	|	0.09
134.083	0.00	0.00	0.005	o	|	|	|	|	0.09
134.167	0.00	0.00	0.005	o	|	|	|	|	0.09
134.250	0.00	0.00	0.005	o	|	|	|	|	0.09
134.333	0.00	0.00	0.005	o	|	|	|	|	0.09
134.417	0.00	0.00	0.005	o	|	|	|	|	0.09
134.500	0.00	0.00	0.005	o	|	|	|	|	0.09
134.583	0.00	0.00	0.004	o	|	|	|	|	0.09
134.667	0.00	0.00	0.004	o	|	|	|	|	0.09
134.750	0.00	0.00	0.004	o	|	|	|	|	0.09
134.833	0.00	0.00	0.004	o	|	|	|	|	0.09
134.917	0.00	0.00	0.004	o	|	|	|	|	0.09
135.000	0.00	0.00	0.004	o	|	|	|	|	0.09
135.083	0.00	0.00	0.004	o	|	|	|	|	0.09
135.167	0.00	0.00	0.004	o	|	|	|	|	0.09
135.250	0.00	0.00	0.004	o	|	|	|	|	0.09
135.333	0.00	0.00	0.004	o	|	|	|	|	0.09
135.417	0.00	0.00	0.004	o	|	|	|	|	0.09
135.500	0.00	0.00	0.004	o	|	|	|	|	0.09
135.583	0.00	0.00	0.004	o	|	|	|	|	0.09
135.667	0.00	0.00	0.004	o	|	|	|	|	0.09
135.750	0.00	0.00	0.004	o	|	|	|	|	0.09
135.833	0.00	0.00	0.004	o	|	|	|	|	0.09
135.917	0.00	0.00	0.004	o	|	|	|	|	0.08
136.000	0.00	0.00	0.004	o	|	|	|	|	0.08
136.083	0.00	0.00	0.004	o	|	|	|	|	0.08
136.167	0.00	0.00	0.004	o	|	|	|	|	0.08
136.250	0.00	0.00	0.004	o	|	|	|	|	0.08
136.333	0.00	0.00	0.004	o	|	|	|	|	0.08
136.417	0.00	0.00	0.004	o	|	|	|	|	0.08
136.500	0.00	0.00	0.004	o	|	|	|	|	0.08
136.583	0.00	0.00	0.004	o	|	|	|	|	0.08
136.667	0.00	0.00	0.004	o	|	|	|	|	0.08
136.750	0.00	0.00	0.004	o	|	|	|	|	0.08
136.833	0.00	0.00	0.004	o	|	|	|	|	0.08
136.917	0.00	0.00	0.004	o	|	|	|	|	0.08
137.000	0.00	0.00	0.004	o	|	|	|	|	0.08
137.083	0.00	0.00	0.004	o	|	|	|	|	0.08

137.167	0.00	0.00	0.004	o	|	|	|	|	0.08
137.250	0.00	0.00	0.004	o	|	|	|	|	0.08
137.333	0.00	0.00	0.004	o	|	|	|	|	0.08
137.417	0.00	0.00	0.004	o	|	|	|	|	0.08
137.500	0.00	0.00	0.004	o	|	|	|	|	0.08
137.583	0.00	0.00	0.004	o	|	|	|	|	0.08
137.667	0.00	0.00	0.004	o	|	|	|	|	0.08
137.750	0.00	0.00	0.004	o	|	|	|	|	0.08
137.833	0.00	0.00	0.004	o	|	|	|	|	0.08
137.917	0.00	0.00	0.004	o	|	|	|	|	0.08
138.000	0.00	0.00	0.004	o	|	|	|	|	0.08
138.083	0.00	0.00	0.004	o	|	|	|	|	0.08
138.167	0.00	0.00	0.004	o	|	|	|	|	0.08
138.250	0.00	0.00	0.004	o	|	|	|	|	0.08
138.333	0.00	0.00	0.004	o	|	|	|	|	0.08
138.417	0.00	0.00	0.004	o	|	|	|	|	0.07
138.500	0.00	0.00	0.004	o	|	|	|	|	0.07
138.583	0.00	0.00	0.004	o	|	|	|	|	0.07
138.667	0.00	0.00	0.004	o	|	|	|	|	0.07
138.750	0.00	0.00	0.004	o	|	|	|	|	0.07
138.833	0.00	0.00	0.004	o	|	|	|	|	0.07
138.917	0.00	0.00	0.004	o	|	|	|	|	0.07
139.000	0.00	0.00	0.004	o	|	|	|	|	0.07
139.083	0.00	0.00	0.004	o	|	|	|	|	0.07
139.167	0.00	0.00	0.004	o	|	|	|	|	0.07
139.250	0.00	0.00	0.003	o	|	|	|	|	0.07
139.333	0.00	0.00	0.003	o	|	|	|	|	0.07
139.417	0.00	0.00	0.003	o	|	|	|	|	0.07
139.500	0.00	0.00	0.003	o	|	|	|	|	0.07
139.583	0.00	0.00	0.003	o	|	|	|	|	0.07
139.667	0.00	0.00	0.003	o	|	|	|	|	0.07
139.750	0.00	0.00	0.003	o	|	|	|	|	0.07
139.833	0.00	0.00	0.003	o	|	|	|	|	0.07
139.917	0.00	0.00	0.003	o	|	|	|	|	0.07
140.000	0.00	0.00	0.003	o	|	|	|	|	0.07
140.083	0.00	0.00	0.003	o	|	|	|	|	0.07
140.167	0.00	0.00	0.003	o	|	|	|	|	0.07
140.250	0.00	0.00	0.003	o	|	|	|	|	0.07
140.333	0.00	0.00	0.003	o	|	|	|	|	0.07
140.417	0.00	0.00	0.003	o	|	|	|	|	0.07
140.500	0.00	0.00	0.003	o	|	|	|	|	0.07
140.583	0.00	0.00	0.003	o	|	|	|	|	0.07
140.667	0.00	0.00	0.003	o	|	|	|	|	0.07
140.750	0.00	0.00	0.003	o	|	|	|	|	0.07
140.833	0.00	0.00	0.003	o	|	|	|	|	0.07
140.917	0.00	0.00	0.003	o	|	|	|	|	0.07
141.000	0.00	0.00	0.003	o	|	|	|	|	0.07
141.083	0.00	0.00	0.003	o	|	|	|	|	0.07
141.167	0.00	0.00	0.003	o	|	|	|	|	0.07
141.250	0.00	0.00	0.003	o	|	|	|	|	0.07
141.333	0.00	0.00	0.003	o	|	|	|	|	0.07
141.417	0.00	0.00	0.003	o	|	|	|	|	0.07
141.500	0.00	0.00	0.003	o	|	|	|	|	0.07
141.583	0.00	0.00	0.003	o	|	|	|	|	0.07
141.667	0.00	0.00	0.003	o	|	|	|	|	0.07
141.750	0.00	0.00	0.003	o	|	|	|	|	0.07
141.833	0.00	0.00	0.003	o	|	|	|	|	0.07
141.917	0.00	0.00	0.003	o	|	|	|	|	0.07
142.000	0.00	0.00	0.003	o	|	|	|	|	0.07
142.083	0.00	0.00	0.003	o	|	|	|	|	0.07
142.167	0.00	0.00	0.003	o	|	|	|	|	0.07
142.250	0.00	0.00	0.003	o	|	|	|	|	0.07
142.333	0.00	0.00	0.003	o	|	|	|	|	0.07
142.417	0.00	0.00	0.003	o	|	|	|	|	0.07
142.500	0.00	0.00	0.003	o	|	|	|	|	0.06
142.583	0.00	0.00	0.003	o	|	|	|	|	0.06
142.667	0.00	0.00	0.003	o	|	|	|	|	0.06
142.750	0.00	0.00	0.003	o	|	|	|	|	0.06
142.833	0.00	0.00	0.003	o	|	|	|	|	0.06
142.917	0.00	0.00	0.003	o	|	|	|	|	0.06
143.000	0.00	0.00	0.003	o	|	|	|	|	0.06
143.083	0.00	0.00	0.003	o	|	|	|	|	0.06
143.167	0.00	0.00	0.003	o	|	|	|	|	0.06
143.250	0.00	0.00	0.003	o	|	|	|	|	0.06
143.333	0.00	0.00	0.003	o	|	|	|	|	0.06

```
143.417    0.00    0.00      0.003  O       |       |       |       |     0.06
143.500    0.00    0.00      0.003  O       |       |       |       |     0.06
143.583    0.00    0.00      0.003  O       |       |       |       |     0.06
143.667    0.00    0.00      0.003  O       |       |       |       |     0.06

        Remaining water in basin =    0.00 (Ac.Ft)


        ****************************HYDROGRAPH DATA****************************
                       Number of intervals =  1724
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =        0.160 (CFS)
                       Total volume =       1.058 (Ac.Ft)
                Status of hydrographs being held in storage
                           Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
                Peak (CFS)      0.000     0.000     0.000     0.000     0.000
                Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
        ************************************************************************

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV BLDG A AREA 2
2-YEAR 24 HOUR STORM EVENT
21-0034
2021-11-24 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR2A242.rte
**********HYDROGRAPH DATA**********
Number of intervals = 297
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.367 (CFS)
Total volume = 1.444 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 297
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.063	0.004	0.001	0.004	0.004
0.500	0.033	0.090	0.033	0.033
1.000	0.092	0.130	0.092	0.092
1.500	0.165	0.160	0.164	0.166
2.000	0.248	0.180	0.247	0.249
2.500	0.339	0.200	0.338	0.340
3.000	0.435	0.220	0.434	0.436
3.500	0.534	0.240	0.533	0.535
4.000	0.635	0.260	0.634	0.636
4.500	0.736	0.270	0.735	0.737
5.000	0.835	0.290	0.834	0.836
5.500	0.931	0.300	0.930	0.932
6.000	1.022	0.320	1.021	1.023
6.500	1.106	0.330	1.105	1.107
7.000	1.179	0.340	1.178	1.180
7.500	1.237	0.350	1.236	1.238
8.000	1.270	0.370	1.269	1.271

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.6	1.18	1.78	2.37	Depth (Ft.)
0.083	0.01	0.00	0.000	O					0.00
0.167	0.07	0.00	0.000	O					0.00
0.250	0.11	0.00	0.001	OI					0.01
0.333	0.13	0.00	0.002	OI					0.03
0.417	0.17	0.00	0.003	O I					0.04
0.500	0.19	0.00	0.004	O I					0.06
0.583	0.20	0.00	0.005	O I					0.08
0.667	0.20	0.01	0.007	O I					0.10
0.750	0.21	0.01	0.008	O I					0.12
0.833	0.21	0.02	0.009	O I					0.14
0.917	0.24	0.02	0.011	O I					0.16
1.000	0.26	0.03	0.012	O I					0.19
1.083	0.27	0.03	0.014	O I					0.21
1.167	0.24	0.04	0.015	O I					0.24
1.250	0.22	0.04	0.017	O I					0.26
1.333	0.22	0.04	0.018	O I					0.27
1.417	0.21	0.05	0.019	O I					0.29
1.500	0.21	0.05	0.020	O I					0.31
1.583	0.21	0.05	0.021	O I					0.33
1.667	0.21	0.06	0.022	O I					0.34
1.750	0.21	0.06	0.024	O I					0.36
1.833	0.21	0.06	0.025	O I					0.37
1.917	0.24	0.07	0.026	O I					0.39
2.000	0.26	0.07	0.027	O I					0.41
2.083	0.27	0.08	0.028	O I					0.43
2.167	0.28	0.08	0.030	O I					0.45
2.250	0.28	0.08	0.031	O I					0.47
2.333	0.28	0.09	0.032	O I					0.49
2.417	0.28	0.09	0.034	O I					0.51
2.500	0.28	0.09	0.035	O I					0.52
2.583	0.28	0.09	0.036	O I					0.53
2.667	0.31	0.09	0.038	O I					0.54
2.750	0.33	0.09	0.039	O I					0.55
2.833	0.34	0.10	0.041	O I					0.57
2.917	0.35	0.10	0.043	O I					0.58
3.000	0.35	0.10	0.044	O I					0.60
3.083	0.35	0.10	0.046	O I					0.61
3.167	0.35	0.10	0.048	O I					0.62
3.250	0.35	0.10	0.049	O I					0.64
3.333	0.35	0.10	0.051	O I					0.65
3.417	0.35	0.10	0.053	O I					0.67
3.500	0.35	0.10	0.055	O I					0.68
3.583	0.35	0.11	0.056	O I					0.70
3.667	0.35	0.11	0.058	O I					0.71
3.750	0.35	0.11	0.060	O I					0.73
3.833	0.35	0.11	0.061	O I					0.74
3.917	0.38	0.11	0.063	O I					0.75
4.000	0.40	0.11	0.065	O I					0.77
4.083	0.41	0.11	0.067	O I					0.79
4.167	0.42	0.11	0.069	O I					0.81
4.250	0.42	0.12	0.071	O I					0.82
4.333	0.42	0.12	0.073	O I					0.84
4.417	0.45	0.12	0.075	O I					0.86
4.500	0.47	0.12	0.078	O I					0.88
4.583	0.48	0.12	0.080	O I					0.90
4.667	0.49	0.12	0.083	O I					0.92
4.750	0.49	0.13	0.085	O I					0.94
4.833	0.49	0.13	0.088	O I					0.96
4.917	0.52	0.13	0.090	O I					0.99
5.000	0.54	0.13	0.093	O I					1.01
5.083	0.54	0.13	0.096	O I					1.03
5.167	0.49	0.13	0.099	O I					1.05
5.250	0.45	0.13	0.101	O I					1.06
5.333	0.44	0.13	0.103	O I					1.08
5.417	0.46	0.14	0.105	O I					1.09
5.500	0.48	0.14	0.108	O I					1.11
5.583	0.49	0.14	0.110	O I					1.12
5.667	0.52	0.14	0.112	O I					1.14

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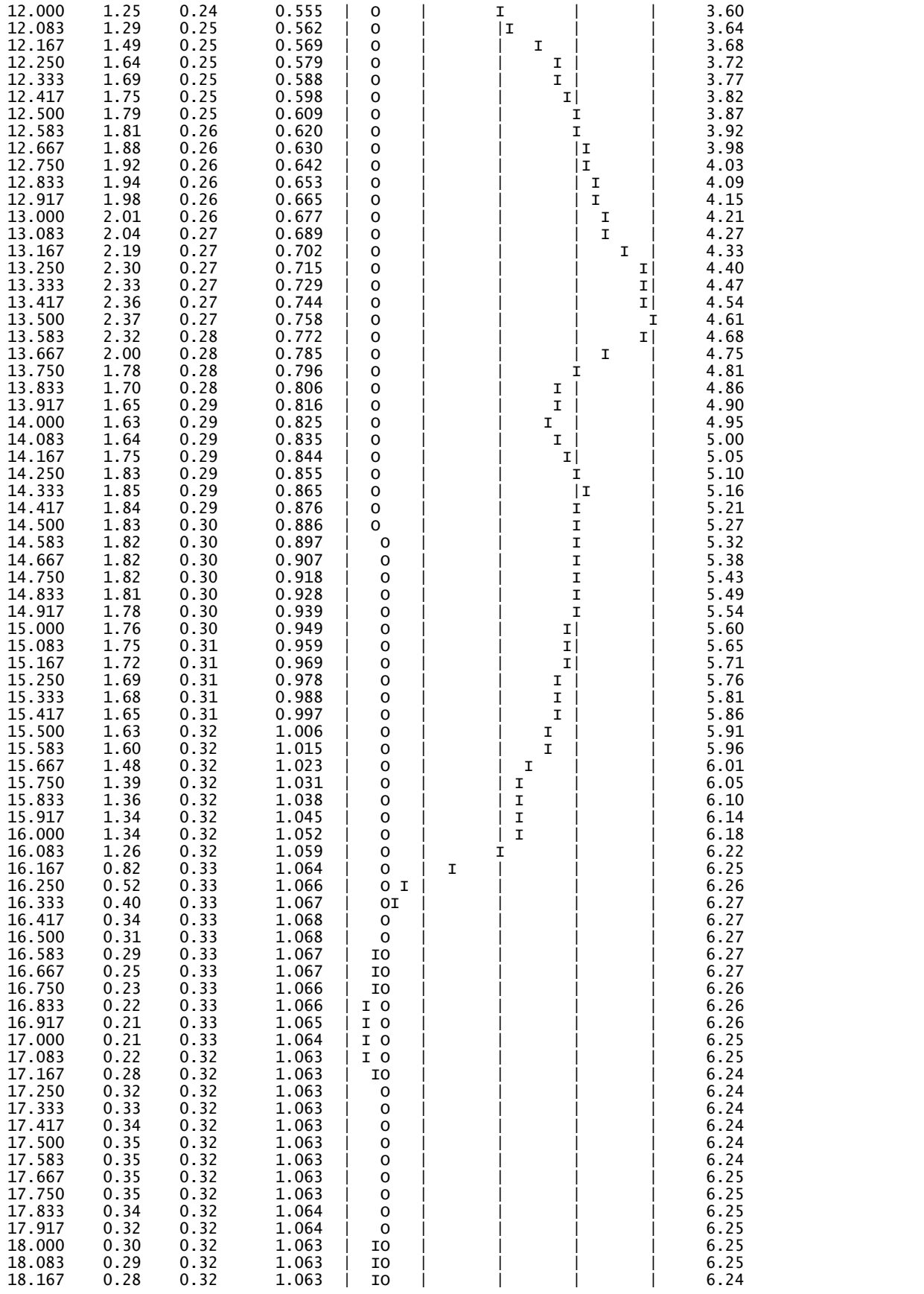
 5.750    0.54    0.14      0.115  |o     I|        |        |        |     1.16
 5.833    0.55    0.14      0.118  |o     I|        |        |        |     1.18
 5.917    0.55    0.14      0.121  |o     I|        |        |        |     1.20
 6.000    0.56    0.14      0.124  |o     I|        |        |        |     1.22
 6.083    0.56    0.14      0.126  |o     I|        |        |        |     1.24
 6.167    0.59    0.15      0.129  |o      I        |        |        |     1.26
 6.250    0.61    0.15      0.133  |o      I        |        |        |     1.28
 6.333    0.62    0.15      0.136  | o     I        |        |        |     1.30
 6.417    0.63    0.15      0.139  | o     I        |        |        |     1.32
 6.500    0.63    0.15      0.142  | o     I        |        |        |     1.34
 6.583    0.63    0.15      0.146  | o     I        |        |        |     1.37
 6.667    0.66    0.15      0.149  | o     I        |        |        |     1.39
 6.750    0.68    0.15      0.153  | o     |I       |        |        |     1.42
 6.833    0.69    0.16      0.156  | o     |I       |        |        |     1.44
 6.917    0.69    0.16      0.160  | o     |I       |        |        |     1.47
 7.000    0.70    0.16      0.164  | o     |I       |        |        |     1.49
 7.083    0.70    0.16      0.167  | o     |I       |        |        |     1.51
 7.167    0.70    0.16      0.171  | o     |I       |        |        |     1.54
 7.250    0.70    0.16      0.175  | o     |I       |        |        |     1.56
 7.333    0.70    0.16      0.178  | o     |I       |        |        |     1.58
 7.417    0.73    0.16      0.182  | o     |I       |        |        |     1.60
 7.500    0.75    0.17      0.186  | o     | I      |        |        |     1.63
 7.583    0.77    0.17      0.190  | o     | I      |        |        |     1.65
 7.667    0.80    0.17      0.195  | o     | I      |        |        |     1.68
 7.750    0.82    0.17      0.199  | o     |  I     |        |        |     1.71
 7.833    0.83    0.17      0.204  | o     |  I     |        |        |     1.73
 7.917    0.87    0.17      0.208  | o     |  I     |        |        |     1.76
 8.000    0.89    0.17      0.213  | o     |   I    |        |        |     1.79
 8.083    0.91    0.17      0.218  | o     |   I    |        |        |     1.82
 8.167    0.97    0.17      0.223  | o     |    I   |        |        |     1.85
 8.250    1.01    0.18      0.229  | o     |    I   |        |        |     1.89
 8.333    1.03    0.18      0.235  | o     |    I   |        |        |     1.92
 8.417    1.04    0.18      0.241  | o     |     I  |        |        |     1.96
 8.500    1.04    0.18      0.247  | o     |     I  |        |        |     1.99
 8.583    1.05    0.18      0.253  | o     |     I  |        |        |     2.03
 8.667    1.08    0.18      0.259  | o     |     I  |        |        |     2.06
 8.750    1.10    0.18      0.265  | o     |     I  |        |        |     2.09
 8.833    1.12    0.19      0.271  | o     |      I |        |        |     2.13
 8.917    1.15    0.19      0.278  | o     |      I |        |        |     2.16
 9.000    1.17    0.19      0.285  | o     |      I |        |        |     2.20
 9.083    1.19    0.19      0.292  | o     |       I        |        |     2.24
 9.167    1.25    0.19      0.299  | o     |       I        |        |     2.28
 9.250    1.29    0.19      0.306  | o     |       |I       |        |     2.32
 9.333    1.32    0.19      0.314  | o     |       |I       |        |     2.36
 9.417    1.35    0.20      0.322  | o     |       | I      |        |     2.40
 9.500    1.38    0.20      0.330  | o     |       | I      |        |     2.45
 9.583    1.39    0.20      0.338  | o     |       | I      |        |     2.49
 9.667    1.43    0.20      0.346  | o     |       |  I     |        |     2.54
 9.750    1.45    0.20      0.355  | o     |       |  I     |        |     2.58
 9.833    1.46    0.21      0.363  | o     |       |  I     |        |     2.63
 9.917    1.50    0.21      0.372  | o     |       |   I    |        |     2.67
10.000    1.52    0.21      0.381  | o     |       |   I    |        |     2.72
10.083    1.49    0.21      0.390  | o     |       |   I    |        |     2.77
10.167    1.29    0.21      0.398  | o     |       |I       |        |     2.81
10.250    1.16    0.21      0.405  | o     |      I|        |        |     2.84
10.333    1.10    0.22      0.411  | o     |     I |        |        |     2.88
10.417    1.08    0.22      0.417  | o     |     I |        |        |     2.91
10.500    1.06    0.22      0.423  | o     |     I |        |        |     2.94
10.583    1.08    0.22      0.429  | o     |     I |        |        |     2.97
10.667    1.22    0.22      0.436  | o     |       I        |        |     3.00
10.750    1.32    0.22      0.443  | o     |       |I       |        |     3.04
10.833    1.36    0.22      0.450  |  o    |       | I      |        |     3.08
10.917    1.38    0.22      0.458  |  o    |       | I      |        |     3.12
11.000    1.39    0.23      0.466  |  o    |       | I      |        |     3.16
11.083    1.39    0.23      0.474  |  o    |       | I      |        |     3.20
11.167    1.36    0.23      0.482  |  o    |       | I      |        |     3.24
11.250    1.34    0.23      0.490  |  o    |       | I      |        |     3.28
11.333    1.34    0.23      0.498  |  o    |       | I      |        |     3.32
11.417    1.33    0.23      0.505  |  o    |       | I      |        |     3.35
11.500    1.33    0.24      0.513  |  o    |       |I       |        |     3.39
11.583    1.32    0.24      0.520  |  o    |       |I       |        |     3.43
11.667    1.26    0.24      0.527  |  o    |       |I       |        |     3.47
11.750    1.22    0.24      0.534  |  o    |       I        |        |     3.50
11.833    1.21    0.24      0.541  |  o    |       I        |        |     3.53
11.917    1.23    0.24      0.548  |  o    |       I        |        |     3.57
```



18.250	0.28	0.32	1.063	| IO	|	|	|	6.24
18.333	0.28	0.32	1.062	| IO	|	|	|	6.24
18.417	0.28	0.32	1.062	| IO	|	|	|	6.24
18.500	0.28	0.32	1.062	| IO	|	|	|	6.24
18.583	0.27	0.32	1.061	| IO	|	|	|	6.23
18.667	0.25	0.32	1.061	| IO	|	|	|	6.23
18.750	0.23	0.32	1.060	| IO	|	|	|	6.23
18.833	0.21	0.32	1.060	| I O	|	|	|	6.22
18.917	0.18	0.32	1.059	| I O	|	|	|	6.22
19.000	0.16	0.32	1.058	| I O	|	|	|	6.21
19.083	0.15	0.32	1.057	| I O	|	|	|	6.21
19.167	0.18	0.32	1.055	| I O	|	|	|	6.20
19.250	0.20	0.32	1.055	| I O	|	|	|	6.19
19.333	0.21	0.32	1.054	| I O	|	|	|	6.19
19.417	0.24	0.32	1.053	| IO	|	|	|	6.18
19.500	0.26	0.32	1.052	| IO	|	|	|	6.18
19.583	0.27	0.32	1.052	| IO	|	|	|	6.18
19.667	0.24	0.32	1.052	| IO	|	|	|	6.18
19.750	0.22	0.32	1.051	| IO	|	|	|	6.17
19.833	0.21	0.32	1.050	| I O	|	|	|	6.17
19.917	0.18	0.32	1.049	| I O	|	|	|	6.16
20.000	0.16	0.32	1.048	| I O	|	|	|	6.16
20.083	0.15	0.32	1.047	| I O	|	|	|	6.15
20.167	0.18	0.32	1.046	| I O	|	|	|	6.14
20.250	0.20	0.32	1.045	| I O	|	|	|	6.14
20.333	0.20	0.32	1.044	| I O	|	|	|	6.13
20.417	0.21	0.32	1.043	| I O	|	|	|	6.13
20.500	0.21	0.32	1.043	| I O	|	|	|	6.12
20.583	0.21	0.32	1.042	| I O	|	|	|	6.12
20.667	0.21	0.32	1.041	| I O	|	|	|	6.11
20.750	0.21	0.32	1.040	| I O	|	|	|	6.11
20.833	0.20	0.32	1.040	| I O	|	|	|	6.10
20.917	0.18	0.32	1.039	| I O	|	|	|	6.10
21.000	0.16	0.32	1.038	| I O	|	|	|	6.09
21.083	0.15	0.32	1.036	| I O	|	|	|	6.09
21.167	0.18	0.32	1.035	| I O	|	|	|	6.08
21.250	0.20	0.32	1.034	| I O	|	|	|	6.07
21.333	0.20	0.32	1.034	| I O	|	|	|	6.07
21.417	0.17	0.32	1.033	| I O	|	|	|	6.06
21.500	0.15	0.32	1.031	| I O	|	|	|	6.06
21.583	0.15	0.32	1.030	| I O	|	|	|	6.05
21.667	0.18	0.32	1.029	| I O	|	|	|	6.04
21.750	0.20	0.32	1.028	| I O	|	|	|	6.04
21.833	0.20	0.32	1.027	| I O	|	|	|	6.03
21.917	0.17	0.32	1.027	| I O	|	|	|	6.03
22.000	0.15	0.32	1.025	| I O	|	|	|	6.02
22.083	0.15	0.32	1.024	| I O	|	|	|	6.01
22.167	0.18	0.32	1.023	| I O	|	|	|	6.01
22.250	0.20	0.32	1.022	| I O	|	|	|	6.00
22.333	0.20	0.32	1.021	| I O	|	|	|	6.00
22.417	0.17	0.32	1.021	| I O	|	|	|	5.99
22.500	0.15	0.32	1.019	| I O	|	|	|	5.99
22.583	0.15	0.32	1.018	|I O	|	|	|	5.98
22.667	0.14	0.32	1.017	|I O	|	|	|	5.97
22.750	0.14	0.32	1.016	|I O	|	|	|	5.97
22.833	0.14	0.32	1.015	|I O	|	|	|	5.96
22.917	0.14	0.32	1.013	|I O	|	|	|	5.95
23.000	0.14	0.32	1.012	|I O	|	|	|	5.95
23.083	0.14	0.32	1.011	|I O	|	|	|	5.94
23.167	0.14	0.32	1.010	|I O	|	|	|	5.93
23.250	0.14	0.32	1.009	|I O	|	|	|	5.93
23.333	0.14	0.32	1.007	|I O	|	|	|	5.92
23.417	0.14	0.32	1.006	|I O	|	|	|	5.91
23.500	0.14	0.32	1.005	|I O	|	|	|	5.91
23.583	0.14	0.32	1.004	|I O	|	|	|	5.90
23.667	0.14	0.32	1.002	|I O	|	|	|	5.89
23.750	0.14	0.32	1.001	|I O	|	|	|	5.89
23.833	0.14	0.32	1.000	|I O	|	|	|	5.88
23.917	0.14	0.31	0.999	|I O	|	|	|	5.87
24.000	0.14	0.31	0.998	|I O	|	|	|	5.87
24.083	0.13	0.31	0.996	|I O	|	|	|	5.86
24.167	0.07	0.31	0.995	I O	|	|	|	5.85
24.250	0.03	0.31	0.993	I O	|	|	|	5.84
24.333	0.02	0.31	0.991	I O	|	|	|	5.83
24.417	0.01	0.31	0.989	I O	|	|	|	5.82

24.500	0.00	0.31	0.987	I	o	|	|	|	5.81
24.583	0.00	0.31	0.985	I	o	|	|	|	5.80
24.667	0.00	0.31	0.983	I	o	|	|	|	5.78
24.750	0.00	0.31	0.981	I	o	|	|	|	5.77
24.833	0.00	0.31	0.978	I	o	|	|	|	5.76
24.917	0.00	0.31	0.976	I	o	|	|	|	5.75
25.000	0.00	0.31	0.974	I	o	|	|	|	5.74
25.083	0.00	0.31	0.972	I	o	|	|	|	5.73
25.167	0.00	0.31	0.970	I	o	|	|	|	5.71
25.250	0.00	0.31	0.968	I	o	|	|	|	5.70
25.333	0.00	0.31	0.966	I	o	|	|	|	5.69
25.417	0.00	0.31	0.963	I	o	|	|	|	5.68
25.500	0.00	0.31	0.961	I	o	|	|	|	5.67
25.583	0.00	0.31	0.959	I	o	|	|	|	5.66
25.667	0.00	0.31	0.957	I	o	|	|	|	5.64
25.750	0.00	0.31	0.955	I	o	|	|	|	5.63
25.833	0.00	0.30	0.953	I	o	|	|	|	5.62
25.917	0.00	0.30	0.951	I	o	|	|	|	5.61
26.000	0.00	0.30	0.949	I	o	|	|	|	5.60
26.083	0.00	0.30	0.947	I	o	|	|	|	5.59
26.167	0.00	0.30	0.945	I	o	|	|	|	5.57
26.250	0.00	0.30	0.943	I	o	|	|	|	5.56
26.333	0.00	0.30	0.940	I	o	|	|	|	5.55
26.417	0.00	0.30	0.938	I	o	|	|	|	5.54
26.500	0.00	0.30	0.936	I	o	|	|	|	5.53
26.583	0.00	0.30	0.934	I	o	|	|	|	5.52
26.667	0.00	0.30	0.932	I	o	|	|	|	5.51
26.750	0.00	0.30	0.930	I	o	|	|	|	5.50
26.833	0.00	0.30	0.928	I	o	|	|	|	5.48
26.917	0.00	0.30	0.926	I	o	|	|	|	5.47
27.000	0.00	0.30	0.924	I	o	|	|	|	5.46
27.083	0.00	0.30	0.922	I	o	|	|	|	5.45
27.167	0.00	0.30	0.920	I	o	|	|	|	5.44
27.250	0.00	0.30	0.918	I	o	|	|	|	5.43
27.333	0.00	0.30	0.916	I	o	|	|	|	5.42
27.417	0.00	0.30	0.914	I	o	|	|	|	5.41
27.500	0.00	0.30	0.912	I	o	|	|	|	5.40
27.583	0.00	0.30	0.909	I	o	|	|	|	5.39
27.667	0.00	0.30	0.907	I	o	|	|	|	5.38
27.750	0.00	0.30	0.905	I	o	|	|	|	5.37
27.833	0.00	0.30	0.903	I	o	|	|	|	5.36
27.917	0.00	0.30	0.901	I	o	|	|	|	5.35
28.000	0.00	0.30	0.899	I	o	|	|	|	5.33
28.083	0.00	0.30	0.897	I	o	|	|	|	5.32
28.167	0.00	0.30	0.895	I	o	|	|	|	5.31
28.250	0.00	0.30	0.893	I	o	|	|	|	5.30
28.333	0.00	0.30	0.891	I	o	|	|	|	5.29
28.417	0.00	0.30	0.889	I	o	|	|	|	5.28
28.500	0.00	0.30	0.887	I	o	|	|	|	5.27
28.583	0.00	0.30	0.885	I	o	|	|	|	5.26
28.667	0.00	0.29	0.883	I	o	|	|	|	5.25
28.750	0.00	0.29	0.881	I	o	|	|	|	5.24
28.833	0.00	0.29	0.879	I	o	|	|	|	5.23
28.917	0.00	0.29	0.877	I	o	|	|	|	5.22
29.000	0.00	0.29	0.875	I	o	|	|	|	5.21
29.083	0.00	0.29	0.873	I	o	|	|	|	5.20
29.167	0.00	0.29	0.871	I	o	|	|	|	5.19
29.250	0.00	0.29	0.869	I	o	|	|	|	5.18
29.333	0.00	0.29	0.867	I	o	|	|	|	5.17
29.417	0.00	0.29	0.865	I	o	|	|	|	5.15
29.500	0.00	0.29	0.863	I	o	|	|	|	5.14
29.583	0.00	0.29	0.861	I	o	|	|	|	5.13
29.667	0.00	0.29	0.859	I	o	|	|	|	5.12
29.750	0.00	0.29	0.857	I	o	|	|	|	5.11
29.833	0.00	0.29	0.855	I	o	|	|	|	5.10
29.917	0.00	0.29	0.853	I	o	|	|	|	5.09
30.000	0.00	0.29	0.851	I	o	|	|	|	5.08
30.083	0.00	0.29	0.849	I	o	|	|	|	5.07
30.167	0.00	0.29	0.847	I	o	|	|	|	5.06
30.250	0.00	0.29	0.845	I	o	|	|	|	5.05
30.333	0.00	0.29	0.843	I	o	|	|	|	5.04
30.417	0.00	0.29	0.841	I	o	|	|	|	5.03
30.500	0.00	0.29	0.839	I	o	|	|	|	5.02
30.583	0.00	0.29	0.837	I	o	|	|	|	5.01
30.667	0.00	0.29	0.835	I	o	|	|	|	5.00

30.750	0.00	0.29	0.833	I	o	|	|	|	4.99
30.833	0.00	0.29	0.831	I	o	|	|	|	4.98
30.917	0.00	0.29	0.829	I	o	|	|	|	4.97
31.000	0.00	0.29	0.827	I	o	|	|	|	4.96
31.083	0.00	0.29	0.825	I	o	|	|	|	4.95
31.167	0.00	0.29	0.823	I	o	|	|	|	4.94
31.250	0.00	0.29	0.821	I	o	|	|	|	4.93
31.333	0.00	0.29	0.819	I	o	|	|	|	4.92
31.417	0.00	0.29	0.817	I	o	|	|	|	4.91
31.500	0.00	0.29	0.815	I	o	|	|	|	4.90
31.583	0.00	0.29	0.813	I	o	|	|	|	4.89
31.667	0.00	0.29	0.811	I	o	|	|	|	4.88
31.750	0.00	0.28	0.809	I	o	|	|	|	4.87
31.833	0.00	0.28	0.807	I	o	|	|	|	4.86
31.917	0.00	0.28	0.805	I	o	|	|	|	4.85
32.000	0.00	0.28	0.803	I	o	|	|	|	4.84
32.083	0.00	0.28	0.801	I	o	|	|	|	4.83
32.167	0.00	0.28	0.799	I	o	|	|	|	4.82
32.250	0.00	0.28	0.797	I	o	|	|	|	4.81
32.333	0.00	0.28	0.795	I	o	|	|	|	4.80
32.417	0.00	0.28	0.793	I	o	|	|	|	4.79
32.500	0.00	0.28	0.791	I	o	|	|	|	4.78
32.583	0.00	0.28	0.789	I	o	|	|	|	4.77
32.667	0.00	0.28	0.787	I	o	|	|	|	4.76
32.750	0.00	0.28	0.786	I	o	|	|	|	4.75
32.833	0.00	0.28	0.784	I	o	|	|	|	4.74
32.917	0.00	0.28	0.782	I	o	|	|	|	4.73
33.000	0.00	0.28	0.780	I	o	|	|	|	4.72
33.083	0.00	0.28	0.778	I	o	|	|	|	4.71
33.167	0.00	0.28	0.776	I	o	|	|	|	4.70
33.250	0.00	0.28	0.774	I	o	|	|	|	4.69
33.333	0.00	0.28	0.772	I	o	|	|	|	4.68
33.417	0.00	0.28	0.770	I	o	|	|	|	4.67
33.500	0.00	0.28	0.768	I	o	|	|	|	4.66
33.583	0.00	0.28	0.766	I	o	|	|	|	4.65
33.667	0.00	0.28	0.764	I	o	|	|	|	4.64
33.750	0.00	0.28	0.763	I	o	|	|	|	4.63
33.833	0.00	0.27	0.761	I	o	|	|	|	4.62
33.917	0.00	0.27	0.759	I	o	|	|	|	4.62
34.000	0.00	0.27	0.757	I	o	|	|	|	4.61
34.083	0.00	0.27	0.755	I	o	|	|	|	4.60
34.167	0.00	0.27	0.753	I	o	|	|	|	4.59
34.250	0.00	0.27	0.751	I	o	|	|	|	4.58
34.333	0.00	0.27	0.749	I	o	|	|	|	4.57
34.417	0.00	0.27	0.748	I	o	|	|	|	4.56
34.500	0.00	0.27	0.746	I	o	|	|	|	4.55
34.583	0.00	0.27	0.744	I	o	|	|	|	4.54
34.667	0.00	0.27	0.742	I	o	|	|	|	4.53
34.750	0.00	0.27	0.740	I	o	|	|	|	4.52
34.833	0.00	0.27	0.738	I	o	|	|	|	4.51
34.917	0.00	0.27	0.736	I	o	|	|	|	4.50
35.000	0.00	0.27	0.734	I	o	|	|	|	4.49
35.083	0.00	0.27	0.733	I	o	|	|	|	4.48
35.167	0.00	0.27	0.731	I	o	|	|	|	4.47
35.250	0.00	0.27	0.729	I	o	|	|	|	4.46
35.333	0.00	0.27	0.727	I	o	|	|	|	4.46
35.417	0.00	0.27	0.725	I	o	|	|	|	4.45
35.500	0.00	0.27	0.723	I	o	|	|	|	4.44
35.583	0.00	0.27	0.721	I	o	|	|	|	4.43
35.667	0.00	0.27	0.720	I	o	|	|	|	4.42
35.750	0.00	0.27	0.718	I	o	|	|	|	4.41
35.833	0.00	0.27	0.716	I	o	|	|	|	4.40
35.917	0.00	0.27	0.714	I	o	|	|	|	4.39
36.000	0.00	0.27	0.712	I	o	|	|	|	4.38
36.083	0.00	0.27	0.710	I	o	|	|	|	4.37
36.167	0.00	0.27	0.709	I	o	|	|	|	4.36
36.250	0.00	0.27	0.707	I	o	|	|	|	4.35
36.333	0.00	0.27	0.705	I	o	|	|	|	4.35
36.417	0.00	0.27	0.703	I	o	|	|	|	4.34
36.500	0.00	0.27	0.701	I	o	|	|	|	4.33
36.583	0.00	0.27	0.699	I	o	|	|	|	4.32
36.667	0.00	0.27	0.698	I	o	|	|	|	4.31
36.750	0.00	0.27	0.696	I	o	|	|	|	4.30
36.833	0.00	0.27	0.694	I	o	|	|	|	4.29
36.917	0.00	0.27	0.692	I	o	|	|	|	4.28

37.000	0.00	0.27	0.690	I	o	|	|	|	4.27
37.083	0.00	0.27	0.688	I	o	|	|	|	4.26
37.167	0.00	0.27	0.687	I	o	|	|	|	4.26
37.250	0.00	0.26	0.685	I	o	|	|	|	4.25
37.333	0.00	0.26	0.683	I	o	|	|	|	4.24
37.417	0.00	0.26	0.681	I	o	|	|	|	4.23
37.500	0.00	0.26	0.679	I	o	|	|	|	4.22
37.583	0.00	0.26	0.677	I	o	|	|	|	4.21
37.667	0.00	0.26	0.676	I	o	|	|	|	4.20
37.750	0.00	0.26	0.674	I	o	|	|	|	4.19
37.833	0.00	0.26	0.672	I	o	|	|	|	4.18
37.917	0.00	0.26	0.670	I	o	|	|	|	4.17
38.000	0.00	0.26	0.668	I	o	|	|	|	4.17
38.083	0.00	0.26	0.667	I	o	|	|	|	4.16
38.167	0.00	0.26	0.665	I	o	|	|	|	4.15
38.250	0.00	0.26	0.663	I	o	|	|	|	4.14
38.333	0.00	0.26	0.661	I	o	|	|	|	4.13
38.417	0.00	0.26	0.659	I	o	|	|	|	4.12
38.500	0.00	0.26	0.657	I	o	|	|	|	4.11
38.583	0.00	0.26	0.656	I	o	|	|	|	4.10
38.667	0.00	0.26	0.654	I	o	|	|	|	4.09
38.750	0.00	0.26	0.652	I	o	|	|	|	4.08
38.833	0.00	0.26	0.650	I	o	|	|	|	4.08
38.917	0.00	0.26	0.648	I	o	|	|	|	4.07
39.000	0.00	0.26	0.647	I	o	|	|	|	4.06
39.083	0.00	0.26	0.645	I	o	|	|	|	4.05
39.167	0.00	0.26	0.643	I	o	|	|	|	4.04
39.250	0.00	0.26	0.641	I	o	|	|	|	4.03
39.333	0.00	0.26	0.639	I	o	|	|	|	4.02
39.417	0.00	0.26	0.638	I	o	|	|	|	4.01
39.500	0.00	0.26	0.636	I	o	|	|	|	4.00
39.583	0.00	0.26	0.634	I	o	|	|	|	4.00
39.667	0.00	0.26	0.632	I	o	|	|	|	3.99
39.750	0.00	0.26	0.631	I	o	|	|	|	3.98
39.833	0.00	0.26	0.629	I	o	|	|	|	3.97
39.917	0.00	0.26	0.627	I	o	|	|	|	3.96
40.000	0.00	0.26	0.625	I	o	|	|	|	3.95
40.083	0.00	0.26	0.623	I	o	|	|	|	3.94
40.167	0.00	0.26	0.622	I	o	|	|	|	3.93
40.250	0.00	0.26	0.620	I	o	|	|	|	3.93
40.333	0.00	0.26	0.618	I	o	|	|	|	3.92
40.417	0.00	0.26	0.616	I	o	|	|	|	3.91
40.500	0.00	0.26	0.615	I	o	|	|	|	3.90
40.583	0.00	0.26	0.613	I	o	|	|	|	3.89
40.667	0.00	0.26	0.611	I	o	|	|	|	3.88
40.750	0.00	0.25	0.609	I	o	|	|	|	3.87
40.833	0.00	0.25	0.608	I	o	|	|	|	3.86
40.917	0.00	0.25	0.606	I	o	|	|	|	3.86
41.000	0.00	0.25	0.604	I	o	|	|	|	3.85
41.083	0.00	0.25	0.602	I	o	|	|	|	3.84
41.167	0.00	0.25	0.601	I	o	|	|	|	3.83
41.250	0.00	0.25	0.599	I	o	|	|	|	3.82
41.333	0.00	0.25	0.597	I	o	|	|	|	3.81
41.417	0.00	0.25	0.595	I	o	|	|	|	3.80
41.500	0.00	0.25	0.594	I	o	|	|	|	3.80
41.583	0.00	0.25	0.592	I	o	|	|	|	3.79
41.667	0.00	0.25	0.590	I	o	|	|	|	3.78
41.750	0.00	0.25	0.588	I	o	|	|	|	3.77
41.833	0.00	0.25	0.587	I	o	|	|	|	3.76
41.917	0.00	0.25	0.585	I	o	|	|	|	3.75
42.000	0.00	0.25	0.583	I	o	|	|	|	3.74
42.083	0.00	0.25	0.582	I	o	|	|	|	3.74
42.167	0.00	0.25	0.580	I	o	|	|	|	3.73
42.250	0.00	0.25	0.578	I	o	|	|	|	3.72
42.333	0.00	0.25	0.576	I	o	|	|	|	3.71
42.417	0.00	0.25	0.575	I	o	|	|	|	3.70
42.500	0.00	0.25	0.573	I	o	|	|	|	3.69
42.583	0.00	0.25	0.571	I	o	|	|	|	3.68
42.667	0.00	0.25	0.570	I	o	|	|	|	3.68
42.750	0.00	0.25	0.568	I	o	|	|	|	3.67
42.833	0.00	0.25	0.566	I	o	|	|	|	3.66
42.917	0.00	0.25	0.564	I	o	|	|	|	3.65
43.000	0.00	0.25	0.563	I	o	|	|	|	3.64
43.083	0.00	0.25	0.561	I	o	|	|	|	3.63
43.167	0.00	0.25	0.559	I	o	|	|	|	3.63

43.250	0.00	0.24	0.558	I o	|	|	|	3.62
43.333	0.00	0.24	0.556	I o	|	|	|	3.61
43.417	0.00	0.24	0.554	I o	|	|	|	3.60
43.500	0.00	0.24	0.553	I o	|	|	|	3.59
43.583	0.00	0.24	0.551	I o	|	|	|	3.58
43.667	0.00	0.24	0.549	I o	|	|	|	3.58
43.750	0.00	0.24	0.548	I o	|	|	|	3.57
43.833	0.00	0.24	0.546	I o	|	|	|	3.56
43.917	0.00	0.24	0.544	I o	|	|	|	3.55
44.000	0.00	0.24	0.543	I o	|	|	|	3.54
44.083	0.00	0.24	0.541	I o	|	|	|	3.53
44.167	0.00	0.24	0.539	I o	|	|	|	3.53
44.250	0.00	0.24	0.538	I o	|	|	|	3.52
44.333	0.00	0.24	0.536	I o	|	|	|	3.51
44.417	0.00	0.24	0.534	I o	|	|	|	3.50
44.500	0.00	0.24	0.533	I o	|	|	|	3.49
44.583	0.00	0.24	0.531	I o	|	|	|	3.49
44.667	0.00	0.24	0.529	I o	|	|	|	3.48
44.750	0.00	0.24	0.528	I o	|	|	|	3.47
44.833	0.00	0.24	0.526	I o	|	|	|	3.46
44.917	0.00	0.24	0.524	I o	|	|	|	3.45
45.000	0.00	0.24	0.523	I o	|	|	|	3.44
45.083	0.00	0.24	0.521	I o	|	|	|	3.44
45.167	0.00	0.24	0.520	I o	|	|	|	3.43
45.250	0.00	0.24	0.518	I o	|	|	|	3.42
45.333	0.00	0.24	0.516	I o	|	|	|	3.41
45.417	0.00	0.24	0.515	I o	|	|	|	3.40
45.500	0.00	0.24	0.513	I o	|	|	|	3.39
45.583	0.00	0.24	0.511	I o	|	|	|	3.39
45.667	0.00	0.24	0.510	I o	|	|	|	3.38
45.750	0.00	0.23	0.508	I o	|	|	|	3.37
45.833	0.00	0.23	0.507	I o	|	|	|	3.36
45.917	0.00	0.23	0.505	I o	|	|	|	3.35
46.000	0.00	0.23	0.503	I o	|	|	|	3.35
46.083	0.00	0.23	0.502	I o	|	|	|	3.34
46.167	0.00	0.23	0.500	I o	|	|	|	3.33
46.250	0.00	0.23	0.499	I o	|	|	|	3.32
46.333	0.00	0.23	0.497	I o	|	|	|	3.31
46.417	0.00	0.23	0.495	I o	|	|	|	3.30
46.500	0.00	0.23	0.494	I o	|	|	|	3.30
46.583	0.00	0.23	0.492	I o	|	|	|	3.29
46.667	0.00	0.23	0.491	I o	|	|	|	3.28
46.750	0.00	0.23	0.489	I o	|	|	|	3.27
46.833	0.00	0.23	0.487	I o	|	|	|	3.26
46.917	0.00	0.23	0.486	I o	|	|	|	3.26
47.000	0.00	0.23	0.484	I o	|	|	|	3.25
47.083	0.00	0.23	0.483	I o	|	|	|	3.24
47.167	0.00	0.23	0.481	I o	|	|	|	3.23
47.250	0.00	0.23	0.479	I o	|	|	|	3.22
47.333	0.00	0.23	0.478	I o	|	|	|	3.22
47.417	0.00	0.23	0.476	I o	|	|	|	3.21
47.500	0.00	0.23	0.475	I o	|	|	|	3.20
47.583	0.00	0.23	0.473	I o	|	|	|	3.19
47.667	0.00	0.23	0.472	I o	|	|	|	3.18
47.750	0.00	0.23	0.470	I o	|	|	|	3.18
47.833	0.00	0.23	0.468	I o	|	|	|	3.17
47.917	0.00	0.23	0.467	I o	|	|	|	3.16
48.000	0.00	0.23	0.465	I o	|	|	|	3.15
48.083	0.00	0.23	0.464	I o	|	|	|	3.15
48.167	0.00	0.23	0.462	I o	|	|	|	3.14
48.250	0.00	0.23	0.461	I o	|	|	|	3.13
48.333	0.00	0.22	0.459	I o	|	|	|	3.12
48.417	0.00	0.22	0.458	I o	|	|	|	3.11
48.500	0.00	0.22	0.456	I o	|	|	|	3.11
48.583	0.00	0.22	0.454	I o	|	|	|	3.10
48.667	0.00	0.22	0.453	I o	|	|	|	3.09
48.750	0.00	0.22	0.451	I o	|	|	|	3.08
48.833	0.00	0.22	0.450	I o	|	|	|	3.08
48.917	0.00	0.22	0.448	I o	|	|	|	3.07
49.000	0.00	0.22	0.447	I o	|	|	|	3.06
49.083	0.00	0.22	0.445	I o	|	|	|	3.05
49.167	0.00	0.22	0.444	I o	|	|	|	3.04
49.250	0.00	0.22	0.442	I o	|	|	|	3.04
49.333	0.00	0.22	0.441	I o	|	|	|	3.03
49.417	0.00	0.22	0.439	I o	|	|	|	3.02

49.500	0.00	0.22	0.438	I O	|	|	|	3.01
49.583	0.00	0.22	0.436	I O	|	|	|	3.01
49.667	0.00	0.22	0.435	I O	|	|	|	3.00
49.750	0.00	0.22	0.433	I O	|	|	|	2.99
49.833	0.00	0.22	0.432	I O	|	|	|	2.98
49.917	0.00	0.22	0.430	I O	|	|	|	2.97
50.000	0.00	0.22	0.429	I O	|	|	|	2.97
50.083	0.00	0.22	0.427	I O	|	|	|	2.96
50.167	0.00	0.22	0.426	I O	|	|	|	2.95
50.250	0.00	0.22	0.424	I O	|	|	|	2.94
50.333	0.00	0.22	0.423	I O	|	|	|	2.94
50.417	0.00	0.22	0.421	I O	|	|	|	2.93
50.500	0.00	0.22	0.420	I O	|	|	|	2.92
50.583	0.00	0.22	0.418	I O	|	|	|	2.91
50.667	0.00	0.22	0.417	I O	|	|	|	2.90
50.750	0.00	0.22	0.415	I O	|	|	|	2.90
50.833	0.00	0.22	0.414	I O	|	|	|	2.89
50.917	0.00	0.22	0.412	I O	|	|	|	2.88
51.000	0.00	0.21	0.411	I O	|	|	|	2.87
51.083	0.00	0.21	0.409	I O	|	|	|	2.87
51.167	0.00	0.21	0.408	I O	|	|	|	2.86
51.250	0.00	0.21	0.406	I O	|	|	|	2.85
51.333	0.00	0.21	0.405	I O	|	|	|	2.84
51.417	0.00	0.21	0.403	I O	|	|	|	2.83
51.500	0.00	0.21	0.402	I O	|	|	|	2.83
51.583	0.00	0.21	0.400	I O	|	|	|	2.82
51.667	0.00	0.21	0.399	I O	|	|	|	2.81
51.750	0.00	0.21	0.397	I O	|	|	|	2.80
51.833	0.00	0.21	0.396	I O	|	|	|	2.80
51.917	0.00	0.21	0.394	I O	|	|	|	2.79
52.000	0.00	0.21	0.393	I O	|	|	|	2.78
52.083	0.00	0.21	0.392	I O	|	|	|	2.77
52.167	0.00	0.21	0.390	I O	|	|	|	2.77
52.250	0.00	0.21	0.389	I O	|	|	|	2.76
52.333	0.00	0.21	0.387	I O	|	|	|	2.75
52.417	0.00	0.21	0.386	I O	|	|	|	2.74
52.500	0.00	0.21	0.384	I O	|	|	|	2.74
52.583	0.00	0.21	0.383	I O	|	|	|	2.73
52.667	0.00	0.21	0.381	I O	|	|	|	2.72
52.750	0.00	0.21	0.380	I O	|	|	|	2.71
52.833	0.00	0.21	0.379	I O	|	|	|	2.71
52.917	0.00	0.21	0.377	I O	|	|	|	2.70
53.000	0.00	0.21	0.376	I O	|	|	|	2.69
53.083	0.00	0.21	0.374	I O	|	|	|	2.68
53.167	0.00	0.21	0.373	I O	|	|	|	2.68
53.250	0.00	0.21	0.371	I O	|	|	|	2.67
53.333	0.00	0.21	0.370	I O	|	|	|	2.66
53.417	0.00	0.21	0.369	I O	|	|	|	2.65
53.500	0.00	0.21	0.367	I O	|	|	|	2.65
53.583	0.00	0.21	0.366	I O	|	|	|	2.64
53.667	0.00	0.21	0.364	I O	|	|	|	2.63
53.750	0.00	0.20	0.363	I O	|	|	|	2.62
53.833	0.00	0.20	0.362	I O	|	|	|	2.62
53.917	0.00	0.20	0.360	I O	|	|	|	2.61
54.000	0.00	0.20	0.359	I O	|	|	|	2.60
54.083	0.00	0.20	0.357	I O	|	|	|	2.60
54.167	0.00	0.20	0.356	I O	|	|	|	2.59
54.250	0.00	0.20	0.355	I O	|	|	|	2.58
54.333	0.00	0.20	0.353	I O	|	|	|	2.57
54.417	0.00	0.20	0.352	I O	|	|	|	2.57
54.500	0.00	0.20	0.350	I O	|	|	|	2.56
54.583	0.00	0.20	0.349	I O	|	|	|	2.55
54.667	0.00	0.20	0.348	I O	|	|	|	2.54
54.750	0.00	0.20	0.346	I O	|	|	|	2.54
54.833	0.00	0.20	0.345	I O	|	|	|	2.53
54.917	0.00	0.20	0.343	I O	|	|	|	2.52
55.000	0.00	0.20	0.342	I O	|	|	|	2.52
55.083	0.00	0.20	0.341	I O	|	|	|	2.51
55.167	0.00	0.20	0.339	I O	|	|	|	2.50
55.250	0.00	0.20	0.338	I O	|	|	|	2.49
55.333	0.00	0.20	0.336	I O	|	|	|	2.49
55.417	0.00	0.20	0.335	I O	|	|	|	2.48
55.500	0.00	0.20	0.334	I O	|	|	|	2.47
55.583	0.00	0.20	0.332	I O	|	|	|	2.46
55.667	0.00	0.20	0.331	I O	|	|	|	2.46

55.750	0.00	0.20	0.330	I o	|	|	|	2.45
55.833	0.00	0.20	0.328	I o	|	|	|	2.44
55.917	0.00	0.20	0.327	I o	|	|	|	2.43
56.000	0.00	0.20	0.326	I o	|	|	|	2.43
56.083	0.00	0.20	0.324	I o	|	|	|	2.42
56.167	0.00	0.20	0.323	I o	|	|	|	2.41
56.250	0.00	0.20	0.321	I o	|	|	|	2.40
56.333	0.00	0.20	0.320	I o	|	|	|	2.40
56.417	0.00	0.20	0.319	I o	|	|	|	2.39
56.500	0.00	0.20	0.317	I o	|	|	|	2.38
56.583	0.00	0.19	0.316	I o	|	|	|	2.37
56.667	0.00	0.19	0.315	I o	|	|	|	2.37
56.750	0.00	0.19	0.313	I o	|	|	|	2.36
56.833	0.00	0.19	0.312	I o	|	|	|	2.35
56.917	0.00	0.19	0.311	I o	|	|	|	2.34
57.000	0.00	0.19	0.309	I o	|	|	|	2.34
57.083	0.00	0.19	0.308	I o	|	|	|	2.33
57.167	0.00	0.19	0.307	I o	|	|	|	2.32
57.250	0.00	0.19	0.305	I o	|	|	|	2.32
57.333	0.00	0.19	0.304	I o	|	|	|	2.31
57.417	0.00	0.19	0.303	I o	|	|	|	2.30
57.500	0.00	0.19	0.301	I o	|	|	|	2.29
57.583	0.00	0.19	0.300	I o	|	|	|	2.29
57.667	0.00	0.19	0.299	I o	|	|	|	2.28
57.750	0.00	0.19	0.298	I o	|	|	|	2.27
57.833	0.00	0.19	0.296	I o	|	|	|	2.26
57.917	0.00	0.19	0.295	I o	|	|	|	2.26
58.000	0.00	0.19	0.294	I o	|	|	|	2.25
58.083	0.00	0.19	0.292	I o	|	|	|	2.24
58.167	0.00	0.19	0.291	I o	|	|	|	2.24
58.250	0.00	0.19	0.290	I o	|	|	|	2.23
58.333	0.00	0.19	0.288	I o	|	|	|	2.22
58.417	0.00	0.19	0.287	I o	|	|	|	2.21
58.500	0.00	0.19	0.286	I o	|	|	|	2.21
58.583	0.00	0.19	0.284	I o	|	|	|	2.20
58.667	0.00	0.19	0.283	I o	|	|	|	2.19
58.750	0.00	0.19	0.282	I o	|	|	|	2.19
58.833	0.00	0.19	0.281	I o	|	|	|	2.18
58.917	0.00	0.19	0.279	I o	|	|	|	2.17
59.000	0.00	0.19	0.278	I o	|	|	|	2.16
59.083	0.00	0.19	0.277	I o	|	|	|	2.16
59.167	0.00	0.19	0.275	I o	|	|	|	2.15
59.250	0.00	0.19	0.274	I o	|	|	|	2.14
59.333	0.00	0.19	0.273	I o	|	|	|	2.14
59.417	0.00	0.19	0.272	I o	|	|	|	2.13
59.500	0.00	0.18	0.270	I o	|	|	|	2.12
59.583	0.00	0.18	0.269	I o	|	|	|	2.12
59.667	0.00	0.18	0.268	I o	|	|	|	2.11
59.750	0.00	0.18	0.267	I o	|	|	|	2.10
59.833	0.00	0.18	0.265	I o	|	|	|	2.09
59.917	0.00	0.18	0.264	I o	|	|	|	2.09
60.000	0.00	0.18	0.263	I o	|	|	|	2.08
60.083	0.00	0.18	0.261	I o	|	|	|	2.07
60.167	0.00	0.18	0.260	I o	|	|	|	2.07
60.250	0.00	0.18	0.259	I o	|	|	|	2.06
60.333	0.00	0.18	0.258	I o	|	|	|	2.05
60.417	0.00	0.18	0.256	I o	|	|	|	2.05
60.500	0.00	0.18	0.255	I o	|	|	|	2.04
60.583	0.00	0.18	0.254	I o	|	|	|	2.03
60.667	0.00	0.18	0.253	I o	|	|	|	2.03
60.750	0.00	0.18	0.251	I o	|	|	|	2.02
60.833	0.00	0.18	0.250	I o	|	|	|	2.01
60.917	0.00	0.18	0.249	I o	|	|	|	2.01
61.000	0.00	0.18	0.248	I o	|	|	|	2.00
61.083	0.00	0.18	0.246	I o	|	|	|	1.99
61.167	0.00	0.18	0.245	I o	|	|	|	1.98
61.250	0.00	0.18	0.244	I o	|	|	|	1.98
61.333	0.00	0.18	0.243	I o	|	|	|	1.97
61.417	0.00	0.18	0.242	I o	|	|	|	1.96
61.500	0.00	0.18	0.240	I o	|	|	|	1.95
61.583	0.00	0.18	0.239	I o	|	|	|	1.95
61.667	0.00	0.18	0.238	I o	|	|	|	1.94
61.750	0.00	0.18	0.237	I o	|	|	|	1.93
61.833	0.00	0.18	0.235	I o	|	|	|	1.92
61.917	0.00	0.18	0.234	I o	|	|	|	1.92

62.000	0.00	0.18	0.233	I o	|	|	|	1.91
62.083	0.00	0.18	0.232	I o	|	|	|	1.90
62.167	0.00	0.18	0.231	I o	|	|	|	1.90
62.250	0.00	0.18	0.229	I o	|	|	|	1.89
62.333	0.00	0.18	0.228	I o	|	|	|	1.88
62.417	0.00	0.17	0.227	I o	|	|	|	1.87
62.500	0.00	0.17	0.226	I o	|	|	|	1.87
62.583	0.00	0.17	0.225	I o	|	|	|	1.86
62.667	0.00	0.17	0.223	I o	|	|	|	1.85
62.750	0.00	0.17	0.222	I o	|	|	|	1.84
62.833	0.00	0.17	0.221	I o	|	|	|	1.84
62.917	0.00	0.17	0.220	I o	|	|	|	1.83
63.000	0.00	0.17	0.219	I o	|	|	|	1.82
63.083	0.00	0.17	0.217	I o	|	|	|	1.82
63.167	0.00	0.17	0.216	I o	|	|	|	1.81
63.250	0.00	0.17	0.215	I o	|	|	|	1.80
63.333	0.00	0.17	0.214	I o	|	|	|	1.79
63.417	0.00	0.17	0.213	I o	|	|	|	1.79
63.500	0.00	0.17	0.211	I o	|	|	|	1.78
63.583	0.00	0.17	0.210	I o	|	|	|	1.77
63.667	0.00	0.17	0.209	I o	|	|	|	1.77
63.750	0.00	0.17	0.208	I o	|	|	|	1.76
63.833	0.00	0.17	0.207	I o	|	|	|	1.75
63.917	0.00	0.17	0.206	I o	|	|	|	1.74
64.000	0.00	0.17	0.204	I o	|	|	|	1.74
64.083	0.00	0.17	0.203	I o	|	|	|	1.73
64.167	0.00	0.17	0.202	I o	|	|	|	1.72
64.250	0.00	0.17	0.201	I o	|	|	|	1.72
64.333	0.00	0.17	0.200	I o	|	|	|	1.71
64.417	0.00	0.17	0.199	I o	|	|	|	1.70
64.500	0.00	0.17	0.197	I o	|	|	|	1.70
64.583	0.00	0.17	0.196	I o	|	|	|	1.69
64.667	0.00	0.17	0.195	I o	|	|	|	1.68
64.750	0.00	0.17	0.194	I o	|	|	|	1.67
64.833	0.00	0.17	0.193	I o	|	|	|	1.67
64.917	0.00	0.17	0.192	I o	|	|	|	1.66
65.000	0.00	0.17	0.191	I o	|	|	|	1.65
65.083	0.00	0.17	0.189	I o	|	|	|	1.65
65.167	0.00	0.17	0.188	I o	|	|	|	1.64
65.250	0.00	0.17	0.187	I o	|	|	|	1.63
65.333	0.00	0.17	0.186	I o	|	|	|	1.63
65.417	0.00	0.16	0.185	I o	|	|	|	1.62
65.500	0.00	0.16	0.184	I o	|	|	|	1.61
65.583	0.00	0.16	0.183	I o	|	|	|	1.61
65.667	0.00	0.16	0.181	I o	|	|	|	1.60
65.750	0.00	0.16	0.180	I o	|	|	|	1.59
65.833	0.00	0.16	0.179	I o	|	|	|	1.59
65.917	0.00	0.16	0.178	I o	|	|	|	1.58
66.000	0.00	0.16	0.177	I o	|	|	|	1.57
66.083	0.00	0.16	0.176	I o	|	|	|	1.57
66.167	0.00	0.16	0.175	I o	|	|	|	1.56
66.250	0.00	0.16	0.174	I o	|	|	|	1.55
66.333	0.00	0.16	0.172	I o	|	|	|	1.55
66.417	0.00	0.16	0.171	I o	|	|	|	1.54
66.500	0.00	0.16	0.170	I o	|	|	|	1.53
66.583	0.00	0.16	0.169	I o	|	|	|	1.52
66.667	0.00	0.16	0.168	I o	|	|	|	1.52
66.750	0.00	0.16	0.167	I o	|	|	|	1.51
66.833	0.00	0.16	0.166	I o	|	|	|	1.50
66.917	0.00	0.16	0.165	I o	|	|	|	1.50
67.000	0.00	0.16	0.164	I o	|	|	|	1.49
67.083	0.00	0.16	0.163	I o	|	|	|	1.48
67.167	0.00	0.16	0.161	I o	|	|	|	1.48
67.250	0.00	0.16	0.160	I o	|	|	|	1.47
67.333	0.00	0.16	0.159	I o	|	|	|	1.46
67.417	0.00	0.16	0.158	I o	|	|	|	1.45
67.500	0.00	0.16	0.157	I o	|	|	|	1.45
67.583	0.00	0.16	0.156	I o	|	|	|	1.44
67.667	0.00	0.16	0.155	I o	|	|	|	1.43
67.750	0.00	0.16	0.154	I o	|	|	|	1.42
67.833	0.00	0.15	0.153	I o	|	|	|	1.42
67.917	0.00	0.15	0.152	I o	|	|	|	1.41
68.000	0.00	0.15	0.151	I o	|	|	|	1.40
68.083	0.00	0.15	0.150	I o	|	|	|	1.39
68.167	0.00	0.15	0.149	I o	|	|	|	1.39

68.250	0.00	0.15	0.147	I O	|	|	|	1.38
68.333	0.00	0.15	0.146	I O	|	|	|	1.37
68.417	0.00	0.15	0.145	I O	|	|	|	1.37
68.500	0.00	0.15	0.144	I O	|	|	|	1.36
68.583	0.00	0.15	0.143	I O	|	|	|	1.35
68.667	0.00	0.15	0.142	I O	|	|	|	1.34
68.750	0.00	0.15	0.141	I O	|	|	|	1.34
68.833	0.00	0.15	0.140	I O	|	|	|	1.33
68.917	0.00	0.15	0.139	I O	|	|	|	1.32
69.000	0.00	0.15	0.138	I O	|	|	|	1.32
69.083	0.00	0.15	0.137	I O	|	|	|	1.31
69.167	0.00	0.15	0.136	I O	|	|	|	1.30
69.250	0.00	0.15	0.135	IO	|	|	|	1.30
69.333	0.00	0.15	0.134	IO	|	|	|	1.29
69.417	0.00	0.15	0.133	IO	|	|	|	1.28
69.500	0.00	0.15	0.132	IO	|	|	|	1.27
69.583	0.00	0.15	0.131	IO	|	|	|	1.27
69.667	0.00	0.15	0.130	IO	|	|	|	1.26
69.750	0.00	0.15	0.129	IO	|	|	|	1.25
69.833	0.00	0.14	0.128	IO	|	|	|	1.25
69.917	0.00	0.14	0.127	IO	|	|	|	1.24
70.000	0.00	0.14	0.126	IO	|	|	|	1.23
70.083	0.00	0.14	0.125	IO	|	|	|	1.23
70.167	0.00	0.14	0.124	IO	|	|	|	1.22
70.250	0.00	0.14	0.123	IO	|	|	|	1.21
70.333	0.00	0.14	0.122	IO	|	|	|	1.21
70.417	0.00	0.14	0.121	IO	|	|	|	1.20
70.500	0.00	0.14	0.120	IO	|	|	|	1.19
70.583	0.00	0.14	0.119	IO	|	|	|	1.19
70.667	0.00	0.14	0.118	IO	|	|	|	1.18
70.750	0.00	0.14	0.117	IO	|	|	|	1.17
70.833	0.00	0.14	0.116	IO	|	|	|	1.17
70.917	0.00	0.14	0.115	IO	|	|	|	1.16
71.000	0.00	0.14	0.114	IO	|	|	|	1.15
71.083	0.00	0.14	0.113	IO	|	|	|	1.15
71.167	0.00	0.14	0.112	IO	|	|	|	1.14
71.250	0.00	0.14	0.111	IO	|	|	|	1.13
71.333	0.00	0.14	0.111	IO	|	|	|	1.13
71.417	0.00	0.14	0.110	IO	|	|	|	1.12
71.500	0.00	0.14	0.109	IO	|	|	|	1.11
71.583	0.00	0.14	0.108	IO	|	|	|	1.11
71.667	0.00	0.14	0.107	IO	|	|	|	1.10
71.750	0.00	0.14	0.106	IO	|	|	|	1.09
71.833	0.00	0.14	0.105	IO	|	|	|	1.09
71.917	0.00	0.13	0.104	IO	|	|	|	1.08
72.000	0.00	0.13	0.103	IO	|	|	|	1.08
72.083	0.00	0.13	0.102	IO	|	|	|	1.07
72.167	0.00	0.13	0.101	IO	|	|	|	1.06
72.250	0.00	0.13	0.100	IO	|	|	|	1.06
72.333	0.00	0.13	0.099	IO	|	|	|	1.05
72.417	0.00	0.13	0.098	IO	|	|	|	1.04
72.500	0.00	0.13	0.098	IO	|	|	|	1.04
72.583	0.00	0.13	0.097	IO	|	|	|	1.03
72.667	0.00	0.13	0.096	IO	|	|	|	1.03
72.750	0.00	0.13	0.095	IO	|	|	|	1.02
72.833	0.00	0.13	0.094	IO	|	|	|	1.01
72.917	0.00	0.13	0.093	IO	|	|	|	1.01
73.000	0.00	0.13	0.092	IO	|	|	|	1.00
73.083	0.00	0.13	0.091	IO	|	|	|	0.99
73.167	0.00	0.13	0.090	IO	|	|	|	0.99
73.250	0.00	0.13	0.089	IO	|	|	|	0.98
73.333	0.00	0.13	0.089	IO	|	|	|	0.97
73.417	0.00	0.13	0.088	IO	|	|	|	0.96
73.500	0.00	0.13	0.087	IO	|	|	|	0.96
73.583	0.00	0.13	0.086	IO	|	|	|	0.95
73.667	0.00	0.13	0.085	IO	|	|	|	0.94
73.750	0.00	0.12	0.084	IO	|	|	|	0.93
73.833	0.00	0.12	0.083	IO	|	|	|	0.93
73.917	0.00	0.12	0.082	IO	|	|	|	0.92
74.000	0.00	0.12	0.082	IO	|	|	|	0.91
74.083	0.00	0.12	0.081	IO	|	|	|	0.91
74.167	0.00	0.12	0.080	IO	|	|	|	0.90
74.250	0.00	0.12	0.079	IO	|	|	|	0.89
74.333	0.00	0.12	0.078	IO	|	|	|	0.88
74.417	0.00	0.12	0.077	IO	|	|	|	0.88

74.500	0.00	0.12	0.077	IO				0.87
74.583	0.00	0.12	0.076	IO				0.86
74.667	0.00	0.12	0.075	IO				0.86
74.750	0.00	0.12	0.074	IO				0.85
74.833	0.00	0.12	0.073	IO				0.84
74.917	0.00	0.12	0.073	IO				0.84
75.000	0.00	0.12	0.072	IO				0.83
75.083	0.00	0.12	0.071	IO				0.82
75.167	0.00	0.12	0.070	IO				0.81
75.250	0.00	0.11	0.069	IO				0.81
75.333	0.00	0.11	0.069	IO				0.80
75.417	0.00	0.11	0.068	IO				0.79
75.500	0.00	0.11	0.067	IO				0.79
75.583	0.00	0.11	0.066	IO				0.78
75.667	0.00	0.11	0.065	IO				0.78
75.750	0.00	0.11	0.065	IO				0.77
75.833	0.00	0.11	0.064	IO				0.76
75.917	0.00	0.11	0.063	IO				0.76
76.000	0.00	0.11	0.062	IO				0.75
76.083	0.00	0.11	0.062	IO				0.74
76.167	0.00	0.11	0.061	IO				0.74
76.250	0.00	0.11	0.060	IO				0.73
76.333	0.00	0.11	0.059	IO				0.72
76.417	0.00	0.11	0.059	IO				0.72
76.500	0.00	0.11	0.058	IO				0.71
76.583	0.00	0.11	0.057	IO				0.71
76.667	0.00	0.11	0.056	IO				0.70
76.750	0.00	0.11	0.056	IO				0.69
76.833	0.00	0.10	0.055	IO				0.69
76.917	0.00	0.10	0.054	IO				0.68
77.000	0.00	0.10	0.054	IO				0.67
77.083	0.00	0.10	0.053	IO				0.67
77.167	0.00	0.10	0.052	IO				0.66
77.250	0.00	0.10	0.051	IO				0.66
77.333	0.00	0.10	0.051	IO				0.65
77.417	0.00	0.10	0.050	IO				0.64
77.500	0.00	0.10	0.049	IO				0.64
77.583	0.00	0.10	0.049	IO				0.63
77.667	0.00	0.10	0.048	IO				0.63
77.750	0.00	0.10	0.047	IO				0.62
77.833	0.00	0.10	0.047	IO				0.62
77.917	0.00	0.10	0.046	IO				0.61
78.000	0.00	0.10	0.045	IO				0.60
78.083	0.00	0.10	0.045	IO				0.60
78.167	0.00	0.10	0.044	IO				0.59
78.250	0.00	0.10	0.043	IO				0.59
78.333	0.00	0.10	0.043	IO				0.58
78.417	0.00	0.10	0.042	IO				0.58
78.500	0.00	0.10	0.041	IO				0.57
78.583	0.00	0.10	0.041	IO				0.56
78.667	0.00	0.09	0.040	IO				0.56
78.750	0.00	0.09	0.039	IO				0.55
78.833	0.00	0.09	0.039	IO				0.55
78.917	0.00	0.09	0.038	IO				0.54
79.000	0.00	0.09	0.037	IO				0.54
79.083	0.00	0.09	0.037	IO				0.53
79.167	0.00	0.09	0.036	IO				0.53
79.250	0.00	0.09	0.035	IO				0.52
79.333	0.00	0.09	0.035	IO				0.52
79.417	0.00	0.09	0.034	IO				0.51
79.500	0.00	0.09	0.034	IO				0.50
79.583	0.00	0.09	0.033	IO				0.50
79.667	0.00	0.09	0.032	IO				0.49
79.750	0.00	0.09	0.032	IO				0.48
79.833	0.00	0.08	0.031	IO				0.47
79.917	0.00	0.08	0.031	IO				0.46
80.000	0.00	0.08	0.030	IO				0.45
80.083	0.00	0.08	0.029	IO				0.45
80.167	0.00	0.08	0.029	IO				0.44
80.250	0.00	0.08	0.028	IO				0.43
80.333	0.00	0.07	0.028	IO				0.42
80.417	0.00	0.07	0.027	O				0.41
80.500	0.00	0.07	0.027	O				0.41
80.583	0.00	0.07	0.026	O				0.40
80.667	0.00	0.07	0.026	O				0.39

80.750	0.00	0.07	0.025	o	|	|	|	|	0.39
80.833	0.00	0.07	0.025	o	|	|	|	|	0.38
80.917	0.00	0.06	0.025	o	|	|	|	|	0.37
81.000	0.00	0.06	0.024	o	|	|	|	|	0.37
81.083	0.00	0.06	0.024	o	|	|	|	|	0.36
81.167	0.00	0.06	0.023	o	|	|	|	|	0.35
81.250	0.00	0.06	0.023	o	|	|	|	|	0.35
81.333	0.00	0.06	0.022	o	|	|	|	|	0.34
81.417	0.00	0.06	0.022	o	|	|	|	|	0.33
81.500	0.00	0.06	0.022	o	|	|	|	|	0.33
81.583	0.00	0.05	0.021	o	|	|	|	|	0.32
81.667	0.00	0.05	0.021	o	|	|	|	|	0.32
81.750	0.00	0.05	0.021	o	|	|	|	|	0.31
81.833	0.00	0.05	0.020	o	|	|	|	|	0.31
81.917	0.00	0.05	0.020	o	|	|	|	|	0.30
82.000	0.00	0.05	0.020	o	|	|	|	|	0.30
82.083	0.00	0.05	0.019	o	|	|	|	|	0.29
82.167	0.00	0.05	0.019	o	|	|	|	|	0.29
82.250	0.00	0.05	0.019	o	|	|	|	|	0.28
82.333	0.00	0.04	0.018	o	|	|	|	|	0.28
82.417	0.00	0.04	0.018	o	|	|	|	|	0.27
82.500	0.00	0.04	0.018	o	|	|	|	|	0.27
82.583	0.00	0.04	0.017	o	|	|	|	|	0.26
82.667	0.00	0.04	0.017	o	|	|	|	|	0.26
82.750	0.00	0.04	0.017	o	|	|	|	|	0.26
82.833	0.00	0.04	0.016	o	|	|	|	|	0.25
82.917	0.00	0.04	0.016	o	|	|	|	|	0.25
83.000	0.00	0.04	0.016	o	|	|	|	|	0.24
83.083	0.00	0.04	0.016	o	|	|	|	|	0.24
83.167	0.00	0.04	0.015	o	|	|	|	|	0.24
83.250	0.00	0.04	0.015	o	|	|	|	|	0.23
83.333	0.00	0.03	0.015	o	|	|	|	|	0.23
83.417	0.00	0.03	0.015	o	|	|	|	|	0.22
83.500	0.00	0.03	0.015	o	|	|	|	|	0.22
83.583	0.00	0.03	0.014	o	|	|	|	|	0.22
83.667	0.00	0.03	0.014	o	|	|	|	|	0.21
83.750	0.00	0.03	0.014	o	|	|	|	|	0.21
83.833	0.00	0.03	0.014	o	|	|	|	|	0.21
83.917	0.00	0.03	0.013	o	|	|	|	|	0.20
84.000	0.00	0.03	0.013	o	|	|	|	|	0.20
84.083	0.00	0.03	0.013	o	|	|	|	|	0.20
84.167	0.00	0.03	0.013	o	|	|	|	|	0.20
84.250	0.00	0.03	0.013	o	|	|	|	|	0.19
84.333	0.00	0.03	0.012	o	|	|	|	|	0.19
84.417	0.00	0.03	0.012	o	|	|	|	|	0.19
84.500	0.00	0.03	0.012	o	|	|	|	|	0.18
84.583	0.00	0.03	0.012	o	|	|	|	|	0.18
84.667	0.00	0.02	0.012	o	|	|	|	|	0.18
84.750	0.00	0.02	0.012	o	|	|	|	|	0.18
84.833	0.00	0.02	0.011	o	|	|	|	|	0.17
84.917	0.00	0.02	0.011	o	|	|	|	|	0.17
85.000	0.00	0.02	0.011	o	|	|	|	|	0.17
85.083	0.00	0.02	0.011	o	|	|	|	|	0.17
85.167	0.00	0.02	0.011	o	|	|	|	|	0.17
85.250	0.00	0.02	0.011	o	|	|	|	|	0.16
85.333	0.00	0.02	0.010	o	|	|	|	|	0.16
85.417	0.00	0.02	0.010	o	|	|	|	|	0.16
85.500	0.00	0.02	0.010	o	|	|	|	|	0.16
85.583	0.00	0.02	0.010	o	|	|	|	|	0.15
85.667	0.00	0.02	0.010	o	|	|	|	|	0.15
85.750	0.00	0.02	0.010	o	|	|	|	|	0.15
85.833	0.00	0.02	0.010	o	|	|	|	|	0.15
85.917	0.00	0.02	0.010	o	|	|	|	|	0.15
86.000	0.00	0.02	0.009	o	|	|	|	|	0.14
86.083	0.00	0.02	0.009	o	|	|	|	|	0.14
86.167	0.00	0.02	0.009	o	|	|	|	|	0.14
86.250	0.00	0.02	0.009	o	|	|	|	|	0.14
86.333	0.00	0.02	0.009	o	|	|	|	|	0.14
86.417	0.00	0.02	0.009	o	|	|	|	|	0.14
86.500	0.00	0.02	0.009	o	|	|	|	|	0.13
86.583	0.00	0.02	0.009	o	|	|	|	|	0.13
86.667	0.00	0.01	0.009	o	|	|	|	|	0.13
86.750	0.00	0.01	0.008	o	|	|	|	|	0.13
86.833	0.00	0.01	0.008	o	|	|	|	|	0.13
86.917	0.00	0.01	0.008	o	|	|	|	|	0.13

87.000	0.00	0.01	0.008	o					0.13
87.083	0.00	0.01	0.008	o					0.12
87.167	0.00	0.01	0.008	o					0.12
87.250	0.00	0.01	0.008	o					0.12
87.333	0.00	0.01	0.008	o					0.12
87.417	0.00	0.01	0.008	o					0.12
87.500	0.00	0.01	0.008	o					0.12
87.583	0.00	0.01	0.008	o					0.12
87.667	0.00	0.01	0.007	o					0.11
87.750	0.00	0.01	0.007	o					0.11
87.833	0.00	0.01	0.007	o					0.11
87.917	0.00	0.01	0.007	o					0.11
88.000	0.00	0.01	0.007	o					0.11
88.083	0.00	0.01	0.007	o					0.11
88.167	0.00	0.01	0.007	o					0.11
88.250	0.00	0.01	0.007	o					0.11
88.333	0.00	0.01	0.007	o					0.11
88.417	0.00	0.01	0.007	o					0.10
88.500	0.00	0.01	0.007	o					0.10
88.583	0.00	0.01	0.007	o					0.10
88.667	0.00	0.01	0.007	o					0.10
88.750	0.00	0.01	0.007	o					0.10
88.833	0.00	0.01	0.006	o					0.10
88.917	0.00	0.01	0.006	o					0.10
89.000	0.00	0.01	0.006	o					0.10
89.083	0.00	0.01	0.006	o					0.10
89.167	0.00	0.01	0.006	o					0.10
89.250	0.00	0.01	0.006	o					0.10
89.333	0.00	0.01	0.006	o					0.10
89.417	0.00	0.01	0.006	o					0.09
89.500	0.00	0.01	0.006	o					0.09
89.583	0.00	0.01	0.006	o					0.09
89.667	0.00	0.01	0.006	o					0.09
89.750	0.00	0.01	0.006	o					0.09
89.833	0.00	0.01	0.006	o					0.09
89.917	0.00	0.01	0.006	o					0.09
90.000	0.00	0.01	0.006	o					0.09
90.083	0.00	0.01	0.006	o					0.09
90.167	0.00	0.01	0.006	o					0.09
90.250	0.00	0.01	0.006	o					0.09
90.333	0.00	0.01	0.006	o					0.09
90.417	0.00	0.01	0.006	o					0.09
90.500	0.00	0.01	0.006	o					0.09
90.583	0.00	0.01	0.005	o					0.09
90.667	0.00	0.01	0.005	o					0.08
90.750	0.00	0.01	0.005	o					0.08
90.833	0.00	0.01	0.005	o					0.08
90.917	0.00	0.01	0.005	o					0.08
91.000	0.00	0.00	0.005	o					0.08
91.083	0.00	0.00	0.005	o					0.08
91.167	0.00	0.00	0.005	o					0.08
91.250	0.00	0.00	0.005	o					0.08
91.333	0.00	0.00	0.005	o					0.08
91.417	0.00	0.00	0.005	o					0.08
91.500	0.00	0.00	0.005	o					0.08
91.583	0.00	0.00	0.005	o					0.08
91.667	0.00	0.00	0.005	o					0.08
91.750	0.00	0.00	0.005	o					0.08
91.833	0.00	0.00	0.005	o					0.08
91.917	0.00	0.00	0.005	o					0.08
92.000	0.00	0.00	0.005	o					0.08
92.083	0.00	0.00	0.005	o					0.08
92.167	0.00	0.00	0.005	o					0.08
92.250	0.00	0.00	0.005	o					0.08
92.333	0.00	0.00	0.005	o					0.08
92.417	0.00	0.00	0.005	o					0.08
92.500	0.00	0.00	0.005	o					0.07
92.583	0.00	0.00	0.005	o					0.07
92.667	0.00	0.00	0.005	o					0.07
92.750	0.00	0.00	0.005	o					0.07
92.833	0.00	0.00	0.005	o					0.07
92.917	0.00	0.00	0.005	o					0.07
93.000	0.00	0.00	0.005	o					0.07
93.083	0.00	0.00	0.005	o					0.07
93.167	0.00	0.00	0.005	o					0.07

93.250	0.00	0.00	0.005	o	|	|	|	0.07
93.333	0.00	0.00	0.005	o	|	|	|	0.07
93.417	0.00	0.00	0.005	o	|	|	|	0.07
93.500	0.00	0.00	0.005	o	|	|	|	0.07
93.583	0.00	0.00	0.005	o	|	|	|	0.07
93.667	0.00	0.00	0.004	o	|	|	|	0.07
93.750	0.00	0.00	0.004	o	|	|	|	0.07
93.833	0.00	0.00	0.004	o	|	|	|	0.07
93.917	0.00	0.00	0.004	o	|	|	|	0.07
94.000	0.00	0.00	0.004	o	|	|	|	0.07
94.083	0.00	0.00	0.004	o	|	|	|	0.07
94.167	0.00	0.00	0.004	o	|	|	|	0.07
94.250	0.00	0.00	0.004	o	|	|	|	0.07
94.333	0.00	0.00	0.004	o	|	|	|	0.07
94.417	0.00	0.00	0.004	o	|	|	|	0.07
94.500	0.00	0.00	0.004	o	|	|	|	0.07
94.583	0.00	0.00	0.004	o	|	|	|	0.07
94.667	0.00	0.00	0.004	o	|	|	|	0.07
94.750	0.00	0.00	0.004	o	|	|	|	0.07
94.833	0.00	0.00	0.004	o	|	|	|	0.07
94.917	0.00	0.00	0.004	o	|	|	|	0.07
95.000	0.00	0.00	0.004	o	|	|	|	0.07
95.083	0.00	0.00	0.004	o	|	|	|	0.07
95.167	0.00	0.00	0.004	o	|	|	|	0.07
95.250	0.00	0.00	0.004	o	|	|	|	0.07
95.333	0.00	0.00	0.004	o	|	|	|	0.07
95.417	0.00	0.00	0.004	o	|	|	|	0.07
95.500	0.00	0.00	0.004	o	|	|	|	0.07
95.583	0.00	0.00	0.004	o	|	|	|	0.07
95.667	0.00	0.00	0.004	o	|	|	|	0.07
95.750	0.00	0.00	0.004	o	|	|	|	0.07
95.833	0.00	0.00	0.004	o	|	|	|	0.07
95.917	0.00	0.00	0.004	o	|	|	|	0.07
96.000	0.00	0.00	0.004	o	|	|	|	0.06
96.083	0.00	0.00	0.004	o	|	|	|	0.06
96.167	0.00	0.00	0.004	o	|	|	|	0.06
96.250	0.00	0.00	0.004	o	|	|	|	0.06
96.333	0.00	0.00	0.004	o	|	|	|	0.06
96.417	0.00	0.00	0.004	o	|	|	|	0.06
96.500	0.00	0.00	0.004	o	|	|	|	0.06
96.583	0.00	0.00	0.004	o	|	|	|	0.06
96.667	0.00	0.00	0.004	o	|	|	|	0.06
96.750	0.00	0.00	0.004	o	|	|	|	0.06
96.833	0.00	0.00	0.004	o	|	|	|	0.06
96.917	0.00	0.00	0.004	o	|	|	|	0.06
97.000	0.00	0.00	0.004	o	|	|	|	0.06
97.083	0.00	0.00	0.004	o	|	|	|	0.06
97.167	0.00	0.00	0.004	o	|	|	|	0.06
97.250	0.00	0.00	0.004	o	|	|	|	0.06
97.333	0.00	0.00	0.004	o	|	|	|	0.06

Remaining water in basin = 0.00 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 1168
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.325 (CFS)
Total volume = 1.440 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV BLDG A AREA 5
2-YR 24 HR STORM EVENT
21-0034
2021-11-24 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR5A242.rte
**********HYDROGRAPH DATA**********
Number of intervals = 291
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.946 (CFS)
Total volume = 1.183 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 291
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

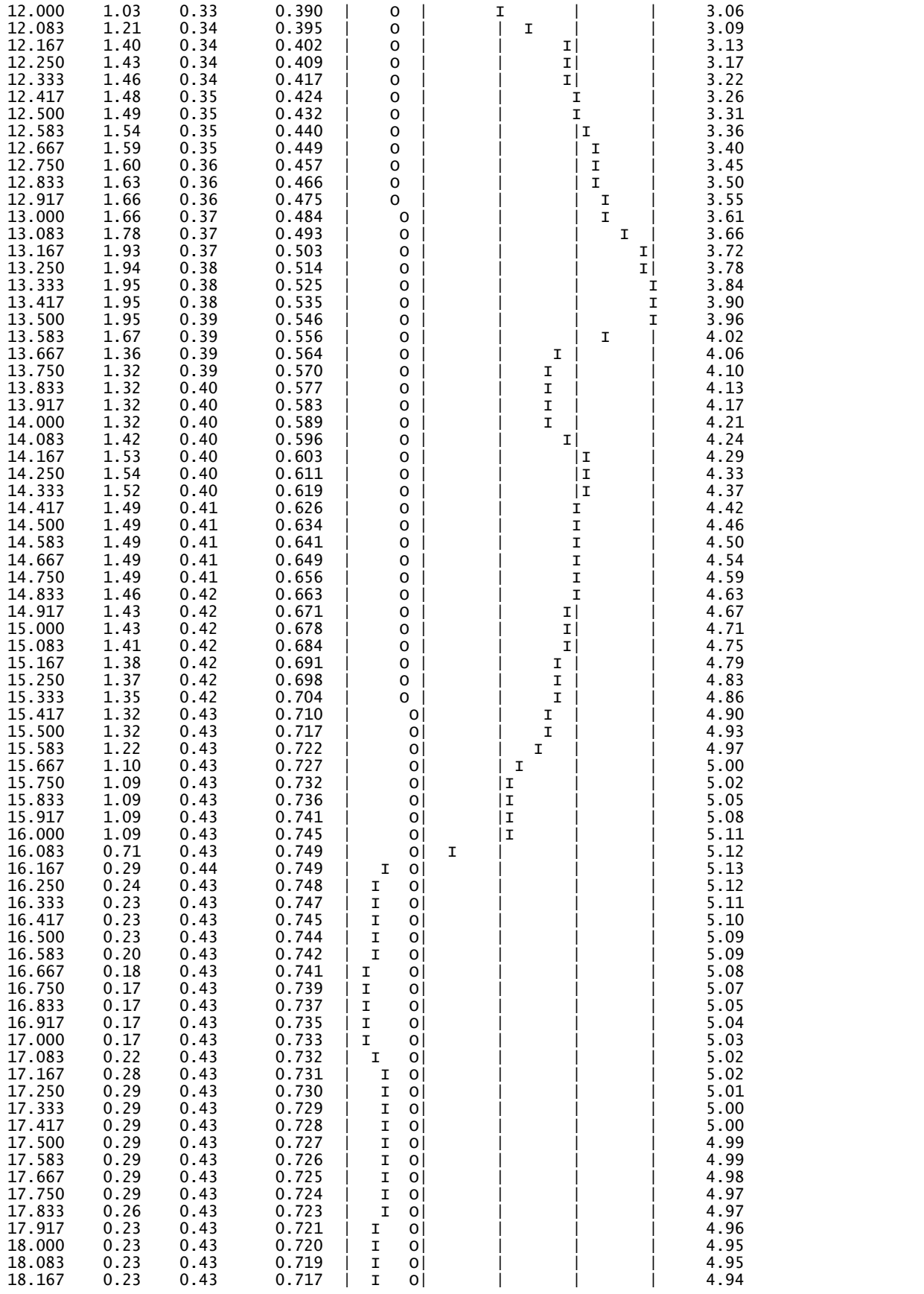
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.063	0.004	0.001	0.004	0.004
0.500	0.029	0.130	0.029	0.029
1.000	0.080	0.190	0.079	0.081
1.500	0.144	0.230	0.143	0.145
2.000	0.216	0.270	0.215	0.217
2.500	0.295	0.300	0.294	0.296
3.000	0.379	0.330	0.378	0.380
3.500	0.465	0.360	0.464	0.466
4.000	0.553	0.390	0.552	0.554
4.500	0.641	0.410	0.640	0.642
5.000	0.728	0.430	0.727	0.729
5.500	0.811	0.450	0.809	0.813
6.000	0.890	0.480	0.888	0.892
6.500	0.963	0.490	0.961	0.965
7.000	1.027	0.510	1.025	1.029
7.500	1.078	0.530	1.076	1.080
8.000	1.107	0.550	1.105	1.109

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.5	0.97	1.46	1.95	Depth (Ft.)
0.083	0.05	0.00	0.000	O					0.00
0.167	0.11	0.00	0.001	OI					0.01
0.250	0.11	0.00	0.001	OI					0.02
0.333	0.14	0.00	0.002	O I					0.04
0.417	0.17	0.00	0.003	O I					0.05
0.500	0.17	0.00	0.005	O I					0.07
0.583	0.17	0.01	0.006	O I					0.09
0.667	0.17	0.02	0.007	O I					0.11
0.750	0.17	0.02	0.008	O I					0.13
0.833	0.20	0.03	0.009	O I					0.15
0.917	0.22	0.03	0.010	O I					0.17
1.000	0.23	0.04	0.011	O I					0.19
1.083	0.20	0.05	0.013	O I					0.21
1.167	0.18	0.05	0.014	O I					0.23
1.250	0.17	0.06	0.014	O I					0.25
1.333	0.17	0.06	0.015	O I					0.26
1.417	0.17	0.06	0.016	OI					0.27
1.500	0.17	0.07	0.017	OI					0.29
1.583	0.17	0.07	0.017	OI					0.30
1.667	0.17	0.07	0.018	OI					0.31
1.750	0.17	0.08	0.019	OI					0.32
1.833	0.20	0.08	0.020	O I					0.33
1.917	0.22	0.09	0.020	O I					0.35
2.000	0.23	0.09	0.021	O I					0.37
2.083	0.23	0.10	0.022	O I					0.38
2.167	0.23	0.10	0.023	O I					0.40
2.250	0.23	0.10	0.024	O I					0.41
2.333	0.23	0.11	0.025	O I					0.43
2.417	0.23	0.11	0.026	O I					0.44
2.500	0.23	0.12	0.027	O I					0.46
2.583	0.25	0.12	0.027	O I					0.47
2.667	0.28	0.13	0.028	O I					0.49
2.750	0.29	0.13	0.029	O I					0.50
2.833	0.29	0.13	0.030	O I					0.51
2.917	0.29	0.13	0.032	O I					0.53
3.000	0.29	0.13	0.033	O I					0.54
3.083	0.29	0.14	0.034	O I					0.55
3.167	0.29	0.14	0.035	O I					0.56
3.250	0.29	0.14	0.036	O I					0.57
3.333	0.29	0.14	0.037	O I					0.58
3.417	0.29	0.14	0.038	O I					0.59
3.500	0.29	0.14	0.039	O I					0.60
3.583	0.29	0.14	0.040	O I					0.61
3.667	0.29	0.14	0.041	O I					0.61
3.750	0.29	0.14	0.042	O I					0.62
3.833	0.31	0.15	0.043	O I					0.63
3.917	0.34	0.15	0.044	O I					0.65
4.000	0.34	0.15	0.045	O I					0.66
4.083	0.34	0.15	0.047	O I					0.67
4.167	0.34	0.15	0.048	O I					0.69
4.250	0.34	0.15	0.049	O I					0.70
4.333	0.37	0.16	0.051	O I					0.71
4.417	0.40	0.16	0.052	O I					0.73
4.500	0.40	0.16	0.054	O I					0.74
4.583	0.40	0.16	0.056	O I					0.76
4.667	0.40	0.16	0.057	O I					0.78
4.750	0.40	0.17	0.059	O I					0.79
4.833	0.43	0.17	0.060	O I					0.81
4.917	0.45	0.17	0.062	O I					0.83
5.000	0.46	0.17	0.064	O I					0.85
5.083	0.41	0.17	0.066	O I					0.86
5.167	0.35	0.18	0.068	O I					0.88
5.250	0.34	0.18	0.069	O I					0.89
5.333	0.37	0.18	0.070	O I					0.90
5.417	0.40	0.18	0.071	O I					0.92
5.500	0.40	0.18	0.073	O I					0.93
5.583	0.43	0.18	0.074	O I					0.95
5.667	0.45	0.19	0.076	O I					0.96

5.750	0.46	0.19	0.078	o	I				0.98
5.833	0.46	0.19	0.080	o	I				1.00
5.917	0.46	0.19	0.082	o	I				1.01
6.000	0.46	0.19	0.084	o	I				1.03
6.083	0.48	0.19	0.085	o	I				1.04
6.167	0.51	0.19	0.088	o	I				1.06
6.250	0.51	0.20	0.090	o	I				1.08
6.333	0.52	0.20	0.092	o	I				1.09
6.417	0.52	0.20	0.094	o	I				1.11
6.500	0.52	0.20	0.096	o	I				1.13
6.583	0.54	0.20	0.099	o	I				1.14
6.667	0.57	0.20	0.101	o	I				1.16
6.750	0.57	0.20	0.103	o	I				1.18
6.833	0.57	0.21	0.106	o	I				1.20
6.917	0.57	0.21	0.109	o	I				1.22
7.000	0.57	0.21	0.111	o	I				1.24
7.083	0.57	0.21	0.114	o	I				1.26
7.167	0.57	0.21	0.116	o	I				1.28
7.250	0.57	0.21	0.118	o	I				1.30
7.333	0.60	0.22	0.121	o	I				1.32
7.417	0.63	0.22	0.124	o	I				1.34
7.500	0.63	0.22	0.127	o	I				1.36
7.583	0.65	0.22	0.129	o	I				1.39
7.667	0.68	0.22	0.133	o	I				1.41
7.750	0.69	0.22	0.136	o	I				1.44
7.833	0.71	0.23	0.139	o	I				1.46
7.917	0.74	0.23	0.142	o	I				1.49
8.000	0.74	0.23	0.146	o	I				1.51
8.083	0.79	0.23	0.150	o	I				1.54
8.167	0.85	0.24	0.154	o	I				1.57
8.250	0.86	0.24	0.158	o	I				1.60
8.333	0.86	0.24	0.162	o	I				1.63
8.417	0.86	0.24	0.166	o	I				1.66
8.500	0.86	0.24	0.171	o	I				1.69
8.583	0.88	0.25	0.175	o	I				1.72
8.667	0.91	0.25	0.179	o	I				1.75
8.750	0.92	0.25	0.184	o	I				1.78
8.833	0.94	0.25	0.189	o	I				1.81
8.917	0.97	0.26	0.193	o	I				1.84
9.000	0.97	0.26	0.198	o	I				1.88
9.083	1.02	0.26	0.203	o	I				1.91
9.167	1.08	0.27	0.209	o	I				1.95
9.250	1.09	0.27	0.214	o	I				1.99
9.333	1.11	0.27	0.220	o	I				2.03
9.417	1.14	0.27	0.226	o	I				2.06
9.500	1.14	0.28	0.232	o	I				2.10
9.583	1.17	0.28	0.238	o	I				2.14
9.667	1.20	0.28	0.244	o	I				2.18
9.750	1.20	0.28	0.251	o	I				2.22
9.833	1.23	0.29	0.257	o	I				2.26
9.917	1.26	0.29	0.264	o	I				2.30
10.000	1.26	0.29	0.270	o	I				2.34
10.083	1.08	0.29	0.276	o	I				2.38
10.167	0.89	0.29	0.281	o	I				2.41
10.250	0.86	0.30	0.285	o	I				2.44
10.333	0.86	0.30	0.289	o	I				2.46
10.417	0.86	0.30	0.293	o	I				2.49
10.500	0.86	0.30	0.297	o	I				2.51
10.583	0.98	0.30	0.301	o	I				2.54
10.667	1.12	0.30	0.306	o	I				2.57
10.750	1.14	0.31	0.312	o	I				2.60
10.833	1.14	0.31	0.318	o	I				2.63
10.917	1.14	0.31	0.323	o	I				2.67
11.000	1.14	0.31	0.329	o	I				2.70
11.083	1.12	0.31	0.335	o	I				2.74
11.167	1.09	0.32	0.340	o	I				2.77
11.250	1.09	0.32	0.346	o	I				2.80
11.333	1.09	0.32	0.351	o	I				2.83
11.417	1.09	0.32	0.356	o	I				2.86
11.500	1.09	0.32	0.361	o	I				2.89
11.583	1.04	0.33	0.366	o	I				2.93
11.667	0.98	0.33	0.371	o	I				2.95
11.750	0.97	0.33	0.376	o	I				2.98
11.833	1.00	0.33	0.380	o	I				3.01
11.917	1.03	0.33	0.385	o	I				3.03



18.250	0.23	0.43	0.716	| I o|	|	|	|	4.93
18.333	0.23	0.43	0.714	| I o|	|	|	|	4.92
18.417	0.23	0.43	0.713	| I o|	|	|	|	4.91
18.500	0.23	0.43	0.712	| I o|	|	|	|	4.91
18.583	0.20	0.43	0.710	| I o|	|	|	|	4.90
18.667	0.18	0.43	0.709	| I o |	|	|	|	4.89
18.750	0.17	0.43	0.707	| I o |	|	|	|	4.88
18.833	0.15	0.42	0.705	| I o |	|	|	|	4.87
18.917	0.12	0.42	0.703	|I o |	|	|	|	4.86
19.000	0.12	0.42	0.701	|I o |	|	|	|	4.84
19.083	0.14	0.42	0.699	| I o |	|	|	|	4.83
19.167	0.17	0.42	0.697	| I o |	|	|	|	4.82
19.250	0.17	0.42	0.695	| I o |	|	|	|	4.81
19.333	0.20	0.42	0.694	| I o |	|	|	|	4.80
19.417	0.22	0.42	0.692	| I o |	|	|	|	4.79
19.500	0.23	0.42	0.691	| I o |	|	|	|	4.79
19.583	0.20	0.42	0.689	| I o |	|	|	|	4.78
19.667	0.18	0.42	0.688	| I o |	|	|	|	4.77
19.750	0.17	0.42	0.686	| I o |	|	|	|	4.76
19.833	0.15	0.42	0.684	| I o |	|	|	|	4.75
19.917	0.12	0.42	0.682	|I o |	|	|	|	4.74
20.000	0.12	0.42	0.680	|I o |	|	|	|	4.73
20.083	0.14	0.42	0.678	| I o |	|	|	|	4.71
20.167	0.17	0.42	0.677	| I o |	|	|	|	4.70
20.250	0.17	0.42	0.675	| I o |	|	|	|	4.69
20.333	0.17	0.42	0.673	| I o |	|	|	|	4.68
20.417	0.17	0.42	0.671	| I o |	|	|	|	4.67
20.500	0.17	0.42	0.670	| I o |	|	|	|	4.67
20.583	0.17	0.42	0.668	| I o |	|	|	|	4.66
20.667	0.17	0.42	0.666	| I o |	|	|	|	4.65
20.750	0.17	0.42	0.665	| I o |	|	|	|	4.64
20.833	0.15	0.42	0.663	| I o |	|	|	|	4.63
20.917	0.12	0.41	0.661	|I o |	|	|	|	4.61
21.000	0.12	0.41	0.659	|I o |	|	|	|	4.60
21.083	0.14	0.41	0.657	| I o |	|	|	|	4.59
21.167	0.17	0.41	0.655	| I o |	|	|	|	4.58
21.250	0.17	0.41	0.653	| I o |	|	|	|	4.57
21.333	0.15	0.41	0.652	| I o |	|	|	|	4.56
21.417	0.12	0.41	0.650	|I o |	|	|	|	4.55
21.500	0.12	0.41	0.648	|I o |	|	|	|	4.54
21.583	0.14	0.41	0.646	| I o |	|	|	|	4.53
21.667	0.17	0.41	0.644	| I o |	|	|	|	4.52
21.750	0.17	0.41	0.642	| I o |	|	|	|	4.51
21.833	0.15	0.41	0.641	| I o |	|	|	|	4.50
21.917	0.12	0.41	0.639	|I o |	|	|	|	4.49
22.000	0.12	0.41	0.637	|I o |	|	|	|	4.48
22.083	0.14	0.41	0.635	| I o |	|	|	|	4.46
22.167	0.17	0.41	0.633	| I o |	|	|	|	4.45
22.250	0.17	0.41	0.631	| I o |	|	|	|	4.45
22.333	0.15	0.41	0.630	| I o |	|	|	|	4.44
22.417	0.12	0.41	0.628	|I o |	|	|	|	4.42
22.500	0.12	0.41	0.626	|I o |	|	|	|	4.41
22.583	0.11	0.41	0.624	|I o |	|	|	|	4.40
22.667	0.11	0.41	0.622	|I o |	|	|	|	4.39
22.750	0.11	0.41	0.620	|I o |	|	|	|	4.38
22.833	0.11	0.40	0.618	|I o |	|	|	|	4.37
22.917	0.11	0.40	0.616	|I o |	|	|	|	4.36
23.000	0.11	0.40	0.614	|I o |	|	|	|	4.35
23.083	0.11	0.40	0.612	|I o |	|	|	|	4.33
23.167	0.11	0.40	0.610	|I o |	|	|	|	4.32
23.250	0.11	0.40	0.608	|I o |	|	|	|	4.31
23.333	0.11	0.40	0.606	|I o |	|	|	|	4.30
23.417	0.11	0.40	0.604	|I o |	|	|	|	4.29
23.500	0.11	0.40	0.602	|I o |	|	|	|	4.28
23.583	0.11	0.40	0.600	|I o |	|	|	|	4.27
23.667	0.11	0.40	0.598	|I o |	|	|	|	4.26
23.750	0.11	0.40	0.596	|I o |	|	|	|	4.24
23.833	0.11	0.40	0.594	|I o |	|	|	|	4.23
23.917	0.11	0.40	0.592	|I o |	|	|	|	4.22
24.000	0.11	0.40	0.590	|I o |	|	|	|	4.21
24.083	0.06	0.40	0.588	|I o |	|	|	|	4.20
24.167	0.01	0.40	0.585	I o |	|	|	|	4.18
24.250	0.00	0.40	0.583	I o |	|	|	|	4.17
24.333	0.00	0.40	0.580	I o |	|	|	|	4.15
24.417	0.00	0.40	0.577	I o |	|	|	|	4.14

24.500	0.00	0.39	0.575	I	o	|	|	|	4.12
24.583	0.00	0.39	0.572	I	o	|	|	|	4.11
24.667	0.00	0.39	0.569	I	o	|	|	|	4.09
24.750	0.00	0.39	0.566	I	o	|	|	|	4.08
24.833	0.00	0.39	0.564	I	o	|	|	|	4.06
24.917	0.00	0.39	0.561	I	o	|	|	|	4.05
25.000	0.00	0.39	0.558	I	o	|	|	|	4.03
25.083	0.00	0.39	0.556	I	o	|	|	|	4.02
25.167	0.00	0.39	0.553	I	o	|	|	|	4.00
25.250	0.00	0.39	0.550	I	o	|	|	|	3.98
25.333	0.00	0.39	0.548	I	o	|	|	|	3.97
25.417	0.00	0.39	0.545	I	o	|	|	|	3.95
25.500	0.00	0.39	0.542	I	o	|	|	|	3.94
25.583	0.00	0.39	0.540	I	o	|	|	|	3.92
25.667	0.00	0.38	0.537	I	o	|	|	|	3.91
25.750	0.00	0.38	0.534	I	o	|	|	|	3.89
25.833	0.00	0.38	0.532	I	o	|	|	|	3.88
25.917	0.00	0.38	0.529	I	o	|	|	|	3.86
26.000	0.00	0.38	0.526	I	o	|	|	|	3.85
26.083	0.00	0.38	0.524	I	o	|	|	|	3.83
26.167	0.00	0.38	0.521	I	o	|	|	|	3.82
26.250	0.00	0.38	0.519	I	o	|	|	|	3.80
26.333	0.00	0.38	0.516	I	o	|	|	|	3.79
26.417	0.00	0.38	0.513	I	o	|	|	|	3.77
26.500	0.00	0.38	0.511	I	o	|	|	|	3.76
26.583	0.00	0.37	0.508	I	o	|	|	|	3.75
26.667	0.00	0.37	0.506	I	o	|	|	|	3.73
26.750	0.00	0.37	0.503	I	o	|	|	|	3.72
26.833	0.00	0.37	0.501	I	o	|	|	|	3.70
26.917	0.00	0.37	0.498	I	o	|	|	|	3.69
27.000	0.00	0.37	0.495	I	o	|	|	|	3.67
27.083	0.00	0.37	0.493	I	o	|	|	|	3.66
27.167	0.00	0.37	0.490	I	o	|	|	|	3.64
27.250	0.00	0.37	0.488	I	o	|	|	|	3.63
27.333	0.00	0.37	0.485	I	o	|	|	|	3.61
27.417	0.00	0.37	0.483	I	o	|	|	|	3.60
27.500	0.00	0.37	0.480	I	o	|	|	|	3.59
27.583	0.00	0.36	0.478	I	o	|	|	|	3.57
27.667	0.00	0.36	0.475	I	o	|	|	|	3.56
27.750	0.00	0.36	0.473	I	o	|	|	|	3.54
27.833	0.00	0.36	0.470	I	o	|	|	|	3.53
27.917	0.00	0.36	0.468	I	o	|	|	|	3.52
28.000	0.00	0.36	0.465	I	o	|	|	|	3.50
28.083	0.00	0.36	0.463	I	o	|	|	|	3.49
28.167	0.00	0.36	0.460	I	o	|	|	|	3.47
28.250	0.00	0.36	0.458	I	o	|	|	|	3.46
28.333	0.00	0.36	0.455	I	o	|	|	|	3.44
28.417	0.00	0.36	0.453	I	o	|	|	|	3.43
28.500	0.00	0.35	0.450	I	o	|	|	|	3.42
28.583	0.00	0.35	0.448	I	o	|	|	|	3.40
28.667	0.00	0.35	0.446	I	o	|	|	|	3.39
28.750	0.00	0.35	0.443	I	o	|	|	|	3.37
28.833	0.00	0.35	0.441	I	o	|	|	|	3.36
28.917	0.00	0.35	0.438	I	o	|	|	|	3.34
29.000	0.00	0.35	0.436	I	o	|	|	|	3.33
29.083	0.00	0.35	0.433	I	o	|	|	|	3.32
29.167	0.00	0.35	0.431	I	o	|	|	|	3.30
29.250	0.00	0.35	0.429	I	o	|	|	|	3.29
29.333	0.00	0.35	0.426	I	o	|	|	|	3.27
29.417	0.00	0.35	0.424	I	o	|	|	|	3.26
29.500	0.00	0.34	0.422	I	o	|	|	|	3.25
29.583	0.00	0.34	0.419	I	o	|	|	|	3.23
29.667	0.00	0.34	0.417	I	o	|	|	|	3.22
29.750	0.00	0.34	0.414	I	o	|	|	|	3.21
29.833	0.00	0.34	0.412	I	o	|	|	|	3.19
29.917	0.00	0.34	0.410	I	o	|	|	|	3.18
30.000	0.00	0.34	0.407	I	o	|	|	|	3.16
30.083	0.00	0.34	0.405	I	o	|	|	|	3.15
30.167	0.00	0.34	0.403	I	o	|	|	|	3.14
30.250	0.00	0.34	0.400	I	o	|	|	|	3.12
30.333	0.00	0.34	0.398	I	o	|	|	|	3.11
30.417	0.00	0.34	0.396	I	o	|	|	|	3.10
30.500	0.00	0.34	0.393	I	o	|	|	|	3.08
30.583	0.00	0.33	0.391	I	o	|	|	|	3.07
30.667	0.00	0.33	0.389	I	o	|	|	|	3.06

30.750	0.00	0.33	0.387	I	o	|	|	|	3.04
30.833	0.00	0.33	0.384	I	o	|	|	|	3.03
30.917	0.00	0.33	0.382	I	o	|	|	|	3.02
31.000	0.00	0.33	0.380	I	o	|	|	|	3.00
31.083	0.00	0.33	0.377	I	o	|	|	|	2.99
31.167	0.00	0.33	0.375	I	o	|	|	|	2.98
31.250	0.00	0.33	0.373	I	o	|	|	|	2.96
31.333	0.00	0.33	0.371	I	o	|	|	|	2.95
31.417	0.00	0.33	0.368	I	o	|	|	|	2.94
31.500	0.00	0.33	0.366	I	o	|	|	|	2.92
31.583	0.00	0.32	0.364	I	o	|	|	|	2.91
31.667	0.00	0.32	0.362	I	o	|	|	|	2.90
31.750	0.00	0.32	0.359	I	o	|	|	|	2.88
31.833	0.00	0.32	0.357	I	o	|	|	|	2.87
31.917	0.00	0.32	0.355	I	o	|	|	|	2.86
32.000	0.00	0.32	0.353	I	o	|	|	|	2.84
32.083	0.00	0.32	0.351	I	o	|	|	|	2.83
32.167	0.00	0.32	0.348	I	o	|	|	|	2.82
32.250	0.00	0.32	0.346	I	o	|	|	|	2.80
32.333	0.00	0.32	0.344	I	o	|	|	|	2.79
32.417	0.00	0.32	0.342	I	o	|	|	|	2.78
32.500	0.00	0.32	0.340	I	o	|	|	|	2.77
32.583	0.00	0.32	0.337	I	o	|	|	|	2.75
32.667	0.00	0.31	0.335	I	o	|	|	|	2.74
32.750	0.00	0.31	0.333	I	o	|	|	|	2.73
32.833	0.00	0.31	0.331	I	o	|	|	|	2.71
32.917	0.00	0.31	0.329	I	o	|	|	|	2.70
33.000	0.00	0.31	0.327	I	o	|	|	|	2.69
33.083	0.00	0.31	0.325	I	o	|	|	|	2.68
33.167	0.00	0.31	0.322	I	o	|	|	|	2.66
33.250	0.00	0.31	0.320	I	o	|	|	|	2.65
33.333	0.00	0.31	0.318	I	o	|	|	|	2.64
33.417	0.00	0.31	0.316	I	o	|	|	|	2.63
33.500	0.00	0.31	0.314	I	o	|	|	|	2.61
33.583	0.00	0.31	0.312	I	o	|	|	|	2.60
33.667	0.00	0.31	0.310	I	o	|	|	|	2.59
33.750	0.00	0.30	0.308	I	o	|	|	|	2.57
33.833	0.00	0.30	0.306	I	o	|	|	|	2.56
33.917	0.00	0.30	0.303	I	o	|	|	|	2.55
34.000	0.00	0.30	0.301	I	o	|	|	|	2.54
34.083	0.00	0.30	0.299	I	o	|	|	|	2.53
34.167	0.00	0.30	0.297	I	o	|	|	|	2.51
34.250	0.00	0.30	0.295	I	o	|	|	|	2.50
34.333	0.00	0.30	0.293	I	o	|	|	|	2.49
34.417	0.00	0.30	0.291	I	o	|	|	|	2.47
34.500	0.00	0.30	0.289	I	o	|	|	|	2.46
34.583	0.00	0.30	0.287	I	o	|	|	|	2.45
34.667	0.00	0.30	0.285	I	o	|	|	|	2.44
34.750	0.00	0.30	0.283	I	o	|	|	|	2.42
34.833	0.00	0.29	0.281	I	o	|	|	|	2.41
34.917	0.00	0.29	0.279	I	o	|	|	|	2.40
35.000	0.00	0.29	0.277	I	o	|	|	|	2.38
35.083	0.00	0.29	0.275	I	o	|	|	|	2.37
35.167	0.00	0.29	0.273	I	o	|	|	|	2.36
35.250	0.00	0.29	0.271	I	o	|	|	|	2.35
35.333	0.00	0.29	0.269	I	o	|	|	|	2.33
35.417	0.00	0.29	0.267	I	o	|	|	|	2.32
35.500	0.00	0.29	0.265	I	o	|	|	|	2.31
35.583	0.00	0.29	0.263	I	o	|	|	|	2.30
35.667	0.00	0.29	0.261	I	o	|	|	|	2.28
35.750	0.00	0.29	0.259	I	o	|	|	|	2.27
35.833	0.00	0.29	0.257	I	o	|	|	|	2.26
35.917	0.00	0.28	0.255	I	o	|	|	|	2.25
36.000	0.00	0.28	0.253	I	o	|	|	|	2.23
36.083	0.00	0.28	0.251	I	o	|	|	|	2.22
36.167	0.00	0.28	0.249	I	o	|	|	|	2.21
36.250	0.00	0.28	0.247	I	o	|	|	|	2.20
36.333	0.00	0.28	0.245	I	o	|	|	|	2.18
36.417	0.00	0.28	0.243	I	o	|	|	|	2.17
36.500	0.00	0.28	0.241	I	o	|	|	|	2.16
36.583	0.00	0.28	0.239	I	o	|	|	|	2.15
36.667	0.00	0.28	0.237	I	o	|	|	|	2.14
36.750	0.00	0.28	0.235	I	o	|	|	|	2.12
36.833	0.00	0.28	0.234	I	o	|	|	|	2.11
36.917	0.00	0.28	0.232	I	o	|	|	|	2.10

37.000	0.00	0.28	0.230	I	o	|	|	|	|	2.09
37.083	0.00	0.27	0.228	I	o	|	|	|	|	2.08
37.167	0.00	0.27	0.226	I	o	|	|	|	|	2.06
37.250	0.00	0.27	0.224	I	o	|	|	|	|	2.05
37.333	0.00	0.27	0.222	I	o	|	|	|	|	2.04
37.417	0.00	0.27	0.220	I	o	|	|	|	|	2.03
37.500	0.00	0.27	0.218	I	o	|	|	|	|	2.02
37.583	0.00	0.27	0.217	I	o	|	|	|	|	2.00
37.667	0.00	0.27	0.215	I	o	|	|	|	|	1.99
37.750	0.00	0.27	0.213	I	o	|	|	|	|	1.98
37.833	0.00	0.27	0.211	I	o	|	|	|	|	1.97
37.917	0.00	0.27	0.209	I	o	|	|	|	|	1.95
38.000	0.00	0.27	0.207	I	o	|	|	|	|	1.94
38.083	0.00	0.26	0.206	I	o	|	|	|	|	1.93
38.167	0.00	0.26	0.204	I	o	|	|	|	|	1.92
38.250	0.00	0.26	0.202	I	o	|	|	|	|	1.90
38.333	0.00	0.26	0.200	I	o	|	|	|	|	1.89
38.417	0.00	0.26	0.198	I	o	|	|	|	|	1.88
38.500	0.00	0.26	0.197	I	o	|	|	|	|	1.87
38.583	0.00	0.26	0.195	I	o	|	|	|	|	1.85
38.667	0.00	0.26	0.193	I	o	|	|	|	|	1.84
38.750	0.00	0.26	0.191	I	o	|	|	|	|	1.83
38.833	0.00	0.26	0.189	I	o	|	|	|	|	1.82
38.917	0.00	0.25	0.188	I	o	|	|	|	|	1.80
39.000	0.00	0.25	0.186	I	o	|	|	|	|	1.79
39.083	0.00	0.25	0.184	I	o	|	|	|	|	1.78
39.167	0.00	0.25	0.183	I	o	|	|	|	|	1.77
39.250	0.00	0.25	0.181	I	o	|	|	|	|	1.76
39.333	0.00	0.25	0.179	I	o	|	|	|	|	1.74
39.417	0.00	0.25	0.177	I	o	|	|	|	|	1.73
39.500	0.00	0.25	0.176	I	o	|	|	|	|	1.72
39.583	0.00	0.25	0.174	I	o	|	|	|	|	1.71
39.667	0.00	0.25	0.172	I	o	|	|	|	|	1.70
39.750	0.00	0.24	0.171	I	o	|	|	|	|	1.68
39.833	0.00	0.24	0.169	I	o	|	|	|	|	1.67
39.917	0.00	0.24	0.167	I	o	|	|	|	|	1.66
40.000	0.00	0.24	0.166	I	o	|	|	|	|	1.65
40.083	0.00	0.24	0.164	I	o	|	|	|	|	1.64
40.167	0.00	0.24	0.162	I	o	|	|	|	|	1.63
40.250	0.00	0.24	0.161	I	o	|	|	|	|	1.61
40.333	0.00	0.24	0.159	I	o	|	|	|	|	1.60
40.417	0.00	0.24	0.157	I	o	|	|	|	|	1.59
40.500	0.00	0.24	0.156	I	o	|	|	|	|	1.58
40.583	0.00	0.24	0.154	I	o	|	|	|	|	1.57
40.667	0.00	0.23	0.152	I	o	|	|	|	|	1.56
40.750	0.00	0.23	0.151	I	o	|	|	|	|	1.55
40.833	0.00	0.23	0.149	I	o	|	|	|	|	1.54
40.917	0.00	0.23	0.148	I	o	|	|	|	|	1.52
41.000	0.00	0.23	0.146	I	o	|	|	|	|	1.51
41.083	0.00	0.23	0.144	I	o	|	|	|	|	1.50
41.167	0.00	0.23	0.143	I	o	|	|	|	|	1.49
41.250	0.00	0.23	0.141	I	o	|	|	|	|	1.48
41.333	0.00	0.23	0.140	I	o	|	|	|	|	1.47
41.417	0.00	0.23	0.138	I	o	|	|	|	|	1.45
41.500	0.00	0.23	0.137	I	o	|	|	|	|	1.44
41.583	0.00	0.22	0.135	I	o	|	|	|	|	1.43
41.667	0.00	0.22	0.133	I	o	|	|	|	|	1.42
41.750	0.00	0.22	0.132	I	o	|	|	|	|	1.41
41.833	0.00	0.22	0.130	I	o	|	|	|	|	1.39
41.917	0.00	0.22	0.129	I	o	|	|	|	|	1.38
42.000	0.00	0.22	0.127	I	o	|	|	|	|	1.37
42.083	0.00	0.22	0.126	I	o	|	|	|	|	1.36
42.167	0.00	0.22	0.124	I	o	|	|	|	|	1.35
42.250	0.00	0.22	0.123	I	o	|	|	|	|	1.33
42.333	0.00	0.22	0.121	I	o	|	|	|	|	1.32
42.417	0.00	0.21	0.120	I	o	|	|	|	|	1.31
42.500	0.00	0.21	0.118	I	o	|	|	|	|	1.30
42.583	0.00	0.21	0.117	I	o	|	|	|	|	1.29
42.667	0.00	0.21	0.115	I	o	|	|	|	|	1.28
42.750	0.00	0.21	0.114	I	o	|	|	|	|	1.27
42.833	0.00	0.21	0.113	I	o	|	|	|	|	1.25
42.917	0.00	0.21	0.111	I	o	|	|	|	|	1.24
43.000	0.00	0.21	0.110	I	o	|	|	|	|	1.23
43.083	0.00	0.21	0.108	I	o	|	|	|	|	1.22
43.167	0.00	0.21	0.107	I	o	|	|	|	|	1.21

43.250	0.00	0.21	0.105	I	o			1.20
43.333	0.00	0.20	0.104	I	o			1.19
43.417	0.00	0.20	0.103	I	o			1.18
43.500	0.00	0.20	0.101	I	o			1.17
43.583	0.00	0.20	0.100	I	o			1.15
43.667	0.00	0.20	0.098	I	o			1.14
43.750	0.00	0.20	0.097	I	o			1.13
43.833	0.00	0.20	0.096	I	o			1.12
43.917	0.00	0.20	0.094	I	o			1.11
44.000	0.00	0.20	0.093	I	o			1.10
44.083	0.00	0.20	0.092	I	o			1.09
44.167	0.00	0.20	0.090	I	o			1.08
44.250	0.00	0.20	0.089	I	o			1.07
44.333	0.00	0.19	0.087	I	o			1.06
44.417	0.00	0.19	0.086	I	o			1.05
44.500	0.00	0.19	0.085	I	o			1.04
44.583	0.00	0.19	0.083	I	o			1.03
44.667	0.00	0.19	0.082	I	o			1.02
44.750	0.00	0.19	0.081	I	o			1.01
44.833	0.00	0.19	0.080	I	o			1.00
44.917	0.00	0.19	0.078	I	o			0.98
45.000	0.00	0.19	0.077	I	o			0.97
45.083	0.00	0.18	0.076	I	o			0.96
45.167	0.00	0.18	0.074	I	o			0.94
45.250	0.00	0.18	0.073	I	o			0.93
45.333	0.00	0.18	0.072	I	o			0.92
45.417	0.00	0.18	0.071	I	o			0.91
45.500	0.00	0.18	0.069	I	o			0.90
45.583	0.00	0.18	0.068	I	o			0.88
45.667	0.00	0.17	0.067	I	o			0.87
45.750	0.00	0.17	0.066	I	o			0.86
45.833	0.00	0.17	0.065	I	o			0.85
45.917	0.00	0.17	0.063	I	o			0.84
46.000	0.00	0.17	0.062	I	o			0.83
46.083	0.00	0.17	0.061	I	o			0.81
46.167	0.00	0.17	0.060	I	o			0.80
46.250	0.00	0.17	0.059	I	o			0.79
46.333	0.00	0.16	0.058	I	o			0.78
46.417	0.00	0.16	0.057	I	o			0.77
46.500	0.00	0.16	0.055	I	o			0.76
46.583	0.00	0.16	0.054	I	o			0.75
46.667	0.00	0.16	0.053	I	o			0.74
46.750	0.00	0.16	0.052	I	o			0.73
46.833	0.00	0.16	0.051	I	o			0.72
46.917	0.00	0.15	0.050	I	o			0.71
47.000	0.00	0.15	0.049	I	o			0.70
47.083	0.00	0.15	0.048	I	o			0.69
47.167	0.00	0.15	0.047	I	o			0.67
47.250	0.00	0.15	0.046	I	o			0.66
47.333	0.00	0.15	0.045	I	o			0.65
47.417	0.00	0.15	0.044	I	o			0.64
47.500	0.00	0.15	0.043	I	o			0.63
47.583	0.00	0.14	0.042	I	o			0.62
47.667	0.00	0.14	0.041	I	o			0.62
47.750	0.00	0.14	0.040	I	o			0.61
47.833	0.00	0.14	0.039	I	o			0.60
47.917	0.00	0.14	0.038	I	o			0.59
48.000	0.00	0.14	0.037	I	o			0.58
48.083	0.00	0.14	0.036	I	o			0.57
48.167	0.00	0.14	0.035	I	o			0.56
48.250	0.00	0.14	0.034	I	o			0.55
48.333	0.00	0.13	0.033	I	o			0.54
48.417	0.00	0.13	0.032	I	o			0.53
48.500	0.00	0.13	0.031	I	o			0.52
48.583	0.00	0.13	0.030	I	o			0.51
48.667	0.00	0.13	0.029	I	o			0.50
48.750	0.00	0.13	0.029	I	o			0.49
48.833	0.00	0.12	0.028	I	o			0.48
48.917	0.00	0.12	0.027	I	o			0.46
49.000	0.00	0.11	0.026	I	o			0.45
49.083	0.00	0.11	0.025	I	o			0.43
49.167	0.00	0.11	0.025	I	o			0.42
49.250	0.00	0.10	0.024	I	o			0.41
49.333	0.00	0.10	0.023	I	o			0.40
49.417	0.00	0.10	0.022	I	o			0.38

49.500	0.00	0.09	0.022	IO	|	|	|	|	0.37
49.583	0.00	0.09	0.021	IO	|	|	|	|	0.36
49.667	0.00	0.09	0.021	IO	|	|	|	|	0.35
49.750	0.00	0.08	0.020	IO	|	|	|	|	0.34
49.833	0.00	0.08	0.019	IO	|	|	|	|	0.33
49.917	0.00	0.08	0.019	IO	|	|	|	|	0.32
50.000	0.00	0.07	0.018	IO	|	|	|	|	0.31
50.083	0.00	0.07	0.018	IO	|	|	|	|	0.30
50.167	0.00	0.07	0.017	IO	|	|	|	|	0.30
50.250	0.00	0.07	0.017	IO	|	|	|	|	0.29
50.333	0.00	0.06	0.016	IO	|	|	|	|	0.28
50.417	0.00	0.06	0.016	IO	|	|	|	|	0.27
50.500	0.00	0.06	0.016	O	|	|	|	|	0.26
50.583	0.00	0.06	0.015	O	|	|	|	|	0.26
50.667	0.00	0.06	0.015	O	|	|	|	|	0.25
50.750	0.00	0.05	0.014	O	|	|	|	|	0.24
50.833	0.00	0.05	0.014	O	|	|	|	|	0.24
50.917	0.00	0.05	0.014	O	|	|	|	|	0.23
51.000	0.00	0.05	0.013	O	|	|	|	|	0.23
51.083	0.00	0.05	0.013	O	|	|	|	|	0.22
51.167	0.00	0.05	0.013	O	|	|	|	|	0.21
51.250	0.00	0.04	0.012	O	|	|	|	|	0.21
51.333	0.00	0.04	0.012	O	|	|	|	|	0.20
51.417	0.00	0.04	0.012	O	|	|	|	|	0.20
51.500	0.00	0.04	0.011	O	|	|	|	|	0.19
51.583	0.00	0.04	0.011	O	|	|	|	|	0.19
51.667	0.00	0.04	0.011	O	|	|	|	|	0.18
51.750	0.00	0.04	0.011	O	|	|	|	|	0.18
51.833	0.00	0.03	0.010	O	|	|	|	|	0.18
51.917	0.00	0.03	0.010	O	|	|	|	|	0.17
52.000	0.00	0.03	0.010	O	|	|	|	|	0.17
52.083	0.00	0.03	0.010	O	|	|	|	|	0.16
52.167	0.00	0.03	0.010	O	|	|	|	|	0.16
52.250	0.00	0.03	0.009	O	|	|	|	|	0.16
52.333	0.00	0.03	0.009	O	|	|	|	|	0.15
52.417	0.00	0.03	0.009	O	|	|	|	|	0.15
52.500	0.00	0.03	0.009	O	|	|	|	|	0.15
52.583	0.00	0.02	0.009	O	|	|	|	|	0.14
52.667	0.00	0.02	0.008	O	|	|	|	|	0.14
52.750	0.00	0.02	0.008	O	|	|	|	|	0.14
52.833	0.00	0.02	0.008	O	|	|	|	|	0.14
52.917	0.00	0.02	0.008	O	|	|	|	|	0.13
53.000	0.00	0.02	0.008	O	|	|	|	|	0.13
53.083	0.00	0.02	0.008	O	|	|	|	|	0.13
53.167	0.00	0.02	0.008	O	|	|	|	|	0.13
53.250	0.00	0.02	0.007	O	|	|	|	|	0.12
53.333	0.00	0.02	0.007	O	|	|	|	|	0.12
53.417	0.00	0.02	0.007	O	|	|	|	|	0.12
53.500	0.00	0.02	0.007	O	|	|	|	|	0.12
53.583	0.00	0.02	0.007	O	|	|	|	|	0.11
53.667	0.00	0.02	0.007	O	|	|	|	|	0.11
53.750	0.00	0.02	0.007	O	|	|	|	|	0.11
53.833	0.00	0.01	0.007	O	|	|	|	|	0.11
53.917	0.00	0.01	0.007	O	|	|	|	|	0.11
54.000	0.00	0.01	0.006	O	|	|	|	|	0.11
54.083	0.00	0.01	0.006	O	|	|	|	|	0.10
54.167	0.00	0.01	0.006	O	|	|	|	|	0.10
54.250	0.00	0.01	0.006	O	|	|	|	|	0.10
54.333	0.00	0.01	0.006	O	|	|	|	|	0.10
54.417	0.00	0.01	0.006	O	|	|	|	|	0.10
54.500	0.00	0.01	0.006	O	|	|	|	|	0.10
54.583	0.00	0.01	0.006	O	|	|	|	|	0.10
54.667	0.00	0.01	0.006	O	|	|	|	|	0.09
54.750	0.00	0.01	0.006	O	|	|	|	|	0.09
54.833	0.00	0.01	0.006	O	|	|	|	|	0.09
54.917	0.00	0.01	0.006	O	|	|	|	|	0.09
55.000	0.00	0.01	0.006	O	|	|	|	|	0.09
55.083	0.00	0.01	0.005	O	|	|	|	|	0.09
55.167	0.00	0.01	0.005	O	|	|	|	|	0.09
55.250	0.00	0.01	0.005	O	|	|	|	|	0.09
55.333	0.00	0.01	0.005	O	|	|	|	|	0.09
55.417	0.00	0.01	0.005	O	|	|	|	|	0.08
55.500	0.00	0.01	0.005	O	|	|	|	|	0.08
55.583	0.00	0.01	0.005	O	|	|	|	|	0.08
55.667	0.00	0.01	0.005	O	|	|	|	|	0.08

55.750	0.00	0.01	0.005	o	|	|	|	|	0.08
55.833	0.00	0.01	0.005	o	|	|	|	|	0.08
55.917	0.00	0.01	0.005	o	|	|	|	|	0.08
56.000	0.00	0.01	0.005	o	|	|	|	|	0.08
56.083	0.00	0.01	0.005	o	|	|	|	|	0.08
56.167	0.00	0.01	0.005	o	|	|	|	|	0.08
56.250	0.00	0.01	0.005	o	|	|	|	|	0.08
56.333	0.00	0.01	0.005	o	|	|	|	|	0.08
56.417	0.00	0.00	0.005	o	|	|	|	|	0.08
56.500	0.00	0.00	0.005	o	|	|	|	|	0.08
56.583	0.00	0.00	0.005	o	|	|	|	|	0.07
56.667	0.00	0.00	0.005	o	|	|	|	|	0.07
56.750	0.00	0.00	0.005	o	|	|	|	|	0.07
56.833	0.00	0.00	0.005	o	|	|	|	|	0.07
56.917	0.00	0.00	0.005	o	|	|	|	|	0.07
57.000	0.00	0.00	0.005	o	|	|	|	|	0.07
57.083	0.00	0.00	0.005	o	|	|	|	|	0.07
57.167	0.00	0.00	0.004	o	|	|	|	|	0.07
57.250	0.00	0.00	0.004	o	|	|	|	|	0.07
57.333	0.00	0.00	0.004	o	|	|	|	|	0.07
57.417	0.00	0.00	0.004	o	|	|	|	|	0.07
57.500	0.00	0.00	0.004	o	|	|	|	|	0.07
57.583	0.00	0.00	0.004	o	|	|	|	|	0.07
57.667	0.00	0.00	0.004	o	|	|	|	|	0.07
57.750	0.00	0.00	0.004	o	|	|	|	|	0.07
57.833	0.00	0.00	0.004	o	|	|	|	|	0.07
57.917	0.00	0.00	0.004	o	|	|	|	|	0.07
58.000	0.00	0.00	0.004	o	|	|	|	|	0.07
58.083	0.00	0.00	0.004	o	|	|	|	|	0.07
58.167	0.00	0.00	0.004	o	|	|	|	|	0.07
58.250	0.00	0.00	0.004	o	|	|	|	|	0.07
58.333	0.00	0.00	0.004	o	|	|	|	|	0.07
58.417	0.00	0.00	0.004	o	|	|	|	|	0.07
58.500	0.00	0.00	0.004	o	|	|	|	|	0.07
58.583	0.00	0.00	0.004	o	|	|	|	|	0.07
58.667	0.00	0.00	0.004	o	|	|	|	|	0.07
58.750	0.00	0.00	0.004	o	|	|	|	|	0.07
58.833	0.00	0.00	0.004	o	|	|	|	|	0.07
58.917	0.00	0.00	0.004	o	|	|	|	|	0.07
59.000	0.00	0.00	0.004	o	|	|	|	|	0.07
59.083	0.00	0.00	0.004	o	|	|	|	|	0.06
59.167	0.00	0.00	0.004	o	|	|	|	|	0.06
59.250	0.00	0.00	0.004	o	|	|	|	|	0.06
59.333	0.00	0.00	0.004	o	|	|	|	|	0.06
59.417	0.00	0.00	0.004	o	|	|	|	|	0.06
59.500	0.00	0.00	0.004	o	|	|	|	|	0.06
59.583	0.00	0.00	0.004	o	|	|	|	|	0.06
59.667	0.00	0.00	0.004	o	|	|	|	|	0.06
59.750	0.00	0.00	0.004	o	|	|	|	|	0.06
59.833	0.00	0.00	0.004	o	|	|	|	|	0.06
59.917	0.00	0.00	0.004	o	|	|	|	|	0.06
60.000	0.00	0.00	0.004	o	|	|	|	|	0.06
60.083	0.00	0.00	0.004	o	|	|	|	|	0.06
60.167	0.00	0.00	0.004	o	|	|	|	|	0.06

Remaining water in basin = 0.00 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 722
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.435 (CFS)
Total volume = 1.179 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV BLDG A AREA 6
2-YR 24-HR STORM EVENT
21-0034
2021-11-24 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR6A242.rte
**********HYDROGRAPH DATA**********
Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.073 (CFS)
Total volume = 1.260 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

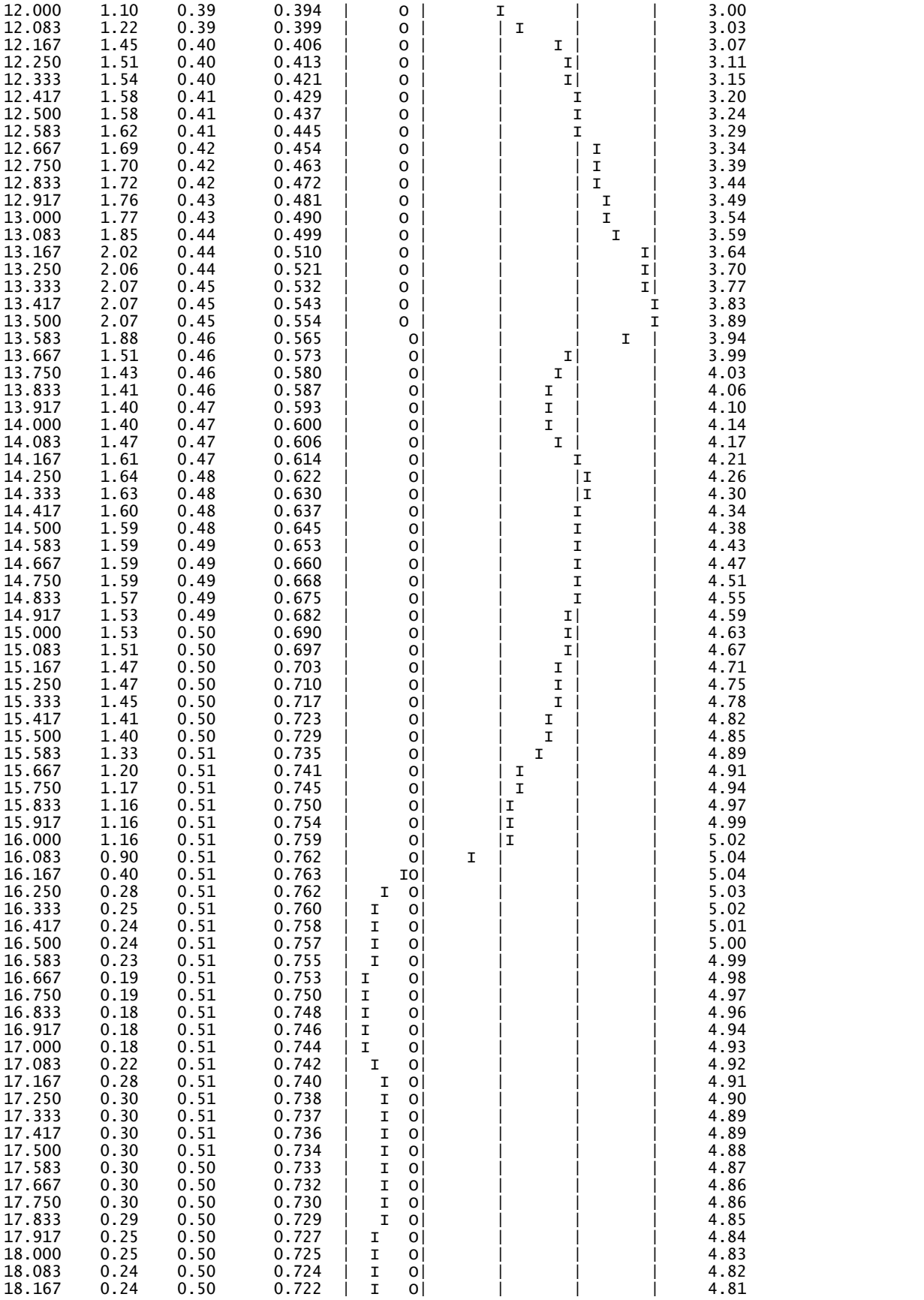
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.083	0.005	0.001	0.005	0.005
0.500	0.030	0.150	0.029	0.031
1.000	0.083	0.220	0.082	0.084
1.500	0.149	0.280	0.148	0.150
2.000	0.225	0.320	0.224	0.226
2.500	0.307	0.360	0.306	0.308
3.000	0.394	0.390	0.393	0.395
3.500	0.483	0.430	0.482	0.484
4.000	0.575	0.460	0.573	0.577
4.500	0.666	0.490	0.664	0.668
5.000	0.756	0.510	0.754	0.758
5.500	0.842	0.540	0.840	0.844
6.000	0.925	0.560	0.923	0.927
6.500	1.000	0.590	0.998	1.002
7.000	1.066	0.610	1.064	1.068
7.500	1.119	0.630	1.117	1.121
8.000	1.149	0.650	1.147	1.151

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.5	1.04	1.56	2.07	Depth (Ft.)
0.083	0.03	0.00	0.000	O					0.00
0.167	0.10	0.00	0.001	OI					0.01
0.250	0.12	0.00	0.001	OI					0.02
0.333	0.14	0.00	0.002	O I					0.04
0.417	0.17	0.00	0.003	O I					0.05
0.500	0.18	0.00	0.004	O I					0.07
0.583	0.18	0.01	0.006	O I					0.10
0.667	0.18	0.01	0.007	O I					0.12
0.750	0.18	0.02	0.008	O I					0.13
0.833	0.20	0.03	0.009	O I					0.15
0.917	0.23	0.03	0.011	O I					0.18
1.000	0.24	0.04	0.012	O I					0.20
1.083	0.23	0.05	0.013	O I					0.22
1.167	0.19	0.06	0.014	O I					0.24
1.250	0.19	0.06	0.015	O I					0.25
1.333	0.18	0.07	0.016	OI					0.27
1.417	0.18	0.07	0.017	OI					0.28
1.500	0.18	0.08	0.018	OI					0.29
1.583	0.18	0.08	0.018	OI					0.30
1.667	0.18	0.08	0.019	OI					0.32
1.750	0.18	0.09	0.020	OI					0.33
1.833	0.20	0.09	0.020	O I					0.34
1.917	0.23	0.10	0.021	O I					0.35
2.000	0.24	0.10	0.022	O I					0.37
2.083	0.24	0.11	0.023	O I					0.38
2.167	0.24	0.11	0.024	O I					0.40
2.250	0.24	0.12	0.025	O I					0.41
2.333	0.24	0.12	0.026	O I					0.43
2.417	0.24	0.13	0.026	O I					0.44
2.500	0.24	0.13	0.027	OI					0.45
2.583	0.26	0.14	0.028	O I					0.47
2.667	0.29	0.14	0.029	O I					0.48
2.750	0.30	0.15	0.030	O I					0.50
2.833	0.30	0.15	0.031	O I					0.51
2.917	0.30	0.15	0.032	O I					0.52
3.000	0.30	0.15	0.033	O I					0.53
3.083	0.30	0.16	0.034	O I					0.54
3.167	0.30	0.16	0.035	O I					0.55
3.250	0.30	0.16	0.036	O I					0.56
3.333	0.30	0.16	0.037	O I					0.57
3.417	0.30	0.16	0.038	O I					0.58
3.500	0.30	0.16	0.039	O I					0.59
3.583	0.30	0.16	0.040	O I					0.60
3.667	0.30	0.16	0.041	O I					0.61
3.750	0.30	0.17	0.042	O I					0.61
3.833	0.32	0.17	0.043	O I					0.62
3.917	0.36	0.17	0.044	O I					0.64
4.000	0.36	0.17	0.046	O I					0.65
4.083	0.37	0.17	0.047	O I					0.66
4.167	0.37	0.17	0.048	O I					0.67
4.250	0.37	0.18	0.050	O I					0.69
4.333	0.38	0.18	0.051	O I					0.70
4.417	0.42	0.18	0.053	O I					0.71
4.500	0.42	0.18	0.054	O I					0.73
4.583	0.43	0.18	0.056	O I					0.74
4.667	0.43	0.19	0.057	O I					0.76
4.750	0.43	0.19	0.059	O I					0.77
4.833	0.44	0.19	0.061	O I					0.79
4.917	0.48	0.19	0.063	O I					0.81
5.000	0.49	0.20	0.065	O I					0.83
5.083	0.45	0.20	0.067	O I					0.84
5.167	0.39	0.20	0.068	O I					0.86
5.250	0.37	0.20	0.069	O I					0.87
5.333	0.38	0.20	0.070	O I					0.88
5.417	0.42	0.21	0.072	O I					0.89
5.500	0.42	0.21	0.073	O I					0.91
5.583	0.44	0.21	0.075	O I					0.92
5.667	0.48	0.21	0.077	O I					0.94

5.750	0.49	0.21	0.078	o	I				0.96
5.833	0.49	0.22	0.080	o	I				0.97
5.917	0.49	0.22	0.082	o	I				0.99
6.000	0.49	0.22	0.084	o	I				1.01
6.083	0.51	0.22	0.086	o	I				1.02
6.167	0.54	0.22	0.088	o	I				1.04
6.250	0.55	0.23	0.090	o	I				1.05
6.333	0.55	0.23	0.092	o	I				1.07
6.417	0.55	0.23	0.095	o	I				1.09
6.500	0.55	0.23	0.097	o	I				1.10
6.583	0.57	0.23	0.099	o	I				1.12
6.667	0.60	0.24	0.101	o	I				1.14
6.750	0.61	0.24	0.104	o	I				1.16
6.833	0.61	0.24	0.106	o	I				1.18
6.917	0.61	0.24	0.109	o	I				1.20
7.000	0.61	0.25	0.111	o	I				1.22
7.083	0.61	0.25	0.114	o	I				1.23
7.167	0.61	0.25	0.116	o	I				1.25
7.250	0.61	0.25	0.119	o	I				1.27
7.333	0.63	0.25	0.121	o	I				1.29
7.417	0.66	0.26	0.124	o	I				1.31
7.500	0.67	0.26	0.127	o	I				1.33
7.583	0.69	0.26	0.130	o	I				1.35
7.667	0.72	0.27	0.133	o	I				1.38
7.750	0.73	0.27	0.136	o	I				1.40
7.833	0.75	0.27	0.139	o	I				1.43
7.917	0.78	0.27	0.143	o	I				1.45
8.000	0.79	0.28	0.146	o	I				1.48
8.083	0.83	0.28	0.150	o	I				1.50
8.167	0.89	0.28	0.154	o	I				1.53
8.250	0.91	0.28	0.158	o	I				1.56
8.333	0.91	0.29	0.162	o	I				1.59
8.417	0.91	0.29	0.167	o	I				1.62
8.500	0.91	0.29	0.171	o	I				1.64
8.583	0.93	0.29	0.175	o	I				1.67
8.667	0.97	0.30	0.180	o	I				1.70
8.750	0.97	0.30	0.184	o	I				1.73
8.833	0.99	0.30	0.189	o	I				1.76
8.917	1.03	0.30	0.194	o	I				1.80
9.000	1.03	0.31	0.199	o	I				1.83
9.083	1.07	0.31	0.204	o	I				1.86
9.167	1.14	0.31	0.210	o	I				1.90
9.250	1.15	0.31	0.215	o	I				1.94
9.333	1.17	0.32	0.221	o	I				1.97
9.417	1.21	0.32	0.227	o	I				2.01
9.500	1.22	0.32	0.233	o	I				2.05
9.583	1.24	0.33	0.239	o	I				2.09
9.667	1.27	0.33	0.246	o	I				2.13
9.750	1.28	0.33	0.252	o	I				2.17
9.833	1.30	0.34	0.259	o	I				2.21
9.917	1.33	0.34	0.266	o	I				2.25
10.000	1.34	0.34	0.272	o	I				2.29
10.083	1.22	0.35	0.279	o	I				2.33
10.167	0.99	0.35	0.284	o	I				2.36
10.250	0.93	0.35	0.288	o	I				2.39
10.333	0.92	0.35	0.292	o	I				2.41
10.417	0.91	0.35	0.296	o	I				2.43
10.500	0.91	0.36	0.300	o	I				2.46
10.583	1.00	0.36	0.304	o	I				2.48
10.667	1.17	0.36	0.309	o	I				2.51
10.750	1.21	0.36	0.315	o	I				2.54
10.833	1.22	0.36	0.321	o	I				2.58
10.917	1.22	0.37	0.327	o	I				2.61
11.000	1.22	0.37	0.332	o	I				2.65
11.083	1.20	0.37	0.338	o	I				2.68
11.167	1.17	0.37	0.344	o	I				2.71
11.250	1.16	0.37	0.349	o	I				2.74
11.333	1.16	0.38	0.355	o	I				2.77
11.417	1.16	0.38	0.360	o	I				2.80
11.500	1.16	0.38	0.365	o	I				2.84
11.583	1.12	0.38	0.371	o	I				2.87
11.667	1.06	0.38	0.375	o	I				2.89
11.750	1.04	0.39	0.380	o	I				2.92
11.833	1.06	0.39	0.385	o	I				2.95
11.917	1.09	0.39	0.389	o	I				2.97



18.250	0.24	0.50	0.720	| I o|	|	|	|	4.80
18.333	0.24	0.50	0.718	| I o|	|	|	|	4.79
18.417	0.24	0.50	0.716	| I o|	|	|	|	4.78
18.500	0.24	0.50	0.715	| I o|	|	|	|	4.77
18.583	0.23	0.50	0.713	| I o|	|	|	|	4.76
18.667	0.19	0.50	0.711	| I o|	|	|	|	4.75
18.750	0.19	0.50	0.709	| I o|	|	|	|	4.74
18.833	0.17	0.50	0.707	| I o|	|	|	|	4.73
18.917	0.13	0.50	0.704	| I o|	|	|	|	4.71
19.000	0.12	0.50	0.702	|I o|	|	|	|	4.70
19.083	0.14	0.50	0.699	| I o|	|	|	|	4.68
19.167	0.17	0.50	0.697	| I o|	|	|	|	4.67
19.250	0.18	0.50	0.694	| I o|	|	|	|	4.66
19.333	0.20	0.50	0.692	| I o|	|	|	|	4.65
19.417	0.23	0.50	0.690	| I o|	|	|	|	4.64
19.500	0.24	0.50	0.689	| I o|	|	|	|	4.63
19.583	0.23	0.49	0.687	| I o|	|	|	|	4.62
19.667	0.19	0.49	0.685	| I o|	|	|	|	4.61
19.750	0.19	0.49	0.683	| I o|	|	|	|	4.59
19.833	0.17	0.49	0.681	| I o|	|	|	|	4.58
19.917	0.13	0.49	0.678	| I o|	|	|	|	4.57
20.000	0.12	0.49	0.676	|I o|	|	|	|	4.55
20.083	0.14	0.49	0.673	| I o|	|	|	|	4.54
20.167	0.17	0.49	0.671	| I o|	|	|	|	4.53
20.250	0.18	0.49	0.669	| I o|	|	|	|	4.52
20.333	0.18	0.49	0.667	| I o|	|	|	|	4.50
20.417	0.18	0.49	0.665	| I o|	|	|	|	4.49
20.500	0.18	0.49	0.662	| I o|	|	|	|	4.48
20.583	0.18	0.49	0.660	| I o|	|	|	|	4.47
20.667	0.18	0.49	0.658	| I o|	|	|	|	4.46
20.750	0.18	0.49	0.656	| I o|	|	|	|	4.45
20.833	0.17	0.49	0.654	| I o|	|	|	|	4.43
20.917	0.13	0.49	0.652	| I o|	|	|	|	4.42
21.000	0.12	0.48	0.649	|I o|	|	|	|	4.41
21.083	0.14	0.48	0.647	| I o|	|	|	|	4.39
21.167	0.17	0.48	0.645	| I o|	|	|	|	4.38
21.250	0.18	0.48	0.642	| I o|	|	|	|	4.37
21.333	0.16	0.48	0.640	| I o|	|	|	|	4.36
21.417	0.13	0.48	0.638	| I o|	|	|	|	4.35
21.500	0.12	0.48	0.636	|I o|	|	|	|	4.33
21.583	0.14	0.48	0.633	| I o|	|	|	|	4.32
21.667	0.17	0.48	0.631	| I o|	|	|	|	4.31
21.750	0.18	0.48	0.629	| I o|	|	|	|	4.30
21.833	0.16	0.48	0.627	| I o|	|	|	|	4.28
21.917	0.13	0.48	0.625	| I o|	|	|	|	4.27
22.000	0.12	0.48	0.622	|I o|	|	|	|	4.26
22.083	0.14	0.47	0.620	| I o|	|	|	|	4.25
22.167	0.17	0.47	0.618	| I o|	|	|	|	4.23
22.250	0.18	0.47	0.616	| I o|	|	|	|	4.22
22.333	0.16	0.47	0.614	| I o|	|	|	|	4.21
22.417	0.13	0.47	0.611	| I o|	|	|	|	4.20
22.500	0.12	0.47	0.609	|I o|	|	|	|	4.19
22.583	0.12	0.47	0.607	|I o|	|	|	|	4.17
22.667	0.12	0.47	0.604	|I o|	|	|	|	4.16
22.750	0.12	0.47	0.602	|I o|	|	|	|	4.15
22.833	0.12	0.47	0.599	|I o|	|	|	|	4.13
22.917	0.12	0.47	0.597	|I o|	|	|	|	4.12
23.000	0.12	0.47	0.595	|I o|	|	|	|	4.11
23.083	0.12	0.47	0.592	|I o|	|	|	|	4.09
23.167	0.12	0.46	0.590	|I o|	|	|	|	4.08
23.250	0.12	0.46	0.587	|I o|	|	|	|	4.07
23.333	0.12	0.46	0.585	|I o|	|	|	|	4.06
23.417	0.12	0.46	0.583	|I o|	|	|	|	4.04
23.500	0.12	0.46	0.580	|I o|	|	|	|	4.03
23.583	0.12	0.46	0.578	|I o|	|	|	|	4.02
23.667	0.12	0.46	0.576	|I o|	|	|	|	4.00
23.750	0.12	0.46	0.573	|I o|	|	|	|	3.99
23.833	0.12	0.46	0.571	|I o|	|	|	|	3.98
23.917	0.12	0.46	0.569	|I o|	|	|	|	3.97
24.000	0.12	0.46	0.567	|I o|	|	|	|	3.95
24.083	0.09	0.46	0.564	|I o|	|	|	|	3.94
24.167	0.02	0.46	0.561	I o|	|	|	|	3.93
24.250	0.00	0.45	0.558	I o|	|	|	|	3.91
24.333	0.00	0.45	0.555	I o |	|	|	|	3.89
24.417	0.00	0.45	0.552	I o |	|	|	|	3.88

24.500	0.00	0.45	0.549	I	o	|	|	|	3.86
24.583	0.00	0.45	0.546	I	o	|	|	|	3.84
24.667	0.00	0.45	0.543	I	o	|	|	|	3.82
24.750	0.00	0.45	0.540	I	o	|	|	|	3.81
24.833	0.00	0.45	0.537	I	o	|	|	|	3.79
24.917	0.00	0.45	0.533	I	o	|	|	|	3.77
25.000	0.00	0.45	0.530	I	o	|	|	|	3.76
25.083	0.00	0.44	0.527	I	o	|	|	|	3.74
25.167	0.00	0.44	0.524	I	o	|	|	|	3.72
25.250	0.00	0.44	0.521	I	o	|	|	|	3.71
25.333	0.00	0.44	0.518	I	o	|	|	|	3.69
25.417	0.00	0.44	0.515	I	o	|	|	|	3.67
25.500	0.00	0.44	0.512	I	o	|	|	|	3.66
25.583	0.00	0.44	0.509	I	o	|	|	|	3.64
25.667	0.00	0.44	0.506	I	o	|	|	|	3.63
25.750	0.00	0.44	0.503	I	o	|	|	|	3.61
25.833	0.00	0.44	0.500	I	o	|	|	|	3.59
25.917	0.00	0.43	0.497	I	o	|	|	|	3.58
26.000	0.00	0.43	0.494	I	o	|	|	|	3.56
26.083	0.00	0.43	0.491	I	o	|	|	|	3.54
26.167	0.00	0.43	0.488	I	o	|	|	|	3.53
26.250	0.00	0.43	0.485	I	o	|	|	|	3.51
26.333	0.00	0.43	0.482	I	o	|	|	|	3.50
26.417	0.00	0.43	0.479	I	o	|	|	|	3.48
26.500	0.00	0.43	0.476	I	o	|	|	|	3.46
26.583	0.00	0.43	0.473	I	o	|	|	|	3.45
26.667	0.00	0.42	0.470	I	o	|	|	|	3.43
26.750	0.00	0.42	0.467	I	o	|	|	|	3.41
26.833	0.00	0.42	0.465	I	o	|	|	|	3.40
26.917	0.00	0.42	0.462	I	o	|	|	|	3.38
27.000	0.00	0.42	0.459	I	o	|	|	|	3.36
27.083	0.00	0.42	0.456	I	o	|	|	|	3.35
27.167	0.00	0.42	0.453	I	o	|	|	|	3.33
27.250	0.00	0.42	0.450	I	o	|	|	|	3.32
27.333	0.00	0.41	0.447	I	o	|	|	|	3.30
27.417	0.00	0.41	0.444	I	o	|	|	|	3.28
27.500	0.00	0.41	0.442	I	o	|	|	|	3.27
27.583	0.00	0.41	0.439	I	o	|	|	|	3.25
27.667	0.00	0.41	0.436	I	o	|	|	|	3.24
27.750	0.00	0.41	0.433	I	o	|	|	|	3.22
27.833	0.00	0.41	0.430	I	o	|	|	|	3.20
27.917	0.00	0.41	0.428	I	o	|	|	|	3.19
28.000	0.00	0.40	0.425	I	o	|	|	|	3.17
28.083	0.00	0.40	0.422	I	o	|	|	|	3.16
28.167	0.00	0.40	0.419	I	o	|	|	|	3.14
28.250	0.00	0.40	0.416	I	o	|	|	|	3.13
28.333	0.00	0.40	0.414	I	o	|	|	|	3.11
28.417	0.00	0.40	0.411	I	o	|	|	|	3.10
28.500	0.00	0.40	0.408	I	o	|	|	|	3.08
28.583	0.00	0.40	0.406	I	o	|	|	|	3.06
28.667	0.00	0.39	0.403	I	o	|	|	|	3.05
28.750	0.00	0.39	0.400	I	o	|	|	|	3.03
28.833	0.00	0.39	0.397	I	o	|	|	|	3.02
28.917	0.00	0.39	0.395	I	o	|	|	|	3.00
29.000	0.00	0.39	0.392	I	o	|	|	|	2.99
29.083	0.00	0.39	0.389	I	o	|	|	|	2.97
29.167	0.00	0.39	0.387	I	o	|	|	|	2.96
29.250	0.00	0.39	0.384	I	o	|	|	|	2.94
29.333	0.00	0.39	0.381	I	o	|	|	|	2.93
29.417	0.00	0.38	0.379	I	o	|	|	|	2.91
29.500	0.00	0.38	0.376	I	o	|	|	|	2.90
29.583	0.00	0.38	0.373	I	o	|	|	|	2.88
29.667	0.00	0.38	0.371	I	o	|	|	|	2.87
29.750	0.00	0.38	0.368	I	o	|	|	|	2.85
29.833	0.00	0.38	0.366	I	o	|	|	|	2.84
29.917	0.00	0.38	0.363	I	o	|	|	|	2.82
30.000	0.00	0.38	0.360	I	o	|	|	|	2.81
30.083	0.00	0.38	0.358	I	o	|	|	|	2.79
30.167	0.00	0.38	0.355	I	o	|	|	|	2.78
30.250	0.00	0.38	0.353	I	o	|	|	|	2.76
30.333	0.00	0.37	0.350	I	o	|	|	|	2.75
30.417	0.00	0.37	0.347	I	o	|	|	|	2.73
30.500	0.00	0.37	0.345	I	o	|	|	|	2.72
30.583	0.00	0.37	0.342	I	o	|	|	|	2.70
30.667	0.00	0.37	0.340	I	o	|	|	|	2.69

30.750	0.00	0.37	0.337	I	o	|	|	|	|	2.67
30.833	0.00	0.37	0.335	I	o	|	|	|	|	2.66
30.917	0.00	0.37	0.332	I	o	|	|	|	|	2.64
31.000	0.00	0.37	0.329	I	o	|	|	|	|	2.63
31.083	0.00	0.37	0.327	I	o	|	|	|	|	2.61
31.167	0.00	0.37	0.324	I	o	|	|	|	|	2.60
31.250	0.00	0.37	0.322	I	o	|	|	|	|	2.59
31.333	0.00	0.36	0.319	I	o	|	|	|	|	2.57
31.417	0.00	0.36	0.317	I	o	|	|	|	|	2.56
31.500	0.00	0.36	0.314	I	o	|	|	|	|	2.54
31.583	0.00	0.36	0.312	I	o	|	|	|	|	2.53
31.667	0.00	0.36	0.309	I	o	|	|	|	|	2.51
31.750	0.00	0.36	0.307	I	o	|	|	|	|	2.50
31.833	0.00	0.36	0.304	I	o	|	|	|	|	2.48
31.917	0.00	0.36	0.302	I	o	|	|	|	|	2.47
32.000	0.00	0.36	0.300	I	o	|	|	|	|	2.45
32.083	0.00	0.36	0.297	I	o	|	|	|	|	2.44
32.167	0.00	0.35	0.295	I	o	|	|	|	|	2.42
32.250	0.00	0.35	0.292	I	o	|	|	|	|	2.41
32.333	0.00	0.35	0.290	I	o	|	|	|	|	2.39
32.417	0.00	0.35	0.287	I	o	|	|	|	|	2.38
32.500	0.00	0.35	0.285	I	o	|	|	|	|	2.37
32.583	0.00	0.35	0.283	I	o	|	|	|	|	2.35
32.667	0.00	0.35	0.280	I	o	|	|	|	|	2.34
32.750	0.00	0.35	0.278	I	o	|	|	|	|	2.32
32.833	0.00	0.34	0.275	I	o	|	|	|	|	2.31
32.917	0.00	0.34	0.273	I	o	|	|	|	|	2.29
33.000	0.00	0.34	0.271	I	o	|	|	|	|	2.28
33.083	0.00	0.34	0.268	I	o	|	|	|	|	2.26
33.167	0.00	0.34	0.266	I	o	|	|	|	|	2.25
33.250	0.00	0.34	0.264	I	o	|	|	|	|	2.24
33.333	0.00	0.34	0.261	I	o	|	|	|	|	2.22
33.417	0.00	0.34	0.259	I	o	|	|	|	|	2.21
33.500	0.00	0.34	0.257	I	o	|	|	|	|	2.19
33.583	0.00	0.33	0.254	I	o	|	|	|	|	2.18
33.667	0.00	0.33	0.252	I	o	|	|	|	|	2.16
33.750	0.00	0.33	0.250	I	o	|	|	|	|	2.15
33.833	0.00	0.33	0.247	I	o	|	|	|	|	2.14
33.917	0.00	0.33	0.245	I	o	|	|	|	|	2.12
34.000	0.00	0.33	0.243	I	o	|	|	|	|	2.11
34.083	0.00	0.33	0.241	I	o	|	|	|	|	2.10
34.167	0.00	0.33	0.238	I	o	|	|	|	|	2.08
34.250	0.00	0.33	0.236	I	o	|	|	|	|	2.07
34.333	0.00	0.32	0.234	I	o	|	|	|	|	2.05
34.417	0.00	0.32	0.232	I	o	|	|	|	|	2.04
34.500	0.00	0.32	0.229	I	o	|	|	|	|	2.03
34.583	0.00	0.32	0.227	I	o	|	|	|	|	2.01
34.667	0.00	0.32	0.225	I	o	|	|	|	|	2.00
34.750	0.00	0.32	0.223	I	o	|	|	|	|	1.99
34.833	0.00	0.32	0.221	I	o	|	|	|	|	1.97
34.917	0.00	0.32	0.218	I	o	|	|	|	|	1.96
35.000	0.00	0.32	0.216	I	o	|	|	|	|	1.94
35.083	0.00	0.31	0.214	I	o	|	|	|	|	1.93
35.167	0.00	0.31	0.212	I	o	|	|	|	|	1.91
35.250	0.00	0.31	0.210	I	o	|	|	|	|	1.90
35.333	0.00	0.31	0.208	I	o	|	|	|	|	1.89
35.417	0.00	0.31	0.206	I	o	|	|	|	|	1.87
35.500	0.00	0.31	0.203	I	o	|	|	|	|	1.86
35.583	0.00	0.31	0.201	I	o	|	|	|	|	1.84
35.667	0.00	0.31	0.199	I	o	|	|	|	|	1.83
35.750	0.00	0.31	0.197	I	o	|	|	|	|	1.82
35.833	0.00	0.30	0.195	I	o	|	|	|	|	1.80
35.917	0.00	0.30	0.193	I	o	|	|	|	|	1.79
36.000	0.00	0.30	0.191	I	o	|	|	|	|	1.78
36.083	0.00	0.30	0.189	I	o	|	|	|	|	1.76
36.167	0.00	0.30	0.187	I	o	|	|	|	|	1.75
36.250	0.00	0.30	0.185	I	o	|	|	|	|	1.73
36.333	0.00	0.30	0.183	I	o	|	|	|	|	1.72
36.417	0.00	0.30	0.180	I	o	|	|	|	|	1.71
36.500	0.00	0.30	0.178	I	o	|	|	|	|	1.69
36.583	0.00	0.29	0.176	I	o	|	|	|	|	1.68
36.667	0.00	0.29	0.174	I	o	|	|	|	|	1.67
36.750	0.00	0.29	0.172	I	o	|	|	|	|	1.65
36.833	0.00	0.29	0.170	I	o	|	|	|	|	1.64
36.917	0.00	0.29	0.168	I	o	|	|	|	|	1.63

37.000	0.00	0.29	0.166	I	o	|	|	|	1.61
37.083	0.00	0.29	0.164	I	o	|	|	|	1.60
37.167	0.00	0.29	0.162	I	o	|	|	|	1.59
37.250	0.00	0.29	0.160	I	o	|	|	|	1.58
37.333	0.00	0.28	0.158	I	o	|	|	|	1.56
37.417	0.00	0.28	0.157	I	o	|	|	|	1.55
37.500	0.00	0.28	0.155	I	o	|	|	|	1.54
37.583	0.00	0.28	0.153	I	o	|	|	|	1.52
37.667	0.00	0.28	0.151	I	o	|	|	|	1.51
37.750	0.00	0.28	0.149	I	o	|	|	|	1.50
37.833	0.00	0.28	0.147	I	o	|	|	|	1.48
37.917	0.00	0.28	0.145	I	o	|	|	|	1.47
38.000	0.00	0.27	0.143	I	o	|	|	|	1.45
38.083	0.00	0.27	0.141	I	o	|	|	|	1.44
38.167	0.00	0.27	0.139	I	o	|	|	|	1.43
38.250	0.00	0.27	0.137	I	o	|	|	|	1.41
38.333	0.00	0.27	0.136	I	o	|	|	|	1.40
38.417	0.00	0.27	0.134	I	o	|	|	|	1.38
38.500	0.00	0.26	0.132	I	o	|	|	|	1.37
38.583	0.00	0.26	0.130	I	o	|	|	|	1.36
38.667	0.00	0.26	0.128	I	o	|	|	|	1.34
38.750	0.00	0.26	0.126	I	o	|	|	|	1.33
38.833	0.00	0.26	0.125	I	o	|	|	|	1.32
38.917	0.00	0.26	0.123	I	o	|	|	|	1.30
39.000	0.00	0.25	0.121	I	o	|	|	|	1.29
39.083	0.00	0.25	0.119	I	o	|	|	|	1.28
39.167	0.00	0.25	0.118	I	o	|	|	|	1.26
39.250	0.00	0.25	0.116	I	o	|	|	|	1.25
39.333	0.00	0.25	0.114	I	o	|	|	|	1.24
39.417	0.00	0.25	0.113	I	o	|	|	|	1.22
39.500	0.00	0.25	0.111	I	o	|	|	|	1.21
39.583	0.00	0.24	0.109	I	o	|	|	|	1.20
39.667	0.00	0.24	0.107	I	o	|	|	|	1.19
39.750	0.00	0.24	0.106	I	o	|	|	|	1.17
39.833	0.00	0.24	0.104	I	o	|	|	|	1.16
39.917	0.00	0.24	0.103	I	o	|	|	|	1.15
40.000	0.00	0.24	0.101	I	o	|	|	|	1.14
40.083	0.00	0.23	0.099	I	o	|	|	|	1.12
40.167	0.00	0.23	0.098	I	o	|	|	|	1.11
40.250	0.00	0.23	0.096	I	o	|	|	|	1.10
40.333	0.00	0.23	0.094	I	o	|	|	|	1.09
40.417	0.00	0.23	0.093	I	o	|	|	|	1.07
40.500	0.00	0.23	0.091	I	o	|	|	|	1.06
40.583	0.00	0.23	0.090	I	o	|	|	|	1.05
40.667	0.00	0.22	0.088	I	o	|	|	|	1.04
40.750	0.00	0.22	0.087	I	o	|	|	|	1.03
40.833	0.00	0.22	0.085	I	o	|	|	|	1.02
40.917	0.00	0.22	0.084	I	o	|	|	|	1.00
41.000	0.00	0.22	0.082	I	o	|	|	|	0.99
41.083	0.00	0.22	0.081	I	o	|	|	|	0.98
41.167	0.00	0.21	0.079	I	o	|	|	|	0.96
41.250	0.00	0.21	0.078	I	o	|	|	|	0.95
41.333	0.00	0.21	0.076	I	o	|	|	|	0.94
41.417	0.00	0.21	0.075	I	o	|	|	|	0.92
41.500	0.00	0.21	0.073	I	o	|	|	|	0.91
41.583	0.00	0.21	0.072	I	o	|	|	|	0.89
41.667	0.00	0.20	0.070	I	o	|	|	|	0.88
41.750	0.00	0.20	0.069	I	o	|	|	|	0.87
41.833	0.00	0.20	0.068	I	o	|	|	|	0.86
41.917	0.00	0.20	0.066	I	o	|	|	|	0.84
42.000	0.00	0.20	0.065	I	o	|	|	|	0.83
42.083	0.00	0.19	0.064	I	o	|	|	|	0.82
42.167	0.00	0.19	0.062	I	o	|	|	|	0.80
42.250	0.00	0.19	0.061	I	o	|	|	|	0.79
42.333	0.00	0.19	0.060	I	o	|	|	|	0.78
42.417	0.00	0.19	0.058	I	o	|	|	|	0.77
42.500	0.00	0.19	0.057	I	o	|	|	|	0.76
42.583	0.00	0.18	0.056	I	o	|	|	|	0.74
42.667	0.00	0.18	0.055	I	o	|	|	|	0.73
42.750	0.00	0.18	0.053	I	o	|	|	|	0.72
42.833	0.00	0.18	0.052	I	o	|	|	|	0.71
42.917	0.00	0.18	0.051	I	o	|	|	|	0.70
43.000	0.00	0.18	0.050	I	o	|	|	|	0.68
43.083	0.00	0.17	0.048	I	o	|	|	|	0.67
43.167	0.00	0.17	0.047	I	o	|	|	|	0.66

43.250	0.00	0.17	0.046	I O	|	|	|	0.65
43.333	0.00	0.17	0.045	I O	|	|	|	0.64
43.417	0.00	0.17	0.044	I O	|	|	|	0.63
43.500	0.00	0.17	0.043	I O	|	|	|	0.62
43.583	0.00	0.17	0.041	I O	|	|	|	0.61
43.667	0.00	0.16	0.040	I O	|	|	|	0.60
43.750	0.00	0.16	0.039	I O	|	|	|	0.59
43.833	0.00	0.16	0.038	I O	|	|	|	0.58
43.917	0.00	0.16	0.037	I O	|	|	|	0.57
44.000	0.00	0.16	0.036	I O	|	|	|	0.55
44.083	0.00	0.16	0.035	I O	|	|	|	0.54
44.167	0.00	0.15	0.034	I O	|	|	|	0.53
44.250	0.00	0.15	0.033	I O	|	|	|	0.52
44.333	0.00	0.15	0.032	I O	|	|	|	0.51
44.417	0.00	0.15	0.031	I O	|	|	|	0.50
44.500	0.00	0.15	0.029	I O	|	|	|	0.49
44.583	0.00	0.14	0.028	I O	|	|	|	0.47
44.667	0.00	0.14	0.028	I O	|	|	|	0.46
44.750	0.00	0.13	0.027	I O	|	|	|	0.44
44.833	0.00	0.12	0.026	IO	|	|	|	0.43
44.917	0.00	0.12	0.025	IO	|	|	|	0.42
45.000	0.00	0.11	0.024	IO	|	|	|	0.40
45.083	0.00	0.11	0.023	IO	|	|	|	0.39
45.167	0.00	0.11	0.023	IO	|	|	|	0.38
45.250	0.00	0.10	0.022	IO	|	|	|	0.36
45.333	0.00	0.10	0.021	IO	|	|	|	0.35
45.417	0.00	0.09	0.021	IO	|	|	|	0.34
45.500	0.00	0.09	0.020	IO	|	|	|	0.33
45.583	0.00	0.09	0.019	IO	|	|	|	0.32
45.667	0.00	0.08	0.019	IO	|	|	|	0.31
45.750	0.00	0.08	0.018	IO	|	|	|	0.30
45.833	0.00	0.08	0.018	IO	|	|	|	0.29
45.917	0.00	0.07	0.017	IO	|	|	|	0.28
46.000	0.00	0.07	0.017	IO	|	|	|	0.28
46.083	0.00	0.07	0.016	IO	|	|	|	0.27
46.167	0.00	0.06	0.016	O	|	|	|	0.26
46.250	0.00	0.06	0.015	O	|	|	|	0.25
46.333	0.00	0.06	0.015	O	|	|	|	0.25
46.417	0.00	0.06	0.014	O	|	|	|	0.24
46.500	0.00	0.05	0.014	O	|	|	|	0.23
46.583	0.00	0.05	0.014	O	|	|	|	0.23
46.667	0.00	0.05	0.013	O	|	|	|	0.22
46.750	0.00	0.05	0.013	O	|	|	|	0.22
46.833	0.00	0.05	0.013	O	|	|	|	0.21
46.917	0.00	0.04	0.012	O	|	|	|	0.21
47.000	0.00	0.04	0.012	O	|	|	|	0.20
47.083	0.00	0.04	0.012	O	|	|	|	0.20
47.167	0.00	0.04	0.011	O	|	|	|	0.19
47.250	0.00	0.04	0.011	O	|	|	|	0.19
47.333	0.00	0.04	0.011	O	|	|	|	0.18
47.417	0.00	0.03	0.011	O	|	|	|	0.18
47.500	0.00	0.03	0.010	O	|	|	|	0.17
47.583	0.00	0.03	0.010	O	|	|	|	0.17
47.667	0.00	0.03	0.010	O	|	|	|	0.17
47.750	0.00	0.03	0.010	O	|	|	|	0.16
47.833	0.00	0.03	0.010	O	|	|	|	0.16
47.917	0.00	0.03	0.009	O	|	|	|	0.16
48.000	0.00	0.03	0.009	O	|	|	|	0.15
48.083	0.00	0.03	0.009	O	|	|	|	0.15
48.167	0.00	0.02	0.009	O	|	|	|	0.15
48.250	0.00	0.02	0.009	O	|	|	|	0.15
48.333	0.00	0.02	0.009	O	|	|	|	0.14
48.417	0.00	0.02	0.008	O	|	|	|	0.14
48.500	0.00	0.02	0.008	O	|	|	|	0.14
48.583	0.00	0.02	0.008	O	|	|	|	0.14
48.667	0.00	0.02	0.008	O	|	|	|	0.13
48.750	0.00	0.02	0.008	O	|	|	|	0.13
48.833	0.00	0.02	0.008	O	|	|	|	0.13
48.917	0.00	0.02	0.008	O	|	|	|	0.13
49.000	0.00	0.02	0.008	O	|	|	|	0.13
49.083	0.00	0.02	0.007	O	|	|	|	0.12
49.167	0.00	0.01	0.007	O	|	|	|	0.12
49.250	0.00	0.01	0.007	O	|	|	|	0.12
49.333	0.00	0.01	0.007	O	|	|	|	0.12
49.417	0.00	0.01	0.007	O	|	|	|	0.12

49.500	0.00	0.01	0.007	o	|	|	|	|	0.12
49.583	0.00	0.01	0.007	o	|	|	|	|	0.11
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49.917	0.00	0.01	0.007	o	|	|	|	|	0.11
50.000	0.00	0.01	0.006	o	|	|	|	|	0.11
50.083	0.00	0.01	0.006	o	|	|	|	|	0.11
50.167	0.00	0.01	0.006	o	|	|	|	|	0.11
50.250	0.00	0.01	0.006	o	|	|	|	|	0.10
50.333	0.00	0.01	0.006	o	|	|	|	|	0.10
50.417	0.00	0.01	0.006	o	|	|	|	|	0.10
50.500	0.00	0.01	0.006	o	|	|	|	|	0.10
50.583	0.00	0.01	0.006	o	|	|	|	|	0.10
50.667	0.00	0.01	0.006	o	|	|	|	|	0.10
50.750	0.00	0.01	0.006	o	|	|	|	|	0.10
50.833	0.00	0.01	0.006	o	|	|	|	|	0.10
50.917	0.00	0.01	0.006	o	|	|	|	|	0.10
51.000	0.00	0.01	0.006	o	|	|	|	|	0.10
51.083	0.00	0.01	0.006	o	|	|	|	|	0.10
51.167	0.00	0.01	0.006	o	|	|	|	|	0.10
51.250	0.00	0.01	0.006	o	|	|	|	|	0.09
51.333	0.00	0.01	0.006	o	|	|	|	|	0.09
51.417	0.00	0.00	0.006	o	|	|	|	|	0.09
51.500	0.00	0.00	0.006	o	|	|	|	|	0.09
51.583	0.00	0.00	0.006	o	|	|	|	|	0.09
51.667	0.00	0.00	0.006	o	|	|	|	|	0.09
51.750	0.00	0.00	0.006	o	|	|	|	|	0.09
51.833	0.00	0.00	0.005	o	|	|	|	|	0.09
51.917	0.00	0.00	0.005	o	|	|	|	|	0.09
52.000	0.00	0.00	0.005	o	|	|	|	|	0.09
52.083	0.00	0.00	0.005	o	|	|	|	|	0.09
52.167	0.00	0.00	0.005	o	|	|	|	|	0.09
52.250	0.00	0.00	0.005	o	|	|	|	|	0.09
52.333	0.00	0.00	0.005	o	|	|	|	|	0.09
52.417	0.00	0.00	0.005	o	|	|	|	|	0.09
52.500	0.00	0.00	0.005	o	|	|	|	|	0.09
52.583	0.00	0.00	0.005	o	|	|	|	|	0.09
52.667	0.00	0.00	0.005	o	|	|	|	|	0.09
52.750	0.00	0.00	0.005	o	|	|	|	|	0.09
52.833	0.00	0.00	0.005	o	|	|	|	|	0.09
52.917	0.00	0.00	0.005	o	|	|	|	|	0.09
53.000	0.00	0.00	0.005	o	|	|	|	|	0.09
53.083	0.00	0.00	0.005	o	|	|	|	|	0.09
53.167	0.00	0.00	0.005	o	|	|	|	|	0.09
53.250	0.00	0.00	0.005	o	|	|	|	|	0.09
53.333	0.00	0.00	0.005	o	|	|	|	|	0.09
53.417	0.00	0.00	0.005	o	|	|	|	|	0.09
53.500	0.00	0.00	0.005	o	|	|	|	|	0.09
53.583	0.00	0.00	0.005	o	|	|	|	|	0.08
53.667	0.00	0.00	0.005	o	|	|	|	|	0.08
53.750	0.00	0.00	0.005	o	|	|	|	|	0.08
53.833	0.00	0.00	0.005	o	|	|	|	|	0.08
53.917	0.00	0.00	0.005	o	|	|	|	|	0.08
54.000	0.00	0.00	0.005	o	|	|	|	|	0.08
54.083	0.00	0.00	0.005	o	|	|	|	|	0.08
54.167	0.00	0.00	0.005	o	|	|	|	|	0.08
54.250	0.00	0.00	0.005	o	|	|	|	|	0.08
54.333	0.00	0.00	0.005	o	|	|	|	|	0.08
54.417	0.00	0.00	0.005	o	|	|	|	|	0.08
54.500	0.00	0.00	0.005	o	|	|	|	|	0.08
54.583	0.00	0.00	0.005	o	|	|	|	|	0.08
54.667	0.00	0.00	0.005	o	|	|	|	|	0.08

Remaining water in basin = 0.00 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 656
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.513 (CFS)
Total volume = 1.255 (Ac.Ft)

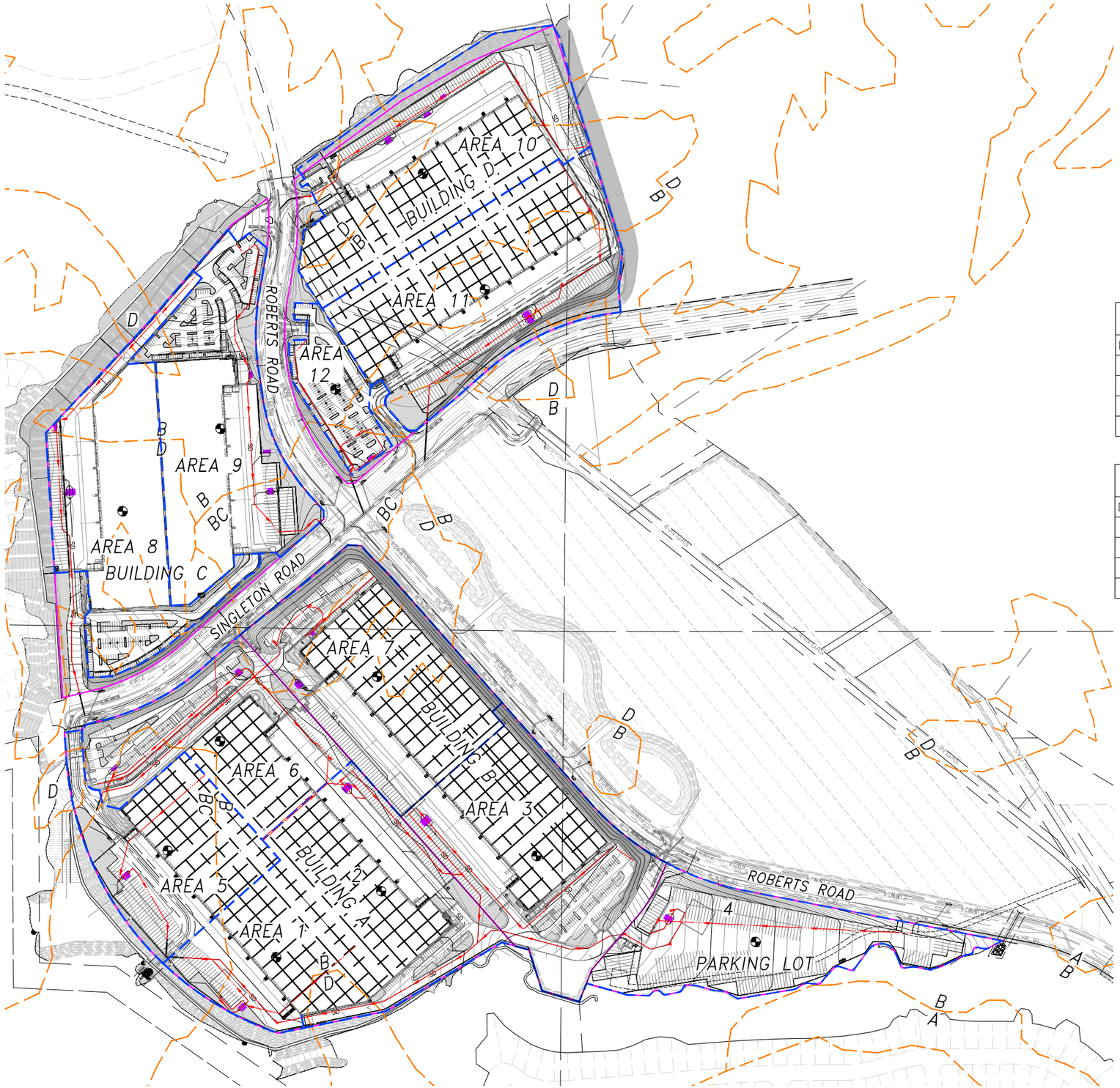
Status of hydrographs being held in storage

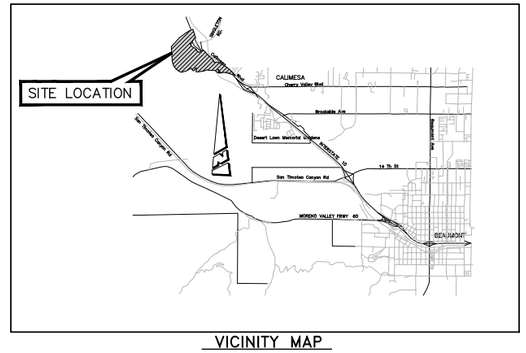
Stream 1	Stream 2	Stream 3	Stream 4	Stream 5

Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

UNIT HYDROGRAPH HYDROLOGY MAP





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

PROPOSED AREAS						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA	6.8 AC	9.5 AC	12.3 AC	9.2 AC	8.1 AC	9.0 AC
L_T	1116 Ft	2462 Ft	2287 Ft	3348 Ft	899 Ft	1634 Ft
L_{CA}	860 Ft	2251 Ft	2251 Ft	2754 Ft	602 Ft	512 Ft
ΔH	6.5 Ft	6.50 Ft	9.30 Ft	37.50 Ft	6.50	3.70 Ft

PROPOSED AREAS						
DRAINAGE AREA	7	8	9	10	11	12
TOTAL AREA	12.5 AC	11.2 AC	12.1 AC	14.1 AC	14.1 AC	2.9 AC
L_T	1378 Ft	1821 Ft	1395 Ft	1473 Ft	1370 Ft	621 Ft
L_{CA}	1136 Ft	683 Ft	552 Ft	540 Ft	486 Ft	341 Ft
ΔH	3.3 Ft	29.30 Ft	18 Ft	7 Ft	2.80 Ft	9 Ft

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION (FT)
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY (PROPOSED)
- FLOWLINE (PROPOSED)
- PROJECT BOUNDARY
- NRCS SOIL BOUNDARY

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
W WEBB E
S

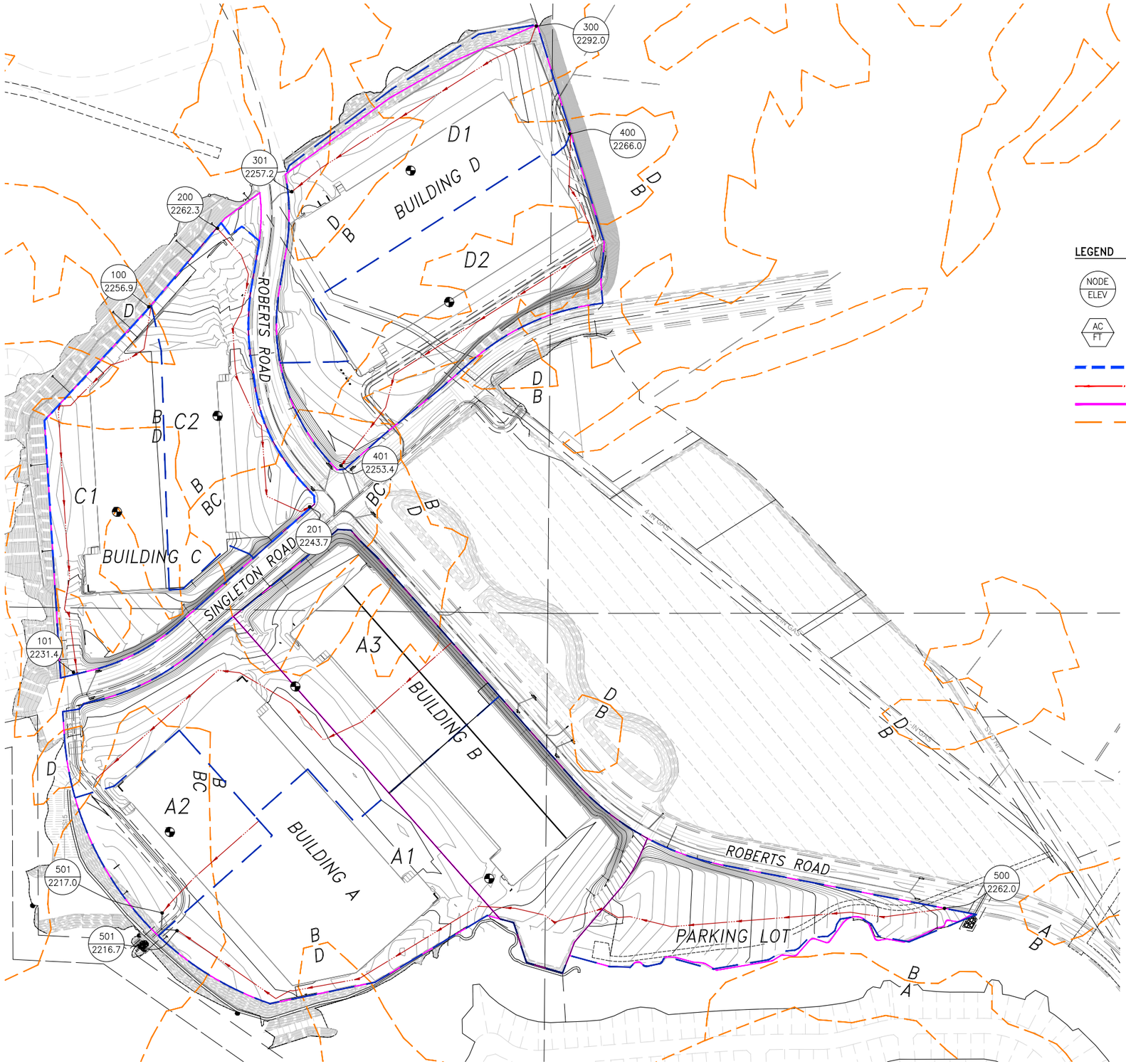
1" = 200'
200 0 200 400 600

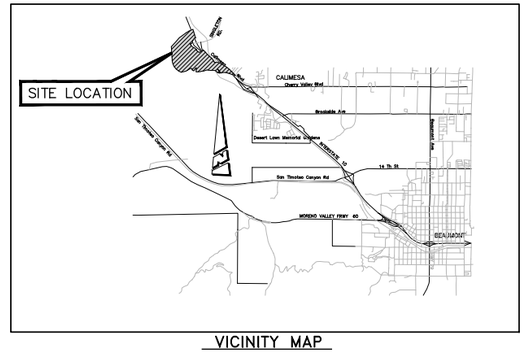
CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
PRELIMINARY PROPOSED UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

H:\2021\21-0034\DRAINAGE\PHYD\DWG FOLDER\21-0034 PRELIM UH MAP 2021-11-23.DWG 12/8/2021 9:34:58 AM





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

LEGEND

NODE / ELEV	– NODE NUMBER – ELEVATION (FT)
AC / FT	– AREA (AC) – LENGTH (FT)
	– DRAINAGE AREA BOUNDARY
	– FLOWLINE (PROPOSED)
	– PROJECT BOUNDARY
	– NRCS SOIL BOUNDARY

EXISTING AREAS			
DRAINAGE AREA	A1	A2	A3
TOTAL AREA	37.7 AC	7.5 AC	21.7 AC
L_T	3231 Ft	526 Ft	1790 Ft
L_{CA}	1394 Ft	234 Ft	939 Ft
ΔH	45.0 Ft	7 Ft	23 Ft

EXISTING AREAS		
DRAINAGE AREA	C1	C2
TOTAL AREA	13.2 AC	11.8 AC
L_T	1645 Ft	1321 Ft
L_{CA}	629 Ft	574 Ft
ΔH	25.0 Ft	19 Ft

EXISTING AREAS		
DRAINAGE AREA	D1	D2
TOTAL AREA	15.8 AC	16.9 AC
L_T	1174 Ft	1828 Ft
L_{CA}	440 Ft	756 Ft
ΔH	35.0 Ft	13 Ft

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
W WEBB E
S

1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
EXISTING UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	W.O.	21-0034
DATE:	12/14/2020	SHEET	1
DESIGNED:	EP	OF	1 SHEETS
CHECKED:	BJV	DWG. NO.	
PLN CK REF:			
F.B.			

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

H:\2021\21-0034\DRAINAGE\PHYD\DWG FOLDER\21-0034 PRELIM UH MAP 2021-11-23.DWG 12/6/2021 4:30:41 PM

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be provided during Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided during Final Engineering

FOR REVIEW ONLY

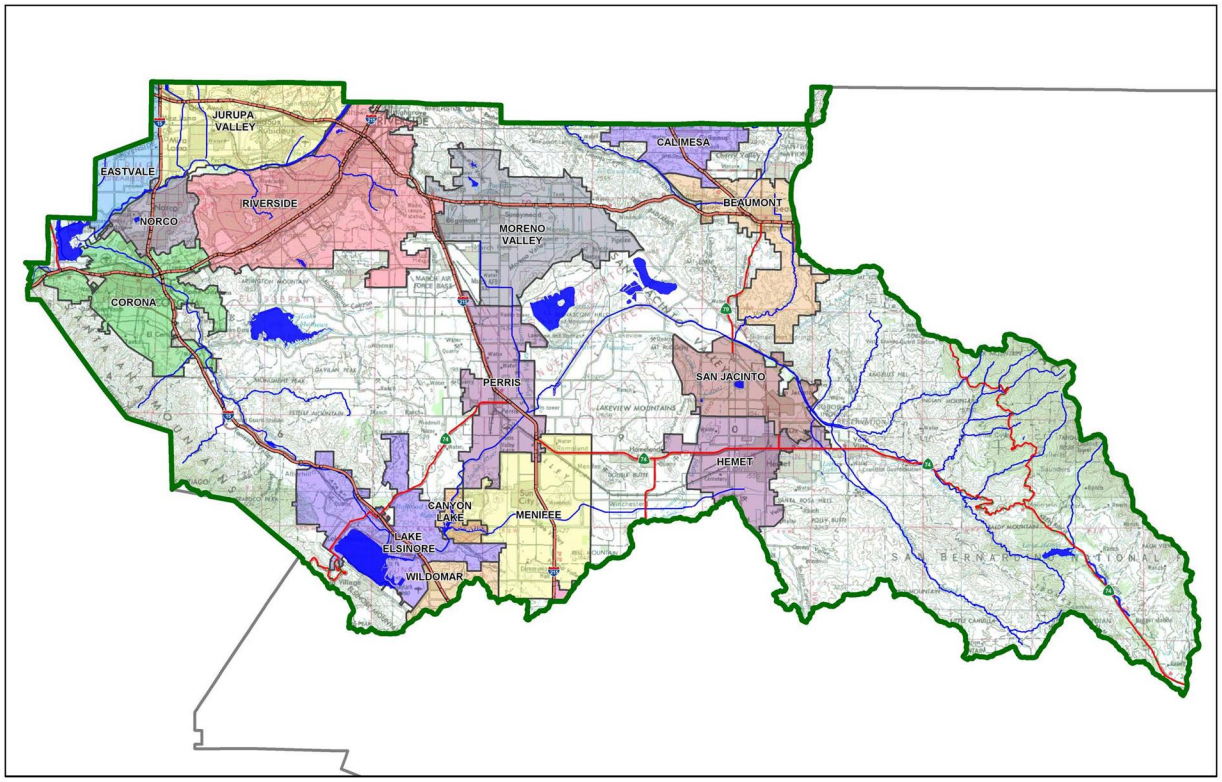
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Birtcher Commerce Center Oak Valley – Building B

Development No: DPR 21-04

Design Review/Case No:



Contact Information:

Prepared for: Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, CA 92660
(714) 728-9070

☒ **Preliminary**
☐ **Final**

Original Date Prepared: May 2021

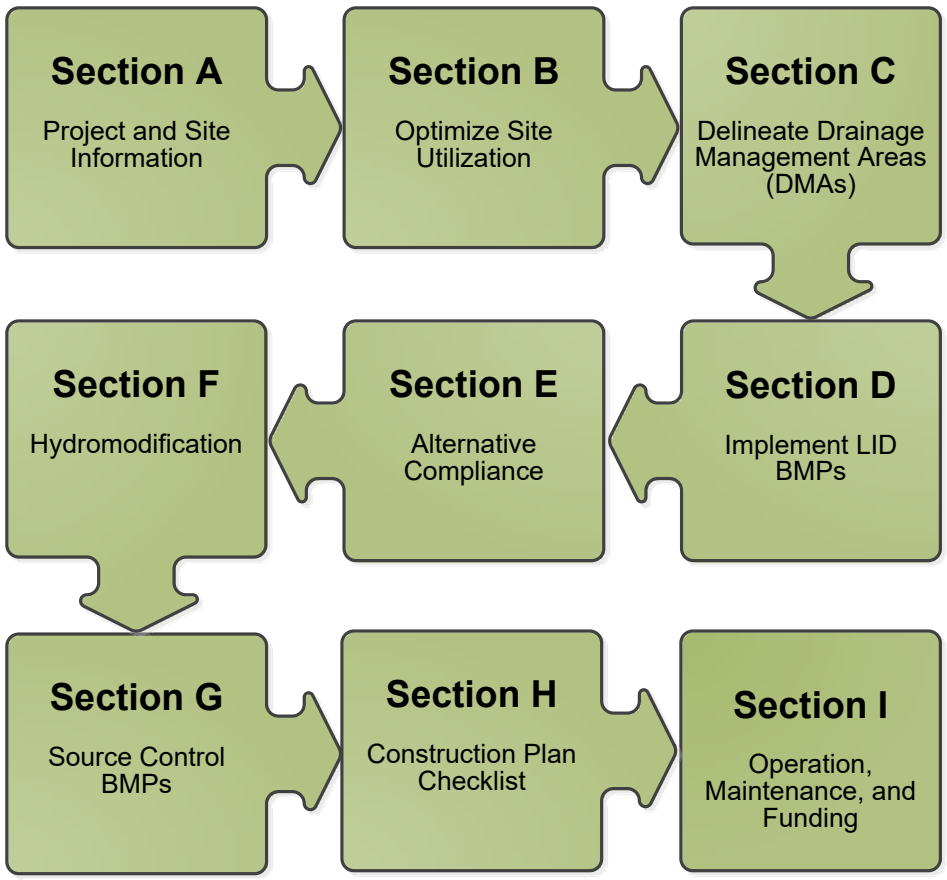
Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Prepared by:
Albert A. Webb Associates
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Birtcher Development by Albert A. Webb Associates for the Birtcher Commerce Center Oak Valley – Building B project.

This WQMP is intended to comply with the requirements of City of Calimesa, County of Riverside for County of Riverside Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (Municipal Code Section 13.12 – Stormwater Drainage System Protection Regulations).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 8
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 10

Section C: Delineate Drainage Management Areas (DMAs) 12

Section D: Implement LID BMPs 14

D.1 Infiltration Applicability 14
D.2 Harvest and Use Assessment 15
D.3 Bioretention and Biotreatment Assessment 17
D.4 Feasibility Assessment Summaries 18
D.5 LID BMP Sizing 19

Section E: Alternative Compliance (LID Waiver Program) 22

E.1 Identify Pollutants of Concern 23
E.2 Stormwater Credits 24
E.3 Sizing Criteria 24
E.4 Treatment Control BMP Selection 25

Section F: Hydromodification 26

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 26
F.2 HCOC Mitigation 27

Section G: Source Control BMPs 28

Section H: Construction Plan Checklist 32

Section I: Operation, Maintenance and Funding 33

List of Tables

Table A.1 Identification of Receiving Waters....8
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....12
Table C.2 Type 'A', Self-Treating Areas....12
Table C.3 Type 'B', Self-Retaining Areas....12
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....13
Table C.5 Type 'D', Areas Draining to BMPs....13
Table D.1 Infiltration Feasibility....14
Table D.2 LID Prioritization Summary Matrix....18
Table D.3 DCV Calculations for LID BMPs....19
Table E.1 Potential Pollutants by Land Use Type....23
Table E.2 Water Quality Credits....24
Table E.3 Treatment Control BMP Sizing....24
Table E.4 Treatment Control BMP Selection....25
Table F.1 Hydrologic Conditions of Concern Summary....26
Table G.1 Permanent and Operational Source Control Measures....28
Table H.1 Construction Plan Cross-reference....32

List of Appendices

Appendix 1: Maps and Site Plans....34
Appendix 2: Construction Plans....35
Appendix 3: Soils Information....36
Appendix 4: Historical Site Conditions....37
Appendix 5: LID Infeasibility....38
Appendix 6: BMP Design Details....39
Appendix 7: Hydromodification....40
Appendix 8: Source Control....41
Appendix 9: O&M....42
Appendix 10: Educational Materials....43

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial / Business Park
Planning Area:	Summerwind Ranch at Oak Valley Specific Plan
Community Name:	Birtcher Commerce Center Oak Valley
Development Name:	Birtcher Commerce Center Oak Valley – Building B
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°58'24.87"N / 117°03'02.05"W	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
APN(s): 413-190-025 & 413-290-047	
Map Book and Page No.: Thomas Bros Page: 689, Grid: H3, H4, J3, J4 ; Page: 690, Grid: A4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial, Business Park
Proposed or Potential SIC Code(s)	1541 – General Contractors-Industrial Buildings and Warehouses 1542 – General Contractors- Non-Residential Other than Industrial and Warehouses
Area of Impervious Project Footprint (SF)	868,614 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	868,614 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B, C, D
What is the Water Quality Design Storm Depth for the project?	0.78
Design rainfall intensity for QBMP calculations	0.2 inches/hr

Project Description

The Birtcher Commerce Center Oak Valley (BCCOV) - Building B project proposes an industrial development in the City of Calimesa on approximately 24.4 acres of vacant land located within the boundaries of the 220-acre PM 37862 (overall BCCOV project site). The overall BCCOV project site consists of approximately 220 acres of vacant land and is bounded by the Interstate-10 (I-10) highway along its northeast, the single-family residential tract TR 32702 (currently under construction) along its southeastern boundary, vacant land along its southern boundary, and a future residential development to its northwest. The San Timoteo Creek runs from north to south along the eastern boundary of the

overall BCCOV site and continues south of the site. The BCCOV - Building B is bounded by Singleton Road to its northwest, Roberts Road to its northeast, the future BCCOV – Parking Lot project to its east, and the future BCCOV – Building A project to its southwest.

The overall BCCOV project site is currently vacant. Runoff from the onsite area and offsite areas north of the project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from north to south. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue through the southern boundary before ultimately discharging into the San Timoteo Creek.

Prior to any construction commencing for the BCCOV - Building B project, the overall BCCOV project site will be mass graded. The mass grading phase also includes the construction of retaining walls along the boundaries of the overall BCCOV project, graded pads, the construction of backbone street improvements for Singleton Road and Roberts Road, the installation of backbone storm drain facilities, and the installation of storm drain stub-outs for the individual BCCOV industrial developments to discharge into. The overall drainage pattern of the mass grade phase will perpetuate the drainage pattern of the existing, vacant project site. However, runoff in the mass graded phase will be captured in temporary inlets and conveyed towards the backbone storm drain facilities. The backbone storm drain facilities have been designed to convey the fully developed flows from the overall BCCOV project as well as the existing offsite flows generated north of the I-10 highway southerly towards the San Timoteo Creek. A separate drainage study titled "Hydrology and Hydraulics Study: Oak Valley Town Center Parcel Map No. 37862 Mass Grading Plan" was conducted for the mass grade phase of the project and encompasses the design and layout of the backbone storm drain facilities.

For the proposed condition, runoff is captured through a series of catch basins and grate inlets located throughout the site at localized low points. Captured flows are directed towards proposed treatment devices in order to treat for water quality requirements. Proposed underground storm drain then directs flows toward the drainage facilities proposed with the future development of the BCCOV – Building A project located directly southwest of the project site. From there, flows are conveyed towards the existing stub-outs that connect into the backbone storm drain facilities. Flows generated by the BCCOV - Building B project development ultimately discharge south of the overall BCCOV project site and into the San Timoteo Creek similar to the existing condition.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to highly variable infiltration rates of the existing soil as well as potentially collapsible soil being present throughout the site. Due to site constraints, most notably the significant offsite grading requirements of the overall BCCOV site, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary actually drains offsite and into the backbone streets. However, in this preliminary analysis all areas within the project boundary have been considered in the Qbmp calculations in order to provide a conservative treatment flow rate.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharging into the proposed CMP chamber detention systems. Mitigated flows outlet to the provided stub-outs. The proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm events to bypass the vault and enter the onsite storm drain facilities. All captured onsite flows will be directed towards the provided lateral stub-outs constructed in the mass grade phase.

The project is required to address increased runoff mitigation for the 24-hour, 2-year storm event to meet HCOC requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	N/A	GWR, MUN, REC1, REC2, WARM, WILD	20± miles
San Timoteo Creek Reach 2	N/A	GWR, MUN, REC1, REC2, WARM, WILD	10± miles
San Timoteo Creek Reach 1B & 1A	N/A	AGR, MUN, REC1, REC2, WARM, WILD	5± miles
Santa Ana River Reach #5	N/A	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.
Santa Ana River Reach #4	Pathogens	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* *City of Calimesa Grading Permit*	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The currently vacant site generally drains from north to south towards the San Timoteo Creek. In this existing condition, flows are generally conveyed via smaller streambed areas that run from north to south through the overall BCCOV site. These smaller streambed areas discharge flows south, offsite into the San Timoteo Creek. In the mass grade phase, the project site generally sheet flows towards temporary inlets that discharge into the backbone storm drain facilities located along Singleton Road/Roberts Road. This backbone storm drain discharges flows towards the San Timoteo Creek south of the overall project site similar to the vacant site conditions.

In the developed condition, a network of catch basins and inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards existing stub-outs provided in the mass grade phase. From there, flows are conveyed into the backbone storm drain line located within the BCCOV – Building A project area before ultimately discharging south, offsite towards the San Timoteo Creek similar to the existing condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing vegetation is very minimal. The existing project site is primarily barren, so no vegetation is proposed to be protected.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Due to poor infiltration capacities and potentially collapsible underlying soils throughout the site, an infiltration-based BMP is not feasible to treat for water quality requirements.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious areas will be minimized as much as possible while maintaining safe and usable facilities onsite. Landscaped areas have been provided throughout the projects site along concrete walkways, around the proposed building, adjacent to parking areas, and in other feasible locations throughout the site.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, however, based on the nature of the industrial development, not all runoff can feasibly be directed towards a pervious area before being captured. Pervious landscaped areas are proposed throughout the site where possible in order to maximize the chances of runoff dispersing into landscaped areas before being captured. All runoff that is captured onsite will be directed towards an MWS vault (or series of MWS vaults) to provide water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA B-1	Mixed Use – Roofs, Concrete or Asphalt	386,972	D
DMA B-2	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	573,601	D
DMA B-3	Mixed Use – Concrete or Asphalt, Ornamental Landscaping	102,719	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	**Area (Sq. Ft.)**	**Stabilization Type**	**Irrigation Type (if any)**

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA B-1	MWS Vaults (2 - 8'x24' vaults in series)
DMA B-2	MWS Vaults (3- 8'x24' vaults in series)
DMA B-3	MWS Vault (8'x12')

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: All DMAs		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Soils underlying project site are potentially collapsible and not suitable for infiltration		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA B-1	☐	☐	☐	☒	☐
DMA B-2	☐	☐	☐	☒	☐
DMA B-3	☐	☐	☐	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the BCCOV - Building B project will utilize biotreatment (MWS vaults) throughout the site to treat for water quality requirements. Infiltration-based BMPs are not feasible due to poor infiltration capacities of underlying soils and potentially collapsible soils (see Appendix 3 for preliminary geotechnical investigation). Harvest and use BMPs are not feasible as reclaimed water will be used for non-potable water demands. Bioretention BMPs are not feasible due to site constraints including minimum parking density requirements and significant offsite grading conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA B-1*		
	[A]		[B]	[C]	[A] x [C]			
Building	*257452*	*Roofs*	*1*	*0.89*	*229647.2*			
Concrete / Asphalt	*122677*	*Concrete or Asphalt*	*1*	*0.89*	*109427.9*			
LS	*6843*	*Ornamental Landscaping*	*0.1*	*0.11*	*755.9*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **386972**				Σ= [D] **339831**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.6**	[G] ***1.6***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA B-2*		
	[A]		[B]	[C]	[A] x [C]			
Building	*210506*	*Roofs*	*1*	*0.89*	*187771.4*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*230186*	*Concrete or Asphalt*	*1*	*0.89*	*205325.9*			
Landscape	*132909.4*	*Ornamental Landscaping*	*0.1*	*.11*	*14680.9*			
	$A_T = \Sigma$[A] **573601.4**				Σ= [D] **407778.2**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.9**	[G] ***1.9***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA B-3*		
	[A]		[B]	[C]	[A] x [C]			
Concrete / Asphalt	*55944.4*	*Concrete or Asphalt*	*1*	*0.89*	*49902.4*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Landscape	*46775*	*Ornamental Landscaping*	*0.1*	*.11*	*5166.7*			
	$A_T = \Sigma$[A] **102719.4**				Σ= [D] **55069.1**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.3**	[G] ***0.3***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
All DMAs	Bacteria/ Pathogens	Medium

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition C in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study. The 24-hour, 2-year unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. A routing analysis was performed to demonstrate that the proposed CMP chamber systems have substantial volume needed to mitigate flows to existing condition flow rates and determine the required orifice outlet sizing. See Appendix 7 for the unit hydrograph and routing analysis details. Further details can also be found in the "Preliminary Drainage Study – BCCOV Building B".

EXISTING CONDITION 2-YEAR, 24-HOUR STORM		
	VOL (AC-FT)	PEAK FLOW (CFS)
AREA A1	0.76	1.26
18.1% A1 (PROP. AREA 1)	-	0.23
25% A1 (PROP. AREA 2)	-	0.31
32.4% A1 (PROP AREA 3)	-	0.41
24.5%A1 (PROP AREA 4)	-	0.31
AREA A3	0.45	1.21
41.6% A3 (PROP AREA 6)	-	0.50
58.4% A3 (PROP AREA 7)	-	0.71

PROPOSED CONDITION 2-YEAR, 24-HOUR STORM			
	VOL (AC-FT)	PEAK FLOW (CFS)	ROUTING PEAK FLOW (CFS)
AREA 1	1.06	1.75	0.16
AREA 2	1.40	2.37	0.33
AREA 3	1.67	2.75	0.47
AREA 4	1.20	1.96	0.32
A1 COMBINED	5.33	8.83	1.28
AREA 6	1.26	2.07	0.51
AREA 7	1.70	2.80	0.78
A3 COMBINED	2.96	487	1.29

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	*Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.*	*Maintain and periodically repaint or replace inlet markings.* *Provide stormwater pollution prevention information to new site owners, lessees, or operators.* *See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Interior floor drains and elevator shaft sump	*The interior floor drains and elevator shaft sump pumps will be plumbed to*	*Inspect and maintain drains to prevent blockages and overflow.*

	sanitary sewer	
Landscape/Outdoor Pesticide Use	*Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.* *Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.* *Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.* *Consider using pest-resistant plants, especially adjacent to hardscape.* *To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.*	*Maintain landscaping using minimum or no pesticides.* *See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/* *Provide IPM information to new owners, lessees and operators.* *Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Refuse Areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com*

Vehicle and Equipment Cleaning	*If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.*	*Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/*
Plazas, Sidewalks and parking lots.		*Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Loading Docks	*Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.* *Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.* *Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.*	*Move loaded and unloaded items indoors as soon as possible.* *See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fire Sprinkler Test Water	*Water discharged from the fire sprinkler systems shall not enter the storm drain system. Discharged water from fire sprinkler testing shall be collected and used for onsite landscape or disposed of at a local waste water treatment plant.*	*See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling*

		Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
All DMAs	MWS Vaults	Appendix 6

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section H will be completed and addressed during Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

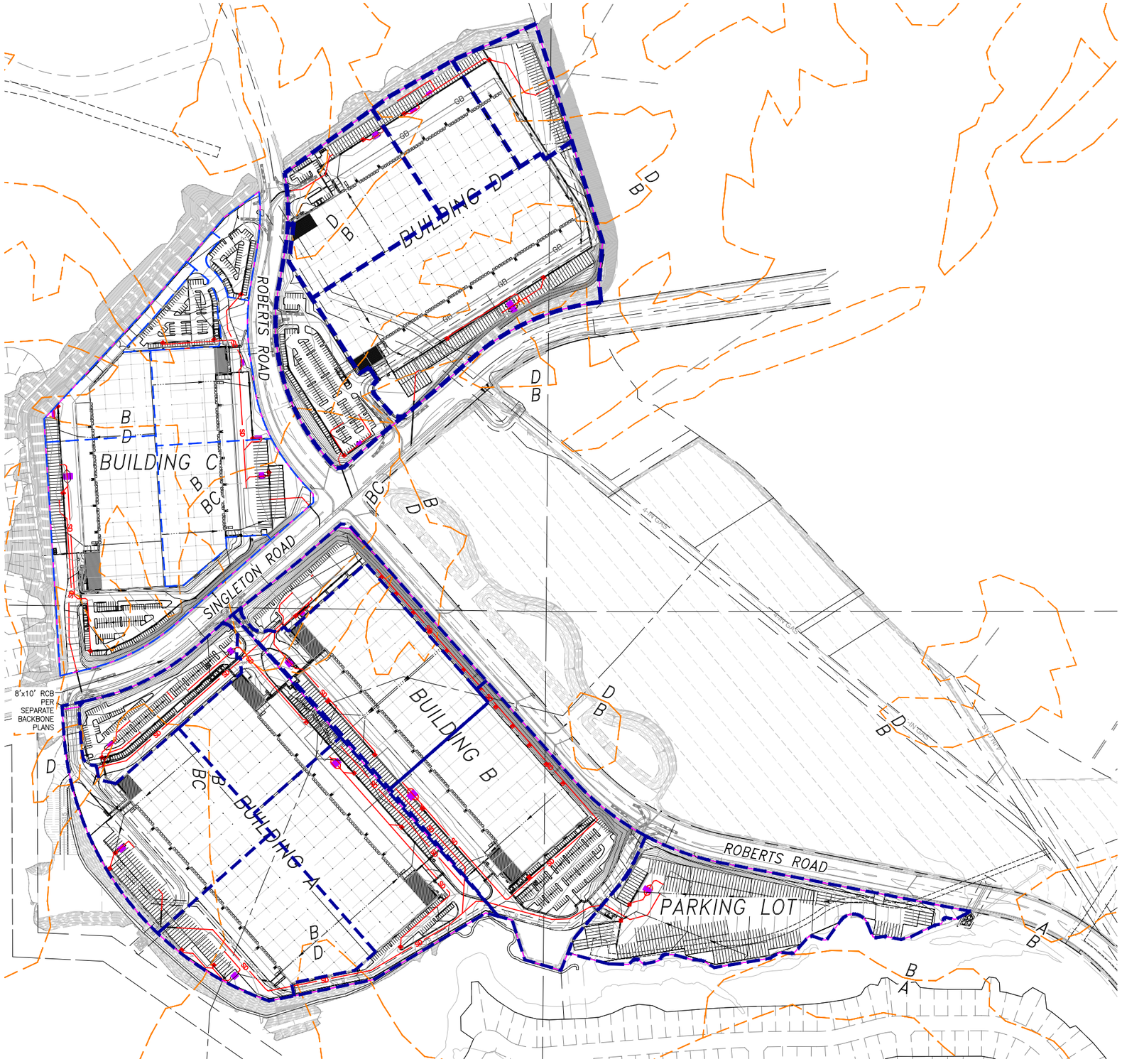
☒ Y ☐ N

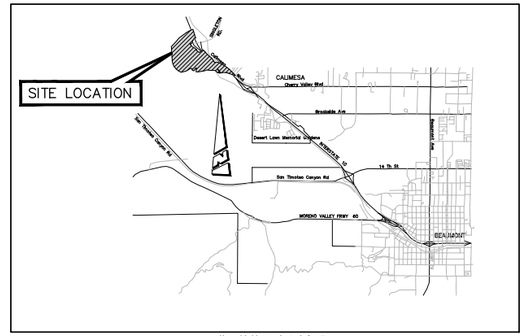
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section I will be completed and addressed during Final WQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

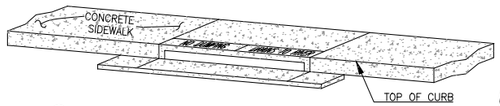


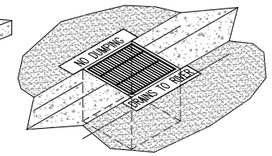


VICINITY MAP

N.T.S.

T2S, R2W, SECTION 23,24,25,26





1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING – DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NTS

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL BELOW (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).
3. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
4. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

SITE CONSTRAINTS:

1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE USE OF RECYCLED WATER FOR IRRIGATION PURPOSES.

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

N
W WEBB E
S

1" = 200'

200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

OVERALL BCCOV SITE PLAN
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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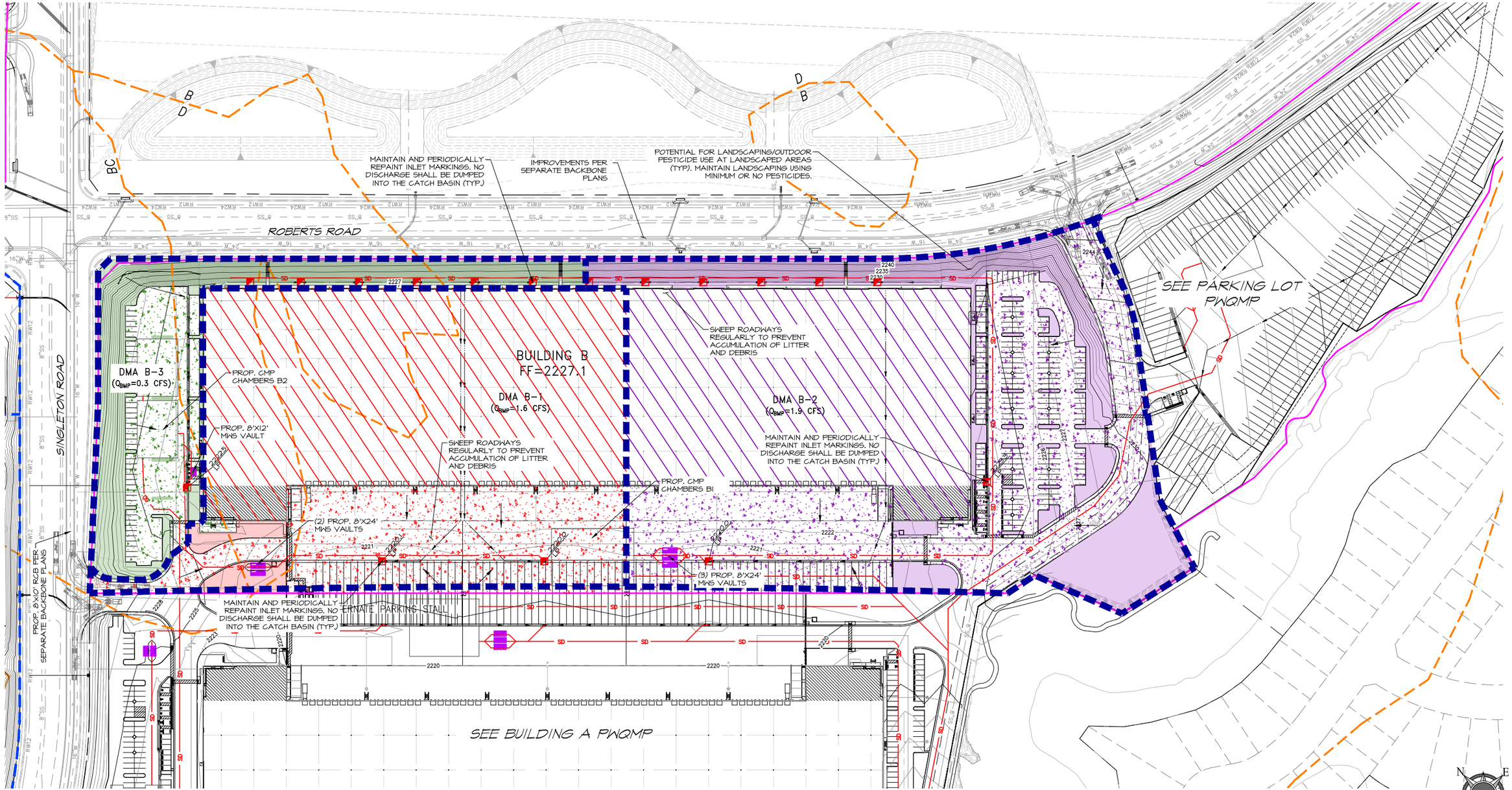

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

DMA AREA TABLE			
	DMA B-1	DMA B-2	DMA B-3
ROOFS (SF)	257,452	210,506	–
CONCRETE (SF)	122,677	230,186	55,944
LANDSCAPE (SF)	6,843	132,909	46,775
QBMP (CFS)	1.6	1.9	0.3
QTREAT (CFS)	1.6	1.9	0.3

1" = 80'

80 0 80 160 240

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

BCCOV – BUILDING B
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=80'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 2
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

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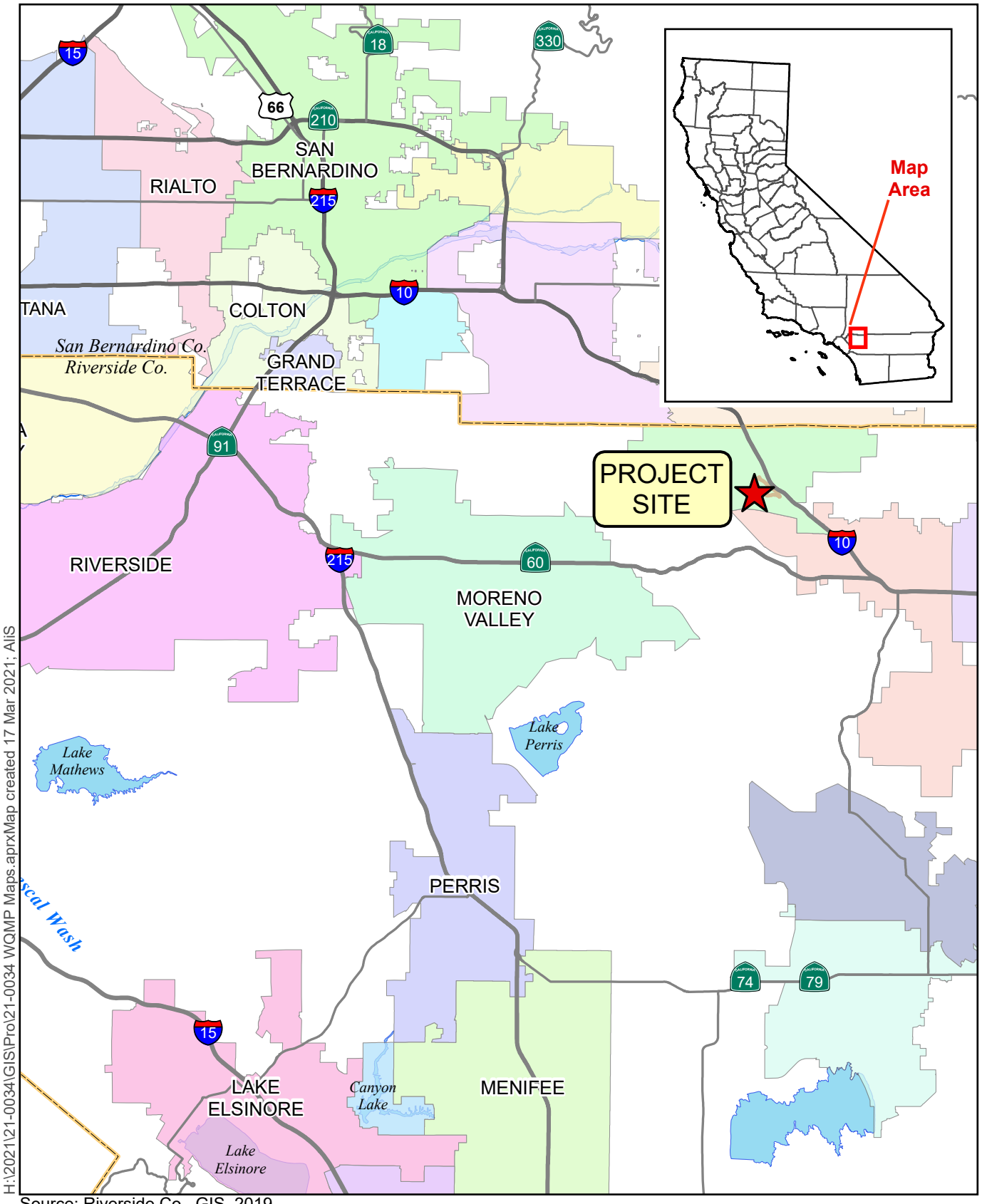


H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprxMap created 17 Mar 2021; AliS

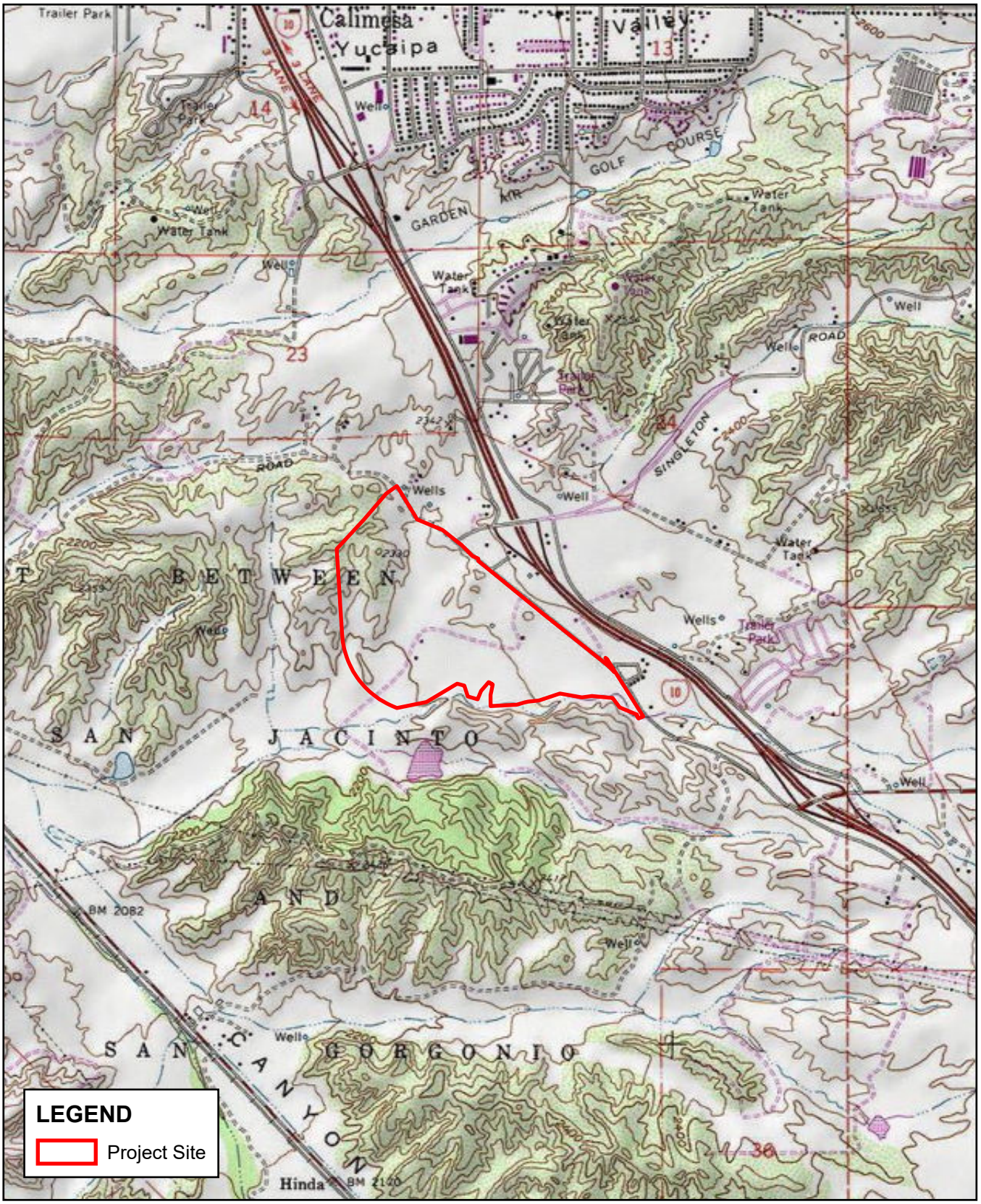
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: ESRI / USGS 7.5min Quad
DRGs: EL CASCO

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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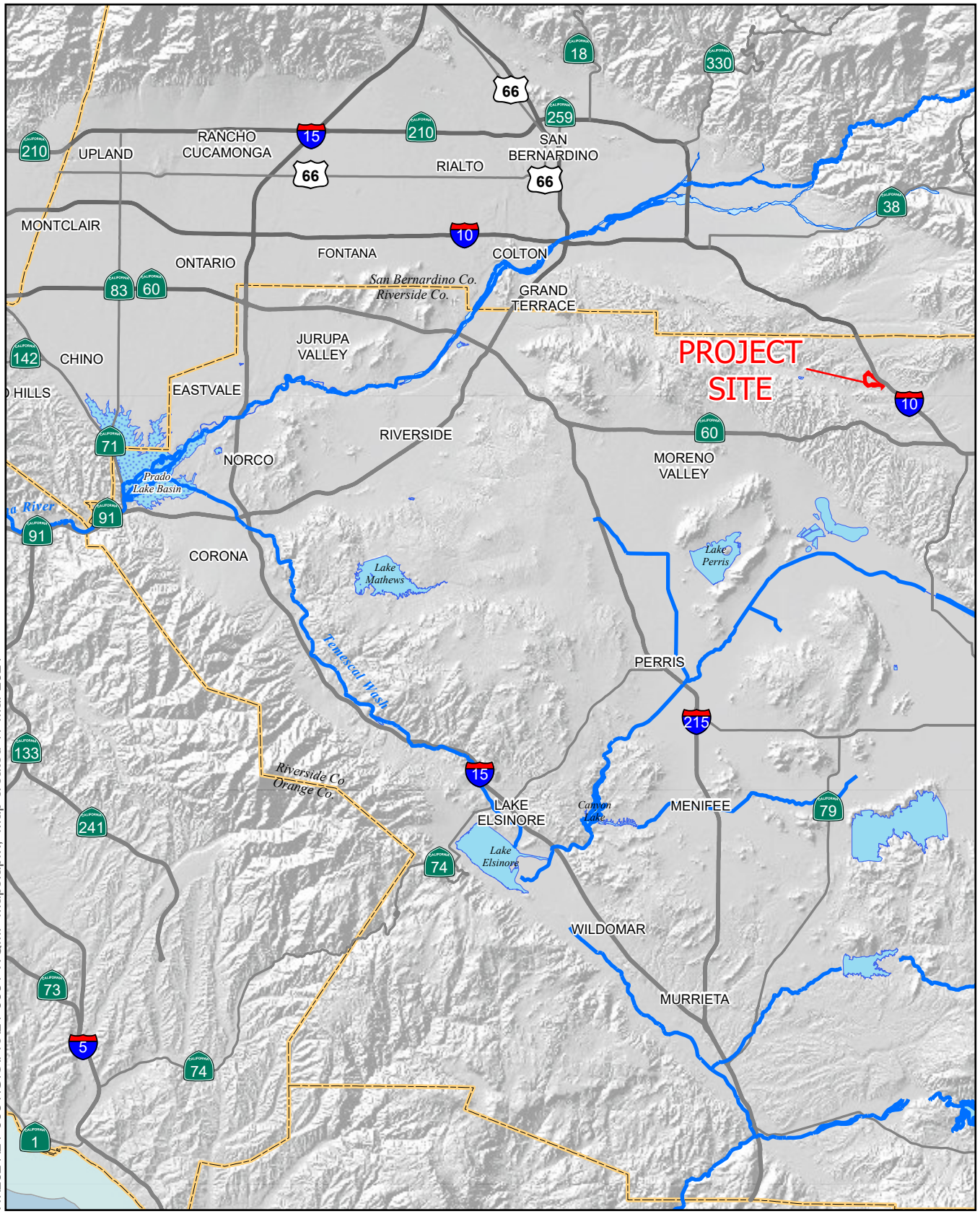
Source: Riverside Co. GIS, Jan. 2020.

0 600 1,200 1,800 Feet

Figure 3 - Aerial Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprx; Map created 17 Mar 2021

Sources: USGS DLG; USGS 30m DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES

Appendix 2: Construction Plans

Grading and Drainage Plans

To be provided during Final Engineering

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

January 21, 2021

Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, California 92660

Attention: Mr. Randy Rankin
President of Construction

Project No.: **20G144-2**

Subject: **Geotechnical Review Letter**
Proposed Commercial/Industrial Development
Singleton Road at Roberts Road
Calimesa, California

Reference: Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, City of Calimesa, County of Riverside, California, prepared for Oak Valley Development Company by Advanced Geotechnical Solutions, Inc. (AGS), Report No. 2004-04-B-5, P/W 2004-01, dated December 23, 2020.

Dear Mr. Rankin:

In accordance with your request, we have reviewed the above-referenced geotechnical report for the proposed development. These reports were reviewed for conformance with generally accepted standards of practice for commercial/industrial development.

Document Review

Southern California Geotechnical, Inc. (SCG) was provided with copies of the above-referenced report previously prepared for the subject site. Comments generated during our review of the referenced documents are presented below:

This report consists of a geotechnical investigation performed in 2020 for a 266-acre site located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in Calimesa, California. The site is identified as being a part of Parcel Map 37862.

The overall site, which was the subject of this report, includes:

a) Four (4) new commercial/industrial buildings, ranging in size from 250,000± ft^2 to 500,000± ft^2, to be constructed in the western and southern areas of the subject site,
b) A new proposed commercial/retail center in the northeast portion of the site bounded by Singleton Road, and
c) A new sewer lift station to be constructed near the southwest corner of the tract.

Please note that only the four (4) proposed commercial/industrial buildings are included in the scope for our client, Birtcher Development. It is our understanding that the remaining proposed structures will be developed by a different developer, Oak Valley Development Company.

The stated scope of this report included providing geologic and geotechnical information and recommendations for the development of the Parcel Map 37862 relative to:

- Unsuitable soil removals,
- Cut, fill and natural slope stability,
- Buttress/stabilization fill requirements,
- Cut/fill pad overexcavation criteria,
- Remedial and design grading recommendations,
- Handling and disposal of oversize hard earth materials,
- Stabilization and removal of saturated removal bottoms, and
- Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

The report indicates that AGS conducted two phases of subsurface investigations. The first phase was performed on May 6, 2020 and May 7, 2020. The second investigation was performed between August 5, 2020 and August 14, 2020. These investigations included twenty-two (22) test pits ranging in depth from 9 to 14 feet and twenty-seven (27) borings drilled to a depth of up to 71½± feet.

The report identified five (5) main geologic units at the subject site. They are, from youngest to oldest:

- Artificial Fill – Undocumented (Map symbol Afu)
- Alluvium (Map symbol Qal)
- Older Alluvium (Map symbol Qoa) – The report states that the older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.
- Very Old Alluvial Fan Deposits (Map symbol Qvof), and
- Sedimentary Deposits of Live Oak Canyon (Map symbol Qlo)

The report indicates that groundwater was encountered throughout the site at highly variable elevations. This variability combined with the range in planned cuts and fills, will likely result in the presence of saturated soils at or near the planned removal depths. This condition will likely require mitigation that may include drying and/or mechanical stabilization of the saturated subgrade soils as well as possible dewatering.

This report states that the expansion potential of the on-site materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D-4829. AGS recommends that further testing and geologic mapping should be conducted during and upon completion of grading operations to provide design recommendations on a pad-by-pad basis.

This report states that on-site materials are significantly compressible, which includes undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. AGS recommends that these significantly compressible materials and the alluvial soils prone to hydro-consolidation be removed and replaced with compacted fill.

This report states that based on the chemical testing performed, the potential for sulfate attack on concrete in contact with the on-site soils is negligible and the on-site surface soils are not considered corrosive to buried ferrous metals.

Isolated layers of peat were encountered at the site and were recommended to be removed in their entirety due to their highly compressible nature.

Estimated depths of removal, ranging from ½ to 40+ feet, for both structural areas and landscape/parking areas for different geologic units were included in Table 7.1 on page 18 of this report.

This report included geotechnical mitigation recommendations related to overexcavation of building pads and streets related to cut/fill transition pads, steep cut and cut/fill transitions.

Comments

This report states that on-site materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. We would also include portions of the "very old alluvium."

Based on our review of the boring log data, it appears that some of the soils identified as older alluvium has similar and even lower blowcounts and relative densities than some of the soils identified as younger alluvium. **Based on our review of the blowcount and consolidation data, it is our opinion that some localized deeper removals of the Qoa and Qvof will be required.**

The report indicates Mirafi RS280i as a possible geotextile to be used to help mitigate an unstable excavation bottom. We would recommend consideration be given to include RS580i as an additional alternative for more unstable bottoms.

Page 23 of the report states that the on-site fill soils are subject to post-grading settlement and it is recommended that all fills overlying saturated soils be monitored prior to release for construction. The report recommends surface monuments. We concur with this recommendation and recommend that consideration should also be given to monitoring the settlement of the underlying bottoms using settlement plates similar to AGS's Plate 11 in the Appendix of their report.

Based on the presence of highly compressible soils at the subject site, we recommend that consideration should be given to requiring a 95 percent relative compaction standard for all new fill soils placed deeper than 20 feet below proposed site grades within the foundation influence zones of proposed buildings.

We concur with AGS's recommendation that additional investigations may be required at a later date to develop more detailed design-level recommendations after more details are provided about the proposed development including, but not limited to: final site elevations, proposed building configurations/locations, and structural requirements/settlement tolerances.

It is our opinion that the report has been prepared in general accordance with accepted geotechnical standards of practice.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, GE 2655
Principal Engineer



Daryl A. Kas, CEG 2467
Senior Geologist

Distribution: (1) Addressee

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GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CITY OF CALIMESA COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for:
Oak Valley Development Company
10410 Roberts Road
Calimesa, CA 92320

Prepared by:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

December 23, 2020
Report No. 2004-01-B-5
P/W 2004-01

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Oak Valley Development Company
10410 Roberts Road
Calimesa, California 92320

December 23, 2020
P/W 2004-01
Report No. 2004-01-B-5

Attention: Mr. John Ohanian

Subject: ***Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, Calimesa, County of Riverside, California***

References: See Appendix

Gentlemen:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Geotechnical Investigation and Review of Mass Grading Plans for the Oak Valley Town Center Project, Parcel Map 37862, located in the City of Calimesa, California. In this report, AGS compiled previous investigative data, new data, and analyzed how it affects the proposed design as shown on the Mass Grading Plan prepared by Proactive Engineering Consultants West.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Prepared by:

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1. Scope of Work 1
1.2. Geotechnical Study Limitations 2
2.0 SITE LOCATION AND DESCRIPTION 2
2.1. Site Location 2
2.2. Site Description 2
3.0 PROPOSED DEVELOPMENT 2
4.0 FIELD AND LABORATORY INVESTIGATION 3
4.1. Previous Investigations 3
4.2. Current Investigation 3
5.0 ENGINEERING GEOLOGY 4
5.1. Geologic Analysis 4
5.1.1. Literature Review 4
5.1.2. Aerial Photograph Review 4
5.1.3. Field Mapping 4
5.2. Geologic and Geomorphic Setting 4
5.3. Stratigraphy 5
5.3.1. Artificial Fill – Undocumented (Map Symbols afu) 5
5.3.2. Alluvium (Map Symbol Qal) 5
5.3.3. Older Alluvium (Map Symbol Qoa) 5
5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof) 6
5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo) 6
5.4. Groundwater 6
5.5. Non-seismic Geologic Hazards 7
5.5.1. Mass Wasting and Debris Flows 7
5.5.2. Flooding 7
5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring 7
5.6. Seismic Hazards 8
5.6.1. Surface Fault Rupture 8
5.6.2. Liquefaction/Dynamic Settlement 8
5.6.3. Lateral Spreading 10
5.6.4. Seismically Induced Landsliding 10
5.6.5. Earthquake Induced Flooding 10
5.7. Seismic Design Parameters 10
5.8. Site Specific Ground Motion Hazard Analysis 11
5.8.1. Probabilistic Seismic Hazard Analysis 11
5.8.2. Deterministic Seismic Hazard Analysis 12
5.8.3. Site-Specific Design Response Spectrum 12
6.0 GEOTECHNICAL ENGINEERING 14
6.1. Material Properties 14
6.1.1. Excavation Characteristics 14
6.1.2. Compressibility 14
6.1.3. Collapse Potential/Hydro-Consolidation 14
6.1.4. Expansion Potential 14
6.1.5. Shear Strength 14

6.1.6. Chemical and Resistivity Test Results 15
6.1.7. Earthwork Adjustments 15
6.1.8. Pavement Support Characteristics 16
6.2. Analytical Methods 16
6.2.1. Slope Stability Analysis 16
6.2.2. Pavement Design 16
6.2.3. Bearing Capacity and Lateral Pressure 16
7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS 16
7.1. Site Preparation and Removals/Overexcavation 17
7.1.1. Overexcavation of Building Pads and Streets 18
7.1.1.1. Cut/Fill Transition Pads 18
7.1.1.2. Steep Cut and Cut/Fill Transitions 18
7.1.1.3. Street Overexcavation 19
7.1.2. Removals Along Grading Limits and Property Lines 19
7.2. Subgrade Stabilization 19
7.3. Slope Stability and Remediation 20
7.3.1. Cut Slopes 20
7.3.2. Fill Slopes 20
7.3.3. Skin Cut and Skin Fill Slopes 21
7.3.4. Fill Over Cut Slopes 21
7.3.5. Offsite Drainage Channel Slopes 21
7.3.6. Surficial Stability 21
7.3.7. Excavation and Temporary Cut Slopes 22
7.3.8. Geologic Observation During Grading 22
7.4. Survey Control During Grading 22
7.5. Settlement Monitoring 23
7.6. Subsurface Drainage 23
7.6.1. Canyon Drains 23
7.6.2. Heel Drains 23
7.6.3. Cut Slope Toe Drains and Subdrains 23
7.7. Seepage 23
7.8. Construction Dewatering 23
7.9. Earthwork Considerations 24
7.9.1. Compaction Standards 24
7.9.2. Fill Materials/ Import Soils 24
7.9.3. Benching 24
7.9.4. Mixing and Moisture Control 24
7.9.5. Haul Roads 25
7.9.6. Oversize Rock 25
7.9.6.1. Rock Blankets 25
7.9.6.2. Rock Windrows 25
7.9.6.3. Individual Rock Burial 26
7.9.6.4. Rock Disposal Logistics 26
7.9.7. Fill Slope Construction 26
7.9.7.1. Overbuilding Fill Slopes 26
7.9.7.2. Compacting the Slope Face 26

7.9.8. Utility Trench Excavation and Backfill 27
7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation 27
8.0 DESIGN RECOMMENDATIONS 27
8.1. Structural Design Recommendations 27
8.1.1. Foundation Design 28
8.1.2. Settlement 28
8.1.3. Isolated Footings 29
8.1.4. Deepened Footings and Setbacks 29
8.1.5. Footing Excavations 29
8.1.6. Moisture and Vapor Barrier 30
8.1.7. Concrete Design 30
8.2. Retaining Wall Design 30
8.2.1. Retaining Walls (backfilled with Native Materials) 30
8.2.2. Retaining Wall Drainage 31
8.3. Civil Design Recommendations 32
8.3.1. Site Drainage 32
8.3.2. Exterior Flatwork 33
8.3.3. Pavement Design 33
8.3.3.1. Asphalt Concrete Pavement 33
8.3.3.2. Portland Cement Concrete Pavement 34
8.4. Corrosion 35
9.0 SLOPE AND LOT MAINTENANCE 35
9.1. Slope Planting 35
9.2. Pad Drainage 35
9.3. Slope Irrigation 35
9.4. Burrowing Animals 36
10.0 FUTURE STUDY NEEDS 36
10.1. Future Studies and Reviews 36
10.2. Grading Observation 36
11.0 CLOSURE 36
11.1. Geotechnical Review 36
11.2. Limitations 37

ATTACHMENTS

Figure 1 - Site Location Map
Figure 2 - Regional Geologic Map
Figure 3 - Fault Map
Figure 4 - Seismic Response Spectra

Appendix A - References
Appendix B - Subsurface Logs
Appendix C - Laboratory Test Results
Appendix D - Engineering Analyses
Appendix E - Earthwork Specifications and Grading Details
Appendix F - Homeowners Maintenance Guidelines

ENCLOSURES

Plates 1 through 9 - Geotechnical Maps (Mass Grading Plans)
Plates 10 through 12 - Geologic Cross-Sections A-A' through N-N'

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CALIMESA, COUNTY OF RIVERSIDE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of this AGS's geotechnical investigation and review of the 60-scale Mass Grading Plans for Parcel Map 37862, in the City of Calimesa, County of Riverside, California prepared by Proactive Engineering Consultants provided to AGS on December 10, 2020.

The purpose of our review and report is to present geologic and geotechnical information obtained during previous geotechnical studies by Pacific Soils Engineering (PSE) with supplemental geologic and geotechnical data obtained by AGS during the current investigation. AGS has provided remedial grading recommendations for the ultimate mass grading configuration whereas an interim grading configuration is currently depicted on the 60-Scale Mass Grading Plan, shown on the attached plates. The interim grading condition avoids drainage areas. Proposed remedial grading conditions shown on Plates 1 through 9 are based on the ultimate mass grading condition. This study is aimed at providing geologic and geotechnical information and recommendations for the development of Parcel Map 37862 relative to: 1) Unsuitable soil removals; 2) Cut, fill and natural slope stability; 3) Buttress/stabilization fill requirements; 4) Cut/fill pad overexcavation criteria; 5) Remedial and design grading recommendations; 6) Handling and disposal of oversize hard earth materials; 7) Stabilization of saturated removal bottoms; and 8) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.1. Scope of Work

This study is aimed at providing geotechnical/geologic conclusions and recommendations for development of the Parcel Map 37862 commercial/retail development. The scope of this study included the following tasks:

- Review of readily available maps, geotechnical and geologic literature and aerial photographs (Appendix A).
- Compiling available data from previous published and unpublished studies by PSE.
- Preparation of Geotechnical Maps using the 60-scale plan with a base design provided by Proactive Engineering Consultants West, Inc. (Plates 1 through 9).
- Preparation of geologic cross-sections A-A' through N-N' (Plates 10 through 12).
- Perform data analyses in relation to the site-specific proposed improvements.
- Provide analysis and discussion of the excavation characteristics (i.e. rippability) of onsite formational materials.
- Formulation of grading, remedial grading and earthwork recommendations.
- Slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Determination of engineering parameters including earthwork adjustments, bearing and friction values, active, passive, and at-rest pressures for retaining walls.

- Perform a limited seismic hazard analysis.
- Preparing and publishing this report which presents geotechnical recommendations pertinent to the accompanying 60-scale grading plans.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on data developed during previous investigations performed by PSE and the current investigation performed by AGS. The conclusions presented herein are based upon the current design as reflected on the accompanying plans. Changes to the plans would necessitate further review.

The materials immediately adjacent to or beneath those observed and sampled may have different characteristics than those observed and sampled. No representations are made as to the quality or extent of materials not observed nor subjected to laboratory testing. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE LOCATION AND DESCRIPTION

2.1. Site Location

The subject site is an irregular shaped, 266-acre parcel located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in the City of Calimesa, Riverside County, California (Figure 1).

2.2. Site Description

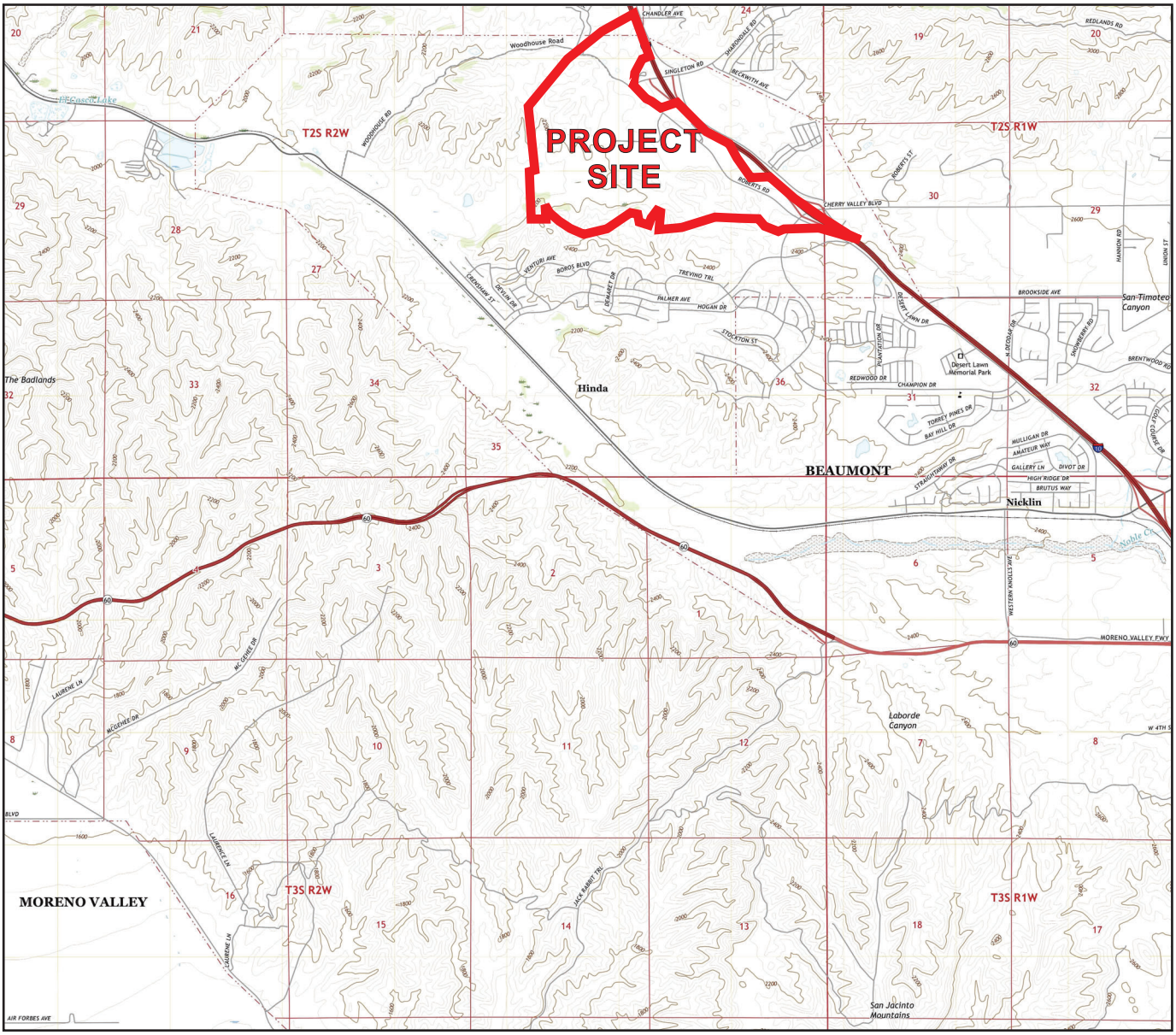
The site currently supports agricultural use (dry farming) on the southern and western portions of the site with several residential structures and outbuildings located within the northeastern, central, and southern portions of the site. Existing Roberts Road runs through the project site from southeast through the northeast. A failed concrete pipe culvert and associated headwall was observed beneath the northern portion of Roberts Road which has been undermined. The road was barricaded and closed to travel in this area.

Remnants of a prior low height dam are located across the main drainage that traverses the site, and its location is reflected by a line of artificial fill (afu) shown on Plate 1. A reservoir upstream of this dam is shown on older topographic maps of the area. Based on a review of historic aerial photographs, the active channel eroded a portion of this dam over 40 years ago.

The northwestern portion of the site consists of rolling hills underlain by formational materials consisting of the Live Oak Canyon and San Timoteo Formations. Several drainages exist onsite with two larger drainages transecting the site from northeast to southwest and one touching on the southwestern project boundary flowing from east to west.

3.0 PROPOSED DEVELOPMENT

It is our understanding that the proposed development as currently envisioned will consist of the following separate components:



SITE LOCATION MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

P/W 2004-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA (2018)

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- A commercial/retail center in the northeast portion of the site bounded by Singleton Road which will include extensive parking areas and possibly a new City Hall. These structures will likely be concrete "tilt-up" or conventional wood frame structures varying from 1 to 3 stories in height and would likely be supported by shallow slab-on-grade foundation systems. In addition to the commercial structures, a "man-made" lake would occupy the southwestern portion of the commercial/retail center.
- Large shipping and manufacturing buildings to be constructed on the western and southern areas of the property ranging in size from 250,000 to 500,000 square feet. The limits of these proposed structures are shown in blue on the attached Geotechnical Maps. It is anticipated that these structures will consist of concrete–tilt-up structures supported by shallow slab-on-grade foundation systems. Surrounding both the commercial and retail components will be interior roadways with primary access provided from Roberts Road and Singleton Road.
- A sewer lift station will be constructed near the southwest corner of the tract.

The mass grading plan shown on Plates 1 through 9 depicts an interim grading condition that avoid drainage areas. It is our understanding that the ultimate grades will be located within these areas.

4.0 FIELD AND LABORATORY INVESTIGATION

4.1. Previous Investigations

Several studies by PSE were previously completed onsite and near-by offsite. A description of the relevant data used within this current investigation is presented below.

- PSE conducted a subsurface investigation in 2004. AGS has utilized five (5) subsurface borings from this investigation (B-037, B-043, B-081, B-095, and B-096). These borings were excavated with a truck mounted drill rig equipped with 18-inch and 30-inch diameter bucket augers to depths ranging from 16 to 65 feet below ground surface (bgs). The locations of the exploratory excavations are shown on the Plates 1 through 9. Boring logs are presented in Appendix B.
- Laboratory testing was performed as a part of the PSE 2004 investigation and included chemical and resistivity testing, sieve analysis, maximum dry density and optimum moisture content, direct shear strength, and consolidation characteristics. Pertinent laboratory test results can be found in Appendix C.

4.2. Current Investigation

AGS conducted two phases of subsurface investigations, one on May 6 and 7, 2020, and the subsequent between August 5, 2020, and August 14, 2020, to evaluate the subsurface conditions as they relate to the proposed mass grading. Twenty two (22) test-pit excavations (T-1 through T-22) were excavated and logged to depths ranging from 9 to 14 feet bgs utilizing a JCB 3CX rubber-tired backhoe. Representative bulk samples were obtained and transported to our laboratory for testing to determine in-situ moisture content, maximum density and optimum moisture content, "remolded" shear strength, grain size distribution, and corrosivity. Test pit logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Twenty seven (27) borings were excavated, logged, and sampled with a truck mounted 8-inch hollow stem auger to depths of up to 71.5 feet. These borings were logged independently by both AGS and Southern California Geotechnical, Inc. (SCG). Representative bulk and relatively undisturbed samples were obtained and transported to AGS's laboratory for testing from eighteen of these borings (AGS-1 through AGS-18, except AGS-7 which was not used). Representative bulk and relatively undisturbed samples were obtained and transported to SCG's laboratory for testing from ten of these borings (SCG-1 through SCG-10). Test pit and boring logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Plates 1 through 9 show the locations of these exploratory excavations.

5.0 ENGINEERING GEOLOGY

5.1. Geologic Analysis

5.1.1. Literature Review

As part of this study, AGS has reviewed the geologic documents referenced in Appendix A. Where deemed appropriate, relevant geologic information has been included in this report.

5.1.2. Aerial Photograph Review

AGS has reviewed current and historical aerial photographs available through sources on the internet.

5.1.3. Field Mapping

Geologic field mapping was performed during our subsurface explorations.

5.2. Geologic and Geomorphic Setting

The Oak Valley Town Center lies on the Beaumont Plains at the north edge of the San Jacinto Mountains – one of the several northwest-trending mountain ranges that comprise the Peninsular Ranges Province of Southern California. Displacements along a series of northwest-trending active faults that extends from the Mojave Desert in the east, to the California Channel Islands in the west have and are elevating the mountain ranges above intervening lowlands. The faults include nearby San Andres fault zone, and the related San Gorgonio Pass Fault, and San Jacinto faults. These faults are, respectively, about 7-miles northeast, 3-miles east, and 5-miles southwest of the site.

According to Matti (2016), the sedimentary section below the Beaumont Plains near the study site includes in decreasing age: Pliocene to Pleistocene alluvial fan and flood plain deposits (5 Mya to ~1.3 Mya), perhaps up to several thousand feet thick, assigned to the San Timoteo Formation which were sourced from San Gabriel Mountains northwest of the area; Pleistocene alluvial and flood plain deposits, assigned sediments of the Live Oak Canyon, that were deposited after the San Timoteo Anticline disrupted the previous depositional pattern around 1.3 Mya; Holocene alluvium and colluvium within active stream channels and swales; topsoil; and local prisms of artificial fill.

West-flowing San Timoteo Creek drains the Beaumont Plains. That high-order drainage has kept pace with uplift in the plains and the west-adjacent San Timoteo Badlands, resulting in ongoing

incision and headward erosion of its channel. Many low-order drainages have consequently formed as tributaries to San Timoteo Creek. These drainages dissect the Beaumont Plains and form distinctive badlands topography common to the area. The canyons and swales on the study site are part of this system.

5.3. Stratigraphy

Mapping and nomenclature following Matti, Morton and Langenheim (2015) are being used for this report (Figure 2, Regional Geologic Map). The site has been mapped as being underlain by Pleistocene and Pliocene age sedimentary deposits of Live Oak Canyon (formerly described as the upper member of the San Timoteo Formation) within the northern rolling hills portion of the site. The majority of the site is mapped as Pleistocene age very old alluvial fan deposits overlain by Holocene age young alluvial axial-valley and fan deposits. The existing channels onsite are mapped as modern age very young wash deposits. Undocumented fill exists in areas where the land surface has been modified in order to support access roads and berms, especially in the vicinity of the existing structures and Roberts Road. For the purpose of this report, the three younger (Holocene) alluvial deposits described below have been labeled as one unit (Qal) on Plates 1 through 9. Approximate surface geologic contacts are shown on Plates 1 through 9. Brief descriptions of the geologic units encountered at the site are presented below, from youngest to oldest.

5.3.1. Artificial Fill – Undocumented (Map Symbols afu)

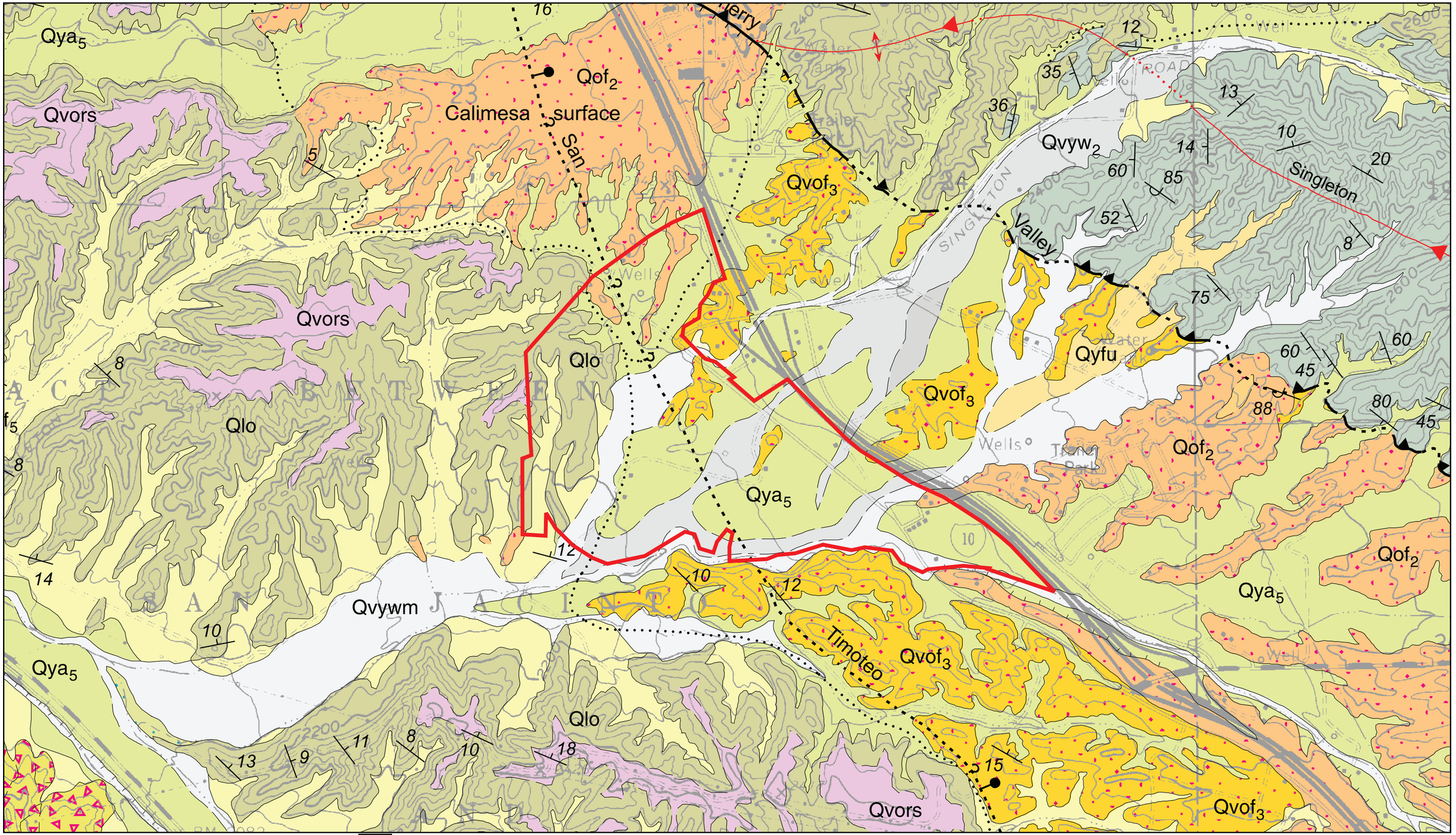
Artificial fill soils were observed throughout the site specifically along margins of adjacent residential developments, underlying existing structures and at roadway improvements including Roberts Road and other disturbed access roads onsite. Artificial fill was not encountered within our subsurface excavations however it is anticipated to be locally derived.

5.3.2. Alluvium (Map Symbol Qal)

Holocene age alluvium are located surrounding the major drainages onsite and cover most of the southerly portion of the site. The alluvium includes very young wash deposits, located within the active drainage channels, young axial valley deposits, and young alluvial fan deposits. These deposits have not been differentiated on the plans or boring logs. These deposits consisted of poorly consolidated sediments within the active drainage channels to more consolidated sediments elsewhere. The alluvium ranges from dry to wet with consistencies that generally range from soft/loose to medium dense/stiff. Up to 60 feet of alluvium was encountered in boring AGS-3. Abundant peat was encountered within boring AGS-4 at depths of up to 35 feet. Additional layers may be present between the roughly 5-foot sampling intervals. Cone penetration tests may be useful in identifying thin layers of peat deposits that may be present as well as the lateral extents.

5.3.3. Older Alluvium (Map Symbol Qoa)

An intermediate age alluvial deposit was observed in several borings and test pits underlying the young alluvial deposits. The older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.



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SOURCE MAP - GEOLOGIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE CALIFORNIA. HIRSCHBERG, MATTI AND COSSETTE (2015)

SCALE: 1 in. = 1000 ft.

Qvywm	Very young wash deposits (modern)
Qya_5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf_5	Young alluvial-fan deposits, unit 5 (middle Holocene)
$Qvof_3$	Very old alluvial-fan deposits, unit 3 (middle Pleistocene)
Qlo	Live Oak Canyon Formation (Pleistocene)

REGIONAL GEOLOGIC MAP

FIGURE 2

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P/W 2004-01

The older alluvium has consistencies that range from medium dense/stiff to very dense/hard. This unit is considered to be late Pleistocene in age.

5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof)

Middle to Lower Pleistocene age very old alluvial fan deposits were encountered within the majority of test pit excavations underlying younger alluvial deposits. This unit was observed to be composed mainly of silty sand in a medium dense to dense condition. The very old alluvium is distinguished from the overlying younger alluvial deposits by its higher relative density, weakly cemented nature, and iron oxide development. Generally minor porosity within the upper five feet existed within this unit.

5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo)

Sedimentary deposits of Live Oak Canyon is a new unit name designated by Morton & Matti (2015) that applies to a sequence of sandy and conglomeratic rock that crops out in low hills and mesas north of San Timoteo Canyon. These materials were previously assigned to the upper member of the San Timoteo Formation and range in age from late Pliocene to early Pleistocene. The sedimentary deposits of Live Oak Canyon have been mapped within the rolling hills located in the northwestern portion of the project site. As encountered onsite, this unit is mostly composed of thickly bedded fine to medium-grained silty sandstone and conglomerate that is yellowish brown to light gray brown and moderately hard. In PSE's B-43 boring, some light grey moderately hard sandy siltstone was encountered. Iron oxide staining was observed in this unit. Although not encountered in exploratory excavations onsite, occasional clay beds may be present within this unit. Regionally, bedding within this unit has been mapped to dip at shallow inclinations (~10 degrees) to the northeast. One bedding attitude taken from B-43 indicates that the bedding dips at 10 degrees to the north-northeast.

5.4. Groundwater

Groundwater was encountered within several exploratory borings and Test Pit T-2 at various depths and elevations in the main drainage course that crosses the site. Standing water was present at the time of our current investigation within the drainage channel running under existing Roberts Road south of the Singleton and Roberts Road intersection. However, groundwater was not encountered in AGS-13, which was excavated just to the north of this drainage course to a depth of 50 feet (elevation 2195). The depth/elevation of the observed groundwater varied across the site and may be difficult to accurately predict. The presence of the concealed San Timoteo Canyon fault may have an impact on groundwater conditions. Matti, et al (2006) has shown groundwater to generally flow to the west in the area, and describes the presence of a groundwater barrier, which has been inferred to be a splay of the San Timoteo Canyon fault. There are four known active wells on the site. The depths of two are known (288 and 319 feet) whereas the other two are not known. The type of well construction, including limits of the screened zones, are unknown. Recent measurements maintained by the USGS California Water Science Center (July and December 2020) indicate that groundwater depths are around 100 to 170 feet (elevations 2105 to 2140). In Spring of 2000, groundwater elevations in the area upstream of the fault have been generalized at

an elevation of around 2175 feet (Matti 2006, Figure 28), which appear to be based on the nearby well readings (depths ranged from 59 to 102 feet in April 2020, which corresponded to an elevation of around 2175). Matti (2006) mentions the location of the fault coincides where springs have been documented historically in this area. However, Matti does not describe the precise locations of these springs. The well readings may be measuring a lower groundwater surface than those encountered in the recent borings.

Shallow groundwater conditions were encountered near the intersection of proposed Roberts and Singleton Roads and the northwest side of Lot 3. In this area, groundwater was encountered at depths of 15 feet (elevation 2216) in PSE-96, 11 feet (elevation 2217) in AGS-3, 10 feet in test pit T-10 (elevation 2216), 15 feet (elevation 2208) in AGS-16, and 40 feet (elevation 2210) in PSE-95. Just upstream of this area, groundwater was not encountered in AGS-13, which was excavated to a maximum depth of around 50 feet (elevation 2195). Groundwater was not encountered in SCG-10 located to the southeast, which was excavated to a maximum depth of around 50 feet (elevation 2180) nor in AGS-4, located downstream and drilled to a maximum depth of around 45 feet (elevation 2150).

Groundwater depths across the site will vary in relation to the time of year, rainfall, and discharge from upstream bodies of water. It should be anticipated that groundwater will be encountered during construction and will require mitigation, especially near the northwest corner of Lot 3. This mitigation may include dewatering areas where the remedial excavation extends below the groundwater level and stabilization of removal bottoms that are near the groundwater level. Subdrains are proposed in this area to mitigate the potential for groundwater rising and impacting surface improvements.

5.5. Non-seismic Geologic Hazards

5.5.1. Mass Wasting and Debris Flows

The site is gently sloping with some steeper topography within the northwestern portion of the project site. Due to the gently sloping existing terrain and proposed mass grading, mass wasting and debris flows are not considered a site hazard.

5.5.2. Flooding

The project site has been mapped as FEMA flood zone “X” which is characterized as an “Area of Minimal Flood Hazard”.

5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring

Some layers of peat were identified in the recent alluvial deposits. Settlement of peat deposits can occur when the moisture content is reduced and oxidation/decomposition is allowed to occur. Subsidence is also related to groundwater withdrawal and changes in stresses. Hazards associated with subsidence can be mitigated with proper design and construction practices. It is proposed to remove peat within building pad areas to mitigate the potential for settlement. Other improvements located outside the areas of deep removals

may be subject to possible settlement/subsidence due to groundwater withdrawal and changes in stresses.

Evidence of ground fissuring has not been identified on the site, and AGS is unaware of ground fissuring in the surrounding areas

5.6. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding.

The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

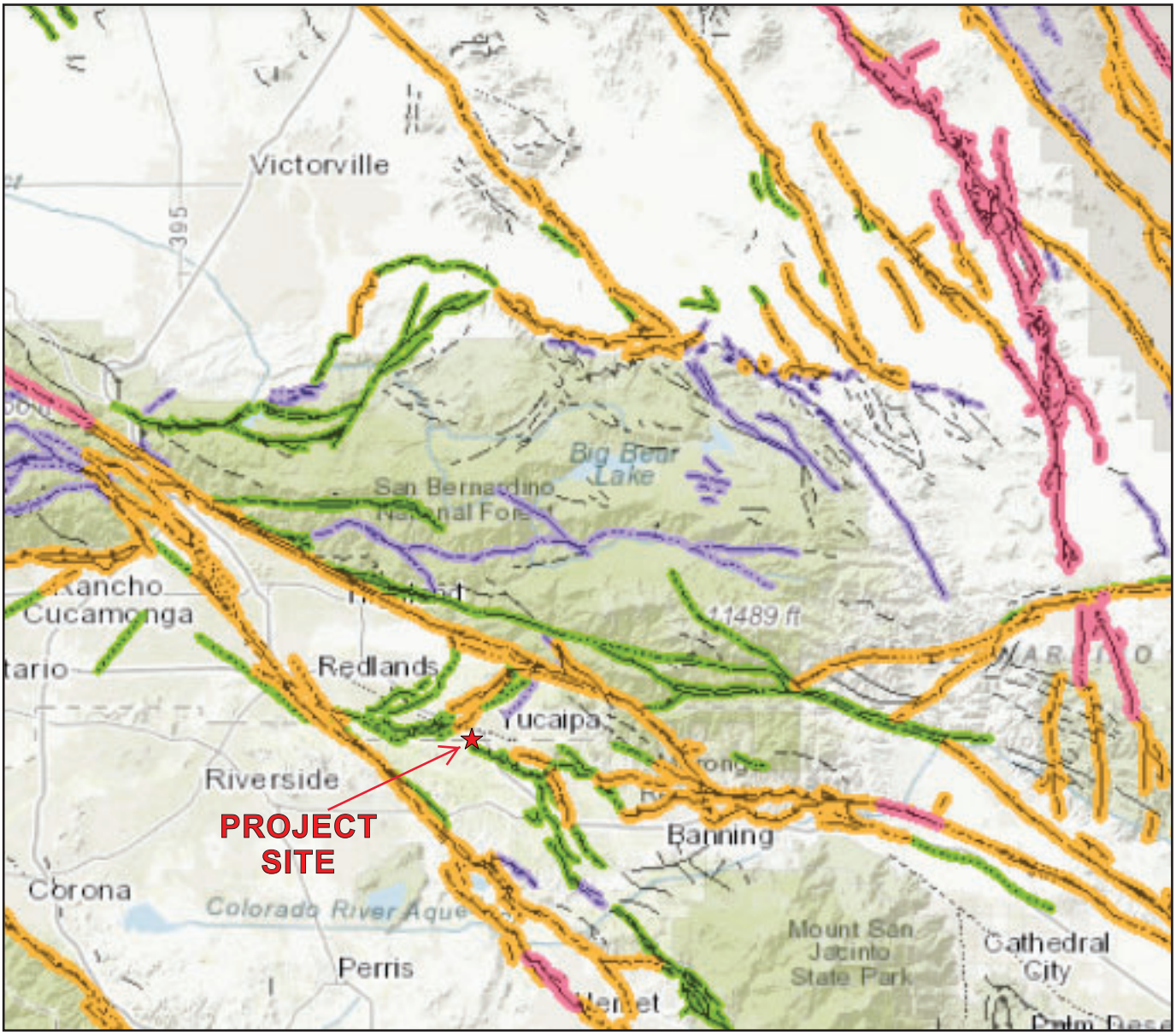
5.6.1. Surface Fault Rupture

There are no known active faults that transect or project into the site. The nearest known active fault is the San Gorgonio Pass Fault located approximately 1.5 miles northeast of the project site (See Figure 3, Regional Fault Map). The San Timoteo Canyon Fault is mapped transecting the site from the southeast to the northwest. The San Timoteo Canyon Fault is an inferred and concealed structure that is tagged with question marks to indicate that its existence is questionable and the evidence for the fault's existence is indirect. The San Timoteo Canyon Fault in the area is entirely concealed by younger Quaternary-age alluvial deposits. The fault is considered to be older than late Quaternary in age but its lower age limit is unknown. Accordingly, the potential for fault surface rupture within the project is considered low.

5.6.2. Liquefaction/Dynamic Settlement

Liquefaction is the phenomenon in which the buildup of excess pore pressures, in saturated granular soils due to seismic agitation, results in a temporary "quick" or "liquefied" condition. Loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. Once the excess pore water pressure dissipates, the liquefied zones/lenses will likely consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways, and may include ground deformation, loss of bearing strength, lateral spreading, flow failure, and dynamic settlement.

The very young wash deposits, young axial-valley deposits, and young alluvial fan deposits are potentially liquefiable in their present condition. Saturated younger alluvial deposits were encountered near the northeast corner of Lot 3. The potential for liquefaction of the saturated deposits was evaluated. The analyses were performed using LiqSVS software (Version 2.0.1.7 by GeoLogismiki, 2019). The deterministic methods presented in NCEER



N

FAULT MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

SOURCE MAP - CALIFORNIA DEPARTMENT OF CONSERVATION FAULT ACTIVITY MAP OF CALIFORNIA (2010)

P/W 2004-01

FIGURE 3

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(1997) were used, and a corresponding dynamic settlement was estimated by the program using the curves proposed by Ishihara and Yoshimine (1992) as described in Zhang et al. (2002) and a groundwater level of 11 feet. Borings AGS-3 and AGS-16 form the basis of our analysis. The peak ground acceleration was determined in accordance with ASCE 7-16 and was determined to be 0.87g. Based on the deaggregation analysis results from the USGS Unified Hazard Tool website, a mean earthquake magnitude of 7.5 for the 2% in 50 year risk was used for the analysis using 100 percent of the PGA_M.

The upper 10 feet of soils were excluded from the analysis since these soils should be removed during remedial grading efforts. Based on test results, certain layers were assumed to behave more "clay-like" and were considered non-liquefiable. Laboratory test results were used to substantiate which soil layers are considered potentially liquefiable or subject to cyclic softening. The moisture contents of the samples (most of which are considered saturated and below the ground water table) were determined and compared with the plasticity indices. The results indicate that fine-grained soils encountered are not considered sensitive and subject to cyclic softening. The liquidity index (LI) indicates that the clayey soils are generally low. Based on the test results, the finer-grained soils onsite are considered to behave clay-like and are not considered susceptible to liquefaction or cyclic softening.

Based on a calibration report for 2R Drilling, an Energy Transfer Ratio of 85.5 percent was used, which corresponds to a Hammer Efficiency Ratio (Ce) of 1.43. The blow counts obtained from the SPT were used in the analyses. Samples were also collected using the Modified California Sampler, and the blow counts were used after applying a reduction factor of 0.6.

The calculations, included in Appendix D, indicate that potentially liquefiable soil layers are located at depths of around 30 feet in AGS-3 and AGS-16. The significant 30-foot thick non-liquefiable crust is anticipated to mitigate the potential for surface manifestations, including settlement, reduced bearing capacity, ground deformation, and lateral spreading. Additionally, it is recommended that a geotextile such as Mirafi RS280i be placed on the saturated subgrade in order to stabilize the subgrade. The related total dynamic settlements summarized in Table 5.6.2, below, are based on methods described in Zhang et al. (2002), and are considered conservative estimates based on the significant thickness of a non-liquefiable soil crust and recommended placement of the geotextile fabric. According to SP-117A (CDMG 2008), up to two thirds of the total settlement should be considered as differential settlement unless more precise predictions of differential settlement can be made. Considering the thick non-liquefiable crust, and placement of 10 to 15 feet of newly compacted fill over a geotextile fabric, it is AGS's opinion that the differential settlement may be less than 2/3 of the total settlement. AGS has estimated that the differential settlement is one half of the total. The structural engineer should design the structures within the northwest corner of Lot 3 to accommodate this settlement without collapsing.

TABLE 5.6.2 ESTIMATED DYNAMIC SETTLEMENT		
Boring	**Full PGA**	
	Total Settlement (inches)	**Differential Settlement (inches)**
AGS-3	2.2	1.1
AGS-16	3.7	1.9

5.6.3. Lateral Spreading

Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in a shallow underlying deposit during an earthquake. With the remedial grading recommendations of removing and recompacting the young alluvial soils, and the thickness of the non-liquefiable crust, the potential for lateral spread and surface manifestations is considered to be low. However, if saturated alluvial soils are left-in-place these areas may be prone to lateral spread. In that case, further evaluation of ground improvement measures may be necessary.

5.6.4. Seismically Induced Landsliding

No landslides, including shallow surficial failures have been mapped onsite. This indicates the lack of any seismically activated land sliding during past historic and ancient seismic events. Seismicially-induced landsliding is not considered a significant concern in either the pre- or post-development site conditions.

5.6.5. Earthquake Induced Flooding

Earthquake induced flooding can be caused by tsunamis, dam failures, or seiches. Also, earthquakes can cause landslides that dam rivers and streams, causing flooding upstream above the dam and also downstream when these dams are breached. A seiche is a free or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. Due to the lack of a freestanding body of water nearby, the potential for a seiche impacting the site is considered to be non-existent.

5.7. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 259 m/s. Table 5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 33.980°N and Longitude 117.051°W. The seismic provisions of 2019 CBC are different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located in Site Class D soil conditions except for certain cases noted in ASCE 7-16 Section 11.4.8.

TABLE 5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Seismic Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	2.239g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.772g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	2.687g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	1.791g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	1.099g
Seismic Design Category	N/A[3]

Notes:
[1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8
ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$.

5.8. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra including the probabilistic and deterministic seismic hazard analyses are described below.

5.8.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

5.8.2. Deterministic Seismic Hazard Analysis

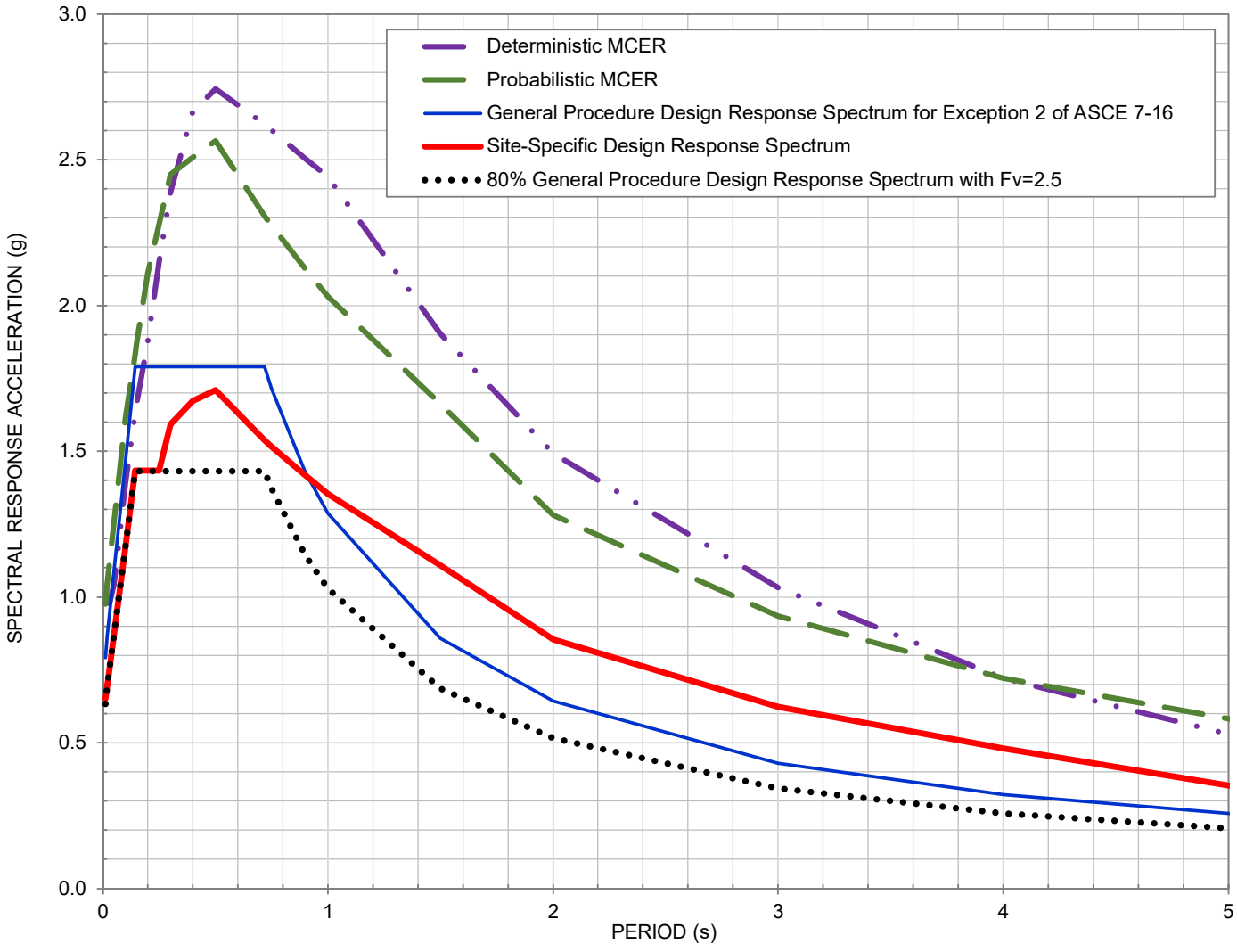
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation we selected three "controlling" sources and seismic events: the San Gorgonio Pass fault, the San Jacinto fault (San Jacinto Valley section) and the San Andreas fault (San Bernardino South section). Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

5.8.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 5.8.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.650
0.02	0.693
0.03	0.753
0.05	0.872
0.075	1.022
0.1	1.172
0.144	1.433
0.15	1.433
0.2	1.433
0.25	1.433
0.3	1.592

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	1.672
0.5	1.711
0.718	1.537
0.75	1.516
0.9	1.418
1.0	1.353
1.5	1.108
2.0	0.853
3.0	0.623
4.0	0.480
5.0	0.353



Note: See report for values of the various curves.

AGS

SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

PARCEL MAP 37862
ROBERTS RD AND CHERRY VALLEY BLVD
CALIMESA, CALIFORNIA

PROJECT NO.	DATE	
2004-01	12/20	**FIGURE 4**

TABLE 5.8.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.791	0.915	1.065	0.975	0.979	0.645	0.979	0.975	0.633	0.650
0.02	0.866	0.915	1.143	1.046	0.983	0.690	0.983	0.983	0.693	0.693
0.03	0.941	0.915	1.220	1.117	0.978	0.735	0.978	0.978	0.753	0.753
0.05	1.091	0.915	1.375	1.259	1.045	0.825	1.045	1.045	0.872	0.872
0.075	1.278	0.915	1.569	1.436	1.214	0.938	1.214	1.214	1.022	1.022
0.1	1.465	0.915	1.763	1.614	1.390	1.050	1.390	1.390	1.172	1.172
0.144	1.791	0.915	2.000	1.830	1.630	1.246	1.630	1.630	1.433	1.433
0.15	1.791	0.915	2.034	1.862	1.658	1.275	1.658	1.658	1.433	1.433
0.2	1.791	0.915	2.305	2.110	1.874	1.500	1.874	1.874	1.433	1.433
0.25	1.791	0.913	2.494	2.278	2.149	1.500	2.149	2.149	1.433	1.433
0.3	1.791	0.912	2.687	2.450	2.388	1.500	2.388	2.388	1.433	1.592
0.4	1.791	0.909	2.760	2.508	2.665	1.500	2.665	2.508	1.433	1.672
0.5	1.791	0.905	2.834	2.566	2.743	1.500	2.743	2.566	1.433	1.711
0.718	1.791	0.898	2.567	2.305	2.622	1.500	2.622	2.305	1.433	1.537
0.75	1.716	0.897	2.535	2.274	2.601	1.500	2.601	2.274	1.372	1.516
0.9	1.430	0.892	2.384	2.127	2.505	1.500	2.505	2.127	1.144	1.418
1	1.287	0.889	2.284	2.030	2.441	1.500	2.441	2.030	1.029	1.353
1.5	0.858	0.889	1.870	1.663	1.903	1.000	1.903	1.663	0.686	1.108
2	0.643	0.889	1.440	1.280	1.493	0.750	1.493	1.280	0.515	0.853
3	0.429	0.889	1.052	0.935	1.032	0.500	1.032	0.935	0.343	0.623
4	0.322	0.889	0.811	0.721	0.722	0.375	0.722	0.721	0.257	0.480
5	0.257	0.889	0.656	0.583	0.530	0.300	0.530	0.530	0.206	0.353

Site-specific design response parameters are provided in Table 5.8.3B. These parameters were derived from the Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 5.8.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	2.882g
Spectral Response Acceleration 1-second period, S_{M1}	2.882g
Design Spectral Response Acceleration for short period, S_{DS}	1.922g
Design Spectral Response Acceleration for 1-second period, S_{D1}	1.922g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.890g

6.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

6.1. Material Properties

6.1.1. Excavation Characteristics

It is anticipated that excavations within the undocumented artificial fill, topsoil, young alluvium, older alluvium, very old alluvial fan deposits, and the highly weathered portions of the formational materials can be accomplished with conventional heavy equipment. It is possible that the deep excavations within the unweathered formational materials on the northwestern portion of the property area could require heavy ripping in deeper cuts.

6.1.2. Compressibility

Onsite materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the very old alluvial deposits and Live Oak Canyon deposits. These materials will require complete removal below structural areas prior to placement of fill, where exposed at design grade, and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 7.1 and earthwork adjustment estimates are presented in Section 6.1.7.

6.1.3. Collapse Potential/Hydro-Consolidation

Some of the upper alluvial soils are susceptible to hydro-consolidation. Beneath settlement sensitive improvements, it is recommended that the upper soils prone to hydro-consolidation be removed and replaced with compacted fill.

6.1.4. Expansion Potential

Based upon AGS's observations and preliminary testing and review of relevant laboratory testing by PSE, the expansion potential of the onsite materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D4829. However, it is anticipated that the majority of materials will fall into the "very low" to "low" range. Further testing and geologic mapping should be conducted during and upon completion of the grading operations to provide design recommendations on a pad by pad basis.

6.1.5. Shear Strength

Based on our laboratory testing, reviewed laboratory testing from PSE and previous experience on similar projects, the following shear strength values may be used for design.

TABLE 6.1.5 Shear Strength Parameters Used for Design (Ultimate)			
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Moist Density (pcf)**
Artificial Compacted Fill	150	31	125
Young and Older Alluvial Deposits (Qal & Qoa))	100	30	125
Very Old Alluvial Fan Deposits (Qvoa)	200	32	125
San Timoteo and Live Oak Canyon Formations	400	34	130

6.1.6. Chemical and Resistivity Test Results

The results of previous preliminary chemical/resistivity testing are presented in Appendix C. Corrosive soils are defined as soils that have minimum resistivity less than 1,000 ohm-centimeters, chloride concentration greater than 500 ppm, sulfate concentration greater than 2,000 ppm, or pH less than 5.5 (Caltrans, 2018).

Test results indicate that the potential for sulfate attack on concrete in contact with the on-site soils is negligible in accordance with ACI 318, Table 4.3.1. In addition, test results also indicated that the potential for chloride attack of reinforcing steel in concrete structures and pipes in contact with the on-site soil is negligible.

Resistivity test results indicate that the on-site near-surface soils are not considered corrosive to buried ferrous metals. However, a corrosion specialist may be consulted regarding suitable types of piping and appropriate protection for underground metal conduits, if needed.

Final determination of the corrosivity of the site should be based upon testing of soils from the site and import soils during grading operations.

6.1.7. Earthwork Adjustments

In consideration of the proposed mass grading to develop the project as currently proposed, the following average earthwork adjustment factors presented in Table 6.1.7 have been formulated for use in the earthwork design of the project.

TABLE 6.1.7 EARTHWORK ADJUSTMENTS	
Geologic Unit	**Approximate Range**
Artificial Fill, Topsoil, Young Alluvial Deposits	5% to 15% shrinkage (average ~12%)
Old and Very Old Alluvium Live Oak Canyon Formation	5% shrinkage to 10% bulk (average ~3% bulk)

6.1.8. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. If structural pavements are to be constructed (concrete or asphaltic concrete), an R-value of 30 can be utilized for the preliminary design of pavements. Final design should be based upon representative sampling of the as-graded soils.

6.2. Analytical Methods

6.2.1. Slope Stability Analysis

Stability analyses were performed for both static and seismic (pseudo-static) conditions using the GSTABL7 computer program. The Modified Bishop method was used to analyze circular type failures. The critical failure surface determined in the static analysis was used in the pseudo-static analysis. A horizontal destabilizing seismic coefficient (kh) of 0.15g was selected for the site and used in the pseudo-static analyses.

Surficial stability analyses were conducted using an infinite height slope method assuming seepage parallel to the slope surface.

6.2.2. Pavement Design

Asphalt concrete pavement sections have been designed using the recommendations and methods presented in the Caltrans Highway Design Manual.

6.2.3. Bearing Capacity and Lateral Pressure

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases.

7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

Some of the alluvial soils onsite are considered prone to hydro-consolidation. Layers of peat were also encountered at depths of up to around 35 feet in AGS-4. Peat is considered highly compressible and is subject to significant volume changes, even with minor changes in stresses and moisture content. It is recommended that these materials be removed below proposed structural areas. Lesser removals can be considered for areas where the potential for settlement may not warrant the cost of complete removal, such as in landscape and parking areas, where the cost associated with possible additional maintenance may be less than the cost remedial grading.

7.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of Riverside and AGS's Earthwork Specifications (Appendix E).

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing foundations elements, standpipes, irrigation lines, and utility conduits should be removed and wasted off-site. Concrete can be placed in the fill provided it is broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations presented in Section 7.9.6. Cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

Topsoil, undocumented fills, the upper young alluvial deposits, and highly weathered portions of older and very old alluvial fan deposits and Live Oak Canyon deposits should be removed in areas planned to receive compacted fill. Additionally, younger alluvial deposits, peat deposits, and porous older alluvium above the groundwater should be completely removed in areas intended to support settlement-sensitive structures. The removals for building areas should extend a minimum of 10 feet outside the building limits or at a 1:1 projection down and away from the building limits until a competent bottom is achieved, whichever is greater. It is anticipated that the upper 3 feet of alluvial soils should be removed in parking and landscape areas. Deeper alluvial removals should be conducted in street areas to support utilities and facilitate trenching. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals are presented in Table 7.1 and shown on Plates 1 through 12.

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. The removal bottoms should be observed and mapped by the engineering geologist prior to fill placement.

In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

TABLE 7.1

ESTIMATED DEPTH OF REMOVALS

Geologic Unit (map symbol)	Estimated Removal Depth	
	Structural Areas	Landscape Parking Areas
Topsoil	0.5-3 feet	
Undocumented Artificial Fill (afu)	1-10+ feet	
Young Alluvial Deposits (Qal)	1-40+ feet	1-3+ feet
Old Alluvial (Qoa) and Very Old Alluvial Fan Deposits (Qvof)	1-5 feet	1-3 feet
Highly Weathered Live Oak Canyon Formation (Qlo)	1-3 feet	

7.1.1. Overexcavation of Building Pads and Streets

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur exposed at the design elevation. Overexcavation recommendations are provided below. The overexcavation should expose competent bottoms, and the replacement fill should be compacted to project specifications as described in Section 7.9.1.

7.1.1.1. Cut/Fill Transition Pads

Where design grades and/or remedial grading activities create a cut/fill transition beneath building pads, the cut and shallow fill portions of the commercial building pad should be over-excavated a minimum depth of five (5) feet and replaced to design grade with compacted fill. In Lot 3 where deeper removals are planned, the cut portions of the building pad exposing Very Old Alluvial Deposits and Live Oak Canyon Formation should be overexcavated a minimum of 10 feet. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas. At this time specific locations of the buildings on the east side of Roberts Road are not known. Accordingly, it may be prudent to sheet grade the lots, and wait to conduct the undercuts once final foundation depths and building locations are determined.

7.1.1.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) of the deepest fill section within the pad but need not exceed 10 feet. The transition between the deep fill and cut (capped) portion of the lot should not exceed a 2:1 gradient.

7.1.1.3. Street Overexcavation

The overexcavation of street areas to facilitate utility installation is not anticipated to be required.

7.1.2. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

It is our understanding that development is planned on the adjacent parcels. Development of one parcel may impact remedial grading efforts needed to support the adjacent parcel development. Coordination with the adjacent property owner should be considered to avoid negatively impacting future development efforts on the adjacent parcel.

7.2. Subgrade Stabilization

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of 1½" angular rock wrapped in geotextile (such as Mirafi RS280i) over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water

truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

7.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. If field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

7.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 or flatter (horizontal to vertical). The highest proposed cut slope is 72 feet in height- 35 feet of 3:1 (H:V) above a 37 foot 2:1 (H:V). It is anticipated that slopes excavated in very old alluvium will be grossly and surficially stable to the proposed heights. If unconsolidated coarse-grained lenses of materials are encountered on the slope face, local stabilization may be necessary.

Although not encountered during the subsurface investigation, occasional weak beds are present in the Live Oak Canyon Formation. It is anticipated that slopes excavated in Live Oak Canyon Formation will be grossly and surficially stable to the proposed heights unless out-of-slope bedding conditions are encountered. Bedding generally dips to the northeast, so cut slopes facing this direction may need to be stabilized. Generally, the proposed cut slopes within the Live Oak Canyon Formation face to the east, southeast and south.

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcut. Terrace drains and benches should be constructed on cut slopes in accordance with the County of Riverside Grading Ordinance.

7.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 46 feet. Fill slopes, when properly constructed with onsite materials and maintained as described herein, are expected to be grossly and surficially stable as designed.

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will

improve surficial stability and should be considered. Areas subject to potential scour should be armored.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of ascending slope, whichever is greater. Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward, from the catch point of the design toe at a minimum 1:1 projection, to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County of Riverside Grading Ordinance.

7.3.3. Skin Cut and Skin Fill Slopes

A review of the mass grading plans did not indicate any significant design skin fill and skin cut conditions, however, skin cut or thin fill sections may be created during grading. If these conditions occur, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half the remaining slope height, and not less than 15 feet, is provided. Where the design cut is insufficient to remove all unsuitable materials, overexcavation and replacement with a stabilization fill will be required, as shown on Grading Detail 6 in Appendix E.

7.3.4. Fill Over Cut Slopes

Fill over cut slopes should be constructed such that the cut portion is excavated first for geologic mapping and stability determination. If deemed stable then a "tilt-back" keyway half the remaining slope height or minimally twenty (20) feet wide should be established. Drains will be required for this condition with the locations determined based upon exposed field conditions.

7.3.5. Offsite Drainage Channel Slopes

Along the southerly boundary, steep natural slopes are present along the active drainage channel and outside the grading limits (See Cross Sections K-K', L-L', M-M', N-N'). Continued migration of this channel, scour, and/or undercutting of these slopes may impact onsite improvement and/or lead to slopes having a factor of safety that is less than desired. It is our understanding that future plans may include stabilization of portions of this channel. AGS should evaluate the proposed channel improvements to determine if additional stabilization measures or setbacks are warranted on this boundary.

7.3.6. Surficial Stability

The surficial stability of 2:1 (or flatter) fill and cut slopes have been analyzed, and the analysis presented in Appendix D indicates a factor-of-safety in excess of code minimums. When fill and cut slopes are properly constructed and maintained, satisfactory performance can be anticipated although slopes will be subject to erosion, particularly before landscaping is fully established.

7.3.7. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials (Live Oak Canyon Formation) can be considered a Type "A" soil. Very Old Alluvial Fan Deposits and Engineered Fill can be considered Type "B" soils. Young and older alluvial soils can be considered Type "C". Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material, 1:1 in fill soils, and 1.5:1 in young alluvial soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations. Final determination should be made during construction by the project Geotechnical Engineer based upon field observation.

For vertical excavations less than approximately 15 feet in height, cantilevered shoring may be used. Where cantilevered shoring is used for deeper excavations, the total deflection at the top of the wall tends to exceed acceptable magnitudes. Shoring of excavations deeper than approximately 15 feet may need to be accomplished with the aid of tied back earth anchors.

The shoring design should be provided by a California Registered Civil Engineer experienced in the design and construction of shoring under similar conditions. Once the final excavation and shoring plans are complete, the plans and the design should be reviewed by AGS for conformance with the design intent and recommendations. Further, the shoring system should satisfy applicable requirements of Cal-OSHA.

Personnel from AGS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including Cal-OSHA requirements, should be met.

7.3.8. Geologic Observation During Grading

All temporary slope excavations, including front, side and backcuts, and all cut slopes should be mapped to verify the geologic conditions that were modeled prior to grading are consistent with the exposures during the grading. Slope stability analyses and designed keyways may have to be modified based on conditions exposed during grading.

7.4. Survey Control During Grading

Removal bottoms, keyways, sub drains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations. Survey support will also be required to monitor settlement as discussed in Section 7.5.

7.5. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated alluvial soils be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix E).

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

7.6. Subsurface Drainage

7.6.1. Canyon Drains

Six- (6), eight- (8), and ten- (10) inch diameter canyon subdrains are recommended along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. The diameter and approximate locations of proposed subdrains are shown on Plates 1 and 9. Final determination of drain locations will be made in the field, based on exposed conditions. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

7.6.2. Heel Drains

Heel drains will be required for all stabilization fill keyways. Tentative heel drain locations can be provided when more detailed grading plans become available. Heel drains should be constructed in accordance with the details shown on Detail 3 (Appendix E).

7.6.3. Cut Slope Toe Drains and Subdrains

Consideration should be given to placing a toe drain on all major cut slopes in order to provide drainage for possible future nuisance water on the cut slopes.

Subdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

7.7. Seepage

Seepage, when encountered during grading, should be evaluated by the Geotechnical Consultant. If seepage is excessive, remedial measures such as horizontal drains or under drains may need to be installed.

7.8. Construction Dewatering

Due to the presence of shallow groundwater encountered during our field exploration, dewatering measures may be necessary during the excavation operation. It should be noted that controlling and maintaining of groundwater during construction is the responsibility of the contractor. As part of

the groundwater control, the quality of collected water should also be checked in accordance with applicable permits and regulations for water discharge.

7.9. Earthwork Considerations

7.9.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction listed below as determined by ASTM Test Method: D 1557. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

- Minimum 90% relative compaction: general fills unless higher compaction standard applies.
- Minimum 93% relative compaction: below subdrains.
- Minimum 95% relative compaction: upper 12-inches below pavement areas and fills deeper than 40 feet.

7.9.2. Fill Materials/ Import Soils

Most of the soils encountered during our subsurface exploration should be suitable for use as engineered fill provided oversize rock is disposed of in accordance with the recommendations in Section 7.9.6.

Any imported fill material should consist of granular soil having a "very low" expansion potential (expansion index of 20 or less). Import should also have a low corrosion potential (chloride content less than 500 parts per million, soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Import soils should be tested and approved by the Geotechnical Consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

7.9.3. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

7.9.4. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

7.9.5. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

7.9.6. Oversize Rock

Allow large quantities of oversize materials are not expected, some oversized rock material [i.e., rock fragments greater than eight (8) inches] may be encountered during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within commercial pads and to two (2) foot below the deepest utility in street and building utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

7.9.6.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

7.9.6.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural

fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

7.9.6.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

7.9.6.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

7.9.7. Fill Slope Construction

Fill slopes may be constructed by preferably overbuilding and cutting back to the compacted core or by back-rolling and compacting the slope face. The following recommendations should be incorporated into construction of the proposed fill slopes.

Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal before compaction, shaping and grid rolling.

Seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

7.9.7.1. Overbuilding Fill Slopes

Fill slopes should be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the compaction of the slope face meets the minimum project requirements for compaction. Compaction of each lift should extend out to the temporary slope face.

7.9.7.2. Compacting the Slope Face

As an alternative to overbuilding the fill slopes, the slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Back-rolling at more frequent intervals may be required. Compaction of each fill should extend to the face of the slope. Upon completion, the slopes should be watered, shaped, and track-walked with a D-8 bulldozer or

similar equipment until the compaction of the slope face meets the minimum project requirements. Multiple passes may be required.

7.9.8. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation

The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc., should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content prior to concrete placement.

8.0 DESIGN RECOMMENDATIONS

From a geotechnical perspective, the proposed development is feasible provided the following recommendations are incorporated into the design and construction. Preliminary design recommendations are presented herein and are based on some of the general soils conditions encountered during the geotechnical investigations. As such, recommendations provided herein are considered preliminary and subject to change based on the results of additional subsurface exploratory investigation.. Final design recommendations should be provided in a final rough/precise grading report.

8.1. Structural Design Recommendations

Precise building products, loading conditions, and locations are not currently available. It is anticipated that the as-graded near-surface soils could vary from “very low” to “medium” in

expansion potential when tested in general accordance with ASTM D 4829, although a majority is expected to be "very low" to "low". AGS has provided recommendations below assuming a "very low" to "low" expansion potential, which should be verified during grading.

8.1.1. Foundation Design

At this time specific building types, heights and locations have not been determined. Accordingly, the following general design parameters can be used for preliminary design and budgeting. Once the proposed buildings type and locations are known, site specific foundation design parameters should be developed by the project Geotechnical Engineer. The following values may be used in preliminary foundation design.

The values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

TABLE 8.1.1
FOUNDATION DESIGN PARAMETERS (COMMERCIAL/RETAIL)

Allowable Bearing	2,000 psf, increasing by 300 psf for each additional foot of embedment and width beyond the minimum provided, up to 3,000 psf assuming a minimum embedment of 18 inches below lowest adjacent finish grade.
Lateral Bearing	250 psf per foot of depth to a maximum of 2,000 psf for level conditions. Reduced values may be appropriate for descending slope conditions.
Sliding Coefficient	0.35
Assumed Expansion Potential	"Very Low" to "Low"
Slab-on-Grade Thickness	Minimum 4 inches
Slab-on-Grade Reinforcement	No. 3 rebar 18-inches on center each way
Continuous Footing Width	Minimum 12 inches (one-story), 15 inches (two stories)
Continuous Footing Depth*	Minimum 12 inches
Min. Footing Reinforcement	No. 4 rebar - 2 on top, 2 on bottom or No. 5 rebar, 1 on top and bottom
*Notes on Footing Embedment: Depth of embedment should be measured below lowest adjacent finish grade. Footings Adjacent to Swales and Slopes: If exterior footings adjacent to drainage swales are to exist within 5 feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least 5 feet is provided horizontally from edge of the footing to the face of the slope.	

8.1.2. Settlement

Settlements are likely to be produced from structural loads and long term settlement of the fill and underlying alluvial soils. As verified by settlement monitoring, primary settlement of the compacted fill materials should be completed prior to the release of lots for construction. AGS has provided a preliminary estimate of settlement for a typical one to two story building with shallow foundations. However, AGS should re-evaluate the settlement based on as-graded soil conditions and actual structural loads.

For lots with less than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 3/4 inch total and 3/8-inch across 20 feet.

For lots with greater than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 1 inch total and 1/2-inch across 20 feet.

For lots with left-in-place saturated alluvial soils, estimated settlements are 1.5 inches total and 3/4-inch across 20 feet. Structures should also be designed to accommodate the potential seismic settlement described in Section 5.6.2.

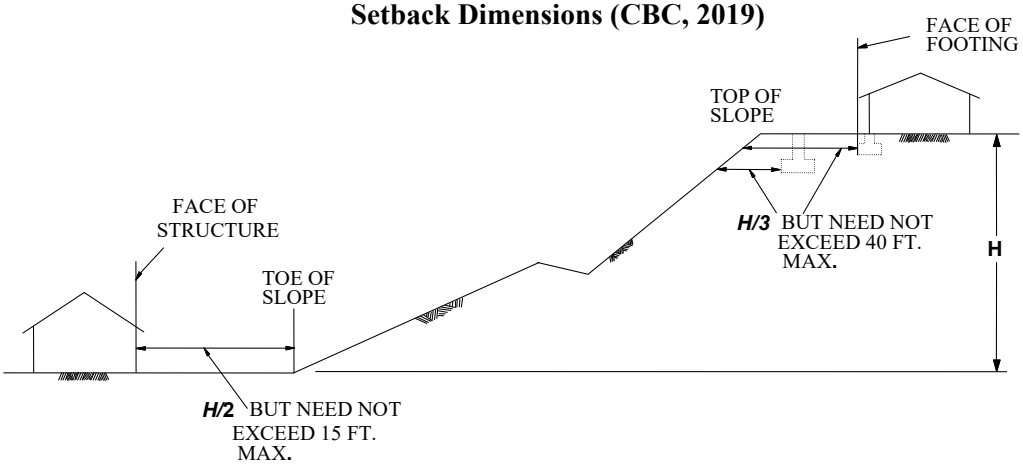
8.1.3. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

8.1.4. Deepened Footings and Setbacks

Improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code, require that structures be set back or footings deepened where subject to the influence of these natural processes. For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in the following figure.

FIGURE 8.1.4
Setback Dimensions (CBC, 2019)



8.1.5. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Spoils from the footing excavations should not be placed on slab-on-grade areas unless the soils are properly compacted. The footing excavations should not be allowed to dry back and should be kept moist until concrete is poured. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

8.1.6. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

8.1.7. Concrete Design

The test results from a sample collected during the current investigation indicated a sulfate concentration that corresponds to a S0 sulfate exposure class when classified in accordance with ACI 318.

Additional testing should be conducted after mass grading. It should be recognized that some fertilizers have been known to leach water-soluble sulfate compounds into soils containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. Accordingly, it is suggested that Portland cement type II/V be used for concrete in contact with soil.

8.2. Retaining Wall Design

8.2.1. Retaining Walls (backfilled with Native Materials)

The foundations for retaining walls should be founded on compacted fill, competent very old alluvial fan deposits, or Live Oak Canyon Formation and may be designed in accordance with the recommendations provided in Table 8.1.1. When calculating the lateral resistance, the upper 12 inches of soil cover should be ignored in areas that are not covered with hardscape. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance.

Retaining walls should be designed to resist earth pressures presented in the following table. These values assume that the retaining walls will be backfilled with native materials as shown in Detail RTW-A. Retaining walls should be designed to resist additional loads such as construction loads, temporary loads, traffic loads, and other surcharges as evaluated by the structural engineer.

The following Rankine earth pressure coefficients are recommended for the design of retaining walls onsite:

Static Case

"Native" backfill (C =150 psf, ϕ= 31°, density = 125 pcf)

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	390
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	63
Coefficient of Passive Pressure:	$K_p = 1.18$	148
Coefficient of At Rest Pressure:	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density (pcf)

k_h = seismic pseudostatic coefficient = $0.5 * PGA_M / g$

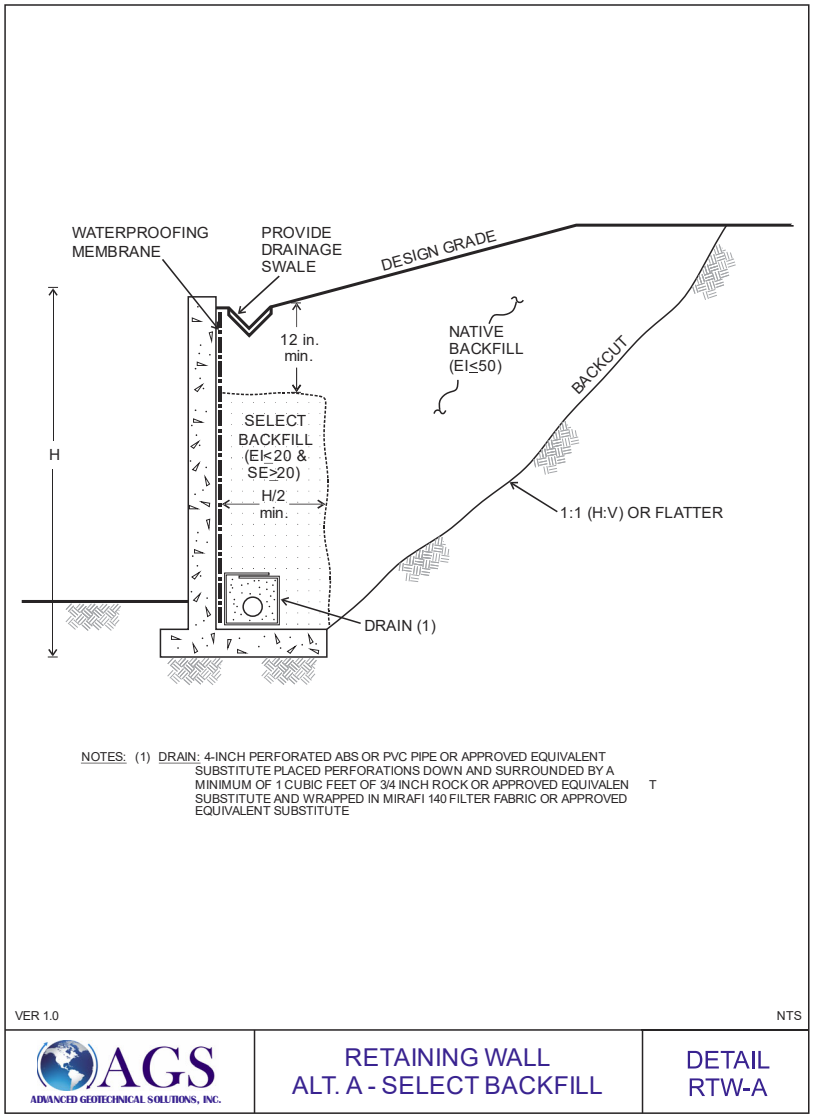
Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

8.2.2. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces as shown in Details RTW-A and RTW-B. Otherwise, the retaining walls should be designed to resist hydrostatic forces. Proper drainage devices should be installed along the top of the wall backfill and should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8 inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by

compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



8.3. Civil Design Recommendations

8.3.1. Site Drainage

Final site grading should assure positive drainage away from structures. Planter areas should be provided with area drains to transmit irrigation and rain water away from structures. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

8.3.2. Exterior Flatwork

- **Slab Thickness:** Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- **Control Joints:** Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.
- **Flatwork Reinforcement:** Consideration should be given to reinforcing any exterior flatwork.
- **Thickened Edge:** Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.3.3. Pavement Design

Preliminary pavement recommendations for streets and driveways are provided below. The performance of pavement is highly dependent on providing positive surface drainage away from the edge of pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed towards controlled drainage structures and not towards pavement areas. Landscaped areas adjacent to pavement areas are not recommended due the potential for surface or irrigation water infiltrating into the aggregate base and pavement subgrade. If landscaped areas are placed adjacent to pavement areas, consideration should be given to implementing measures that will reduce the potential for water to be introduced into the aggregate base. Such measures may include installing impermeable vertical barriers between the landscaped area and pavement areas including deepened curbs or 10 mil thick plastic liners extending a minimum of 6 inches below the bottom of the aggregate base.

8.3.3.1. Asphalt Concrete Pavement

Presented below are preliminary pavement sections for a range of traffic indices and an assumed Resistance-Value (R-Value) of 30 for the subgrade soils. R-Value testing of the subgrade soils should be performed during precise grading operations. The project Civil Engineer or Traffic Engineer should select traffic indices that are appropriate for the anticipated pavement usage and level of maintenance desired through the pavement life. Final pavement structural sections will be dependent on the R-value of the subgrade materials and the traffic index for the specific street or area being addressed. The pavement sections are subject to the review and approval by the County of Riverside.

TABLE 8.3.3.1. PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS*			
Traffic Index	**Assumed R-Value**	**Asphalt Concrete (inches)**	**Class II Aggregate Base (inches)**
4.5	30	3	5
5.0	30	3	6
5.5	30	3	7
6.0	30	3.5	8
6.5	30	4	8
7.0	30	4	10
7.5	30	4.5	10
8.0	30	5	11
*Note: See additional recommendations for subgrade preparation below.			

Pavement subgrade soils should be moisture conditioned to near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557 and should conform with the specifications listed in Section 26 of the *Standard Specifications for the State of California Department of Transportation* (Caltrans) or Section 200-2 of the *Standard Specifications for Public Works Construction* (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans *Standard Specifications* or Section 203-6 of the Green Book.

8.3.3.2. Portland Cement Concrete Pavement

Portland cement concrete may be used for the onsite driveways, trash enclosures, and truck loading docks. The following concrete pavement sections were determined using the recommendations provided in "Design of Concrete Pavement for City Streets" by the American Concrete Pavement Association. Testing of subgrade soils should be performed once driveway subgrades are achieved to determine the actual R-Value of the subgrade soils and/or corresponding modulus of subgrade reaction.

TABLE 8.3.3.2 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS				
Traffic Classification	**Maximum ADTT***	**Portland Cement Concrete Section (inches)**	**k* (pci)**	**MR* (psi)**
Collector	100	6.5	200	550
Industrial	300	8.0	200	550
*Notes: k = Modulus of subgrade reaction; ADDT = Average daily truck traffic; MR=Flexural strength of concrete (Modulus of Rupture) 550 corresponds to concrete having a minimum compressive strength of roughly 3,000 psi				

Joints should be provided at a minimum spacing of 8 feet. The joints should be caulked and sealed with a flexible compound to reduce the potential for moisture

infiltration. The civil engineer should determine the need for reinforcement and doweling.

The subgrade should be moisture conditioned and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Subgrade soils should be at or near the optimum moisture content to a depth of 12-inches immediately prior to placing concrete.

8.4. Corrosion

As discussed in Section 6.1.6, previous testing (pH, electrical resistivity, chloride content, and sulfate content) indicate that the soil conditions are not anticipated to be corrosive according to the Caltrans definition of a corrosive site. Final verification of site corrosivity will be based upon testing of import soil and soil from the site during grading operations. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of the construction materials.

9.0 SLOPE AND LOT MAINTENANCE

Maintenance of improvements is essential to the long-term performance of structures and slopes. Although the design and construction during mass grading created slopes that are considered both grossly and surficially stable, certain factors are beyond the control of the soil engineer and geologist. The property owners must implement certain maintenance procedures.

9.1. Slope Planting

Slope planting should consist of ground cover, shrubs and trees that possess deep, dense root structures and require a minimum of irrigation. The property owner should be advised of their responsibility to maintain such planting.

9.2. Pad Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure, or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water away from structures and slopes. Property owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, downdrains, and other devices that have been installed to promote structure and slope stability.

9.3. Slope Irrigation

The property owner should be advised of their responsibility to maintain irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful run-off and ground saturation should be avoided. If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

9.4. Burrowing Animals

Property owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

10.0 FUTURE STUDY NEEDS

10.1. Future Studies and Reviews

This report represents a geotechnical review of the current 60-scale mass grading plans for the project. From a geotechnical standpoint, it is AGS's opinion that additional subsurface investigation and analysis is required before construction of the proposed project begins.

As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Additional subsurface investigation and analysis
- Review of Rough Grading plans
- Review of Precise Grading plans
- Review of Foundation plans
- Review of Retaining Wall plans
- Review of road improvements, including potential impacts to existing improvements.

Project plans should be forwarded to the geotechnical engineer/geologist for evaluation and comment, as necessary

10.2. Grading Observation

Geologic exposures afforded during remedial and rough grading operations provide the best opportunity to evaluate the anticipated site geologic structure. Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional near-surface samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from the exploratory excavations at the locations indicated on the plans. The findings are based on the review of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

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APPENDIX B

SUBSURFACE LOGS

APPENDIX B-1

SUBSURFACE LOGS (AGS)

Date Excavated 5/6/2020, 5/7/2020 & 8/5/2020
Logged by SS
Equipment: JCB 3CX Backhoe

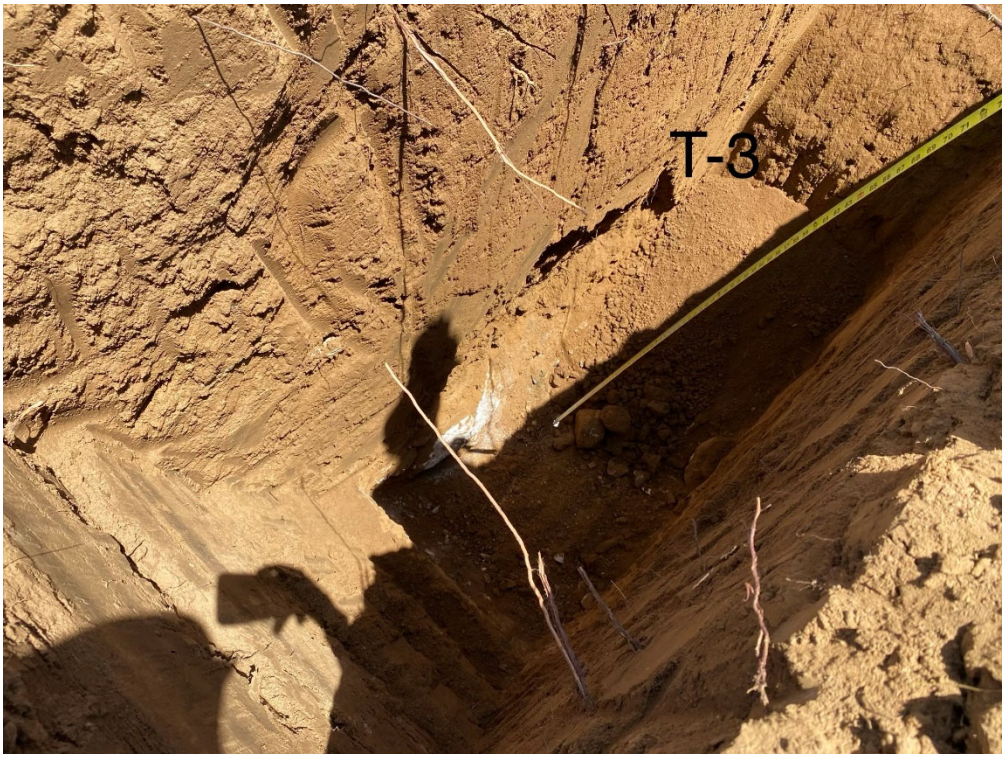
LOG OF TEST PITS

Excavation No.	Depth	USCS	Description
T-1	0.0 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @1.0 ft., moist; occasional gravel
	6.5 – 11.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @11.0 ft., increased density TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-2	0.0 – 4.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous
	4.5 – 11.5 ft.	SM/CL	@4.5 ft., Clayey SAND to Sandy CLAY, fine- to medium-grained, dark gray brown, very moist, loose to firm; micaceous @6.0 ft., wet @10.0 ft., Seepage, caving TOTAL DEPTH = 11.5 ft. SEEPAGE @ 10 ft., CAVING BELOW 10 ft.

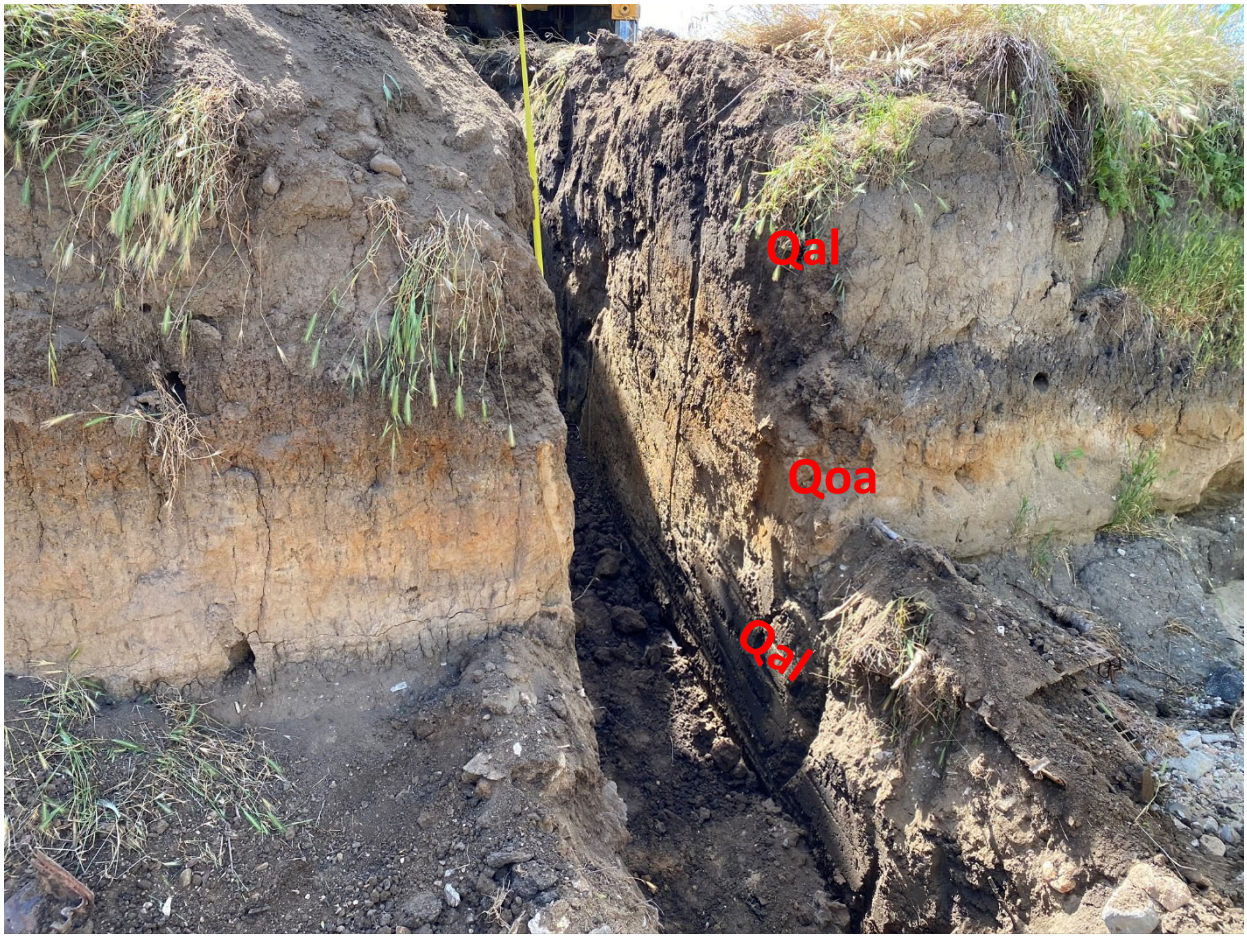


Excavation No.	Depth	USCS	Description
T-3	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to medium-grained SAND, brown, slightly moist, loose; roots
	1.0 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown, moist, medium dense; occasional gravel @6.0 ft., Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense; abundant sub-rounded to sub-angular gravel to cobble
	8.0 – 13.0 ft.	GM	@8.0 ft., Sandy sub-rounded GRAVEL layer, yellow brown to orange brown, slightly moist, medium dense; 2-3-foot boulder in sidewall
	13.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, slightly moist, medium dense to dense; micaceous, iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-4	0.0 – 4.0 ft.	SM	**Alluvium (Qal)** Clayey fine- to coarse-grained SAND, dark gray brown, moist, loose
	4.0 – 8.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense to dense; micaceous, iron oxide staining, weakly cemented @6.0 ft., Silty fine-grained SAND
	8.0 – 12.0 ft.	SM/SC	**Alluvium (Qal)** Silty SAND to Clayey SAND, fine- to coarse-grained, dark gray brown, moist, loose; rounded to sub-rounded gravel to cobble. (Channel deposits undermining the side wall of channel)

TOTAL DEPTH = 12.0 ft.
NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-5	0.0 – 2.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.5 – 11.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; minor porosity, weakly cemented @4.0 ft., Yellow brown to orange brown; occasional sub-rounded gravel @8.0 ft., no longer porous @10.0 ft., increased density; occasional sub-angular gravel to cobble TOTAL DEPTH = 11.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-6	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous, roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, yellow brown, slightly moist to moist, loose to medium dense
	6.5 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; weakly cemented, micaceous, minor porosity, trace coarse-grained sand to fine gravel @9.0 ft., Dense; no longer porous
	11.0 – 12.0 ft.	GM	Fine- to coarse-grained Sandy GRAVEL to COBBLE, yellow brown, slightly moist, dense
			TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-7	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 14.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine- to coarse grained SAND, dark yellow brown, slightly moist, medium dense to dense; occasional gravel @3.0 ft., moist; weakly cemented @8.0 ft., trace clay
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-8	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @2.0 ft., occasional gravel @4.5 ft., increased moisture; minor porosity
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse grained SAND, yellow brown to gray brown, moist, medium dense to dense; some gravel to cobble @9.0 ft., trace clay; weakly cemented, minor porosity, micaceous @10.0 ft., trace clay TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-9	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous @6.0 ft., yellow brown to gray brown, medium dense
	8.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented @11.0 ft., no longer porous TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-10	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 12.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @3.0 ft., occasional sub-rounded gravel @7.0 ft., yellow brown to gray brown, increased moisture, loose to medium dense; porous @11.0 ft., with clay, moist to very moist
	12.0 – 13.0 ft.	ML/CL	Sandy SILT to Sandy CLAY, wet; occasional sub-rounded gravel to cobble
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-11	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	3.0 – 7.5 ft.	ML/SM	Sandy SILT to Silty SAND, fine-grained, dark gray brown, moist, firm to medium dense; micaceous
	7.5 – 13.0 ft.	ML	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented
	8.0 – 13.0 ft.	SM	Silty fine-grained SAND, gray brown to yellow brown, moist, dense; trace clay, micaceous, manganese oxide nodules
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-12	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, slightly moist, loose; micaceous
	3.0 – 7.0 ft.	SW	Fine- to coarse-grained SAND with Silt with sub-rounded gravel
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; micaceous, weakly cemented
			TOTAL DEPTH = 14.0 ft. NO WATER, CAVING FROM 0 to 7 ft.

Excavation No.	Depth	USCS	Description
T-13	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @2.0 ft., moist; occasional gravel, micaceous
	7.5 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @10.0 ft., increased density TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-14	0.0 – 2.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.0 – 11.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous @5.0 ft., abundant sub-rounded gravel to cobble TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-15	0.0 – 4.0 ft.	SW	**Alluvium (Qal)** Fine- to coarse-grained SAND, yellow brown to gray brown, dry to slightly moist, loose; with sub-angular gravel
	4.0 – 9.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, moist, medium dense to dense; micaceous
			TOTAL DEPTH = 9.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-16	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense; trace clay
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, minor porosity
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, yellow brown to gray brown, moist, dense to moderately hard; trace clay, micaceous TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-17	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark gray brown, slightly moist, loose to medium dense; occasional sub-angular gravel to cobble
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, micaceous, manganese oxide
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, dense to moderately hard; trace clay and gravel @13.0 becomes fine- to coarse-grained TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-18	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 6.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, red brown, slightly moist, medium dense
	6.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor porosity @11.0 ft., decreasing moisture TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-19	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, medium dense; trace clay
	6.5 – 11.0 ft.	SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to medium-grained SAND, light yellow brown to light gray brown, very dense; iron oxide staining
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING





Excavation No.	Depth	USCS	Description
T-20	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 10.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, slightly moist, medium dense; trace gravel
	10.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-21	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist, loose; roots
	1.0 – 3.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, moist, medium dense; minor porosity
	3.5.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to gray brown, moist, dense; minor iron oxide staining, manganese oxide nodules
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-22	0.0 – 9.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	9.0 – 13.0 ft.	SM	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, stiff; occasional fine gravel, minor porosity, weakly cemented
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

BORING NUMBER AGS-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to orange brown, moist, medium dense; trace coarse sand, micaceous										
5				SPT	5-7-9 (16)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; iron oxide staining, micaceous										
10			@10.0 ft., very dense	MC	24-38-50/3"	112	2.9	16	Consol				
15			@15.0 ft., Silty fine-grained SAND, orange brown to red brown, moist, very dense; trace clay, iron oxide staining, micaceous	SPT	40-47-50/5"								
20				MC	47-50/3"	124	6.1	46					
25			@25.0 ft., Silty fine- to coarse-grained, orange brown, slightly moist, very dense; iron oxide staining, micaceous	SPT	37-50/5"								

Total depth = 25.9 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to brown, moist, medium dense; trace coarse sand, micaceous										
5				MC	4-4-5 (9)								
10		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND, yellow brown, slightly moist, dense; iron oxide staining, calcium carbonate development, micaceous	SPT	8-12-16 (28)								
15			@15.0 ft., occasional gray brown to blue gray siltstone fragments	MC	50								
20				SPT	25-50								
25		SM	@25.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown, moist, very dense; trace clay, occasional quartz fragments, iron oxide development, micaceous	MC	50	117	10.2	62	Shear				
			Total depth = 25.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2228 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 11.00 ft / Elev 2217.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5				MC	3-3-5 (8)	105	7.5	33					
10		ML	▽ @10.0 ft., Fine-grained Sandy SILT with Clay, dark gray brown, wet, soft; micaceous, mottled, minor iron oxide development	SPT	1-1-1 (2)								74
15			@15.0 ft., becomes gray brown	MC	3-4-6 (10)	106	16.9	77	Consol				
20			@20.0 ft., increased clay content; minor iron oxide development	SPT	3-3-3 (6)					46	29	17	71
25		CL	@25.0 ft., Silty CLAY with fine-grained Sand, brown to gray brown, wet, soft; minor iron oxide development	MC	5-7-9 (16)	95	25.6	89	Consol				
30		SC	@30.0 ft., Clayey SAND, blue gray to gray brown; occasional fine quartz fragments, trace root fibers	SPT	2-3-7 (10)					32	22	10	36
35													

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ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	@35.0 ft., Clayey SILT grades down to Silty fine-grained SAND, dark gray to dark olive brown, wet, stiff to medium dense	MC	6-9-12 (21)	89	17.0	51					
40		CL	@40.0 ft., Silty to Sandy CLAY, dark gray, wet, stiff	SPT	3-5-8 (13)								
45		SM	@45 ft., Silty fine-grained SAND with clay, blue gray to gray brown, wet, medium dense	MC	6-12-20 (32)	121	12.4	86					
50			@50.0 ft., Interbedded: from Silty fine- to coarse-grained SAND with fine quartz fragments to Clayey SILT with fine-grained Sand	SPT	4-4-7 (11)								59
55			@55.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown, wet, medium dense	SPT	6-5-11 (16)								
60		SC-SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to Clayey fine-grained SAND, dark yellow brown, wet, dense; iron oxide staining, micaceous	MC	11-22-35 (57)								
65			@65.0 ft., Sand becomes fine- to coarse-grained	SPT	8-10-10 (20)								
70		SP	@70.0 ft., Coarse-grained SAND with rock fragments	MC	30-20-26 (46)	115	13.3	78					
			@71.0 ft., Silty fine-grained SAND with Clay										
		SM	Total depth = 71.5 feet Groundwater encountered at 11 feet Backfilled with soil cuttings										

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2197 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND with Clay, dark gray brown, dry to slightly moist, loose										
5			@5.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown to olive, moist, medium dense to firm; micaceous	MC	10-12-14 (26)	103	19.4	83	Consol				
10		CL	@10.0 ft., Silty CLAY with fine-grained Sand, yellow brow to gray brown to black, moist, soft; abundant decomposing organic matter, minor iron oxide staining, micaceous	SPT	2-2-3 (5)								
15		CL-ML	@15.0 ft., Fine-grained Sandy SILT, yellow brown to gray brown with Silty CLAY, black, moist, medium dense to stiff; abundant decomposing organic matter, iron oxide staining, micaceous	MC	3-5-10 (15)	93	18.3	61	Consol				
20		OL	@20.0 ft., Organic SILT/PEAT, blue gray to black, moist, soft; abundant decomposing organic matter	SPT	1-2-4 (6)								
25			@25.0 ft., Silty CLAY to Clayey SILT with Peat layers, dark gray to blue gray to black, moist, soft; abundant decomposing organic matter	MC	4-5-6 (11)	60	37.8	57	Consol				
30		CL-ML	@30.0 ft., With fine-grained sand, very moist; trace fine root fibers	SPT	3-5-5 (10)								
35													

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	**Older Alluvium (Qoa)** Fine- to coarse-grained Sandy SILT with Clay, yellow brown to gray brown to olive, moist, very stiff; iron oxide staining, micaceous	MC	7-10-13 (23)	121	12.2	84					
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to orange brown, slightly moist, very dense; trace fine gravel, iron oxide staining, micaceous	SPT	17-21-21 (42)								
45				MC	50	110	4.8	24					

Total depth = 45.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
5		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, light yellow brown to light gray brown, slightly moist, dense; minor iron oxide staining, micaceous, weakly cemented	MC	25-34-35 (69)	103	5.1	21	Consol				
10		SM	@10.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, medium dense to very stiff; iron oxide staining, micaceous	SPT	5-7-9 (16)								
15			@15.0 ft., becomes dark yellow brown to orange brown, increased fines and moisture content	MC	9-13-16 (29)	119	9.5	62	Shear				
20		SM	@20.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to orange brown, moist, dense; trace gravel, iron oxide staining, micaceous	SPT	9-14-11 (25)								
25				MC	18-50	126	6.5	52					

Total depth = 26.0 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2190 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to olive brown, slightly moist, medium dense; micaceous										
5				MC	15-13-20 (33)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND with gravel, yellow brown to gray brown, slightly moist, dense; iron oxide staining, micaceous										
10				SPT	4-8-14 (22)								
15		ML	@15.0 ft., Clayey SILT with fine-grained Sand, gray brown to olive, moist, hard; iron oxide staining, manganese oxide nodules, micaceous	MC	9-15-26 (41)	120	11.7	24	Shear				
20		ML	@20.0 ft., Fine-grained Sandy SILT, blue green to gray, moist, very stiff; minor iron oxide staining, micaceous	SPT	5-5-8 (13)								
25				MC	17-22-30 (52)	122	8.6	61	Shear				
30		ML	@30.0 ft., with Clay, very moist; occasional quartz fragments	SPT	8-8-7 (15)								
35													

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Silty fine-grained SAND, blue gray, slightly moist to moist, dense; iron oxide staining, micaceous	MC	9-19-24 (43)	110	11.4	58					
40		CL-ML	@40.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, blue gray, moist to very moist, very stiff; micaceous, trace root fibers	SPT	3-5-9 (14)								
45		SM	@45.0 ft., Silty fine-grained SAND	MC	20-36-50 (86)	127	7.6	63					
50		CL-ML	@50.0 ft., Silty CLAY to Clayey SILT	SPT	4-4-5 (9)								

Total depth = 51.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2238 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND with Clay, dark gray brown to black, moist, medium dense; micaceous										
5				MC	5-7-14 (21)	120	7.1	47					
10		SM	**Older Alluvium (Qoa)** Silty fine- to medium-grained SAND, dark yellow brown to olive brown, slightly moist, dense; iron oxide staining, carbonate, micaceous	SPT	5-11-12 (23)								
15		SM	@15.0 ft., Silty fine-grained SAND to fine-grained SILT, olive, moist, dense to hard; trace clay, iron oxide staining, micaceous	MC	10-26-49 (75)	122	11.4	81	Shear, Consol				
20			@20.0 ft., becomes yellow brown to orange brown to olive, increased clay content	SPT	8-11-25 (36)								
25				MC	18-40-50/4"	115	11.6	68					
			Total depth = 26.3 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-9

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	1-1-0 (1)								
10			@10.0 ft., trace coarse sand, trace fine gravel, micaceous	MC	10-15-15 (30)								
15		ML	Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, loose to stiff; trace coarse sand, trace fine gravel, micaceous	SPT	3-3-4 (7)								
20		ML	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, dense to hard; trace coarse sand, trace fine gravel, iron oxide staining, micaceous	MC	12-19-26 (45)	128	8.5	71	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND, yellow brown to gray brown, slightly moist, medium dense; trace fine gravel, iron oxide staining, micaceous	SPT	9-7-8 (15)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	5-6-7 (13)								
10		SM	**Older Alluvium (Qoa)** Silty fine-gained SAND with gravel, yellow brown to gray brown, slightly moist, dense; trace fine sand, iron oxide staining, micaceous	MC	20-20-30 (50)	126	2.0	16	Consol				
15			@15.0 ft., becomes dark yellow brown to orange brown, moist, trace clay	SPT	7-11-11 (22)								
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, dense to hard; trace clay, trace fine gravel, iron oxide staining, micaceous	MC	21-25-29 (54)	120	7.2	48					
25		SW	@25.0 ft., Fine- to coarse-grained SAND with gravel, light yellow brown to light gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	SPT	11-16-17 (33)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-11

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2220 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		ML	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine-grained SAND to fine-grained Sandy SILT, yellow brown to orange brown, slightly moist, medium dense to very stiff; iron oxide staining, micaceous										
5				SPT	7-7-8 (15)								
10		SM	@10.0 ft., Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	22-50/5"	113	9.3	51					
15		ML	@15.0 ft., Clayey SILT with fine-grained SAND, dark yellow brown to gray brown to olive, moist, hard; iron oxide, micaceous	SPT	9-16-18 (34)								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with fine Gravel, yellow brown to gray, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	20-34-50/5"	115	3.1	18					
25				SPT	20-27-33 (60)								

Total depth = 26.5 feet
No groundwater encountered
backfilled with soil cuttings

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2320 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND with gravel to cobble, yellow brown, dry to slightly moist, dense										
5			@5.0 ft., Sand becomes fine-grained, minor iron oxide staining	SPT	16-22-26 (48)								
10				MC	50/4"	99	2.4	9					
15			@15.0 ft., quartz fragments	SPT	50/5"								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50	113	2.5	14					
25		SP	@25.0 ft., Fine-grained SAND with Silt, dark yellow brown to gray brown to olive, moist, dense; trace clay, iron oxide staining, micaceous	SPT	12-17-20 (37)								
30		SW	@30.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50/5"	111	1.7	9					
35													

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW		SPT	50/5"								
40		SM	@40.0 ft., Silty fine-grained SAND, yellow brown to orange brown to gray brown, moist very dense; trace clay, iron oxide staining, micaceous	MC	50	105	12.8	58					
45			@45.5 ft., occasional quartz fragments	SPT	11-26-36 (62)								
50			@50.0 ft., increased clay content, manganese oxide nodules	MC	50/5"	115	9.5	55					

Total depth = 50.4 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/7/20
GROUND ELEVATION 2235 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, slightly moist, loose; trace fine gravel, micaceous										
		SP	@5.0 ft., Coarse-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose; trace fine gravel	SPT	3-2-5 (7)								
10				MC	11-19-29 (48)	122	2.4	17	Consol				
15		SM	@15.0 ft., Silty fine- to coarse-grained SAND, dark gray brown, moist, loose; trace clay, trace fine gravel, micaceous	SPT	1-2-4 (6)								
20		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to olive, dense; trace fine gravel, iron oxide staining, micaceous	MC	11-21-31 (52)	129	9.0	79	Consol				
25				SPT	8-10-14 (24)								
30		SM	@30.0 ft., becomes dark yellow brown to orange brown, moist, very dense; iron oxide staining, micaceous, weakly cemented	MC	30-50/5"	131	6.2	59					
35													

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW	@35.0 ft., Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, slightly moist, dense; trace gravel	SPT	15-16-17 (33)								
40				MC	25-47-50/5"	120	4.3	28					
45				SPT	10-13-23 (36)								
50				MC	50	115	3.9	22					
			Total depth = 50.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-14

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2275 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; trace fine gravel, micaceous										
5			SPT	1-1-3 (4)								
10		@10.0 ft., medium dense	MC	9-11-13 (24)	102	3.5	14					
15	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-9-9 (18)								
20	ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	MC	8-11-12 (23)	128	5.1	43	Consol				
25		@25.0 ft., with gravel	SPT	7-8-12 (20)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-15

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2254 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, medium dense; micaceous										
5				MC	10-6-9 (15)	107	6.7	32					
10		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-10-8 (18)								
15				MC	13-21-23 (44)	108	5.7	28					
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	SPT	6-8-8 (16)								
25			@25.0 ft., with gravel	MC	11-17-20 (37)	126	9.8	79	Consol				

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 15.00 ft / Elev 2208.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 22.25 ft / Elev 2200.75 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SP	**Alluvium (Qal)** Coarse-grained SAND with fine gravel, light yellow brown to light gray brown, slightly moist, loose; trace fine gravel, micaceous @0.5 ft., becomes fine-grained, dark gray brown to dark yellow brown, moist										
5		ML	@5.0 ft., Silty fine-grained SAND to Sandy SILT with Clay, gray brown to olive to dark yellow brown, moist, loose to soft; micaceous	SPT	3-1-2 (3)								
10		CL-ML	@10.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, dark gray brown, moist, stiff; micaceous	MC	3-6-8 (14)	92	21.2	68	Consol				
15		CL	▽ @15.0 ft., Silty CLAY with fine-grained Sand, gray brown, wet, stiff	SPT	1-2-4 (6)								78
20			@20.0 ft., brown to dark gray brown, mottled	MC	4-5-6 (11)	93	25.3	84	Consol				
25			▼	SPT	3-3-5 (8)					43	23	20	54
30		SC	@30.0 ft., Clayey fine- to coarse-grained SAND, gray brown to dark olive, saturated, medium dense; minor iron oxide staining, micaceous, trace organics	MC	10-8-13 (21)	122	12.3	88	Consol				
35													

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AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	**Older Alluvium (Qoa)** Clayey fine- to coarse-grained SAND to fine- to coarse-grained Sandy CLAY	SPT	5-5-6 (11)								
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to gray brown, mottled, saturated, medium dense; trace fine gravel, iron oxide development	MC	6-8-12 (20)	118	14.9	95					
45		SC-SM	@45.0 ft., becomes Silty fine- to coarse-grained SAND to Clayey fine- to coarse-grained SAND; manganese oxide nodules	SPT	4-6-8 (14)								
50				MC	13-17-20 (37)	123	9.8	72					
55				SPT	9-11-13 (24)								

Total depth = 56.5 feet
Seepage @ 15 feet
groundwater measured at 22.25 feet
Backfilled with soil cuttings

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2252 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark red brown, slightly moist, loose										
5				MC	4-10-12 (22)	111	4.5	23					
10			@8.0 ft., becomes dark red brown to dark yellow brown, minor porosity	SPT	4-5-7 (12)								
15		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, dense; iron oxide staining	MC	21-27-41 (68)	127	4.5	37	Consol				
20			@20.0 ft., trace clay	SPT	7-9-10 (19)								
25				MC	18-50/5"	123	4.1	30					
30		SM	@30.0 ft., becomes yellow brown to orange brown, slightly moist, dense; iron oxide staining, minor carbonate development	SPT	13-17-18 (35)								
35													

(Continued Next Page)

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Sand becomes more fine-grained; weakly cemented, micaceous	MC	12-24-35 (59)	120	3.2	21					
40			@40.0 ft., becomes dark yellow brown to gray brown, dry to slightly moist, very dense; occasional gravel, micaceous	SPT	13-29-50/3"								
45				MC	50/5"	110	1.6	8					
50				SPT	50/1"								
			Total depth = 50.1 feet No groundwater encountered Backfilled with soil cuttings										

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2219 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, brown to gray brown, slightly moist, loose										
5		SW	@5.0 ft., Fine- to coarse-grained SAND with Gravel, light yellow brown, light gray brown, dry to slightly moist, medium dense	SPT	4-7-7 (14)								
10		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT with Clay, gray brown to olive, moist, medium dense to very stiff; occasional gravel, iron oxide staining, micaceous	MC	13-16-21 (37)	124	8.9	67					
15				SPT	6-12-21 (33)								
20		CL-ML	@20.0 ft., Silty CLAY to Clayey SILT with fine-grained SAND, blue green to blue gray, moist, very stiff; occasional fine quartz fragments, iron oxide staining, micaceous	MC	3-7-15 (22)	117	12.3	75	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND with Gravel, blue gray, moist, very dense; micaceous	SPT	32-40-15 (55)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

APPENDIX B-2

DRAFT SUBSURFACE LOGS (SCG)

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium Sand, trace fine root fibers, slightly porous, medium dense-damp							
5		15				106	6					
10		15			@ 8.5', little medium to coarse Sand, trace fine Gravel, medium dense-damp		4					
15		34			Light Red Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp	112	3			27		
20		81			Light Gray Brown Silty fine Sand, trace medium Sand, very dense-damp		5					
25		50/5"			Light Gray Brown fine to coarse Sand, trace fine Gravel, trace Silt, very dense-dry	105	2					
30		89			Light Gray Brown fine Sandy Silt, trace medium Sand, very dense-damp		7					
		50/5"			Light Red Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, very dense-damp	108	4					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, very dense-moist							
40		50/4"					12					
		50/3"				118	11					
45					Light Gray Silty fine to coarse Sand, trace fine Gravel, very dense-dry to damp							
		50/4"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-2

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Orange Brown fine Sandy Silt, trace Clay, very dense-moist							
5		54					14					
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, very dense-moist							
10		50/5"				126	12					
15		50/5"					10					
					Red Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, very dense-damp							
20		50/5"				124	10					
					Red Brown fine Sandy Silt, trace Clay, very dense-moist							
25		67					15					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					COLLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, slightly porous, trace fine root fibers, medium dense-damp							
5		16				81	4					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
10		10					5					
15		39			@ 13.5', trace Clay	108	4					
20		18					4			33		
					OLDER ALLUVIUM: Orange Brown Silty fine to medium Sand, trace coarse Sand, very dense-dry to damp							
25		50/6"				92	3					
					LIVE OAK CANYON FORMATION: Light Gray Silty fine-grained Sandstone to fine-grained Siltstone, highly weathered, friable, weakly cemented, very dense-damp							
30		67					6			51		
					Gray Brown Silty fine to coarse-grained Conglomeratic Sandstone, little fine to coarse Gravel, highly weathered, friable, weakly cemented, very dense-dry to damp							
		50/3"					2					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/6"					5					
					Light Gray Brown Silty fine-grained Sandstone, some Iron Oxide staining, highly weathered, friable, weakly cemented, very dense-damp							
45		50/6"				103	5					
		50/5"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-4

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		16			ALLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace to little fine Gravel, trace Clay, medium dense-damp	107	6					
10		17			Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		2					
15		39			Brown Silty fine Sand, trace medium to coarse Sand, trace Clay, medium dense-damp	117	4					
20		26			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense to very dense-dry to damp		4					
25		50/6"				116	3					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		17	3.5		POSSIBLE FILL: Black to Dark Brown Clayey Silt, trace fine to medium Sand, slightly organic, very stiff-damp to moist	111	9					
10		13	3.5		ALLUVIUM: Light Gray Clayey Silt to Silty Clay, trace fine Sand, stiff-damp		8					
15		50/6"			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace clay, very dense-damp	124	7					
20		14			Brown Silty fine Sand, little medium to coarse Sand, medium dense-moist		13			44		
25		50			Gray Brown Silty Clay, little fine to medium Sand, abundant Calcareous veining, hard-moist to very moist	116	17			72		
30		50/6"			Light Gray Brown Gravelly fine to coarse Sand, little Silt, very dense-damp		6					
		59			Gray Brown Clayey Silt, trace fine Sand, hard-moist	115	16					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium to coarse Sand, dense-damp							
		40					6			30		
40												
					Light Gray Brown Gravelly fine to coarse Sand, very dense-damp							
		50/4"				114	4					
45												
		56					5					
50												
					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-6

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Light Gray Clayey Silt, trace fine Sand, stiff-moist		18					
10		17	4.5		Dark Brown Silty Clay, trace fine Sand, stiff-moist	107	15					
15		12	4.5		Gray Brown Clayey Silt, trace fine Sand, stiff-moist		16					
20		22			Light Brown Silty fine Sand, medium dense-damp to moist	94	11					
25		22			Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		8					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Dark Brown Clayey Silt, trace fine to coarse Sand, trace Iron Oxide staining, loose-moist	113	14					
10		7			Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, trace fine Gravel, loose-very moist		17					
15		13	4.5		Light Brown to Dark Brown Clayey Silt, trace fine Sand, trace fine root fibers, loose-moist	112	15			74		
20		10	1.0				19	29	17	66		
25		21	3.0			110	20	27	14	77		
30		16			Dark Gray fine Sandy Silt interbedded with 5" Dark Gray Silty Clay lenses, medium dense-moist		16			76		
		28				116	16			57		

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Light Brown to Brown fine Sandy Silt interbedded with Brown Silty fine to coarse Sand with trace fine Gravel and 3" lenses of Dark Gray Silty Clay, medium dense to very stiff-wet							
40		19					32			48		
					Gray Brown Silty fine to coarse Sand, trace Silt, trace fine Gravel, dense-dry to damp							
45		61				111	3			10		
					Dark Gray Silty Clay with lenses of Dark Gray Silty fine Sand, very stiff-very moist							
50		16	1.5				26	40	24	73		
					Dark Gray Clayey fine Sand, trace medium to coarse Sand, trace fine root fibers, very stiff-moist to very moist							
55		43	4.5			113	16					
					Boring Terminated at 55'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-8

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		9			ALLUVIUM: Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, loose to medium dense-damp		7					
10		36				118	13					
15		15			@ 13.5,' trace Iron Oxide staining		9					
20		24			Dark Brown Clayey fine Sand, trace medium to coarse Sand, little Silt, little Iron Oxide staining, medium dense-damp to moist	114	14					
25		18			Dark Gray fine Sandy Silt with 3" lenses of Dark Gray Silty fine Sand, trace to little fine to coarse Sand, trace to little fine Gravel, medium dense-damp to moist		13					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-9

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine Sand, trace fine root fibers, trace Clay, trace Calcareous nodules and veining, medium dense-damp to moist							
5		21				115	9					
10		29					9					
15		38				122	8					
20		20					11					
25		56				122	13					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		7			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-damp		6					
10		58			Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, dense-damp	126	10			40		
15		14			Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Clay, medium dense-damp to moist		14					
20		50/6"			OLDER ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous nodules, trace to little fine Gravel, dense to very dense-damp	130	8					
25		34					7					
30		41			@ 28.5', medium dense-very moist	114	17					
		28			Brown Silty fine Sand, trace medium Sand, medium dense-damp		5					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		24				105	10					
40												
					Dark Gray Silty fine Sand, trace to little medium to coarse Sand, trace Clay, trace fine Gravel, medium dense-very moist							
		25					24					
45												
		34				116	14					
50												
					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10b

APPENDIX B-3

SUBSURFACE LOGS (PSE)

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-037
DATE STARTED	4/8/04	GROUND ELEV.	2268	LOGGED BY	DMP
DATE FINISHED	4/9/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ALLUVIUM** (Qal): SANDY SILT, fine grained, light brown, slightly moist, firm, trace coarse grains, visible porosity.				
	2265									
						@ 4.0 ft. color change to yellow brown.				
5		R	Push				5.4	100	22	
	2260					@ 8.0 ft. trace gravel.				
10		R	3		SM	@ 10.0 ft. SILTY SAND, fine grained, yellow brown, slightly moist to moist, medium dense, visible porosity, trace coarse grains, gravel.	4.4	115	27	
	2255	B								
						SAN TIMOTEO FORMATION (QTst): SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard to hard.				
15		R	9				8.6	131	85	CON, HY
						TOTAL DEPTH 16.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=49911b.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=38411b.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=24461b.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2275				CL	**TOPSOIL** (No Map Symbol): SANDY CLAY, sand is fine to coarse grained, dark red brown, moist, stiff, trace gravel, secondary clay development.				
						SAN TIMOTEO FORMATION (QTst): CONGLOMERATE, matrix supported, mostly granule sized clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard some secondary clay, calcium carbonate cementation.				
5	2270					@ 3.0 ft. SANDY SILTSTONE, fine grained, light yellow brown, dry, moderately hard, pinches out, interfingered contact with below.				
						@ 4.0 ft. PEBBLE CONGLOMERATE, matrix supported, 1/4-3" clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard, clasts are igneous and metamorphic, subrounded, occasional 4-5" clasts.				
						@ 6.0 ft. low cohesion, slight caving.				
10	2265					@ 8.0 ft. SILTY SAND matrix, greater cohesion, fewer clasts.				
						@ 11.0 ft. coarser grained, mostly medium to coarse grained SAND and granules, visible porosity, low cohesion.				
						@ 13.0 ft. occasional interfingered lenses of SANDY SILTSTONE, and SILTY SANDSTONE, fine grained, yellow brown, moist, moderately hard.				
15	2260									
						@ 17.0 ft. gradational change to SILTY SANDSTONE, fine to coarse grained, (coarse grained locally), yellow brown to reddish brown, moist, moderately hard, trace pebbles and granules.				
20	2255					@ 20.0 ft. 1.5' thick CONGLOMERATE bed, clast supported, up to 9" clasts.				
						@ 22.0 ft. N78W , 10NE-approximate attitude of bedding on coarse grained SANDSTONE bed, 6" thick.				
25	2250									
						@ 28.0 ft. SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard, trace granules and pebbles, locally SILTY SANDSTONE.				
30	2245	R B	6				11.3	123	87	
						@ 33.0 ft. 2' thick SANDSTONE bed, fine to coarse grained, light gray, moist, moderately hard, trace pebbles and granules.				
35	2240									
	2235					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2235					**SAN TIMOTEO FORMATION** (QTst): Continued. @ 38.0 ft. interfingered contact with below, gradational change, alternating SANDY SILTSTONE and PEBBLE CONGLOMERATE, 3"-1' thick.				
45	2230	R	19			@ 43.0 ft. PEBBLE CONGLOMERATE, matrix supported, mostly 1/2-2" in diameter clasts in a fine to coarse grained sand matrix, yellow brown to yellow gray, moist, hard.	3.9	132	41	
						@ 46.0 ft. faint biotite rich laminations in sandy lenses, cross bedded, discontinuous, overall decrease in clast size to mostly granules for 3'.				
50	2225	R	22				2.3	128	21	
55	2220	B				@ 56.0 ft. increased cohesion/cementation, hard.				
						@ 57.0 ft. greater abundance of clasts, mostly 1/2-1" in diameter, subangular to subrounded, igneous and metamorphic.				
60	2215									
65	2210					TOTAL DEPTH 65.0 FT NO GROUNDWATER ENCOUNTERED CAVING OBSERVED @ 6.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind		
DATE STARTED	7/22/04	GROUND ELEV.	2280	BORING DESIG.	B-081
DATE FINISHED	7/22/04	GW DEPTH (FT)		LOGGED BY	SJD
DRILLER	Al Roy Drilling	DRIVE WT.	SEE NOTE	NOTE	0-24'=2150 lb
TYPE OF DRILL RIG	18" Bucket Auger	DROP	12 in.		25-44'=1350 lb
					45-65=650lb/65+=1150lb

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2280				SM	ALLUVIUM (Qal): SILTY SAND, fine to coarse-grained, trace gravel, reddish brown, dry to slightly moist.				
5	2275	R	4			@ 5 ft. slightly moist, medium dense.	5.2	96	19	
10	2270	R	3				5.0	110	26	
15	2265	R	5				5.5	112	31	CON, HY
						@ 17 ft. slightly moist to moist, fine-grained.				
20	2260	R/B	3			@ 20 ft. moist.	6.1	110	32	
25	2255	R	30 for 11"		SM	OLDER ALLUVIUM (QTst): SILTY SAND, fine-grained, trace medium to coarse-grained, reddish brown to yellowish brown, moist, dense.	6.8	128	61	
30	2250	R	32 for 8"			@ 30 ft. coarse-grained, reddish brown.	5.6	119	38	
					ML	@ 32 ft. SANDY SILT, fine-grained SAND, yellowish brown to reddish brown, moist, stiff.				
35	2245	R	30 for 8"		SM	@ 35 ft. SILTY SAND, fine to coarse-grained, some GRAVEL, reddish brown, slightly moist, dense.	5.3	118	35	
						TOTAL DEPTH 36 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-47

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-095
DATE STARTED	9/15/04	GROUND ELEV.	2225	LOGGED BY	FE
DATE FINISHED	9/15/04	GW DEPTH (FT)	15	NOTE	0-22'=2400lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		23-42'=
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		1200lb.43-65'=850lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2225				SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SAND, light yellow brown, dry, loose.				
5	2220	R	1				3.0			
					SM	ALLUVIUM (Qal): SILTY SAND, medium gray brown, moist, moderately dense, fine to medium grained.				
10	2215	R B	1			@ 10.0 ft. moist to very moist.	13.2	113	75	CON, HY MAX. CHEM HY
15	2210	R	2		SM	INTERMEDIATE-AGE ALLUVIUM (Qia): SILTY SAND, fine grained, dense, very moist to wet, some clay, brown and olive gray, slightly mottled, water entering boring @ 15.0 ft and 24.0 ft.	14.6	121	95	
20	2205	R	Push		ML	@ 20.0 ft. SANDY SILT to CLAYEY SILT, brown, very moist, soft, some fine grained sand.	19.1	110	95	
25	2200	R B	1			@ 25.0 ft. interlensed SAND and CLAYEY SILT, light gray to brown, soft, very moist to wet, sand is fine to coarse grained.	21.0	105	92	
30	2195	R	1				22.4	104	94	
35	2190					@ 34.0 ft. dark blueish gray.				
40	2185					TOTAL DEPTH 40.0 FT GROUNDWATER ENCOUNTERED @ 15.0 & 20.0 FT CAVING @ 40.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-54

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-096
DATE STARTED	9/16/04	GROUND ELEV.	2232	LOGGED BY	FE
DATE FINISHED	9/16/04	GW DEPTH (FT)		NOTE	0-22'=2400lb, 23-42'=1200lb, 43-65'=850lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	2230				SM/SP	**ALLUVIUM** (Qal): interlensed SAND and SILTY SAND, light brown to light gray, fine to coarse grained, dry to slightly moist, abundant visible porosity, some clay, trace of gravel, loose, trace gravel.				
5		R	Push				3.9	103	17	CON, HY
	2225									
10						@ 10.0 ft. subrounded metamorphic clasts to 2" in diameter.				
		R	1			@ 11.0 ft. sharp contact, dark gray to black, moist, firm, some visible porosity.	14.4	112	79	CON, HY
	2220	B								DSR, MAX, HY, CHEM
					SM	**INTERMEDIATE-AGE ALLUVIUM** (Qia): SILTY SAND, light brown and olive gray, slightly mottled, moist, moderately dense, fine to medium gray, iron oxide, some clay, weathered.				
15		R	1				12.3	115	75	
						@ 16.0 ft. less weathered, dense.				
	2215									
20		R	4			@ 20.0 ft. brown and olive gray, mottled, moist, very dense, fine to coarse grained.	6.6	123	50	
	2210				SP	@ 22.0 ft. SAND, light yellow brown, fine to coarse grained, slightly moist, dense, some gravel to 1/8" in diameter.				
25		B								
					SM	@ 26.0 ft. SILTY SAND, light yellow brown, fine to coarse grained, slightly moist, dense.				
	2205					@ 26.0 ft. N35E, 20SE - erosional surface.				
30		R	3				12.5	118	82	
						SAN TIMOTEO FORMATION (QTst): fine SANDY SILTSTONE, light yellow brown, moist to very moist, moderately hard, massive, trace gravel.				
	2200					@ 31.0 ft. N30E, 15SE - contact.				
35						@ 33.0 ft. CLAYEY SILTSTONE, light olive gray, moist to very moist, very stiff, massive, some fine grained SAND.				
	2195	B								
40		R	10				12.5	118	82	
						TOTAL DEPTH 41.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-55

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C-1

LABORATORY TEST RESULTS (AGS)

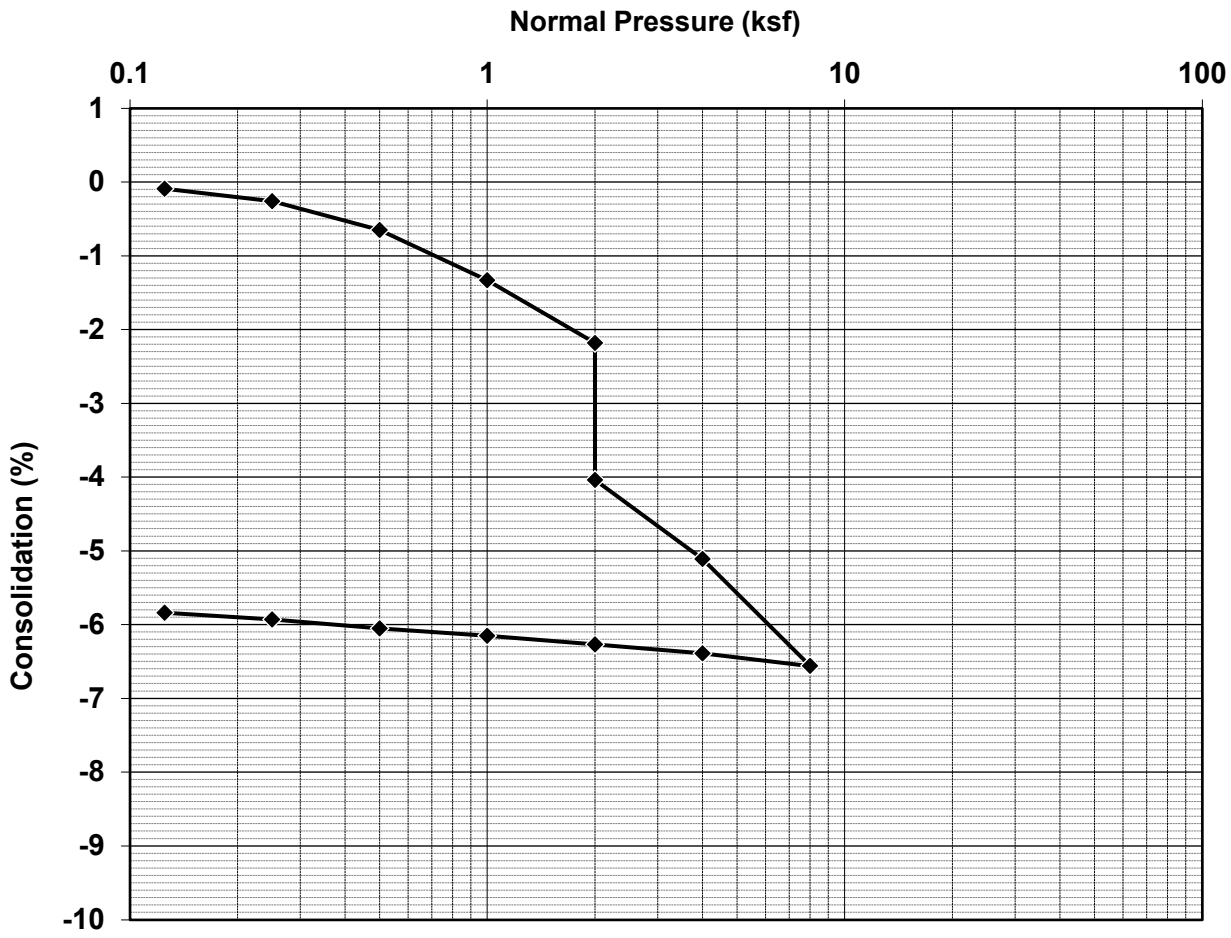
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-1
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.9%	15.3%
Void Ratio, e	0.57	0.48
Saturation, S	14%	86%
Dry Density (pcf)	107.4	114.1
Wet Density (pcf)	110.5	131.5

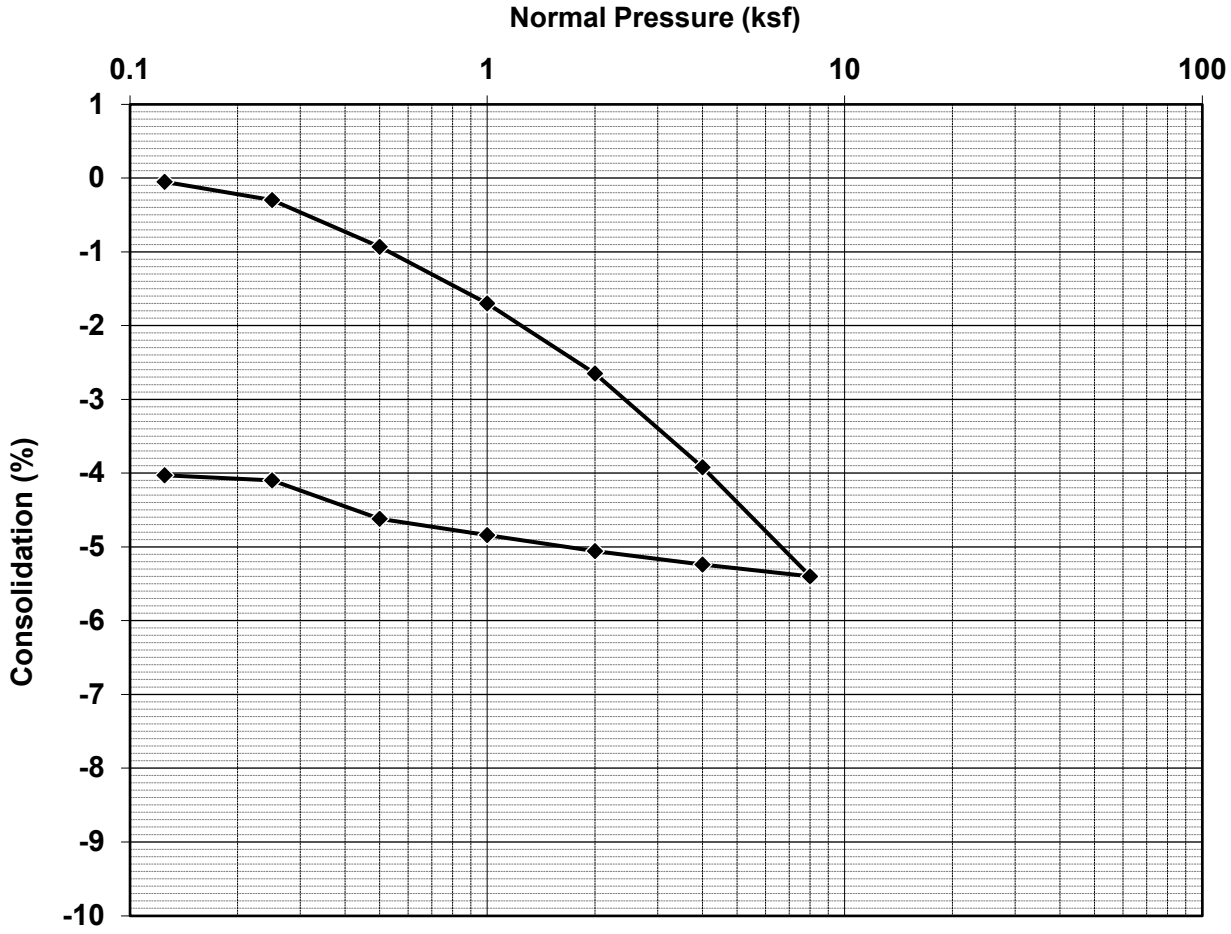
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	15 ft
Project No:	2001-04	Description:	Qal- Sandy Silt with Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	16.9%	22.2%
Void Ratio, e	0.64	0.57
Saturation, S	72%	105%
Dry Density (pcf)	102.8	107.1
Wet Density (pcf)	120.2	131.0

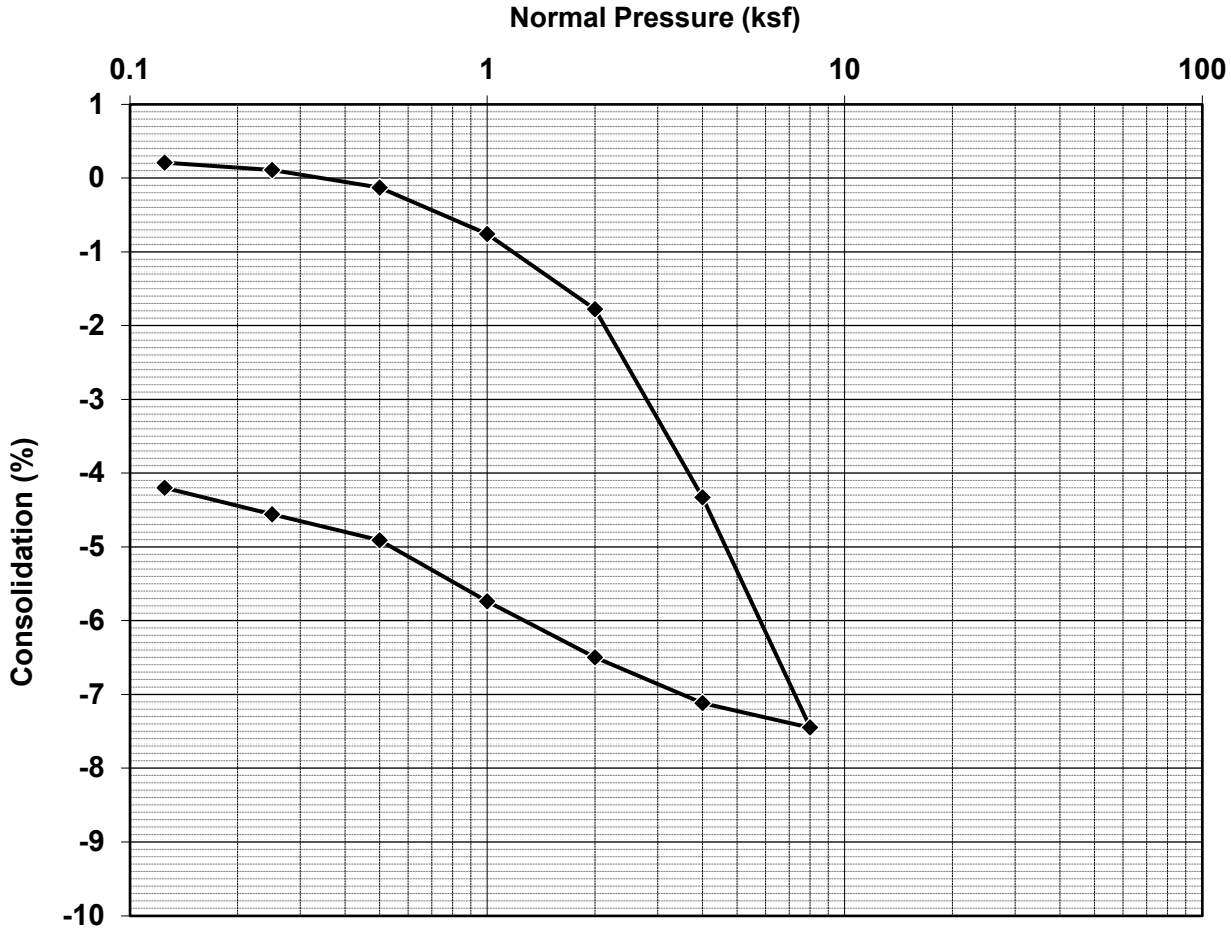
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	25 ft
Project No:	2001-04	Description:	Qal- Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.6%	27.4%
Void Ratio, e	0.82	0.74
Saturation, S	85%	100%
Dry Density (pcf)	92.7	96.8
Wet Density (pcf)	116.5	123.2

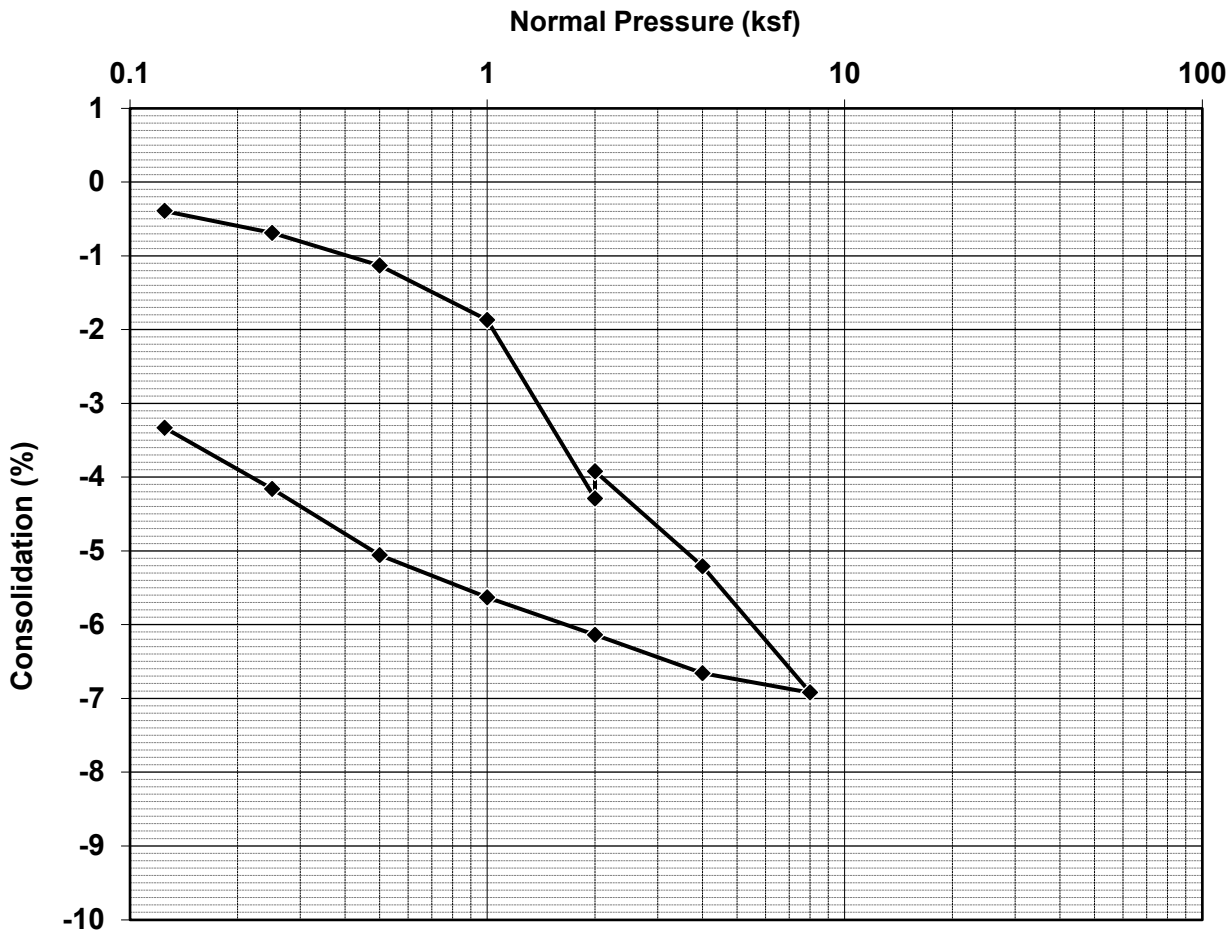
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qal- Sandy Silt
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	19.4%	34.5%
Void Ratio, e	0.91	0.84
Saturation, S	58%	111%
Dry Density (pcf)	88.4	91.5
Wet Density (pcf)	105.5	123.0

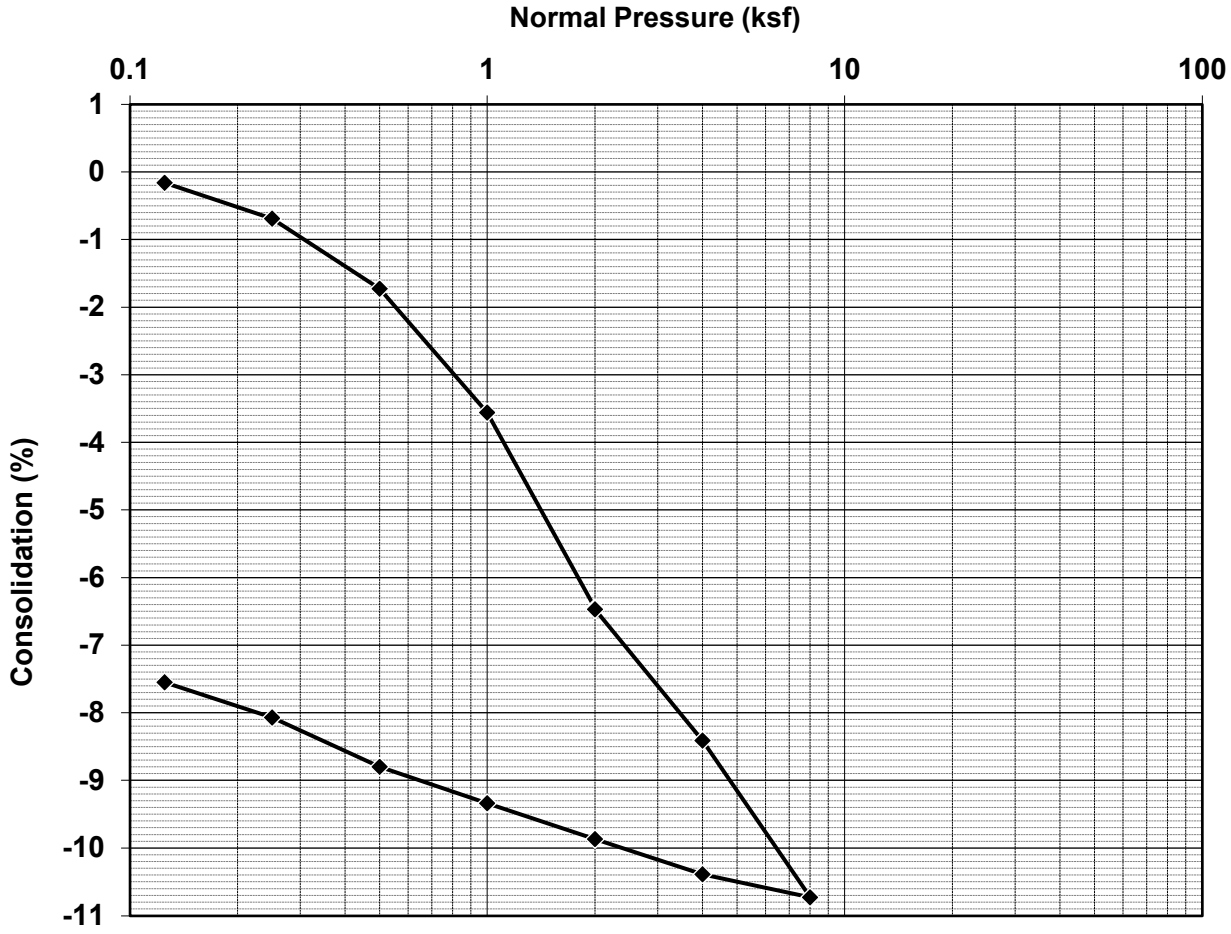
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qal- Sandy Silt with Peat
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	18.3%	34.0%
Void Ratio, e	0.81	0.67
Saturation, S	61%	137%
Dry Density (pcf)	93.3	100.9
Wet Density (pcf)	110.4	135.3

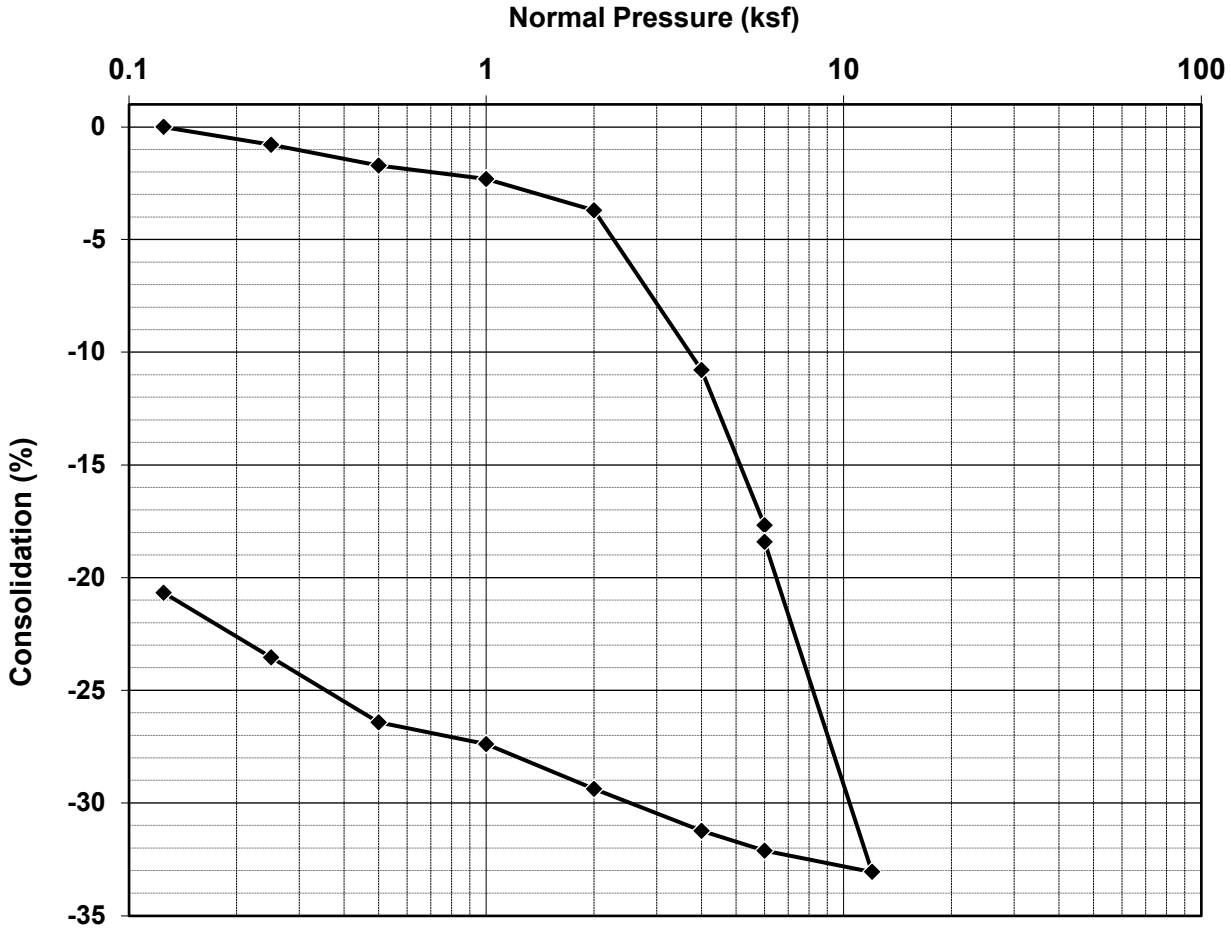
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Black Peat
Date:	9/10/2011	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w		143.9%
Void Ratio, e		
Saturation, S		
Dry Density (pcf)		33.1
Wet Density (pcf)	75.6	80.7

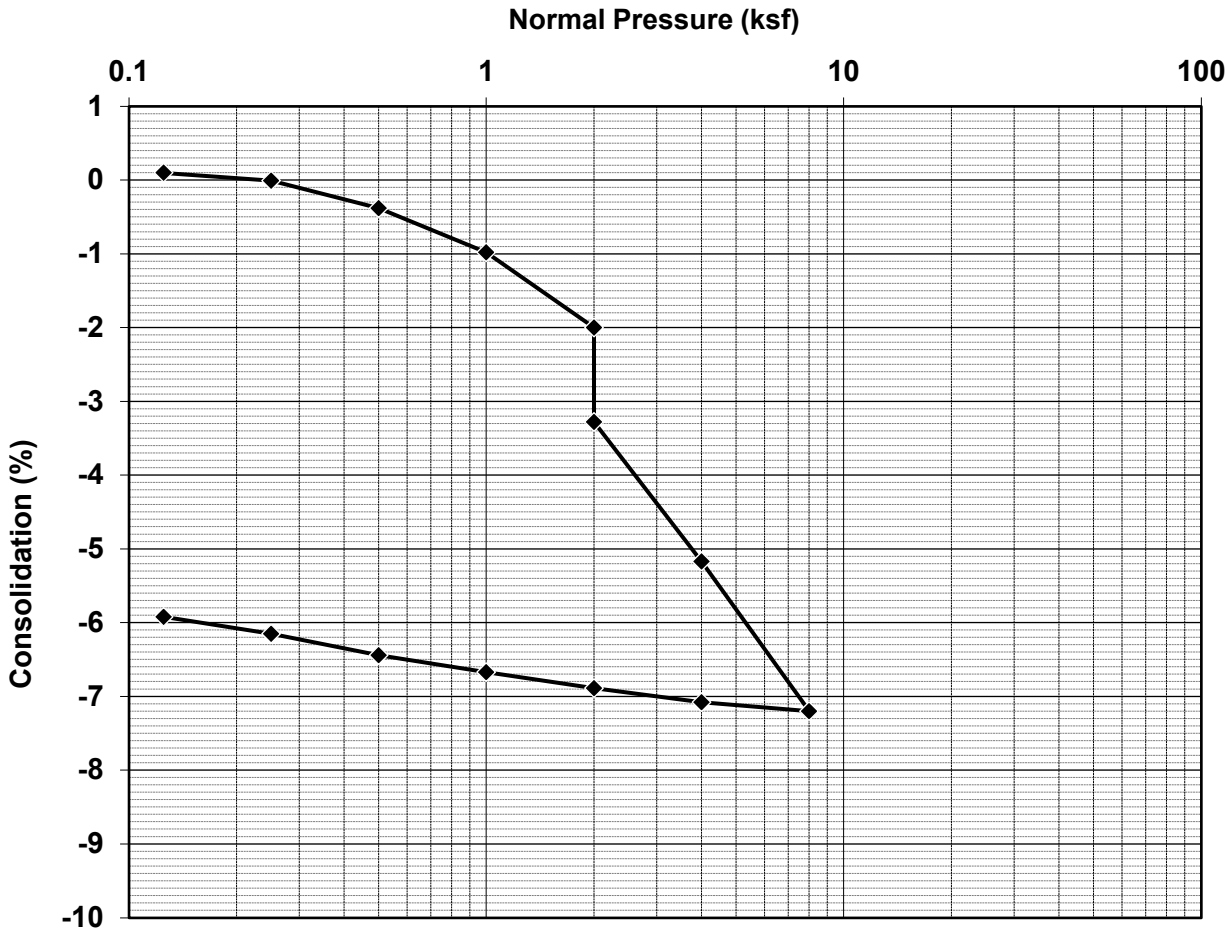
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	15.0%
Void Ratio, e	0.53	0.43
Saturation, S	26%	93%
Dry Density (pcf)	110.5	117.4
Wet Density (pcf)	116.1	135.0

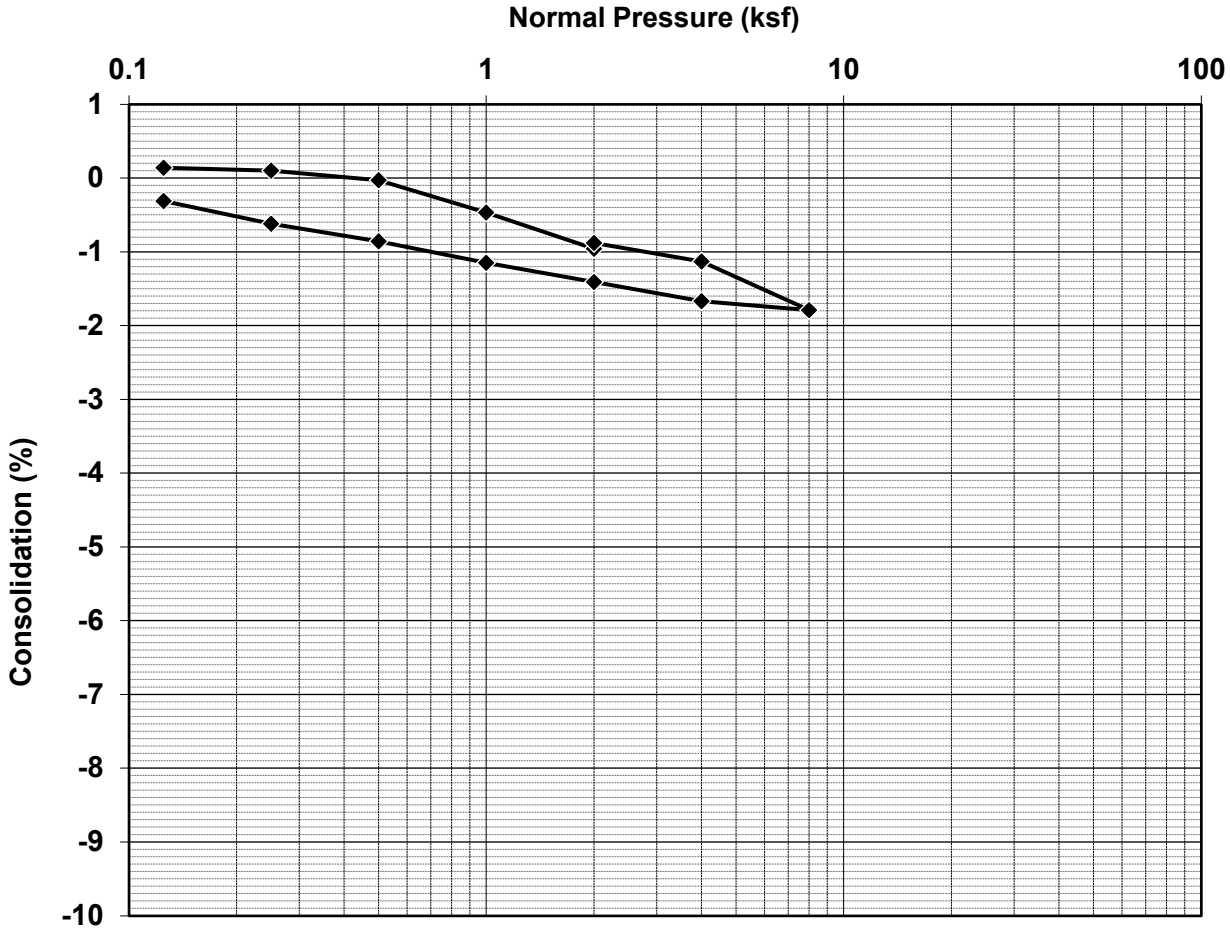
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/10/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	11.4%	17.0%
Void Ratio, e	0.46	0.46
Saturation, S	66%	100%
Dry Density (pcf)	115.1	115.5
Wet Density (pcf)	128.3	135.1

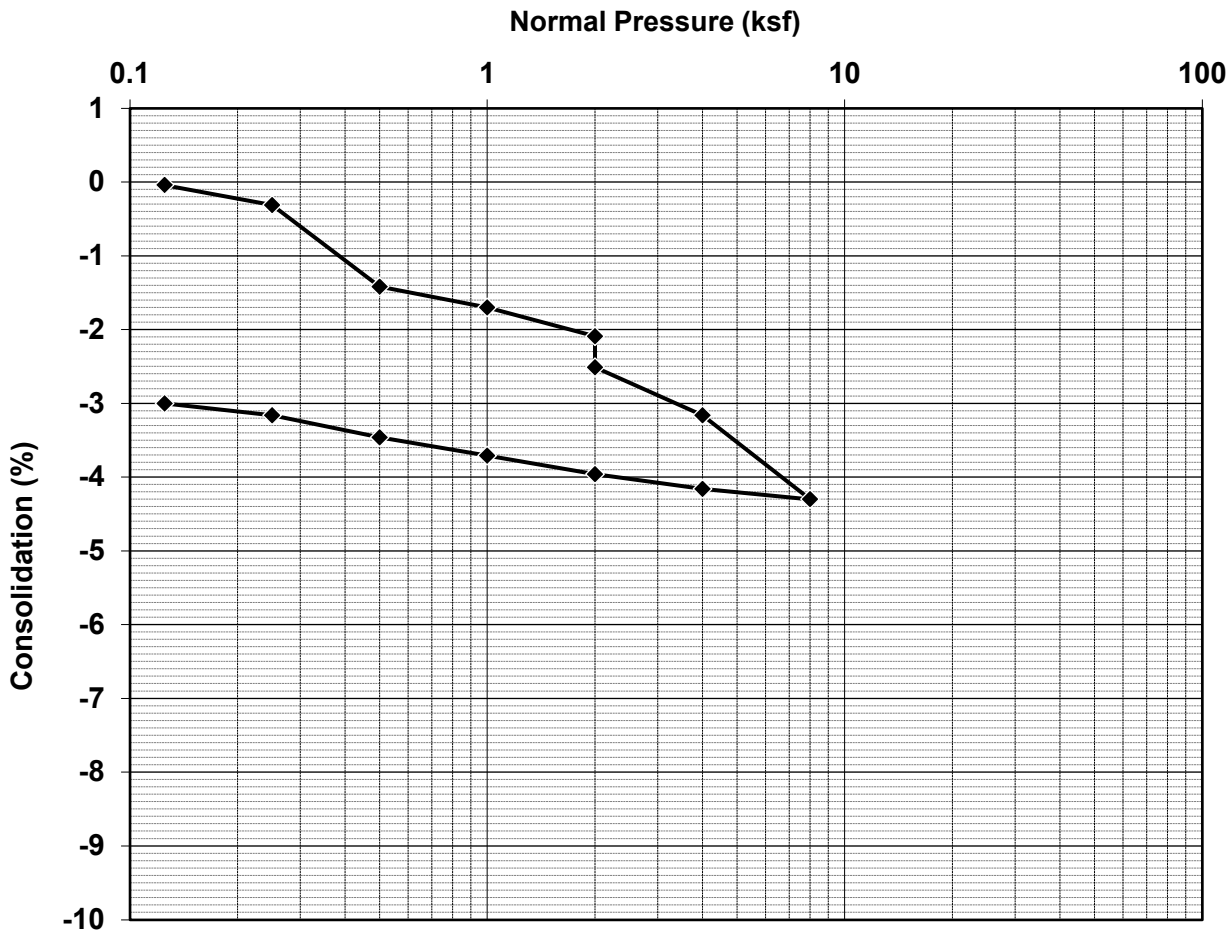
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-9
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand/Sandy Silt
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	8.5%	16.5%
Void Ratio, e	0.37	0.33
Saturation, S	62%	135%
Dry Density (pcf)	122.9	126.7
Wet Density (pcf)	133.4	147.6

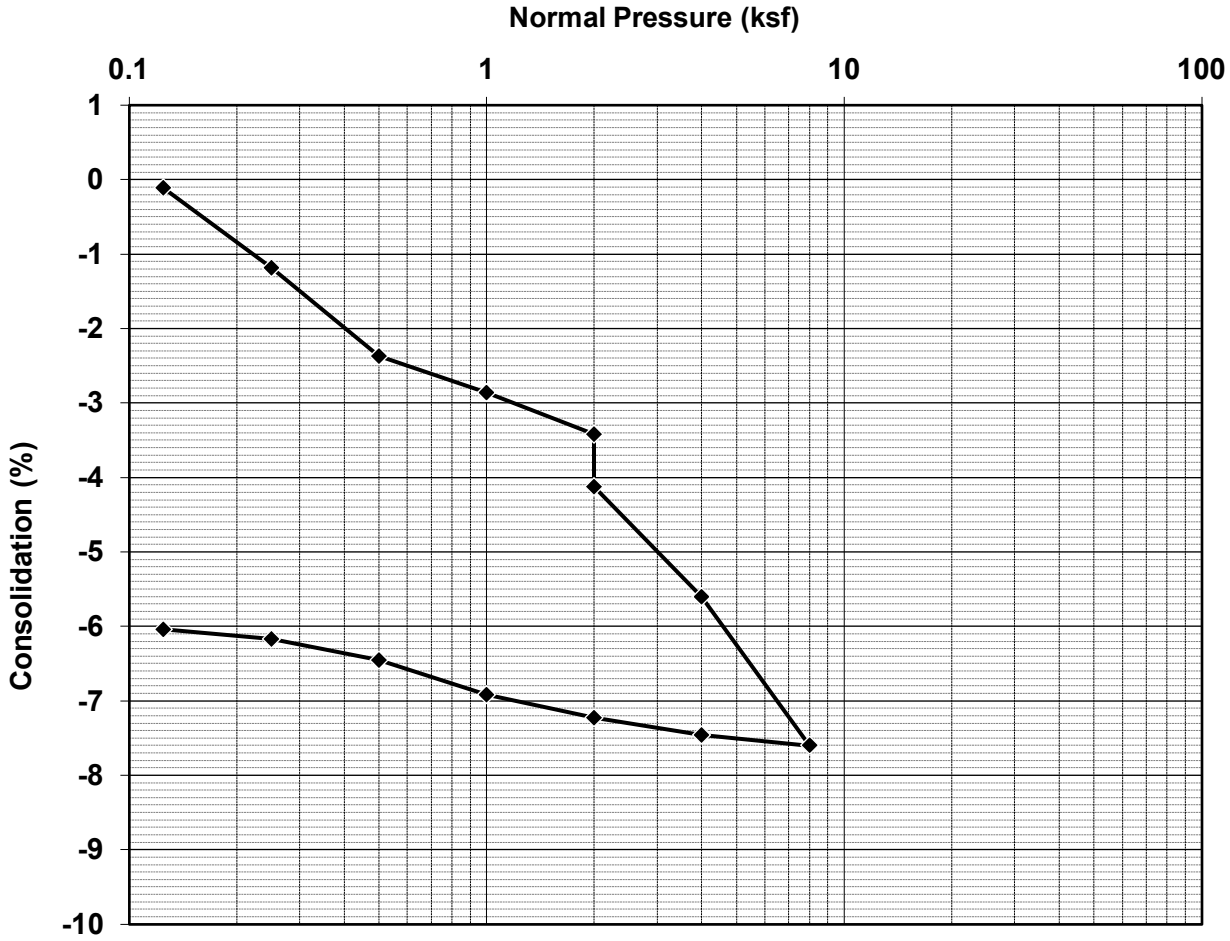
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-10
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.0%	15.9%
Void Ratio, e	0.40	0.31
Saturation, S	14%	138%
Dry Density (pcf)	120.7	128.5
Wet Density (pcf)	123.2	149.0

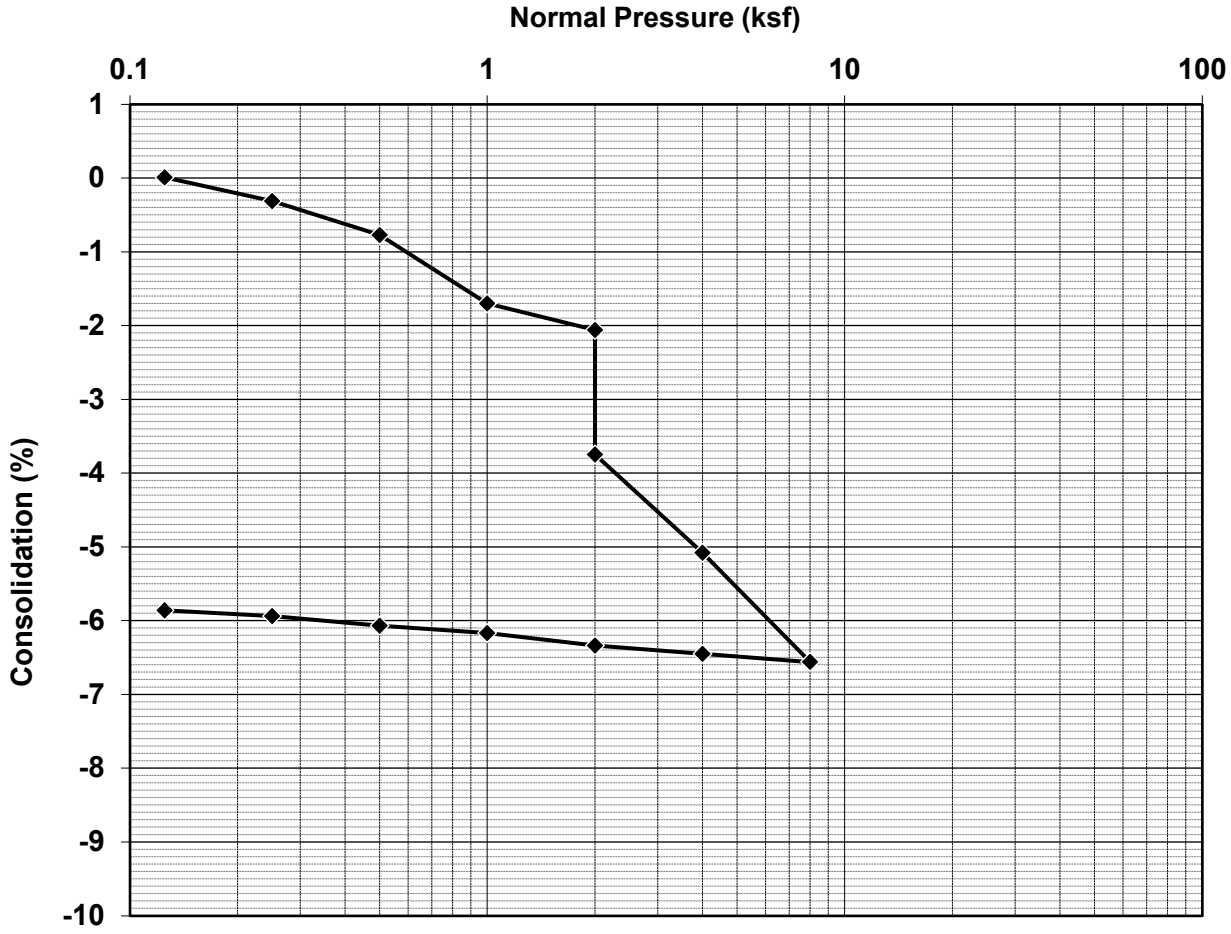
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qal- Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.4%	13.0%
Void Ratio, e	0.48	0.39
Saturation, S	13%	89%
Dry Density (pcf)	113.9	121.0
Wet Density (pcf)	116.6	136.7

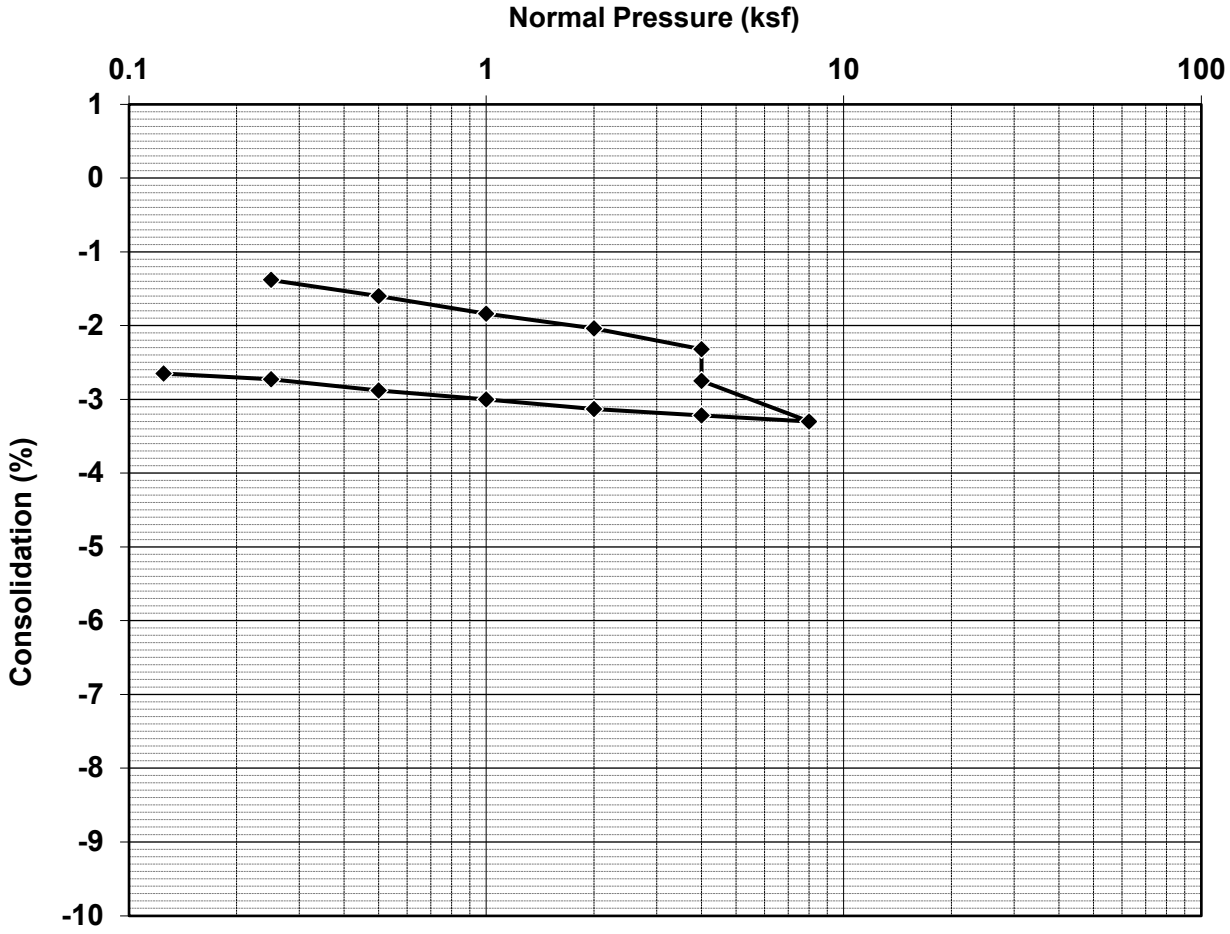
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.0%	12.0%
Void Ratio, e	0.34	0.31
Saturation, S	71%	106%
Dry Density (pcf)	125.6	129.0
Wet Density (pcf)	136.9	144.5

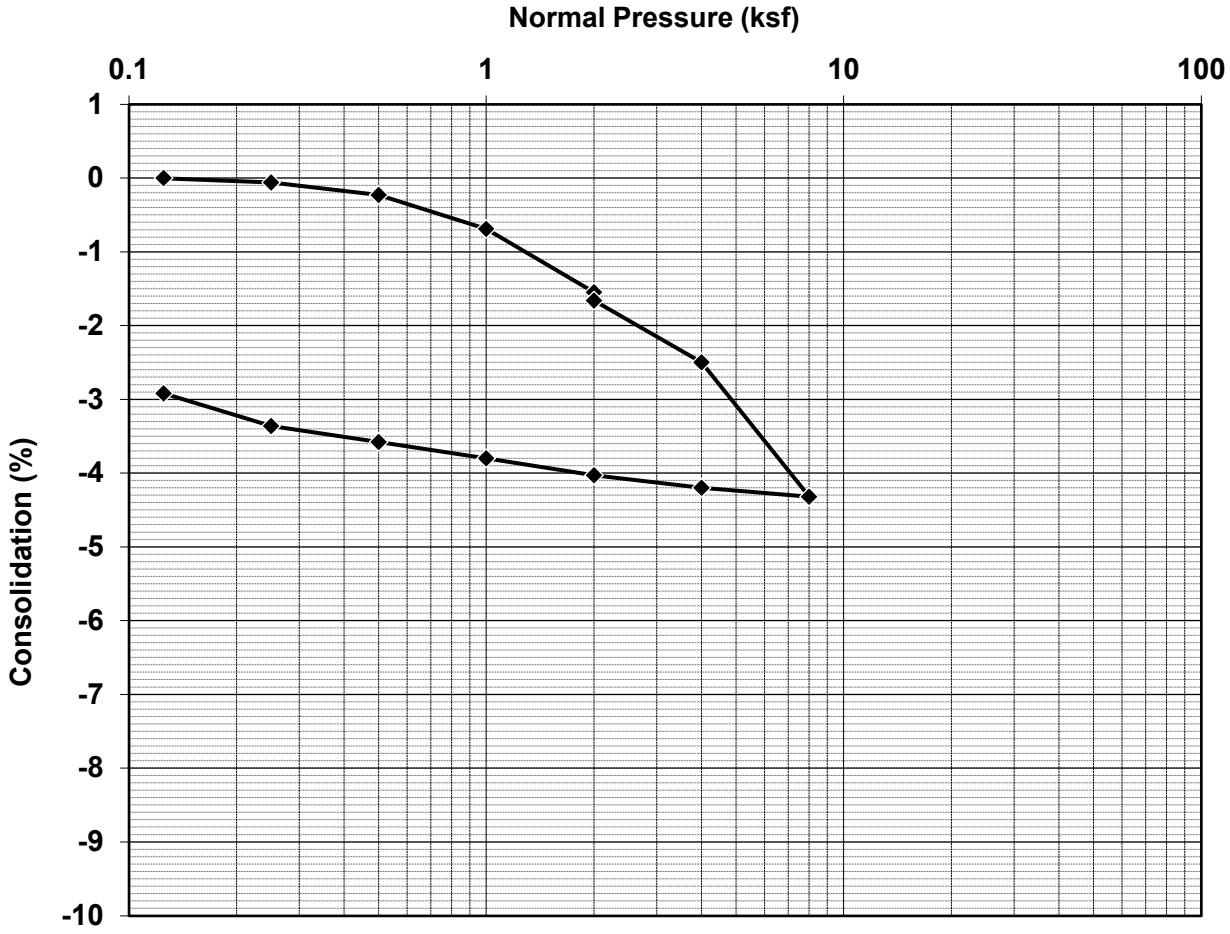
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS -14
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/22/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	14.9%
Void Ratio, e	0.40	0.36
Saturation, S	34%	111%
Dry Density (pcf)	120.0	123.6
Wet Density (pcf)	126.1	142.0

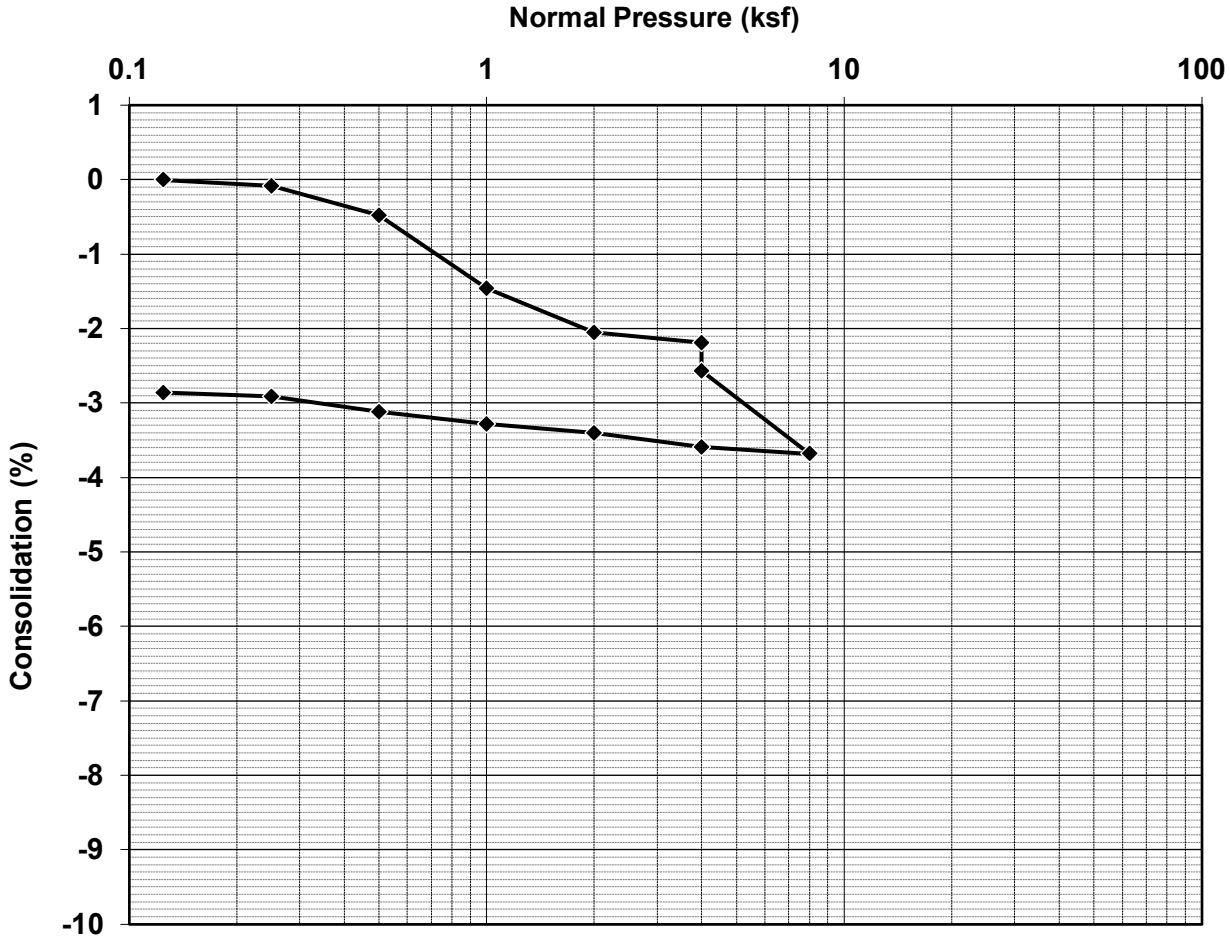
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-15
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Silty to Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.8%	12.5%
Void Ratio, e	0.36	0.32
Saturation, S	74%	106%
Dry Density (pcf)	124.1	127.8
Wet Density (pcf)	136.3	143.8

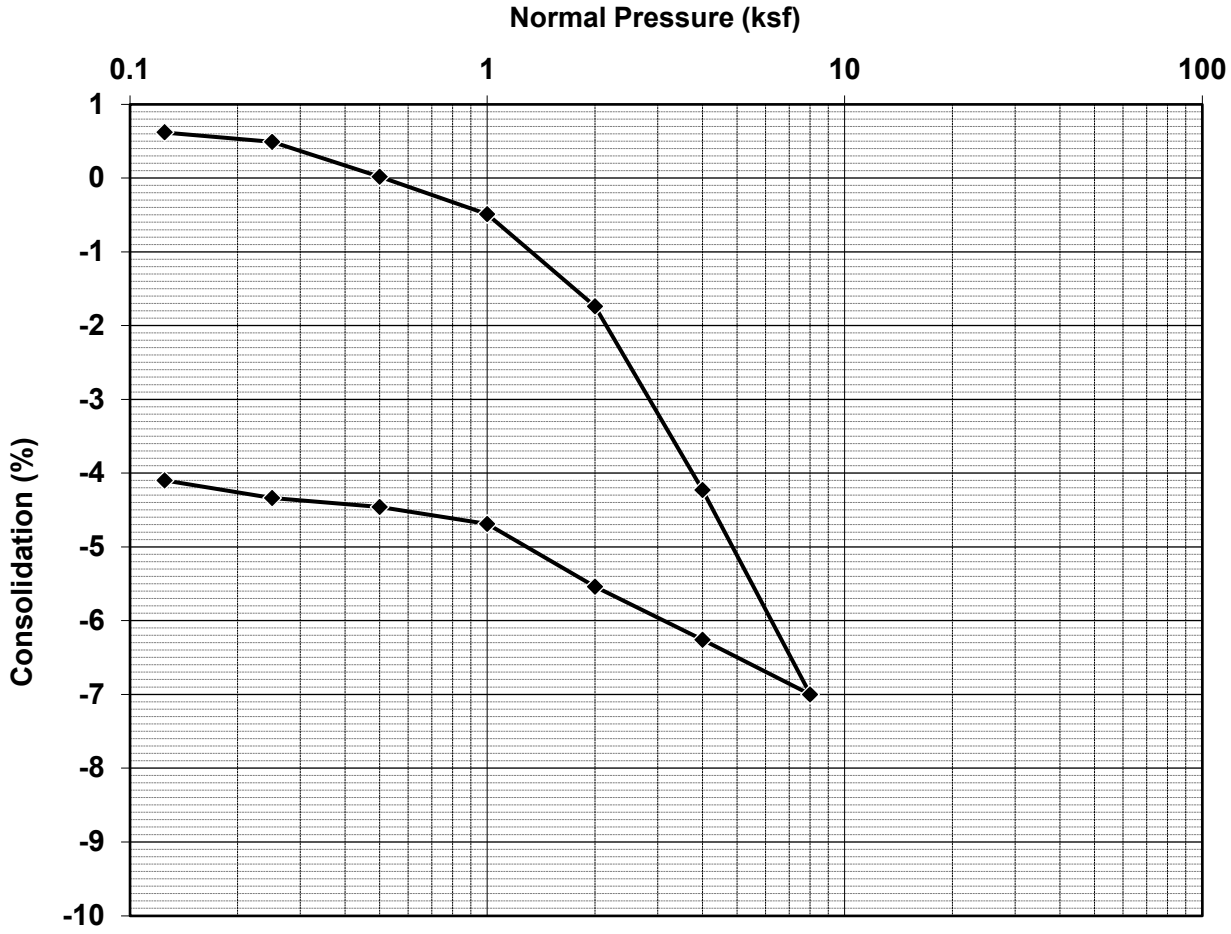
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	10 ft
Project No:	2001-04	Description:	Qal- Silty Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	21.2%	28.0%
Void Ratio, e	0.86	0.78
Saturation, S	67%	97%
Dry Density (pcf)	90.7	94.6
Wet Density (pcf)	109.9	121.1

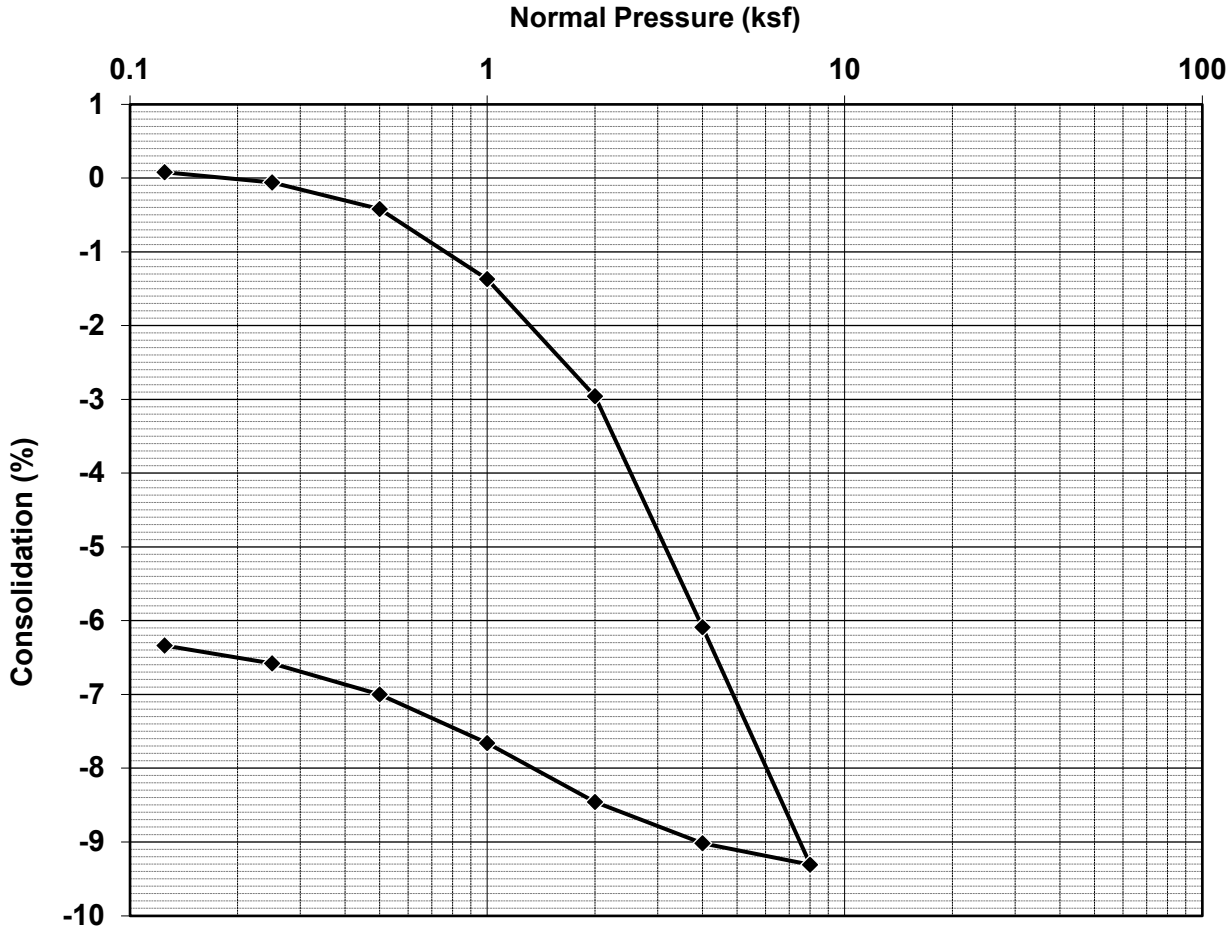
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	20 ft
Project No:	2001-04	Description:	Qal- Silty Clay with Sand
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.3%	25.5%
Void Ratio, e	0.99	0.86
Saturation, S	69%	80%
Dry Density (pcf)	84.8	90.5
Wet Density (pcf)	106.3	113.6

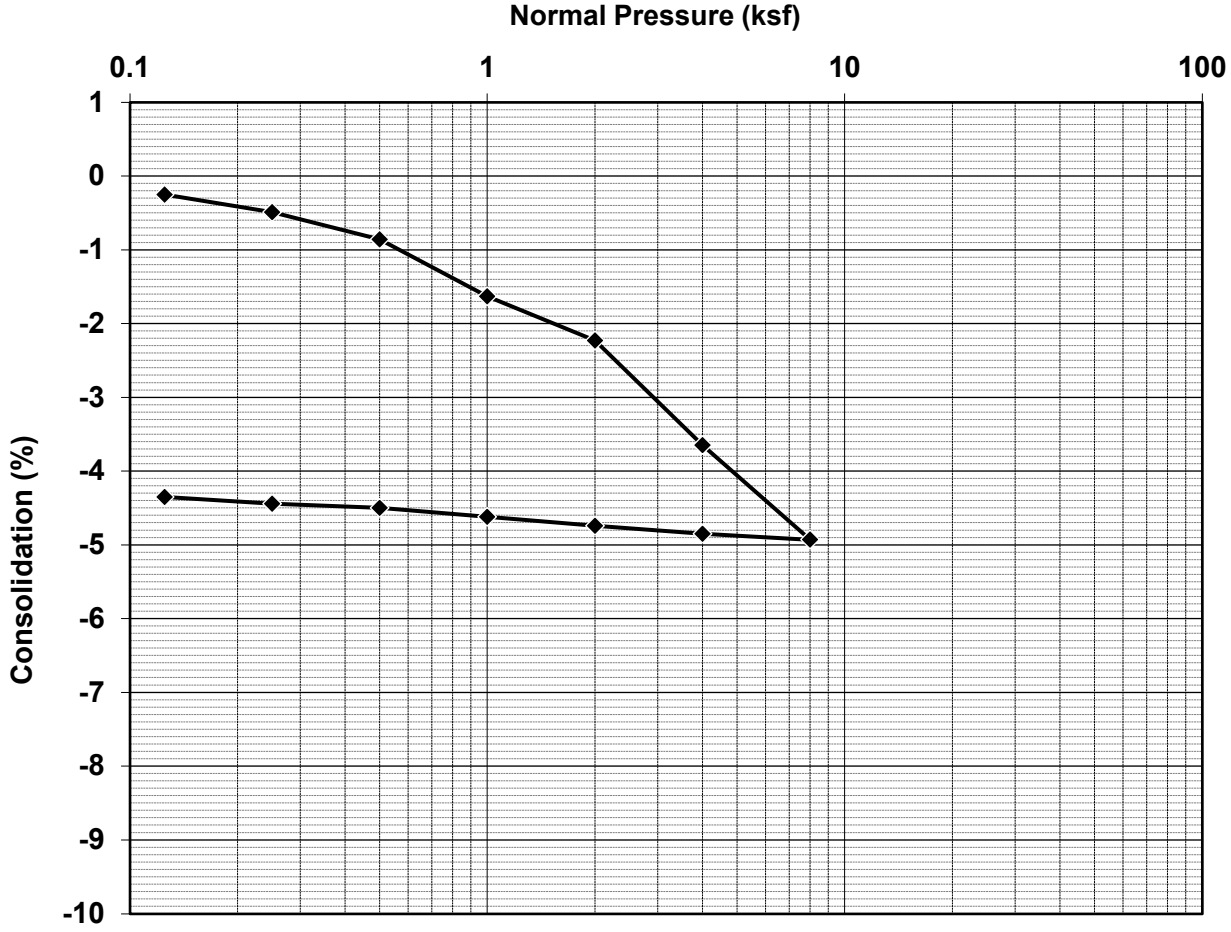
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No:	2004-01	Description:	Qoa- Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	13.9%
Void Ratio, e	0.40	0.34
Saturation, S	84%	112%
Dry Density (pcf)	120.6	126.1
Wet Density (pcf)	135.5	143.6

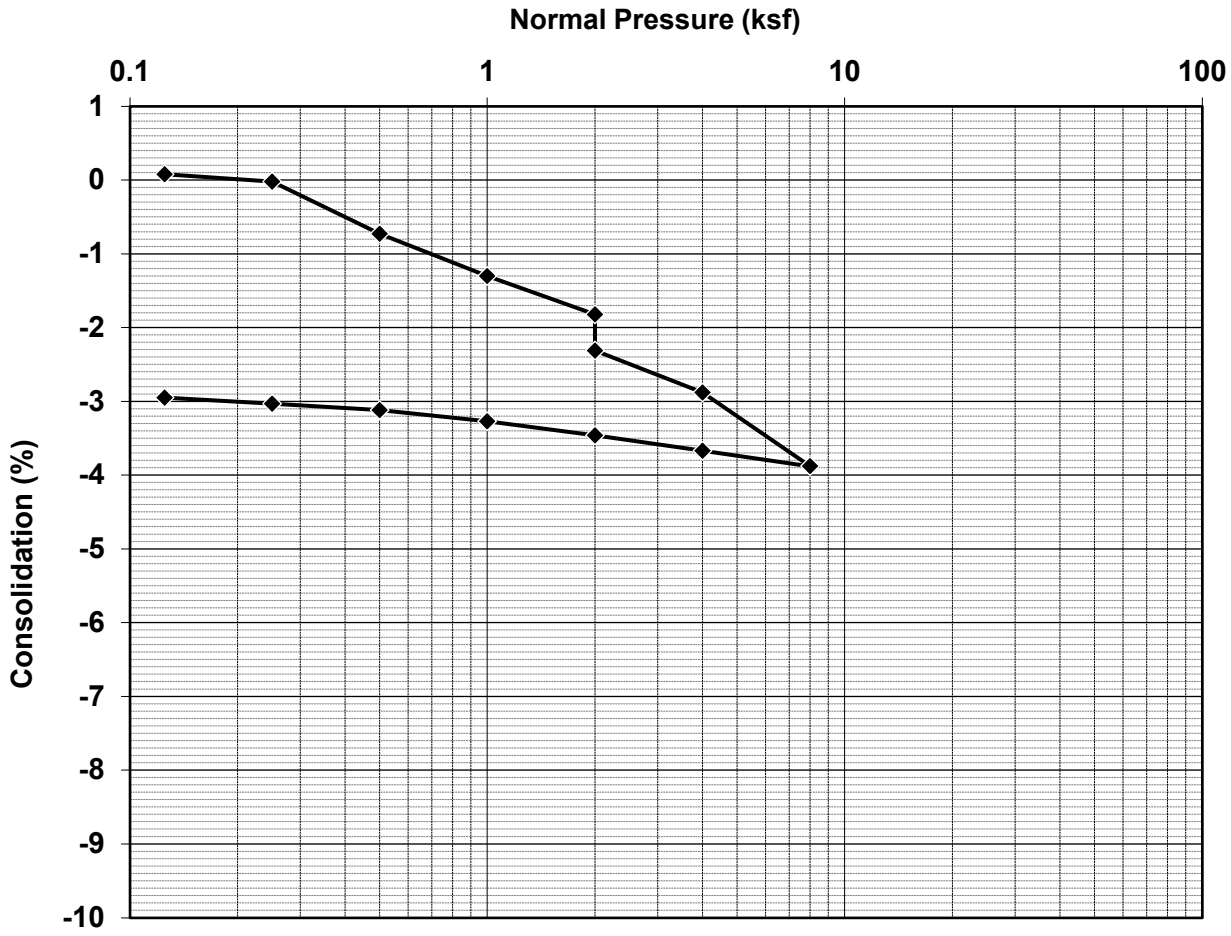
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-17
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	4.5%	14.1%
Void Ratio, e	0.41	0.37
Saturation, S	30%	104%
Dry Density (pcf)	119.6	123.3
Wet Density (pcf)	125.0	140.6

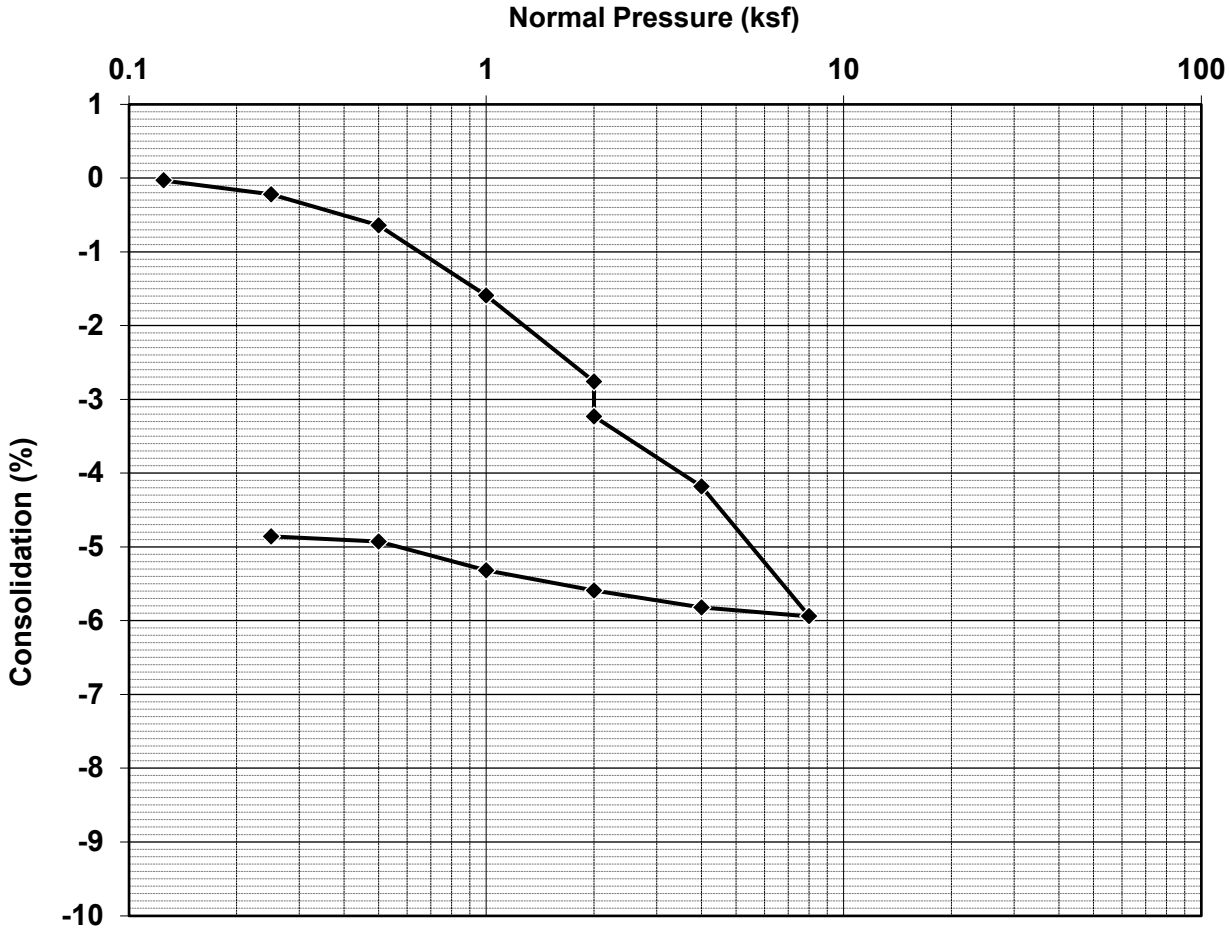
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-18
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qal- Silty Clay
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	19.0%
Void Ratio, e	0.57	0.50
Saturation, S	58%	103%
Dry Density (pcf)	107.1	112.6
Wet Density (pcf)	120.3	134.0

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

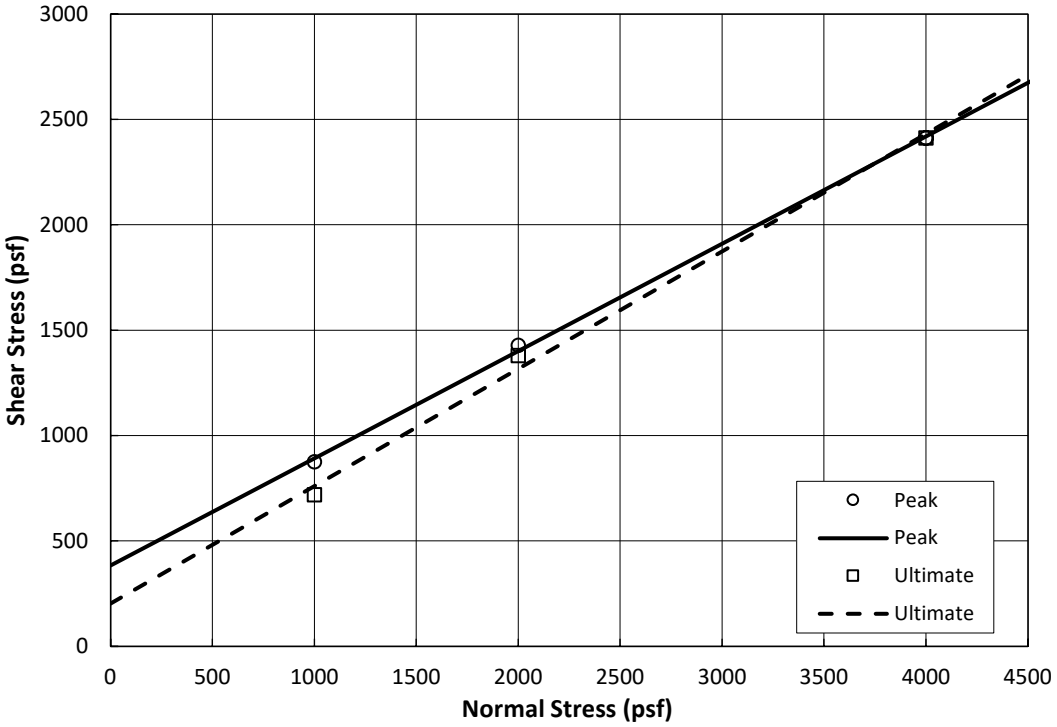
DIRECT SHEAR - ASTM D3080

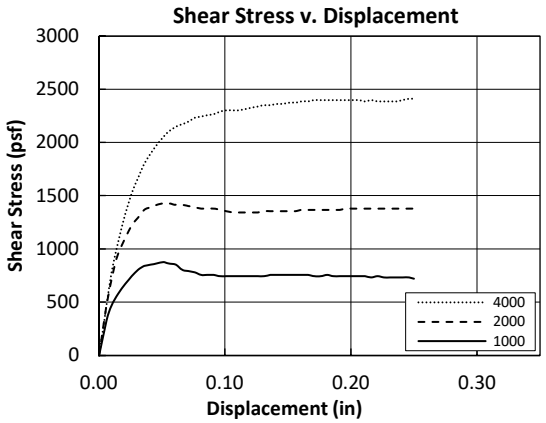
Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/19/2020	Reviewed by:	JC

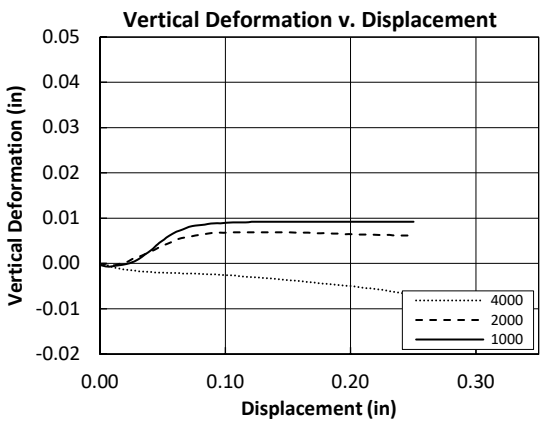
Samples Tested	1	2	3
Intial Moisture (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.5	111.5	111.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	876	1428	2412
Ult. Shear Stress (psf)	720	1380	2412

Soil Type:	Qya
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	27	29
Cohesion (psf)	384	204







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

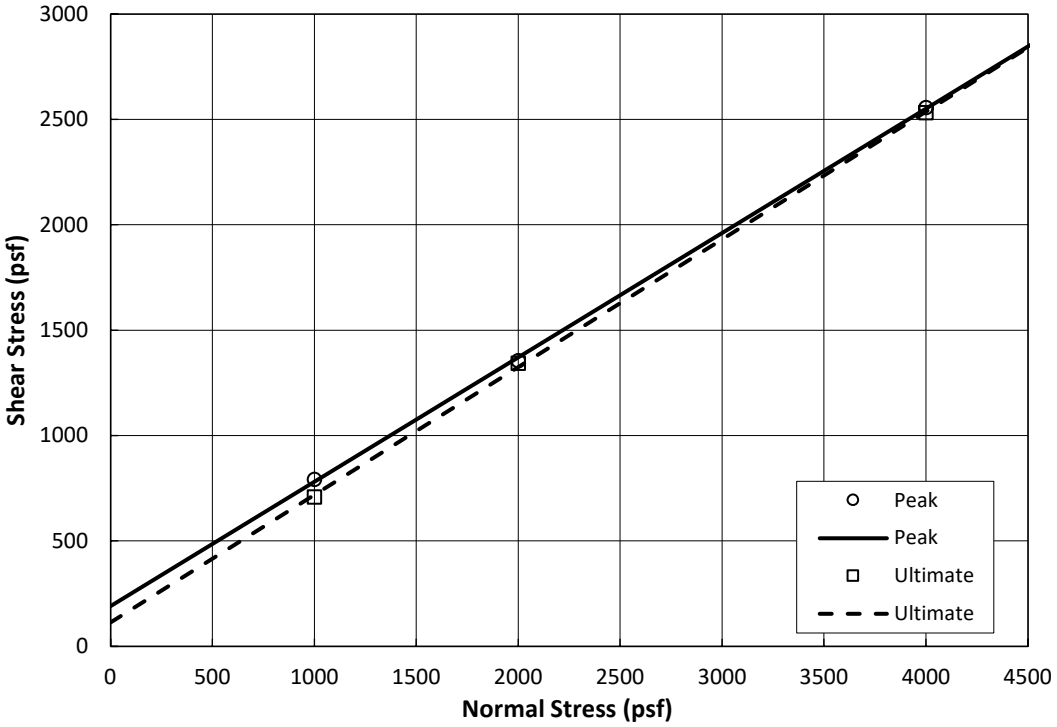
DIRECT SHEAR - ASTM D3080

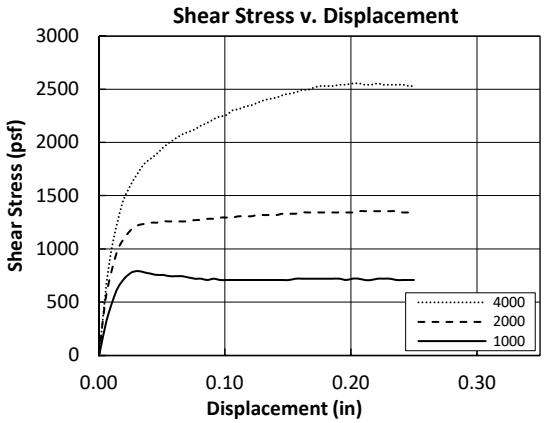
Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/20/2020	Reviewed by:	JC

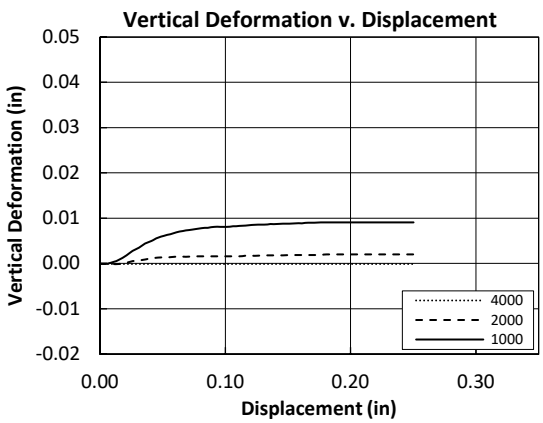
Samples Tested	1	2	3
Intial Moisture (%)	10.5	10.5	10.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	792	1356	2556
Ult. Shear Stress (psf)	708	1344	2532

Soil Type:	Qoa
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	31	31
Cohesion (psf)	192	114







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

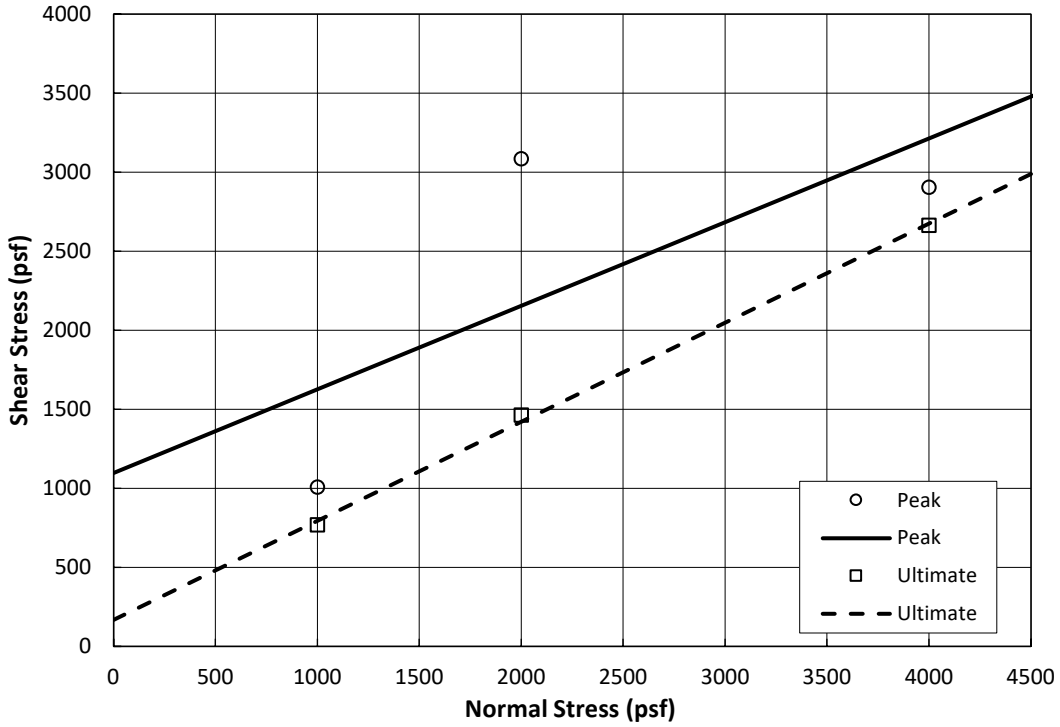
DIRECT SHEAR - ASTM D3080

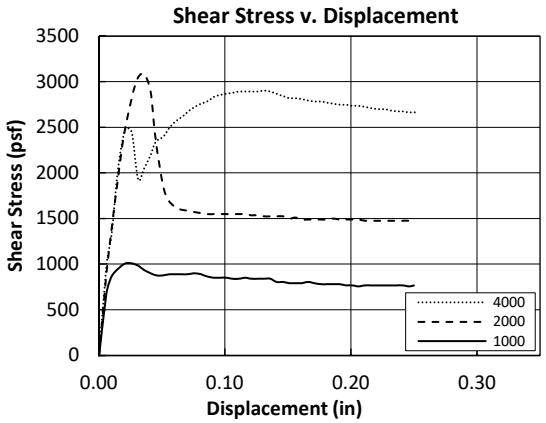
Project Name:	Oak Valley Town Center	Excavation:	AGS-2
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/3/2020	Reviewed by:	SS

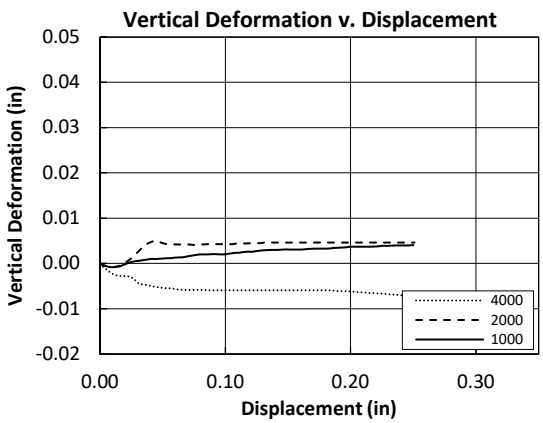
Samples Tested	1	2	3
Intial Moisture (%)	10.2	10.2	10.2
Initial Dry Density (pcf)	113.8	123.7	111.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	3084	2904
Ult. Shear Stress (psf)	768	1464	2664

Soil Type:	Yellowish SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	32
Cohesion (psf)	1098	168







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

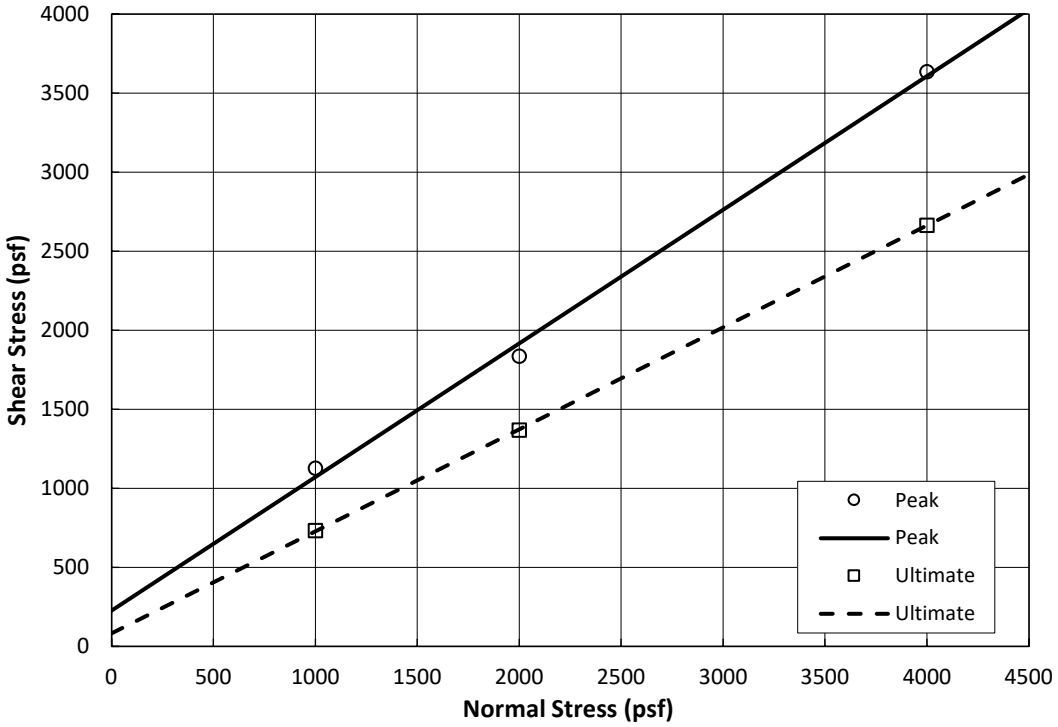
DIRECT SHEAR - ASTM D3080

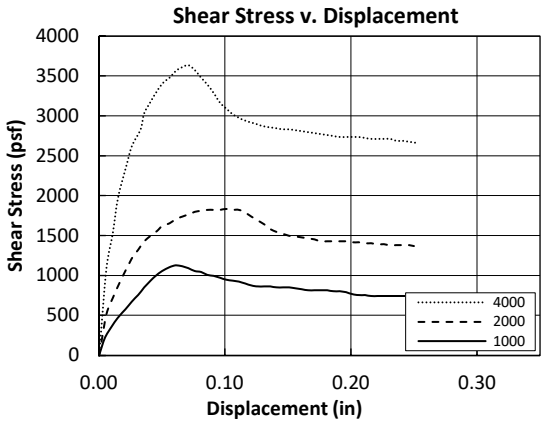
Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/31/2020	Reviewed by:	SS

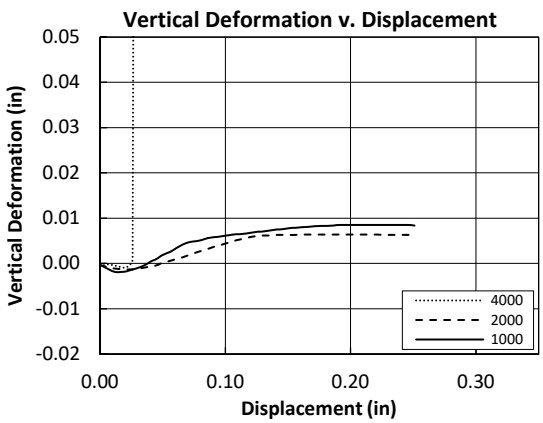
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	122.9	121.1	117.9
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1128	1836	3636
Ult. Shear Stress (psf)	732	1368	2664

Soil Type:	Light Brn SC-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	33
Cohesion (psf)	228	84







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

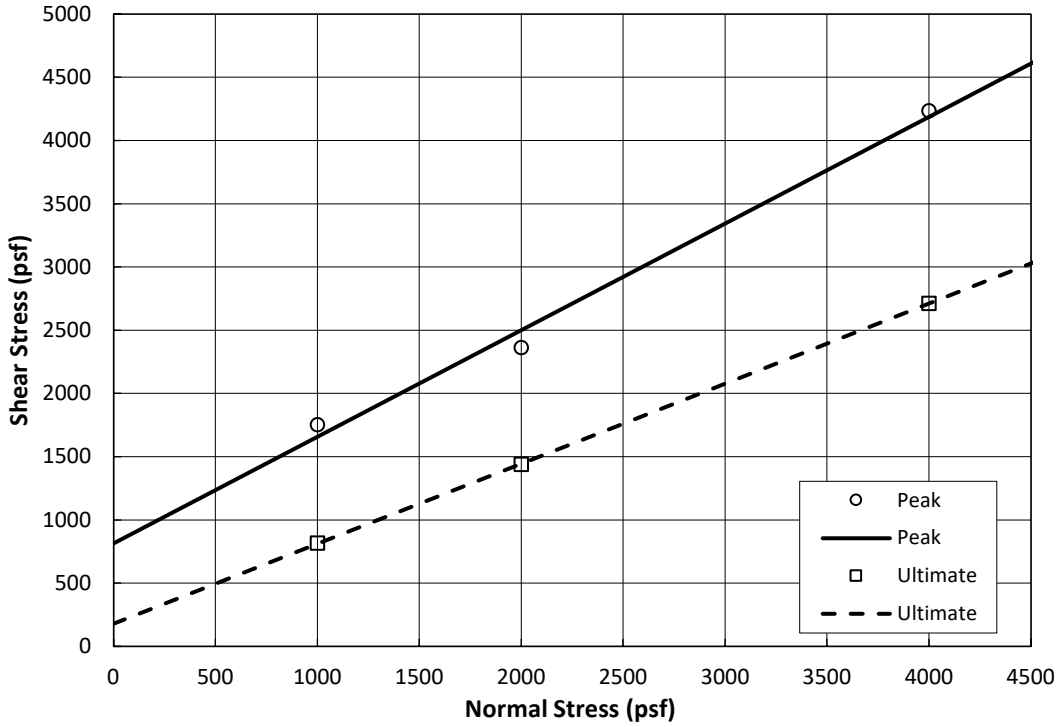
DIRECT SHEAR - ASTM D3080

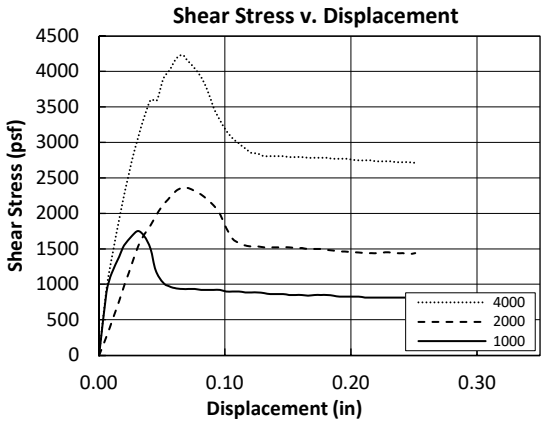
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/10/2020	Reviewed by:	SS

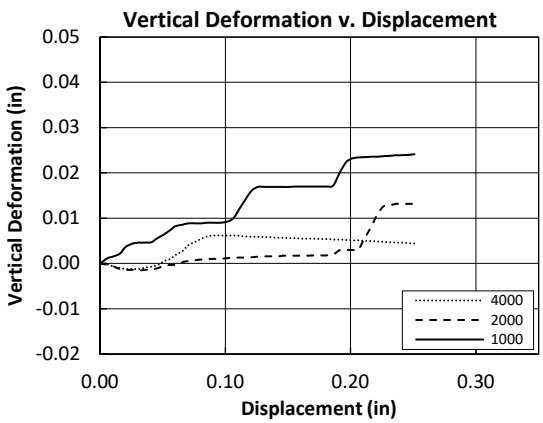
Samples Tested	1	2	3
Intial Moisture (%)	8.6	8.6	8.6
Initial Dry Density (pcf)	121.0	121.8	121.0
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1752	2364	4236
Ult. Shear Stress (psf)	816	1440	2712

Soil Type:	Blue SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	32
Cohesion (psf)	816	180







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

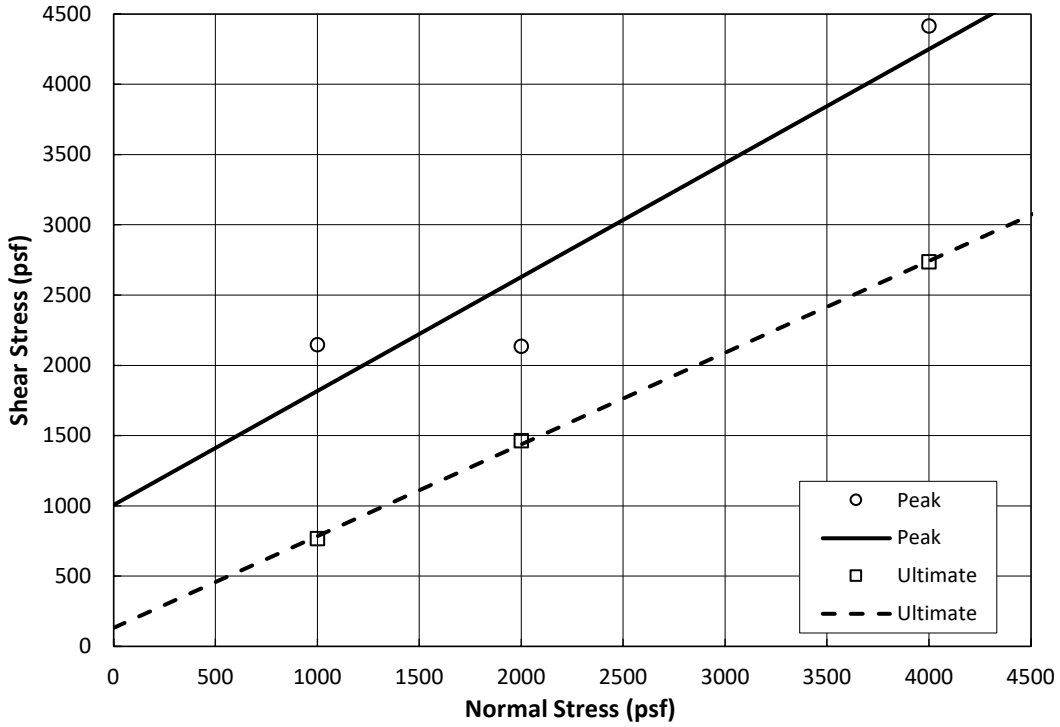
DIRECT SHEAR - ASTM D3080

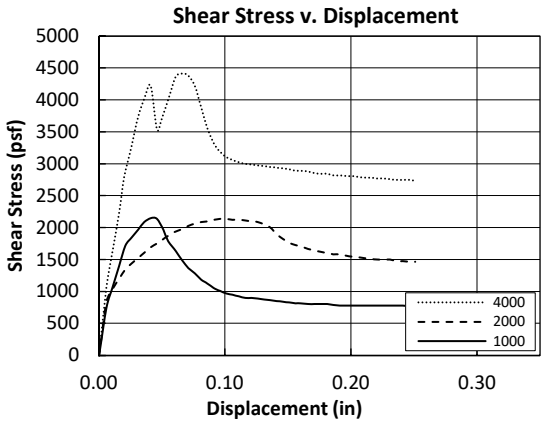
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/4/2020	Reviewed by:	SS

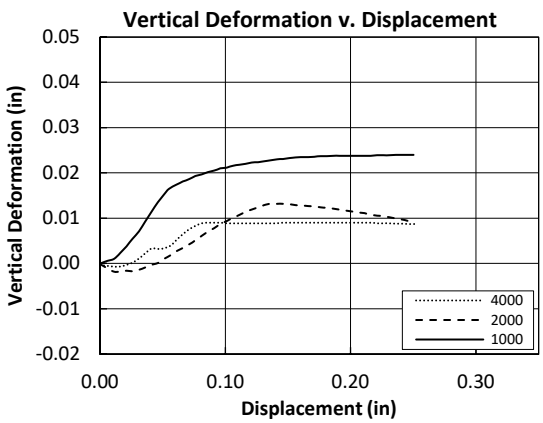
Samples Tested	1	2	3
Intial Moisture (%)	11.7	11.7	11.7
Initial Dry Density (pcf)	120.0	118.0	119.1
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	2148	2136	4416
Ult. Shear Stress (psf)	768	1464	2736

Soil Type:	Olive ML-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	39	33
Cohesion (psf)	1008	132







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

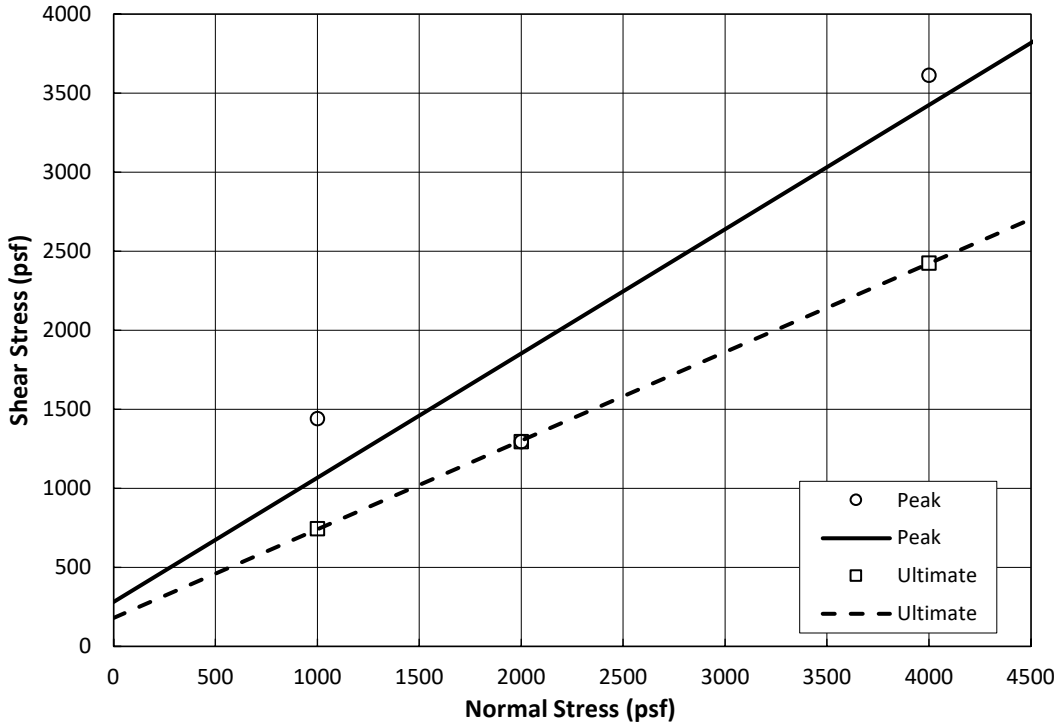
DIRECT SHEAR - ASTM D3080

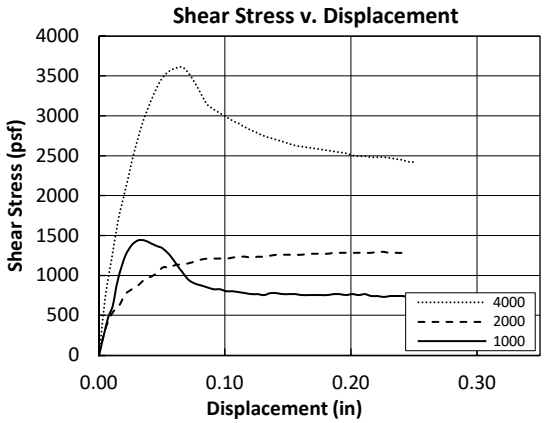
Project Name:	Oak Valeey Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/28/2020	Reviewed by:	SS

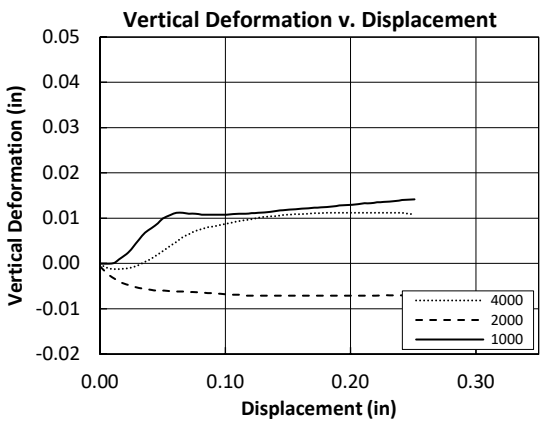
Samples Tested	1	2	3
Intial Moisture (%)	11.4	11.4	11.4
Initial Dry Density (pcf)	120.5	120.9	121.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1440	1296	3612
Ult. Shear Stress (psf)	744	1296	2424

Soil Type:	Olive SM-ML
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	38	29
Cohesion (psf)	282	180







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 05/20/2020

P.O. NO.: Chain of Custody

LAB NO.: C-3816

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 2004-01
Project: Oak Valley Town Center
Date sampled: 05/18/2020
Sample ID: T-2 @ 8'-9'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
7.5	7,600	292	111

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Oak Valley Town Center	Excavation/Tract:	T-2
Location:	Calimesa	Depth/Lot:	6-9 ft
P/W:	2004-01	Description:	Qya
Date:	5/21/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	108.3
Initial Moisture Content (%):	10.4
Initial Saturation (%):	50.6
Final Dry Density (pcf):	106.8
Final Moisture Content (%):	20.1
Final Saturation (%):	93.9
Expansion Index:	14
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

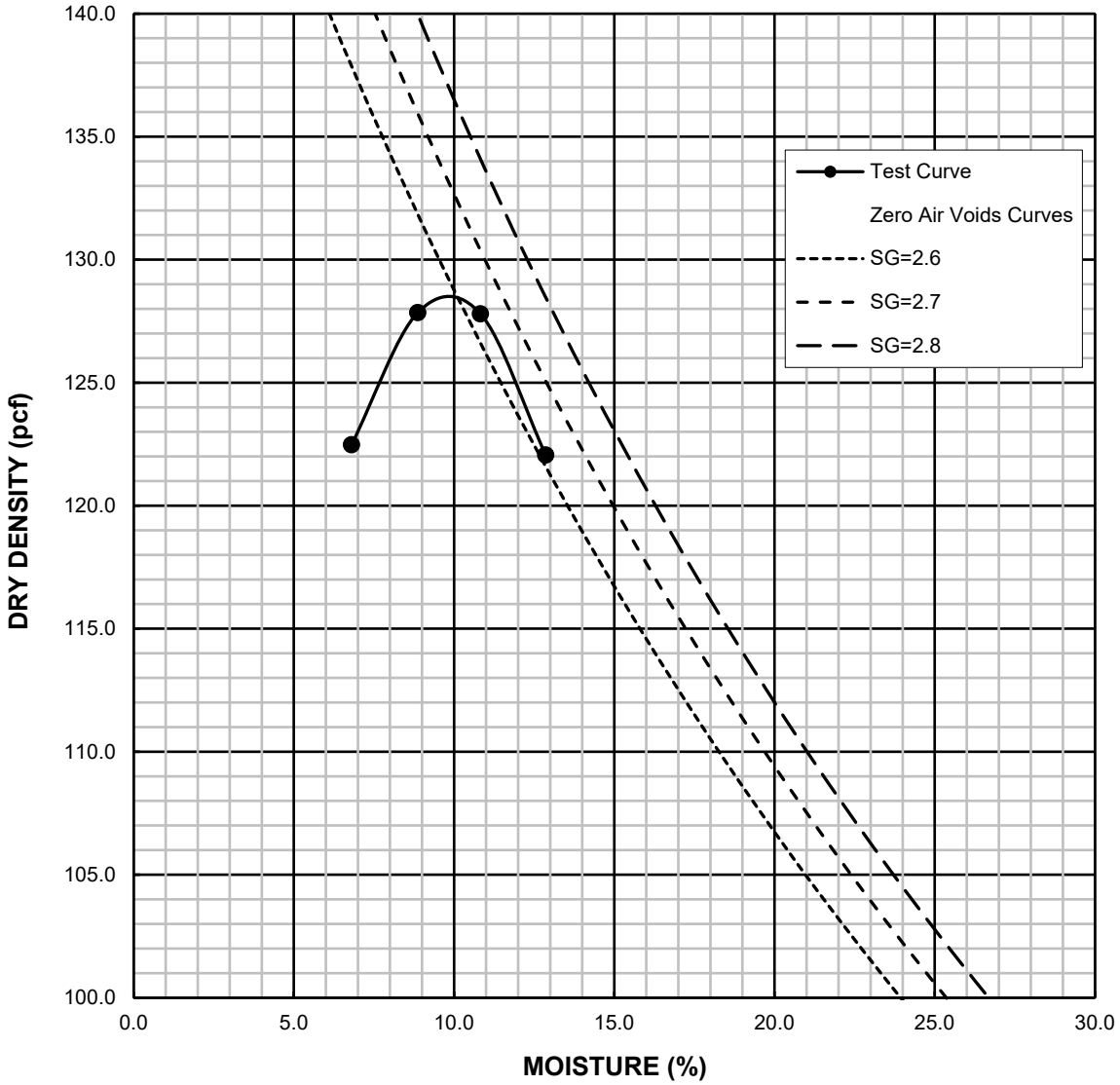
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-3
Location:	Calimesa	Depth:	8-10 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	FV
		Checked by:	SS

Method:	A	Oversize Retained: 25 %		
Point No.	1	2	3	4
Dry Density (pcf)	122.5	127.9	127.8	122.1
Moisture Content (%)	6.8	8.9	10.8	12.9

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**136.3 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**128.5 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

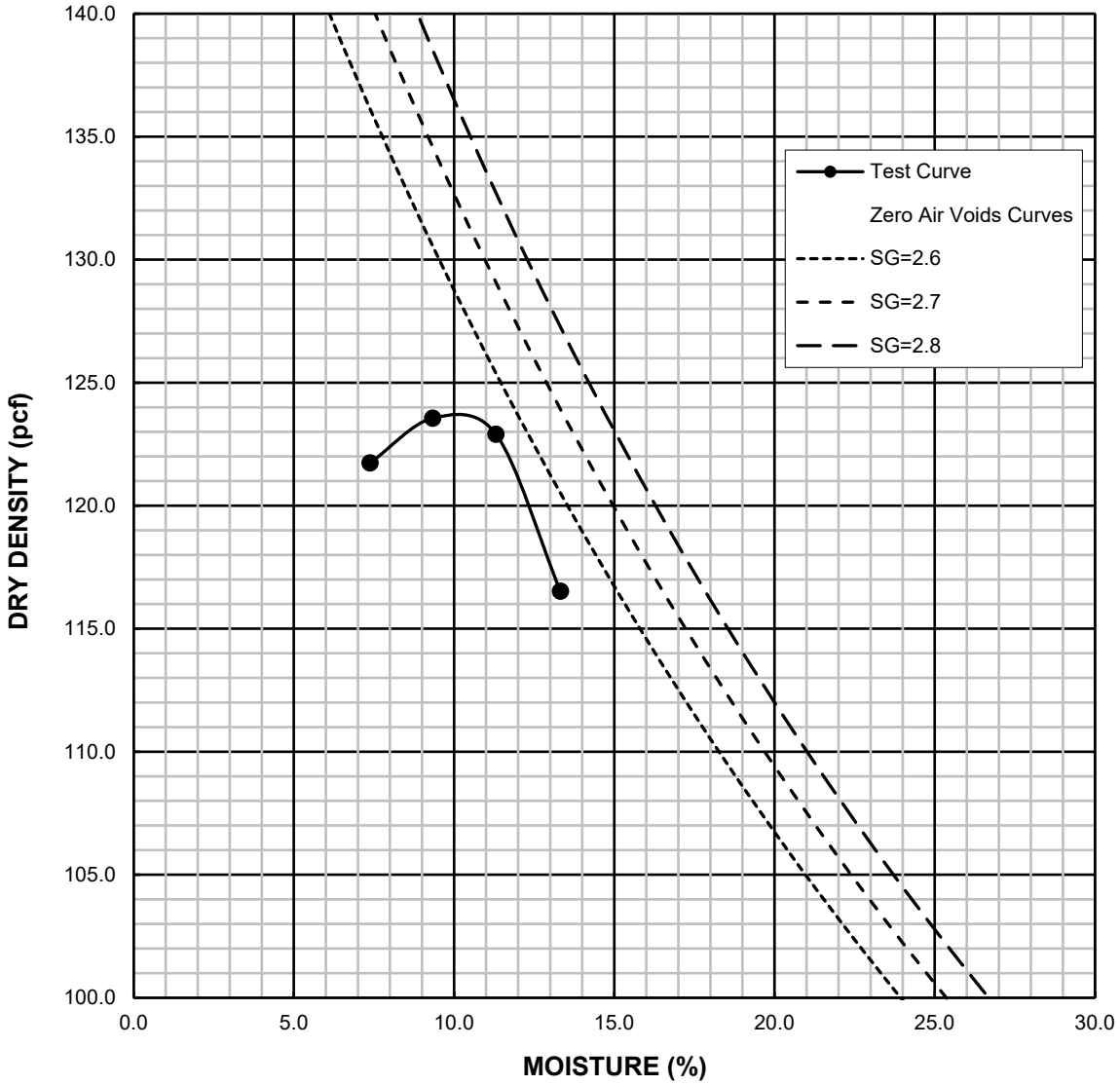
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 2.9 %		
Point No.	1	2	3	4
Dry Density (pcf)	121.7	123.6	122.9	116.5
Moisture Content (%)	7.4	9.3	11.3	13.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**124.8 pcf**	Corrected Moisture	**9.7** %
Max. Dry Density	**123.9 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

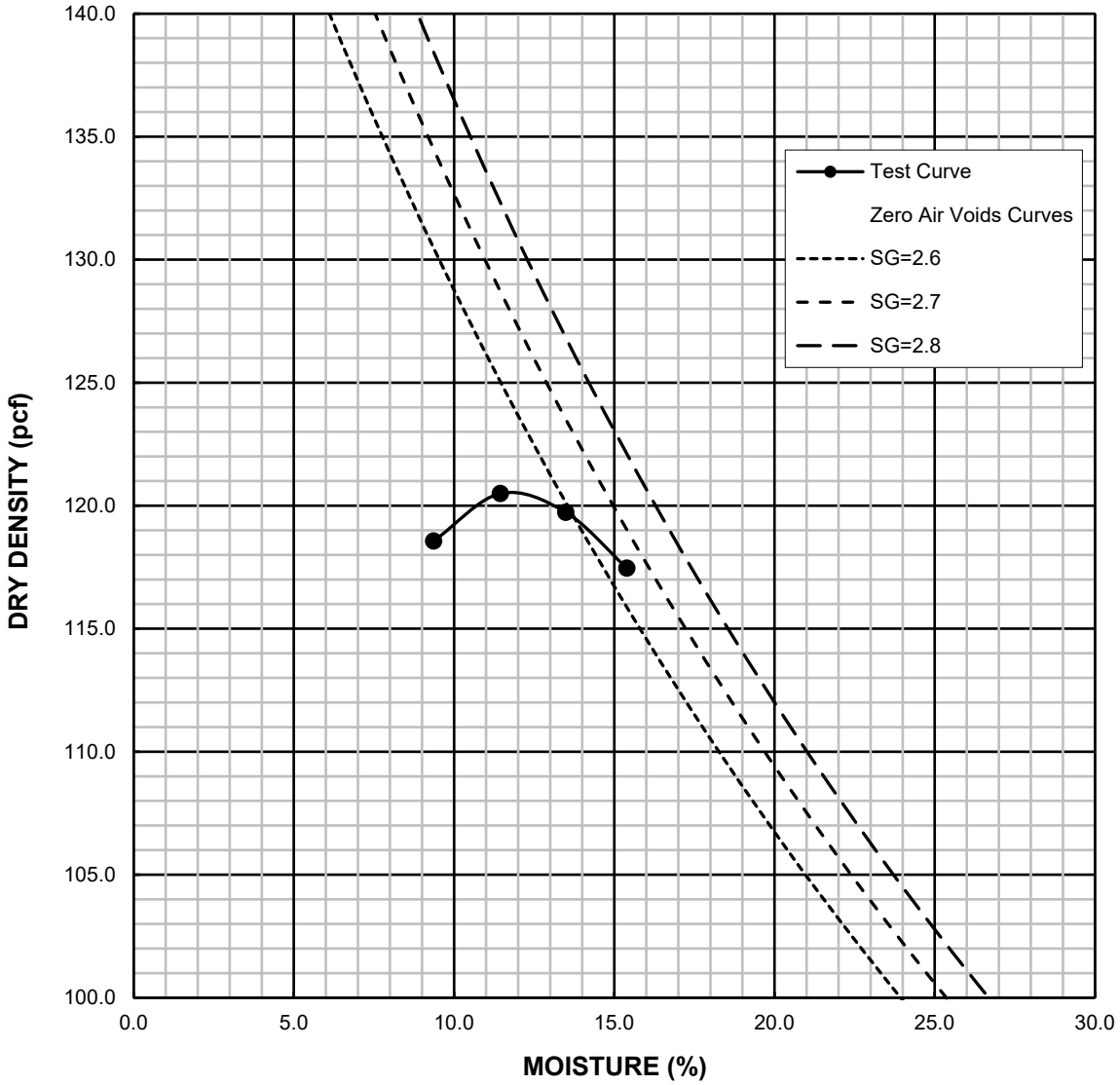
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-16
Location:	Calimesa	Depth:	7-9 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.6	120.5	119.7	117.5
Moisture Content (%)	9.4	11.4	13.5	15.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**123.9 pcf**	Corrected Moisture	**9.9** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

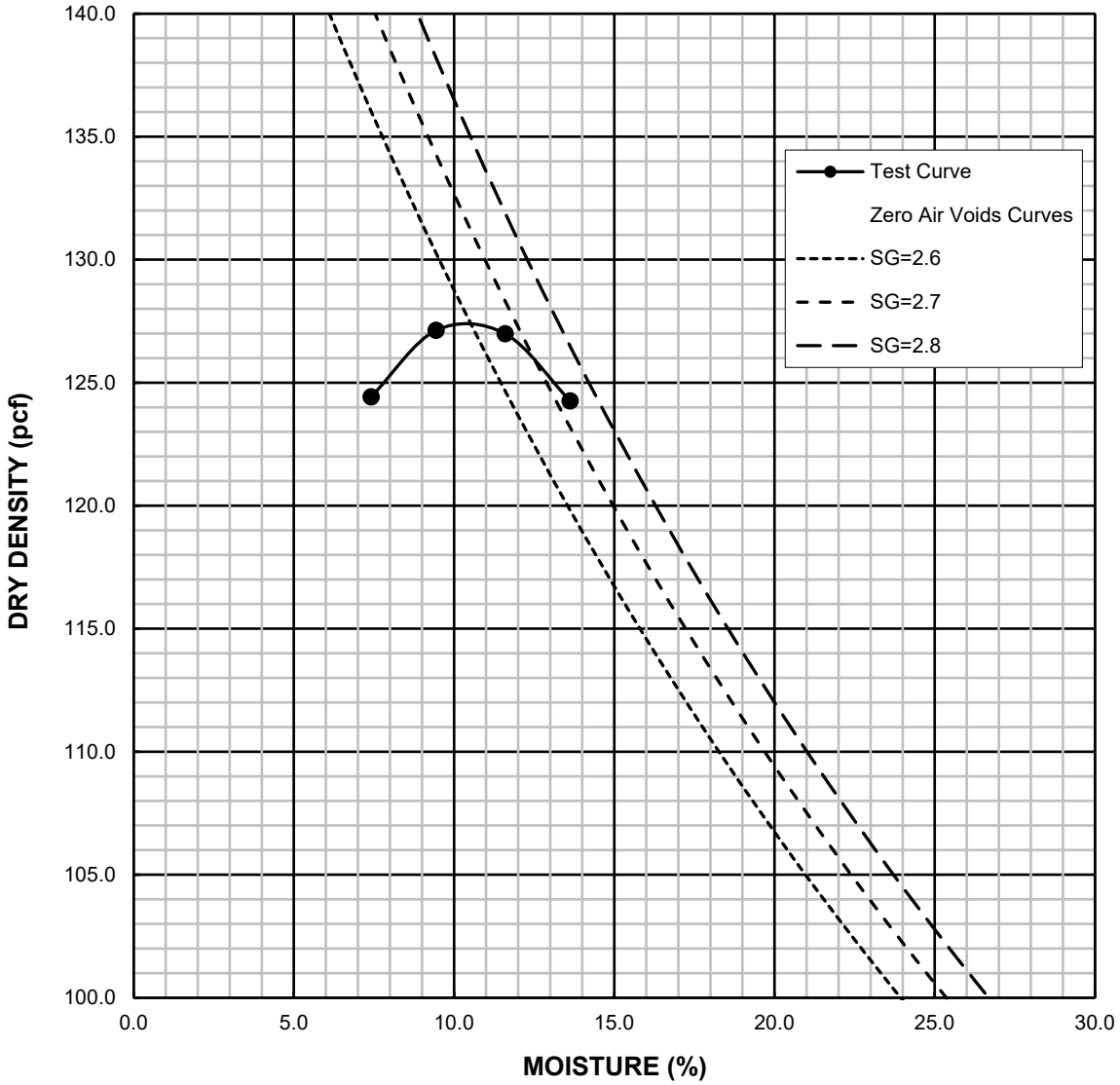
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	124.4	127.1	127.0	124.3
Moisture Content (%)	7.4	9.4	11.6	13.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**130.6 pcf**	Corrected Moisture	**9.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**10.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

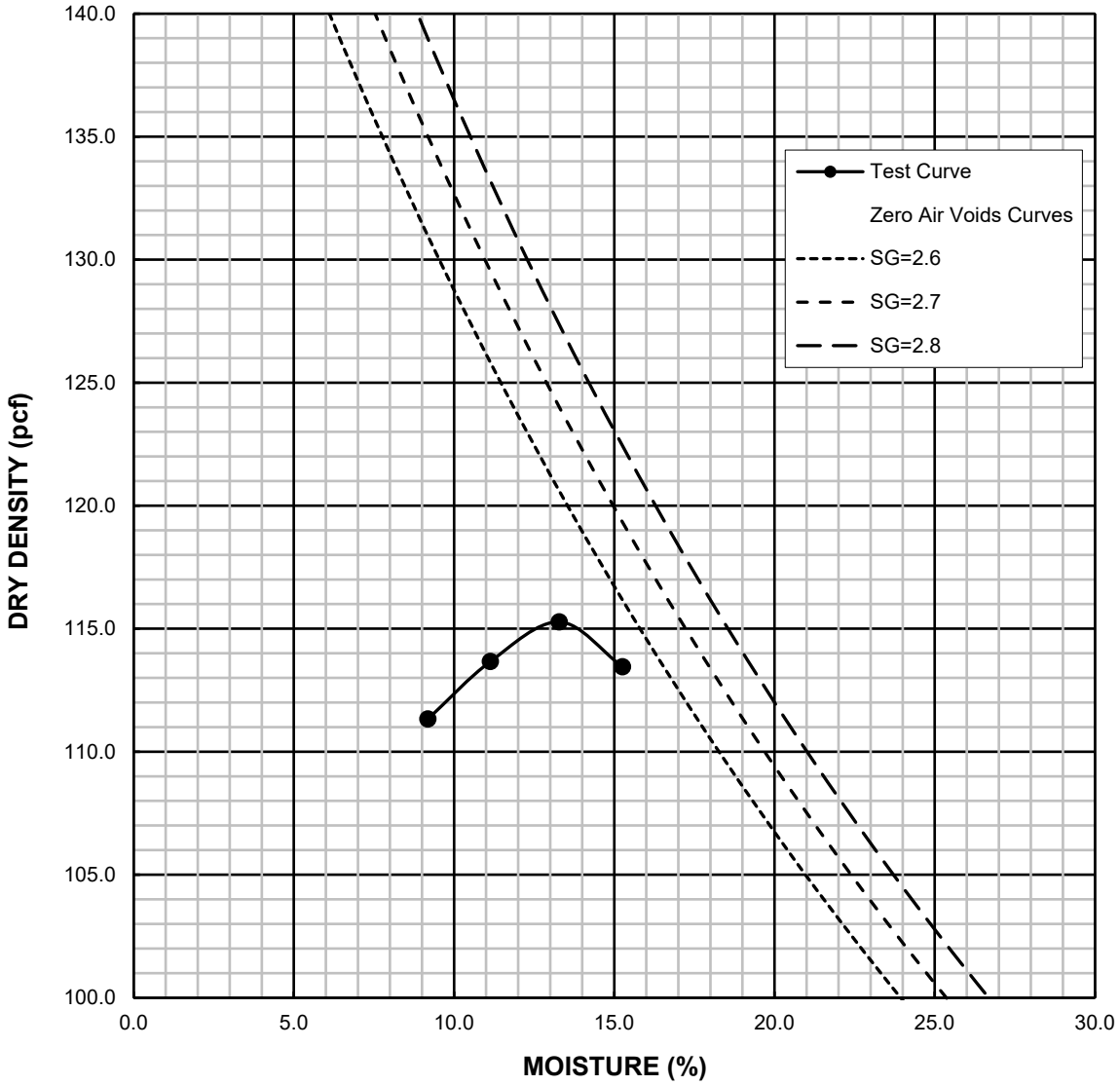
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-19
Location:	Calimesa	Depth:	6-9 ft
P/W No.:	2004-01	Soil Type:	Qlo
Date:	05-2019	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	111.3	113.7	115.3	113.5
Moisture Content (%)	9.2	11.1	13.3	15.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**118.7 pcf**	Corrected Moisture	**12.2** %
Max. Dry Density	**115 pcf**	Optimum Moisture	**13.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/24/2020

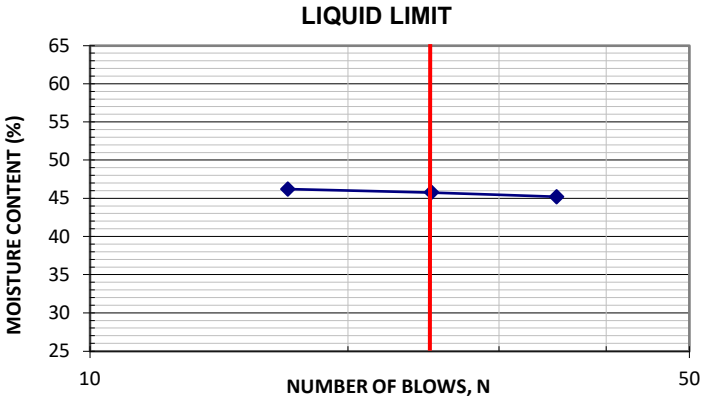
Excavation: AGS-3
Depth: 20 ft
Description: ML
By: FV

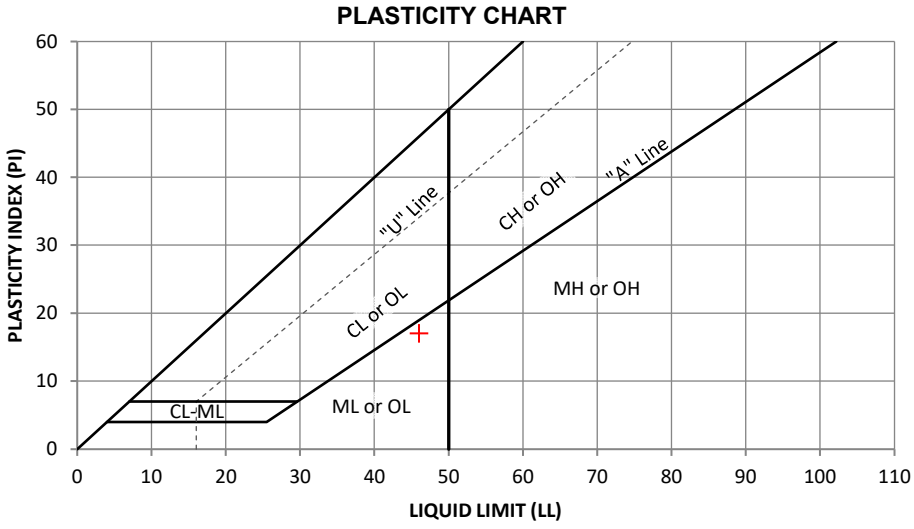
LIQUID LIMIT

Can No.	16	4	2
Wt. wet soil+can (g)	19.20	18.37	19.24
Wt. dry soil+can (g)	16.70	16.09	16.68
Wt. can (g)	11.17	11.11	11.14
Wt. mosture (g)	2.50	2.28	2.56
Wt. dry soil (g)	5.53	4.98	5.54
Water Content %	45.21	45.78	46.21
No. of Blows	35	25	17

PLASTIC LIMIT

101	105
58.85	57.22
57.12	55.77
51.09	50.74
1.73	1.45
6.03	5.03
28.69	28.83





Liquid Limit (LL) 46 Plastic Limit (PL) 29 Plasticity Index (PI) 17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

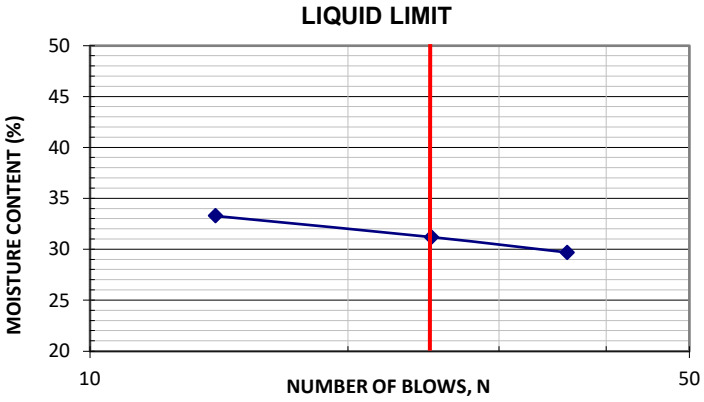
AGS Form E-2

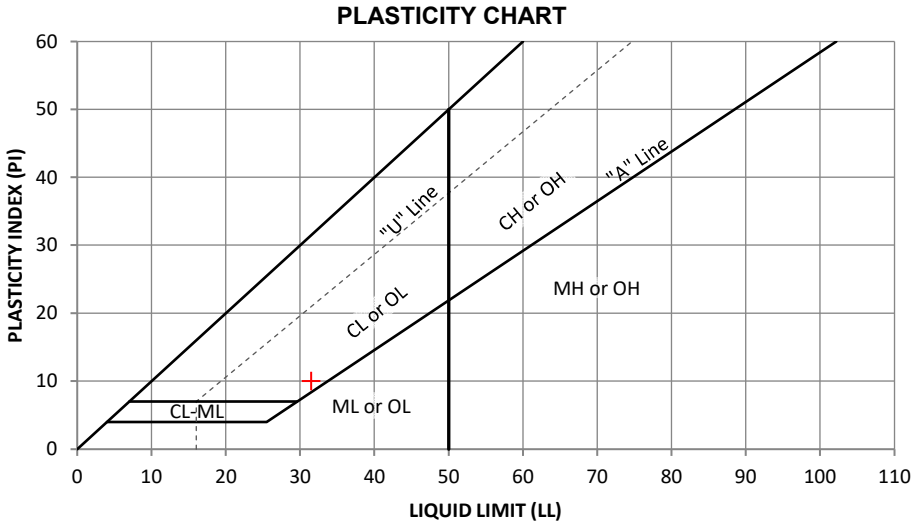
ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/21/2020

Excavation: AGS-3
Depth: 30 ft
Description: Grey Brn SC-SM
By: FV

	LIQUID LIMIT			PLASTIC LIMIT	
Can No.	3	11	1	108	102
Wt. wet soil+can (g)	21.32	23.11	23.84	60.31	62.31
Wt. dry soil+can (g)	18.80	20.29	20.96	58.63	60.41
Wt. can (g)	11.23	11.25	11.26	50.93	51.44
Wt. mosture (g)	2.52	2.82	2.88	1.68	1.90
Wt. dry soil (g)	7.57	9.04	9.70	7.70	8.97
Water Content %	33.29	31.19	29.69	21.82	21.18
No. of Blows	14	25	36		





Liquid Limit (LL) 31.5 Plastic Limit (PL) 21.5 Plasticity Index (PI) 10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

Excavation: AGS-3
Depth: 35 ft
Description: ML
By: FV

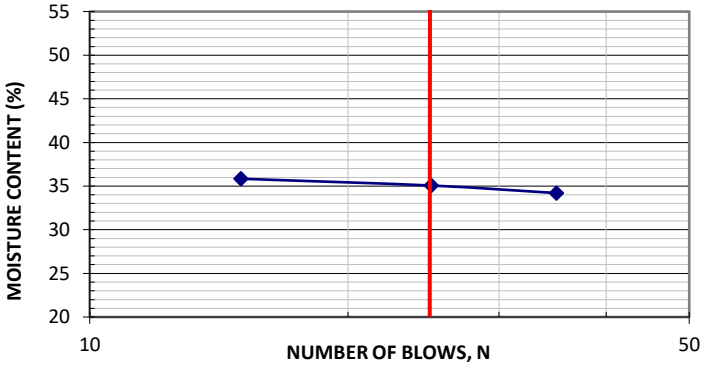
LIQUID LIMIT

Can No.	1	5	11
Wt. wet soil+can (g)	18.84	23.79	24.65
Wt. dry soil+can (g)	16.84	20.55	21.24
Wt. can (g)	11.26	11.31	11.27
Wt. mosture (g)	2.00	3.24	3.41
Wt. dry soil (g)	5.58	9.24	9.97
Water Content %	35.84	35.06	34.20
No. of Blows	15	25	35

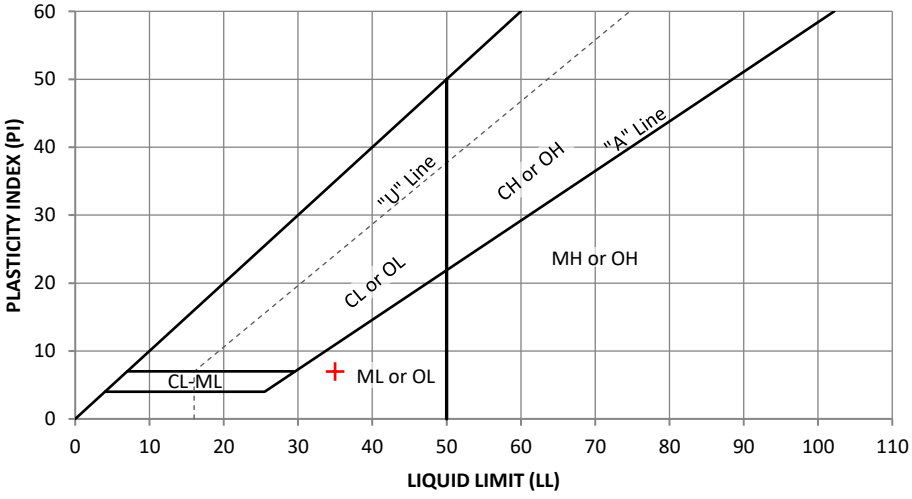
PLASTIC LIMIT

108	105
59.98	61.77
57.85	59.50
50.96	50.73
2.13	2.27
6.89	8.77
30.91	25.88

LIQUID LIMIT



PLASTICITY CHART



Liquid Limit (LL) 35 Plastic Limit (PL) 28 Plasticity Index (PI) 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

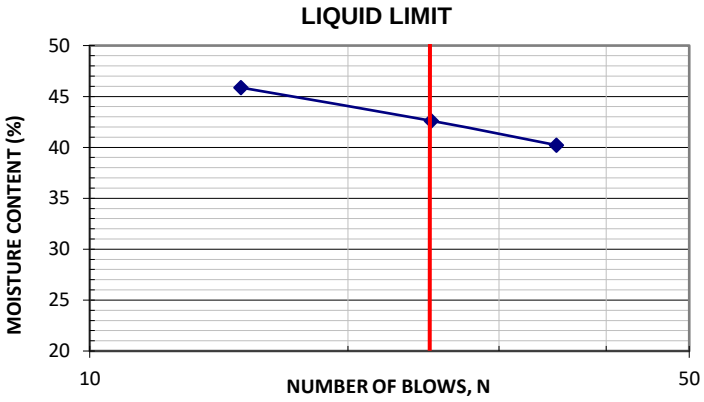
Excavation: AGS-3
Depth: 40 ft
Description: CL (Fine portion)
By: FV

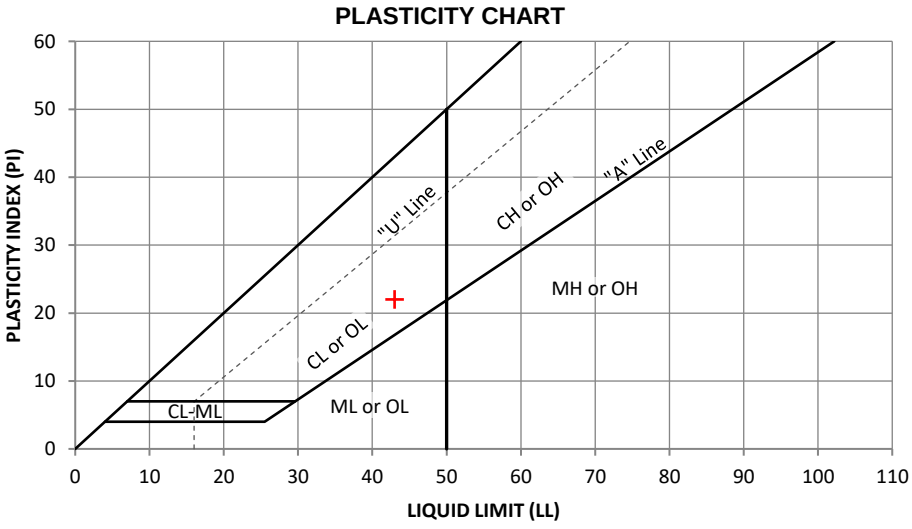
LIQUID LIMIT

Can No.	15	14	3
Wt. wet soil+can (g)	20.42	20.43	19.94
Wt. dry soil+can (g)	17.53	17.69	17.39
Wt. can (g)	11.23	11.26	11.05
Wt. mosture (g)	2.89	2.74	2.55
Wt. dry soil (g)	6.30	6.43	6.34
Water Content %	45.87	42.61	40.22
No. of Blows	15	25	35

PLASTIC LIMIT

104	102
59.27	57.85
57.87	56.74
51.04	51.47
1.40	1.11
6.83	5.27
20.50	21.06





Liquid Limit (LL) 43 Plastic Limit (PL) 21 Plasticity Index (PI) 22

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley town Center
Location: Calimesa
Project No: 2004-01
Date: 9/23/2020

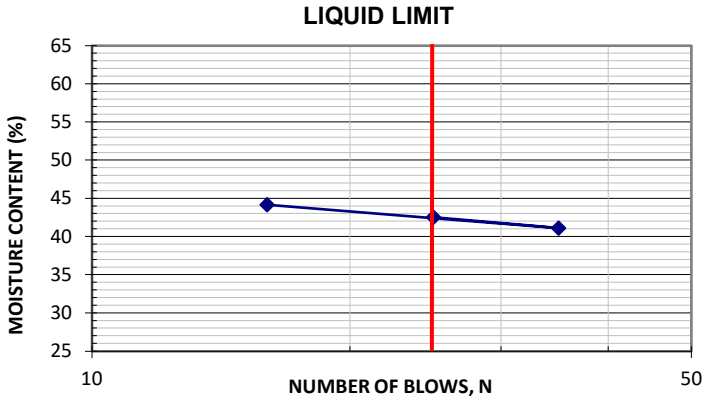
Excavation: AGS-16
Depth: 25 ft
Description: CL
By: FV

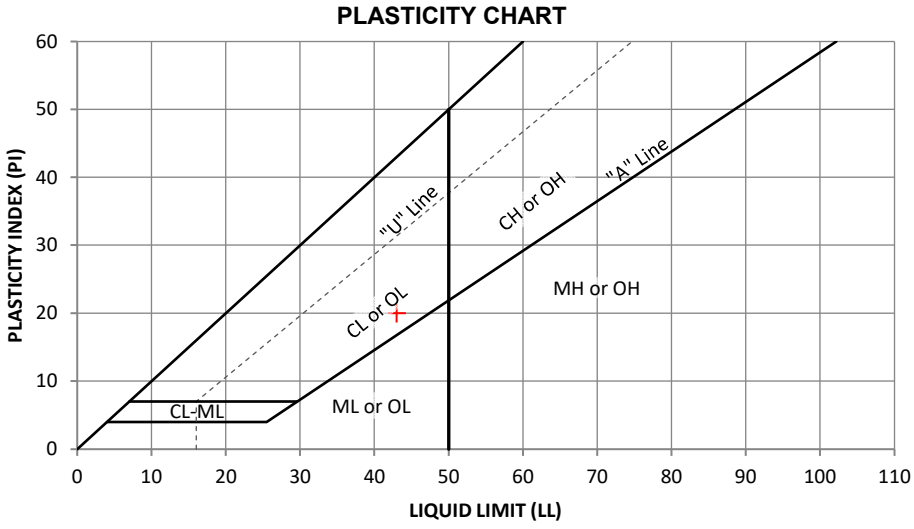
LIQUID LIMIT

Can No.	15	11	5
Wt. wet soil+can (g)	20.10	19.65	18.21
Wt. dry soil+can (g)	17.45	17.20	16.09
Wt. can (g)	11.22	11.24	11.29
Wt. mosture (g)	2.65	2.45	2.12
Wt. dry soil (g)	6.23	5.96	4.80
Water Content %	42.54	41.11	44.17
No. of Blows	25	35	16

PLASTIC LIMIT

109	106
56.91	58.04
55.89	56.78
51.56	51.34
1.02	1.26
4.33	5.44
23.56	23.16





Liquid Limit (LL) 43 Plastic Limit (PL) 23 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

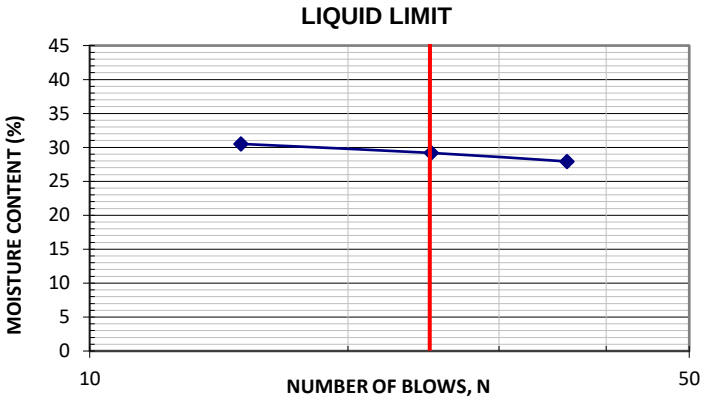
Excavation: AGS-16
Depth: 30 ft
Description: CL (Fine portion)
By: FV

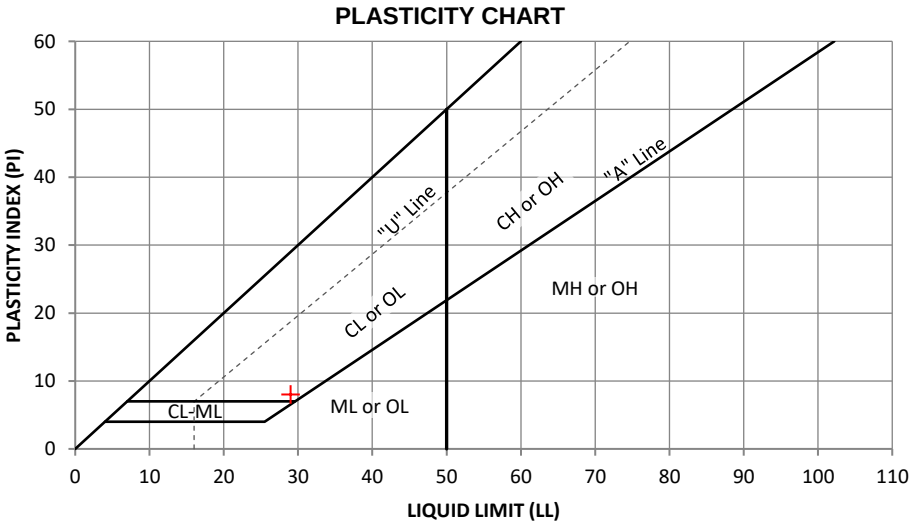
LIQUID LIMIT

Can No.	14	3	15
Wt. wet soil+can (g)	22.98	22.43	21.44
Wt. dry soil+can (g)	20.24	19.90	19.22
Wt. can (g)	11.26	11.23	11.27
Wt. mosture (g)	2.74	2.53	2.22
Wt. dry soil (g)	8.98	8.67	7.95
Water Content %	30.51	29.18	27.92
No. of Blows	15	25	36

PLASTIC LIMIT

101	109
58.25	58.32
56.94	57.20
51.08	51.55
1.31	1.12
5.86	5.65
22.35	19.82





Liquid Limit (LL) 29 Plastic Limit (PL) 21 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

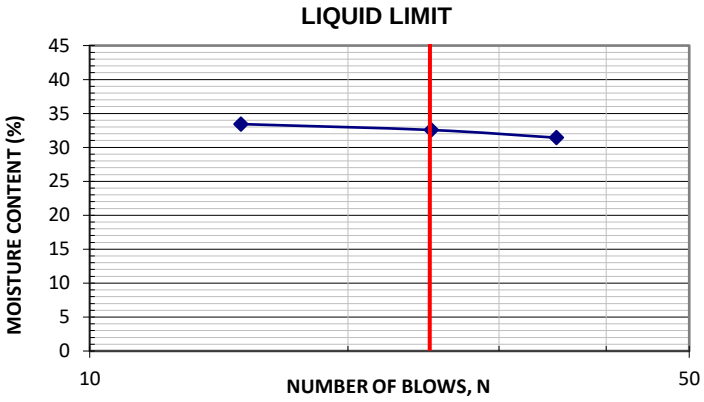
Excavation: AGS-16
Depth: 35 ft
Description: CL (Fine portion)
By: FV

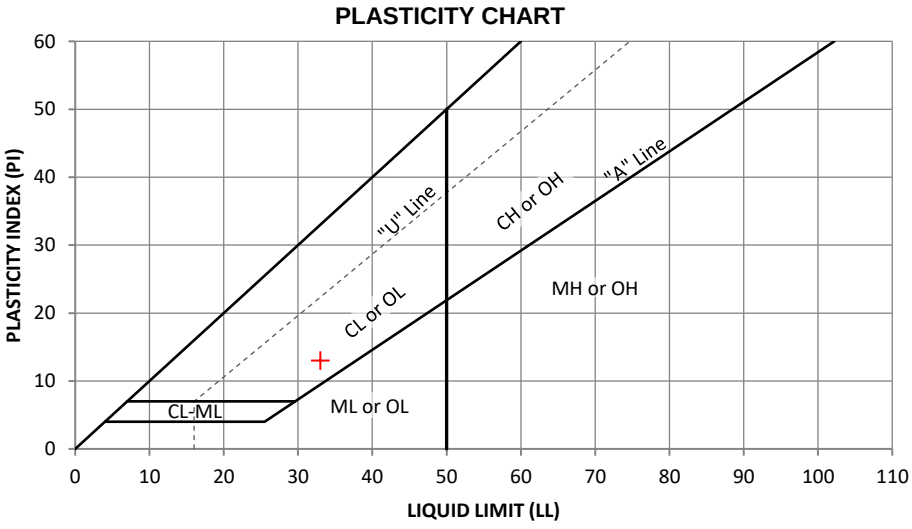
LIQUID LIMIT

Can No.	16	11	5
Wt. wet soil+can (g)	20.66	21.55	22.08
Wt. dry soil+can (g)	18.29	19.02	19.50
Wt. can (g)	11.20	11.25	11.29
Wt. mosture (g)	2.37	2.53	2.58
Wt. dry soil (g)	7.09	7.77	8.21
Water Content %	33.43	32.56	31.43
No. of Blows	15	25	35

PLASTIC LIMIT

106	111
57.80	57.64
56.66	56.63
51.34	51.42
1.14	1.01
5.32	5.21
21.43	19.39





Liquid Limit (LL) 33 Plastic Limit (PL) 20 Plasticity Index (PI) 13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

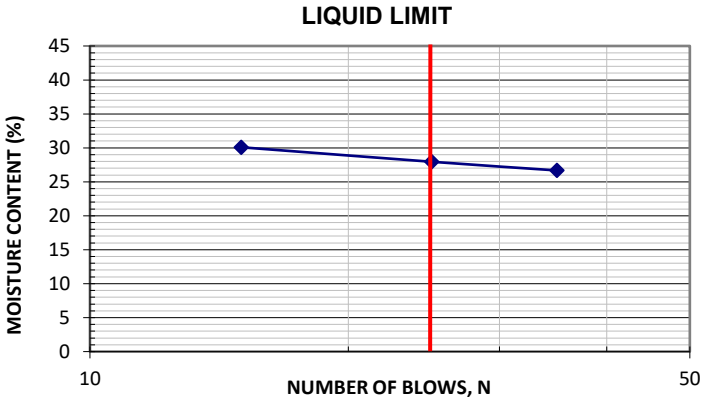
Excavation: AGS-16
Depth: 45 ft
Description: CL (Fine portion)
By: FV

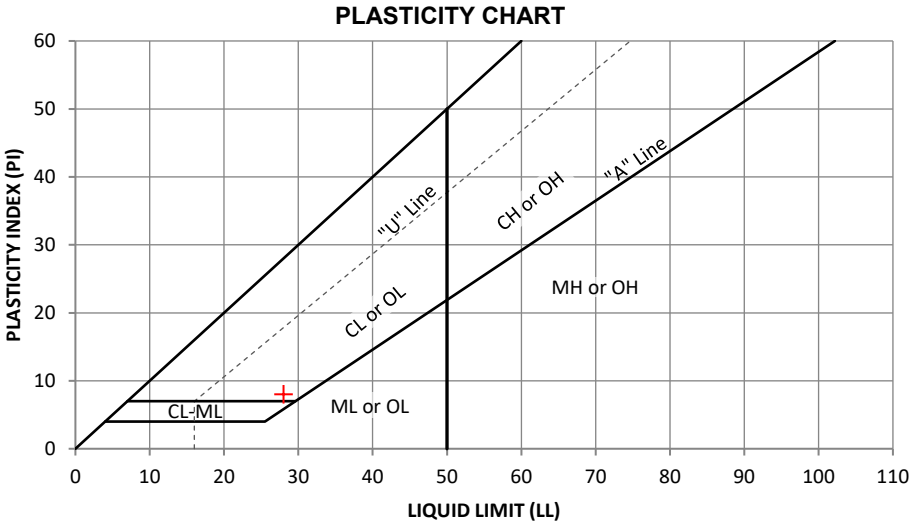
LIQUID LIMIT

Can No.	4	2	10
Wt. wet soil+can (g)	20.75	20.88	21.44
Wt. dry soil+can (g)	18.72	18.75	19.06
Wt. can (g)	11.11	11.13	11.15
Wt. mosture (g)	2.03	2.13	2.38
Wt. dry soil (g)	7.61	7.62	7.91
Water Content %	26.68	27.95	30.09
No. of Blows	35	25	15

PLASTIC LIMIT

100	103
58.69	58.58
57.45	57.40
51.53	51.47
1.24	1.18
5.92	5.93
20.95	19.90





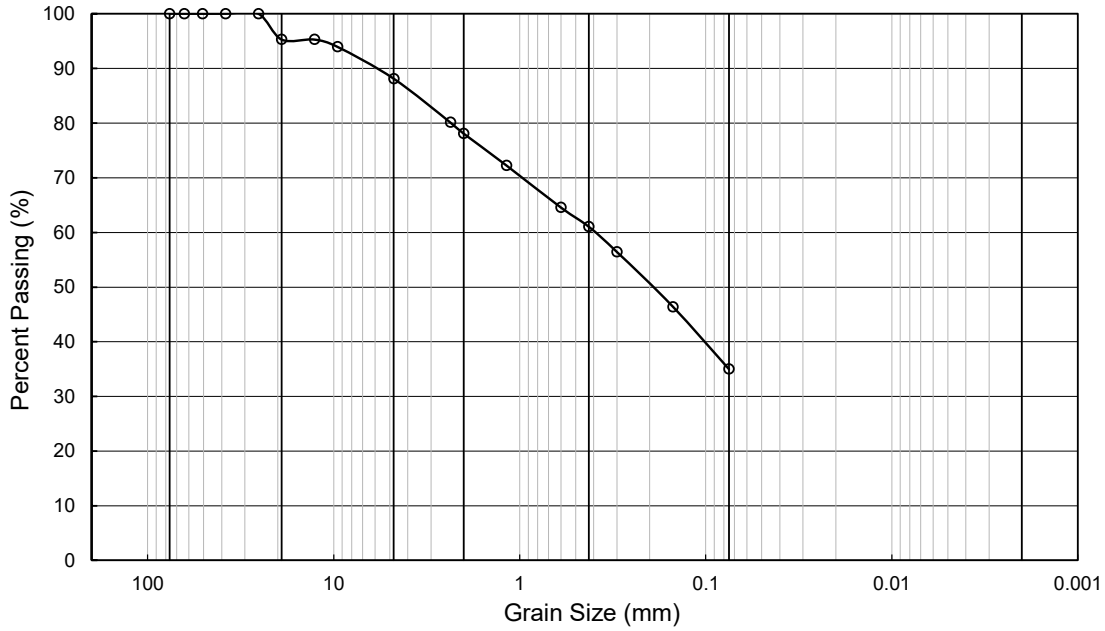
Liquid Limit (LL) 28 Plastic Limit (PL) 20 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-5
Location:	Calimesa	Depth:	4 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	95
1/2 "	12.70	95
3/8 "	9.53	94
# 4	4.75	88.1
# 8	2.36	80.1
#10	2.00	78.1
#16	1.18	72.3
# 30	0.60	64.5
# 40	0.425	61.0
# 50	0.30	56.4
# 100	0.15	46.4
# 200	0.075	35.0

Summary	
% Gravel =	11.9
% Sand =	53.1
% Fines =	35.0
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

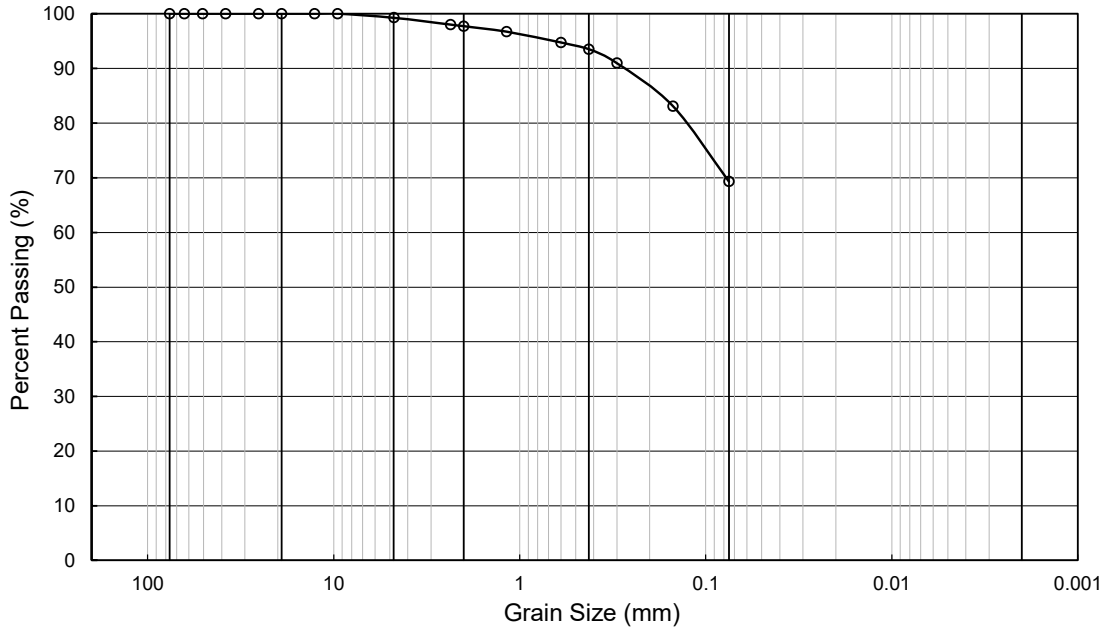
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-10
Location:	Calimesa	Depth:	12 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.3
# 8	2.36	98.0
#10	2.00	97.7
#16	1.18	96.7
# 30	0.60	94.7
# 40	0.425	93.5
# 50	0.30	91.0
# 100	0.15	83.1
# 200	0.075	69.3

Summary	
% Gravel =	0.7
% Sand =	30.0
% Fines =	69.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

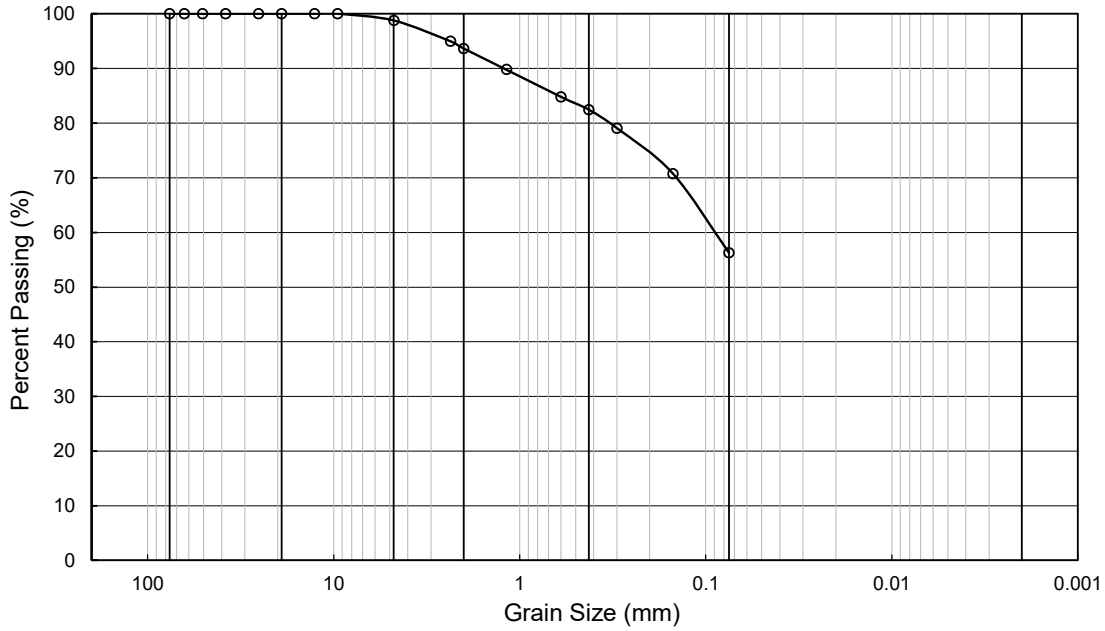
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-11
Location:	Calimesa	Depth:	7.5 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.8
# 8	2.36	95.0
#10	2.00	93.6
#16	1.18	89.8
# 30	0.60	84.8
# 40	0.425	82.4
# 50	0.30	79.1
# 100	0.15	70.7
# 200	0.075	56.3

Summary	
% Gravel =	1.2
% Sand =	42.5
% Fines =	56.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

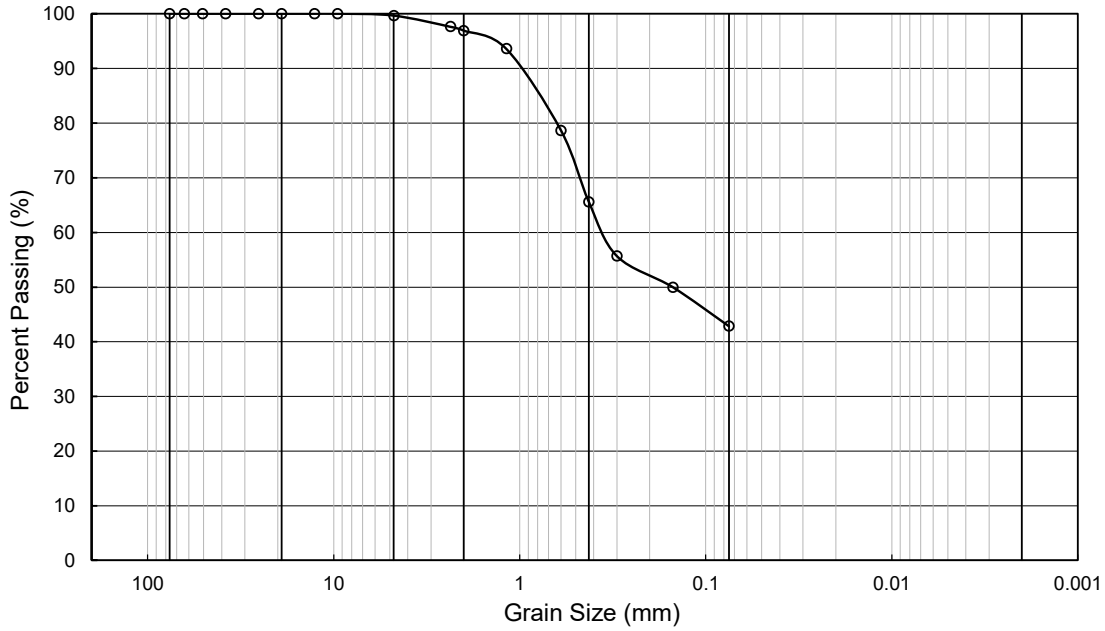
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-17
Location:	Calimesa	Depth:	13-14 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.6
# 8	2.36	97.6
#10	2.00	96.9
#16	1.18	93.6
# 30	0.60	78.6
# 40	0.425	65.6
# 50	0.30	55.7
# 100	0.15	50.0
# 200	0.075	42.8

Summary	
% Gravel =	0.4
% Sand =	56.8
% Fines =	42.8
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

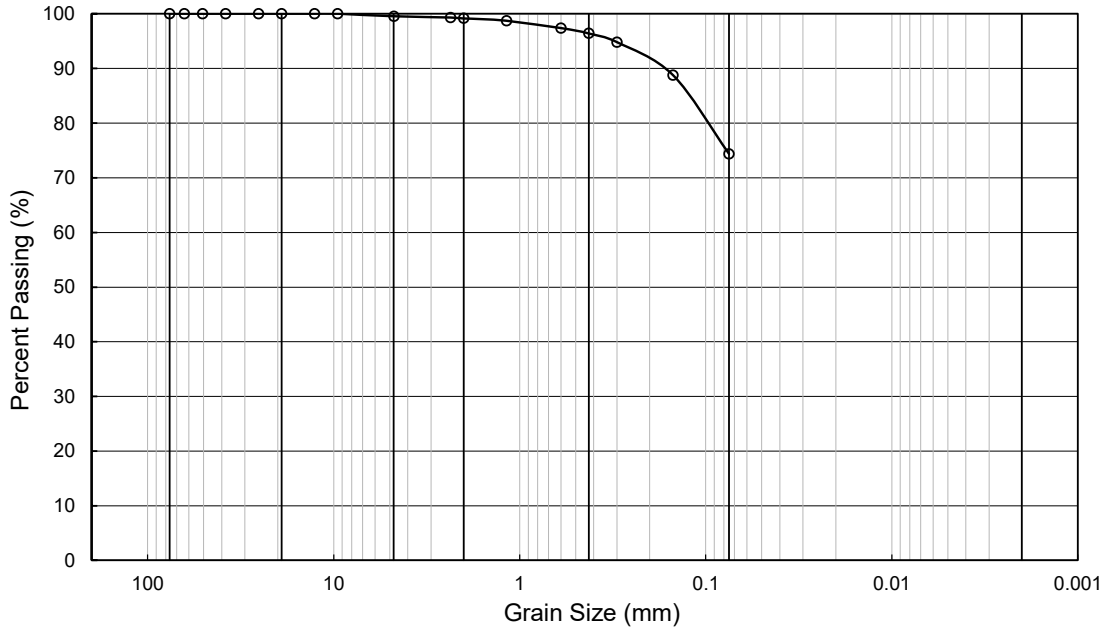
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	10 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.5
# 8	2.36	99.3
#10	2.00	99.2
#16	1.18	98.7
# 30	0.60	97.4
# 40	0.425	96.4
# 50	0.30	94.8
# 100	0.15	88.8
# 200	0.075	74.3

Summary	
% Gravel =	0.5
% Sand =	25.2
% Fines =	74.3
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

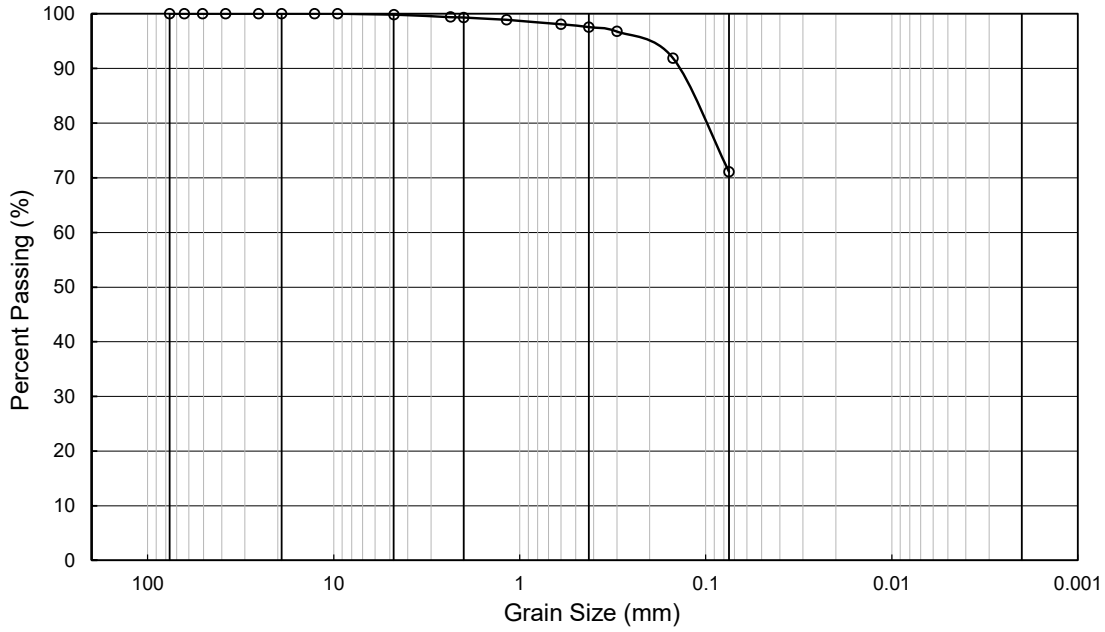
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	20 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.8
# 8	2.36	99.4
#10	2.00	99.3
#16	1.18	98.9
# 30	0.60	98.1
# 40	0.425	97.5
# 50	0.30	96.8
# 100	0.15	91.9
# 200	0.075	71.1

Summary	
% Gravel =	0.2
% Sand =	28.7
% Fines =	71.1
Sum =	100.0

LL=	46
PL=	29
PI =	17

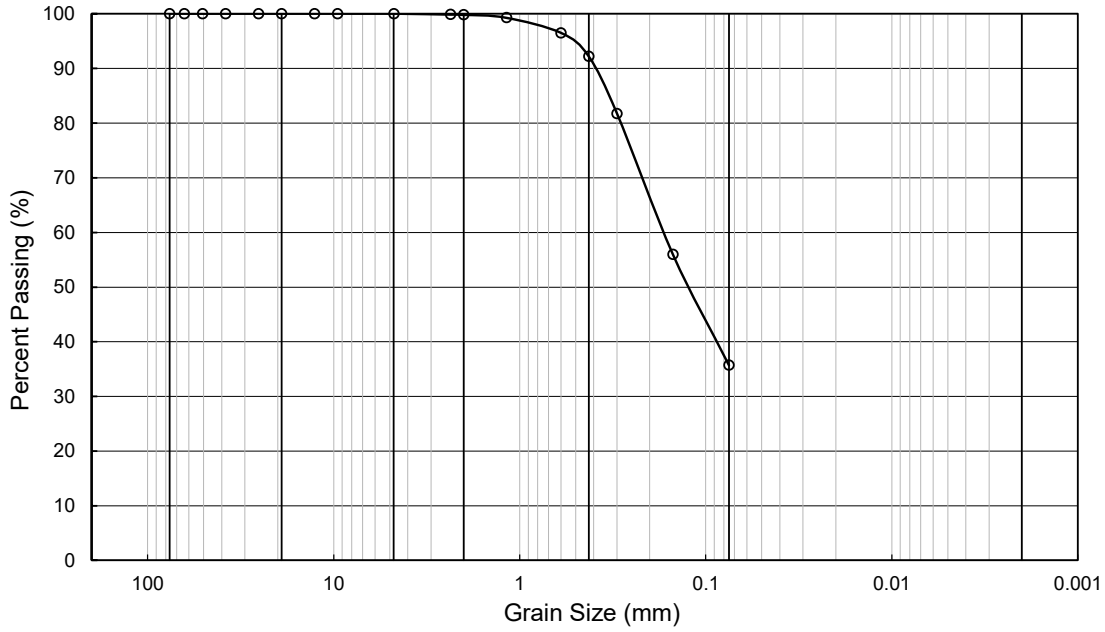
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.9
#10	2.00	99.8
#16	1.18	99.3
# 30	0.60	96.5
# 40	0.425	92.2
# 50	0.30	81.7
# 100	0.15	55.9
# 200	0.075	35.7

Summary	
% Gravel =	0.0
% Sand =	64.3
% Fines =	35.7
Sum =	100.0

LL=	31.5
PL=	21.5
PI =	10

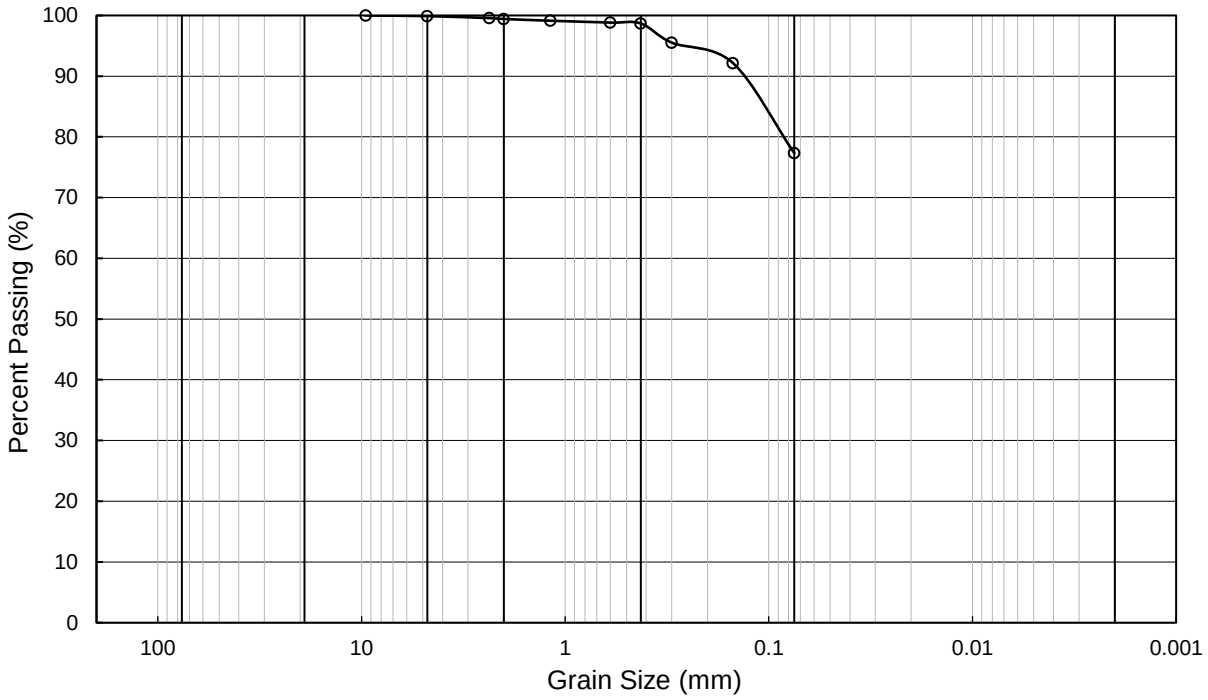
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	99.9
# 8	2.36	99.6
#10	2.00	99.4
#16	1.18	99.1
# 30	0.60	98.8
# 40	0.425	98.7
# 50	0.30	95.5
# 100	0.15	92.2
# 200	0.075	77.3

Summary	
% Gravel =	0.1
% Sand =	22.6
% Fines =	77.3
Sum =	100.0

LL=	35
PL=	28
PI =	7

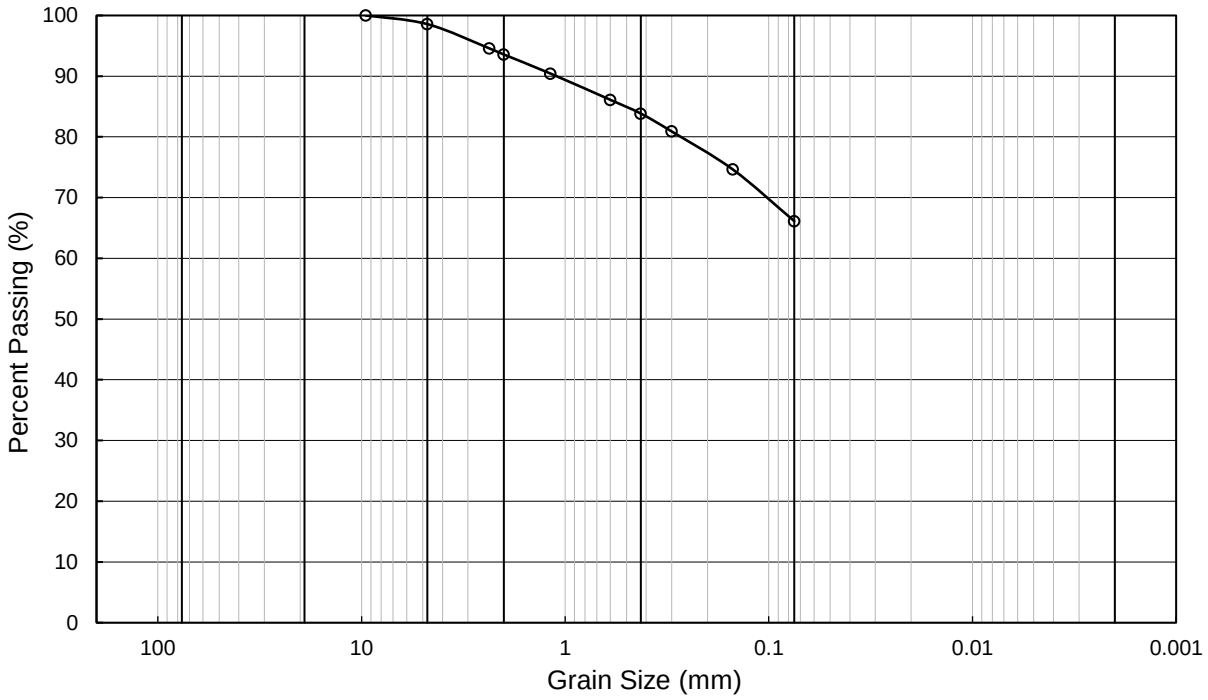
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	40 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	98.6
# 8	2.36	94.6
#10	2.00	93.6
#16	1.18	90.4
# 30	0.60	86.1
# 40	0.425	83.8
# 50	0.30	80.9
# 100	0.15	74.6
# 200	0.075	66.1

Summary	
% Gravel =	1.4
% Sand =	32.4
% Fines =	66.1
Sum =	100.0

LL=	43
PL=	21
PI =	22

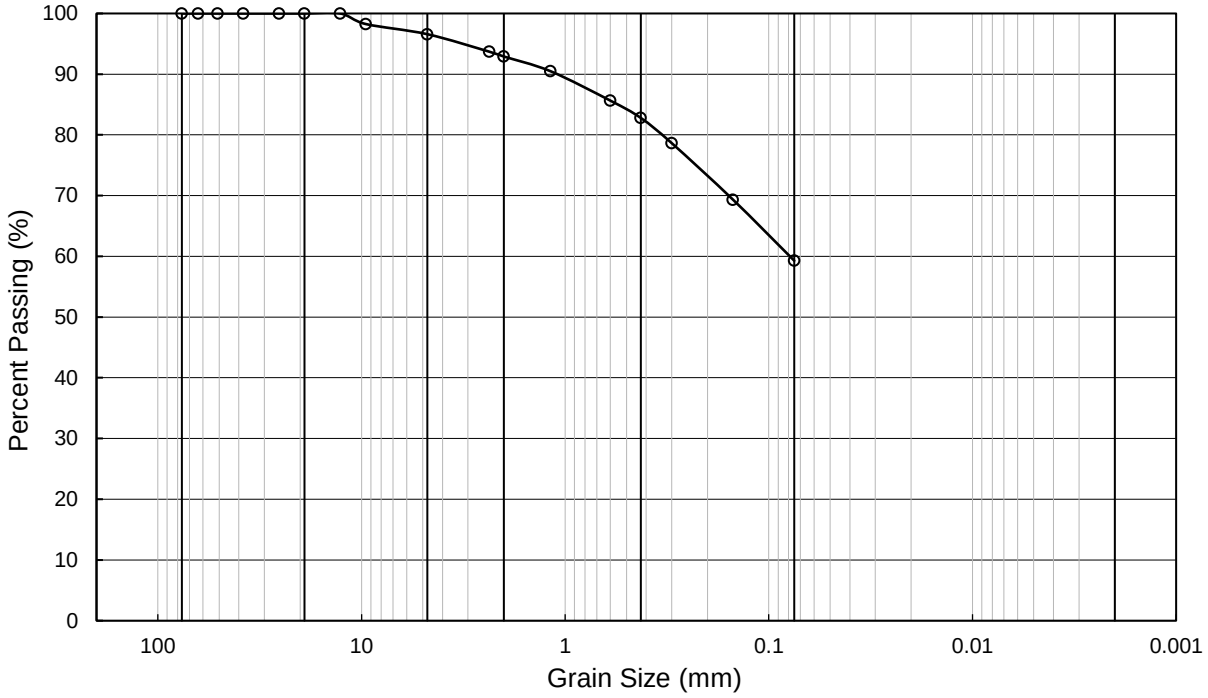
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	50 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	98
# 4	4.75	96.6
# 8	2.36	93.7
#10	2.00	92.9
#16	1.18	90.5
# 30	0.60	85.6
# 40	0.425	82.8
# 50	0.30	78.7
# 100	0.15	69.3
# 200	0.075	59.3

Summary	
% Gravel =	3.4
% Sand =	37.3
% Fines =	59.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

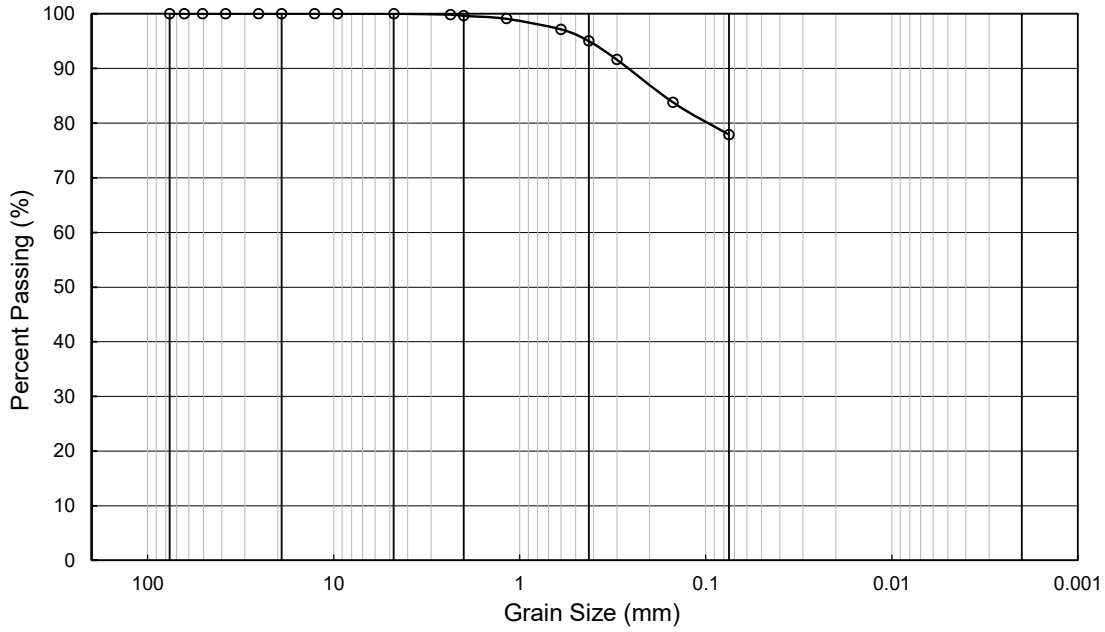
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.8
#10	2.00	99.6
#16	1.18	99.1
# 30	0.60	97.1
# 40	0.425	95.0
# 50	0.30	91.6
# 100	0.15	83.8
# 200	0.075	77.9

Summary	
% Gravel =	0.0
% Sand =	22.1
% Fines =	77.9
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

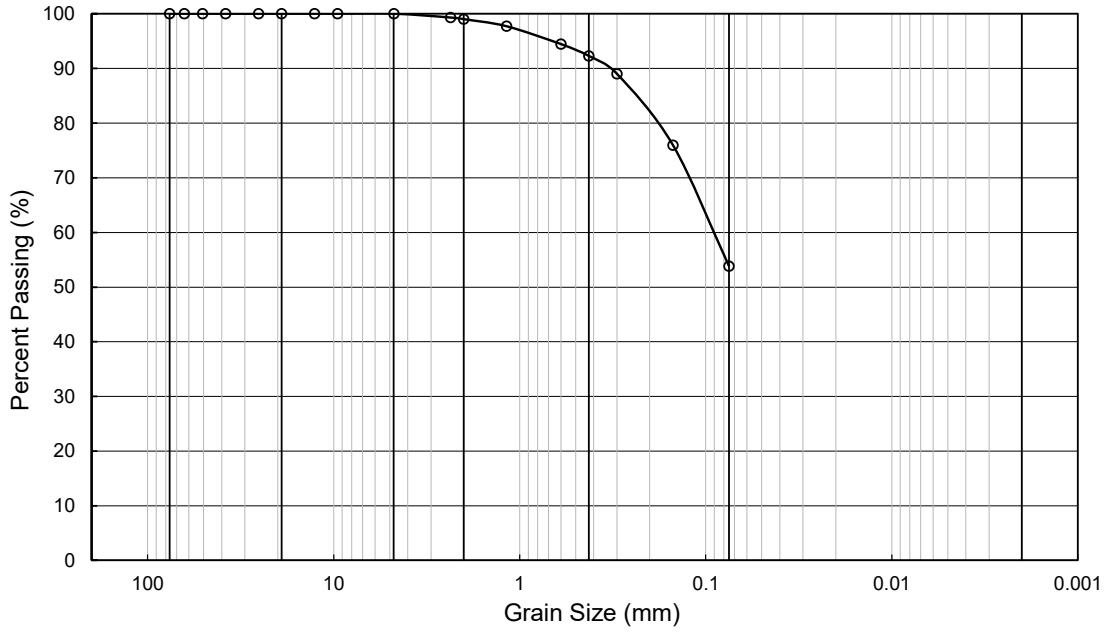
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.3
#10	2.00	99.0
#16	1.18	97.7
# 30	0.60	94.4
# 40	0.425	92.3
# 50	0.30	89.0
# 100	0.15	75.9
# 200	0.075	53.8

Summary	
% Gravel =	0.0
% Sand =	46.2
% Fines =	53.8
Sum =	100.0

LL=	43
PL=	23
PI =	20

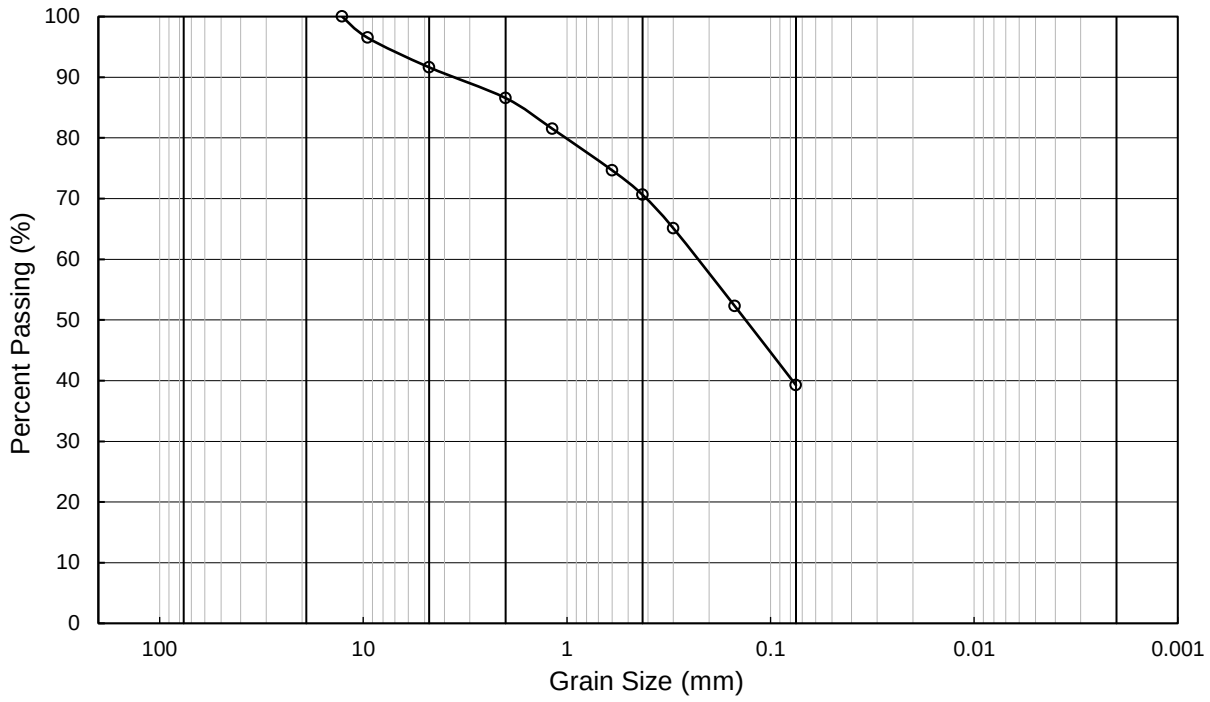
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	100
3/8 "	9.53	97
# 4	4.75	91.6
#10	2.00	86.6
#16	1.18	81.5
# 30	0.60	74.7
# 40	0.425	70.6
# 50	0.30	65.1
# 100	0.15	52.3
# 200	0.075	39.3

Summary	
% Gravel =	8.4
% Sand =	52.4
% Fines =	39.3
Sum =	100.0

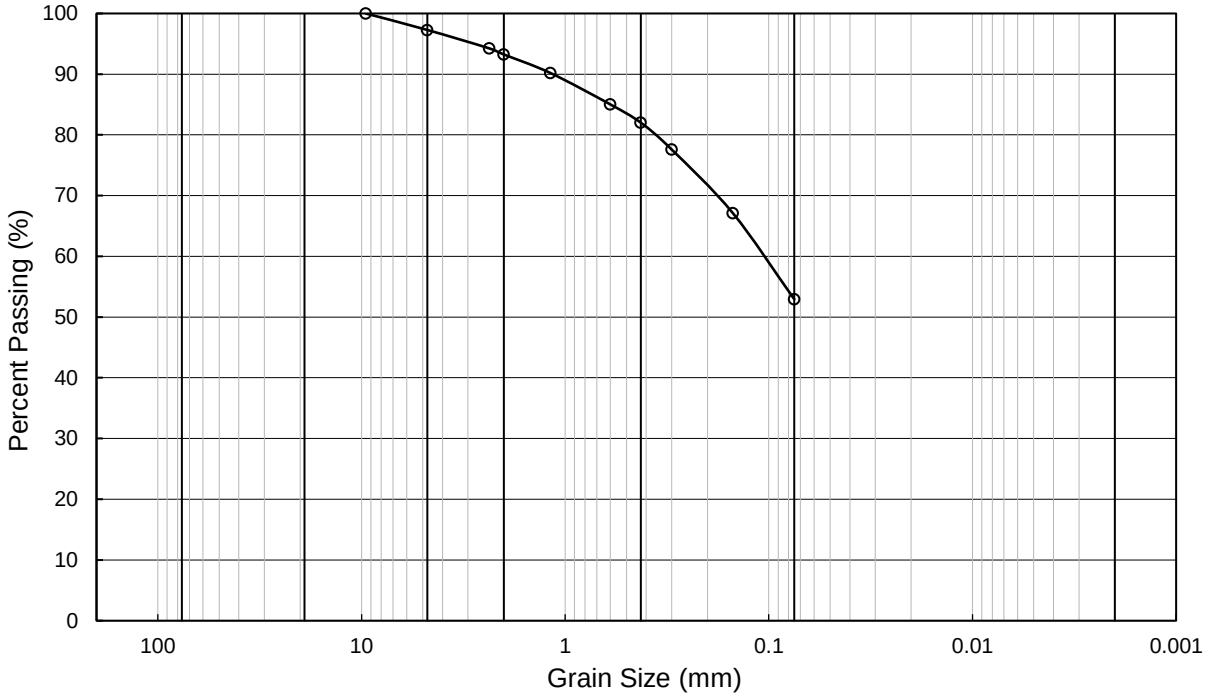
LL=	29
PL=	21
PI =	8
Soil Type:	SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.3
#10	2.00	93.2
#16	1.18	90.2
# 30	0.60	85.0
# 40	0.425	82.0
# 50	0.30	77.6
# 100	0.15	67.1
# 200	0.075	52.9

Summary	
% Gravel =	2.7
% Sand =	44.3
% Fines =	52.9
Sum =	100.0

LL=	33
PL=	20
PI =	13

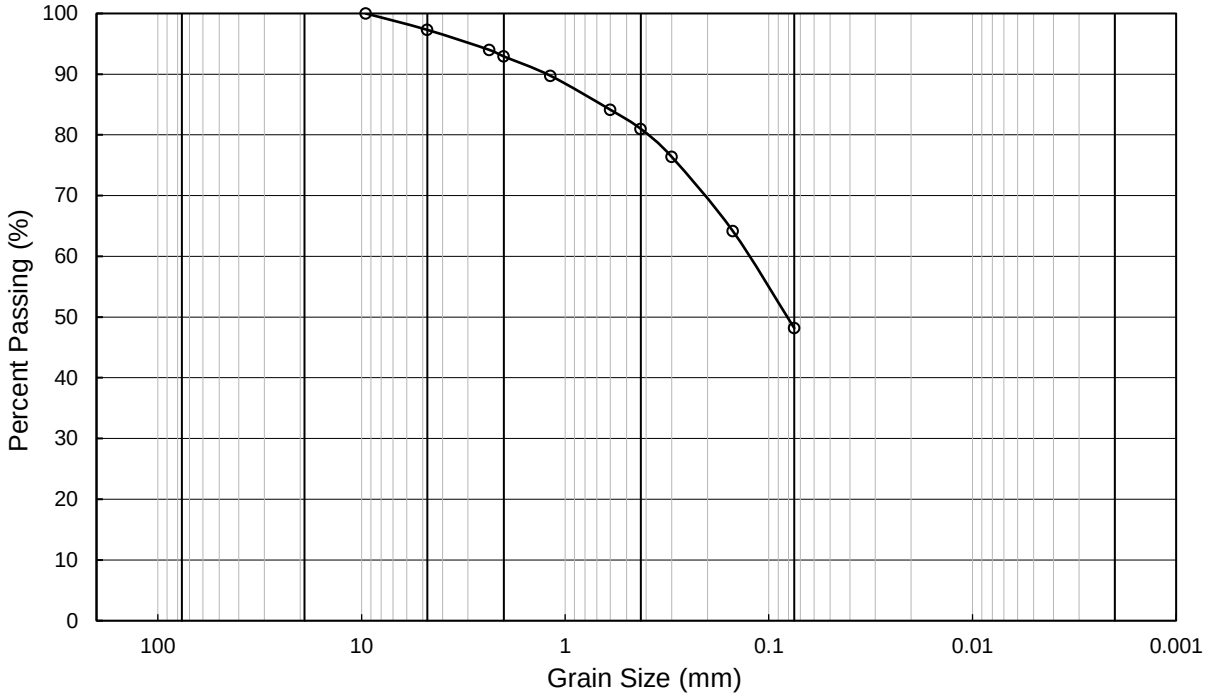
Soil Type: SC-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	45 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.0
#10	2.00	92.9
#16	1.18	89.7
# 30	0.60	84.1
# 40	0.425	81.0
# 50	0.30	76.4
# 100	0.15	64.1
# 200	0.075	48.2

Summary	
% Gravel =	2.7
% Sand =	49.1
% Fines =	48.2
Sum =	100.0

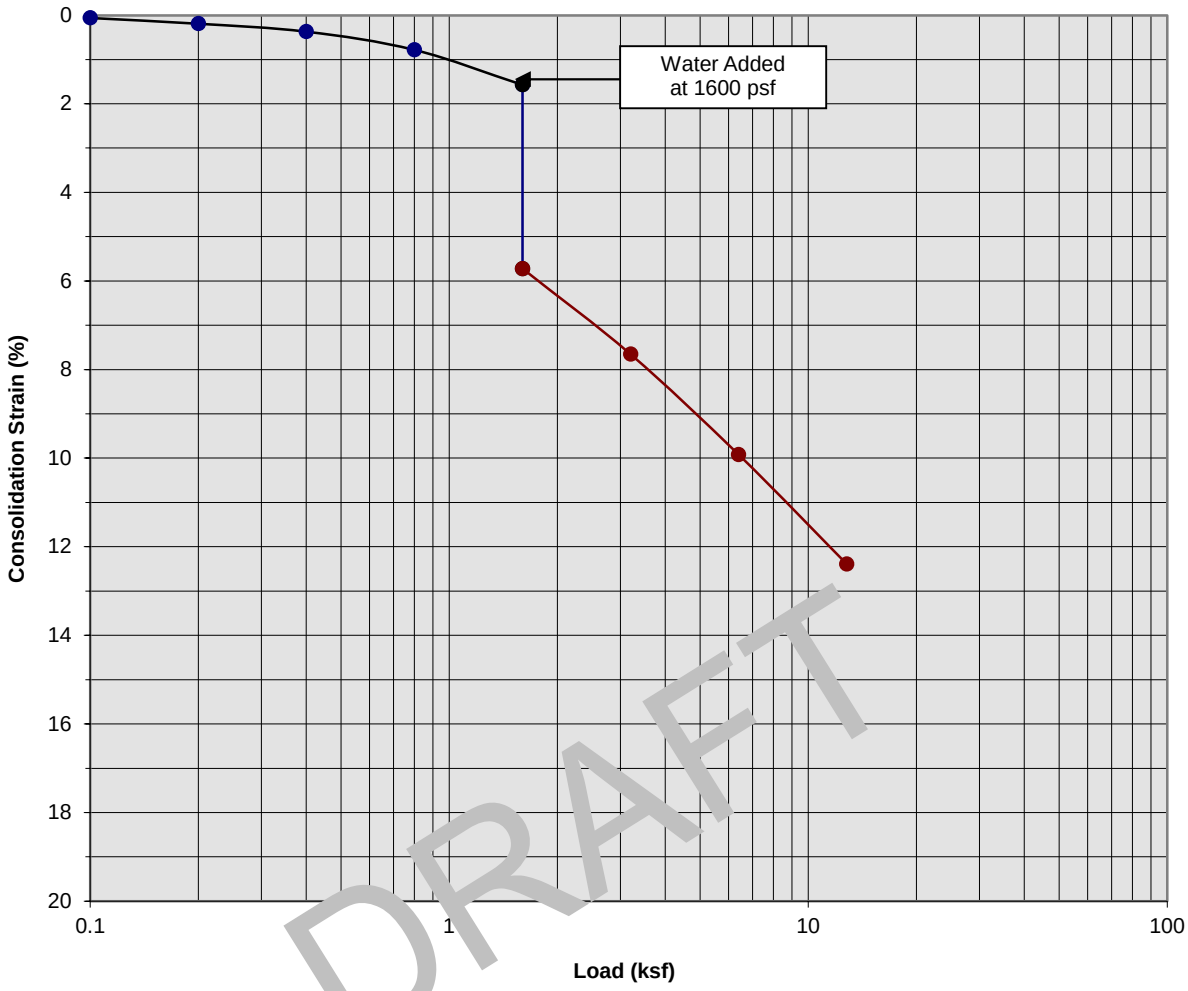
LL=	28
PL=	20
PI =	8

Soil Type: SC-CL

APPENDIX C-2

DRAFT LABORATORY TEST RESULTS (SCG)

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Light Red Brown Silty fine to coarse Sand

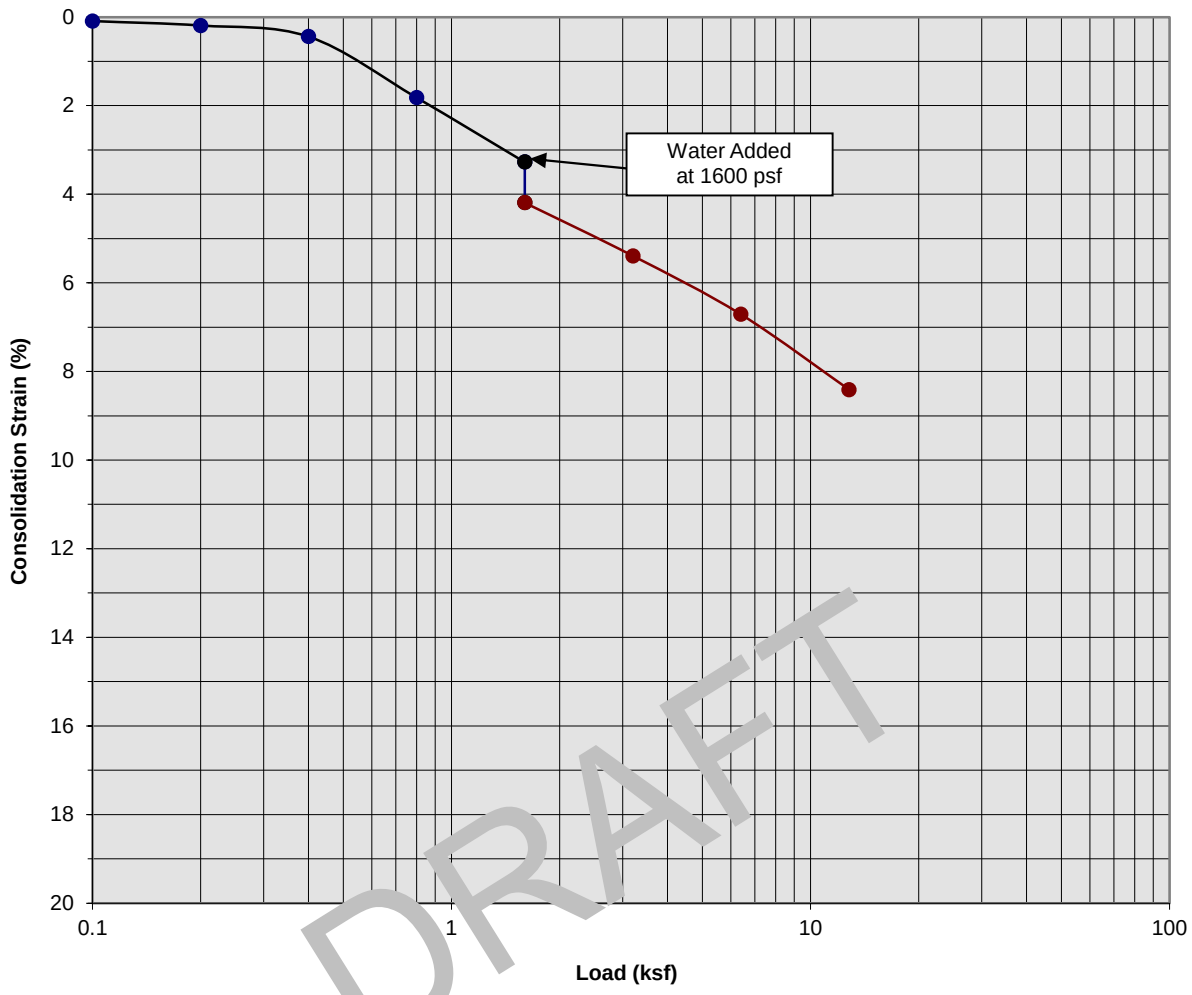
Boring Number:	SCG-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Red Brown Silty fine Sand, trace medium to coarse Sand

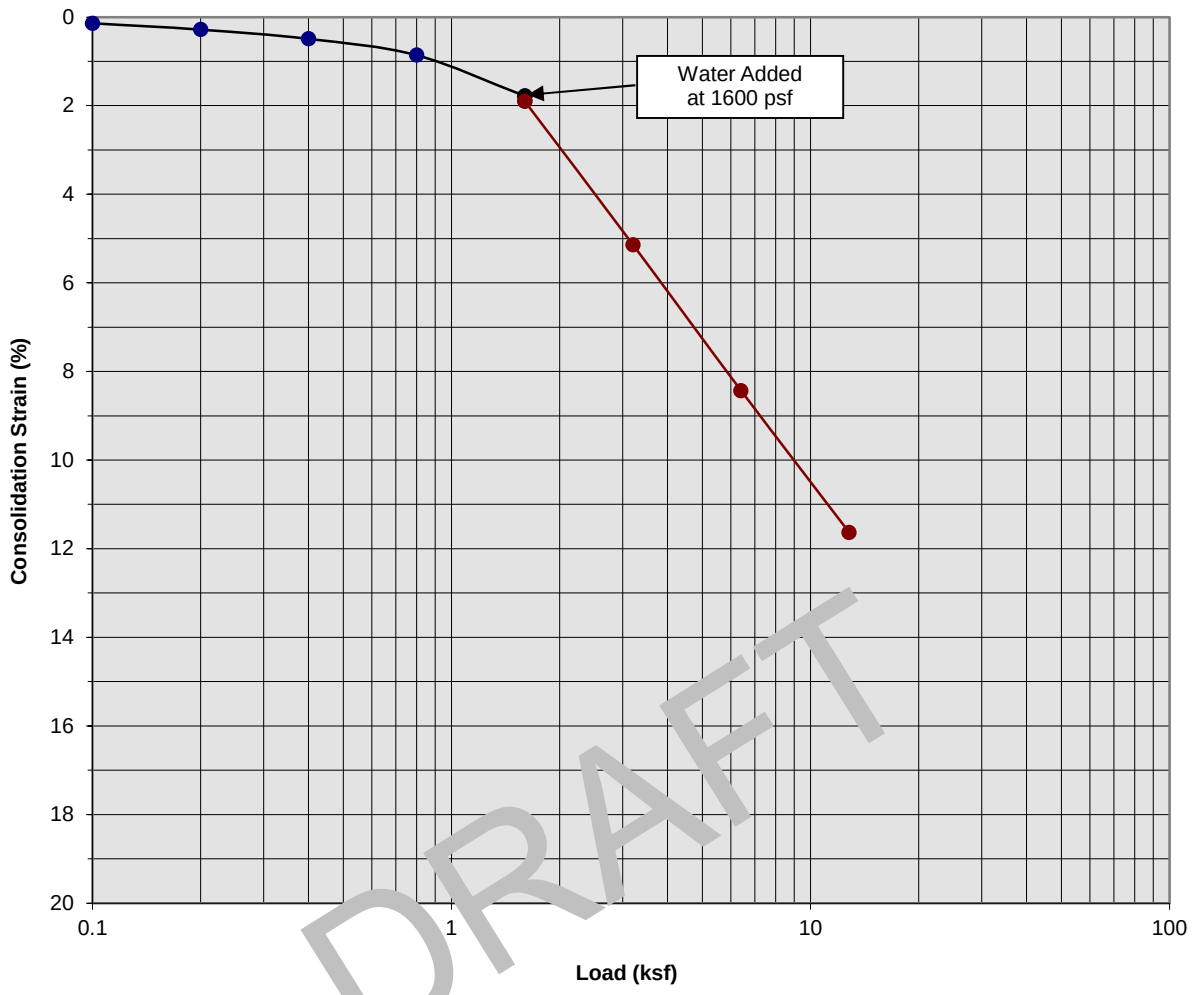
Boring Number:	SCG-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	121.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Colluvium: Dark Gray Brown Silty fine to medium Sand

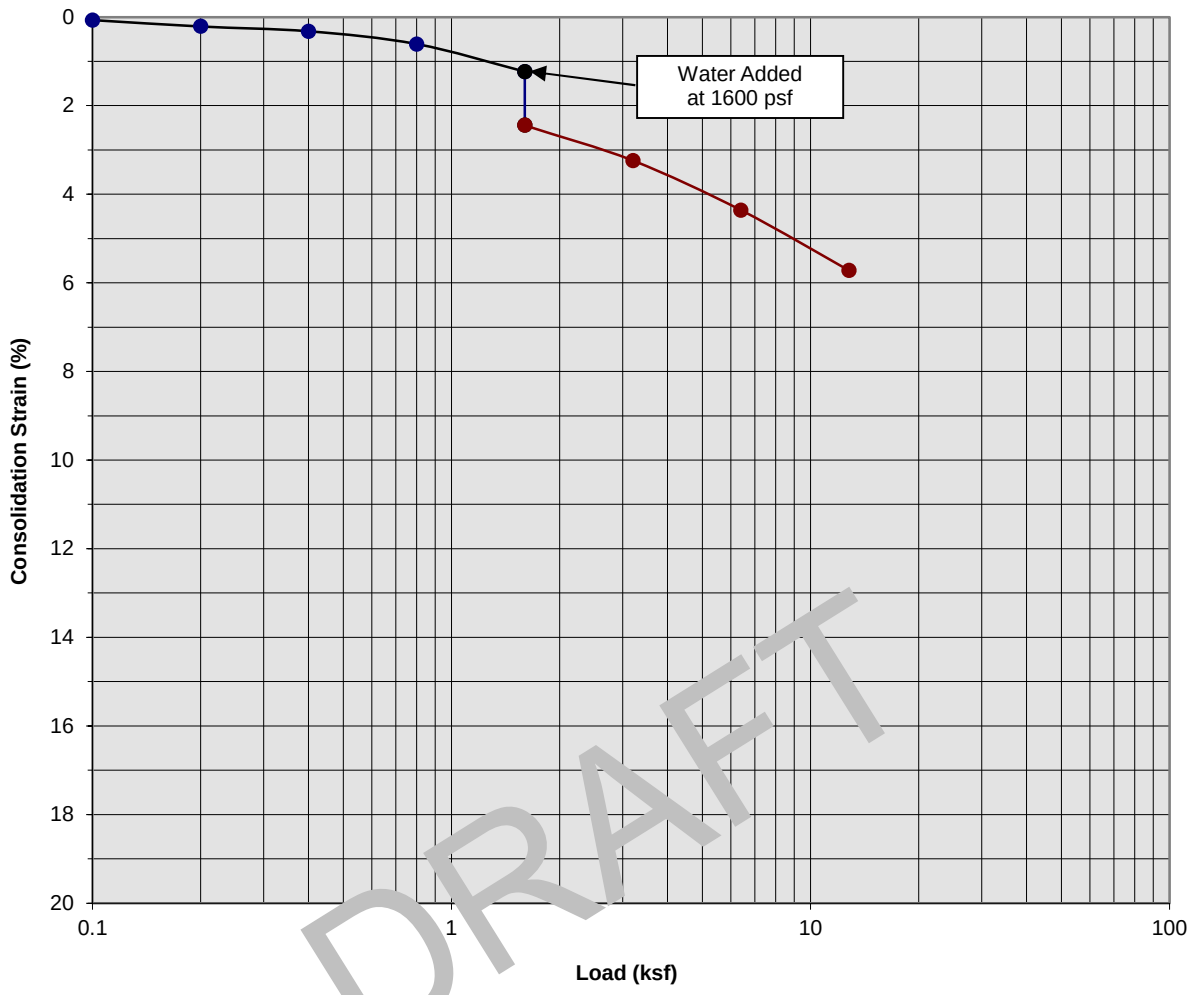
Boring Number:	SCG-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	99.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	SCG-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	125.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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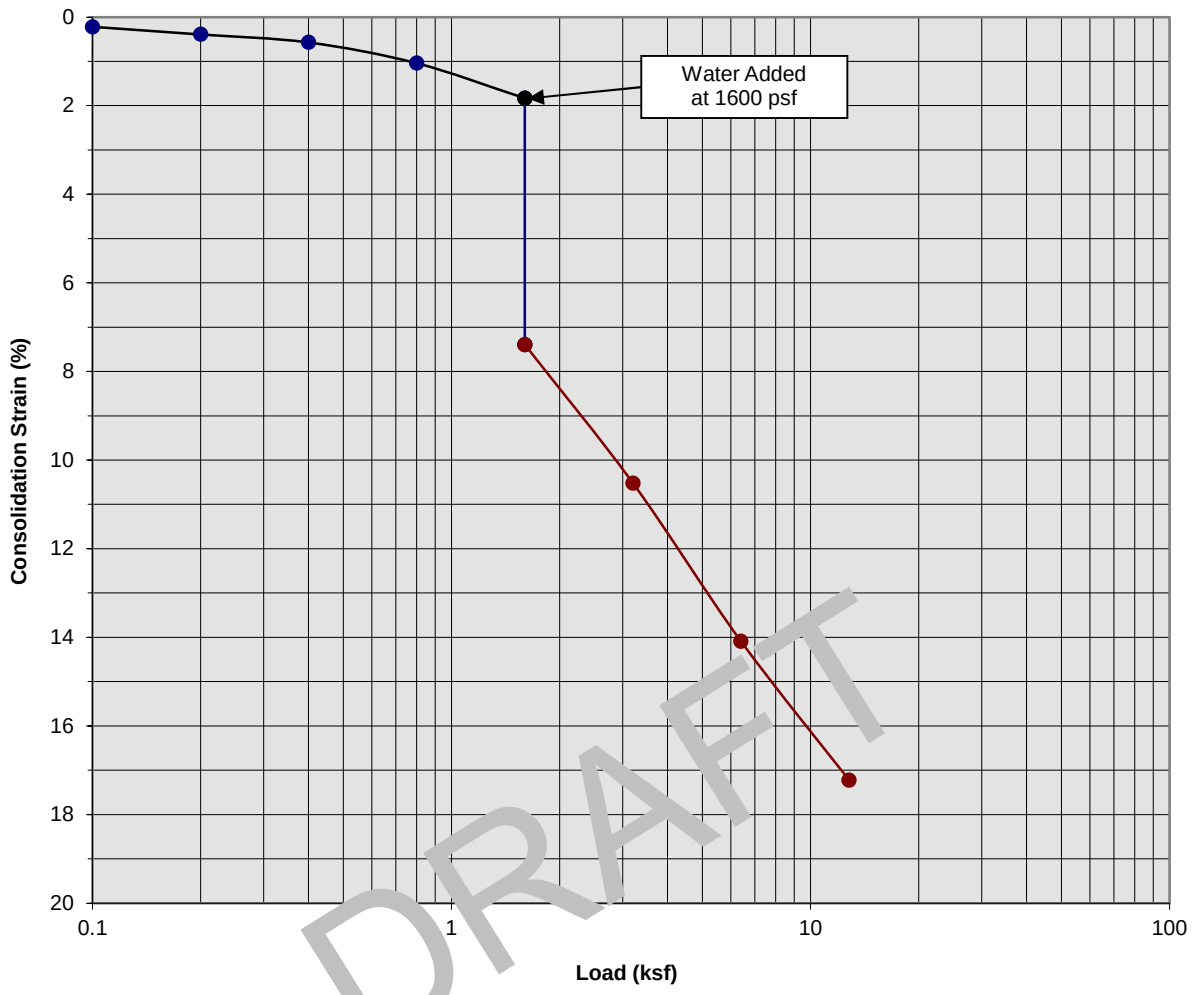
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Gray Brown Silty fine to medium Sand

Boring Number:	SCG-4	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	102.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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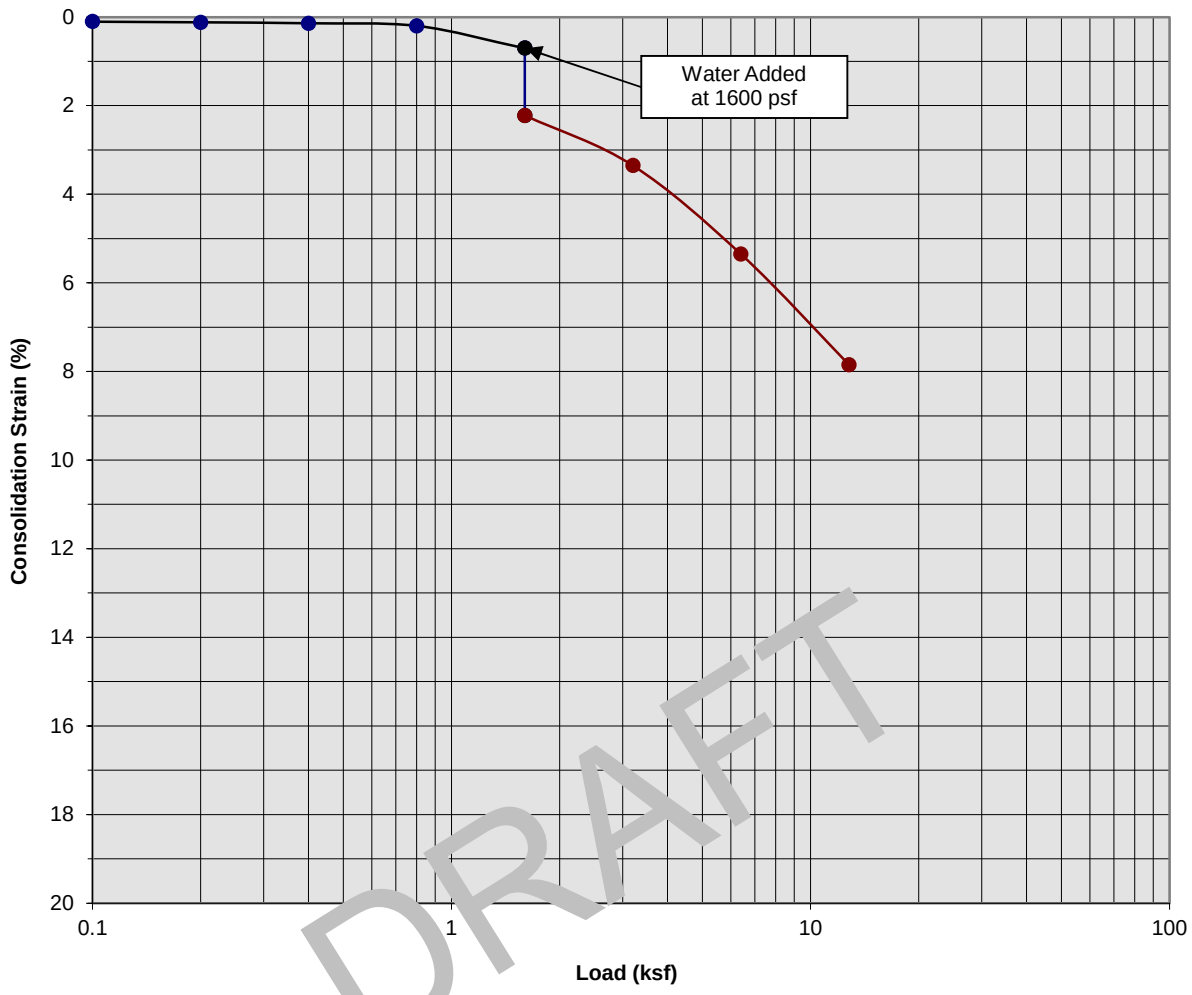
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

Boring Number:	SCG-4	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	126.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.52

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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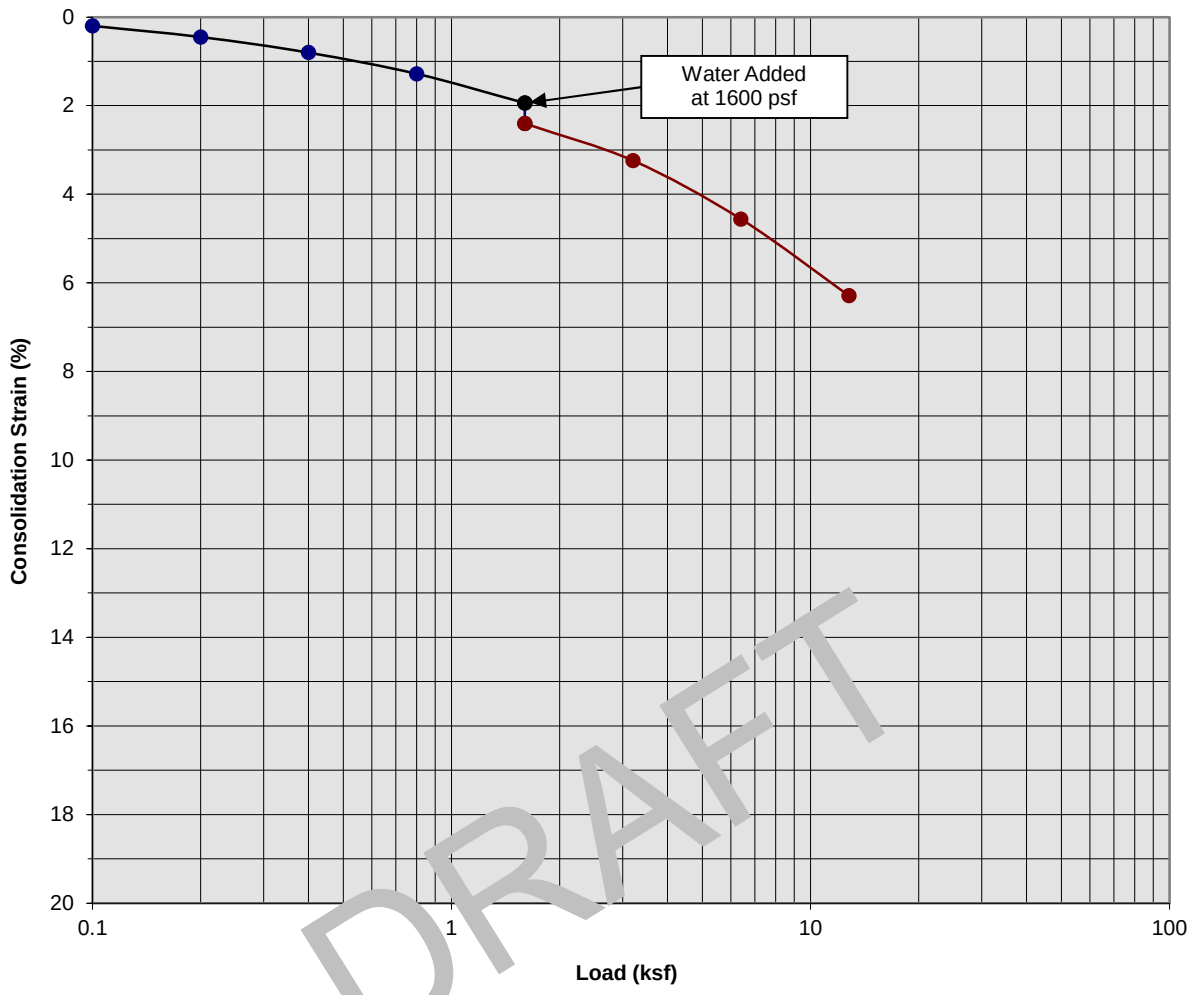
Consolidation/Collapse Test Results



DRAFT

Classification: FILL: Black to Dark Brown Clayey Silt

Boring Number:	SCG-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	115.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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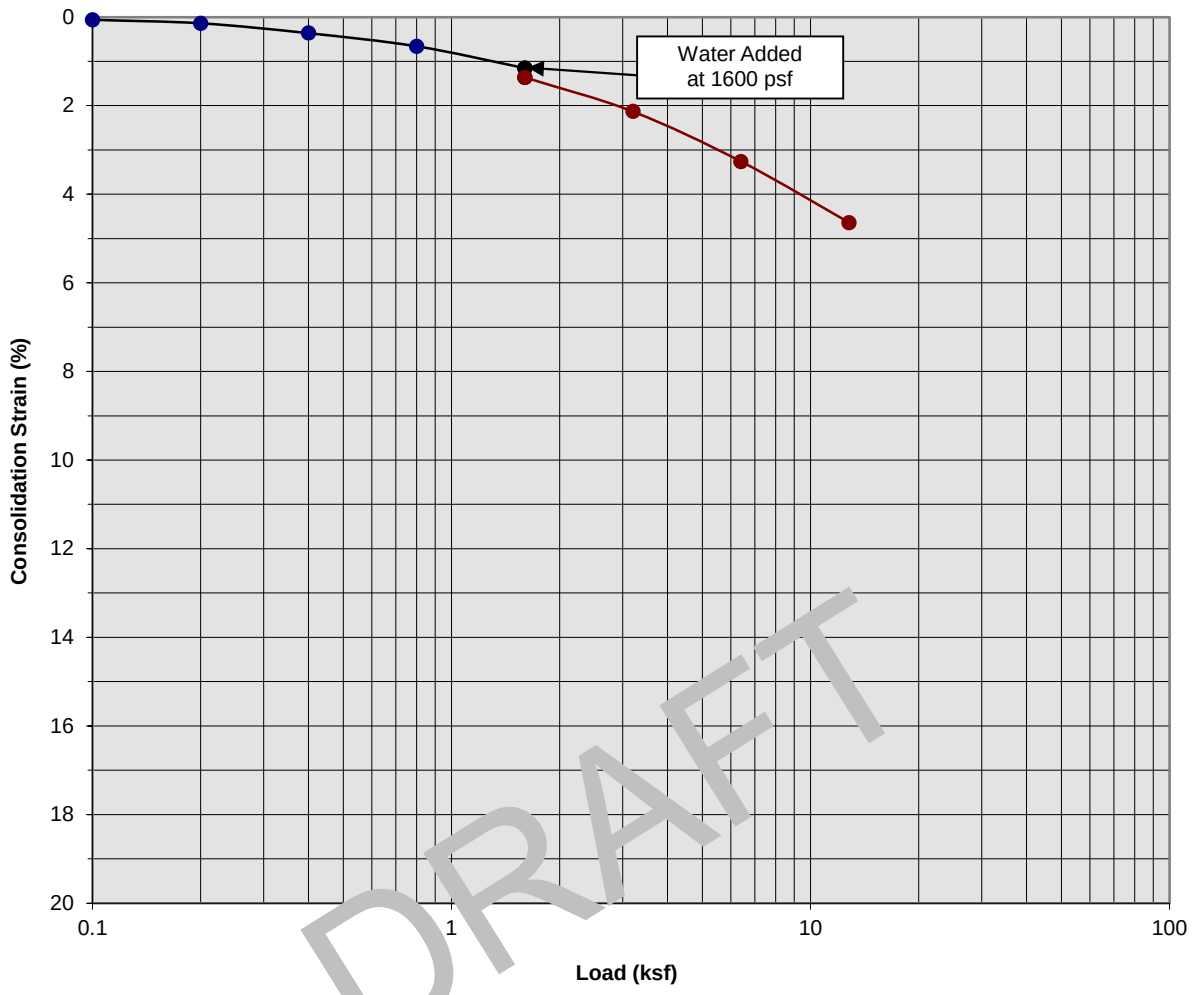
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Bray Brown Silty Clay, little fine to medium Sand

Boring Number:	SCG-5	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	131.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 8

SoCalGeo
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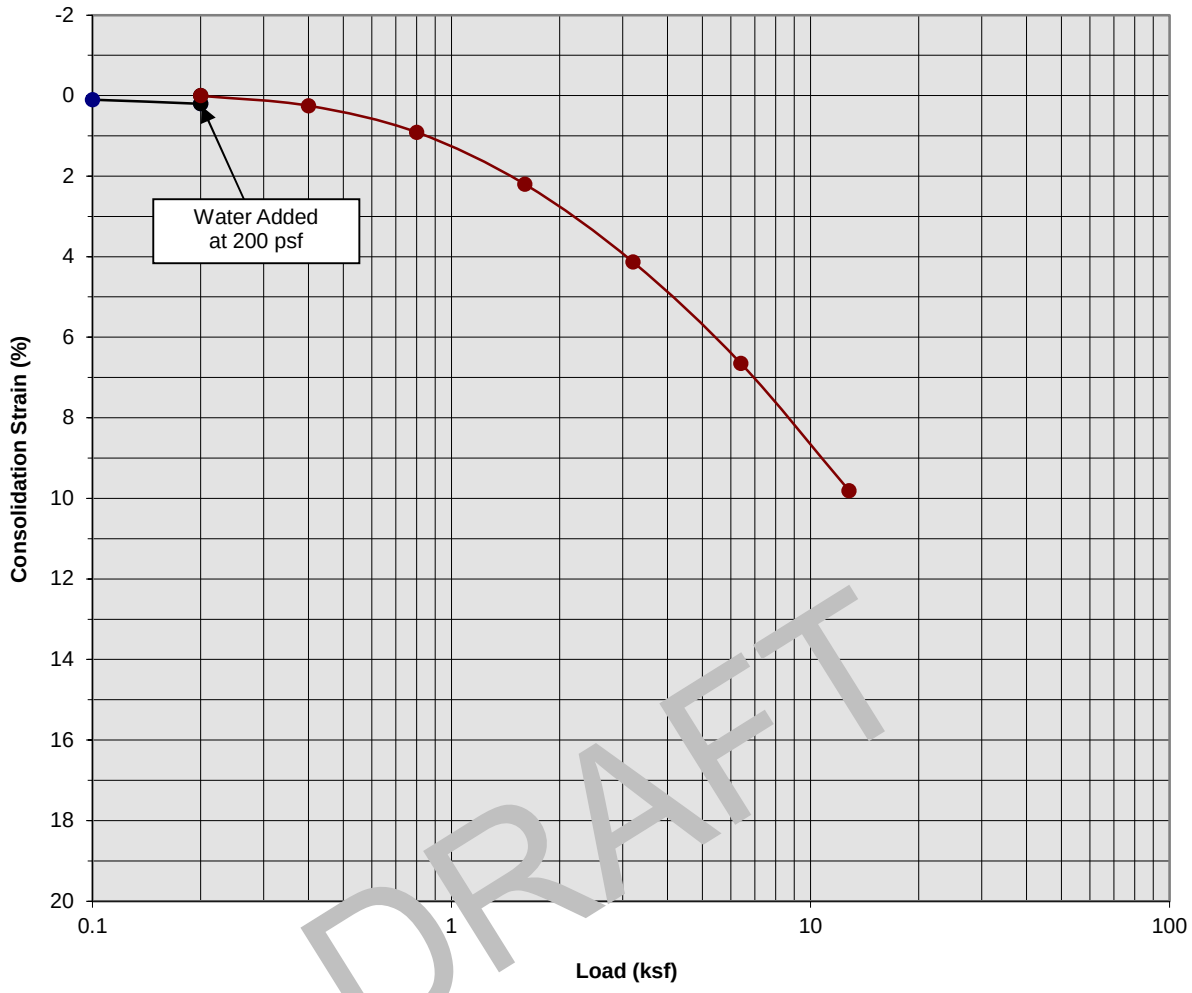
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Silty Clay, trace fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	102.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.20

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 9

SoCalGeo
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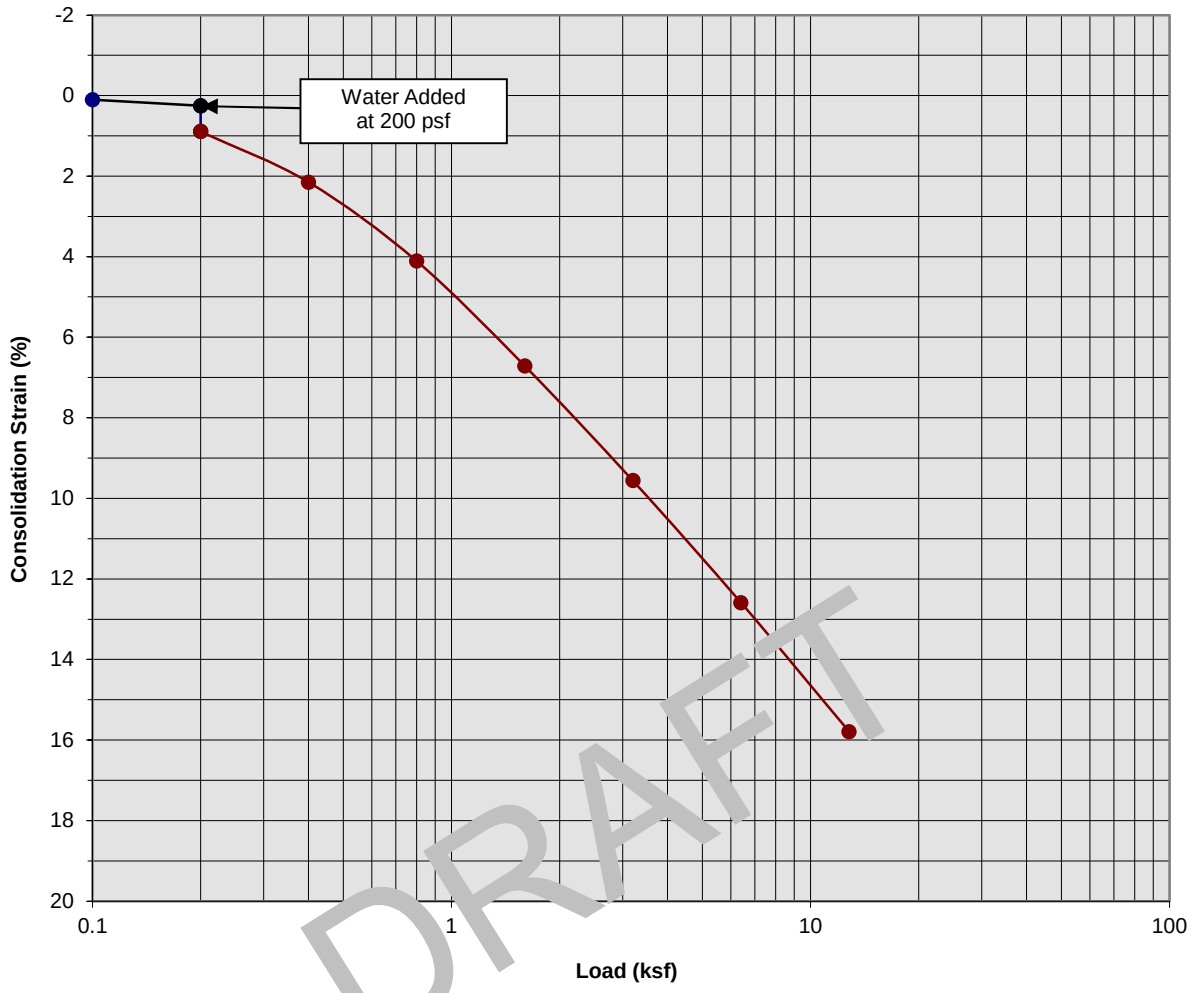
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light Brown Silty fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	95.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.64

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 10

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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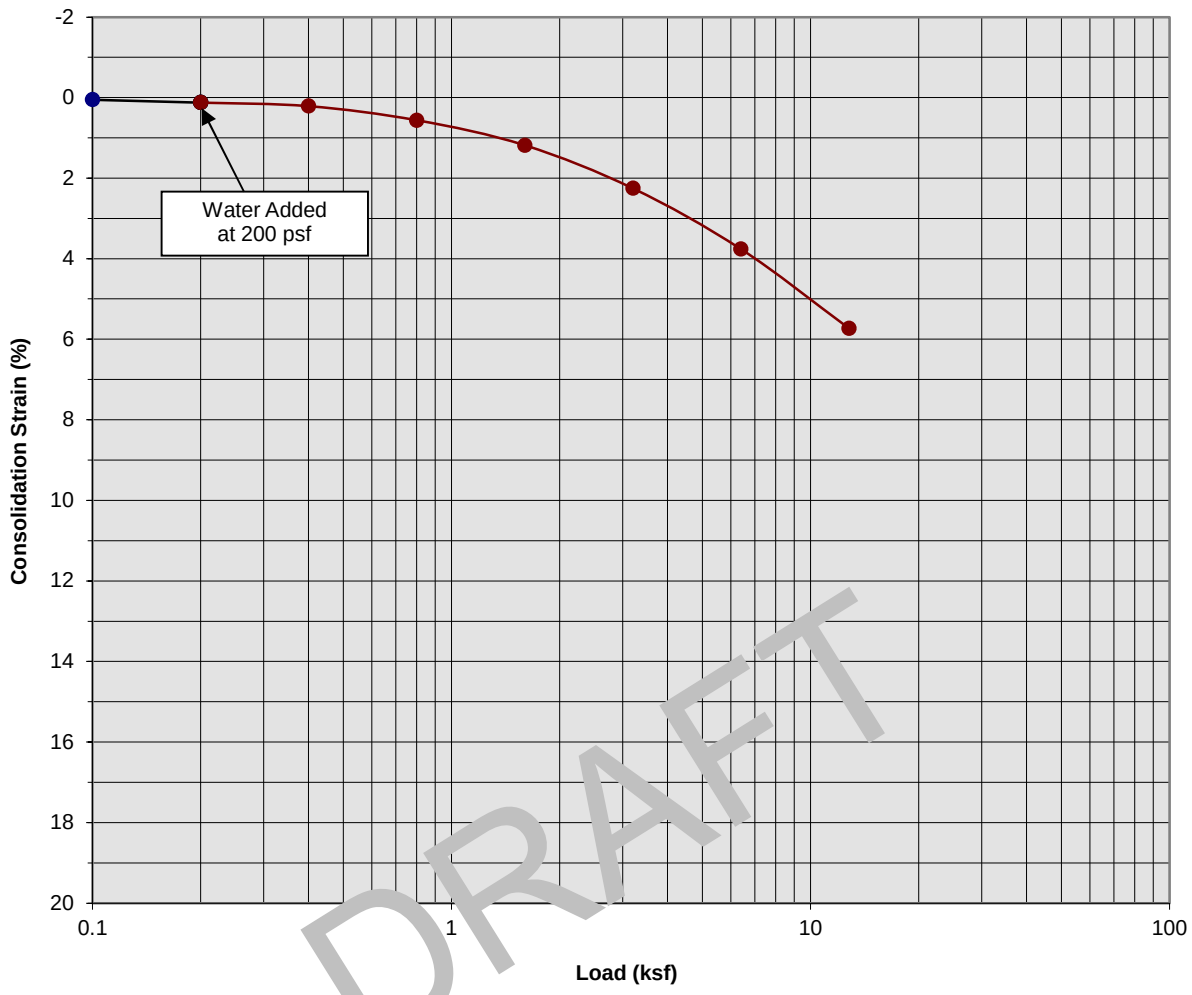
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Clayey Silt, trace fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 11

SoCalGeo
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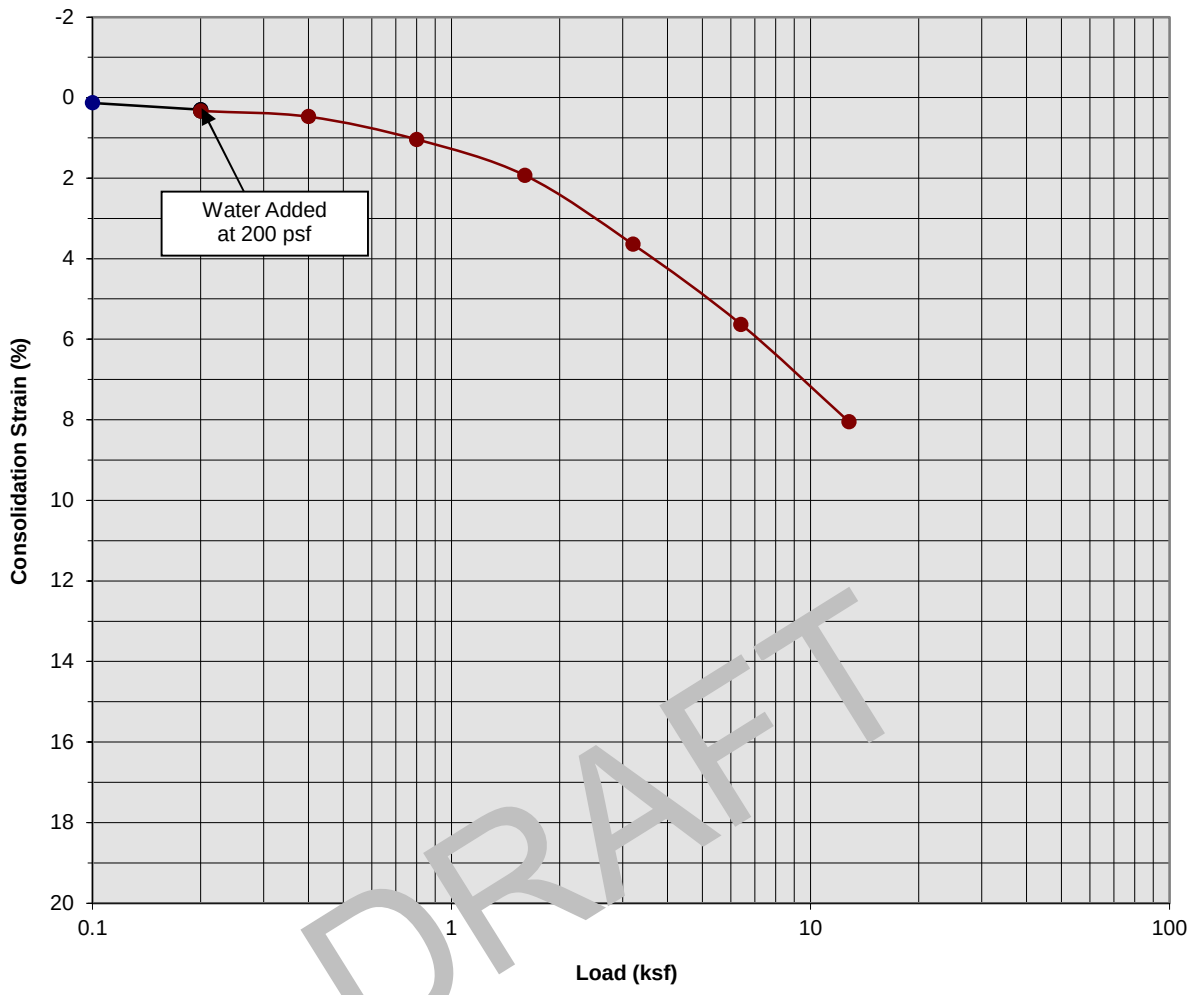
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 12

SoCalGeo
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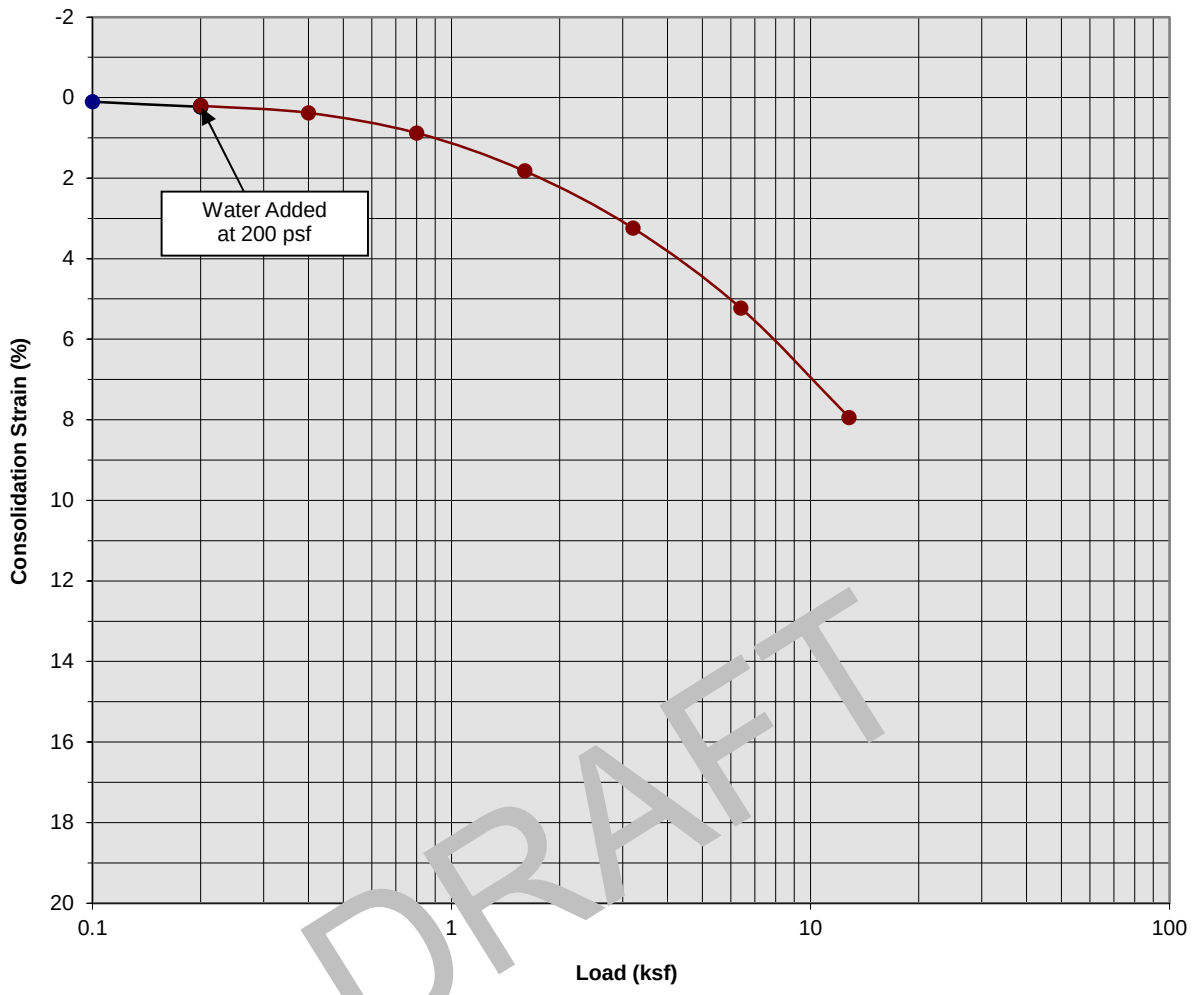
Consolidation/Collapse Test Results



DRAFT

Classification: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	109.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 13

SoCalGeo
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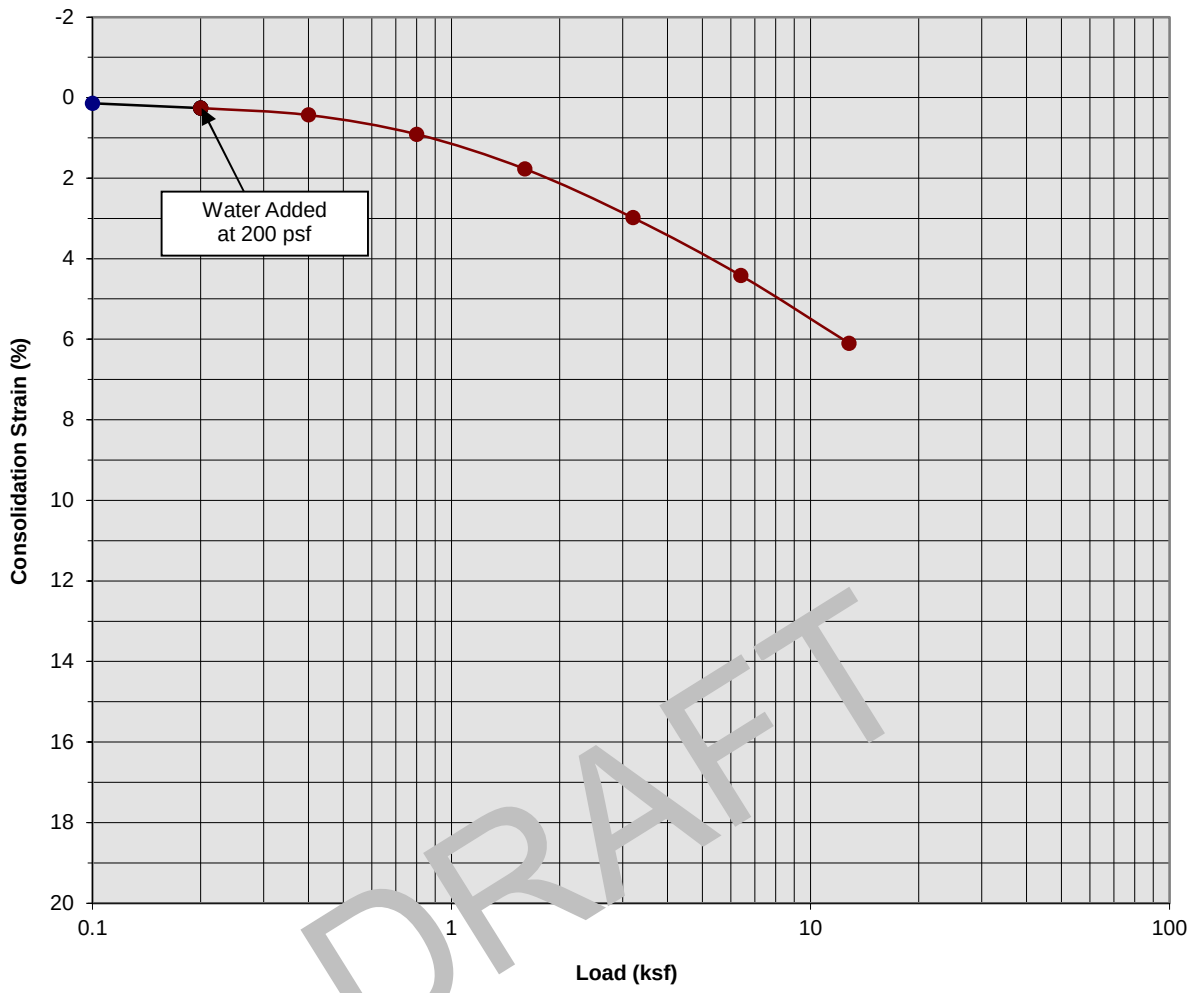
Consolidation/Collapse Test Results



DRAFT

Classification: Green Blue Silty fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	33.5 to 34.5	Initial Dry Density (pcf)	113.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 14

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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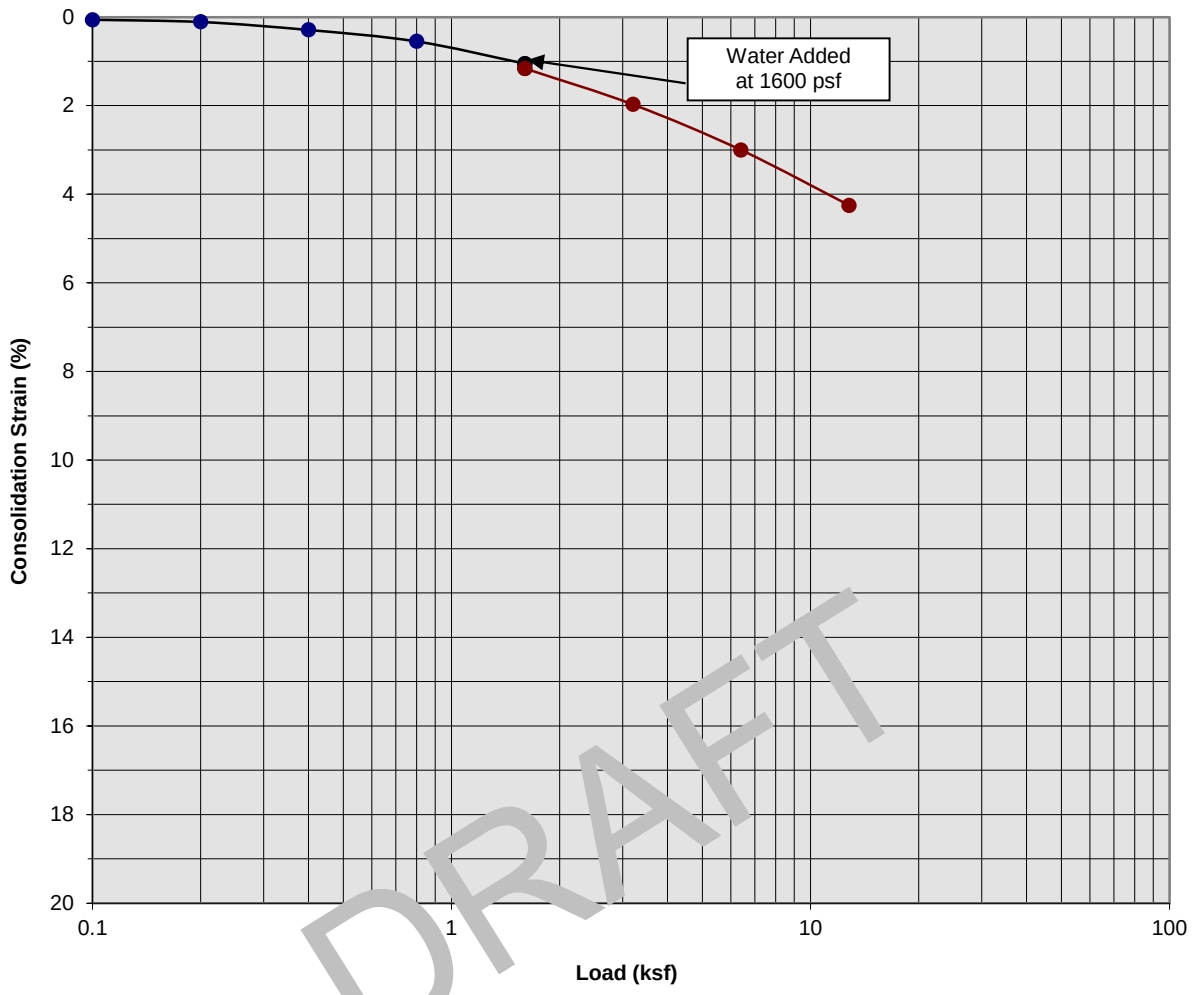
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Gray Brown Silty fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	43.5 to 44.5	Initial Dry Density (pcf)	114.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.11

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 15

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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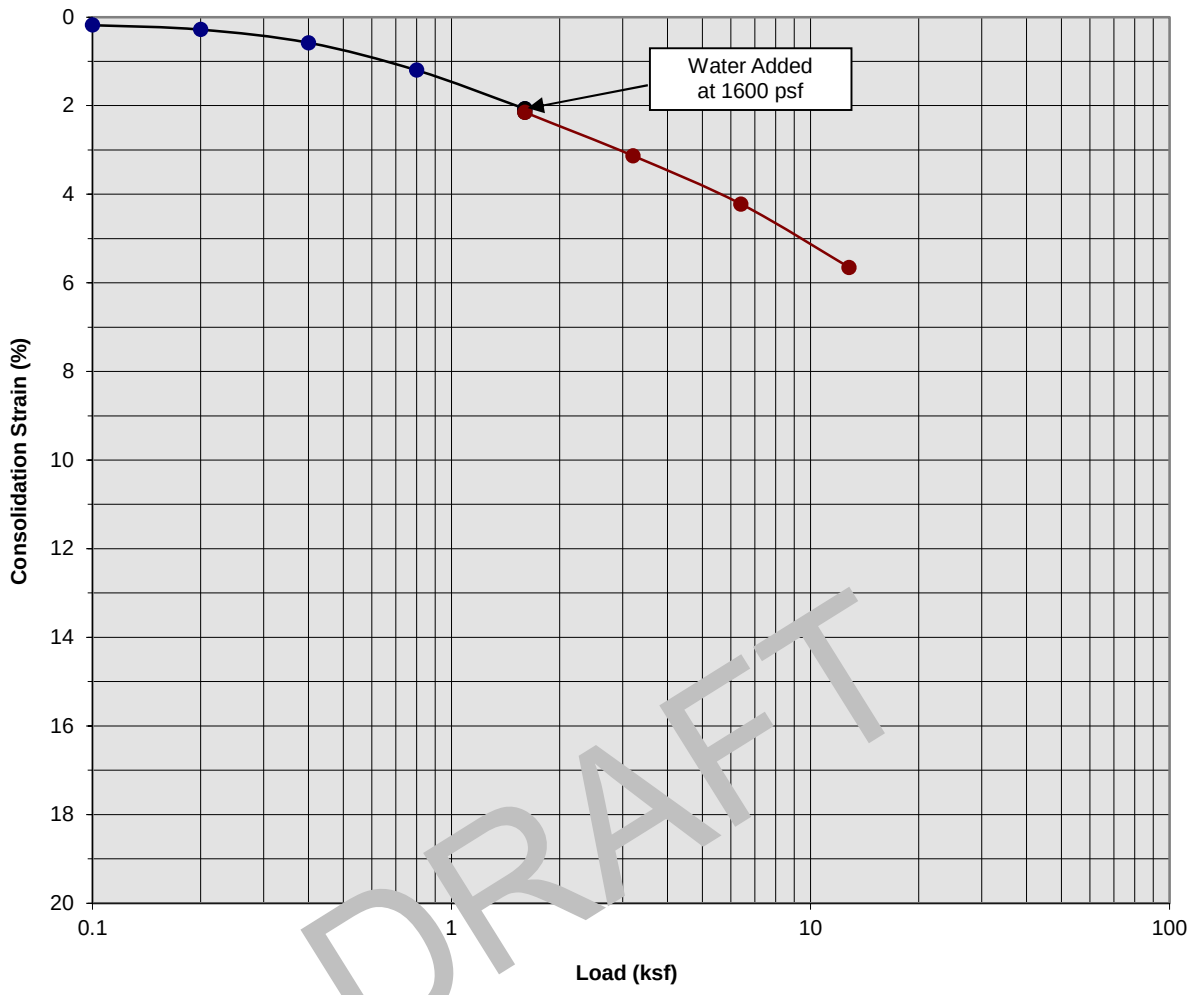
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Blue Green Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	53.5 to 54.5	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 16

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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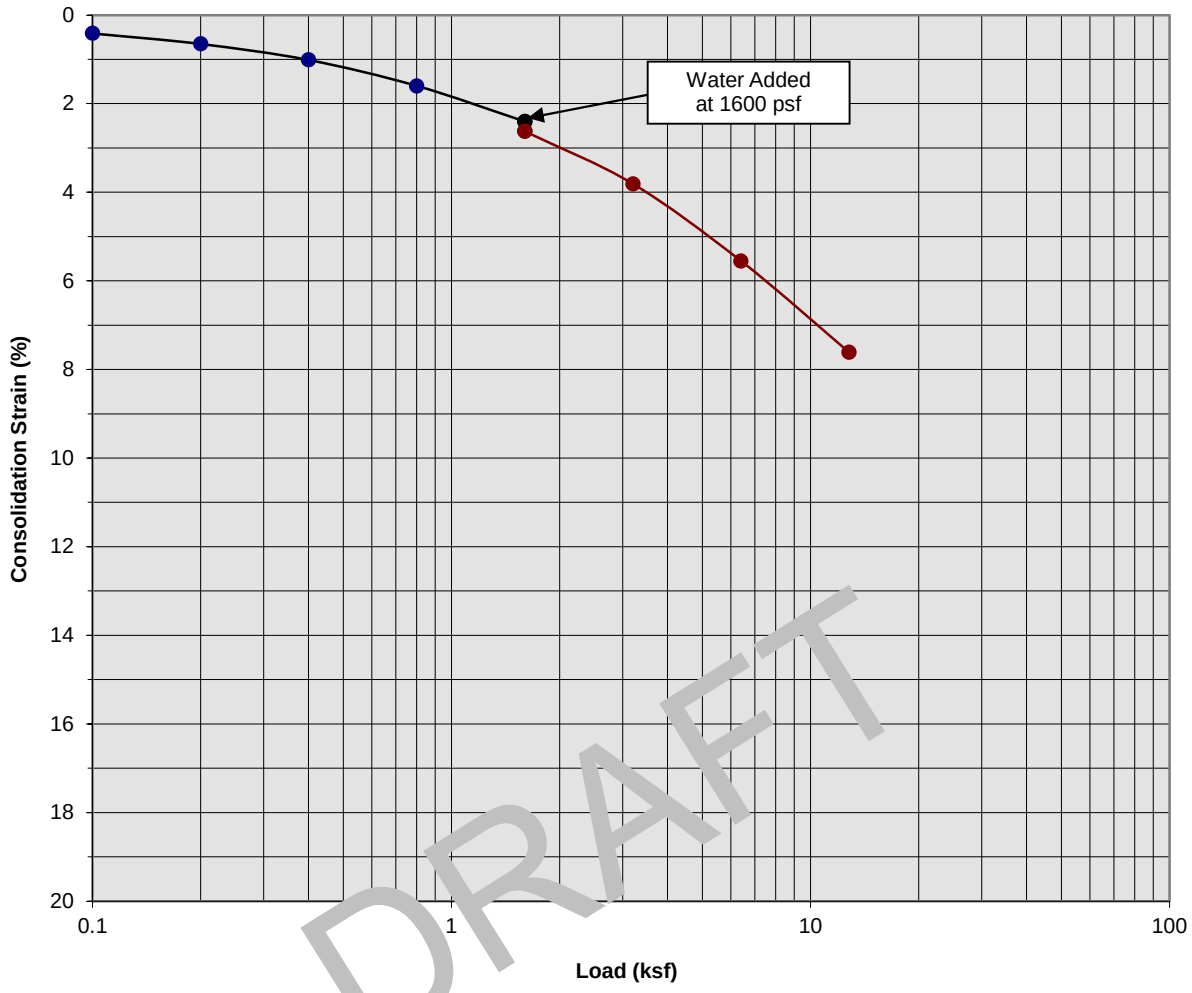
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.22

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 17

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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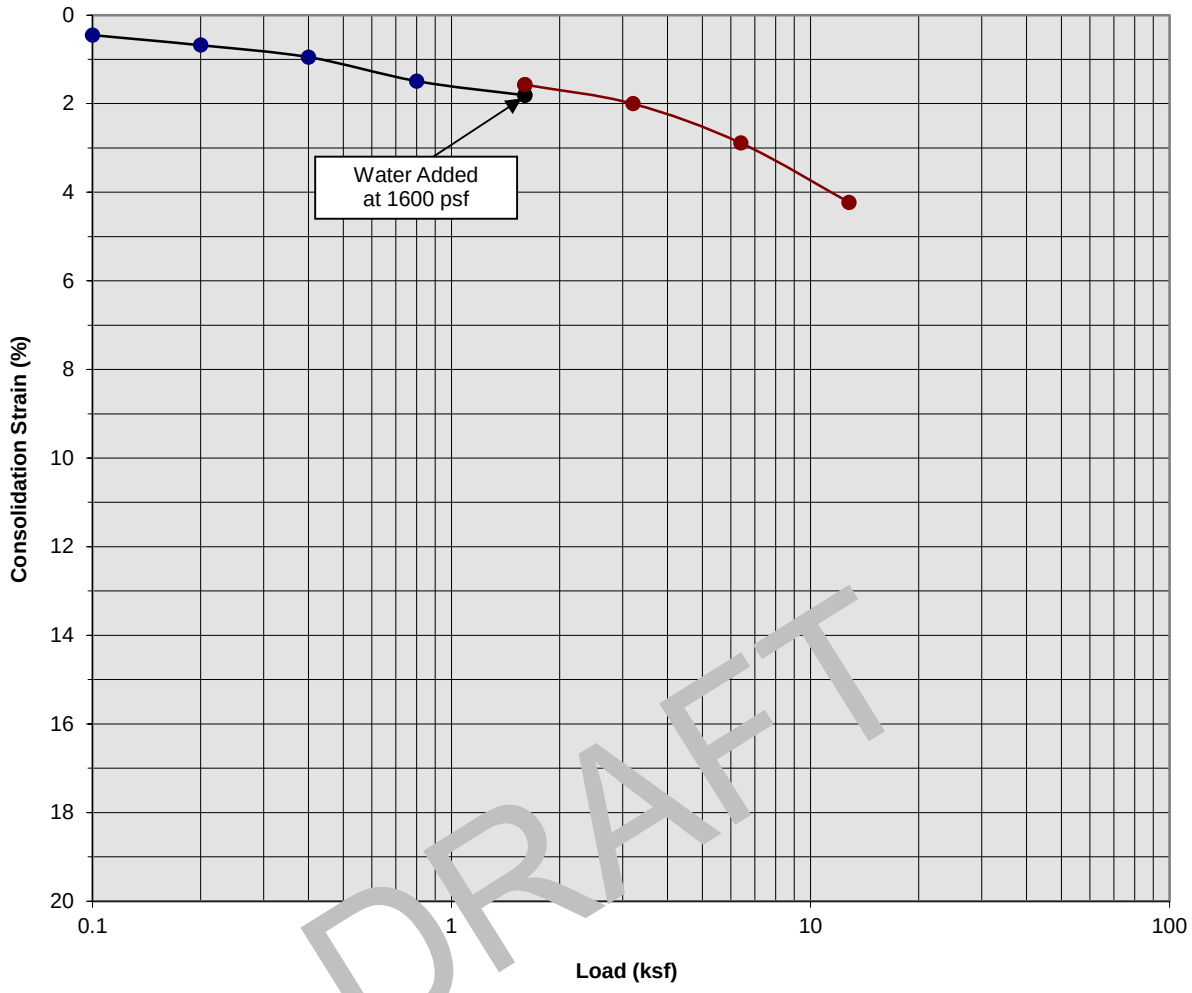
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	122.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.24

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 18

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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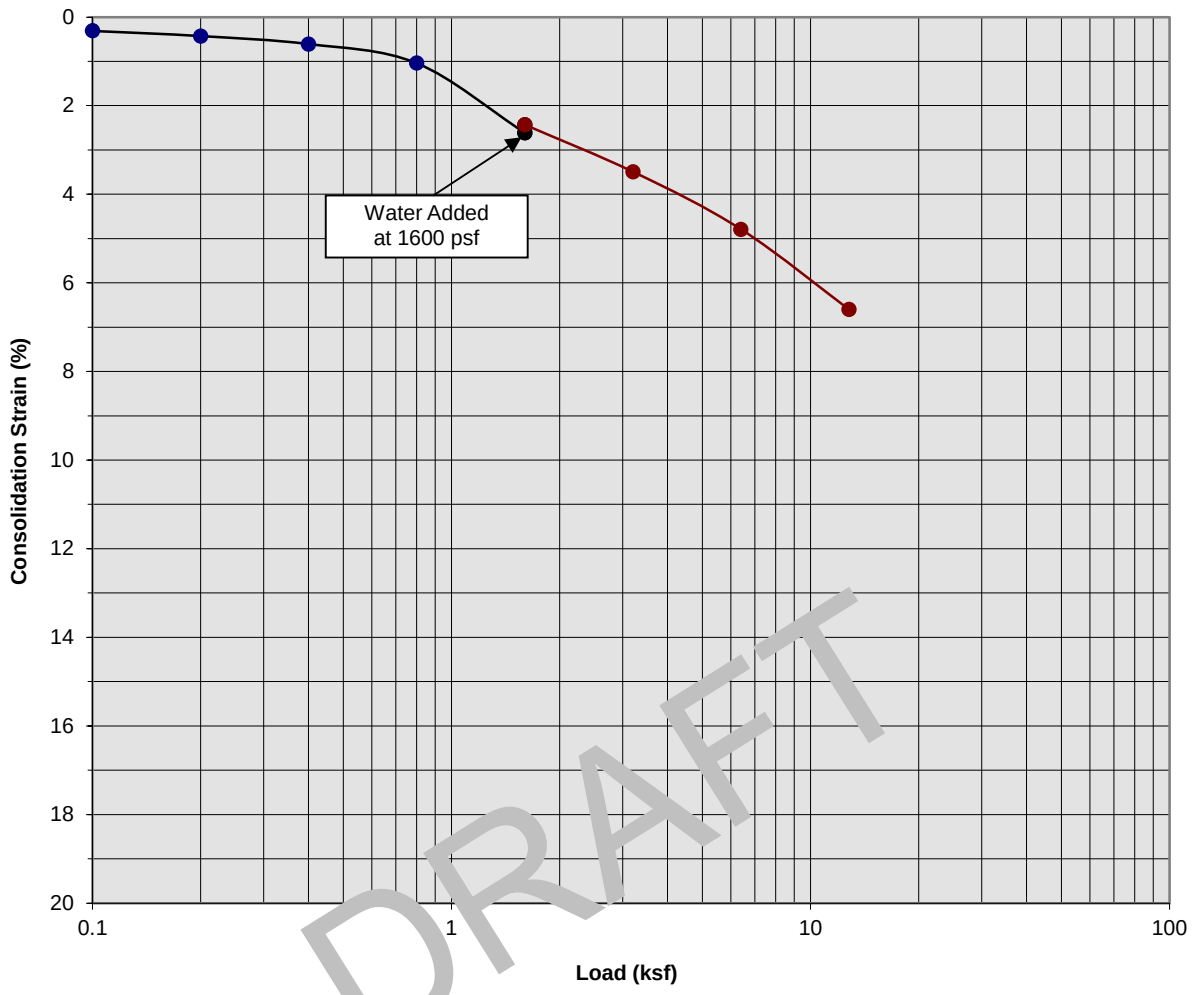
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.18

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 19

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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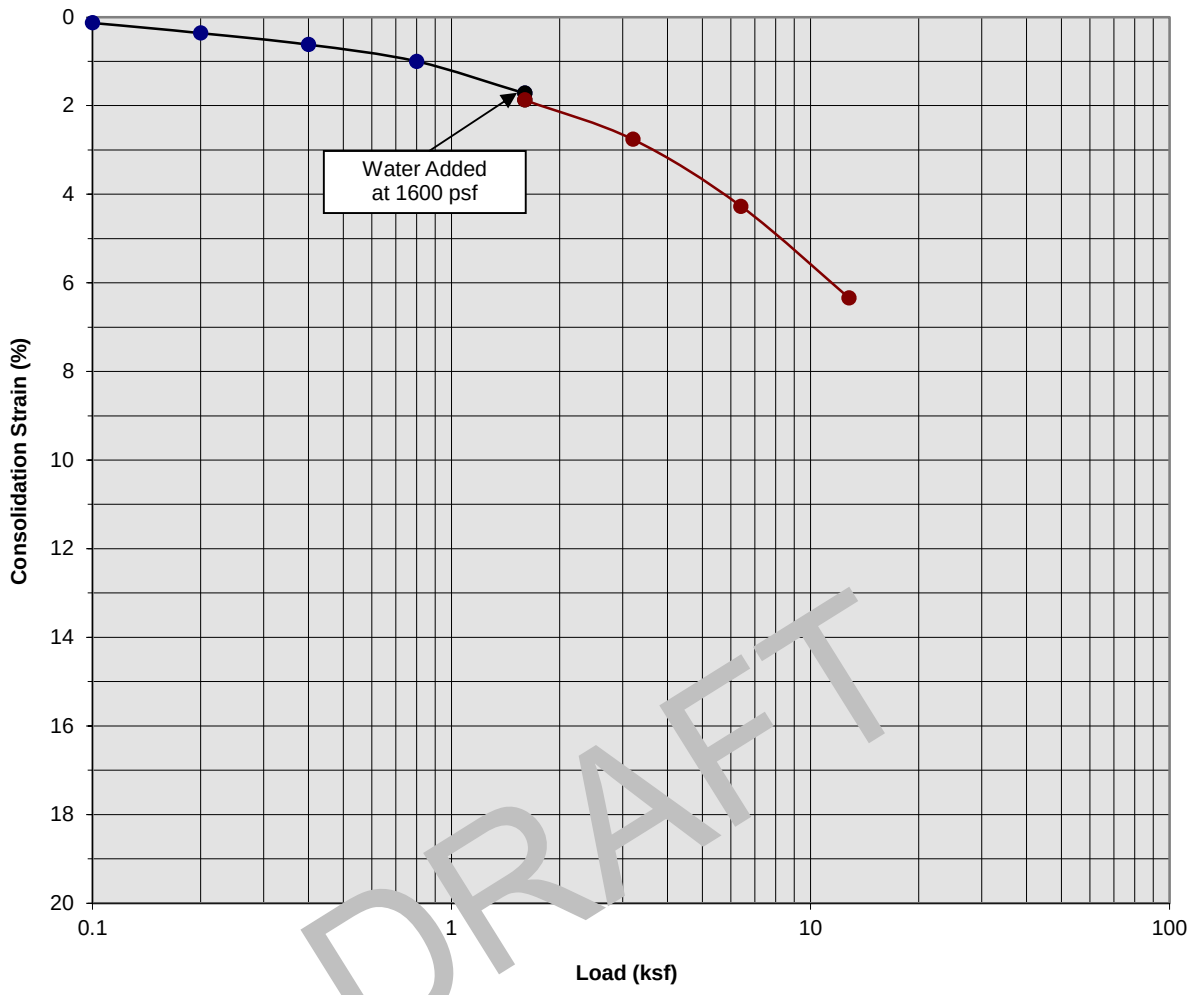
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	131.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 20

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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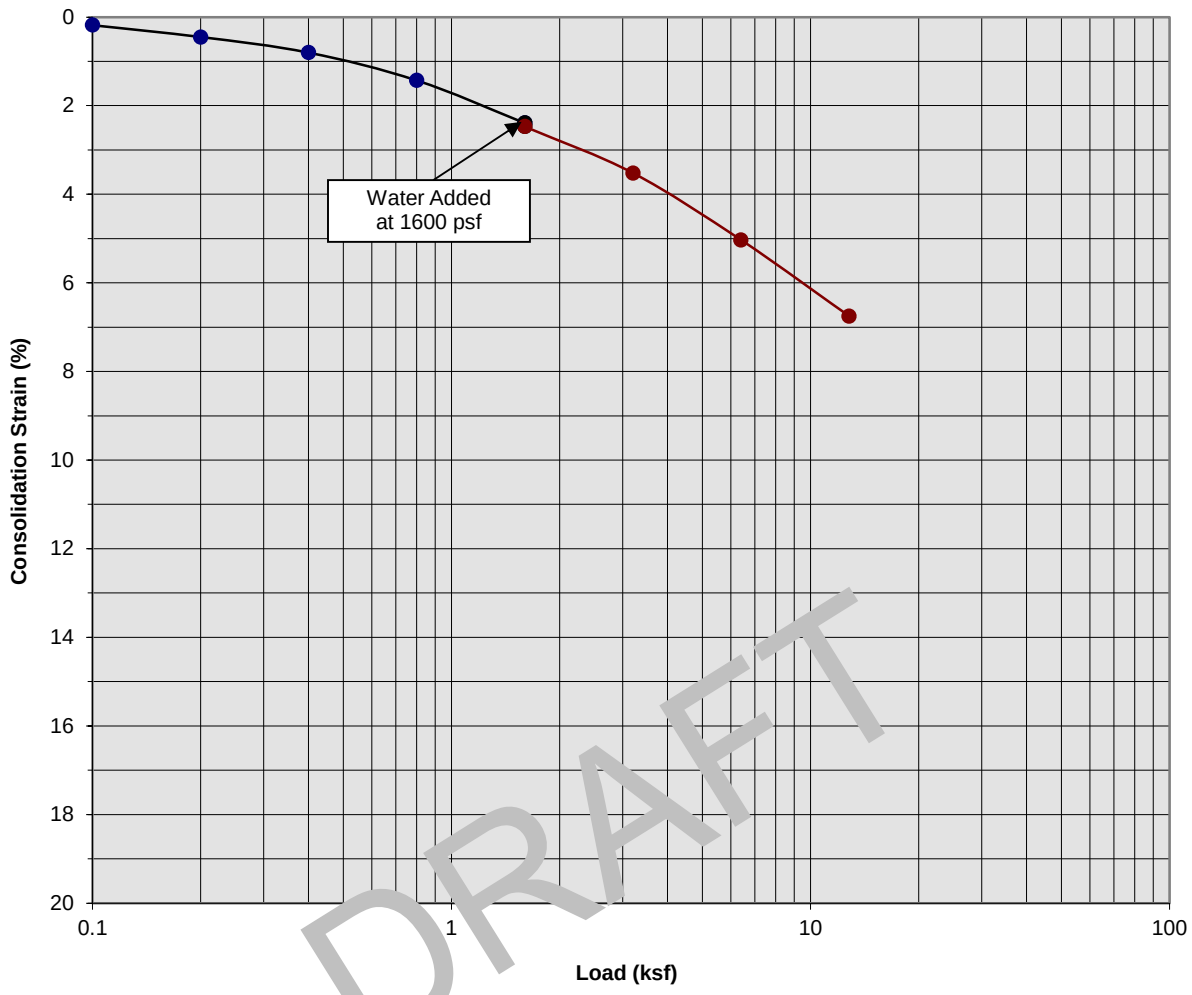
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	117.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 21

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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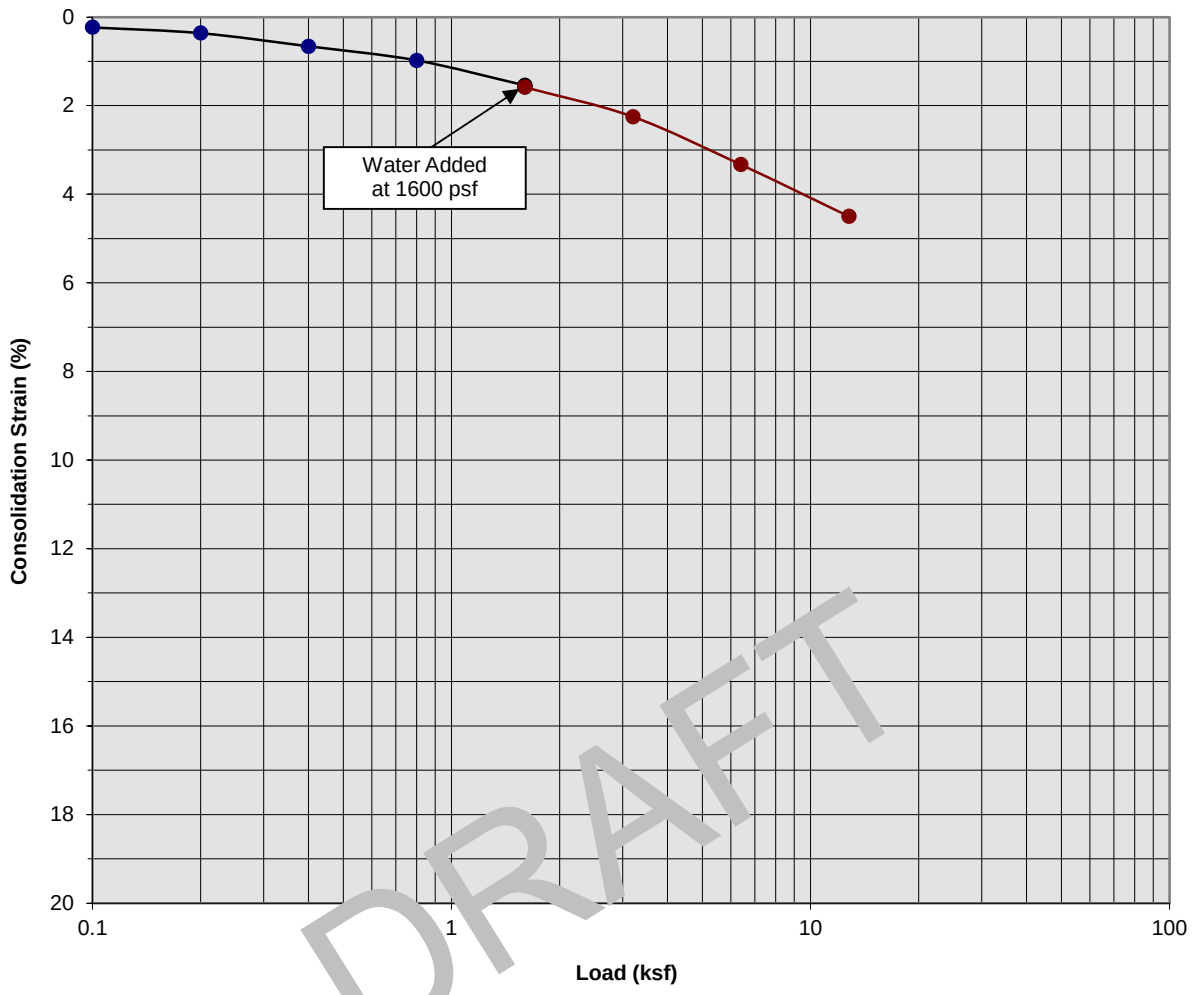
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	28.5 to 29.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.04

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 22

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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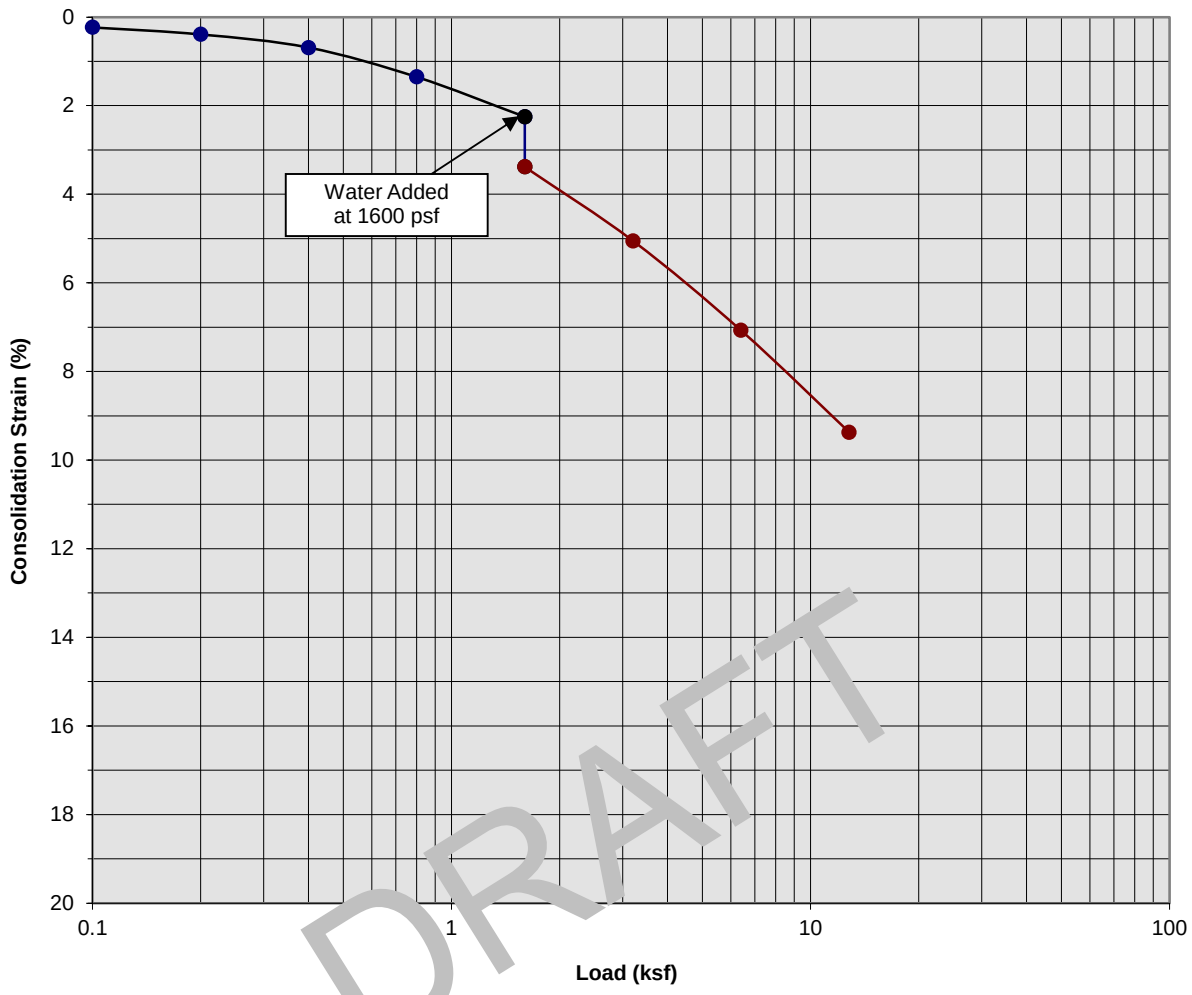
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand, trace medium Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	38.5 to 39.5	Initial Dry Density (pcf)	103.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 23

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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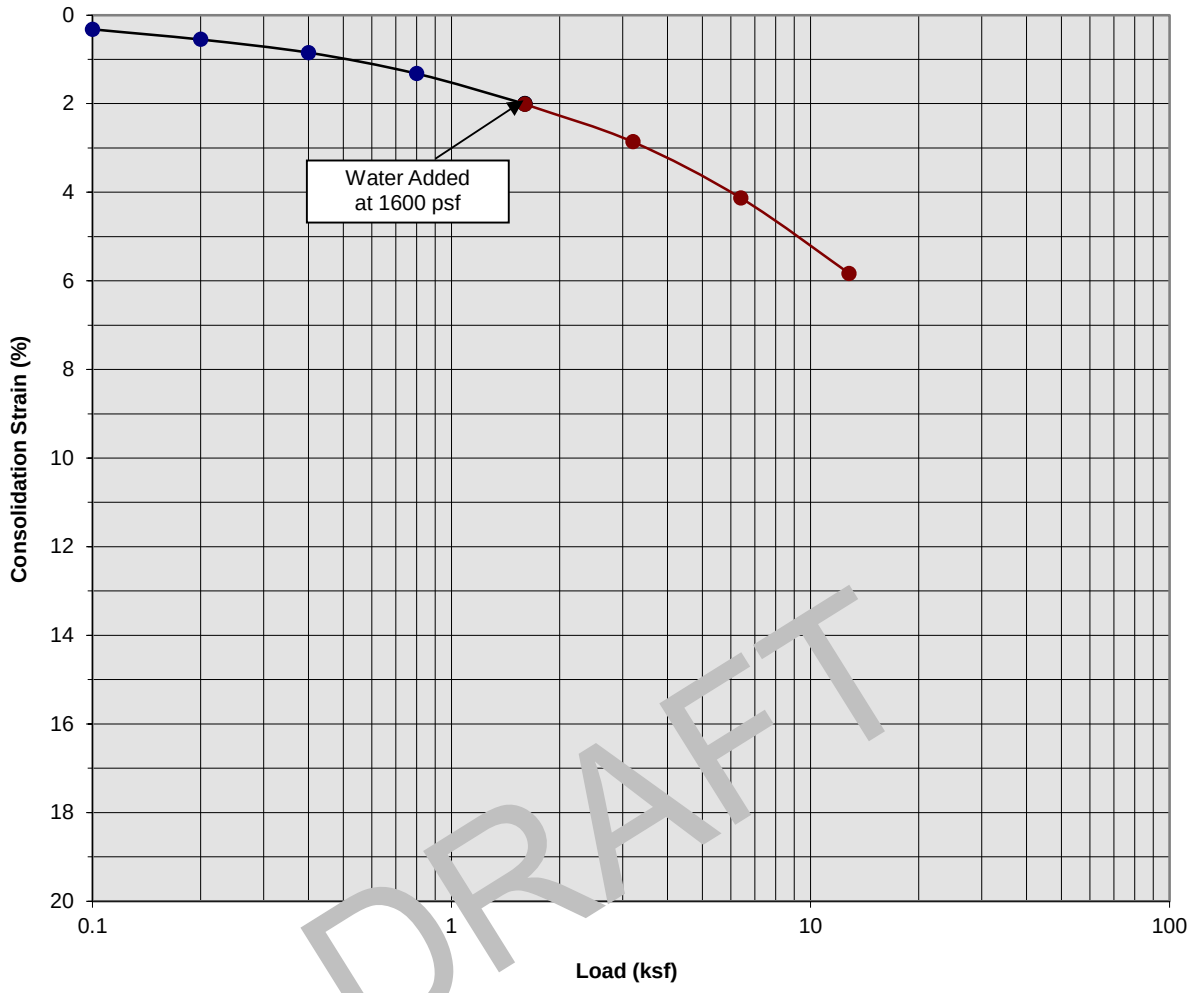
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Green Blue Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	48.5 to 49.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 24

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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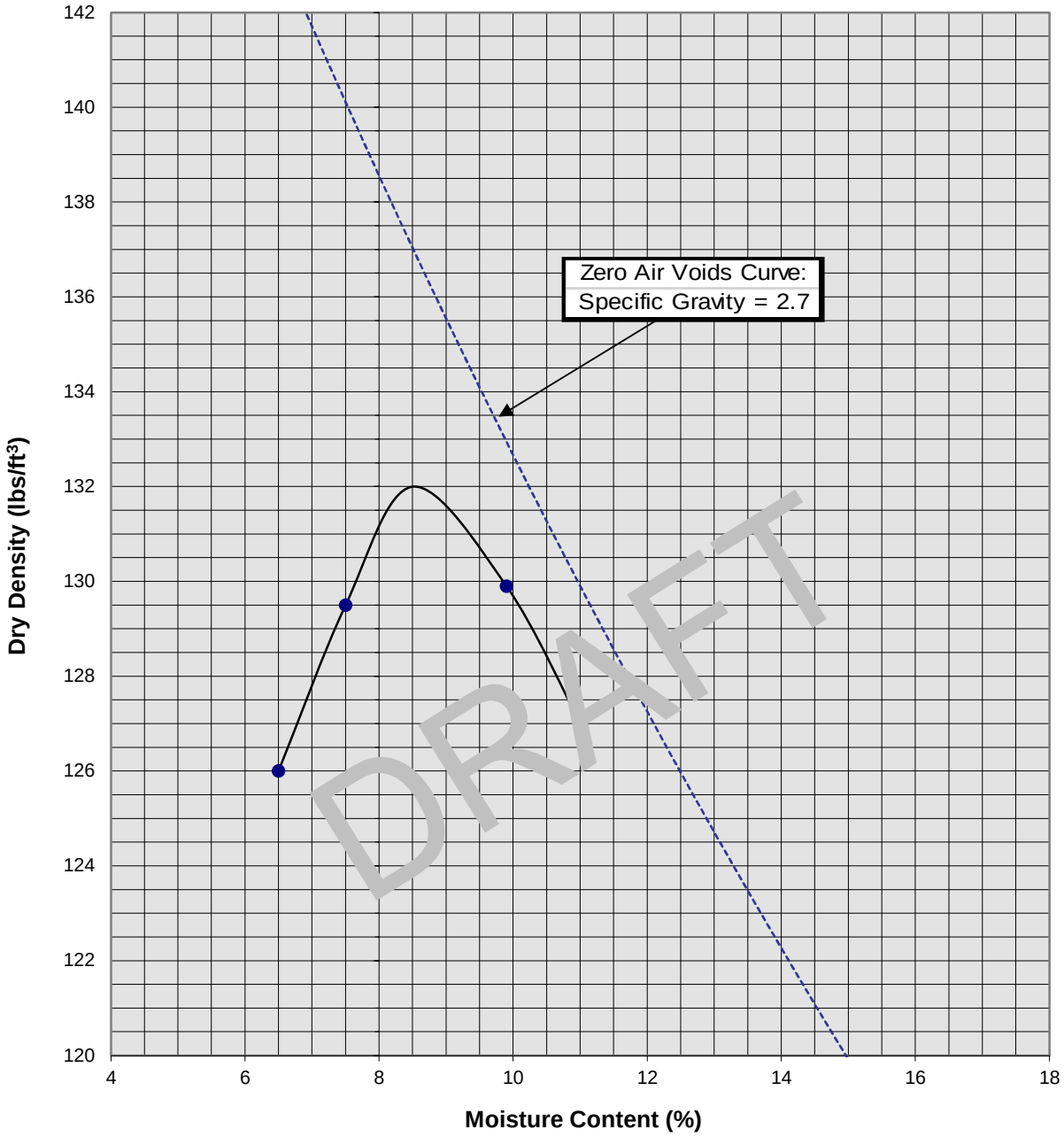
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-2 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	132
Soil Classification	Orange Brown fine Sandy Silt, trace Clay

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-25

SoCalGeo
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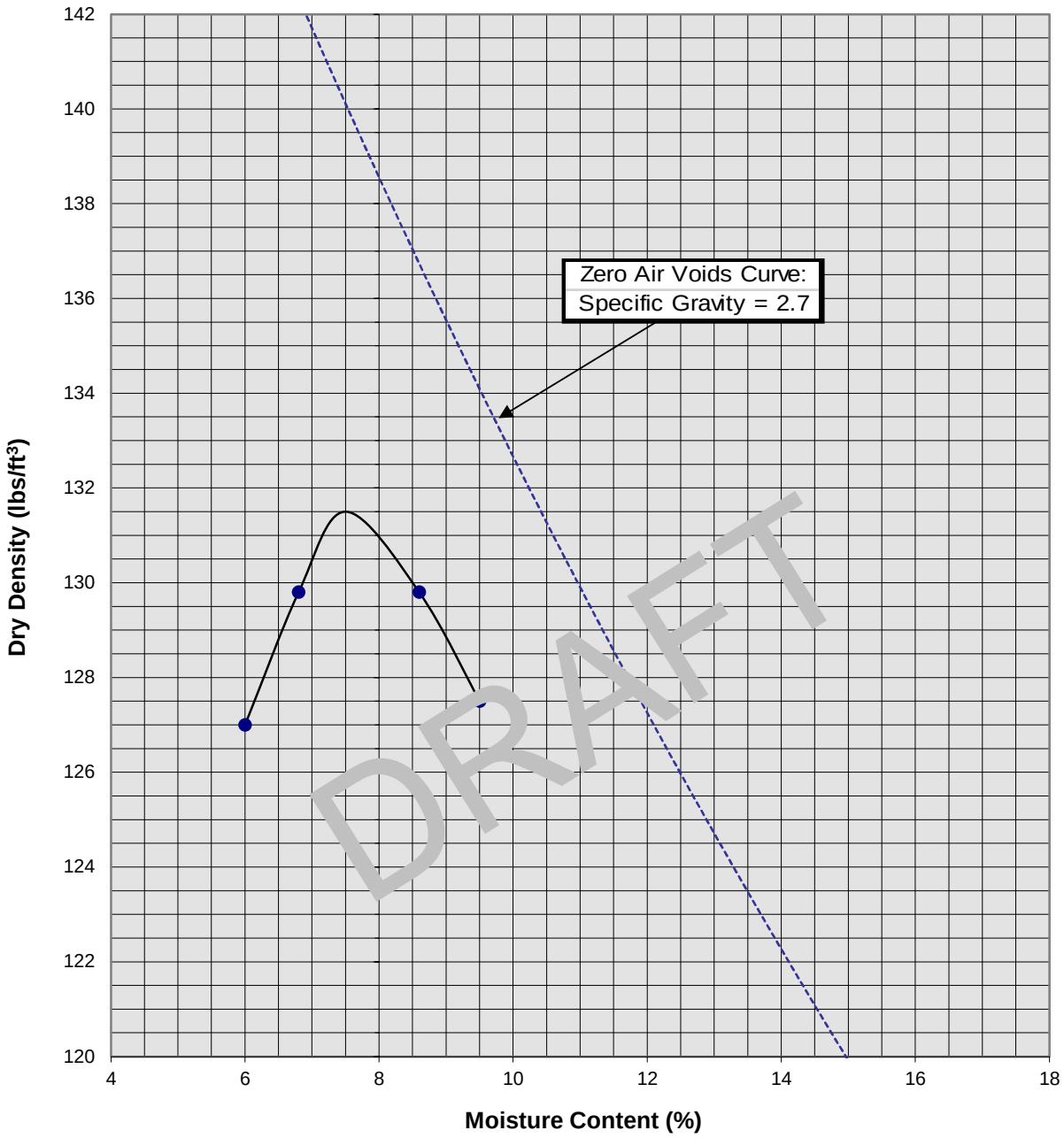
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-4 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	131.5
Soil Classification	Dark Gray Brown Silty fine to medium Sand, trace to little course Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-26

SoCalGeo
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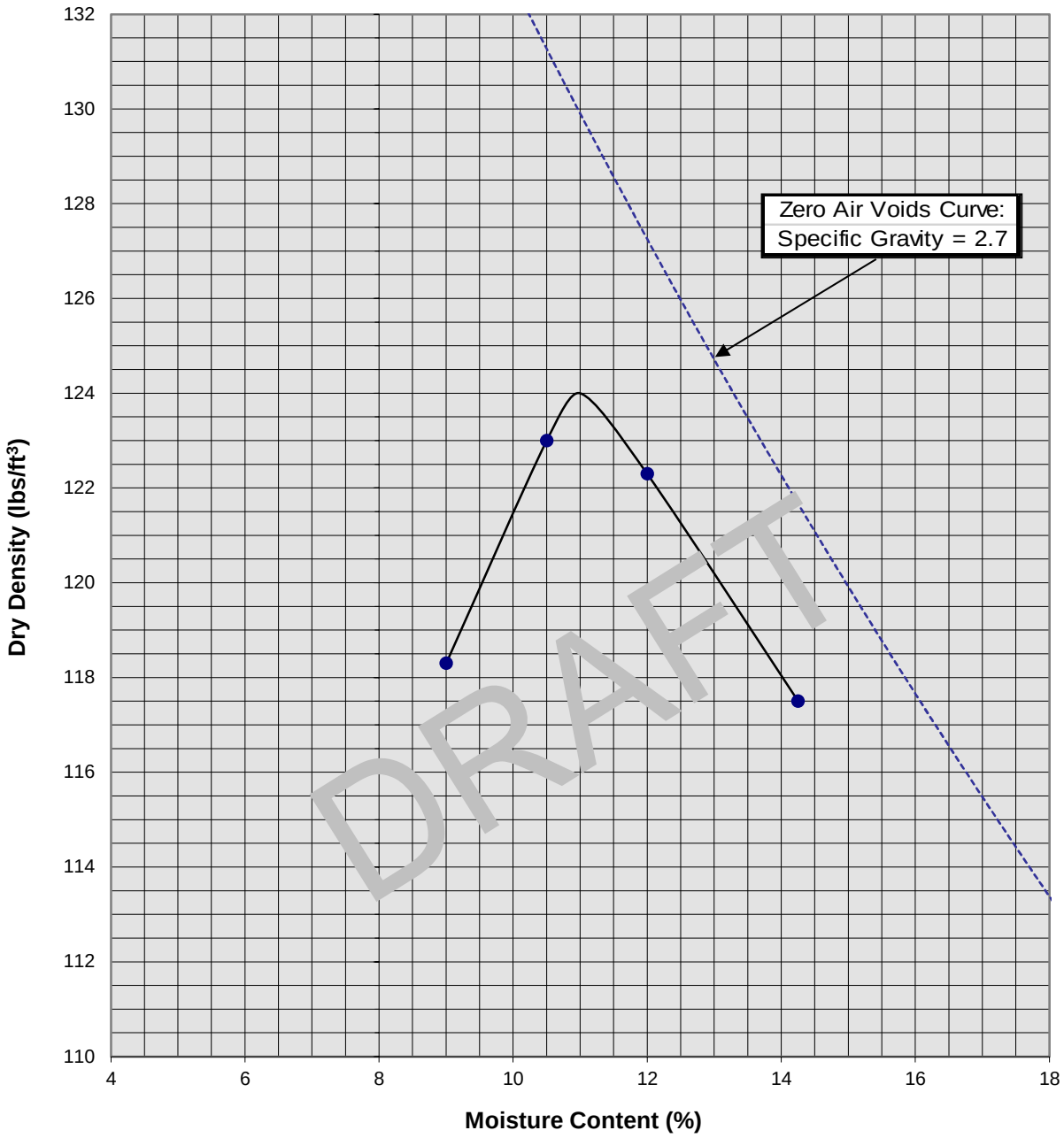
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-5 @ 0-5'
Optimum Moisture (%)	11
Maximum Dry Density (pcf)	124
Soil Classification	Dark Brown Clayey Silt, trace fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-27

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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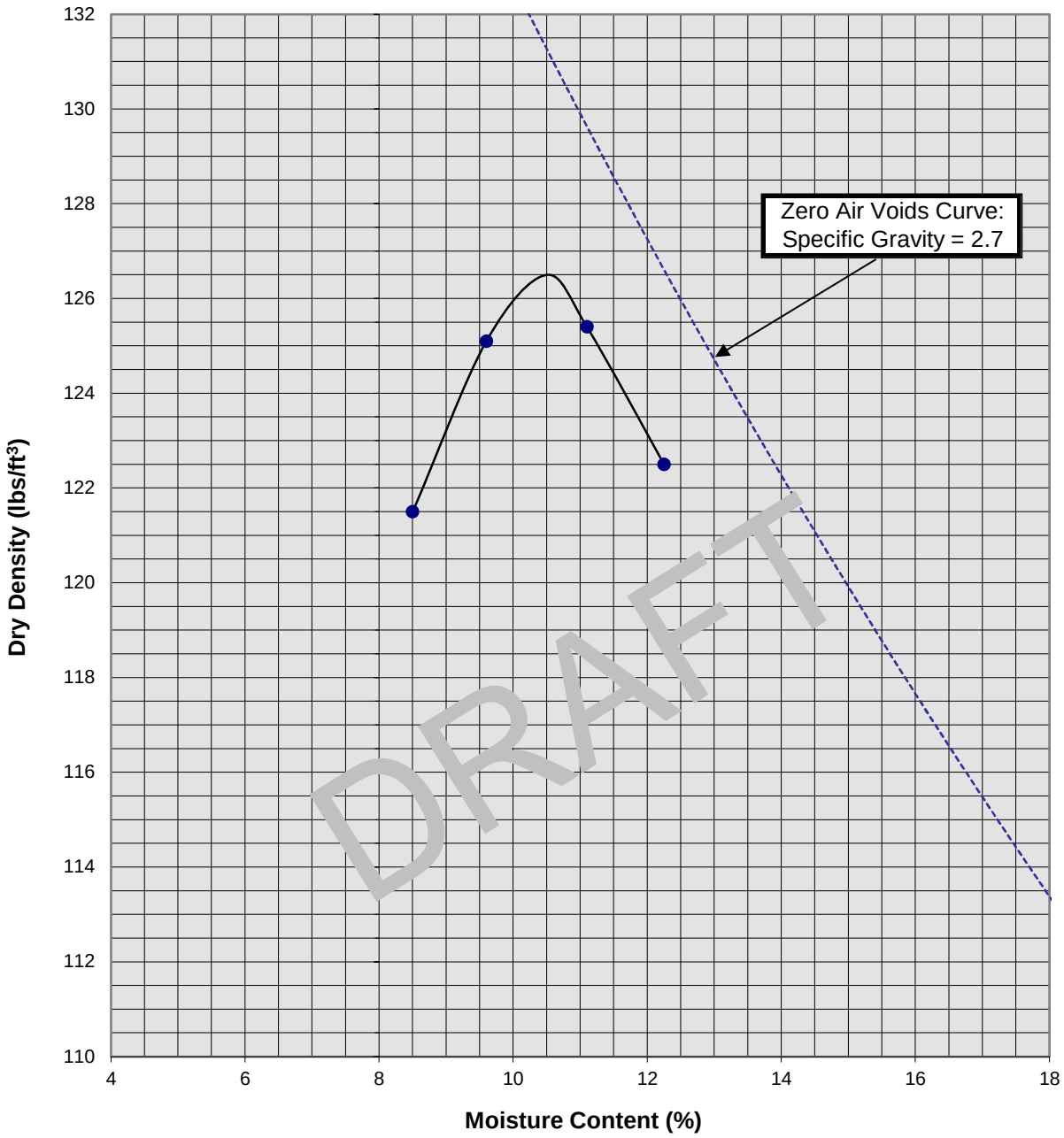
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-10 @ 0-5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-28

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX C-3

LABORATORY TEST RESULTS (PSE)

Expansion Index Tests

Expansion Index tests were performed to evaluate the expansion potential of typical on-site soils. Testing was carried out according to UBC Method 18-2. The results are presented in Table C-1.

Corrosivity Testing

Corrosivity tests were performed to analyze the corrosion potential of the on-site soils on ferrous metals and concrete. Sulfate contents were determined and are shown on Plates 243 through 253.

The pH and electrical resistivity were also determined and are summarized in the following table.

Electrical Resistivity and pH			
Boring/Trench	**Depth**	**pH**	**Resistivity (ohms-cm)**
B-039	25	7.7	2360
B-039	55	7.0	3470
B-040	24	8.0	2090
B-054	20	7.8	3920
B-059	20	7.8	6130
B-067	5	6.6	3570
B-070	5	7.4	4200
B-073	10	7.3	4260
B-079	45	6.5	2180
B-093	6	6.8	6960
B-095	11	6.8	4090
B-096	12	6.8	3050
BB-01	16	8.2	4550
BB-03	11	8.3	4480
BB-05	11	8.3	4080
BB-08	4	8.4	3270
H-01	3	6.9	3950
H-04	3	6.9	3950
H-06	9	7.7	4100

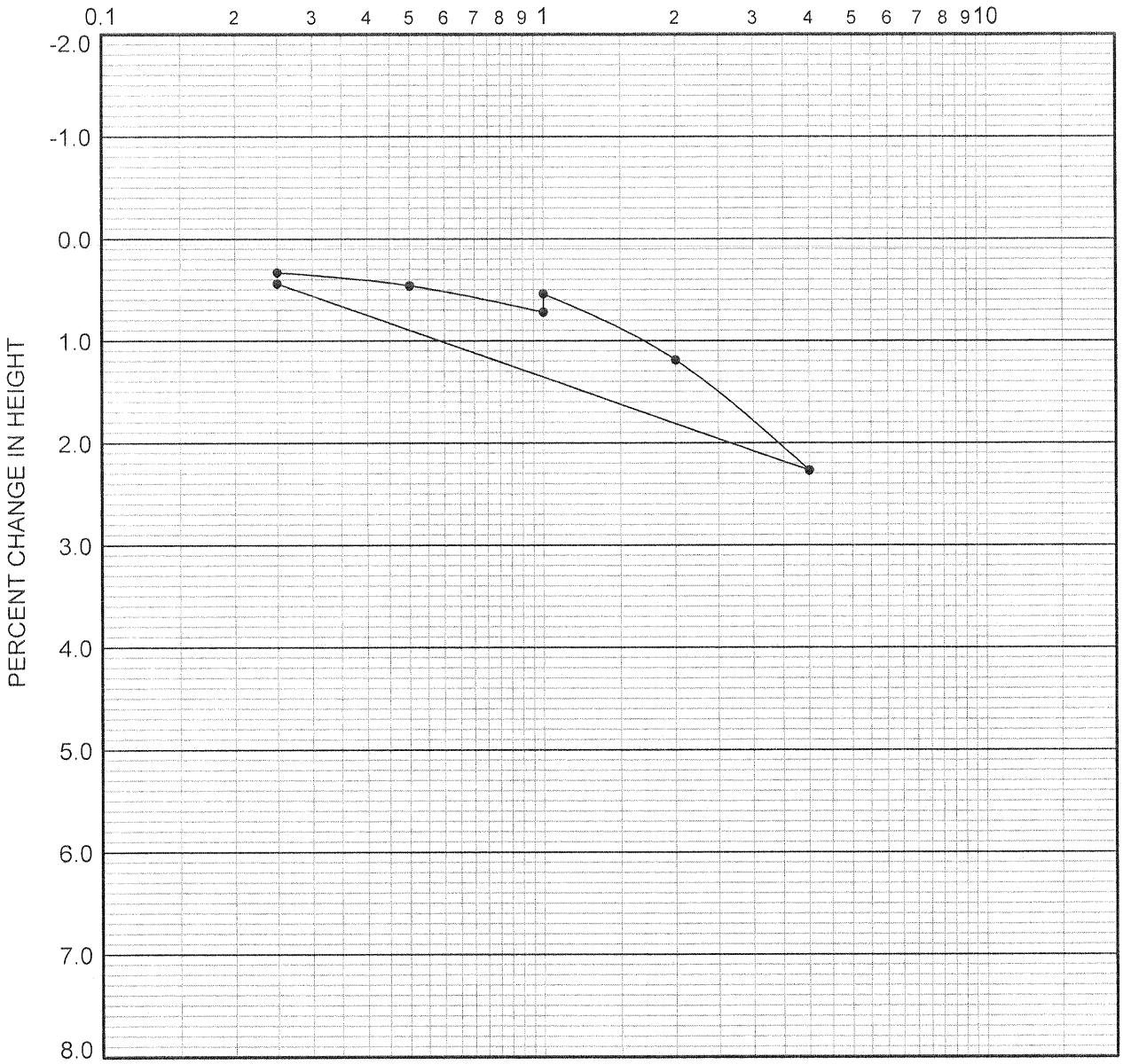
TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-035	20	Silty Sand (Qal)	SM				0	58	30	12		Consolidation-Plate C-1
B-035	27	Silty Sand (Qal)	SM	130.2	8.6		10	58	25	7		
B-035	30	Silty Sand (Qal)	SM				3	55	32	10		Consolidation-Plate C-2
B-036	21	Silty Sand (Qal)	SM	122.7	10.8		2	59	31	8		
B-037	15	Sandy Siltstone (QTst)					5	45	40	10		Consolidation-Plate C-3
B-038	20	Silty Sand (Qoa)	SM				0	76	17	7		Consolidation-Plate C-4
B-039	25	Sandy Siltstone (QTst)		120.4	12.5	SEE PLATE C-161	7	51	31	11	32	Chemical-Plate C-243 Resistivity = 2360, pH = 7.7
B-039	50	Sandy Siltstone (QTst)				SEE PLATE C-162	0	42	46	12		
B-039	55	Sandy Siltstone (QTst)		122.4	11.1	SEE PLATE C-163	5	52	33	10	11	Chemical-Plate C-243 Resistivity = 3470, pH = 7.0
B-040	24	Sandy Siltstone (QTst)		117.8	13.3	SEE PLATE C-164	5	55	29	11	42	Chemical-Plate C-243 Resistivity = 2090, pH = 8.0
B-041	30	Pebble Conglomerate (QTst)				SEE PLATE C-165	16	60	20	4		
B-041	51	Sandy Siltstone (QTst)				SEE PLATE C-166	2	51	34	13		
B-041	70	Silty Sandstone (QTst)					0	64	32	4		Consolidation - Plate C-5
B-041	71	Silty Sandstone (QTst)		125.0	9.0	SEE PLATE C-167	0	73	22	5	0	Chemical-Plate C-244
B-042	30	Sandy Siltstone (QTst)					0	63	28	9		Consolidation - Plate C-6
B-044	25	Silty Sand (Qal)	SM				14	66	16	4		Consolidation - Plate C-7
B-045	20	Gravelly Sand (Qal)	SP				17	72	8	3		Consolidation - Plate C-8
B-045	30	Silty Sand (Qal)	SM				16	52	25	7		Consolidation - Plate C-9
B-046	30	Silty Sand (Qal)	SM				9	62	21	8		Consolidation - Plate C-10
B-047	30	Silty Sand (Qal)	SM				0	53	32	15		Consolidation - Plate C-11
B-047	31	Silty Sand (Qal)	SM	128.8	9.5		2	58	30	10		
B-047	35	Silty Sand (Qal)	SM				2	53	30	15		Consolidation - Plate C-12

TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-079	70	Silty Sandstone (Qtst)		120.0	11.9	SEE PLATE C-186	0	33	44	23		
B-080	20	Silty Sand (Qoa)	SM	132.3	8.3		6	64	22	8		
B-081	15	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-58
B-082	10	Sand with Silt (Qal)	SP-SM				8	78	11	3		Consolidation-Plate C-59
B-082	20	Sandy Siltstone (Qtst)		126.2	9.1	SEE PLATE C-187	0	70	20	10		
B-082	35	Sandy Siltstone (Qtst)				SEE PLATE C-188	0	56	27	17		
B-082	45	Sandy Siltstone (Qtst)				SEE PLATE C-189	0	70	15	15		
B-083	20	Silty Sand (Qoa)	SM			SEE PLATE C-190	0	53	30	17		
B-084	20	Silty Sandstone (Qtst)				SEE PLATE C-191	0	60	30	10		
B-084	35	Sandy Siltstone (Qtst)				SEE PLATE C-192	0	45	42	13		
B-085	15	Silty Sand (Qoa)	SM	130.6	8.7		0	79	18	3		Consolidation-Plate C-60
B-090	26	Gravelly Sand (Qoa)	SP			SEE PLATE C-193						
B-093	6	Silty Sandstone (Qtst)		125.9	10.0	SEE PLATE C-194	0	71	20	9		Chemical-Plate C-249 Resistivity = 6960, pH = 6.8
B-093	13	Silty Sandstone (Qtst)				SEE PLATE C-195	0	58	22	10		
B-093	20	Sandy Siltstone (Qtst)					0	40	48	12		Consolidation-Plate C-61
B-095	10	Silty Sand (Qal)	SM				0	70	20	10		Consolidation-Plate C-62
B-095	11	Silty Sand (Qal)	SM	126.6	10.7							Chemical-Plate C-249 Resistivity = 4090, pH = 6.8
B-096	5	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-63
B-096	11	Silty Sand (Qal)	SM				0	60	20	20		Consolidation-Plate C-64
B-096	12	Silty Sand (Qal)	SM	125.1	11.9	SEE PLATE C-196	0	72	16	12		Chemical-Plate C-250 Resistivity = 3050, pH = 6.8
B-099	15	Silty Sand (Qal)	SM				10	69	12	9		Consolidation-Plate C-65
B-099	21	Gravelly Sand (Qal)	SP	130.2	7.9	SEE PLATE C-197	18	71	8	3	0	

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-037	15.0	131	8.6	85	49		Sandy Siltstone (QTst)

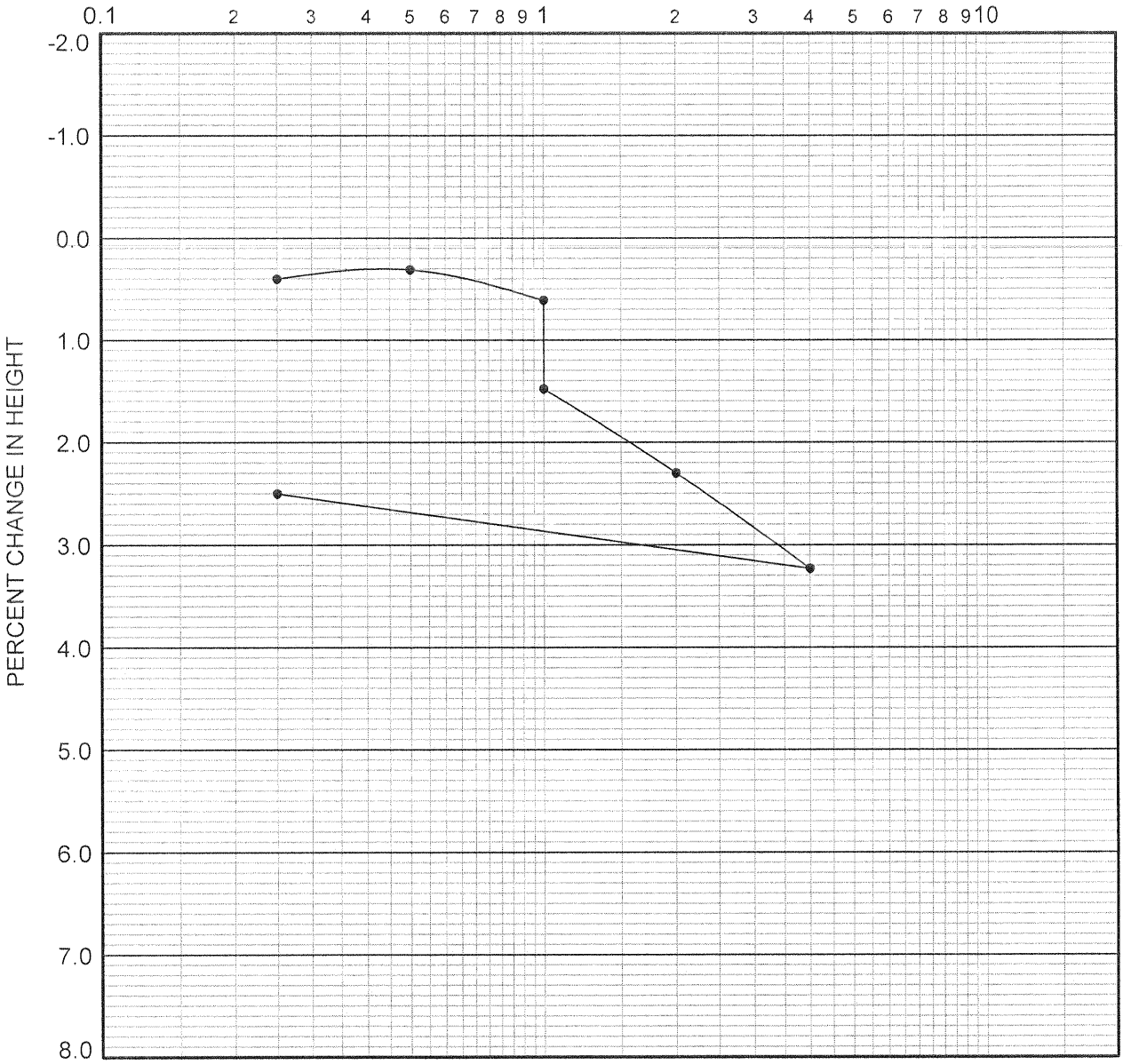
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-3

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-081	15.0	112	5.5	31	29	SM	Silty Sand (Qal)

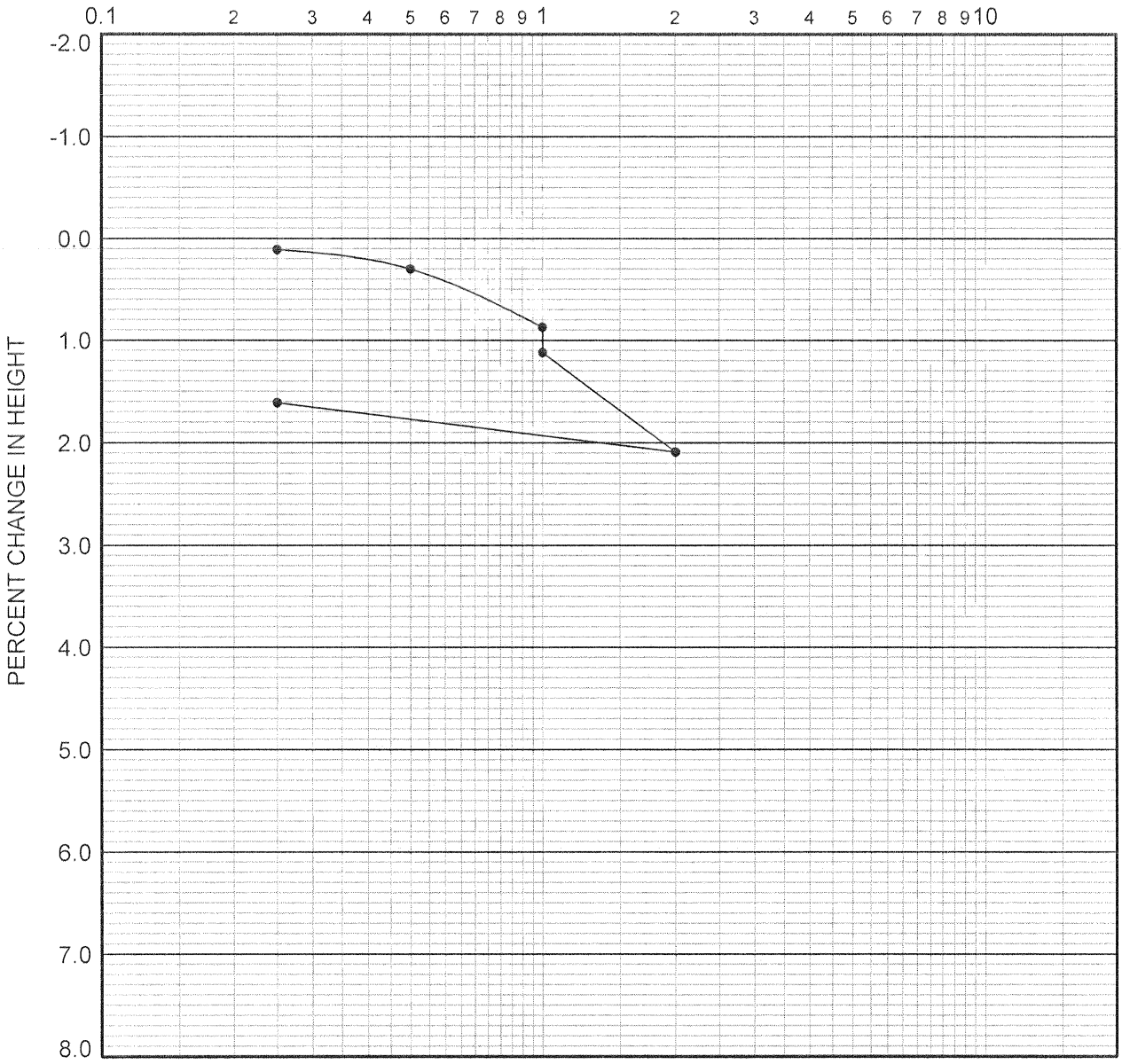
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-58

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-095	10.0	113	13.2	75	30	SM	Silty Sand (Qal)

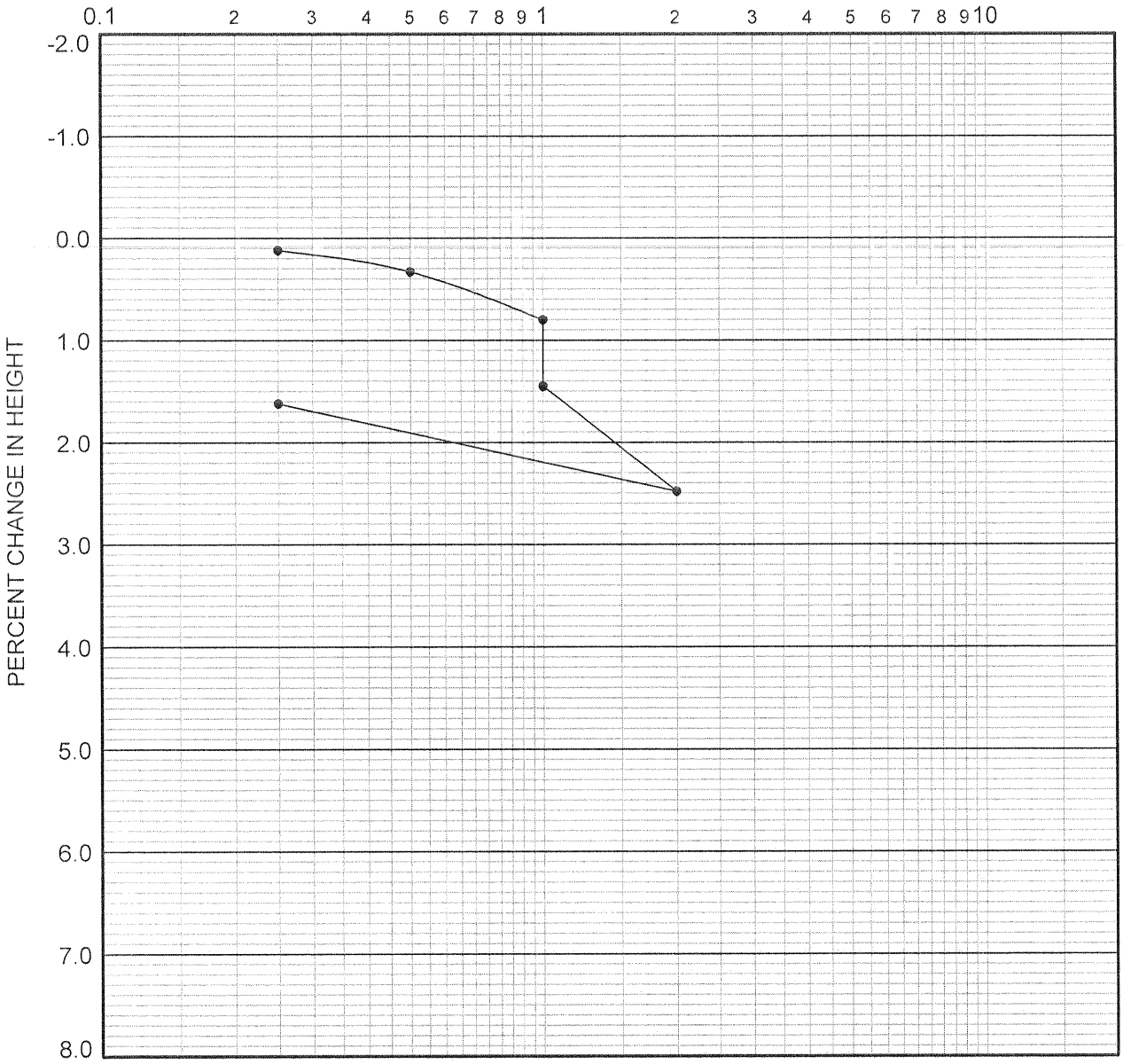
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-62

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	5.0	103	3.9	17	29	SM	Silty Sand (Qal)

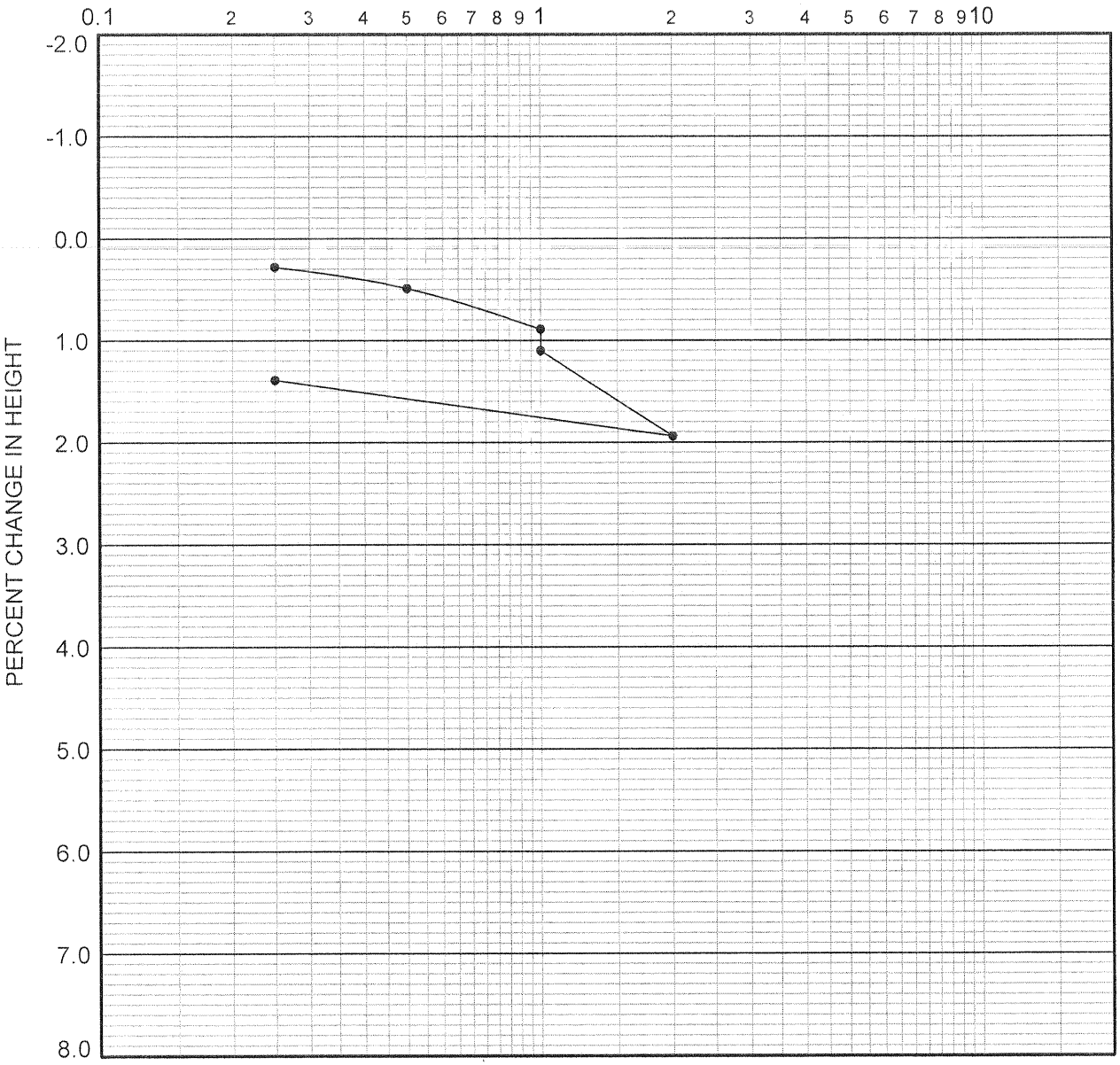
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-63

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	11.0	112	14.4	79	40	SM	Silty Sand (Qal)

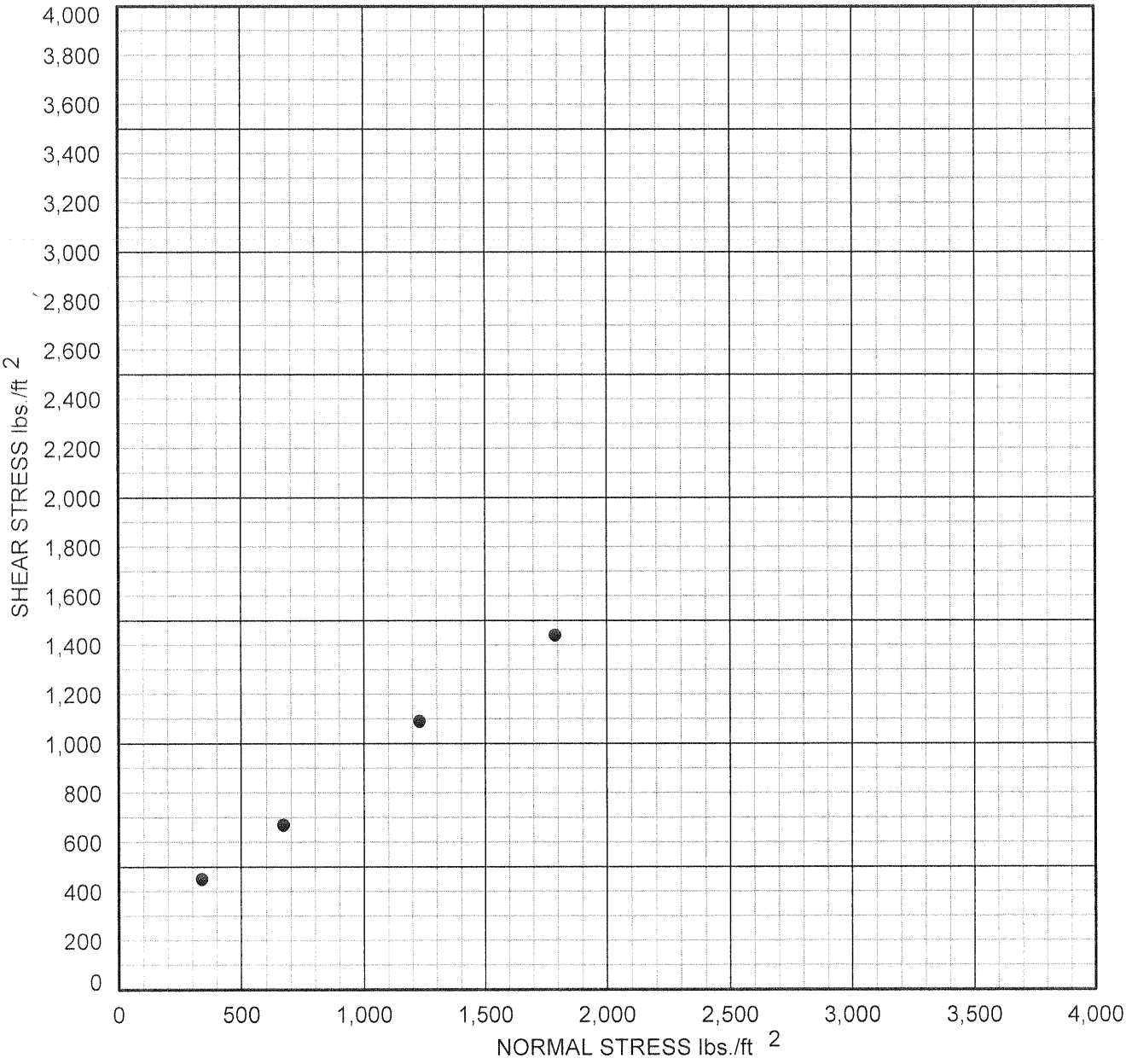
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-64

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
B-096	12.0			28	SM	Silty Sand (Qal)

COHESION	220	psf.
FRICTION ANGLE	35.0	degrees

DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-196

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 Tel: (714) 549-5824 Fax: (714) 549-8375

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246199R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.005~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.004~~	~~0.001~~
B-93 (6)	20979	11-1-2004	Chloride Content	CalTrans 422	0.002	0.001
B-93 (6)	20979	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-93 (6)	20979	11-1-2004	Alkalinity	EPA 310.1	0.002	0.001
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.001~~	~~0.001~~
B-95 (11)	20981	11-1-2004	Chloride Content	CalTrans 422	0.001	0.001
B-95 (11)	20981	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-95 (11)	20981	11-1-2004	Alkalinity	EPA 310.1	0.007	0.001

Authorized Signature

November 3, 2004
Report Date

PLATE C-249

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 *Tel: (714) 549-5824* *Fax: (714) 549-8375*

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246148R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.005~~	~~0.001~~
B-96 (12)	20856	10-5-2004	Chloride Content	CalTrans 422	0.001	0.001
B-96 (12)	20856	10-5-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-96 (12)	20856	10-5-2004	Alkalinity	EPA 310.1	0.006	0.001
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.002~~	~~0.001~~

Authorized Signature

October 11, 2004
Report Date

PLATE C-250

APPENDIX D

ENGINEERING ANALYSES

APPENDIX D-1

LIQEFACTION ANALYSIS

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

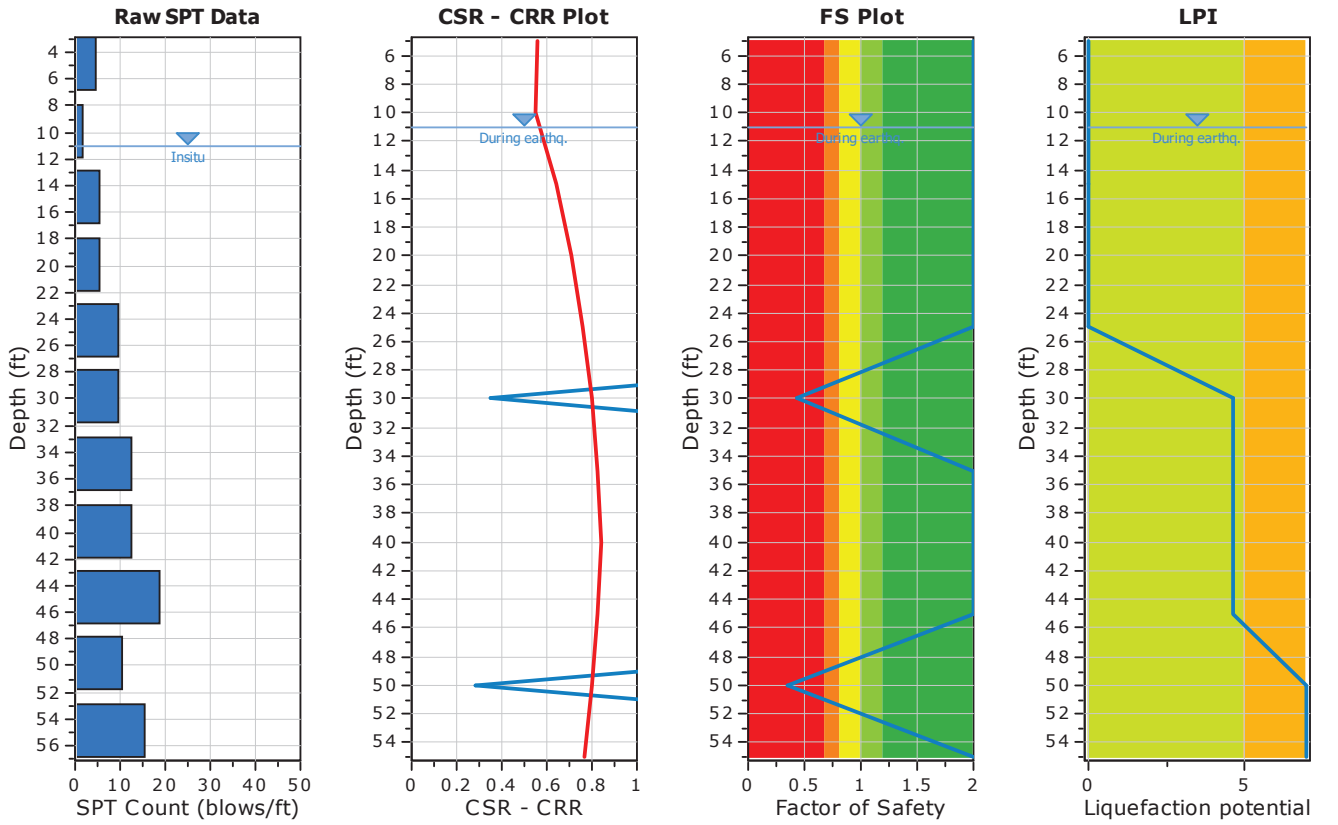
SPT BASED LIQUEFACTION ANALYSIS REPORT

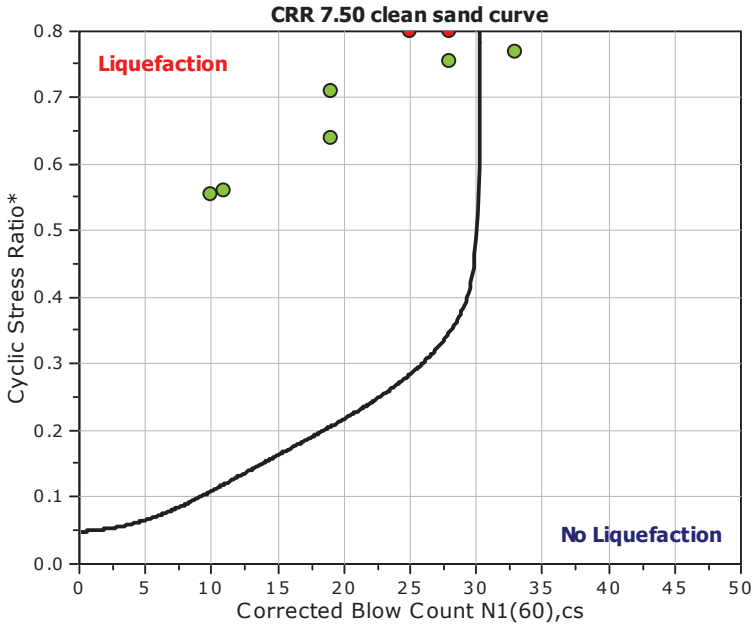
Project title : 2004-01 OVTC **SPT Name: AGS-3**

Location : Calimesa, CA

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	11.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	11.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	7.50
Borehole diameter:	200mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.42		

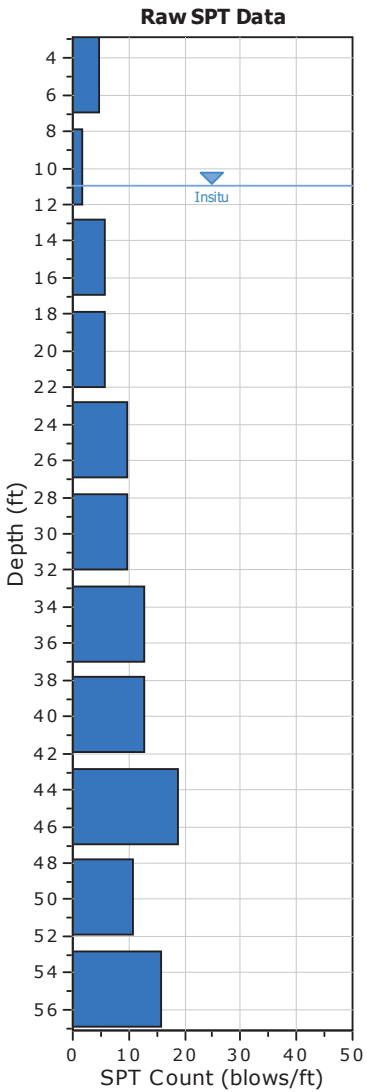


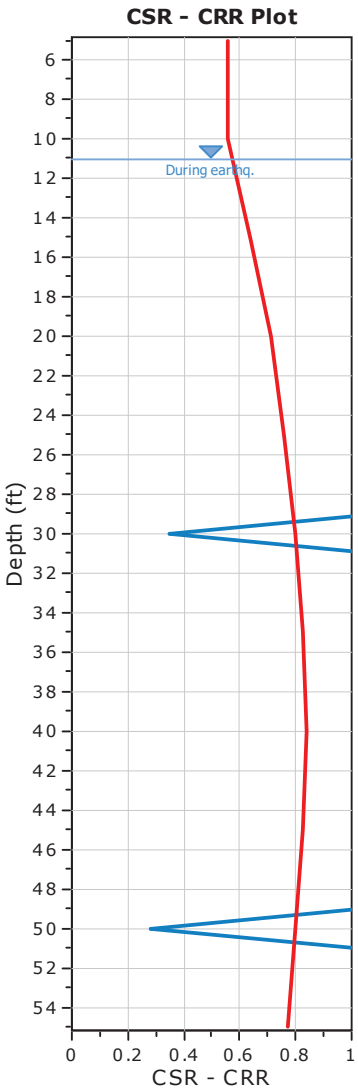


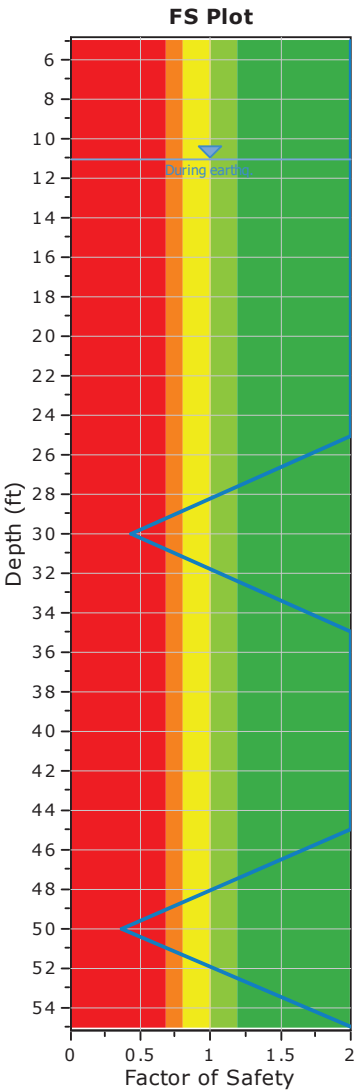
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

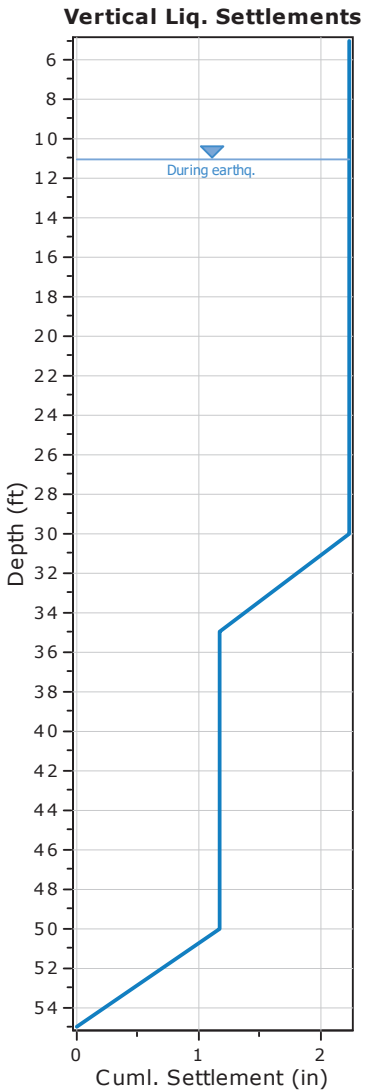
LPI color scheme
- Very high risk
- High risk
- Low risk

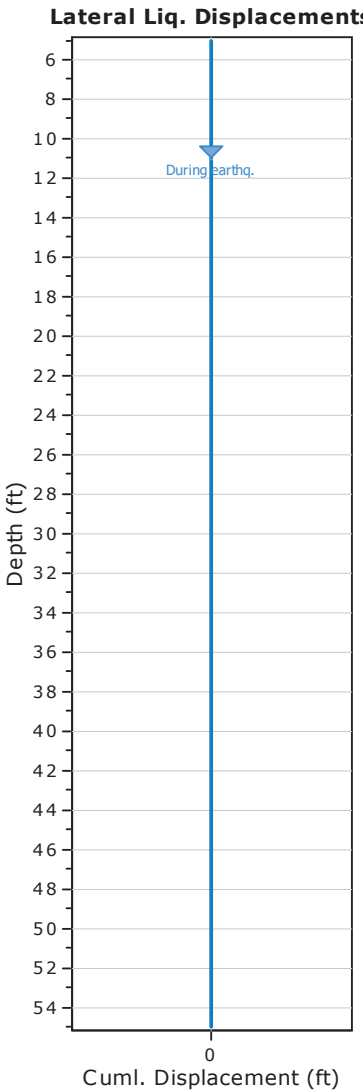
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	5	0.00	113.00	5.00	No
10.00	2	74.30	113.00	5.00	No
15.00	6	74.30	124.00	5.00	No
20.00	6	71.10	124.00	5.00	No
25.00	10	71.10	119.00	5.00	No
30.00	10	35.70	119.00	5.00	Yes
35.00	13	77.30	104.00	5.00	No
40.00	13	66.10	104.00	5.00	No
45.00	19	66.10	136.00	5.00	Yes
50.00	11	59.30	125.00	5.00	Yes
55.00	16	59.30	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	5	113.00	0.28	0.00	0.28	1.50	1.42	1.15	0.75	1.20	11	0.00	0.00	1.00	11	4.000
10.00	2	113.00	0.56	0.00	0.56	1.27	1.42	1.15	0.85	1.20	4	74.30	5.00	1.20	10	4.000
15.00	6	124.00	0.88	0.12	0.75	1.15	1.42	1.15	0.85	1.20	12	74.30	5.00	1.20	19	4.000
20.00	6	124.00	1.19	0.28	0.90	1.07	1.42	1.15	0.95	1.20	12	71.10	5.00	1.20	19	4.000
25.00	10	119.00	1.48	0.44	1.05	1.01	1.42	1.15	0.95	1.20	19	71.10	5.00	1.20	28	4.000
30.00	10	119.00	1.78	0.59	1.19	0.95	1.42	1.15	1.00	1.20	19	35.70	5.00	1.20	28	0.348
35.00	13	104.00	2.04	0.75	1.29	0.91	1.42	1.15	1.00	1.20	23	77.30	5.00	1.20	33	4.000
40.00	13	104.00	2.30	0.91	1.39	0.87	1.42	1.15	1.00	1.20	22	66.10	5.00	1.20	31	4.000
45.00	19	136.00	2.64	1.06	1.58	0.82	1.42	1.15	1.00	1.20	30	66.10	5.00	1.20	41	4.000
50.00	11	125.00	2.95	1.22	1.73	0.77	1.42	1.15	1.00	1.20	17	59.30	5.00	1.20	25	0.285
55.00	16	130.00	3.28	1.37	1.90	0.73	1.42	1.15	1.00	1.20	23	59.30	5.00	1.20	33	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	113.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	113.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	124.00	0.88	0.12	0.75	0.97	1.00	0.639	1.00	0.639	1.00	0.639	2.000	●
20.00	124.00	1.19	0.28	0.90	0.96	1.00	0.709	1.00	0.710	1.00	0.710	2.000	●
25.00	119.00	1.48	0.44	1.05	0.94	1.00	0.755	1.00	0.756	1.00	0.756	2.000	●
30.00	119.00	1.78	0.59	1.19	0.92	1.00	0.781	1.00	0.781	0.98	0.799	0.436	●
35.00	104.00	2.04	0.75	1.29	0.89	1.00	0.796	1.00	0.796	0.96	0.829	2.000	●
40.00	104.00	2.30	0.91	1.39	0.85	1.00	0.794	1.00	0.794	0.95	0.839	2.000	●
45.00	136.00	2.64	1.06	1.58	0.80	1.00	0.760	1.00	0.760	0.92	0.824	2.000	●
50.00	125.00	2.95	1.22	1.73	0.75	1.00	0.724	1.00	0.725	0.91	0.800	0.356	●
55.00	130.00	3.28	1.37	1.90	0.70	1.00	0.685	1.00	0.685	0.89	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.436	0.56	5.43	5.00	4.67
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	0.356	0.64	2.38	5.00	2.33
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 7.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
10.00	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.77	5.00	1.064
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	0.00	5.00	0.000
45.00	0.00	5.00	0.00	5.00	0.000
50.00	0.00	5.00	1.95	5.00	1.168
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 2.232

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	11	46.43	0.00	5.00	0.000	0.00
10.00	4	28.00	0.00	5.00	0.000	0.00
15.00	12	48.50	0.00	5.00	0.000	0.00
20.00	12	48.50	0.00	5.00	0.000	0.00
25.00	19	61.02	0.00	5.00	0.000	0.00
30.00	19	61.02	22.70	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	22	65.67	0.00	5.00	0.000	0.00
45.00	30	76.68	0.00	5.00	0.000	0.00
50.00	17	57.72	22.70	5.00	0.000	0.00
55.00	23	67.14	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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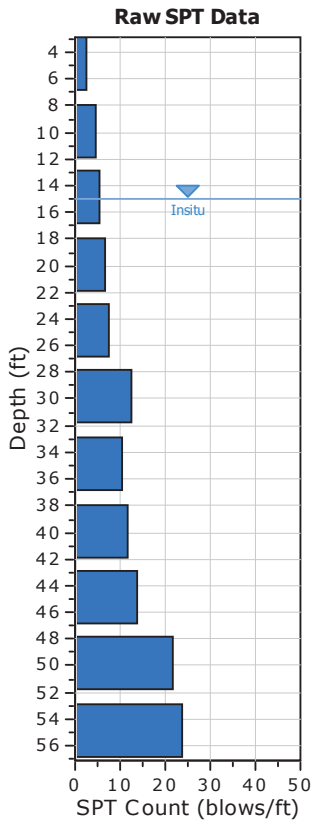
SPT BASED LIQUEFACTION ANALYSIS REPORT

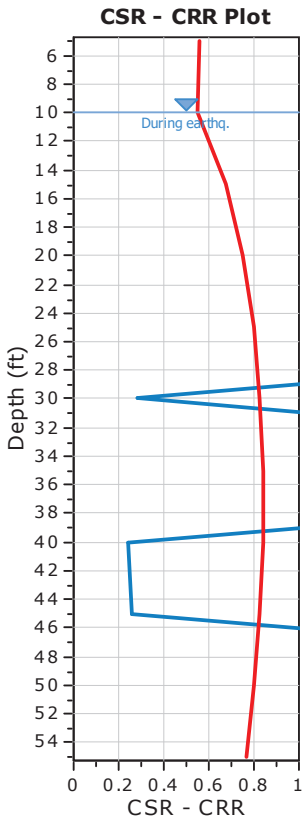
Project title : 2004-01 OVTC **SPT Name: AGS-16**

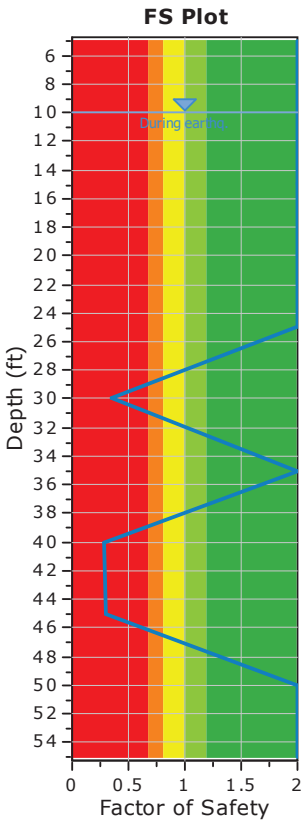
Location : Calimesa, CA

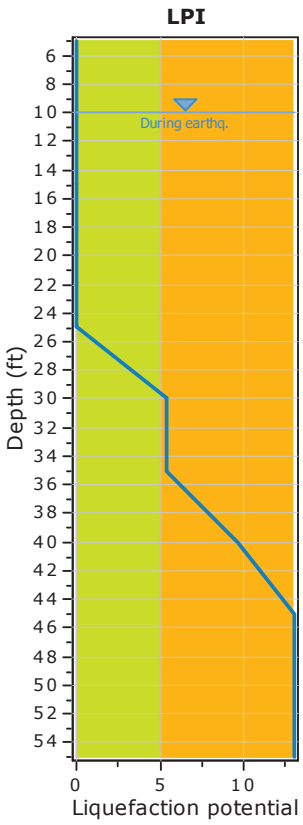
:: Input parameters and analysis properties ::

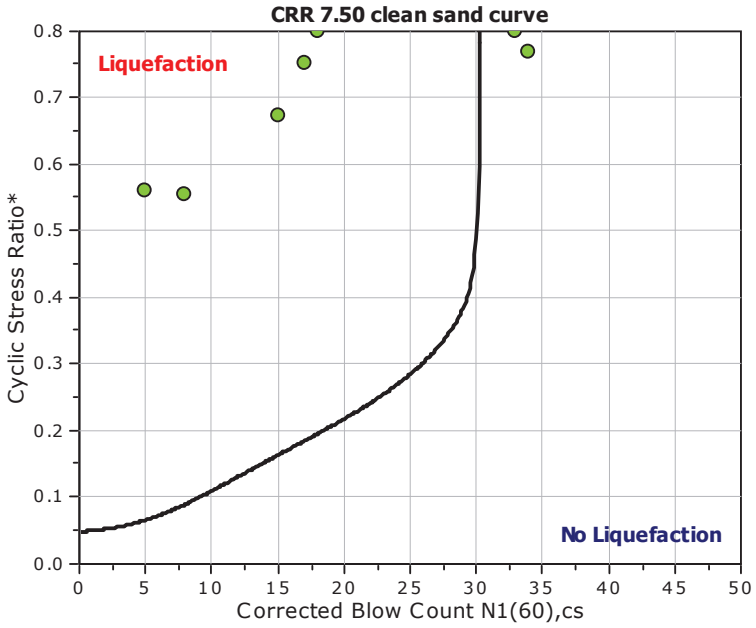
Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.50
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.45		







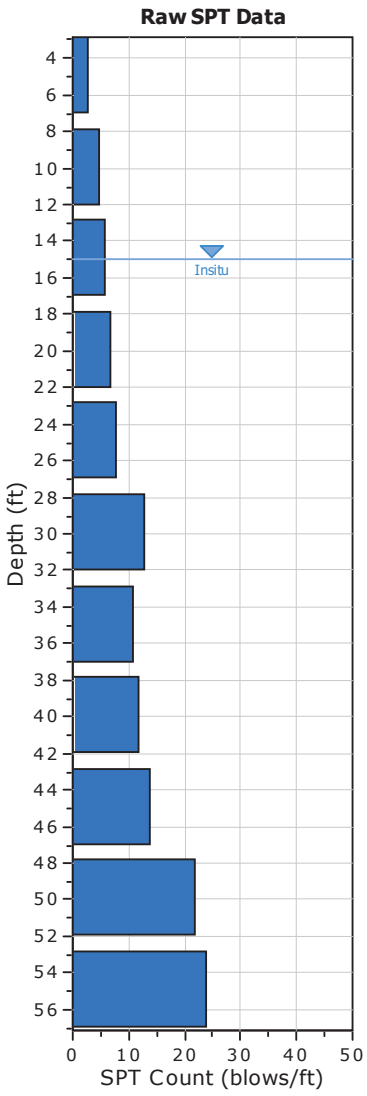


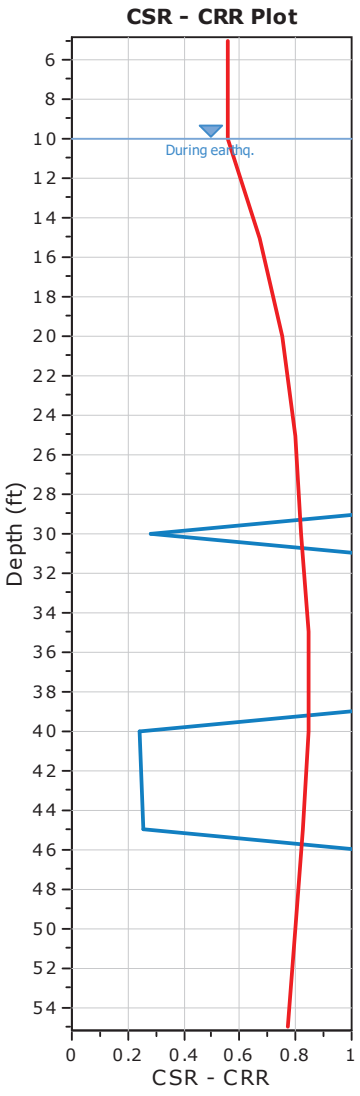


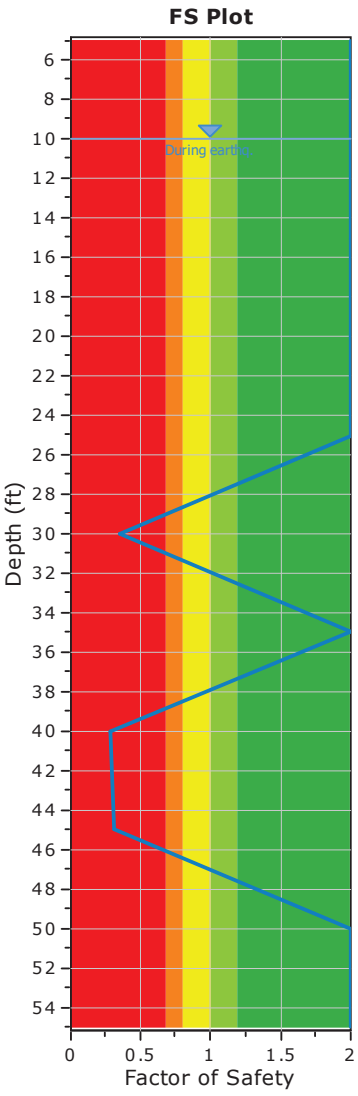
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

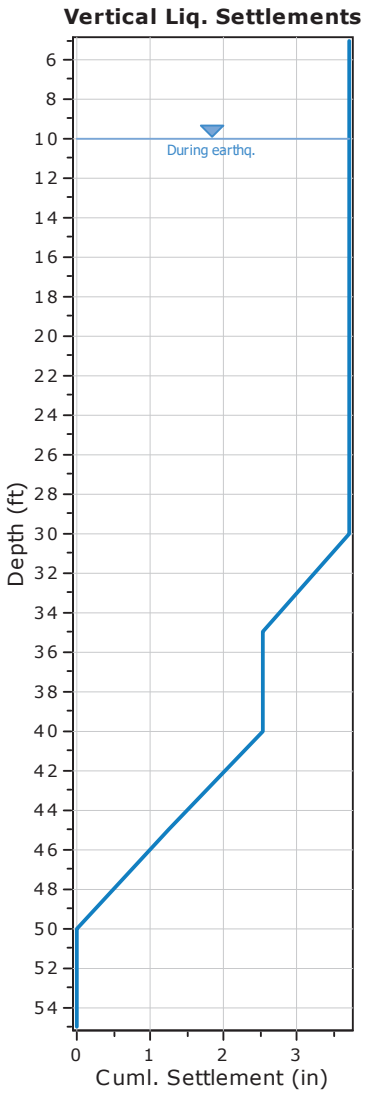
LPI color scheme
- Very high risk
- High risk
- Low risk

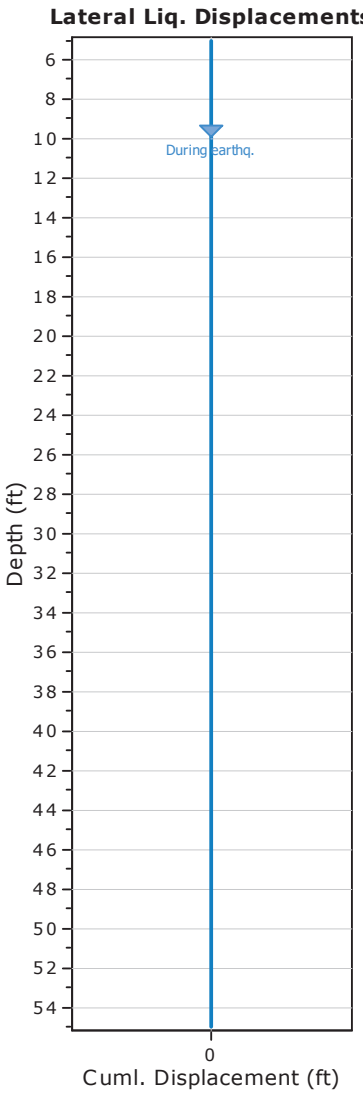
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	3	0.00	111.00	5.00	No
10.00	5	0.00	111.00	5.00	No
15.00	6	77.90	111.00	5.00	No
20.00	7	77.90	113.00	5.00	No
25.00	8	53.80	113.00	5.00	No
30.00	13	34.00	134.00	5.00	Yes
35.00	11	52.90	125.00	5.00	No
40.00	12	52.90	135.00	5.00	Yes
45.00	14	48.20	135.00	5.00	Yes
50.00	22	48.20	135.00	5.00	Yes
55.00	24	48.20	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	3	111.00	0.28	0.00	0.28	1.50	1.45	1.00	0.75	1.00	5	0.00	0.00	1.00	5	4.000
10.00	5	111.00	0.56	0.00	0.56	1.28	1.45	1.00	0.85	1.00	8	0.00	0.00	1.00	8	4.000
15.00	6	111.00	0.83	0.00	0.83	1.11	1.45	1.00	0.85	1.00	8	77.90	5.00	1.20	15	4.000
20.00	7	113.00	1.12	0.16	0.96	1.04	1.45	1.00	0.95	1.00	10	77.90	5.00	1.20	17	4.000
25.00	8	113.00	1.40	0.31	1.09	0.99	1.45	1.00	0.95	1.00	11	53.80	5.00	1.20	18	4.000
30.00	13	134.00	1.73	0.47	1.26	0.92	1.45	1.00	1.00	1.00	17	34.00	4.93	1.19	25	0.285
35.00	11	125.00	2.05	0.62	1.42	0.87	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	4.000
40.00	12	135.00	2.38	0.78	1.60	0.81	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	0.242
45.00	14	135.00	2.72	0.94	1.78	0.76	1.45	1.00	1.00	1.00	15	48.20	5.00	1.20	23	0.255
50.00	22	135.00	3.06	1.09	1.97	0.72	1.45	1.00	1.00	1.00	23	48.20	5.00	1.20	33	4.000
55.00	24	135.00	3.40	1.25	2.15	0.68	1.45	1.00	1.00	1.00	24	48.20	5.00	1.20	34	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	111.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	111.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	111.00	0.83	0.16	0.68	0.97	1.00	0.674	1.00	0.674	1.00	0.674	2.000	●
20.00	113.00	1.12	0.31	0.80	0.96	1.00	0.751	1.00	0.752	1.00	0.752	2.000	●
25.00	113.00	1.40	0.47	0.93	0.94	1.00	0.801	1.00	0.801	1.00	0.801	2.000	●
30.00	134.00	1.73	0.62	1.11	0.92	1.00	0.814	1.00	0.814	0.99	0.822	0.347	●
35.00	125.00	2.05	0.78	1.26	0.89	1.00	0.814	1.00	0.814	0.96	0.844	2.000	●
40.00	135.00	2.38	0.94	1.45	0.85	1.00	0.793	1.00	0.793	0.94	0.844	0.286	●
45.00	135.00	2.72	1.09	1.63	0.80	1.00	0.759	1.00	0.760	0.92	0.828	0.308	●
50.00	135.00	3.06	1.25	1.81	0.75	1.00	0.719	1.00	0.719	0.90	0.801	2.000	●
55.00	135.00	3.40	1.40	1.99	0.70	1.00	0.678	1.00	0.678	0.88	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.347	0.65	5.43	5.00	5.40
35.00	2.000	0.00	4.67	5.00	0.00
40.00	0.286	0.71	3.90	5.00	4.25
45.00	0.308	0.69	3.14	5.00	3.31
50.00	2.000	0.00	2.38	5.00	0.00
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 12.96

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
10.00	0.00	5.00	0.00	5.00	0.000
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.95	5.00	1.168
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	2.16	5.00	1.297
45.00	0.00	5.00	2.08	5.00	1.250
50.00	0.00	5.00	0.00	5.00	0.000
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 3.714

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	5	31.30	0.00	5.00	0.000	0.00
10.00	8	39.60	0.00	5.00	0.000	0.00
15.00	8	39.60	0.00	5.00	0.000	0.00
20.00	10	44.27	0.00	5.00	0.000	0.00
25.00	11	46.43	0.00	5.00	0.000	0.00
30.00	17	57.72	22.70	5.00	0.000	0.00
35.00	14	52.38	0.00	5.00	0.000	0.00
40.00	14	52.38	34.10	5.00	0.000	0.00
45.00	15	54.22	34.10	5.00	0.000	0.00
50.00	23	67.14	0.00	5.00	0.000	0.00
55.00	24	68.59	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX D-2

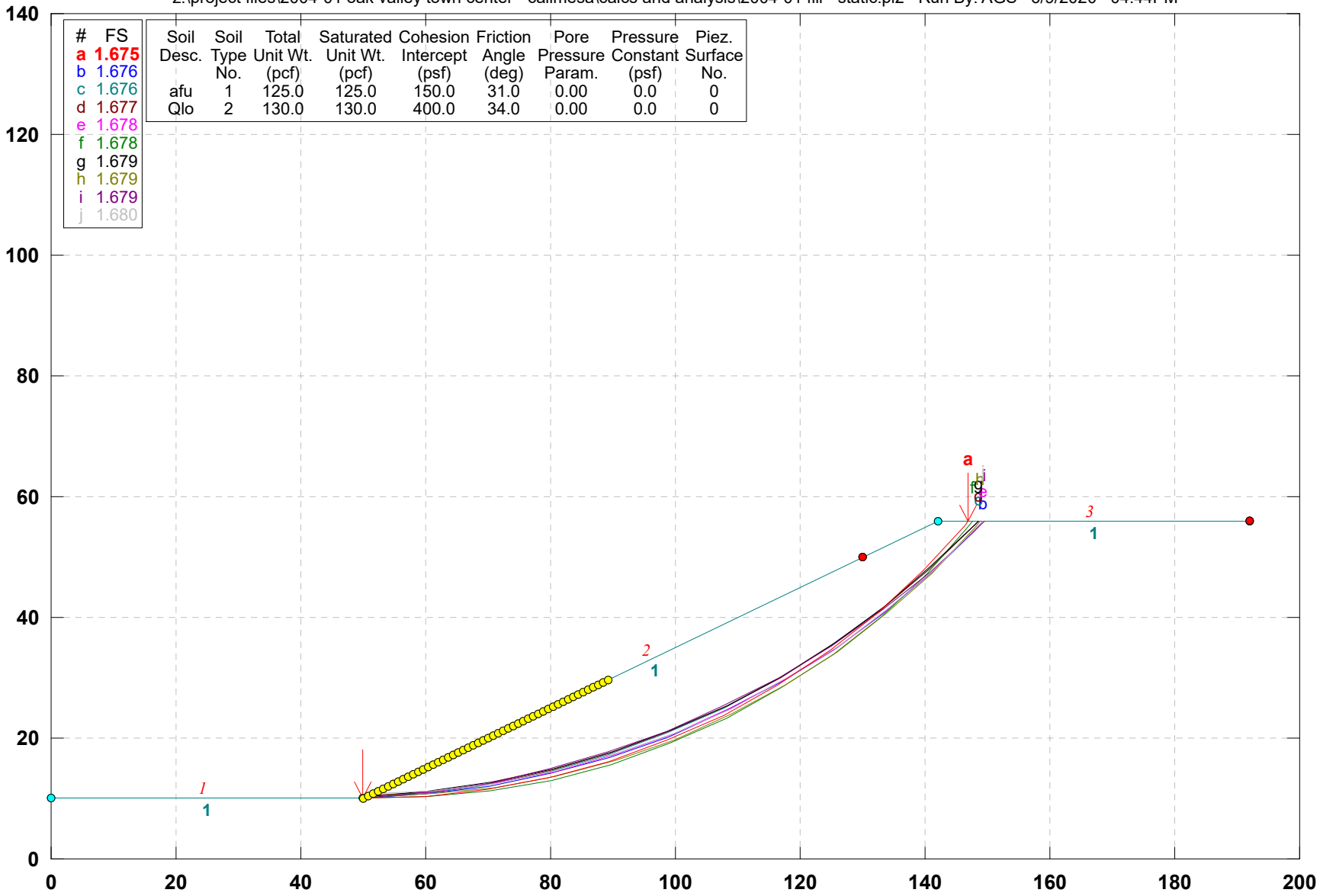
SLOPE STABILITY ANALYSIS

2004-01 OVTC 46 ft. Fill Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static.pl2 Run By: AGS 6/9/2020 04:44PM

#	FS
a	1.675
b	1.676
c	1.676
d	1.677
e	1.678
f	1.678
g	1.679
h	1.679
i	1.679
j	1.680

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.675

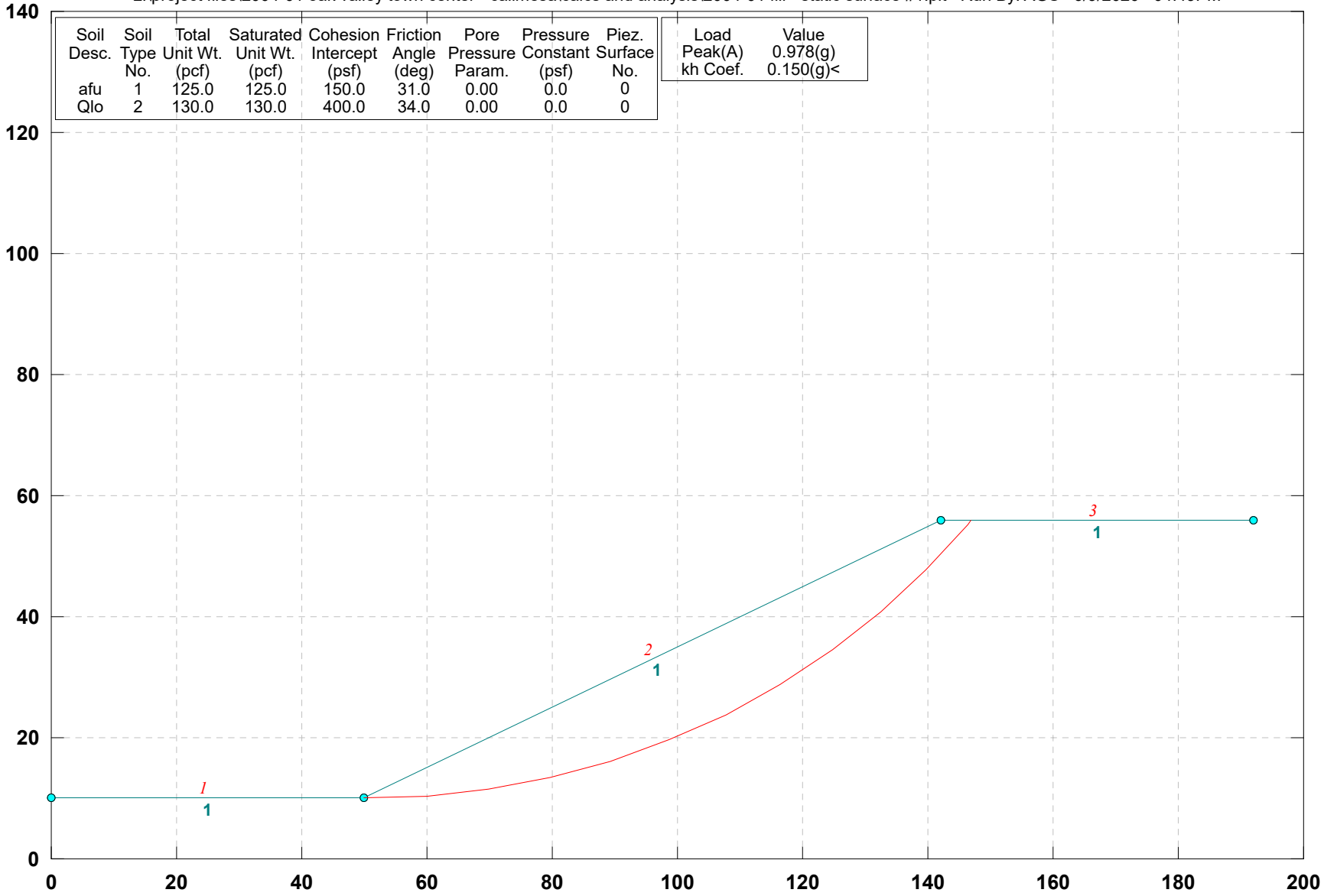
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 46 ft. Fill Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static surface #1.plt Run By: AGS 6/9/2020 04:49PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

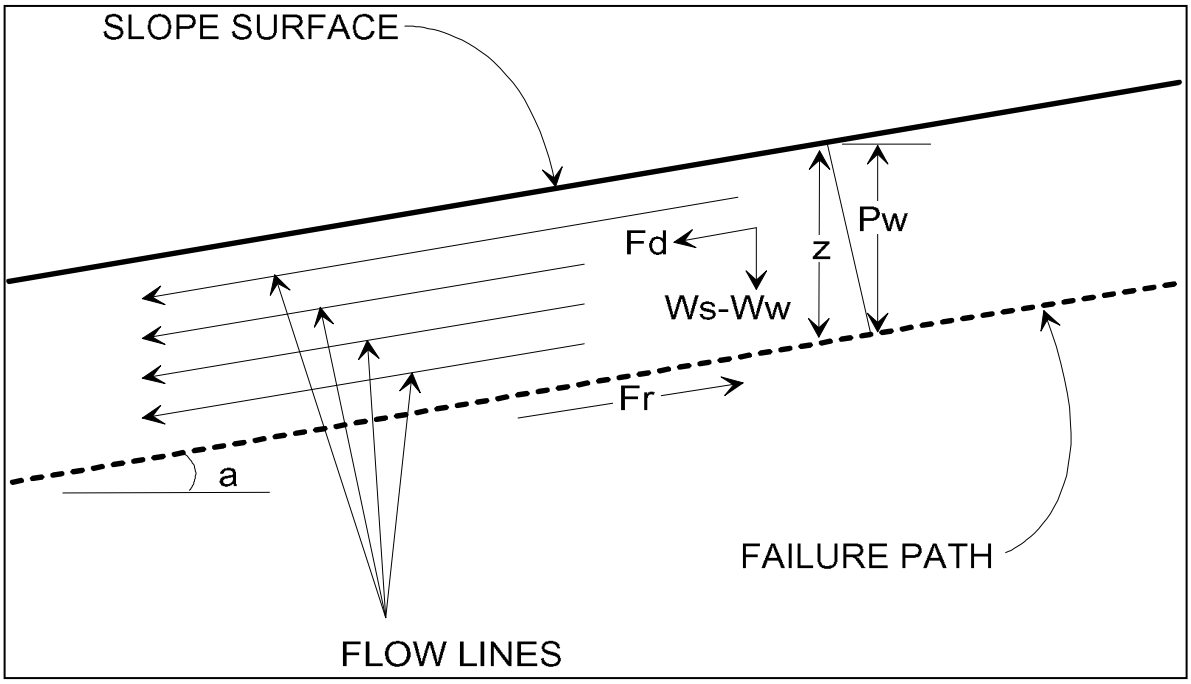
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.221

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
125	3	26.56505	0.463648	31	0.541052	150

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	240.27	**1.60**

2004-01 OVTC 72 ft Cut Slope - Static

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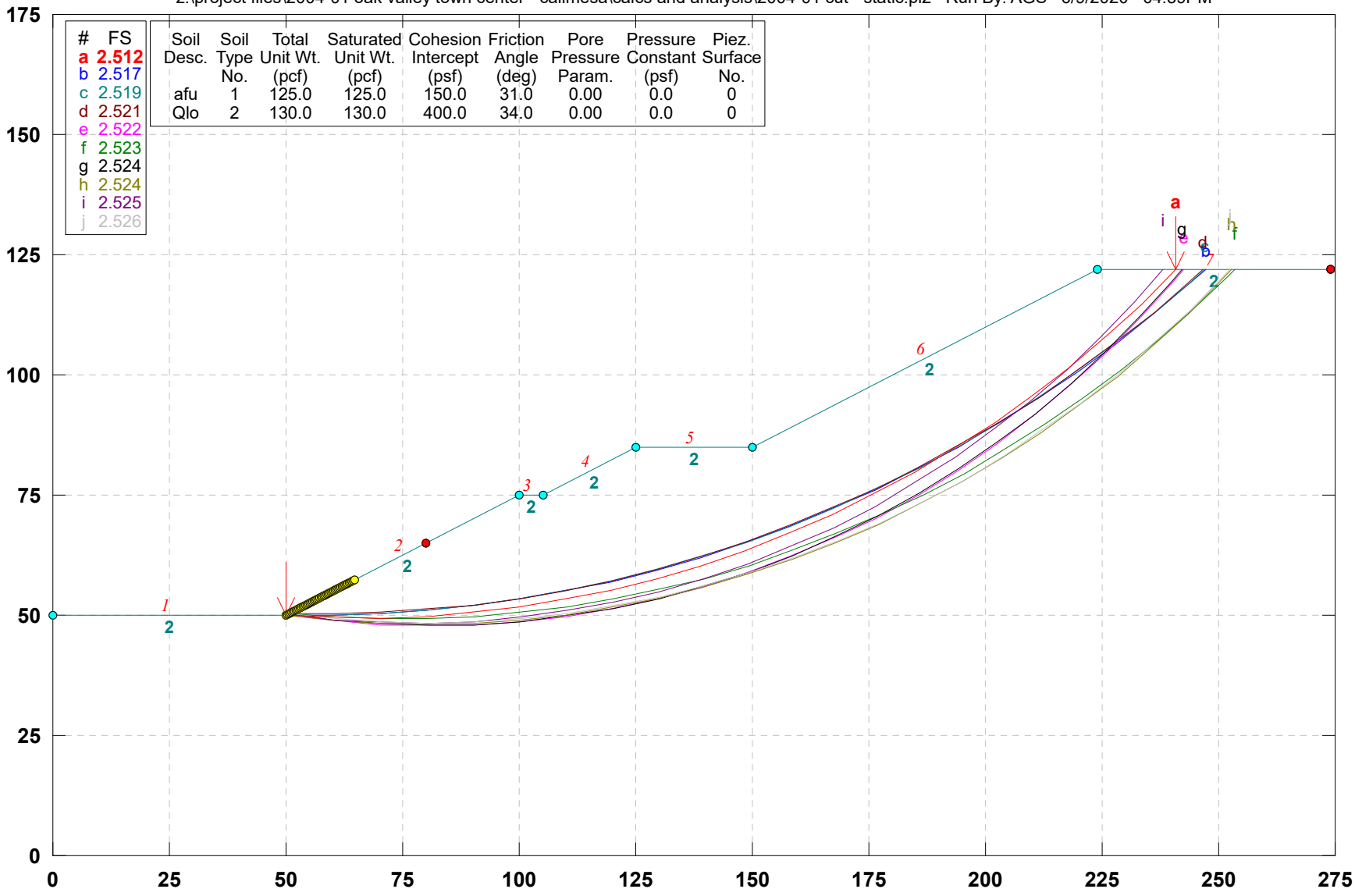


GSTABL7 v.2 FSmin=2.512

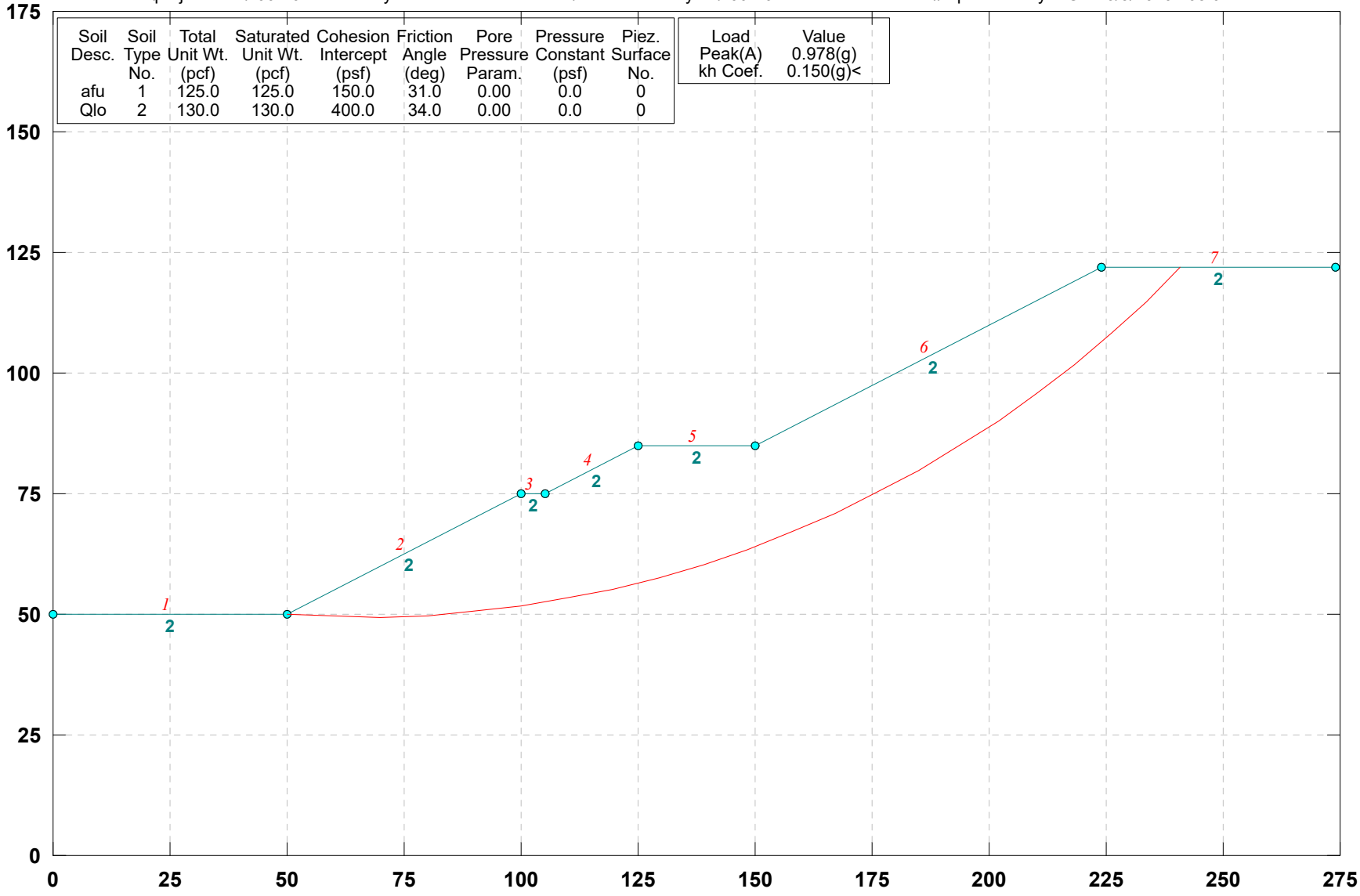
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 72 ft Cut Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static surface #1.plt Run By: AGS 6/9/2020 05:01PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

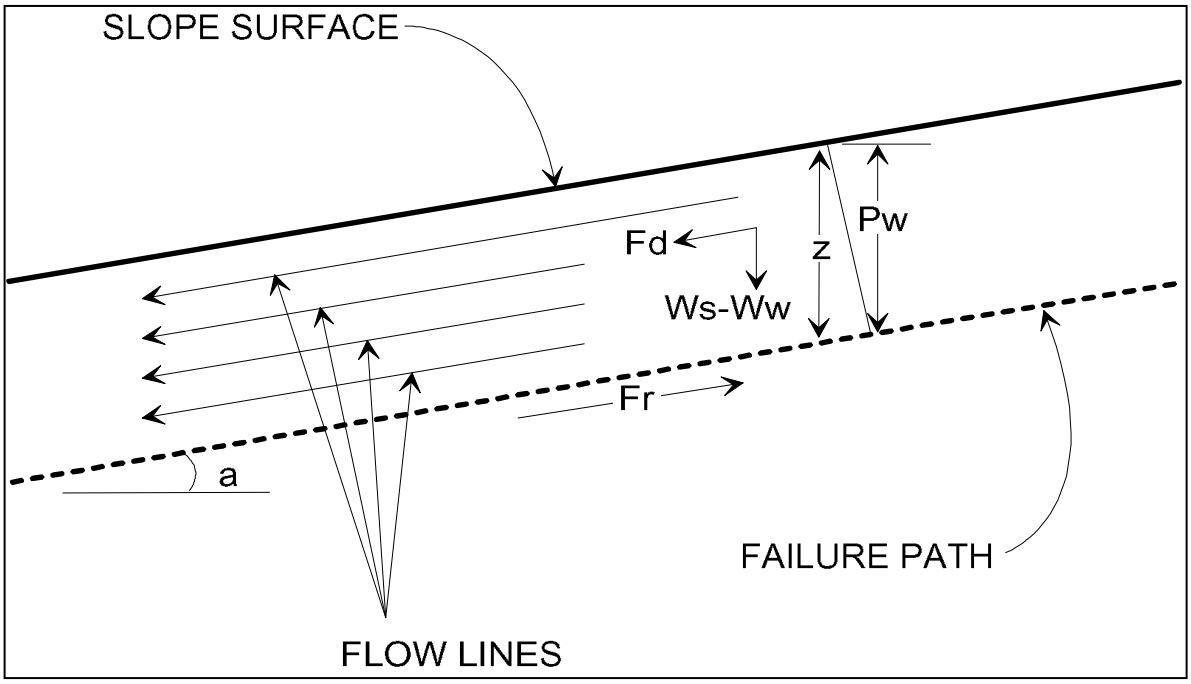
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.727

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
130	3	26.56505	0.463648	34	0.593412	400

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	156.00	509.43	**3.27**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All clearing and grubbing, remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be

properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspoles, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant. Environmental evaluation of existing conditions is not the responsibility of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be processed or scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 12 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant and do not inhibit the ability to properly compact fill materials.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to ½ the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall observe all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Civil Engineer.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation

by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials to achieve compaction is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill will be tested and evaluated by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content is not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

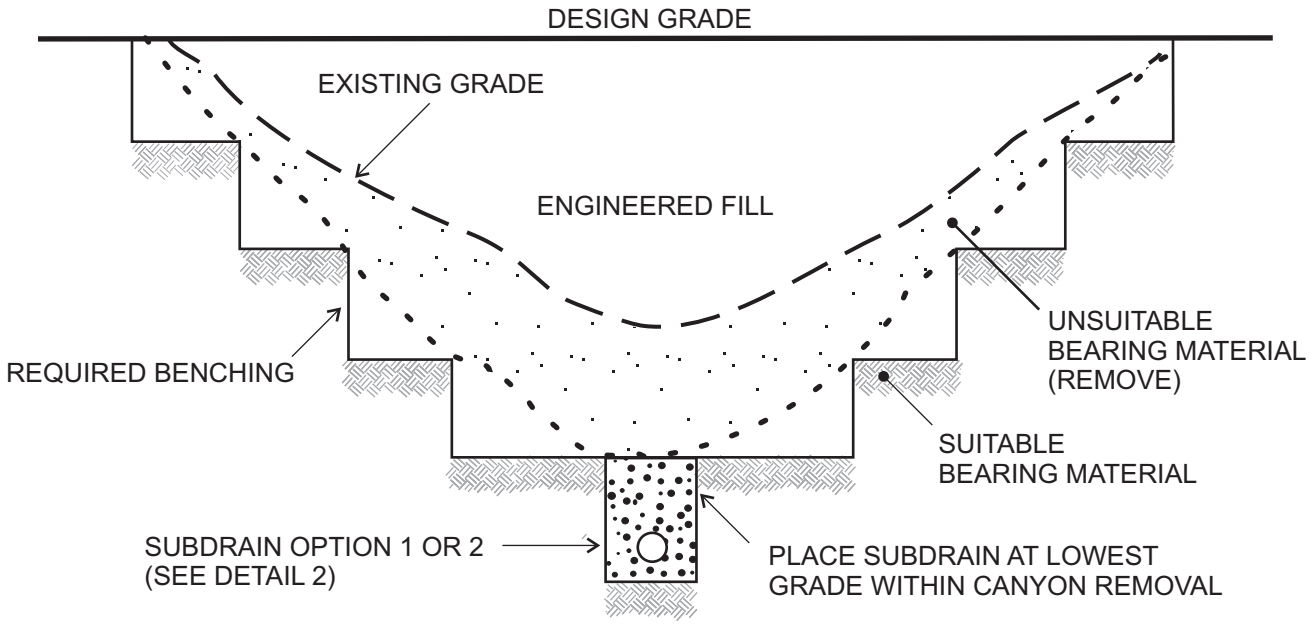
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals approximately two feet in fill height.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

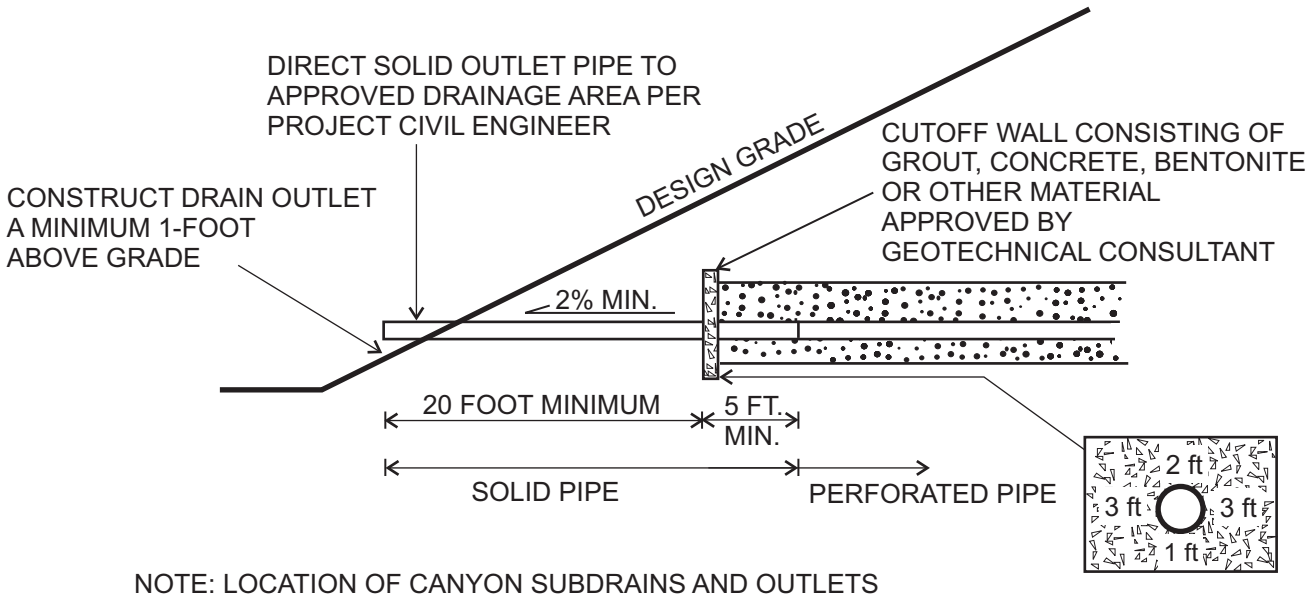
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results.



CANYON SUBDRAIN PROFILE



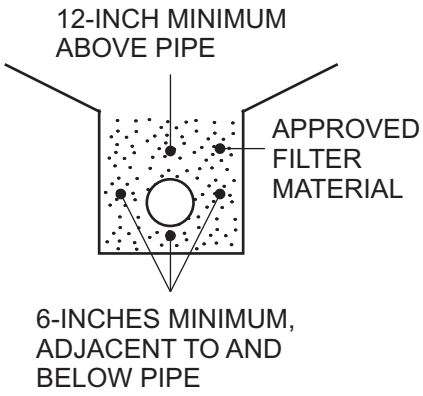
NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

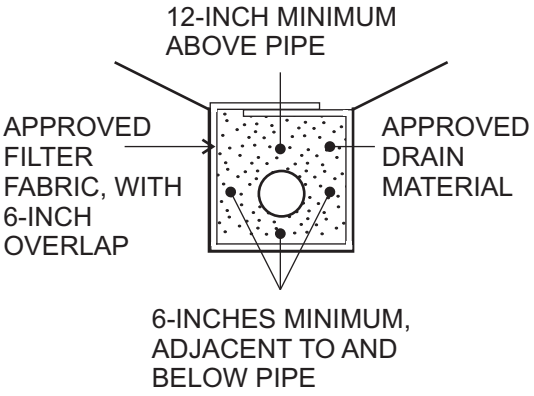
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

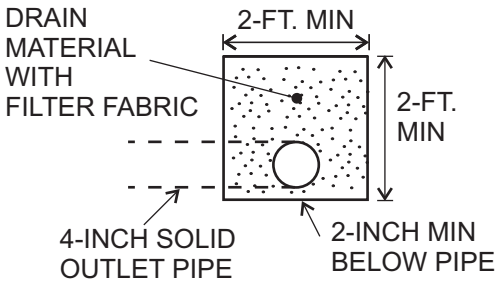
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

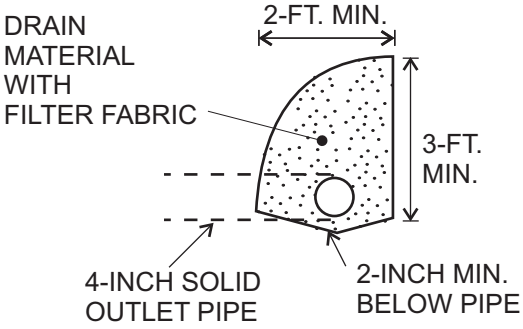
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

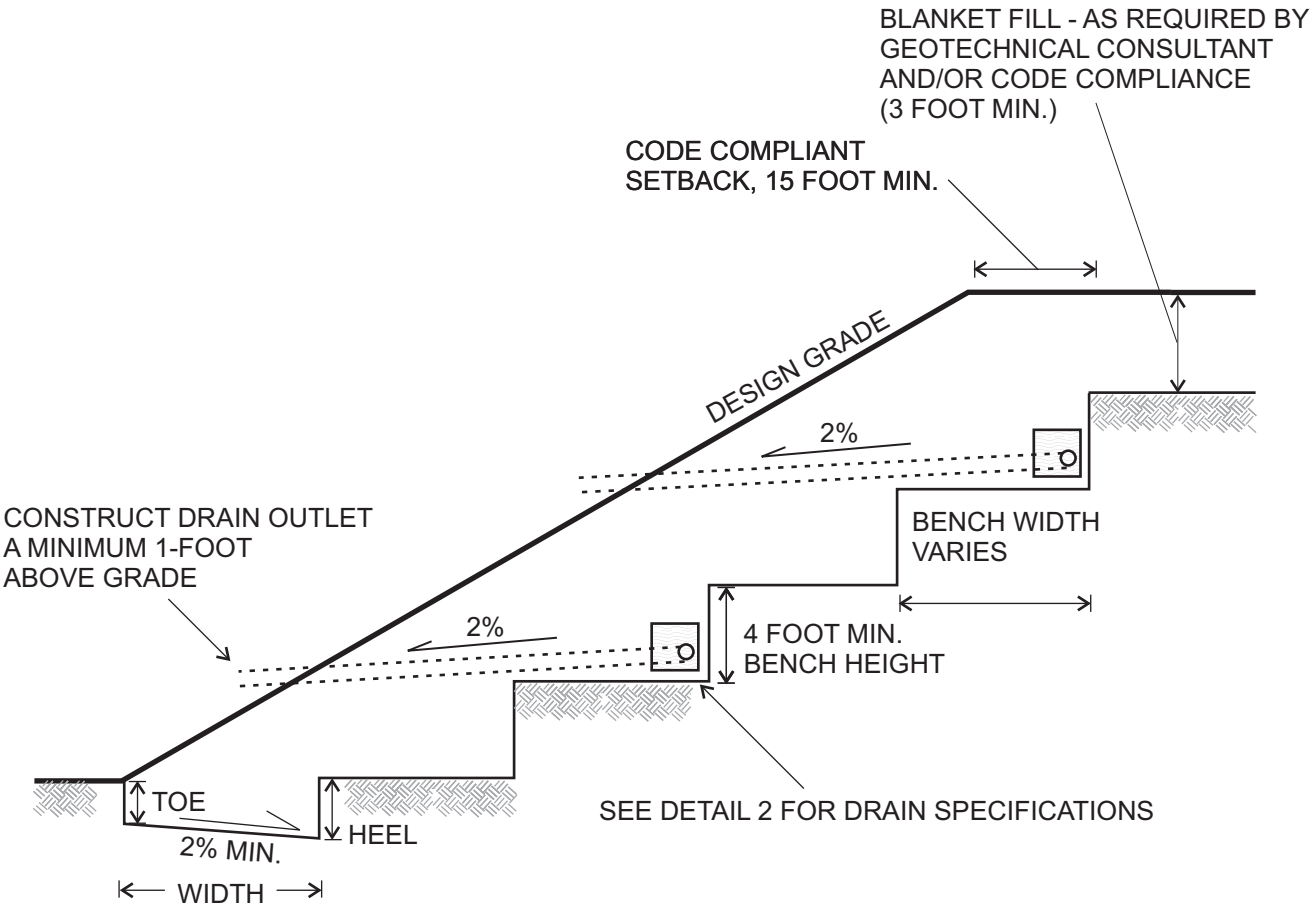
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

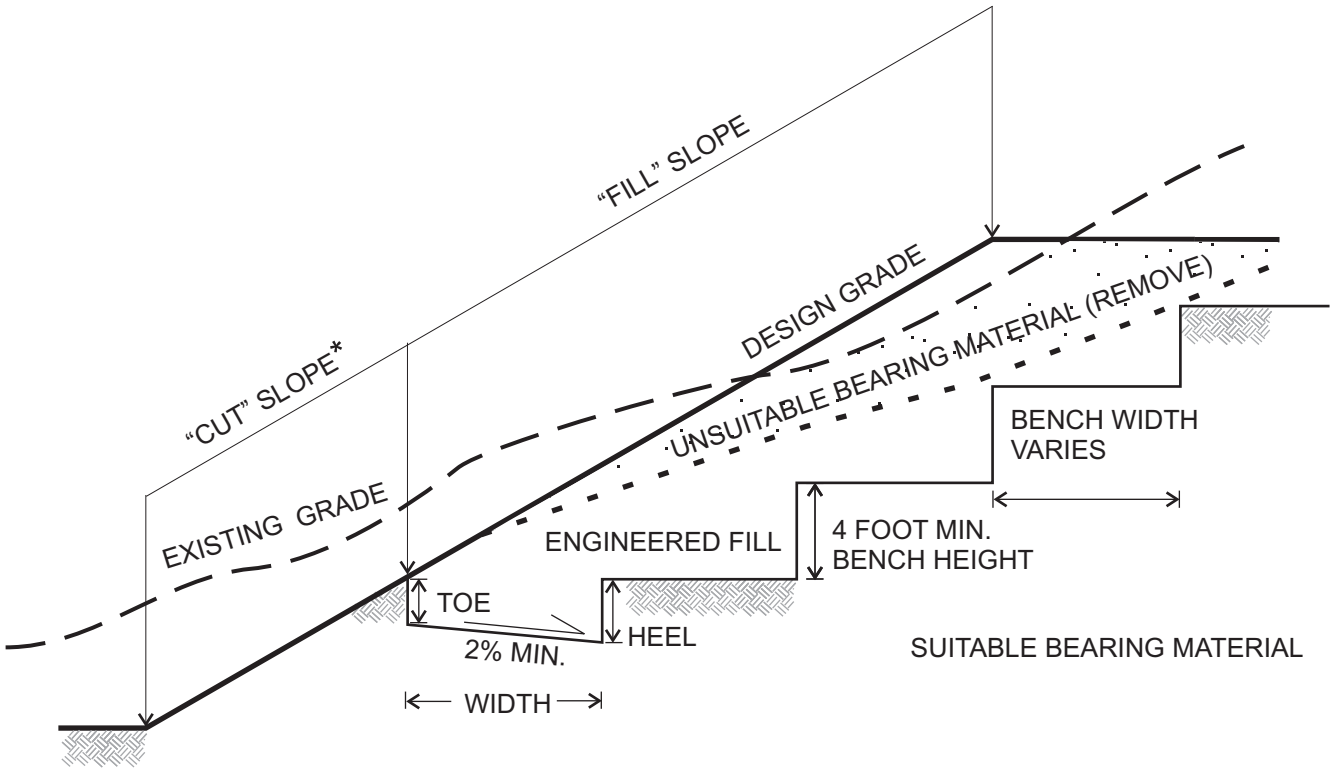
NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

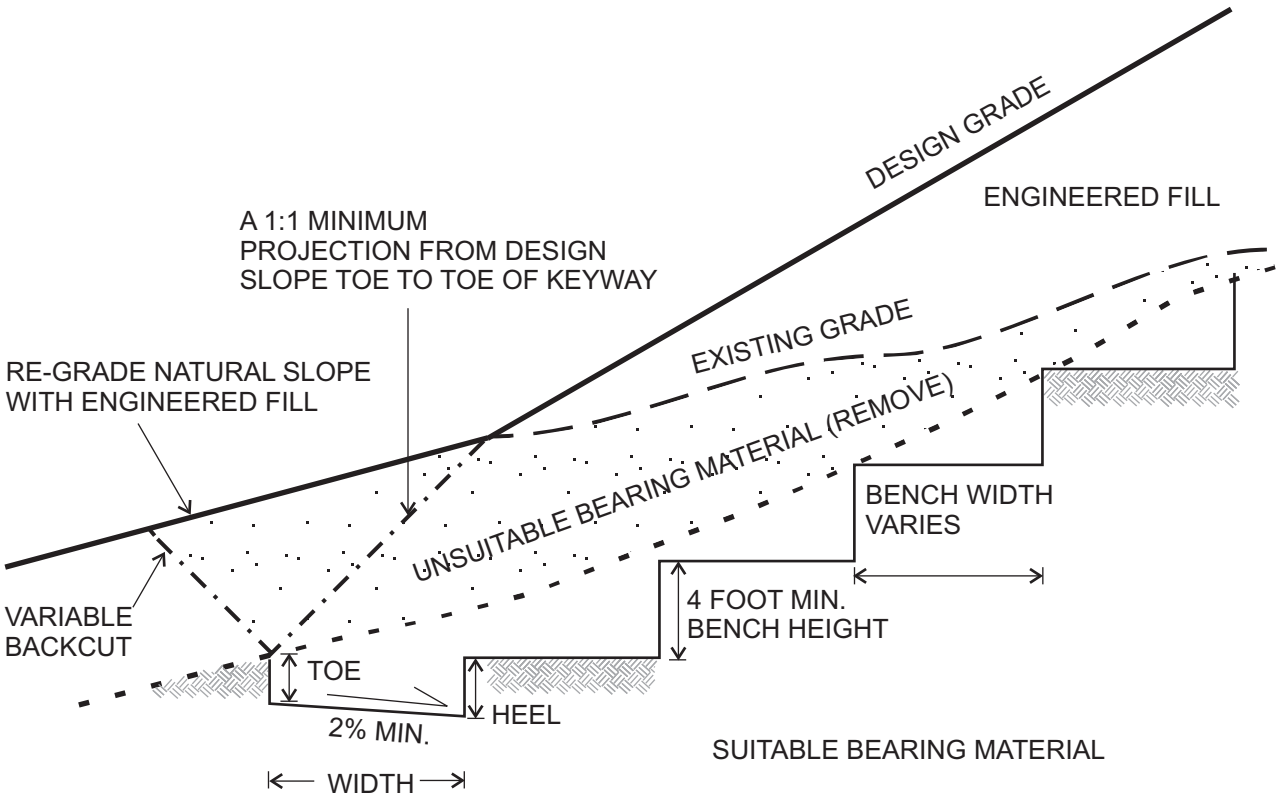
2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0 NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

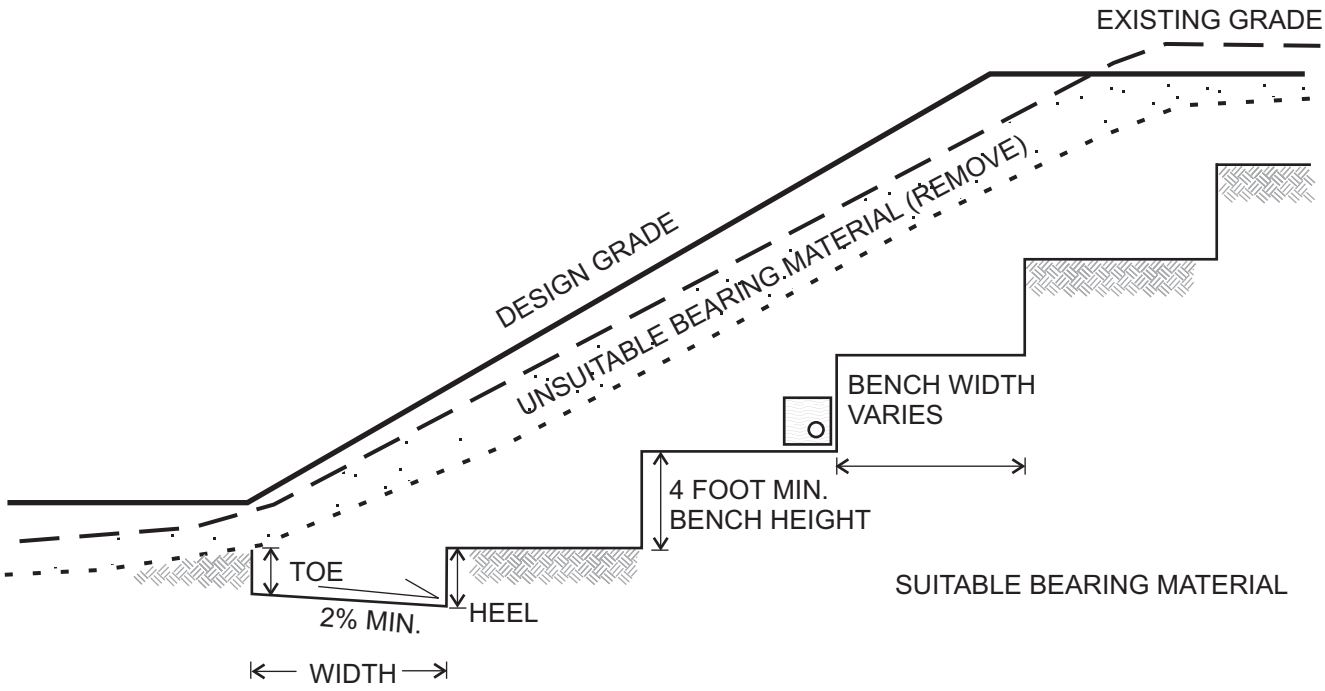
3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

VER 1.0 NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

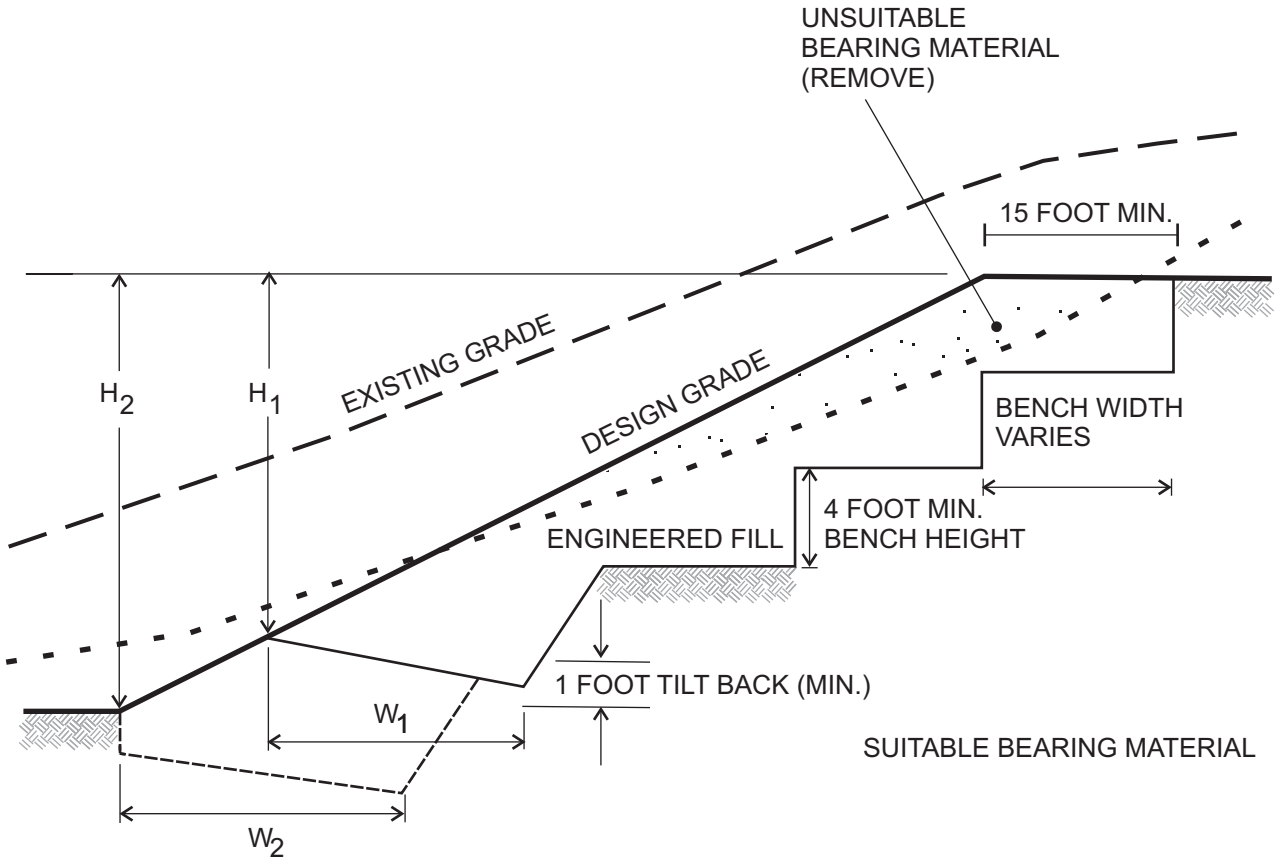
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

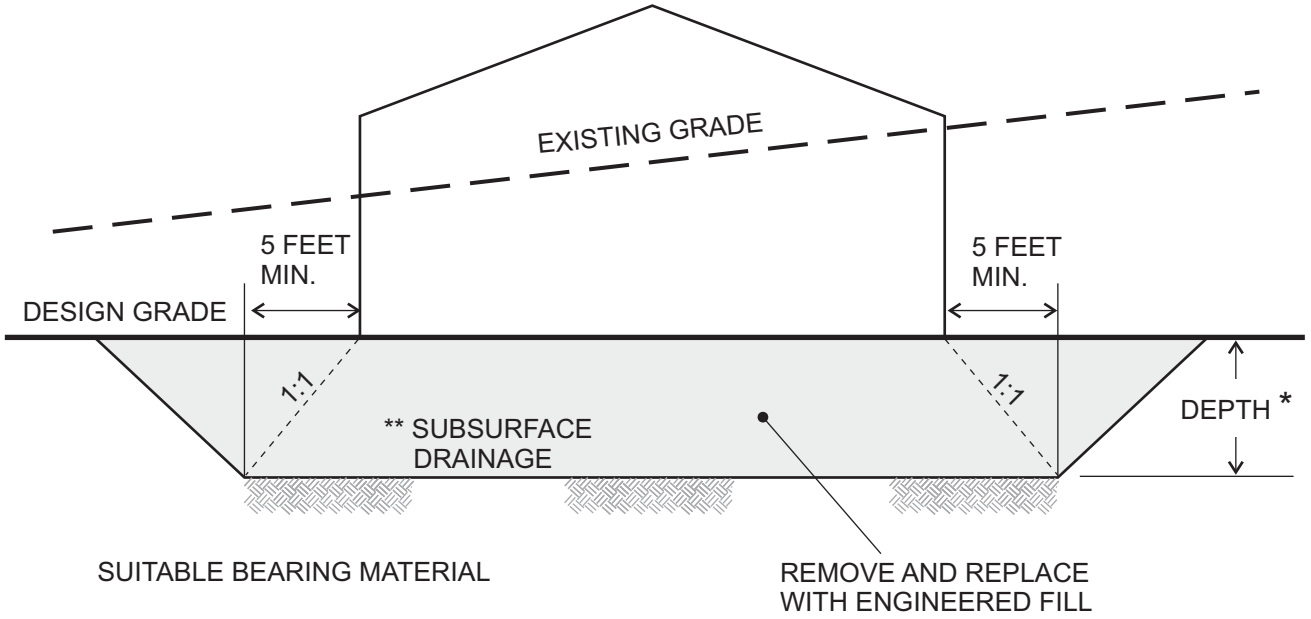
VER 1.0

NTS

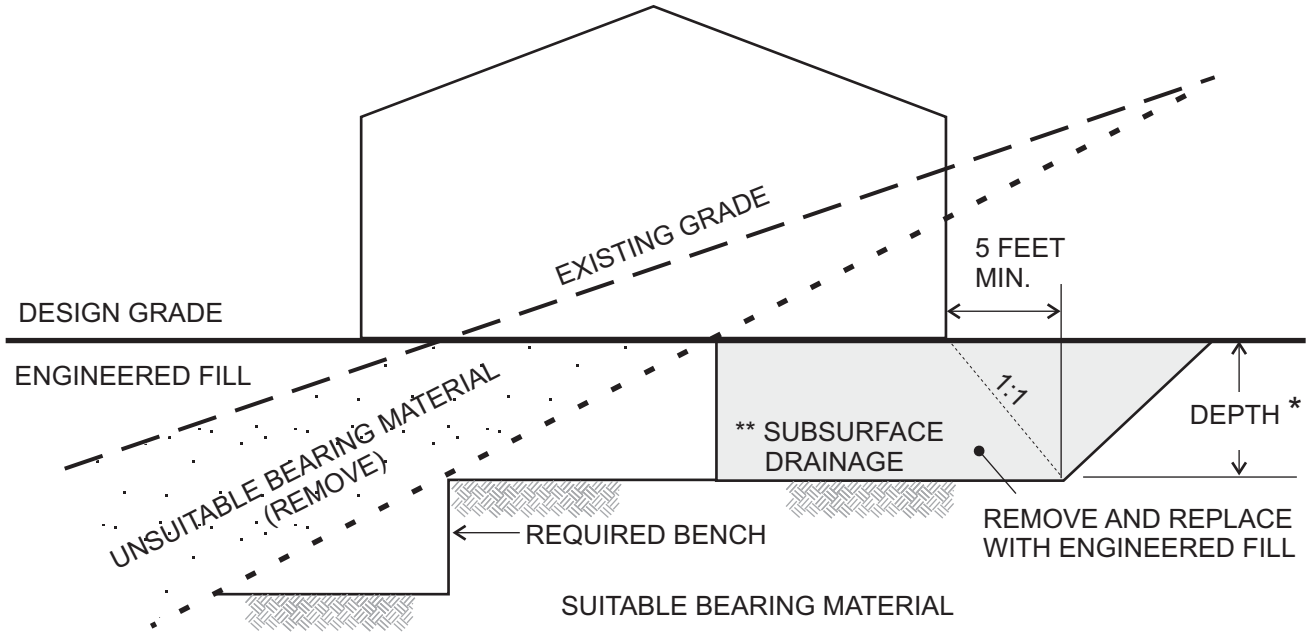
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

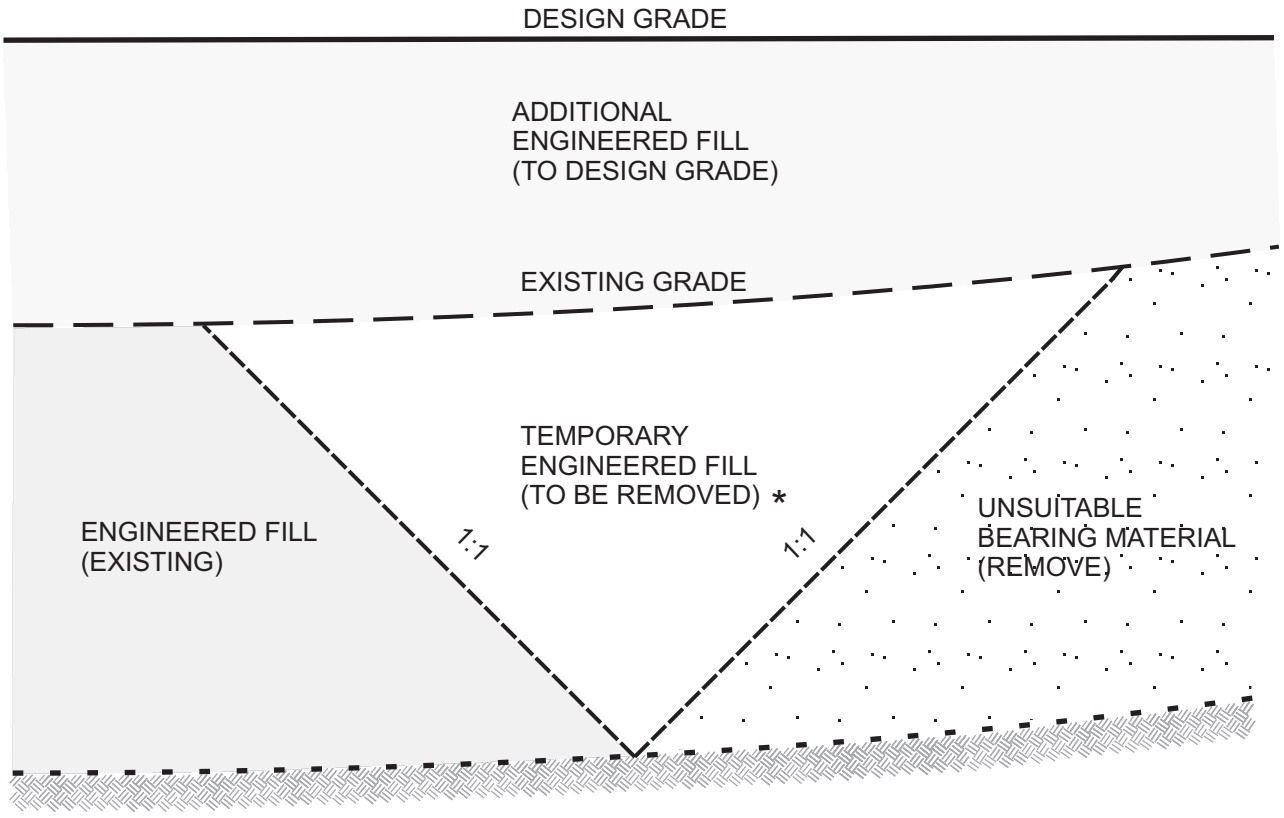
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0 NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

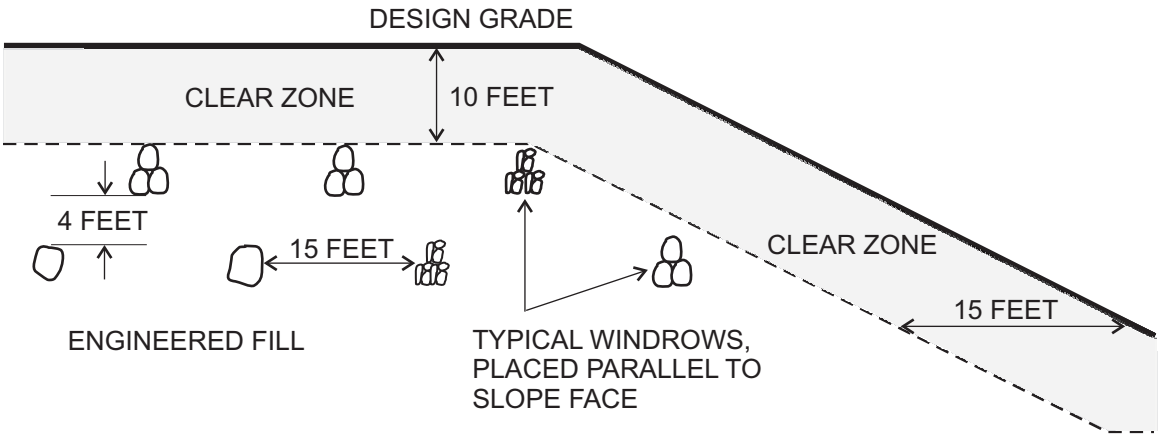
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

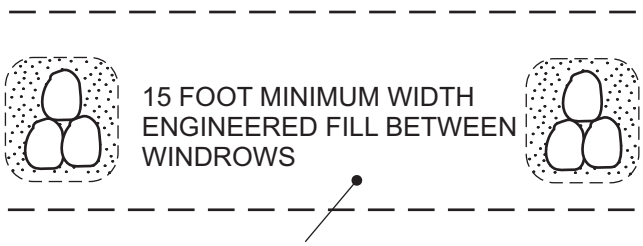
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

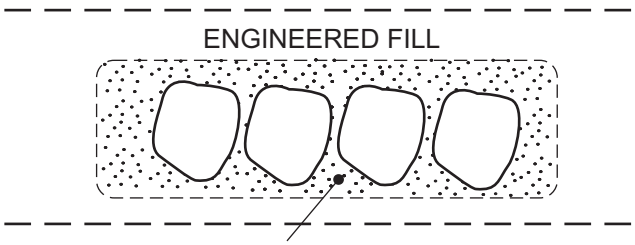
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

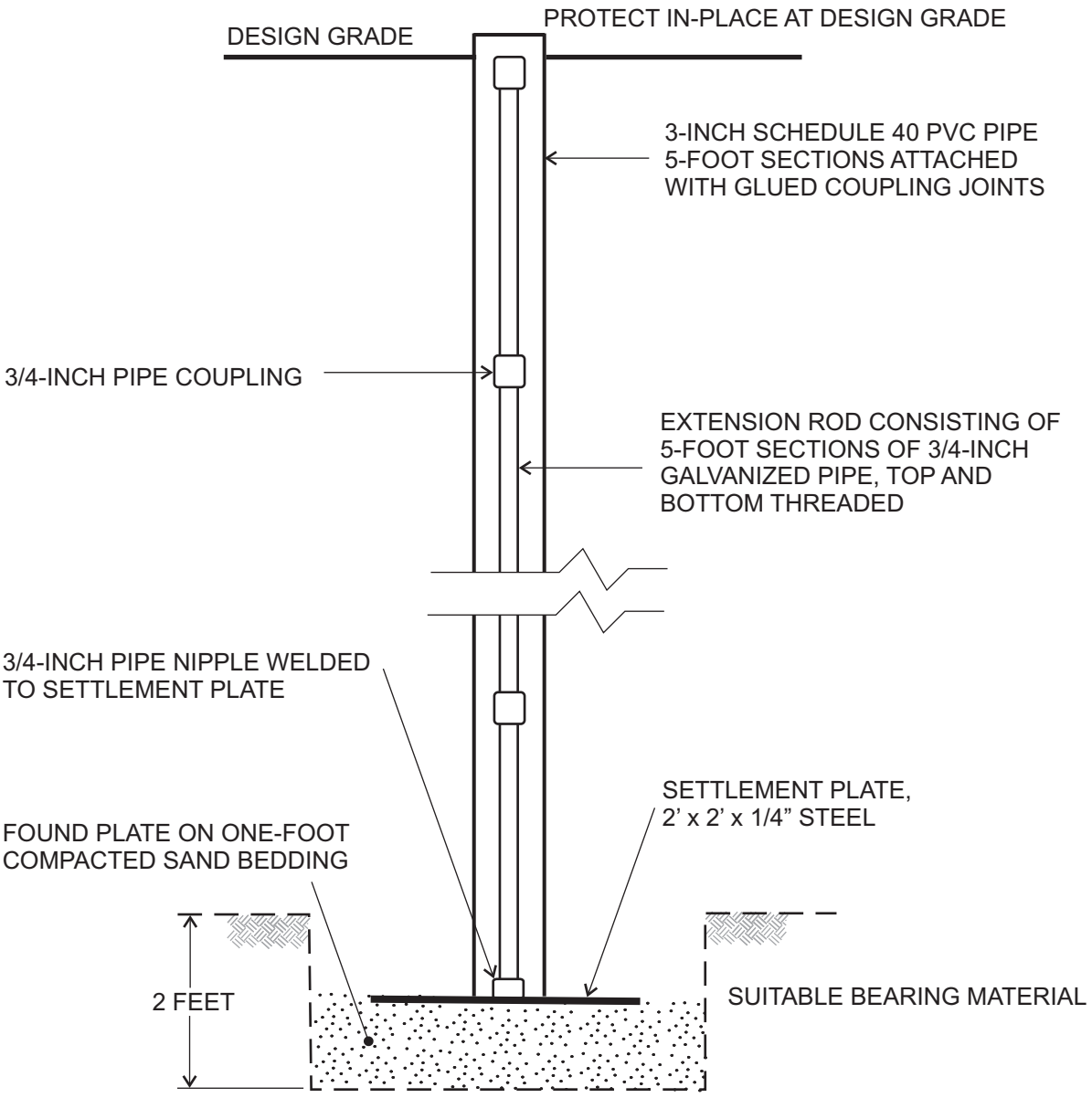
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

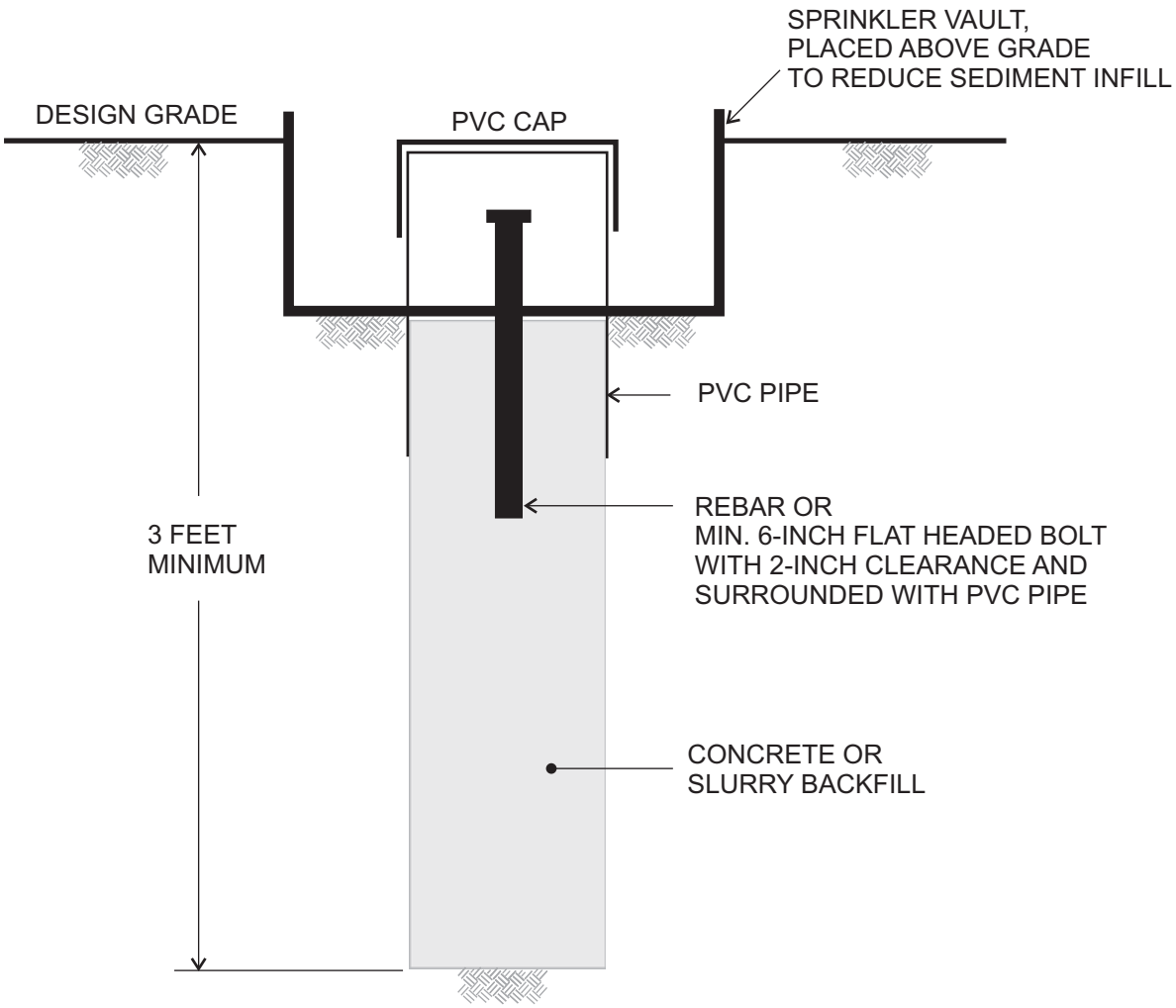
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT MONUMENT

DETAIL 12

LEGEND

afu	ARTIFICAL FILL - UNDOCUMENTED
Qya	YOUNG ALLUVIUM (DESIGNATION FOR ALL HOLOCENE, ALLUVIUMS ENCOUNTERED ONSITE)
Qoa	OLDER ALLUVIUM
$Qvof_3$	VERY OLD ALLUVIAL-FAN DEPOSITS
Qlo	SEDIMENTARY DEPOSITS OF LIVE OAK CANYON
T-22	APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (AGS, 2020)
B-37	APPROXIMATE LOCATION OF EXPLORATORY BORING (PSE)
AGS-18	APPROXIMATE LOCATION OF EXPLORATORY BORING (AGS, 2020)
SCG-10	APPROXIMATE LOCATION OF EXPLORATORY BORING (SCG, 2020)
	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
15	ESTIMATED REMOVAL DEPTH (IN FEET)
O.X. 5	PROPOSED BUILDING OVEREXCAVATION DEPTH (IN FEET)
	POSSIBLE INFILTRATION AREAS TO BE VERIFIED BY TESTING
	PROPOSED KEYWAY
8	PROPOSED SUBDRAIN WITH SIZE IN INCHES

PARCEL "A"
LLA. 05-002
INST. NO. 2005-0324926 O.R.

B-81 B

0-25.0' Qal
25.0-36.0' Qoa
T.D.=36.0'
No Water
No Caving

Install Stub for Future Development?

PROJECT BOUNDARY

15X2X3 Keyway

B'

$Qvof_3$

O.X. 5

T-15

0-8.0' Qal
8.0-25.0' Qoa
T.D.=26.0
No Water

GRADING AVOIDANCE AREA, TYP.

AGS-1

0-4.0' Qal
4.0-9.5' $Qvof_3$
T.D.=9.5'
No Water
No Caving

Qal

afu

Install Stub for Future Development?

$Qvof_3$

EXISTING STRUCTURES TO BE REMOVED, TYP.

0-15.0' Qal
15.0-50.1' Qoa
T.D.=50.1'
No Water

AGS-17

EXISTING MISC. ITEMS TO BE REMOVED & DISPOSED

0.0-25.0' $Qvof_3$
T.D.=25.0'
No Water

SCG-2

T-1

0-6.5' Qal
6.5-11.0' $Qvof_3$
T.D.=11.0'
No Water
No Caving

EXISTING WALLS TO BE REMOVED

EXISTING STRUCTURES REMOVED

SCG-1

0-13.5' Qal
13.5-49.3' Qoa
T.D.=49.3'
No Water
No Caving

Install Subdrain in Future

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

GRADING AND PROPOSED FUTURE FREEWAY OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

15X2X3 Keyway

EXISTING 30" RCP

EXISTING 36" RCP

EXISTING 48" RCP

GRADING LIMITS

CALTRANS R/W & PROJECT BOUNDARY

40' ±

WRITTEN GRADING PERMIT CLEARANCE OR PERMITS REQUIRED FROM CALTRANS PRIOR TO START OF GRADING

15X2X3 Keyway

A A'

GRADING AND OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

GRADING LIMITS

APN 413-190-006

40' WIDE ROAD & UTILITY EASEMENT (WOODHOUSE RD.)

ROBERTS ROAD

Qlo

Qal

afu

EXISTING DIRT ROAD

CAUTION: EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING POLES AND POWER LINES TO BE REMOVED, TYP.

0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

0-2.0 Topsoil

R/W

SEE SHEET 12

SEE SHEET 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
3. PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE

EXISTING EASEMENT NOTES:

24. EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
    - GRANTED TO: RIVERSIDE COUNTY
    - PURPOSE: PUBLIC HIGHWAY AND PUBLIC UTILITIES
    - RECORDED: NOVEMBER 20, 1945, IN BOOK 714 PAGE 216 O.R.
    - AFFECTS: AS SET FORTH IN SAID DOCUMENT

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
	ENGINEER		REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

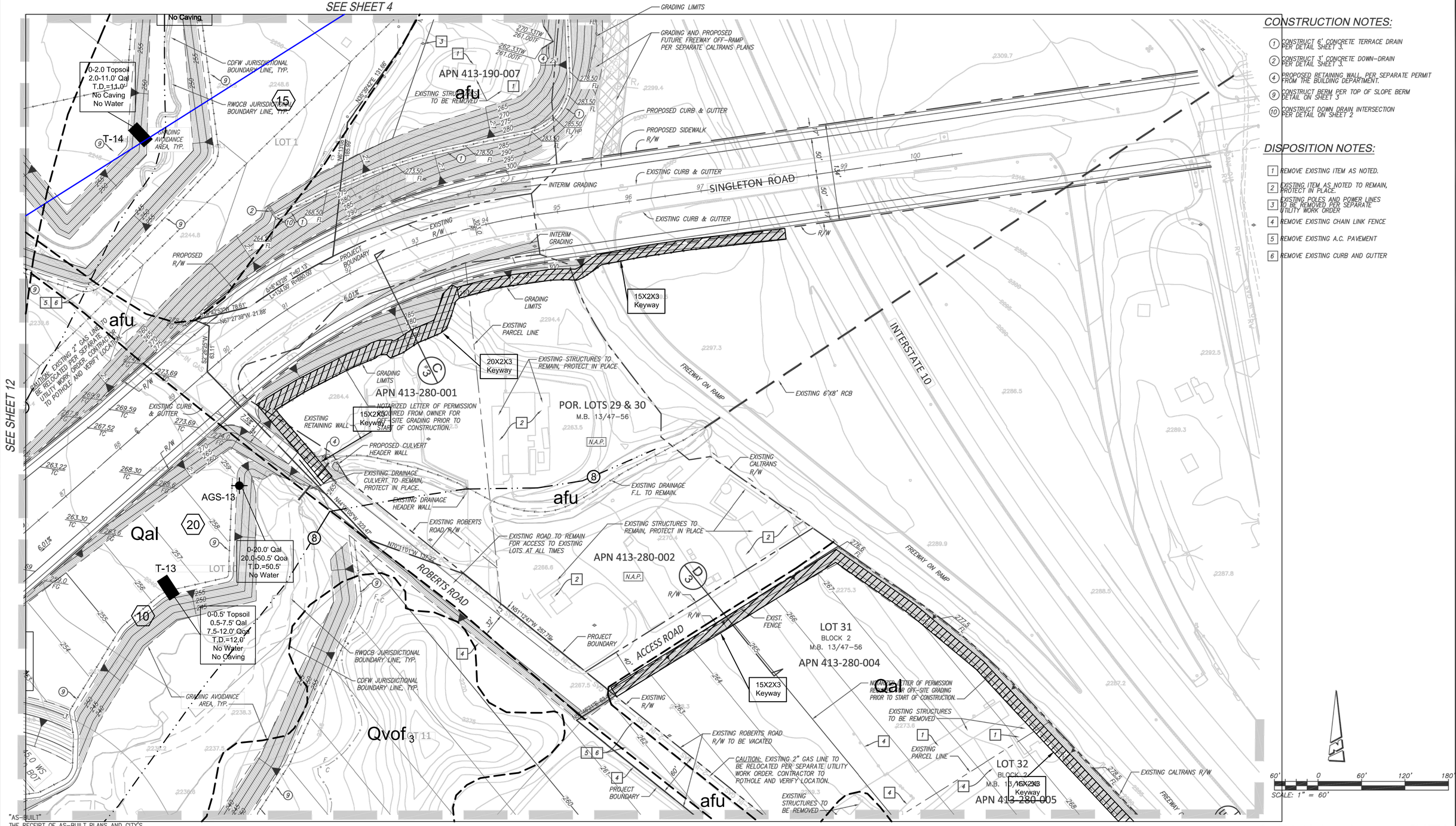
4 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg



CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
9. CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP: _____

See Plate 1 for Legend — PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM — ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

5 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberto
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 5

SEE SHEET 11

SEE SHEET 7

SEE SHEET 9

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING WEST
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 28.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

6 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

Plotted: Dec 10, 2020 - 10:42am By: gherta
DWG: N:\01_169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

LOT 32
BLOCK 2
M.B. 13/47–56

APN 413-280-005

APN 413-280-006

APN 413-280-007

APN 413-280-008

EXISTING PARCEL LINE

PROJECT BOUNDARY

INTERSTATE 10

EXISTING 30" RCP

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

A.P.N.413-280-009

A.P.N.413-280-010

EXISTING CALTRANS R/W

EXISTING DOUBLE 48" CMP

EXISTING BORING PIT PER CROSSING I-10 PLANS PERMIT NO. 08-05-6-UU-1116

EXISTING 48" CMP

N64°25'37"W 396.38'

N.A.P.

EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 4" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 2" GAS LINE TO BE RELOCATED PER / SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING COPPER DRIVE R/W TO BE VACATED

EXISTING ROBERTS ROAD R/W TO BE VACATED

EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING TELEPHONE LINE, PRIOR TO CONSTRUCTION CONTRACTOR TO VERIFY LOCATION.

EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

LOT 18
PARCEL MAP 19207
P.M. 127/10–11

A.P.N.413-280-034

A.P.N.413-280-035

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

CAUTION: EXISTING 24" DIP (CLASS 300) ZONE 11 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

CAUTION: EXISTING 16" DIP (CLASS 300) ZONE 12 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

EXISTING PARCEL LINE

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXIST. ROBERTS ROAD R/W TO BE VACATED

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXISTING PARCEL LINE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

LOT 14

LOT 15

LOT 16

LOT 17

ROBERTS ROAD

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY

RWQCB JURISDICTIONAL BOUNDARY

CUT/FILL LINE

EXISTING 90' SCE 20.00' SDGE FORCE MAIN EASEMENT

PROJECT BOUNDARY

PARCEL 9
P.M. NO. 33105
P.M. 243/99–111

TRACT BOUNDARY

TRACT 32702

N36°55'25"W 170.0

N84°30'34"W 299.43

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. NOTARIZED LETTER OF PERMISSION REQUIRED FROM SEWER AGENCY FOR GRADING OVER EXISTING SEWER PIPE PRIOR TO START OF CONSTRUCTION.

SEE SHEET 6

SEE SHEET 8

SEE SHEET 9

AGS-14

AGS-15

AGS-10

0-0.5' Topsoil
0.5-8.0' Qal
8.0-12.0' Qvof
T.D.=12.0'
No Water
No Caving

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-1.0' Topsoil
1.0-13.0' Qal
T.D.=13.0'
No Water
No Caving

0-0.5' Topsoil
0.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

60' 0 60' 120' 180'
SCALE: 1" = 60'

See Plate 1 for Legend PLATE 4

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

811 Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

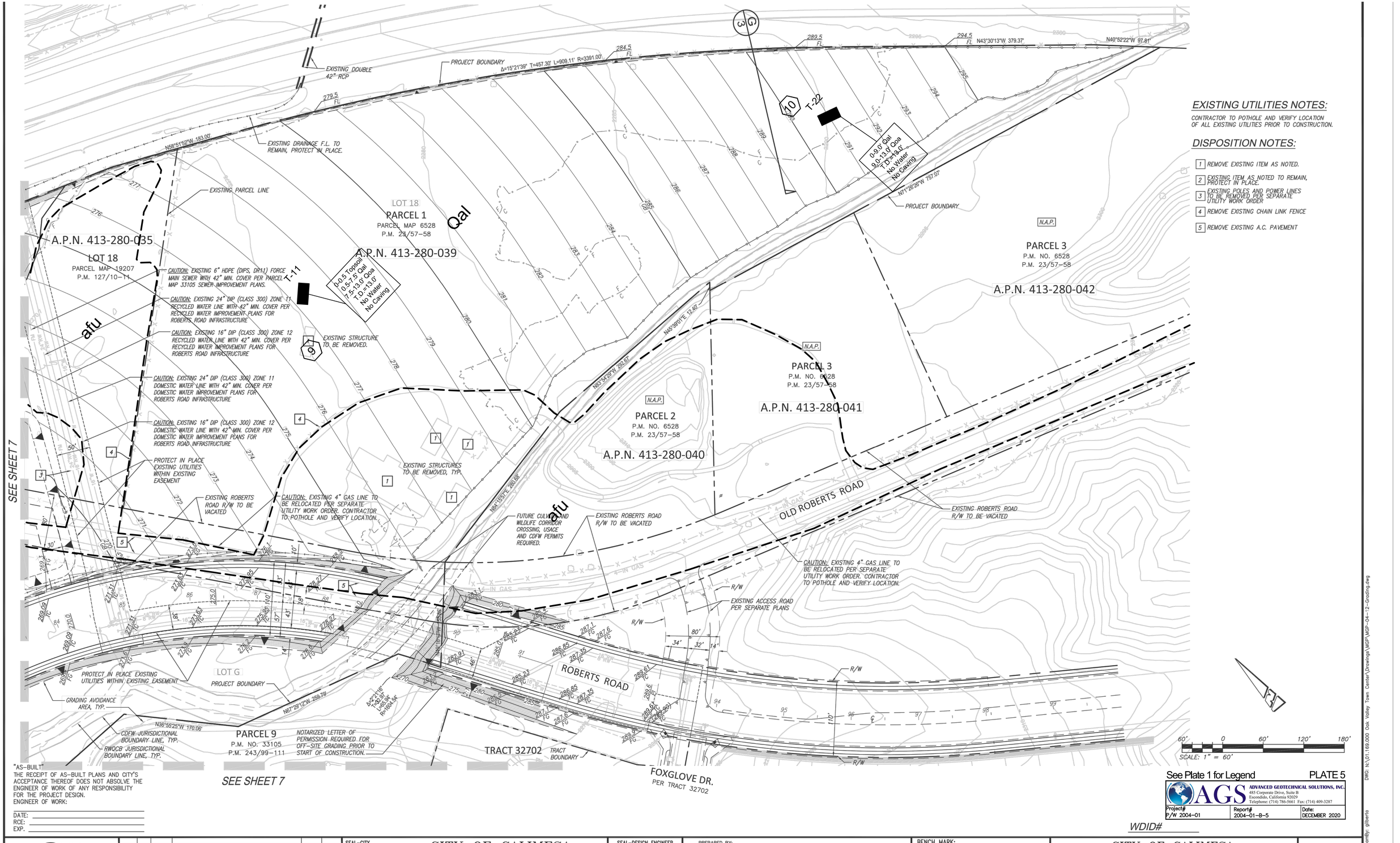
7 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 – 10:43am By: gilberta
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg



EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY

REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER

REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

8 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:43am By: gilberto DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MSP-04-12-Grading.dwg

SEE SHEET 6

SEE SHEET 10

SEE SHEET 7

SCG-9
0-10.0' Qal
10.0-25.0' Qoa
T.D.=25.0'
No Water

T-17
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-5
0-4.0' Qya
4.0-26.0' Qoa
T.D.=26.0'
No Water

B-94
0-12' Qal
12-50.0' Qoa
T.D.=50.0'
No Water

T-8
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-15

AGS-10
0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

T-21
0-3.5' Qal
3.5-11.0' Qoa
T.D.=11.0'
No Water
No Caving

15X2X3 Keyway

15X2X3 Keyway

afu

EXISTING STRUCTURES TO BE REMOVED, TYP.

EXISTING STRUCTURES TO BE REMOVED, TYP.

45.0 WS
37.0 BOT

LOT 9
LOT C
LOT 3
LOT 15
LOT 16
LOT 5

Qal

Qal

Qal

ST4

ROBERTS ROAD

ROBERTS

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 9
P.M. NO. 33105
P.M. 243/99-111

TRACT 32702
TRACT BOUNDARY

TRACT 32702
TRACT BOUNDARY

GRADING AVOIDANCE AREA, TYP.

PROJECT BOUNDARY

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

EXISTING PARCEL LIINE

PROJECT BOUNDARY

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. CONTRACTOR TO POTHOLE AND VERIFY.

EXISTING 20.00' FORCE MAIN EASEMENT

M

M'

N

N'

L=140.57'
T=94.17'
R=350.00'
N40°35'10"E 164.17'
N12°03'25"E 150.84'
N1°43'09"E 133.04'
N0°10'01"E 161.34'

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1 REMOVE EXISTING ITEM AS NOTED.

4 REMOVE EXISTING CHAIN LINK FENCE

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

9 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01\169.000 Oak Valley Town Center\Drawings\MGP\04-12-Grading.dwg

SEE SHEET 11

Qlo
CUT/FILL LINE
Qal
Qlo
SCG-5
0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water
0-26.5' Qlo
T.D.=26.5'
No Water
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
Qal
AGS-4
0-35.0' Qal
35.0-45.5' Qoa
T.D.=45.5'
No Water
PAD=223.9
afu
EXISTING STRUCTURES TO BE REMOVED, TYP.
SCG-9
SCG-7
0-8.5' Qal
8.5-55.0' Qoa
T.D.=55.0'
No Water
ST5
ST7
ST6
T-16
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving
LOT 4
SCG-6
0-25.0' Qoa ?
T.D.=25.0'
No Water
0-4.0' Qal
4.0-8.0' Qoa
8.0-12.0' Qya
T.D.=12.0'
No Water
No Caving
Qlo
TEMP. SEWER LIFT STATION PAD
PAD=186.0
T-4
Qal
0-18.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water
AGS-18
GRADING AVOIDANCE AREA, TYP.
0-8.5' Qal
8.5-25.0' Qoa
T.D.=25.0'
No Water
SCG-8
15X2X3 Keyway
PROJECT BOUNDARY
EXISTING 100' WIDE DRAINAGE, GRADING & SLOPES EASEMENT
Δ=67°29'06" T=801.59'
L=1413.40' R=1200.00'
C.L. 4' WIDE
NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF-SITE GRADING PRIOR TO START OF CONSTRUCTION.
0-7.0' Qal
7.0-51.5' Qoa
T.D.=51.6'
No Water
AGS-6
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.

[4] REMOVE EXISTING CHAIN LINK FENCE

SEE SHEET 9

EXISTING EASEMENT NOTES:

(21) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: MARCH 9, 1971, INSTRUMENT NO. 23255 OF OFFICIAL RECORDS
AFFECTS: AS SET FORTH IN SAID DOCUMENT

(23) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: SUNCAL SUMMERWIND RANCH LLC
PURPOSE: DRAINAGE, GRADING & SLOPE EASEMENT
RECORDED: AUGUST 28, 2006, INSTRUMENT NO. 2006-0632646
AFFECTS: AS SET FORTH IN SAID DOCUMENT

S-BUILT"
E RECEIPT OF AS-BUILT PLANS AND CITY'S
CCEPTANCE THEREOF DOES NOT ABSOLVE THE
GINEER OF WORK OF ANY RESPONSIBILITY
R THE PROJECT DESIGN.
GINEER OF WORK:

TE: _____
E: _____
P. _____

See Plate 1 for Legend PLATE 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

60' 0 60' 120' 180'
SCALE: 1" = 60'

WDID#

811 now what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER MICHAEL THORNTON No. C44226 Exp. 6/30/21 CIVIL STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER GEORGE ALAN LENFESTEY No. 45920 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

10 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 12

SEE SHEET 6

SEE SHEET 10

CONSTRUCTION NOTES:

(2) CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
(3) PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
(4) PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
(5) CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
(8) CONSTRUCT 3' CONCRETE BROW DITCH PER DETAIL ON SHEET 3
(9) CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.
[4] REMOVE EXISTING CHAIN LINK FENCE

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

0-1.0' Topsoil
1.0-10.0' Qal
10.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

0-8.5' Qal
8.5-18.5' Qoa
18.5-24.0' Qlo
T.D.=24.0'
No Water

0-2.0' Topsoil
2.0-65.0' Qlo
T.D.=65.0'
No Water
Caving @ 5'

0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water

0-26.5' Qlo
T.D.=26.5'
No Water

0-30.0' Qal
30.0-56.5' Qoa
T.D.=56.5'
Seepage @
46.0-56.5'

0-11.5' Qal
T.D.=11.5'
Seepage @10'
Caving below 10

0-60.0' Qal
60.0-71.5' Qoa
T.D.=71.5'
Seepage
11.0-71.5'

0-6.5' afu
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Seepage @
15.0-42'
Caving @ 40'

Stabilize Saturated Removal Bottom

Install Subdrain for Future Development?

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 1
VACANT
RLC PHASE 1
INST. NO. 732045 O.R.

FUTURE SINGLETON ROAD EXTENSION

PROJECT BOUNDARY

EXISTING 100' WIDE DRAINAGE, ROADWAY & SLOPES EASEMENT

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE, SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020
12/10/20 DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

11 OF 23 SHEETS

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 4

PARCEL 14
P.M. NO. 33105
P.M. 243/99–111

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

PROJECT BOUNDARY

CAUTION: EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

B-37
0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

15X2X3 Keyway

AGS-8
0-9.0' Qal
9.0-26.3' Qoa
T.D.=26.3'
No Water

AGS-12
0-50.4' Qlo
T.D.=54.4'
No Water

T-3
0-1.0' Topsoil
1.0-8.0' Qal
8.0-14.0' Qlo
T.D.=14.0'
No Water
No Caving

T-19
0-0.5' Topsoil
0.5-6.5' Qal
6.5-11.0' Qlo
T.D.=11.0'
No Water
No Caving

T-18
PAD=251.9

AGS-2
0-10' Qal
10-25.5' Qlo
T.D.=25.5'
No Water

0-1.0' Topsoil
1.0-6.0' Qal
6.0-12.0' Qoa
T.D.=12.0'
No Water
No Caving

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

B-96
0-6.5 Topsoil
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Water @ 15to42'
Caving @ 40'

Qal
Qlo
Qoa
afu
Qvof 3

ST10
ST11
ST12
ST13
ST9

LOT 2
LOT A
LOT 7

ROBARTS ROAD
SINGLETON ROAD

O.X. 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN–DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V–DITCH PER DETAIL ON SHEET 3
6. CONSTRUCT 12" DRAIN AND PIPE PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2
13. INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

SEE SHEET 5

SEE SHEET 11

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS–BUILT"
THE RECEIPT OF AS–BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 9

WDID# _____

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004–01	2004–01–B–5	DECEMBER 2020

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL–CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL–DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12–31–2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
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SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

12 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

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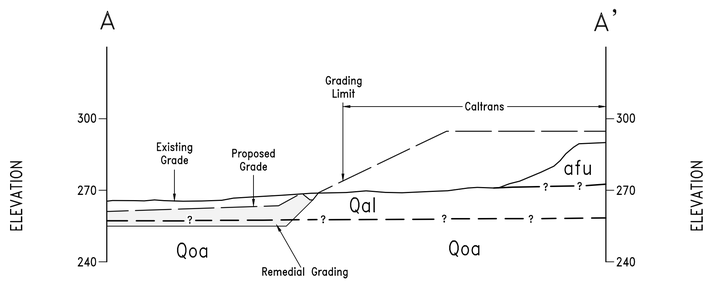
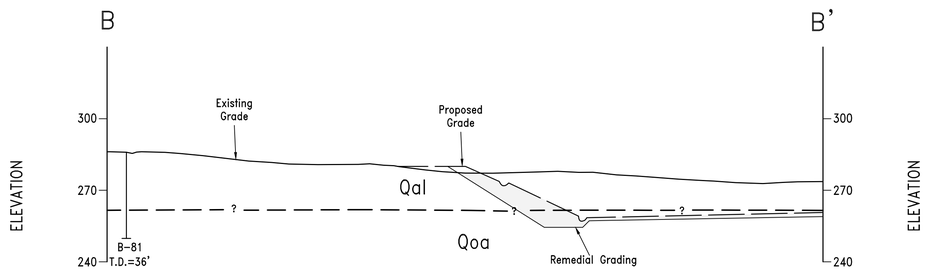
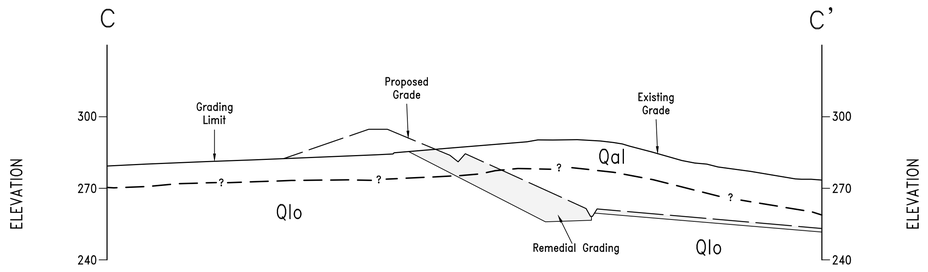
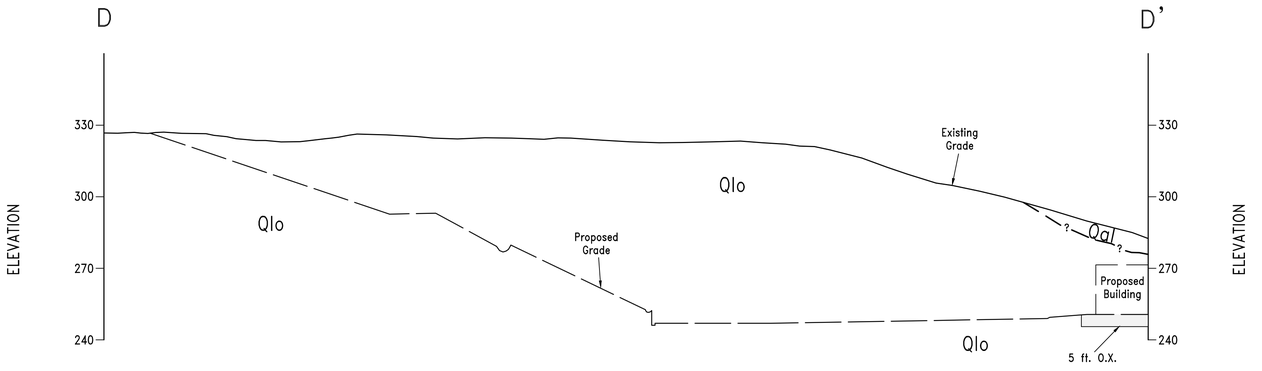
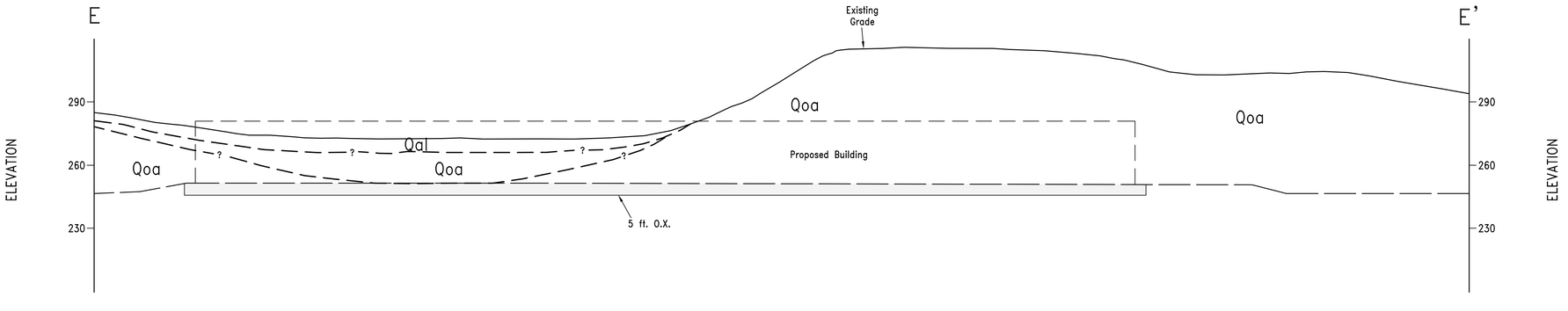
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg











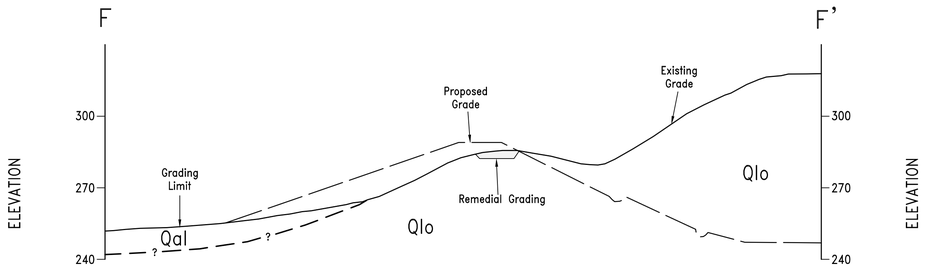
Scale: 1"=30'

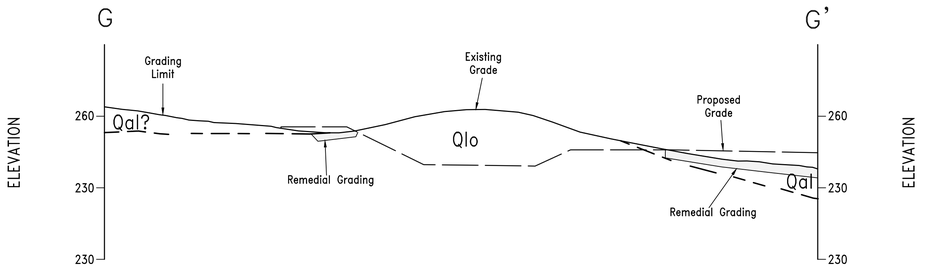
See Plate 1 for Legend

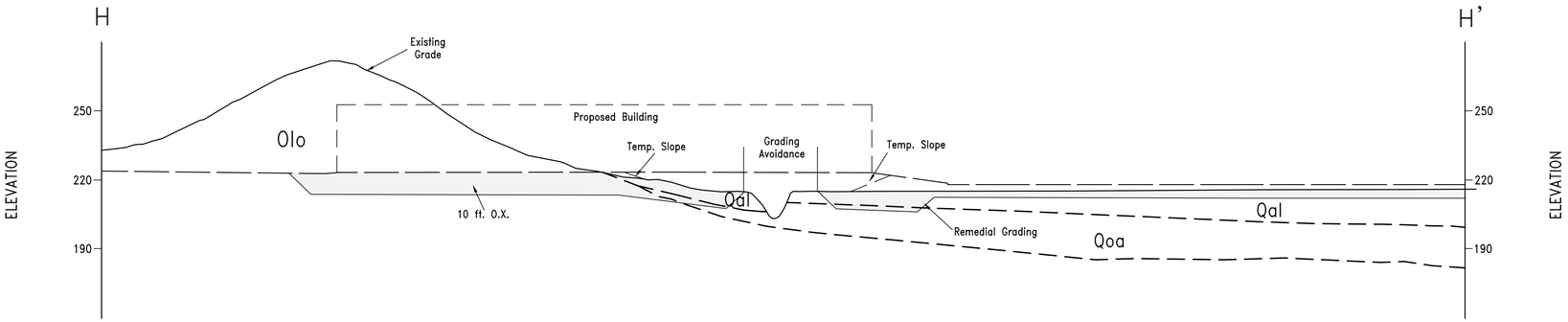
PLATE 10

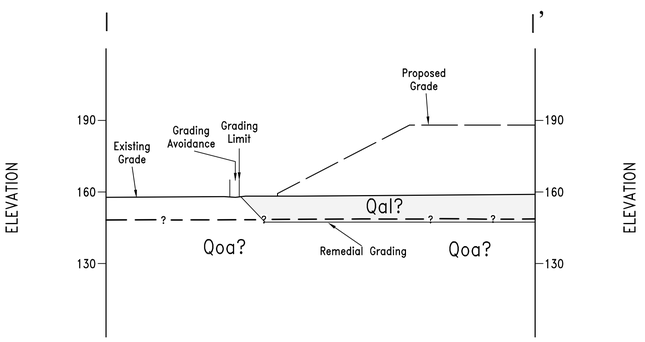
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

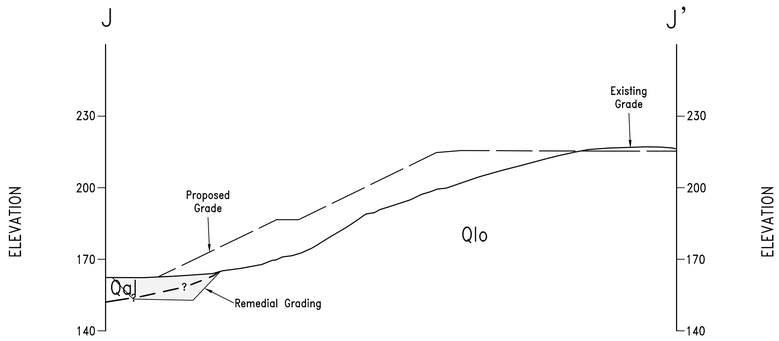
Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020











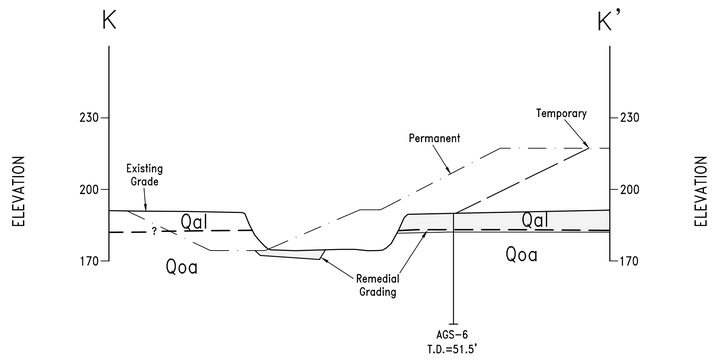
Scale: 1"=30'

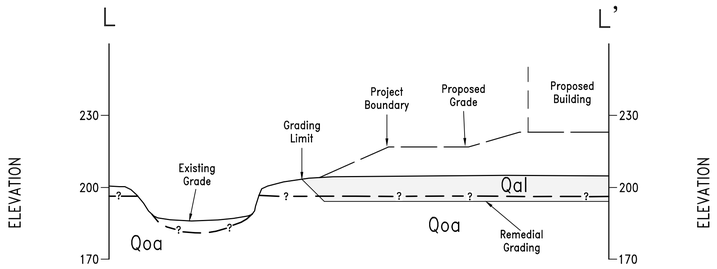
See Plate 1 for Legend

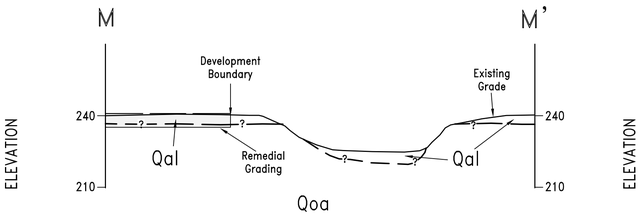
PLATE 11

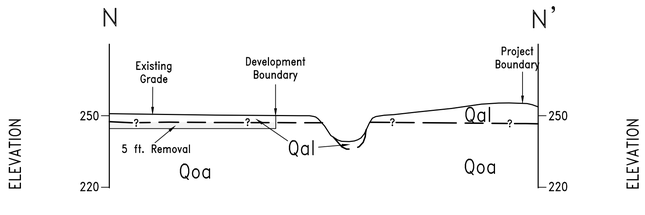
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020









Scale: 1"=30'

See Plate 1 for Legend PLATE 12

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Albert A. Webb Associates	Date	12/2/2021
Designed by	EP	Case No	
Company Project Number/Name	BLCOV - Building B		

BMP Identification

BMP NAME / ID: DMA B-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
ROOFS	*257452*	*Roofs*	*1*	*0.89*	*229647.2*			
CONC	*122677*	*Concrete or Asphalt*	*1*	*0.892*	*109427.9*			
LS	*6843*	*Ornamental Landscaping*	*0.1*	*0.11046*	*755.9*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building B

BMP Identification

BMP NAME / ID: DMA B-2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
ROOFS	*210506*	*Roofs*	*1*	*0.89*	*187771.4*			
CONC	*230186*	*Concrete or Asphalt*	*1*	*0.892*	*205325.9*			
LS	*132909.4*	*Ornamental Landscaping*	*0.1*	*0.11046*	*14680.9*			
	573601.4		***Total***		**407778.2**	**0.20**	***1.9***	***1.9***

Notes: 3 - 8' x 24' MWS Vaults

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building B

BMP Identification

BMP NAME / ID: DMA B-3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

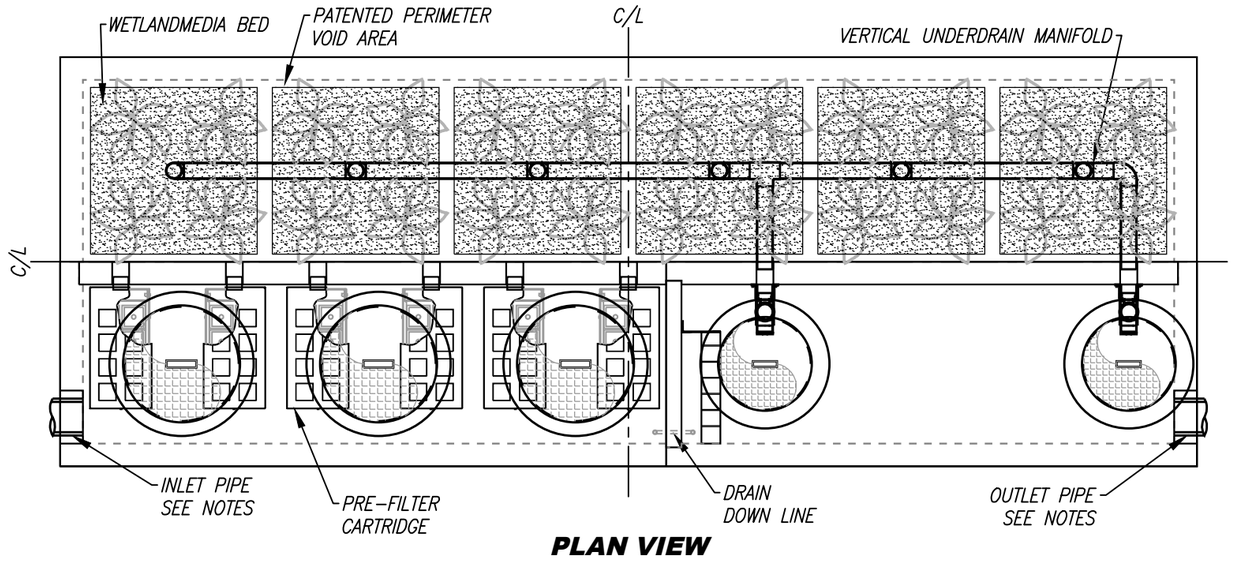
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

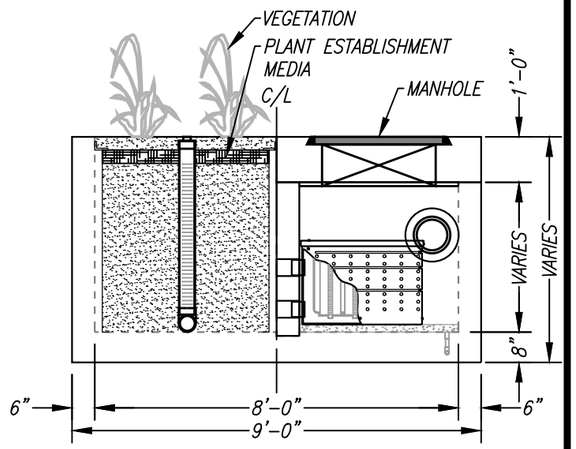
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
CONC	*55944.4*	*Concrete or Asphalt*	*1*	*0.89*	*49902.4*			
LS	*46775*	*Ornamental Landscaping*	*0.1*	*0.11046*	*5166.7*			

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.693	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			28
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



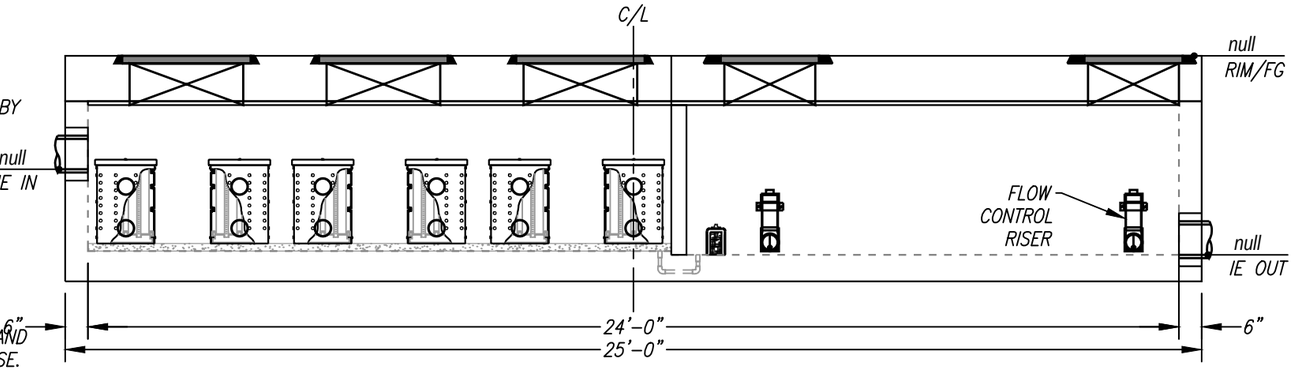
LEFT END VIEW

INSTALLATION NOTES

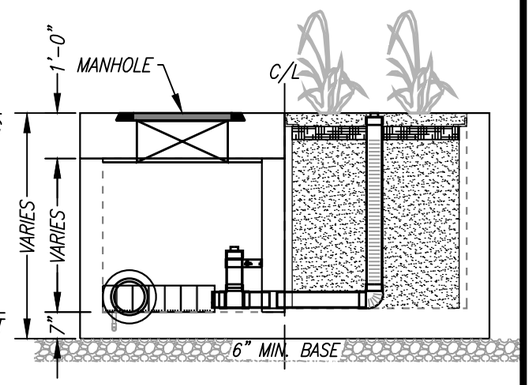
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.5 CFS

DMA B-1

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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Bio Clean
A Forterra Company

MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.693	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			23
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø24"
NOTES:			

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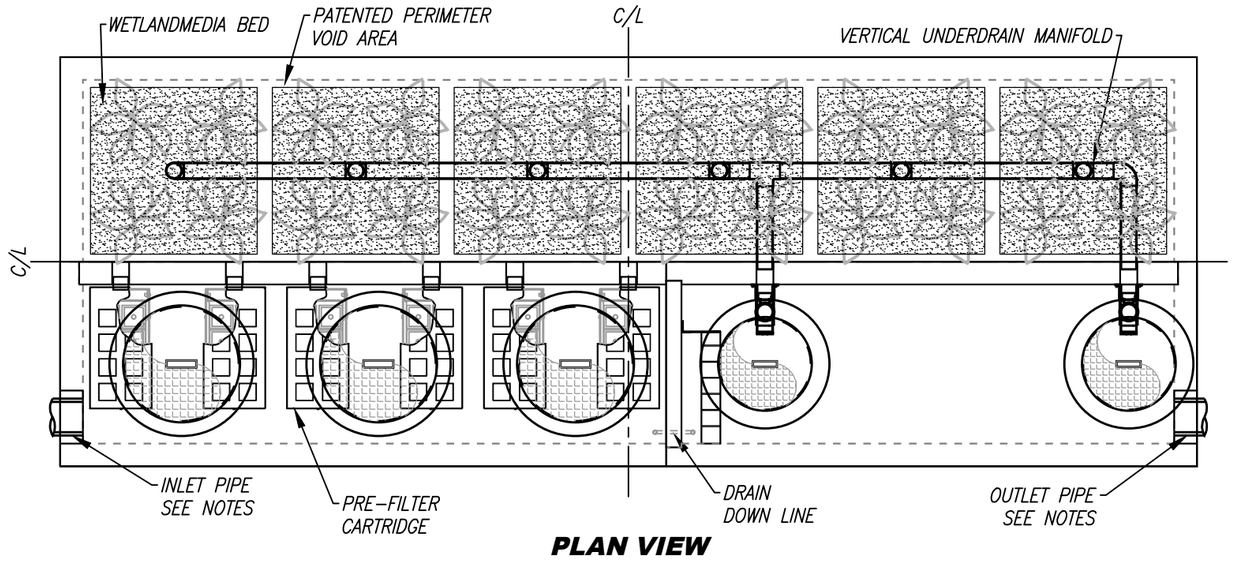
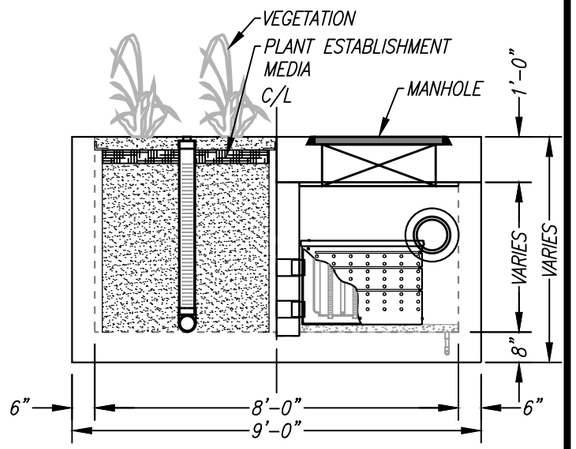


PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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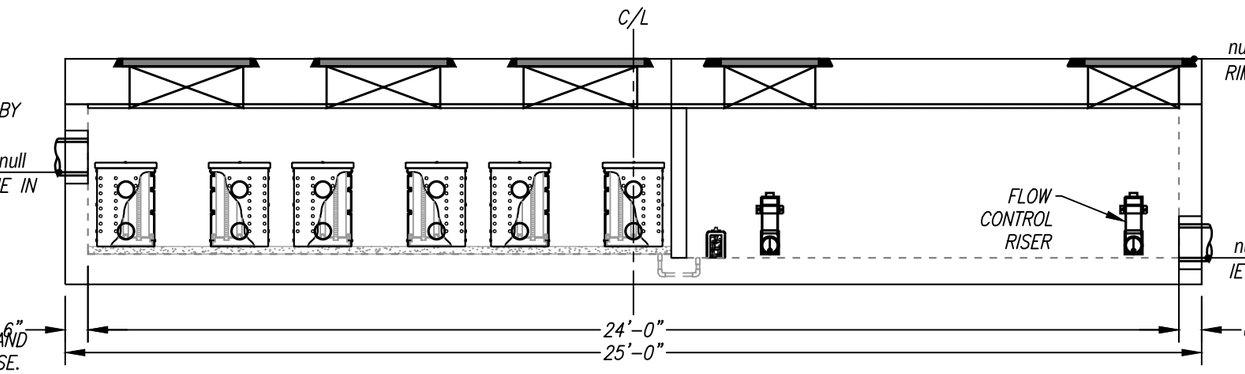
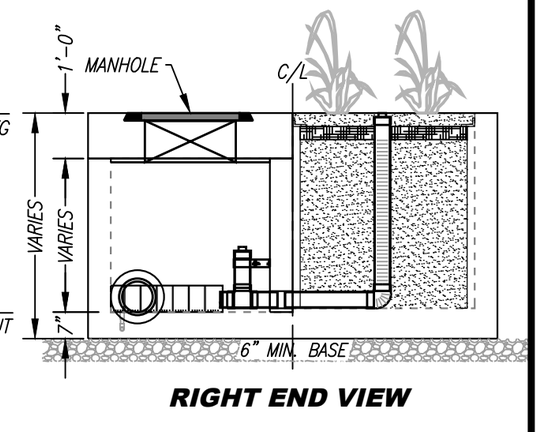


ELEVATION VIEW



RIGHT END VIEW

3 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.9 CFS

DMA B-2

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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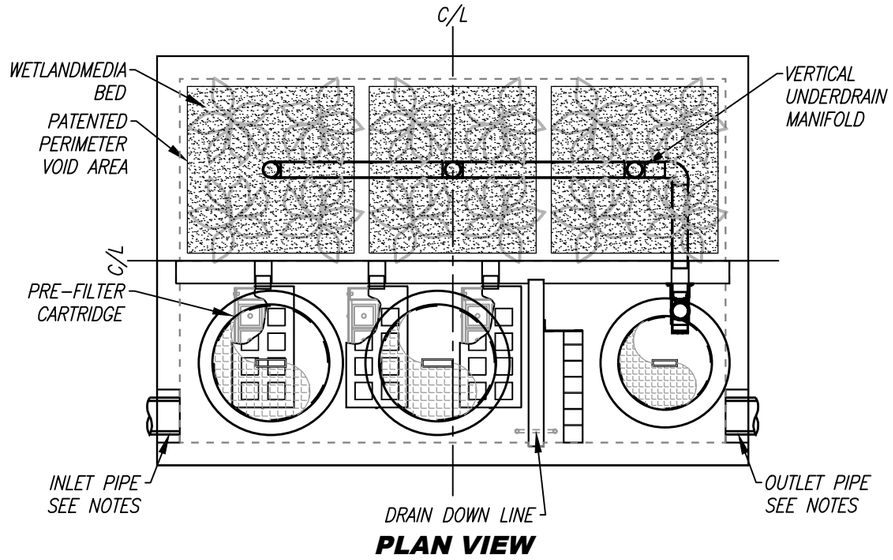
Bio Clean
A Forterra Company

MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

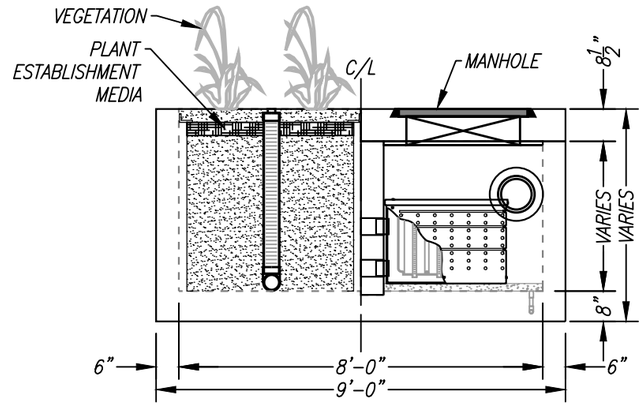
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			13
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



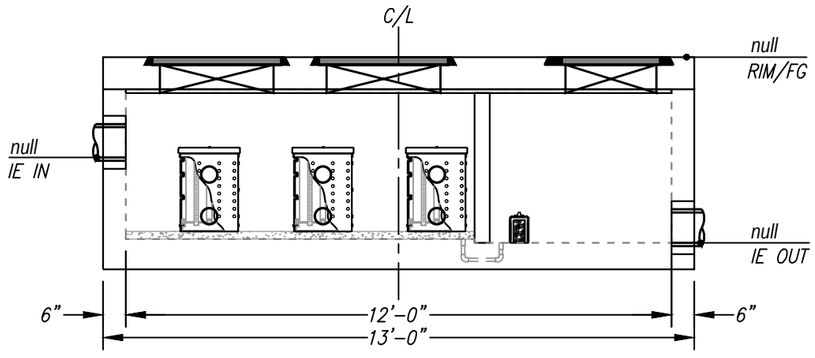
LEFT END VIEW

INSTALLATION NOTES

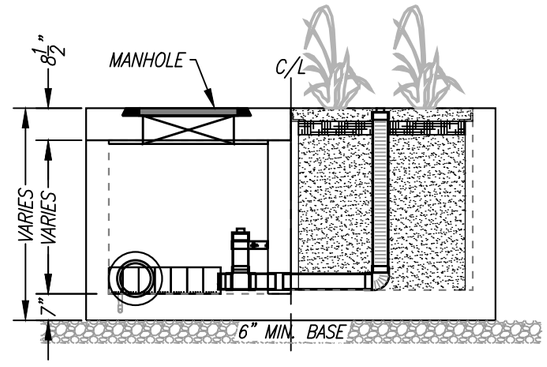
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

DMA B-3

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
A Forterra Company

MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.88 PradoDam
0.50 LakeMathews
0.51 Woodcrest
0.68 PigeonPass
0.66 MorenoEast
0.68 PerrisReservoir
PROJECT SITE
0.85 Beaumont
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.90 HurkeyCreek
0.65 Anza
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.77 SantaRosaPlateau
0.52 SkinnerLake
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution



OVERVIEW

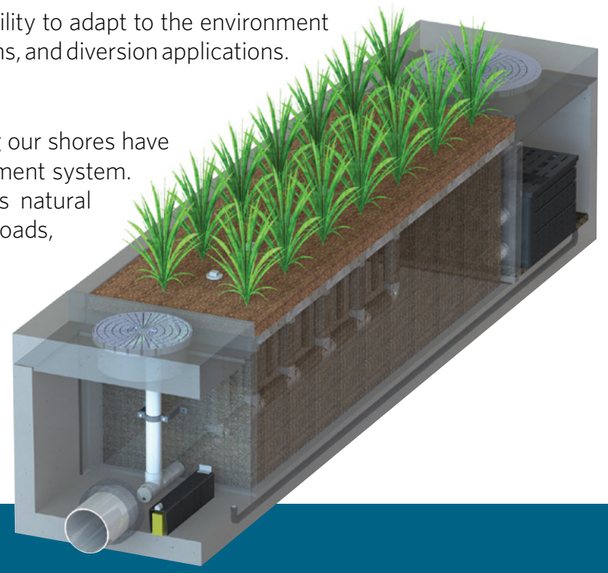
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

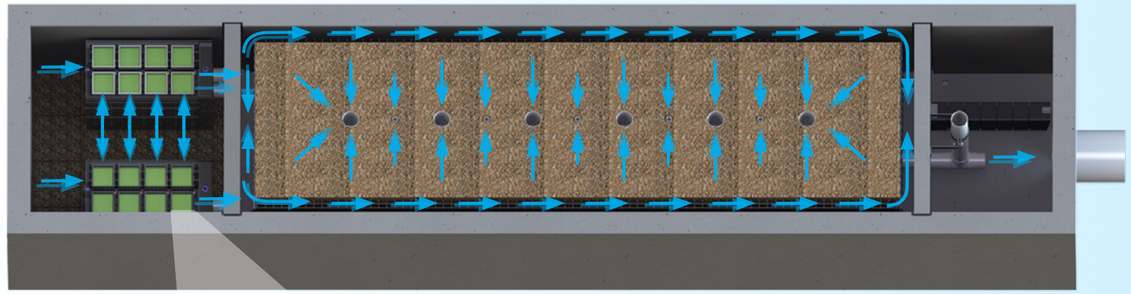


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



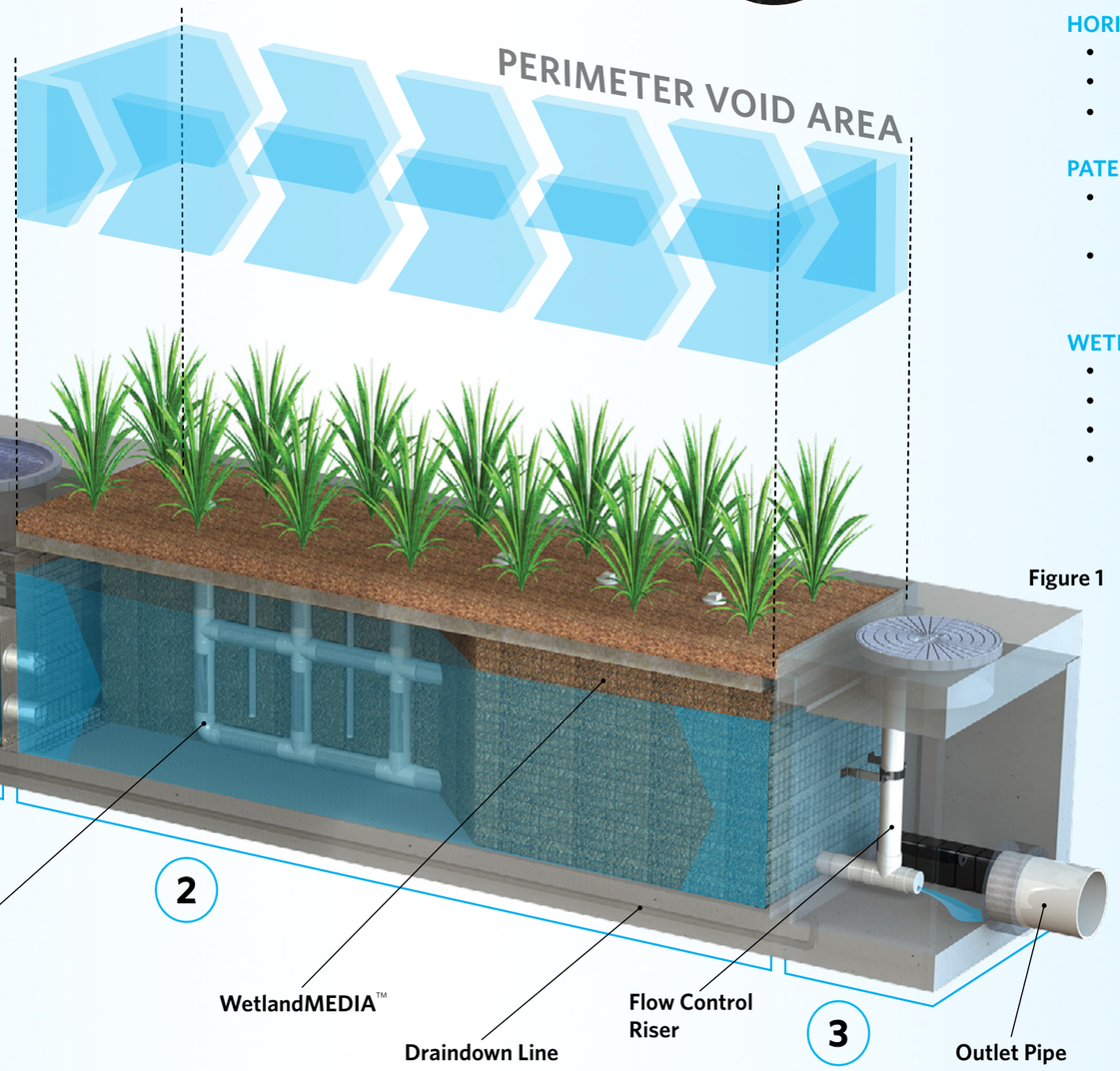


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

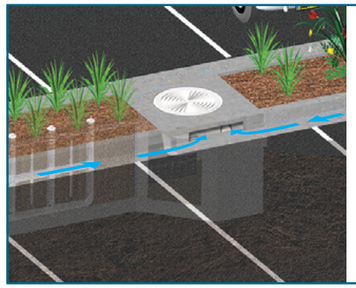
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





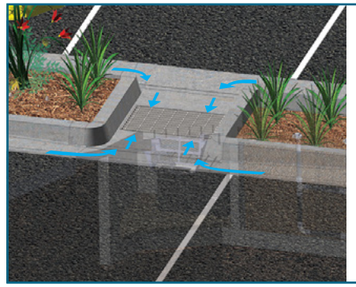
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



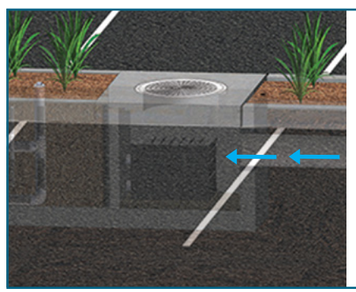
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

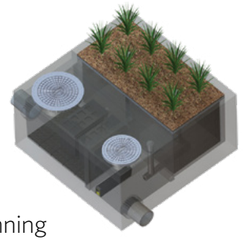


DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

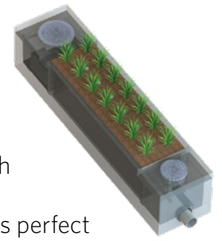
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

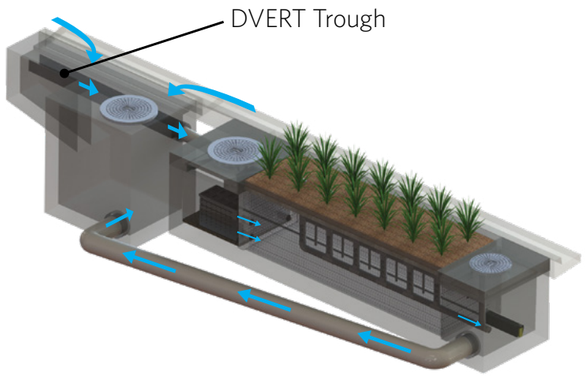
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



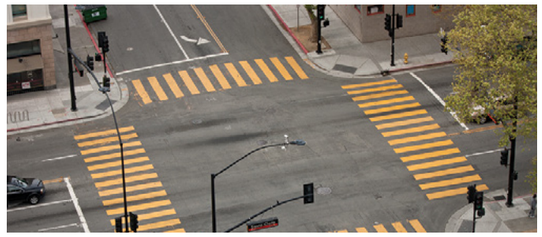
INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



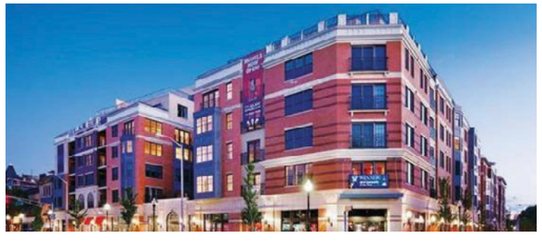
PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION



Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



Bio Clean
A Forterra Company

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01172020

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/24/21 File: EX2YRA1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A1 EXISTING CONDITION
2-YEAR 24 HOUR STORM EVENT
21-0034
2021-11-22 EP

Drainage Area = 37.70(Ac.) = 0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.70(Ac.) = 0.059 Sq. Mi.
Length along longest watercourse = 3231.00(Ft.)
Length along longest watercourse measured to centroid = 1394.00(Ft.)
Length along longest watercourse = 0.612 Mi.
Length along longest watercourse measured to centroid = 0.264 Mi.
Difference in elevation = 45.30(Ft.)
Slope along watercourse = 74.0279 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.159 Hr.
Lag time = 9.54 Min.
25% of lag time = 2.38 Min.
40% of lag time = 3.82 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	2.40	90.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	6.20	233.74

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
37.700	86.20	0.000

Total Area Entered = 37.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

86.2	71.9	0.339	0.000	0.339	1.000	0.339
					Sum (F) =	0.339

Area averaged mean soil loss (F) (In/Hr) = 0.339
Minimum soil loss rate ((In/Hr)) = 0.170
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	52.421	4.579	1.740
2	0.167	104.842	23.119	8.784
3	0.250	157.263	37.515	14.254
4	0.333	209.684	13.955	5.302
5	0.417	262.105	8.053	3.060
6	0.500	314.526	5.188	1.971
7	0.583	366.947	3.309	1.257
8	0.667	419.368	1.927	0.732
9	0.750	471.789	0.794	0.302
10	0.833	524.210	0.520	0.197
11	0.917	576.631	0.358	0.136
12	1.000	629.052	0.374	0.142
13	1.083	681.473	0.212	0.080
14	1.167	733.894	0.098	0.037
			Sum = 100.000	Sum= 37.995

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.602)	0.017	0.002
2	0.17	0.07	0.019	(0.599)	0.017	0.002
3	0.25	0.07	0.019	(0.597)	0.017	0.002
4	0.33	0.10	0.029	(0.595)	0.026	0.003
5	0.42	0.10	0.029	(0.592)	0.026	0.003
6	0.50	0.10	0.029	(0.590)	0.026	0.003
7	0.58	0.10	0.029	(0.588)	0.026	0.003
8	0.67	0.10	0.029	(0.585)	0.026	0.003
9	0.75	0.10	0.029	(0.583)	0.026	0.003
10	0.83	0.13	0.038	(0.581)	0.035	0.004
11	0.92	0.13	0.038	(0.579)	0.035	0.004
12	1.00	0.13	0.038	(0.576)	0.035	0.004
13	1.08	0.10	0.029	(0.574)	0.026	0.003
14	1.17	0.10	0.029	(0.572)	0.026	0.003
15	1.25	0.10	0.029	(0.569)	0.026	0.003
16	1.33	0.10	0.029	(0.567)	0.026	0.003
17	1.42	0.10	0.029	(0.565)	0.026	0.003
18	1.50	0.10	0.029	(0.563)	0.026	0.003
19	1.58	0.10	0.029	(0.560)	0.026	0.003
20	1.67	0.10	0.029	(0.558)	0.026	0.003
21	1.75	0.10	0.029	(0.556)	0.026	0.003
22	1.83	0.13	0.038	(0.554)	0.035	0.004
23	1.92	0.13	0.038	(0.551)	0.035	0.004
24	2.00	0.13	0.038	(0.549)	0.035	0.004
25	2.08	0.13	0.038	(0.547)	0.035	0.004
26	2.17	0.13	0.038	(0.545)	0.035	0.004
27	2.25	0.13	0.038	(0.543)	0.035	0.004
28	2.33	0.13	0.038	(0.540)	0.035	0.004
29	2.42	0.13	0.038	(0.538)	0.035	0.004
30	2.50	0.13	0.038	(0.536)	0.035	0.004
31	2.58	0.17	0.048	(0.534)	0.043	0.005
32	2.67	0.17	0.048	(0.532)	0.043	0.005
33	2.75	0.17	0.048	(0.529)	0.043	0.005
34	2.83	0.17	0.048	(0.527)	0.043	0.005
35	2.92	0.17	0.048	(0.525)	0.043	0.005
36	3.00	0.17	0.048	(0.523)	0.043	0.005

37	3.08	0.17	0.048	(0.521)	0.043	0.005
38	3.17	0.17	0.048	(0.519)	0.043	0.005
39	3.25	0.17	0.048	(0.516)	0.043	0.005
40	3.33	0.17	0.048	(0.514)	0.043	0.005
41	3.42	0.17	0.048	(0.512)	0.043	0.005
42	3.50	0.17	0.048	(0.510)	0.043	0.005
43	3.58	0.17	0.048	(0.508)	0.043	0.005
44	3.67	0.17	0.048	(0.506)	0.043	0.005
45	3.75	0.17	0.048	(0.504)	0.043	0.005
46	3.83	0.20	0.058	(0.501)	0.052	0.006
47	3.92	0.20	0.058	(0.499)	0.052	0.006
48	4.00	0.20	0.058	(0.497)	0.052	0.006
49	4.08	0.20	0.058	(0.495)	0.052	0.006
50	4.17	0.20	0.058	(0.493)	0.052	0.006
51	4.25	0.20	0.058	(0.491)	0.052	0.006
52	4.33	0.23	0.067	(0.489)	0.060	0.007
53	4.42	0.23	0.067	(0.487)	0.060	0.007
54	4.50	0.23	0.067	(0.485)	0.060	0.007
55	4.58	0.23	0.067	(0.483)	0.060	0.007
56	4.67	0.23	0.067	(0.480)	0.060	0.007
57	4.75	0.23	0.067	(0.478)	0.060	0.007
58	4.83	0.27	0.077	(0.476)	0.069	0.008
59	4.92	0.27	0.077	(0.474)	0.069	0.008
60	5.00	0.27	0.077	(0.472)	0.069	0.008
61	5.08	0.20	0.058	(0.470)	0.052	0.006
62	5.17	0.20	0.058	(0.468)	0.052	0.006
63	5.25	0.20	0.058	(0.466)	0.052	0.006
64	5.33	0.23	0.067	(0.464)	0.060	0.007
65	5.42	0.23	0.067	(0.462)	0.060	0.007
66	5.50	0.23	0.067	(0.460)	0.060	0.007
67	5.58	0.27	0.077	(0.458)	0.069	0.008
68	5.67	0.27	0.077	(0.456)	0.069	0.008
69	5.75	0.27	0.077	(0.454)	0.069	0.008
70	5.83	0.27	0.077	(0.452)	0.069	0.008
71	5.92	0.27	0.077	(0.450)	0.069	0.008
72	6.00	0.27	0.077	(0.448)	0.069	0.008
73	6.08	0.30	0.086	(0.446)	0.078	0.009
74	6.17	0.30	0.086	(0.444)	0.078	0.009
75	6.25	0.30	0.086	(0.442)	0.078	0.009
76	6.33	0.30	0.086	(0.440)	0.078	0.009
77	6.42	0.30	0.086	(0.438)	0.078	0.009
78	6.50	0.30	0.086	(0.436)	0.078	0.009
79	6.58	0.33	0.096	(0.434)	0.086	0.010
80	6.67	0.33	0.096	(0.432)	0.086	0.010
81	6.75	0.33	0.096	(0.430)	0.086	0.010
82	6.83	0.33	0.096	(0.428)	0.086	0.010
83	6.92	0.33	0.096	(0.426)	0.086	0.010
84	7.00	0.33	0.096	(0.424)	0.086	0.010
85	7.08	0.33	0.096	(0.422)	0.086	0.010
86	7.17	0.33	0.096	(0.421)	0.086	0.010
87	7.25	0.33	0.096	(0.419)	0.086	0.010
88	7.33	0.37	0.106	(0.417)	0.095	0.011
89	7.42	0.37	0.106	(0.415)	0.095	0.011
90	7.50	0.37	0.106	(0.413)	0.095	0.011
91	7.58	0.40	0.115	(0.411)	0.104	0.012
92	7.67	0.40	0.115	(0.409)	0.104	0.012
93	7.75	0.40	0.115	(0.407)	0.104	0.012
94	7.83	0.43	0.125	(0.405)	0.112	0.012
95	7.92	0.43	0.125	(0.403)	0.112	0.012
96	8.00	0.43	0.125	(0.402)	0.112	0.012
97	8.08	0.50	0.144	(0.400)	0.130	0.014
98	8.17	0.50	0.144	(0.398)	0.130	0.014
99	8.25	0.50	0.144	(0.396)	0.130	0.014
100	8.33	0.50	0.144	(0.394)	0.130	0.014
101	8.42	0.50	0.144	(0.392)	0.130	0.014
102	8.50	0.50	0.144	(0.390)	0.130	0.014
103	8.58	0.53	0.154	(0.389)	0.138	0.015
104	8.67	0.53	0.154	(0.387)	0.138	0.015
105	8.75	0.53	0.154	(0.385)	0.138	0.015
106	8.83	0.57	0.163	(0.383)	0.147	0.016
107	8.92	0.57	0.163	(0.381)	0.147	0.016
108	9.00	0.57	0.163	(0.380)	0.147	0.016
109	9.08	0.63	0.182	(0.378)	0.164	0.018
110	9.17	0.63	0.182	(0.376)	0.164	0.018
111	9.25	0.63	0.182	(0.374)	0.164	0.018

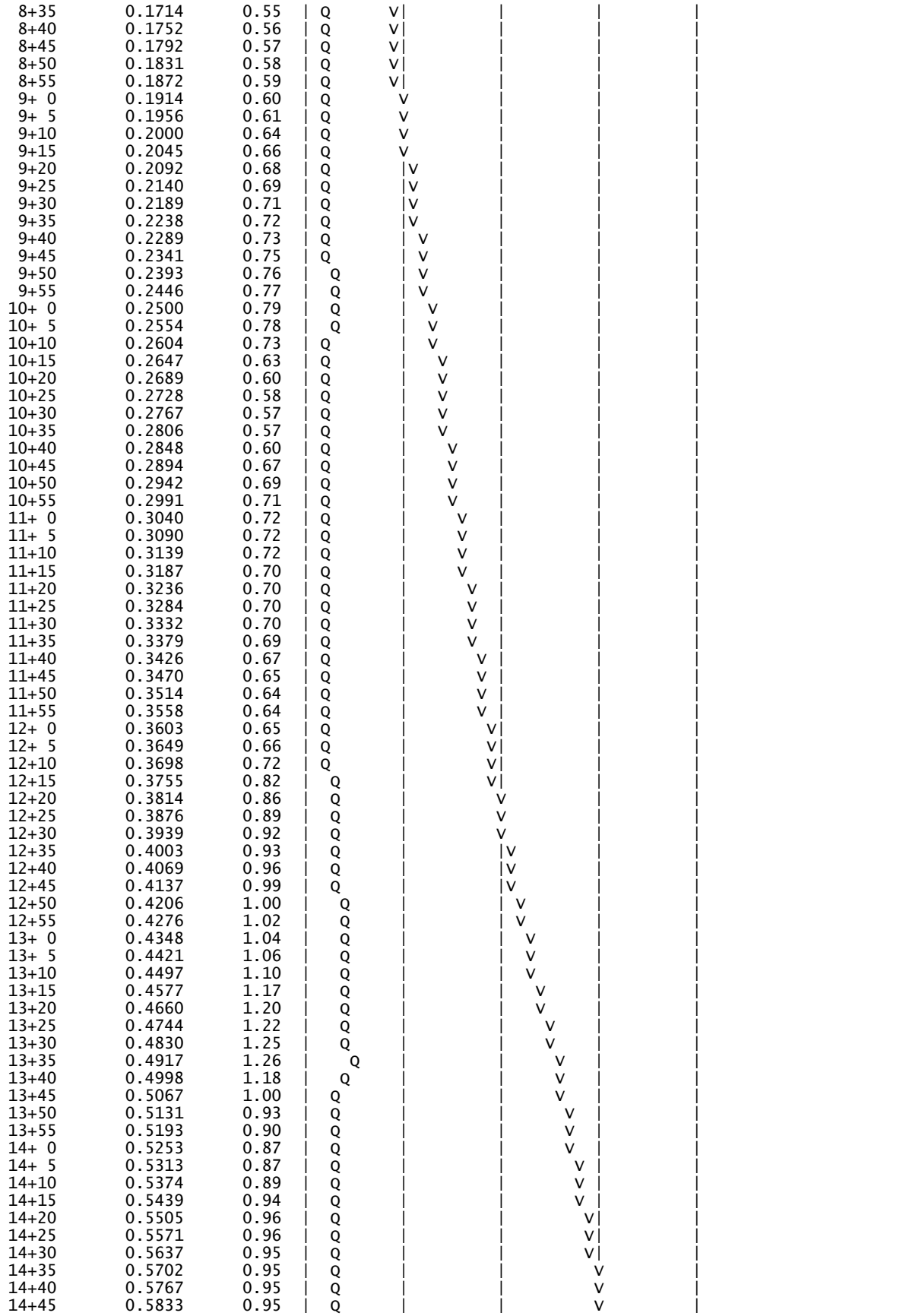
112	9.33	0.67	0.192	(0.372)	0.173	0.019
113	9.42	0.67	0.192	(0.371)	0.173	0.019
114	9.50	0.67	0.192	(0.369)	0.173	0.019
115	9.58	0.70	0.202	(0.367)	0.181	0.020
116	9.67	0.70	0.202	(0.365)	0.181	0.020
117	9.75	0.70	0.202	(0.364)	0.181	0.020
118	9.83	0.73	0.211	(0.362)	0.190	0.021
119	9.92	0.73	0.211	(0.360)	0.190	0.021
120	10.00	0.73	0.211	(0.358)	0.190	0.021
121	10.08	0.50	0.144	(0.357)	0.130	0.014
122	10.17	0.50	0.144	(0.355)	0.130	0.014
123	10.25	0.50	0.144	(0.353)	0.130	0.014
124	10.33	0.50	0.144	(0.351)	0.130	0.014
125	10.42	0.50	0.144	(0.350)	0.130	0.014
126	10.50	0.50	0.144	(0.348)	0.130	0.014
127	10.58	0.67	0.192	(0.346)	0.173	0.019
128	10.67	0.67	0.192	(0.345)	0.173	0.019
129	10.75	0.67	0.192	(0.343)	0.173	0.019
130	10.83	0.67	0.192	(0.341)	0.173	0.019
131	10.92	0.67	0.192	(0.340)	0.173	0.019
132	11.00	0.67	0.192	(0.338)	0.173	0.019
133	11.08	0.63	0.182	(0.336)	0.164	0.018
134	11.17	0.63	0.182	(0.335)	0.164	0.018
135	11.25	0.63	0.182	(0.333)	0.164	0.018
136	11.33	0.63	0.182	(0.331)	0.164	0.018
137	11.42	0.63	0.182	(0.330)	0.164	0.018
138	11.50	0.63	0.182	(0.328)	0.164	0.018
139	11.58	0.57	0.163	(0.326)	0.147	0.016
140	11.67	0.57	0.163	(0.325)	0.147	0.016
141	11.75	0.57	0.163	(0.323)	0.147	0.016
142	11.83	0.60	0.173	(0.322)	0.156	0.017
143	11.92	0.60	0.173	(0.320)	0.156	0.017
144	12.00	0.60	0.173	(0.318)	0.156	0.017
145	12.08	0.83	0.240	(0.317)	0.216	0.024
146	12.17	0.83	0.240	(0.315)	0.216	0.024
147	12.25	0.83	0.240	(0.314)	0.216	0.024
148	12.33	0.87	0.250	(0.312)	0.225	0.025
149	12.42	0.87	0.250	(0.310)	0.225	0.025
150	12.50	0.87	0.250	(0.309)	0.225	0.025
151	12.58	0.93	0.269	(0.307)	0.242	0.027
152	12.67	0.93	0.269	(0.306)	0.242	0.027
153	12.75	0.93	0.269	(0.304)	0.242	0.027
154	12.83	0.97	0.278	(0.303)	0.251	0.028
155	12.92	0.97	0.278	(0.301)	0.251	0.028
156	13.00	0.97	0.278	(0.300)	0.251	0.028
157	13.08	1.13	0.326	(0.298)	0.294	0.033
158	13.17	1.13	0.326	(0.297)	0.294	0.033
159	13.25	1.13	0.326	(0.295)	0.294	0.033
160	13.33	1.13	0.326	0.294	(0.294)	0.033
161	13.42	1.13	0.326	0.292	(0.294)	0.034
162	13.50	1.13	0.326	0.291	(0.294)	0.036
163	13.58	0.77	0.221	(0.289)	0.199	0.022
164	13.67	0.77	0.221	(0.288)	0.199	0.022
165	13.75	0.77	0.221	(0.286)	0.199	0.022
166	13.83	0.77	0.221	(0.285)	0.199	0.022
167	13.92	0.77	0.221	(0.283)	0.199	0.022
168	14.00	0.77	0.221	(0.282)	0.199	0.022
169	14.08	0.90	0.259	(0.280)	0.233	0.026
170	14.17	0.90	0.259	(0.279)	0.233	0.026
171	14.25	0.90	0.259	(0.278)	0.233	0.026
172	14.33	0.87	0.250	(0.276)	0.225	0.025
173	14.42	0.87	0.250	(0.275)	0.225	0.025
174	14.50	0.87	0.250	(0.273)	0.225	0.025
175	14.58	0.87	0.250	(0.272)	0.225	0.025
176	14.67	0.87	0.250	(0.271)	0.225	0.025
177	14.75	0.87	0.250	(0.269)	0.225	0.025
178	14.83	0.83	0.240	(0.268)	0.216	0.024
179	14.92	0.83	0.240	(0.266)	0.216	0.024
180	15.00	0.83	0.240	(0.265)	0.216	0.024
181	15.08	0.80	0.230	(0.264)	0.207	0.023
182	15.17	0.80	0.230	(0.262)	0.207	0.023
183	15.25	0.80	0.230	(0.261)	0.207	0.023
184	15.33	0.77	0.221	(0.260)	0.199	0.022
185	15.42	0.77	0.221	(0.258)	0.199	0.022
186	15.50	0.77	0.221	(0.257)	0.199	0.022

187	15.58	0.63	0.182	(0.256)	0.164	0.018
188	15.67	0.63	0.182	(0.254)	0.164	0.018
189	15.75	0.63	0.182	(0.253)	0.164	0.018
190	15.83	0.63	0.182	(0.252)	0.164	0.018
191	15.92	0.63	0.182	(0.250)	0.164	0.018
192	16.00	0.63	0.182	(0.249)	0.164	0.018
193	16.08	0.13	0.038	(0.248)	0.035	0.004
194	16.17	0.13	0.038	(0.247)	0.035	0.004
195	16.25	0.13	0.038	(0.245)	0.035	0.004
196	16.33	0.13	0.038	(0.244)	0.035	0.004
197	16.42	0.13	0.038	(0.243)	0.035	0.004
198	16.50	0.13	0.038	(0.242)	0.035	0.004
199	16.58	0.10	0.029	(0.240)	0.026	0.003
200	16.67	0.10	0.029	(0.239)	0.026	0.003
201	16.75	0.10	0.029	(0.238)	0.026	0.003
202	16.83	0.10	0.029	(0.237)	0.026	0.003
203	16.92	0.10	0.029	(0.236)	0.026	0.003
204	17.00	0.10	0.029	(0.234)	0.026	0.003
205	17.08	0.17	0.048	(0.233)	0.043	0.005
206	17.17	0.17	0.048	(0.232)	0.043	0.005
207	17.25	0.17	0.048	(0.231)	0.043	0.005
208	17.33	0.17	0.048	(0.230)	0.043	0.005
209	17.42	0.17	0.048	(0.229)	0.043	0.005
210	17.50	0.17	0.048	(0.227)	0.043	0.005
211	17.58	0.17	0.048	(0.226)	0.043	0.005
212	17.67	0.17	0.048	(0.225)	0.043	0.005
213	17.75	0.17	0.048	(0.224)	0.043	0.005
214	17.83	0.13	0.038	(0.223)	0.035	0.004
215	17.92	0.13	0.038	(0.222)	0.035	0.004
216	18.00	0.13	0.038	(0.221)	0.035	0.004
217	18.08	0.13	0.038	(0.220)	0.035	0.004
218	18.17	0.13	0.038	(0.219)	0.035	0.004
219	18.25	0.13	0.038	(0.217)	0.035	0.004
220	18.33	0.13	0.038	(0.216)	0.035	0.004
221	18.42	0.13	0.038	(0.215)	0.035	0.004
222	18.50	0.13	0.038	(0.214)	0.035	0.004
223	18.58	0.10	0.029	(0.213)	0.026	0.003
224	18.67	0.10	0.029	(0.212)	0.026	0.003
225	18.75	0.10	0.029	(0.211)	0.026	0.003
226	18.83	0.07	0.019	(0.210)	0.017	0.002
227	18.92	0.07	0.019	(0.209)	0.017	0.002
228	19.00	0.07	0.019	(0.208)	0.017	0.002
229	19.08	0.10	0.029	(0.207)	0.026	0.003
230	19.17	0.10	0.029	(0.206)	0.026	0.003
231	19.25	0.10	0.029	(0.205)	0.026	0.003
232	19.33	0.13	0.038	(0.204)	0.035	0.004
233	19.42	0.13	0.038	(0.203)	0.035	0.004
234	19.50	0.13	0.038	(0.202)	0.035	0.004
235	19.58	0.10	0.029	(0.202)	0.026	0.003
236	19.67	0.10	0.029	(0.201)	0.026	0.003
237	19.75	0.10	0.029	(0.200)	0.026	0.003
238	19.83	0.07	0.019	(0.199)	0.017	0.002
239	19.92	0.07	0.019	(0.198)	0.017	0.002
240	20.00	0.07	0.019	(0.197)	0.017	0.002
241	20.08	0.10	0.029	(0.196)	0.026	0.003
242	20.17	0.10	0.029	(0.195)	0.026	0.003
243	20.25	0.10	0.029	(0.194)	0.026	0.003
244	20.33	0.10	0.029	(0.194)	0.026	0.003
245	20.42	0.10	0.029	(0.193)	0.026	0.003
246	20.50	0.10	0.029	(0.192)	0.026	0.003
247	20.58	0.10	0.029	(0.191)	0.026	0.003
248	20.67	0.10	0.029	(0.190)	0.026	0.003
249	20.75	0.10	0.029	(0.190)	0.026	0.003
250	20.83	0.07	0.019	(0.189)	0.017	0.002
251	20.92	0.07	0.019	(0.188)	0.017	0.002
252	21.00	0.07	0.019	(0.187)	0.017	0.002
253	21.08	0.10	0.029	(0.187)	0.026	0.003
254	21.17	0.10	0.029	(0.186)	0.026	0.003
255	21.25	0.10	0.029	(0.185)	0.026	0.003
256	21.33	0.07	0.019	(0.184)	0.017	0.002
257	21.42	0.07	0.019	(0.184)	0.017	0.002
258	21.50	0.07	0.019	(0.183)	0.017	0.002
259	21.58	0.10	0.029	(0.182)	0.026	0.003
260	21.67	0.10	0.029	(0.182)	0.026	0.003
261	21.75	0.10	0.029	(0.181)	0.026	0.003

```
262  21.83     0.07      0.019       (  0.180)       0.017        0.002
263  21.92     0.07      0.019       (  0.180)       0.017        0.002
264  22.00     0.07      0.019       (  0.179)       0.017        0.002
265  22.08     0.10      0.029       (  0.179)       0.026        0.003
266  22.17     0.10      0.029       (  0.178)       0.026        0.003
267  22.25     0.10      0.029       (  0.177)       0.026        0.003
268  22.33     0.07      0.019       (  0.177)       0.017        0.002
269  22.42     0.07      0.019       (  0.176)       0.017        0.002
270  22.50     0.07      0.019       (  0.176)       0.017        0.002
271  22.58     0.07      0.019       (  0.175)       0.017        0.002
272  22.67     0.07      0.019       (  0.175)       0.017        0.002
273  22.75     0.07      0.019       (  0.174)       0.017        0.002
274  22.83     0.07      0.019       (  0.174)       0.017        0.002
275  22.92     0.07      0.019       (  0.173)       0.017        0.002
276  23.00     0.07      0.019       (  0.173)       0.017        0.002
277  23.08     0.07      0.019       (  0.173)       0.017        0.002
278  23.17     0.07      0.019       (  0.172)       0.017        0.002
279  23.25     0.07      0.019       (  0.172)       0.017        0.002
280  23.33     0.07      0.019       (  0.172)       0.017        0.002
281  23.42     0.07      0.019       (  0.171)       0.017        0.002
282  23.50     0.07      0.019       (  0.171)       0.017        0.002
283  23.58     0.07      0.019       (  0.171)       0.017        0.002
284  23.67     0.07      0.019       (  0.170)       0.017        0.002
285  23.75     0.07      0.019       (  0.170)       0.017        0.002
286  23.83     0.07      0.019       (  0.170)       0.017        0.002
287  23.92     0.07      0.019       (  0.170)       0.017        0.002
288  24.00     0.07      0.019       (  0.170)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.9
      Flood volume = Effective rainfall      0.24(In)
       times area      37.7(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
      Total soil loss =      2.16(In)
      Total soil loss =     6.784(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       32896.4 Cubic Feet
      Total soil loss =      295521.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.264(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0005      0.05  Q         |         |         |         |
   0+20       0.0009      0.06  Q         |         |         |         |
   0+25       0.0014      0.07  Q         |         |         |         |
   0+30       0.0020      0.09  Q         |         |         |         |
   0+35       0.0027      0.10  Q         |         |         |         |
   0+40       0.0034      0.10  Q         |         |         |         |
   0+45       0.0042      0.11  Q         |         |         |         |
   0+50       0.0049      0.11  Q         |         |         |         |
   0+55       0.0057      0.12  Q         |         |         |         |
   1+ 0       0.0066      0.13  Q         |         |         |         |
   1+ 5       0.0076      0.14  Q         |         |         |         |
   1+10       0.0085      0.13  Q         |         |         |         |
   1+15       0.0093      0.12  Q         |         |         |         |
   1+20       0.0101      0.12  Q         |         |         |         |
   1+25       0.0109      0.11  Q         |         |         |         |
   1+30       0.0116      0.11  Q         |         |         |         |
   1+35       0.0124      0.11  Q         |         |         |         |
   1+40       0.0132      0.11  Q         |         |         |         |
   1+45       0.0139      0.11  Q         |         |         |         |
   1+50       0.0147      0.11  Q         |         |         |         |
   1+55       0.0155      0.12  Q         |         |         |         |
   2+ 0       0.0164      0.13  Q         |         |         |         |
   2+ 5       0.0174      0.14  Q         |         |         |         |
   2+10       0.0184      0.14  Q         |         |         |         |
   2+15       0.0193      0.14  QV        |         |         |         |
```

```
2+20       0.0203      0.14  QV        |         |         |         |
2+25       0.0213      0.15  QV        |         |         |         |
2+30       0.0223      0.15  QV        |         |         |         |
2+35       0.0233      0.15  QV        |         |         |         |
2+40       0.0244      0.16  QV        |         |         |         |
2+45       0.0256      0.17  QV        |         |         |         |
2+50       0.0268      0.17  QV        |         |         |         |
2+55       0.0280      0.18  QV        |         |         |         |
3+ 0       0.0293      0.18  QV        |         |         |         |
3+ 5       0.0305      0.18  QV        |         |         |         |
3+10       0.0317      0.18  QV        |         |         |         |
3+15       0.0330      0.18  QV        |         |         |         |
3+20       0.0343      0.18  QV        |         |         |         |
3+25       0.0355      0.18  QV        |         |         |         |
3+30       0.0368      0.18  QV        |         |         |         |
3+35       0.0380      0.18  Q V       |         |         |         |
3+40       0.0393      0.18  Q V       |         |         |         |
3+45       0.0405      0.18  Q V       |         |         |         |
3+50       0.0418      0.18  Q V       |         |         |         |
3+55       0.0431      0.19  Q V       |         |         |         |
4+ 0       0.0446      0.21  Q V       |         |         |         |
4+ 5       0.0460      0.21  Q V       |         |         |         |
4+10       0.0475      0.21  Q V       |         |         |         |
4+15       0.0490      0.22  Q V       |         |         |         |
4+20       0.0505      0.22  Q V       |         |         |         |
4+25       0.0521      0.23  Q V       |         |         |         |
4+30       0.0537      0.24  Q V       |         |         |         |
4+35       0.0554      0.25  Q V       |         |         |         |
4+40       0.0571      0.25  |Q V       |         |         |         |
4+45       0.0589      0.25  |Q V       |         |         |         |
4+50       0.0606      0.26  |Q V       |         |         |         |
4+55       0.0625      0.26  |Q V       |         |         |         |
5+ 0       0.0644      0.28  |Q V       |         |         |         |
5+ 5       0.0663      0.28  |Q V       |         |         |         |
5+10       0.0682      0.27  |Q V       |         |         |         |
5+15       0.0698      0.24  Q  V       |         |         |         |
5+20       0.0714      0.23  Q  V       |         |         |         |
5+25       0.0731      0.24  Q  V       |         |         |         |
5+30       0.0748      0.25  Q  V       |         |         |         |
5+35       0.0765      0.25  |Q  V       |         |         |         |
5+40       0.0783      0.26  |Q  V       |         |         |         |
5+45       0.0802      0.28  |Q  V       |         |         |         |
5+50       0.0822      0.28  |Q  V       |         |         |         |
5+55       0.0842      0.29  |Q  V       |         |         |         |
6+ 0       0.0862      0.29  |Q  V       |         |         |         |
6+ 5       0.0882      0.29  |Q  V       |         |         |         |
6+10       0.0902      0.30  |Q  V       |         |         |         |
6+15       0.0924      0.32  |Q  V       |         |         |         |
6+20       0.0946      0.32  |Q   V      |         |         |         |
6+25       0.0968      0.32  |Q   V      |         |         |         |
6+30       0.0991      0.33  |Q   V      |         |         |         |
6+35       0.1013      0.33  |Q   V      |         |         |         |
6+40       0.1037      0.34  |Q   V      |         |         |         |
6+45       0.1061      0.35  |Q   V      |         |         |         |
6+50       0.1085      0.36  |Q   V      |         |         |         |
6+55       0.1110      0.36  |Q   V      |         |         |         |
7+ 0       0.1135      0.36  |Q    V     |         |         |         |
7+ 5       0.1160      0.36  |Q    V     |         |         |         |
7+10       0.1185      0.36  |Q    V     |         |         |         |
7+15       0.1210      0.36  |Q    V     |         |         |         |
7+20       0.1236      0.37  |Q    V     |         |         |         |
7+25       0.1261      0.37  |Q    V     |         |         |         |
7+30       0.1288      0.39  |Q    V     |         |         |         |
7+35       0.1315      0.40  |Q    V     |         |         |         |
7+40       0.1343      0.41  |Q     V    |         |         |         |
7+45       0.1373      0.42  |Q     V    |         |         |         |
7+50       0.1402      0.43  |Q     V    |         |         |         |
7+55       0.1433      0.44  |Q     V    |         |         |         |
8+ 0       0.1464      0.46  |Q     V    |         |         |         |
8+ 5       0.1496      0.47  |Q     V    |         |         |         |
8+10       0.1530      0.49  |Q      V   |         |         |         |
8+15       0.1566      0.52  | Q     V   |         |         |         |
8+20       0.1602      0.53  | Q     V   |         |         |         |
8+25       0.1639      0.54  | Q     V   |         |         |         |
8+30       0.1677      0.54  | Q     V   |         |         |         |
```



```
14+50       0.5898      0.95  |  Q      |         |         |V        |
14+55       0.5963      0.94  |  Q      |         |         |V        |
15+ 0       0.6026      0.93  |  Q      |         |         |V        |
15+ 5       0.6090      0.92  |  Q      |         |         | V       |
15+10       0.6152      0.91  |  Q      |         |         | V       |
15+15       0.6213      0.89  |  Q      |         |         | V       |
15+20       0.6274      0.88  |  Q      |         |         |  V      |
15+25       0.6334      0.87  |  Q      |         |         |  V      |
15+30       0.6393      0.86  |  Q      |         |         |  V      |
15+35       0.6451      0.84  |  Q      |         |         |   V     |
15+40       0.6507      0.80  |  Q      |         |         |   V     |
15+45       0.6558      0.75  | Q       |         |         |   V     |
15+50       0.6608      0.73  | Q       |         |         |    V    |
15+55       0.6657      0.71  | Q       |         |         |    V    |
16+ 0       0.6706      0.71  | Q       |         |         |    V    |
16+ 5       0.6752      0.67  | Q       |         |         |    V    |
16+10       0.6790      0.55  | Q       |         |         |    V    |
16+15       0.6813      0.34  |Q        |         |         |     V   |
16+20       0.6831      0.26  |Q        |         |         |     V   |
16+25       0.6846      0.22  Q         |         |         |     V   |
16+30       0.6859      0.19  Q         |         |         |     V   |
16+35       0.6871      0.17  Q         |         |         |     V   |
16+40       0.6881      0.15  Q         |         |         |     V   |
16+45       0.6890      0.13  Q         |         |         |     V   |
16+50       0.6898      0.12  Q         |         |         |     V   |
16+55       0.6906      0.12  Q         |         |         |     V   |
17+ 0       0.6914      0.11  Q         |         |         |     V   |
17+ 5       0.6922      0.11  Q         |         |         |     V   |
17+10       0.6931      0.13  Q         |         |         |     V   |
17+15       0.6942      0.16  Q         |         |         |     V   |
17+20       0.6954      0.17  Q         |         |         |     V   |
17+25       0.6966      0.17  Q         |         |         |     V   |
17+30       0.6978      0.18  Q         |         |         |     V   |
17+35       0.6990      0.18  Q         |         |         |      V  |
17+40       0.7003      0.18  Q         |         |         |      V  |
17+45       0.7015      0.18  Q         |         |         |      V  |
17+50       0.7027      0.18  Q         |         |         |      V  |
17+55       0.7039      0.17  Q         |         |         |      V  |
18+ 0       0.7050      0.16  Q         |         |         |      V  |
18+ 5       0.7061      0.15  Q         |         |         |      V  |
18+10       0.7071      0.15  Q         |         |         |      V  |
18+15       0.7081      0.15  Q         |         |         |      V  |
18+20       0.7092      0.15  Q         |         |         |      V  |
18+25       0.7102      0.15  Q         |         |         |      V  |
18+30       0.7112      0.15  Q         |         |         |      V  |
18+35       0.7122      0.14  Q         |         |         |      V  |
18+40       0.7131      0.14  Q         |         |         |      V  |
18+45       0.7139      0.12  Q         |         |         |      V  |
18+50       0.7147      0.12  Q         |         |         |      V  |
18+55       0.7155      0.10  Q         |         |         |      V  |
19+ 0       0.7161      0.09  Q         |         |         |      V  |
19+ 5       0.7166      0.08  Q         |         |         |      V  |
19+10       0.7173      0.09  Q         |         |         |      V  |
19+15       0.7179      0.10  Q         |         |         |       V |
19+20       0.7187      0.11  Q         |         |         |       V |
19+25       0.7195      0.12  Q         |         |         |       V |
19+30       0.7204      0.13  Q         |         |         |       V |
19+35       0.7213      0.14  Q         |         |         |       V |
19+40       0.7222      0.13  Q         |         |         |       V |
19+45       0.7230      0.12  Q         |         |         |       V |
19+50       0.7238      0.11  Q         |         |         |       V |
19+55       0.7245      0.10  Q         |         |         |       V |
20+ 0       0.7251      0.09  Q         |         |         |       V |
20+ 5       0.7257      0.08  Q         |         |         |       V |
20+10       0.7263      0.09  Q         |         |         |       V |
20+15       0.7270      0.10  Q         |         |         |       V |
20+20       0.7277      0.10  Q         |         |         |       V |
20+25       0.7284      0.11  Q         |         |         |       V |
20+30       0.7292      0.11  Q         |         |         |       V |
20+35       0.7299      0.11  Q         |         |         |       V |
20+40       0.7307      0.11  Q         |         |         |       V |
20+45       0.7314      0.11  Q         |         |         |       V |
20+50       0.7322      0.11  Q         |         |         |       V |
20+55       0.7328      0.10  Q         |         |         |       V |
21+ 0       0.7334      0.09  Q         |         |         |       V |
```

21+ 5	0.7340	0.08	Q				V
21+10	0.7346	0.09	Q				V
21+15	0.7353	0.10	Q				V
21+20	0.7360	0.10	Q				V
21+25	0.7366	0.10	Q				V
21+30	0.7372	0.08	Q				V
21+35	0.7378	0.08	Q				V
21+40	0.7384	0.09	Q				V
21+45	0.7391	0.10	Q				V
21+50	0.7398	0.10	Q				V
21+55	0.7404	0.10	Q				V
22+ 0	0.7410	0.08	Q				V
22+ 5	0.7416	0.08	Q				V
22+10	0.7422	0.09	Q				V
22+15	0.7428	0.10	Q				V
22+20	0.7435	0.10	Q				V
22+25	0.7442	0.10	Q				V
22+30	0.7448	0.08	Q				V
22+35	0.7453	0.08	Q				V
22+40	0.7458	0.08	Q				V
22+45	0.7464	0.08	Q				V
22+50	0.7469	0.07	Q				V
22+55	0.7474	0.07	Q				V
23+ 0	0.7479	0.07	Q				V
23+ 5	0.7484	0.07	Q				V
23+10	0.7489	0.07	Q				V
23+15	0.7494	0.07	Q				V
23+20	0.7499	0.07	Q				V
23+25	0.7504	0.07	Q				V
23+30	0.7509	0.07	Q				V
23+35	0.7514	0.07	Q				V
23+40	0.7519	0.07	Q				V
23+45	0.7524	0.07	Q				V
23+50	0.7529	0.07	Q				V
23+55	0.7534	0.07	Q				V
24+ 0	0.7539	0.07	Q				V
24+ 5	0.7544	0.07	Q				V
24+10	0.7548	0.05	Q				V
24+15	0.7549	0.03	Q				V
24+20	0.7550	0.02	Q				V
24+25	0.7551	0.01	Q				V
24+30	0.7551	0.01	Q				V
24+35	0.7552	0.00	Q				V
24+40	0.7552	0.00	Q				V
24+45	0.7552	0.00	Q				V
24+50	0.7552	0.00	Q				V
24+55	0.7552	0.00	Q				V
25+ 0	0.7552	0.00	Q				V
25+ 5	0.7552	0.00	Q				V

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/24/21 File: EX2YRA3242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A3 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
2021-11-08 EP

Drainage Area = 21.70(Ac.) = 0.034 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 21.70(Ac.) = 0.034 Sq. Mi.
Length along longest watercourse = 1790.00(Ft.)
Length along longest watercourse measured to centroid = 939.00(Ft.)
Length along longest watercourse = 0.339 Mi.
Length along longest watercourse measured to centroid = 0.178 Mi.
Difference in elevation = 21.70(Ft.)
Slope along watercourse = 64.0089 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.112 Hr.
Lag time = 6.74 Min.
25% of lag time = 1.69 Min.
40% of lag time = 2.70 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
21.70	2.40	52.08

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
21.70	6.20	134.54

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
21.700	87.60	0.000

Total Area Entered = 21.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

87.6	74.2	0.313	0.000	0.313	1.000	0.313
					Sum (F) =	0.313

Area averaged mean soil loss (F) (In/Hr) = 0.313
Minimum soil loss rate ((In/Hr)) = 0.156
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	74.161	7.891	1.726
2	0.167	148.322	44.381	9.706
3	0.250	222.484	27.055	5.917
4	0.333	296.645	10.417	2.278
5	0.417	370.806	5.563	1.217
6	0.500	444.967	2.594	0.567
7	0.583	519.128	0.909	0.199
8	0.667	593.290	0.552	0.121
9	0.750	667.451	0.454	0.099
10	0.833	741.612	0.184	0.040
			Sum = 100.000	Sum= 21.870

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.555)	0.017	0.002
2	0.17	0.07	0.019	(0.553)	0.017	0.002
3	0.25	0.07	0.019	(0.550)	0.017	0.002
4	0.33	0.10	0.029	(0.548)	0.026	0.003
5	0.42	0.10	0.029	(0.546)	0.026	0.003
6	0.50	0.10	0.029	(0.544)	0.026	0.003
7	0.58	0.10	0.029	(0.542)	0.026	0.003
8	0.67	0.10	0.029	(0.540)	0.026	0.003
9	0.75	0.10	0.029	(0.538)	0.026	0.003
10	0.83	0.13	0.038	(0.536)	0.035	0.004
11	0.92	0.13	0.038	(0.533)	0.035	0.004
12	1.00	0.13	0.038	(0.531)	0.035	0.004
13	1.08	0.10	0.029	(0.529)	0.026	0.003
14	1.17	0.10	0.029	(0.527)	0.026	0.003
15	1.25	0.10	0.029	(0.525)	0.026	0.003
16	1.33	0.10	0.029	(0.523)	0.026	0.003
17	1.42	0.10	0.029	(0.521)	0.026	0.003
18	1.50	0.10	0.029	(0.519)	0.026	0.003
19	1.58	0.10	0.029	(0.517)	0.026	0.003
20	1.67	0.10	0.029	(0.515)	0.026	0.003
21	1.75	0.10	0.029	(0.513)	0.026	0.003
22	1.83	0.13	0.038	(0.511)	0.035	0.004
23	1.92	0.13	0.038	(0.508)	0.035	0.004
24	2.00	0.13	0.038	(0.506)	0.035	0.004
25	2.08	0.13	0.038	(0.504)	0.035	0.004
26	2.17	0.13	0.038	(0.502)	0.035	0.004
27	2.25	0.13	0.038	(0.500)	0.035	0.004
28	2.33	0.13	0.038	(0.498)	0.035	0.004
29	2.42	0.13	0.038	(0.496)	0.035	0.004
30	2.50	0.13	0.038	(0.494)	0.035	0.004
31	2.58	0.17	0.048	(0.492)	0.043	0.005
32	2.67	0.17	0.048	(0.490)	0.043	0.005
33	2.75	0.17	0.048	(0.488)	0.043	0.005
34	2.83	0.17	0.048	(0.486)	0.043	0.005
35	2.92	0.17	0.048	(0.484)	0.043	0.005
36	3.00	0.17	0.048	(0.482)	0.043	0.005
37	3.08	0.17	0.048	(0.480)	0.043	0.005
38	3.17	0.17	0.048	(0.478)	0.043	0.005
39	3.25	0.17	0.048	(0.476)	0.043	0.005
40	3.33	0.17	0.048	(0.474)	0.043	0.005

41	3.42	0.17	0.048	(0.472)	0.043	0.005
42	3.50	0.17	0.048	(0.470)	0.043	0.005
43	3.58	0.17	0.048	(0.468)	0.043	0.005
44	3.67	0.17	0.048	(0.466)	0.043	0.005
45	3.75	0.17	0.048	(0.464)	0.043	0.005
46	3.83	0.20	0.058	(0.462)	0.052	0.006
47	3.92	0.20	0.058	(0.460)	0.052	0.006
48	4.00	0.20	0.058	(0.458)	0.052	0.006
49	4.08	0.20	0.058	(0.457)	0.052	0.006
50	4.17	0.20	0.058	(0.455)	0.052	0.006
51	4.25	0.20	0.058	(0.453)	0.052	0.006
52	4.33	0.23	0.067	(0.451)	0.060	0.007
53	4.42	0.23	0.067	(0.449)	0.060	0.007
54	4.50	0.23	0.067	(0.447)	0.060	0.007
55	4.58	0.23	0.067	(0.445)	0.060	0.007
56	4.67	0.23	0.067	(0.443)	0.060	0.007
57	4.75	0.23	0.067	(0.441)	0.060	0.007
58	4.83	0.27	0.077	(0.439)	0.069	0.008
59	4.92	0.27	0.077	(0.437)	0.069	0.008
60	5.00	0.27	0.077	(0.435)	0.069	0.008
61	5.08	0.20	0.058	(0.434)	0.052	0.006
62	5.17	0.20	0.058	(0.432)	0.052	0.006
63	5.25	0.20	0.058	(0.430)	0.052	0.006
64	5.33	0.23	0.067	(0.428)	0.060	0.007
65	5.42	0.23	0.067	(0.426)	0.060	0.007
66	5.50	0.23	0.067	(0.424)	0.060	0.007
67	5.58	0.27	0.077	(0.422)	0.069	0.008
68	5.67	0.27	0.077	(0.420)	0.069	0.008
69	5.75	0.27	0.077	(0.419)	0.069	0.008
70	5.83	0.27	0.077	(0.417)	0.069	0.008
71	5.92	0.27	0.077	(0.415)	0.069	0.008
72	6.00	0.27	0.077	(0.413)	0.069	0.008
73	6.08	0.30	0.086	(0.411)	0.078	0.009
74	6.17	0.30	0.086	(0.409)	0.078	0.009
75	6.25	0.30	0.086	(0.408)	0.078	0.009
76	6.33	0.30	0.086	(0.406)	0.078	0.009
77	6.42	0.30	0.086	(0.404)	0.078	0.009
78	6.50	0.30	0.086	(0.402)	0.078	0.009
79	6.58	0.33	0.096	(0.400)	0.086	0.010
80	6.67	0.33	0.096	(0.398)	0.086	0.010
81	6.75	0.33	0.096	(0.397)	0.086	0.010
82	6.83	0.33	0.096	(0.395)	0.086	0.010
83	6.92	0.33	0.096	(0.393)	0.086	0.010
84	7.00	0.33	0.096	(0.391)	0.086	0.010
85	7.08	0.33	0.096	(0.390)	0.086	0.010
86	7.17	0.33	0.096	(0.388)	0.086	0.010
87	7.25	0.33	0.096	(0.386)	0.086	0.010
88	7.33	0.37	0.106	(0.384)	0.095	0.011
89	7.42	0.37	0.106	(0.382)	0.095	0.011
90	7.50	0.37	0.106	(0.381)	0.095	0.011
91	7.58	0.40	0.115	(0.379)	0.104	0.012
92	7.67	0.40	0.115	(0.377)	0.104	0.012
93	7.75	0.40	0.115	(0.376)	0.104	0.012
94	7.83	0.43	0.125	(0.374)	0.112	0.012
95	7.92	0.43	0.125	(0.372)	0.112	0.012
96	8.00	0.43	0.125	(0.370)	0.112	0.012
97	8.08	0.50	0.144	(0.369)	0.130	0.014
98	8.17	0.50	0.144	(0.367)	0.130	0.014
99	8.25	0.50	0.144	(0.365)	0.130	0.014
100	8.33	0.50	0.144	(0.363)	0.130	0.014
101	8.42	0.50	0.144	(0.362)	0.130	0.014
102	8.50	0.50	0.144	(0.360)	0.130	0.014
103	8.58	0.53	0.154	(0.358)	0.138	0.015
104	8.67	0.53	0.154	(0.357)	0.138	0.015
105	8.75	0.53	0.154	(0.355)	0.138	0.015
106	8.83	0.57	0.163	(0.353)	0.147	0.016
107	8.92	0.57	0.163	(0.352)	0.147	0.016
108	9.00	0.57	0.163	(0.350)	0.147	0.016
109	9.08	0.63	0.182	(0.348)	0.164	0.018
110	9.17	0.63	0.182	(0.347)	0.164	0.018
111	9.25	0.63	0.182	(0.345)	0.164	0.018
112	9.33	0.67	0.192	(0.343)	0.173	0.019
113	9.42	0.67	0.192	(0.342)	0.173	0.019
114	9.50	0.67	0.192	(0.340)	0.173	0.019
115	9.58	0.70	0.202	(0.339)	0.181	0.020

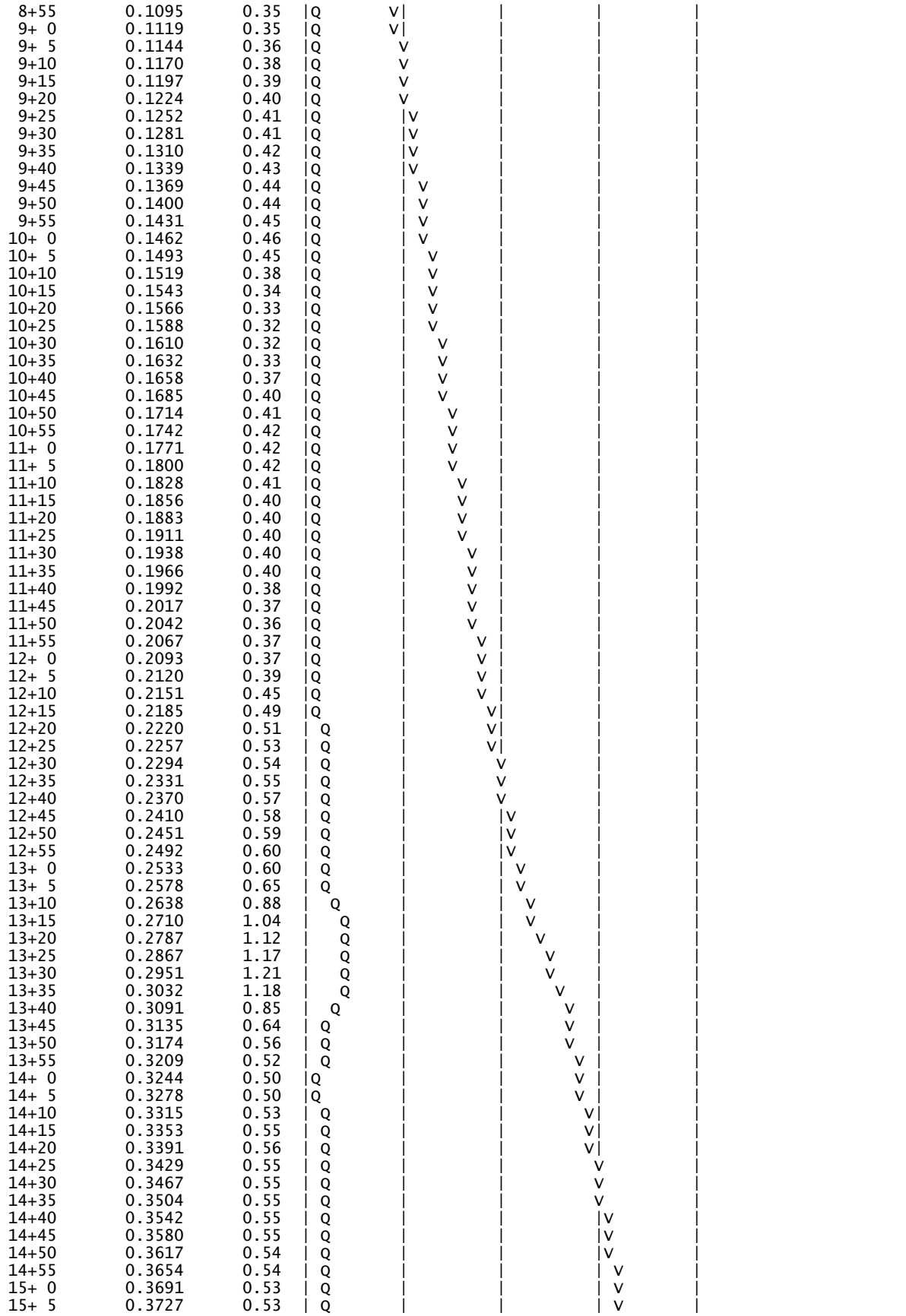
116	9.67	0.70	0.202	(0.337)	0.181	0.020
117	9.75	0.70	0.202	(0.335)	0.181	0.020
118	9.83	0.73	0.211	(0.334)	0.190	0.021
119	9.92	0.73	0.211	(0.332)	0.190	0.021
120	10.00	0.73	0.211	(0.330)	0.190	0.021
121	10.08	0.50	0.144	(0.329)	0.130	0.014
122	10.17	0.50	0.144	(0.327)	0.130	0.014
123	10.25	0.50	0.144	(0.326)	0.130	0.014
124	10.33	0.50	0.144	(0.324)	0.130	0.014
125	10.42	0.50	0.144	(0.322)	0.130	0.014
126	10.50	0.50	0.144	(0.321)	0.130	0.014
127	10.58	0.67	0.192	(0.319)	0.173	0.019
128	10.67	0.67	0.192	(0.318)	0.173	0.019
129	10.75	0.67	0.192	(0.316)	0.173	0.019
130	10.83	0.67	0.192	(0.315)	0.173	0.019
131	10.92	0.67	0.192	(0.313)	0.173	0.019
132	11.00	0.67	0.192	(0.312)	0.173	0.019
133	11.08	0.63	0.182	(0.310)	0.164	0.018
134	11.17	0.63	0.182	(0.309)	0.164	0.018
135	11.25	0.63	0.182	(0.307)	0.164	0.018
136	11.33	0.63	0.182	(0.306)	0.164	0.018
137	11.42	0.63	0.182	(0.304)	0.164	0.018
138	11.50	0.63	0.182	(0.302)	0.164	0.018
139	11.58	0.57	0.163	(0.301)	0.147	0.016
140	11.67	0.57	0.163	(0.299)	0.147	0.016
141	11.75	0.57	0.163	(0.298)	0.147	0.016
142	11.83	0.60	0.173	(0.297)	0.156	0.017
143	11.92	0.60	0.173	(0.295)	0.156	0.017
144	12.00	0.60	0.173	(0.294)	0.156	0.017
145	12.08	0.83	0.240	(0.292)	0.216	0.024
146	12.17	0.83	0.240	(0.291)	0.216	0.024
147	12.25	0.83	0.240	(0.289)	0.216	0.024
148	12.33	0.87	0.250	(0.288)	0.225	0.025
149	12.42	0.87	0.250	(0.286)	0.225	0.025
150	12.50	0.87	0.250	(0.285)	0.225	0.025
151	12.58	0.93	0.269	(0.283)	0.242	0.027
152	12.67	0.93	0.269	(0.282)	0.242	0.027
153	12.75	0.93	0.269	(0.281)	0.242	0.027
154	12.83	0.97	0.278	(0.279)	0.251	0.028
155	12.92	0.97	0.278	(0.278)	0.251	0.028
156	13.00	0.97	0.278	(0.276)	0.251	0.028
157	13.08	1.13	0.326	0.275	(0.294)	0.051
158	13.17	1.13	0.326	0.274	(0.294)	0.053
159	13.25	1.13	0.326	0.272	(0.294)	0.054
160	13.33	1.13	0.326	0.271	(0.294)	0.056
161	13.42	1.13	0.326	0.269	(0.294)	0.057
162	13.50	1.13	0.326	0.268	(0.294)	0.058
163	13.58	0.77	0.221	(0.267)	0.199	0.022
164	13.67	0.77	0.221	(0.265)	0.199	0.022
165	13.75	0.77	0.221	(0.264)	0.199	0.022
166	13.83	0.77	0.221	(0.263)	0.199	0.022
167	13.92	0.77	0.221	(0.261)	0.199	0.022
168	14.00	0.77	0.221	(0.260)	0.199	0.022
169	14.08	0.90	0.259	(0.259)	0.233	0.026
170	14.17	0.90	0.259	(0.257)	0.233	0.026
171	14.25	0.90	0.259	(0.256)	0.233	0.026
172	14.33	0.87	0.250	(0.255)	0.225	0.025
173	14.42	0.87	0.250	(0.253)	0.225	0.025
174	14.50	0.87	0.250	(0.252)	0.225	0.025
175	14.58	0.87	0.250	(0.251)	0.225	0.025
176	14.67	0.87	0.250	(0.249)	0.225	0.025
177	14.75	0.87	0.250	(0.248)	0.225	0.025
178	14.83	0.83	0.240	(0.247)	0.216	0.024
179	14.92	0.83	0.240	(0.246)	0.216	0.024
180	15.00	0.83	0.240	(0.244)	0.216	0.024
181	15.08	0.80	0.230	(0.243)	0.207	0.023
182	15.17	0.80	0.230	(0.242)	0.207	0.023
183	15.25	0.80	0.230	(0.241)	0.207	0.023
184	15.33	0.77	0.221	(0.239)	0.199	0.022
185	15.42	0.77	0.221	(0.238)	0.199	0.022
186	15.50	0.77	0.221	(0.237)	0.199	0.022
187	15.58	0.63	0.182	(0.236)	0.164	0.018
188	15.67	0.63	0.182	(0.235)	0.164	0.018
189	15.75	0.63	0.182	(0.233)	0.164	0.018
190	15.83	0.63	0.182	(0.232)	0.164	0.018

191	15.92	0.63	0.182	(0.231)	0.164	0.018
192	16.00	0.63	0.182	(0.230)	0.164	0.018
193	16.08	0.13	0.038	(0.229)	0.035	0.004
194	16.17	0.13	0.038	(0.227)	0.035	0.004
195	16.25	0.13	0.038	(0.226)	0.035	0.004
196	16.33	0.13	0.038	(0.225)	0.035	0.004
197	16.42	0.13	0.038	(0.224)	0.035	0.004
198	16.50	0.13	0.038	(0.223)	0.035	0.004
199	16.58	0.10	0.029	(0.222)	0.026	0.003
200	16.67	0.10	0.029	(0.221)	0.026	0.003
201	16.75	0.10	0.029	(0.219)	0.026	0.003
202	16.83	0.10	0.029	(0.218)	0.026	0.003
203	16.92	0.10	0.029	(0.217)	0.026	0.003
204	17.00	0.10	0.029	(0.216)	0.026	0.003
205	17.08	0.17	0.048	(0.215)	0.043	0.005
206	17.17	0.17	0.048	(0.214)	0.043	0.005
207	17.25	0.17	0.048	(0.213)	0.043	0.005
208	17.33	0.17	0.048	(0.212)	0.043	0.005
209	17.42	0.17	0.048	(0.211)	0.043	0.005
210	17.50	0.17	0.048	(0.210)	0.043	0.005
211	17.58	0.17	0.048	(0.209)	0.043	0.005
212	17.67	0.17	0.048	(0.208)	0.043	0.005
213	17.75	0.17	0.048	(0.207)	0.043	0.005
214	17.83	0.13	0.038	(0.206)	0.035	0.004
215	17.92	0.13	0.038	(0.205)	0.035	0.004
216	18.00	0.13	0.038	(0.204)	0.035	0.004
217	18.08	0.13	0.038	(0.203)	0.035	0.004
218	18.17	0.13	0.038	(0.202)	0.035	0.004
219	18.25	0.13	0.038	(0.201)	0.035	0.004
220	18.33	0.13	0.038	(0.200)	0.035	0.004
221	18.42	0.13	0.038	(0.199)	0.035	0.004
222	18.50	0.13	0.038	(0.198)	0.035	0.004
223	18.58	0.10	0.029	(0.197)	0.026	0.003
224	18.67	0.10	0.029	(0.196)	0.026	0.003
225	18.75	0.10	0.029	(0.195)	0.026	0.003
226	18.83	0.07	0.019	(0.194)	0.017	0.002
227	18.92	0.07	0.019	(0.193)	0.017	0.002
228	19.00	0.07	0.019	(0.192)	0.017	0.002
229	19.08	0.10	0.029	(0.191)	0.026	0.003
230	19.17	0.10	0.029	(0.190)	0.026	0.003
231	19.25	0.10	0.029	(0.189)	0.026	0.003
232	19.33	0.13	0.038	(0.188)	0.035	0.004
233	19.42	0.13	0.038	(0.188)	0.035	0.004
234	19.50	0.13	0.038	(0.187)	0.035	0.004
235	19.58	0.10	0.029	(0.186)	0.026	0.003
236	19.67	0.10	0.029	(0.185)	0.026	0.003
237	19.75	0.10	0.029	(0.184)	0.026	0.003
238	19.83	0.07	0.019	(0.183)	0.017	0.002
239	19.92	0.07	0.019	(0.183)	0.017	0.002
240	20.00	0.07	0.019	(0.182)	0.017	0.002
241	20.08	0.10	0.029	(0.181)	0.026	0.003
242	20.17	0.10	0.029	(0.180)	0.026	0.003
243	20.25	0.10	0.029	(0.179)	0.026	0.003
244	20.33	0.10	0.029	(0.179)	0.026	0.003
245	20.42	0.10	0.029	(0.178)	0.026	0.003
246	20.50	0.10	0.029	(0.177)	0.026	0.003
247	20.58	0.10	0.029	(0.176)	0.026	0.003
248	20.67	0.10	0.029	(0.176)	0.026	0.003
249	20.75	0.10	0.029	(0.175)	0.026	0.003
250	20.83	0.07	0.019	(0.174)	0.017	0.002
251	20.92	0.07	0.019	(0.173)	0.017	0.002
252	21.00	0.07	0.019	(0.173)	0.017	0.002
253	21.08	0.10	0.029	(0.172)	0.026	0.003
254	21.17	0.10	0.029	(0.171)	0.026	0.003
255	21.25	0.10	0.029	(0.171)	0.026	0.003
256	21.33	0.07	0.019	(0.170)	0.017	0.002
257	21.42	0.07	0.019	(0.169)	0.017	0.002
258	21.50	0.07	0.019	(0.169)	0.017	0.002
259	21.58	0.10	0.029	(0.168)	0.026	0.003
260	21.67	0.10	0.029	(0.168)	0.026	0.003
261	21.75	0.10	0.029	(0.167)	0.026	0.003
262	21.83	0.07	0.019	(0.166)	0.017	0.002
263	21.92	0.07	0.019	(0.166)	0.017	0.002
264	22.00	0.07	0.019	(0.165)	0.017	0.002
265	22.08	0.10	0.029	(0.165)	0.026	0.003

```
266  22.17     0.10      0.029       (  0.164)       0.026        0.003
267  22.25     0.10      0.029       (  0.164)       0.026        0.003
268  22.33     0.07      0.019       (  0.163)       0.017        0.002
269  22.42     0.07      0.019       (  0.163)       0.017        0.002
270  22.50     0.07      0.019       (  0.162)       0.017        0.002
271  22.58     0.07      0.019       (  0.162)       0.017        0.002
272  22.67     0.07      0.019       (  0.161)       0.017        0.002
273  22.75     0.07      0.019       (  0.161)       0.017        0.002
274  22.83     0.07      0.019       (  0.160)       0.017        0.002
275  22.92     0.07      0.019       (  0.160)       0.017        0.002
276  23.00     0.07      0.019       (  0.160)       0.017        0.002
277  23.08     0.07      0.019       (  0.159)       0.017        0.002
278  23.17     0.07      0.019       (  0.159)       0.017        0.002
279  23.25     0.07      0.019       (  0.158)       0.017        0.002
280  23.33     0.07      0.019       (  0.158)       0.017        0.002
281  23.42     0.07      0.019       (  0.158)       0.017        0.002
282  23.50     0.07      0.019       (  0.158)       0.017        0.002
283  23.58     0.07      0.019       (  0.157)       0.017        0.002
284  23.67     0.07      0.019       (  0.157)       0.017        0.002
285  23.75     0.07      0.019       (  0.157)       0.017        0.002
286  23.83     0.07      0.019       (  0.157)       0.017        0.002
287  23.92     0.07      0.019       (  0.157)       0.017        0.002
288  24.00     0.07      0.019       (  0.156)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area      21.7(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      2.15(In)
      Total soil loss =     3.886(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       19782.0 Cubic Feet
      Total soil loss =      169260.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.214(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q          |         |         |         |
  0+10       0.0002      0.02  Q          |         |         |         |
  0+15       0.0004      0.03  Q          |         |         |         |
  0+20       0.0007      0.04  Q          |         |         |         |
  0+25       0.0010      0.05  Q          |         |         |         |
  0+30       0.0014      0.06  Q          |         |         |         |
  0+35       0.0018      0.06  Q          |         |         |         |
  0+40       0.0023      0.06  Q          |         |         |         |
  0+45       0.0027      0.06  Q          |         |         |         |
  0+50       0.0031      0.06  Q          |         |         |         |
  0+55       0.0036      0.07  Q          |         |         |         |
  1+ 0       0.0042      0.08  Q          |         |         |         |
  1+ 5       0.0047      0.08  Q          |         |         |         |
  1+10       0.0052      0.07  Q          |         |         |         |
  1+15       0.0057      0.07  Q          |         |         |         |
  1+20       0.0062      0.06  Q          |         |         |         |
  1+25       0.0066      0.06  Q          |         |         |         |
  1+30       0.0070      0.06  Q          |         |         |         |
  1+35       0.0075      0.06  Q          |         |         |         |
  1+40       0.0079      0.06  Q          |         |         |         |
  1+45       0.0083      0.06  Q          |         |         |         |
  1+50       0.0088      0.06  Q          |         |         |         |
  1+55       0.0093      0.07  Q          |         |         |         |
  2+ 0       0.0098      0.08  Q          |         |         |         |
  2+ 5       0.0104      0.08  Q          |         |         |         |
  2+10       0.0110      0.08  Q          |         |         |         |
  2+15       0.0115      0.08  QV         |         |         |         |
  2+20       0.0121      0.08  QV         |         |         |         |
  2+25       0.0127      0.08  QV         |         |         |         |
  2+30       0.0133      0.08  QV         |         |         |         |
  2+35       0.0139      0.09  QV         |         |         |         |
```

```
2+40       0.0145      0.09  QV        |         |         |         |
2+45       0.0152      0.10  QV        |         |         |         |
2+50       0.0159      0.10  QV        |         |         |         |
2+55       0.0166      0.10  QV        |         |         |         |
3+ 0       0.0174      0.10  QV        |         |         |         |
3+ 5       0.0181      0.10  QV        |         |         |         |
3+10       0.0188      0.10  QV        |         |         |         |
3+15       0.0195      0.10  QV        |         |         |         |
3+20       0.0203      0.11  QV        |         |         |         |
3+25       0.0210      0.11  QV        |         |         |         |
3+30       0.0217      0.11  QV        |         |         |         |
3+35       0.0224      0.11  QV        |         |         |         |
3+40       0.0231      0.11  Q V       |         |         |         |
3+45       0.0239      0.11  Q V       |         |         |         |
3+50       0.0246      0.11  Q V       |         |         |         |
3+55       0.0254      0.12  Q V       |         |         |         |
4+ 0       0.0262      0.12  Q V       |         |         |         |
4+ 5       0.0271      0.12  Q V       |         |         |         |
4+10       0.0280      0.13  Q V       |         |         |         |
4+15       0.0288      0.13  Q V       |         |         |         |
4+20       0.0297      0.13  Q V       |         |         |         |
4+25       0.0306      0.14  Q V       |         |         |         |
4+30       0.0316      0.14  Q V       |         |         |         |
4+35       0.0326      0.14  Q V       |         |         |         |
4+40       0.0336      0.15  Q V       |         |         |         |
4+45       0.0346      0.15  Q  V      |         |         |         |
4+50       0.0357      0.15  Q  V      |         |         |         |
4+55       0.0367      0.16  Q  V      |         |         |         |
5+ 0       0.0379      0.16  Q  V      |         |         |         |
5+ 5       0.0390      0.16  Q  V      |         |         |         |
5+10       0.0400      0.15  Q  V      |         |         |         |
5+15       0.0409      0.13  Q  V      |         |         |         |
5+20       0.0418      0.13  Q  V      |         |         |         |
5+25       0.0428      0.14  Q  V      |         |         |         |
5+30       0.0438      0.14  Q  V      |         |         |         |
5+35       0.0448      0.15  Q  V      |         |         |         |
5+40       0.0459      0.16  Q   V     |         |         |         |
5+45       0.0470      0.16  Q   V     |         |         |         |
5+50       0.0481      0.17  Q   V     |         |         |         |
5+55       0.0493      0.17  Q   V     |         |         |         |
6+ 0       0.0504      0.17  Q   V     |         |         |         |
6+ 5       0.0516      0.17  Q   V     |         |         |         |
6+10       0.0528      0.18  Q   V     |         |         |         |
6+15       0.0541      0.18  Q   V     |         |         |         |
6+20       0.0554      0.19  Q   V     |         |         |         |
6+25       0.0567      0.19  Q   V     |         |         |         |
6+30       0.0580      0.19  Q    V    |         |         |         |
6+35       0.0593      0.19  Q    V    |         |         |         |
6+40       0.0607      0.20  Q    V    |         |         |         |
6+45       0.0621      0.21  Q    V    |         |         |         |
6+50       0.0635      0.21  Q    V    |         |         |         |
6+55       0.0650      0.21  Q    V    |         |         |         |
7+ 0       0.0664      0.21  Q    V    |         |         |         |
7+ 5       0.0679      0.21  Q    V    |         |         |         |
7+10       0.0693      0.21  Q     V   |         |         |         |
7+15       0.0707      0.21  Q     V   |         |         |         |
7+20       0.0722      0.21  Q     V   |         |         |         |
7+25       0.0737      0.22  Q     V   |         |         |         |
7+30       0.0753      0.23  Q     V   |         |         |         |
7+35       0.0769      0.23  Q     V   |         |         |         |
7+40       0.0785      0.24  Q     V   |         |         |         |
7+45       0.0802      0.25  Q      V  |         |         |         |
7+50       0.0820      0.25  |Q     V  |         |         |         |
7+55       0.0838      0.26  |Q     V  |         |         |         |
8+ 0       0.0856      0.27  |Q     V  |         |         |         |
8+ 5       0.0875      0.27  |Q     V  |         |         |         |
8+10       0.0895      0.29  |Q     V  |         |         |         |
8+15       0.0916      0.31  |Q      V |         |         |         |
8+20       0.0938      0.31  |Q      V |         |         |         |
8+25       0.0959      0.31  |Q      V |         |         |         |
8+30       0.0981      0.31  |Q      V |         |         |         |
8+35       0.1003      0.32  |Q      V |         |         |         |
8+40       0.1025      0.33  |Q       V|         |         |         |
8+45       0.1048      0.33  |Q       V|         |         |         |
8+50       0.1071      0.34  |Q       V|         |         |         |
```



15+10	0.3762	0.52	| Q	|	|	|	V |
15+15	0.3797	0.51	| Q	|	|	|	V |
15+20	0.3832	0.50	| Q	|	|	|	V |
15+25	0.3866	0.49	|Q	|	|	|	V |
15+30	0.3900	0.49	|Q	|	|	|	V |
15+35	0.3933	0.48	|Q	|	|	|	V |
15+40	0.3963	0.44	|Q	|	|	|	V |
15+45	0.3992	0.42	|Q	|	|	|	V |
15+50	0.4020	0.41	|Q	|	|	|	V |
15+55	0.4048	0.40	|Q	|	|	|	V |
16+ 0	0.4075	0.40	|Q	|	|	|	V |
16+ 5	0.4101	0.38	|Q	|	|	|	V |
16+10	0.4117	0.23	Q	|	|	|	V |
16+15	0.4128	0.15	Q	|	|	|	V |
16+20	0.4136	0.12	Q	|	|	|	V |
16+25	0.4142	0.10	Q	|	|	|	V |
16+30	0.4149	0.09	Q	|	|	|	V |
16+35	0.4155	0.09	Q	|	|	|	V |
16+40	0.4160	0.08	Q	|	|	|	V |
16+45	0.4164	0.07	Q	|	|	|	V |
16+50	0.4169	0.07	Q	|	|	|	V |
16+55	0.4173	0.06	Q	|	|	|	V |
17+ 0	0.4178	0.06	Q	|	|	|	V |
17+ 5	0.4182	0.07	Q	|	|	|	V |
17+10	0.4188	0.09	Q	|	|	|	V |
17+15	0.4195	0.10	Q	|	|	|	V |
17+20	0.4202	0.10	Q	|	|	|	V |
17+25	0.4209	0.10	Q	|	|	|	V |
17+30	0.4216	0.10	Q	|	|	|	V |
17+35	0.4223	0.10	Q	|	|	|	V |
17+40	0.4230	0.10	Q	|	|	|	V |
17+45	0.4238	0.10	Q	|	|	|	V |
17+50	0.4245	0.10	Q	|	|	|	V |
17+55	0.4251	0.09	Q	|	|	|	V |
18+ 0	0.4257	0.09	Q	|	|	|	V |
18+ 5	0.4263	0.09	Q	|	|	|	V |
18+10	0.4269	0.09	Q	|	|	|	V |
18+15	0.4275	0.08	Q	|	|	|	V |
18+20	0.4281	0.08	Q	|	|	|	V |
18+25	0.4286	0.08	Q	|	|	|	V |
18+30	0.4292	0.08	Q	|	|	|	V |
18+35	0.4298	0.08	Q	|	|	|	V |
18+40	0.4303	0.07	Q	|	|	|	V |
18+45	0.4308	0.07	Q	|	|	|	V |
18+50	0.4312	0.06	Q	|	|	|	V |
18+55	0.4316	0.05	Q	|	|	|	V |
19+ 0	0.4319	0.05	Q	|	|	|	V |
19+ 5	0.4322	0.05	Q	|	|	|	V |
19+10	0.4326	0.05	Q	|	|	|	V |
19+15	0.4330	0.06	Q	|	|	|	V |
19+20	0.4334	0.06	Q	|	|	|	V |
19+25	0.4339	0.07	Q	|	|	|	V |
19+30	0.4345	0.08	Q	|	|	|	V |
19+35	0.4350	0.08	Q	|	|	|	V |
19+40	0.4355	0.07	Q	|	|	|	V |
19+45	0.4360	0.07	Q	|	|	|	V |
19+50	0.4364	0.06	Q	|	|	|	V |
19+55	0.4368	0.05	Q	|	|	|	V |
20+ 0	0.4371	0.05	Q	|	|	|	V |
20+ 5	0.4374	0.05	Q	|	|	|	V |
20+10	0.4378	0.05	Q	|	|	|	V |
20+15	0.4382	0.06	Q	|	|	|	V |
20+20	0.4386	0.06	Q	|	|	|	V |
20+25	0.4390	0.06	Q	|	|	|	V |
20+30	0.4395	0.06	Q	|	|	|	V |
20+35	0.4399	0.06	Q	|	|	|	V |
20+40	0.4403	0.06	Q	|	|	|	V |
20+45	0.4408	0.06	Q	|	|	|	V |
20+50	0.4412	0.06	Q	|	|	|	V |
20+55	0.4415	0.05	Q	|	|	|	V |
21+ 0	0.4419	0.05	Q	|	|	|	V |
21+ 5	0.4422	0.05	Q	|	|	|	V |
21+10	0.4426	0.05	Q	|	|	|	V |
21+15	0.4430	0.06	Q	|	|	|	V|
21+20	0.4434	0.06	Q	|	|	|	V|

21+25	0.4437	0.05	Q	|	|	|	v|
21+30	0.4440	0.05	Q	|	|	|	v|
21+35	0.4444	0.05	Q	|	|	|	v|
21+40	0.4447	0.05	Q	|	|	|	v|
21+45	0.4451	0.06	Q	|	|	|	v|
21+50	0.4455	0.06	Q	|	|	|	v|
21+55	0.4459	0.05	Q	|	|	|	v|
22+ 0	0.4462	0.05	Q	|	|	|	v|
22+ 5	0.4465	0.05	Q	|	|	|	v|
22+10	0.4469	0.05	Q	|	|	|	v|
22+15	0.4473	0.06	Q	|	|	|	v|
22+20	0.4477	0.06	Q	|	|	|	v|
22+25	0.4481	0.05	Q	|	|	|	v|
22+30	0.4484	0.05	Q	|	|	|	v|
22+35	0.4487	0.04	Q	|	|	|	v|
22+40	0.4490	0.04	Q	|	|	|	v|
22+45	0.4493	0.04	Q	|	|	|	v|
22+50	0.4496	0.04	Q	|	|	|	v|
22+55	0.4499	0.04	Q	|	|	|	v|
23+ 0	0.4501	0.04	Q	|	|	|	v|
23+ 5	0.4504	0.04	Q	|	|	|	v|
23+10	0.4507	0.04	Q	|	|	|	v|
23+15	0.4510	0.04	Q	|	|	|	v|
23+20	0.4513	0.04	Q	|	|	|	v|
23+25	0.4516	0.04	Q	|	|	|	v|
23+30	0.4519	0.04	Q	|	|	|	v|
23+35	0.4522	0.04	Q	|	|	|	v|
23+40	0.4525	0.04	Q	|	|	|	v|
23+45	0.4527	0.04	Q	|	|	|	v|
23+50	0.4530	0.04	Q	|	|	|	v|
23+55	0.4533	0.04	Q	|	|	|	v|
24+ 0	0.4536	0.04	Q	|	|	|	v|
24+ 5	0.4539	0.04	Q	|	|	|	v|
24+10	0.4540	0.02	Q	|	|	|	v|
24+15	0.4541	0.01	Q	|	|	|	v|
24+20	0.4541	0.00	Q	|	|	|	v|
24+25	0.4541	0.00	Q	|	|	|	v|
24+30	0.4541	0.00	Q	|	|	|	v|
24+35	0.4541	0.00	Q	|	|	|	v|
24+40	0.4541	0.00	Q	|	|	|	v|
24+45	0.4541	0.00	Q	|	|	|	v|

PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/23/21 File: PROP2YR3B242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG B AREA 3 DEVELOPED CONDITION
2 YR 24 HR STORM EVENT
21-0034
2021-11-23 EP

Drainage Area = 12.30(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.30(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 2287.00(Ft.)
Length along longest watercourse measured to centroid = 2251.00(Ft.)
Length along longest watercourse = 0.433 Mi.
Length along longest watercourse measured to centroid = 0.426 Mi.
Difference in elevation = 9.00(Ft.)
Slope along watercourse = 20.7783 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.106 Hr.
Lag time = 6.39 Min.
25% of lag time = 1.60 Min.
40% of lag time = 2.55 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.30	2.40	29.52

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.30	6.20	76.26

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.300	56.00	0.730

Total Area Entered = 12.30(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

56.0	36.0	0.706	0.730	0.242	1.000	0.242
					Sum (F) =	0.242

Area averaged mean soil loss (F) (In/Hr) = 0.242
Minimum soil loss rate ((In/Hr)) = 0.121
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.320

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	78.278	8.665	1.074
2	0.167	156.556	47.291	5.862
3	0.250	234.834	25.214	3.126
4	0.333	313.112	9.930	1.231
5	0.417	391.390	5.085	0.630
6	0.500	469.668	2.068	0.256
7	0.583	547.947	0.776	0.096
8	0.667	626.225	0.550	0.068
9	0.750	704.503	0.421	0.052
			Sum = 100.000	Sum= 12.396

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.429)	0.006	0.013
2	0.17	0.07	0.019	(0.428)	0.006	0.013
3	0.25	0.07	0.019	(0.426)	0.006	0.013
4	0.33	0.10	0.029	(0.424)	0.009	0.020
5	0.42	0.10	0.029	(0.423)	0.009	0.020
6	0.50	0.10	0.029	(0.421)	0.009	0.020
7	0.58	0.10	0.029	(0.419)	0.009	0.020
8	0.67	0.10	0.029	(0.418)	0.009	0.020
9	0.75	0.10	0.029	(0.416)	0.009	0.020
10	0.83	0.13	0.038	(0.414)	0.012	0.026
11	0.92	0.13	0.038	(0.413)	0.012	0.026
12	1.00	0.13	0.038	(0.411)	0.012	0.026
13	1.08	0.10	0.029	(0.410)	0.009	0.020
14	1.17	0.10	0.029	(0.408)	0.009	0.020
15	1.25	0.10	0.029	(0.406)	0.009	0.020
16	1.33	0.10	0.029	(0.405)	0.009	0.020
17	1.42	0.10	0.029	(0.403)	0.009	0.020
18	1.50	0.10	0.029	(0.401)	0.009	0.020
19	1.58	0.10	0.029	(0.400)	0.009	0.020
20	1.67	0.10	0.029	(0.398)	0.009	0.020
21	1.75	0.10	0.029	(0.397)	0.009	0.020
22	1.83	0.13	0.038	(0.395)	0.012	0.026
23	1.92	0.13	0.038	(0.394)	0.012	0.026
24	2.00	0.13	0.038	(0.392)	0.012	0.026
25	2.08	0.13	0.038	(0.390)	0.012	0.026
26	2.17	0.13	0.038	(0.389)	0.012	0.026
27	2.25	0.13	0.038	(0.387)	0.012	0.026
28	2.33	0.13	0.038	(0.386)	0.012	0.026
29	2.42	0.13	0.038	(0.384)	0.012	0.026
30	2.50	0.13	0.038	(0.382)	0.012	0.026
31	2.58	0.17	0.048	(0.381)	0.015	0.033
32	2.67	0.17	0.048	(0.379)	0.015	0.033
33	2.75	0.17	0.048	(0.378)	0.015	0.033
34	2.83	0.17	0.048	(0.376)	0.015	0.033
35	2.92	0.17	0.048	(0.375)	0.015	0.033
36	3.00	0.17	0.048	(0.373)	0.015	0.033
37	3.08	0.17	0.048	(0.372)	0.015	0.033
38	3.17	0.17	0.048	(0.370)	0.015	0.033
39	3.25	0.17	0.048	(0.368)	0.015	0.033
40	3.33	0.17	0.048	(0.367)	0.015	0.033
41	3.42	0.17	0.048	(0.365)	0.015	0.033

42	3.50	0.17	0.048	(0.364)	0.015	0.033
43	3.58	0.17	0.048	(0.362)	0.015	0.033
44	3.67	0.17	0.048	(0.361)	0.015	0.033
45	3.75	0.17	0.048	(0.359)	0.015	0.033
46	3.83	0.20	0.058	(0.358)	0.018	0.039
47	3.92	0.20	0.058	(0.356)	0.018	0.039
48	4.00	0.20	0.058	(0.355)	0.018	0.039
49	4.08	0.20	0.058	(0.353)	0.018	0.039
50	4.17	0.20	0.058	(0.352)	0.018	0.039
51	4.25	0.20	0.058	(0.350)	0.018	0.039
52	4.33	0.23	0.067	(0.349)	0.022	0.046
53	4.42	0.23	0.067	(0.347)	0.022	0.046
54	4.50	0.23	0.067	(0.346)	0.022	0.046
55	4.58	0.23	0.067	(0.344)	0.022	0.046
56	4.67	0.23	0.067	(0.343)	0.022	0.046
57	4.75	0.23	0.067	(0.341)	0.022	0.046
58	4.83	0.27	0.077	(0.340)	0.025	0.052
59	4.92	0.27	0.077	(0.338)	0.025	0.052
60	5.00	0.27	0.077	(0.337)	0.025	0.052
61	5.08	0.20	0.058	(0.335)	0.018	0.039
62	5.17	0.20	0.058	(0.334)	0.018	0.039
63	5.25	0.20	0.058	(0.333)	0.018	0.039
64	5.33	0.23	0.067	(0.331)	0.022	0.046
65	5.42	0.23	0.067	(0.330)	0.022	0.046
66	5.50	0.23	0.067	(0.328)	0.022	0.046
67	5.58	0.27	0.077	(0.327)	0.025	0.052
68	5.67	0.27	0.077	(0.325)	0.025	0.052
69	5.75	0.27	0.077	(0.324)	0.025	0.052
70	5.83	0.27	0.077	(0.322)	0.025	0.052
71	5.92	0.27	0.077	(0.321)	0.025	0.052
72	6.00	0.27	0.077	(0.320)	0.025	0.052
73	6.08	0.30	0.086	(0.318)	0.028	0.059
74	6.17	0.30	0.086	(0.317)	0.028	0.059
75	6.25	0.30	0.086	(0.315)	0.028	0.059
76	6.33	0.30	0.086	(0.314)	0.028	0.059
77	6.42	0.30	0.086	(0.313)	0.028	0.059
78	6.50	0.30	0.086	(0.311)	0.028	0.059
79	6.58	0.33	0.096	(0.310)	0.031	0.065
80	6.67	0.33	0.096	(0.308)	0.031	0.065
81	6.75	0.33	0.096	(0.307)	0.031	0.065
82	6.83	0.33	0.096	(0.306)	0.031	0.065
83	6.92	0.33	0.096	(0.304)	0.031	0.065
84	7.00	0.33	0.096	(0.303)	0.031	0.065
85	7.08	0.33	0.096	(0.301)	0.031	0.065
86	7.17	0.33	0.096	(0.300)	0.031	0.065
87	7.25	0.33	0.096	(0.299)	0.031	0.065
88	7.33	0.37	0.106	(0.297)	0.034	0.072
89	7.42	0.37	0.106	(0.296)	0.034	0.072
90	7.50	0.37	0.106	(0.295)	0.034	0.072
91	7.58	0.40	0.115	(0.293)	0.037	0.078
92	7.67	0.40	0.115	(0.292)	0.037	0.078
93	7.75	0.40	0.115	(0.291)	0.037	0.078
94	7.83	0.43	0.125	(0.289)	0.040	0.085
95	7.92	0.43	0.125	(0.288)	0.040	0.085
96	8.00	0.43	0.125	(0.287)	0.040	0.085
97	8.08	0.50	0.144	(0.285)	0.046	0.098
98	8.17	0.50	0.144	(0.284)	0.046	0.098
99	8.25	0.50	0.144	(0.283)	0.046	0.098
100	8.33	0.50	0.144	(0.281)	0.046	0.098
101	8.42	0.50	0.144	(0.280)	0.046	0.098
102	8.50	0.50	0.144	(0.279)	0.046	0.098
103	8.58	0.53	0.154	(0.277)	0.049	0.104
104	8.67	0.53	0.154	(0.276)	0.049	0.104
105	8.75	0.53	0.154	(0.275)	0.049	0.104
106	8.83	0.57	0.163	(0.273)	0.052	0.111
107	8.92	0.57	0.163	(0.272)	0.052	0.111
108	9.00	0.57	0.163	(0.271)	0.052	0.111
109	9.08	0.63	0.182	(0.270)	0.058	0.124
110	9.17	0.63	0.182	(0.268)	0.058	0.124
111	9.25	0.63	0.182	(0.267)	0.058	0.124
112	9.33	0.67	0.192	(0.266)	0.061	0.131
113	9.42	0.67	0.192	(0.264)	0.061	0.131
114	9.50	0.67	0.192	(0.263)	0.061	0.131
115	9.58	0.70	0.202	(0.262)	0.065	0.137
116	9.67	0.70	0.202	(0.261)	0.065	0.137

117	9.75	0.70	0.202	(0.259)	0.065	0.137
118	9.83	0.73	0.211	(0.258)	0.068	0.144
119	9.92	0.73	0.211	(0.257)	0.068	0.144
120	10.00	0.73	0.211	(0.256)	0.068	0.144
121	10.08	0.50	0.144	(0.254)	0.046	0.098
122	10.17	0.50	0.144	(0.253)	0.046	0.098
123	10.25	0.50	0.144	(0.252)	0.046	0.098
124	10.33	0.50	0.144	(0.251)	0.046	0.098
125	10.42	0.50	0.144	(0.250)	0.046	0.098
126	10.50	0.50	0.144	(0.248)	0.046	0.098
127	10.58	0.67	0.192	(0.247)	0.061	0.131
128	10.67	0.67	0.192	(0.246)	0.061	0.131
129	10.75	0.67	0.192	(0.245)	0.061	0.131
130	10.83	0.67	0.192	(0.244)	0.061	0.131
131	10.92	0.67	0.192	(0.242)	0.061	0.131
132	11.00	0.67	0.192	(0.241)	0.061	0.131
133	11.08	0.63	0.182	(0.240)	0.058	0.124
134	11.17	0.63	0.182	(0.239)	0.058	0.124
135	11.25	0.63	0.182	(0.238)	0.058	0.124
136	11.33	0.63	0.182	(0.236)	0.058	0.124
137	11.42	0.63	0.182	(0.235)	0.058	0.124
138	11.50	0.63	0.182	(0.234)	0.058	0.124
139	11.58	0.57	0.163	(0.233)	0.052	0.111
140	11.67	0.57	0.163	(0.232)	0.052	0.111
141	11.75	0.57	0.163	(0.231)	0.052	0.111
142	11.83	0.60	0.173	(0.229)	0.055	0.118
143	11.92	0.60	0.173	(0.228)	0.055	0.118
144	12.00	0.60	0.173	(0.227)	0.055	0.118
145	12.08	0.83	0.240	(0.226)	0.077	0.163
146	12.17	0.83	0.240	(0.225)	0.077	0.163
147	12.25	0.83	0.240	(0.224)	0.077	0.163
148	12.33	0.87	0.250	(0.223)	0.080	0.170
149	12.42	0.87	0.250	(0.222)	0.080	0.170
150	12.50	0.87	0.250	(0.220)	0.080	0.170
151	12.58	0.93	0.269	(0.219)	0.086	0.183
152	12.67	0.93	0.269	(0.218)	0.086	0.183
153	12.75	0.93	0.269	(0.217)	0.086	0.183
154	12.83	0.97	0.278	(0.216)	0.089	0.189
155	12.92	0.97	0.278	(0.215)	0.089	0.189
156	13.00	0.97	0.278	(0.214)	0.089	0.189
157	13.08	1.13	0.326	(0.213)	0.104	0.222
158	13.17	1.13	0.326	(0.212)	0.104	0.222
159	13.25	1.13	0.326	(0.211)	0.104	0.222
160	13.33	1.13	0.326	(0.210)	0.104	0.222
161	13.42	1.13	0.326	(0.208)	0.104	0.222
162	13.50	1.13	0.326	(0.207)	0.104	0.222
163	13.58	0.77	0.221	(0.206)	0.071	0.150
164	13.67	0.77	0.221	(0.205)	0.071	0.150
165	13.75	0.77	0.221	(0.204)	0.071	0.150
166	13.83	0.77	0.221	(0.203)	0.071	0.150
167	13.92	0.77	0.221	(0.202)	0.071	0.150
168	14.00	0.77	0.221	(0.201)	0.071	0.150
169	14.08	0.90	0.259	(0.200)	0.083	0.176
170	14.17	0.90	0.259	(0.199)	0.083	0.176
171	14.25	0.90	0.259	(0.198)	0.083	0.176
172	14.33	0.87	0.250	(0.197)	0.080	0.170
173	14.42	0.87	0.250	(0.196)	0.080	0.170
174	14.50	0.87	0.250	(0.195)	0.080	0.170
175	14.58	0.87	0.250	(0.194)	0.080	0.170
176	14.67	0.87	0.250	(0.193)	0.080	0.170
177	14.75	0.87	0.250	(0.192)	0.080	0.170
178	14.83	0.83	0.240	(0.191)	0.077	0.163
179	14.92	0.83	0.240	(0.190)	0.077	0.163
180	15.00	0.83	0.240	(0.189)	0.077	0.163
181	15.08	0.80	0.230	(0.188)	0.074	0.157
182	15.17	0.80	0.230	(0.187)	0.074	0.157
183	15.25	0.80	0.230	(0.186)	0.074	0.157
184	15.33	0.77	0.221	(0.185)	0.071	0.150
185	15.42	0.77	0.221	(0.184)	0.071	0.150
186	15.50	0.77	0.221	(0.183)	0.071	0.150
187	15.58	0.63	0.182	(0.182)	0.058	0.124
188	15.67	0.63	0.182	(0.182)	0.058	0.124
189	15.75	0.63	0.182	(0.181)	0.058	0.124
190	15.83	0.63	0.182	(0.180)	0.058	0.124
191	15.92	0.63	0.182	(0.179)	0.058	0.124

192	16.00	0.63	0.182	(0.178)	0.058	0.124
193	16.08	0.13	0.038	(0.177)	0.012	0.026
194	16.17	0.13	0.038	(0.176)	0.012	0.026
195	16.25	0.13	0.038	(0.175)	0.012	0.026
196	16.33	0.13	0.038	(0.174)	0.012	0.026
197	16.42	0.13	0.038	(0.173)	0.012	0.026
198	16.50	0.13	0.038	(0.172)	0.012	0.026
199	16.58	0.10	0.029	(0.172)	0.009	0.020
200	16.67	0.10	0.029	(0.171)	0.009	0.020
201	16.75	0.10	0.029	(0.170)	0.009	0.020
202	16.83	0.10	0.029	(0.169)	0.009	0.020
203	16.92	0.10	0.029	(0.168)	0.009	0.020
204	17.00	0.10	0.029	(0.167)	0.009	0.020
205	17.08	0.17	0.048	(0.166)	0.015	0.033
206	17.17	0.17	0.048	(0.166)	0.015	0.033
207	17.25	0.17	0.048	(0.165)	0.015	0.033
208	17.33	0.17	0.048	(0.164)	0.015	0.033
209	17.42	0.17	0.048	(0.163)	0.015	0.033
210	17.50	0.17	0.048	(0.162)	0.015	0.033
211	17.58	0.17	0.048	(0.161)	0.015	0.033
212	17.67	0.17	0.048	(0.161)	0.015	0.033
213	17.75	0.17	0.048	(0.160)	0.015	0.033
214	17.83	0.13	0.038	(0.159)	0.012	0.026
215	17.92	0.13	0.038	(0.158)	0.012	0.026
216	18.00	0.13	0.038	(0.158)	0.012	0.026
217	18.08	0.13	0.038	(0.157)	0.012	0.026
218	18.17	0.13	0.038	(0.156)	0.012	0.026
219	18.25	0.13	0.038	(0.155)	0.012	0.026
220	18.33	0.13	0.038	(0.154)	0.012	0.026
221	18.42	0.13	0.038	(0.154)	0.012	0.026
222	18.50	0.13	0.038	(0.153)	0.012	0.026
223	18.58	0.10	0.029	(0.152)	0.009	0.020
224	18.67	0.10	0.029	(0.151)	0.009	0.020
225	18.75	0.10	0.029	(0.151)	0.009	0.020
226	18.83	0.07	0.019	(0.150)	0.006	0.013
227	18.92	0.07	0.019	(0.149)	0.006	0.013
228	19.00	0.07	0.019	(0.149)	0.006	0.013
229	19.08	0.10	0.029	(0.148)	0.009	0.020
230	19.17	0.10	0.029	(0.147)	0.009	0.020
231	19.25	0.10	0.029	(0.147)	0.009	0.020
232	19.33	0.13	0.038	(0.146)	0.012	0.026
233	19.42	0.13	0.038	(0.145)	0.012	0.026
234	19.50	0.13	0.038	(0.144)	0.012	0.026
235	19.58	0.10	0.029	(0.144)	0.009	0.020
236	19.67	0.10	0.029	(0.143)	0.009	0.020
237	19.75	0.10	0.029	(0.143)	0.009	0.020
238	19.83	0.07	0.019	(0.142)	0.006	0.013
239	19.92	0.07	0.019	(0.141)	0.006	0.013
240	20.00	0.07	0.019	(0.141)	0.006	0.013
241	20.08	0.10	0.029	(0.140)	0.009	0.020
242	20.17	0.10	0.029	(0.139)	0.009	0.020
243	20.25	0.10	0.029	(0.139)	0.009	0.020
244	20.33	0.10	0.029	(0.138)	0.009	0.020
245	20.42	0.10	0.029	(0.138)	0.009	0.020
246	20.50	0.10	0.029	(0.137)	0.009	0.020
247	20.58	0.10	0.029	(0.136)	0.009	0.020
248	20.67	0.10	0.029	(0.136)	0.009	0.020
249	20.75	0.10	0.029	(0.135)	0.009	0.020
250	20.83	0.07	0.019	(0.135)	0.006	0.013
251	20.92	0.07	0.019	(0.134)	0.006	0.013
252	21.00	0.07	0.019	(0.134)	0.006	0.013
253	21.08	0.10	0.029	(0.133)	0.009	0.020
254	21.17	0.10	0.029	(0.133)	0.009	0.020
255	21.25	0.10	0.029	(0.132)	0.009	0.020
256	21.33	0.07	0.019	(0.132)	0.006	0.013
257	21.42	0.07	0.019	(0.131)	0.006	0.013
258	21.50	0.07	0.019	(0.131)	0.006	0.013
259	21.58	0.10	0.029	(0.130)	0.009	0.020
260	21.67	0.10	0.029	(0.130)	0.009	0.020
261	21.75	0.10	0.029	(0.129)	0.009	0.020
262	21.83	0.07	0.019	(0.129)	0.006	0.013
263	21.92	0.07	0.019	(0.128)	0.006	0.013
264	22.00	0.07	0.019	(0.128)	0.006	0.013
265	22.08	0.10	0.029	(0.127)	0.009	0.020
266	22.17	0.10	0.029	(0.127)	0.009	0.020

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267  22.25     0.10      0.029       (  0.127)       0.009        0.020
268  22.33     0.07      0.019       (  0.126)       0.006        0.013
269  22.42     0.07      0.019       (  0.126)       0.006        0.013
270  22.50     0.07      0.019       (  0.125)       0.006        0.013
271  22.58     0.07      0.019       (  0.125)       0.006        0.013
272  22.67     0.07      0.019       (  0.125)       0.006        0.013
273  22.75     0.07      0.019       (  0.124)       0.006        0.013
274  22.83     0.07      0.019       (  0.124)       0.006        0.013
275  22.92     0.07      0.019       (  0.124)       0.006        0.013
276  23.00     0.07      0.019       (  0.123)       0.006        0.013
277  23.08     0.07      0.019       (  0.123)       0.006        0.013
278  23.17     0.07      0.019       (  0.123)       0.006        0.013
279  23.25     0.07      0.019       (  0.123)       0.006        0.013
280  23.33     0.07      0.019       (  0.122)       0.006        0.013
281  23.42     0.07      0.019       (  0.122)       0.006        0.013
282  23.50     0.07      0.019       (  0.122)       0.006        0.013
283  23.58     0.07      0.019       (  0.122)       0.006        0.013
284  23.67     0.07      0.019       (  0.122)       0.006        0.013
285  23.75     0.07      0.019       (  0.121)       0.006        0.013
286  23.83     0.07      0.019       (  0.121)       0.006        0.013
287  23.92     0.07      0.019       (  0.121)       0.006        0.013
288  24.00     0.07      0.019       (  0.121)       0.006        0.013
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    19.6
      Flood volume = Effective rainfall      1.63(In)
       times area      12.3(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
      Total soil loss =      0.77(In)
      Total soil loss =     0.787(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       72865.4 Cubic Feet
      Total soil loss =       34289.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.746(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                    R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ----------------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0007      0.09  Q         |         |         |         |
   0+15       0.0016      0.13  Q         |         |         |         |
   0+20       0.0027      0.15  Q         |         |         |         |
   0+25       0.0041      0.20  Q         |         |         |         |
   0+30       0.0056      0.22  Q         |         |         |         |
   0+35       0.0072      0.23  Q         |         |         |         |
   0+40       0.0089      0.24  Q         |         |         |         |
   0+45       0.0105      0.24  Q         |         |         |         |
   0+50       0.0123      0.25  Q         |         |         |         |
   0+55       0.0142      0.29  VQ        |         |         |         |
   1+ 0       0.0164      0.31  VQ        |         |         |         |
   1+ 5       0.0185      0.31  VQ        |         |         |         |
   1+10       0.0204      0.28  VQ        |         |         |         |
   1+15       0.0222      0.26  VQ        |         |         |         |
   1+20       0.0239      0.25  Q         |         |         |         |
   1+25       0.0256      0.25  Q         |         |         |         |
   1+30       0.0273      0.24  Q         |         |         |         |
   1+35       0.0289      0.24  Q         |         |         |         |
   1+40       0.0306      0.24  Q         |         |         |         |
   1+45       0.0323      0.24  Q         |         |         |         |
   1+50       0.0340      0.25  Q         |         |         |         |
   1+55       0.0360      0.29  VQ        |         |         |         |
   2+ 0       0.0381      0.31  VQ        |         |         |         |
   2+ 5       0.0403      0.32  VQ        |         |         |         |
   2+10       0.0425      0.32  |Q        |         |         |         |
   2+15       0.0447      0.32  |Q        |         |         |         |
   2+20       0.0469      0.32  |Q        |         |         |         |
   2+25       0.0492      0.32  |Q        |         |         |         |
   2+30       0.0514      0.32  |Q        |         |         |         |
   2+35       0.0537      0.33  |Q        |         |         |         |
   2+40       0.0562      0.37  |Q        |         |         |         |
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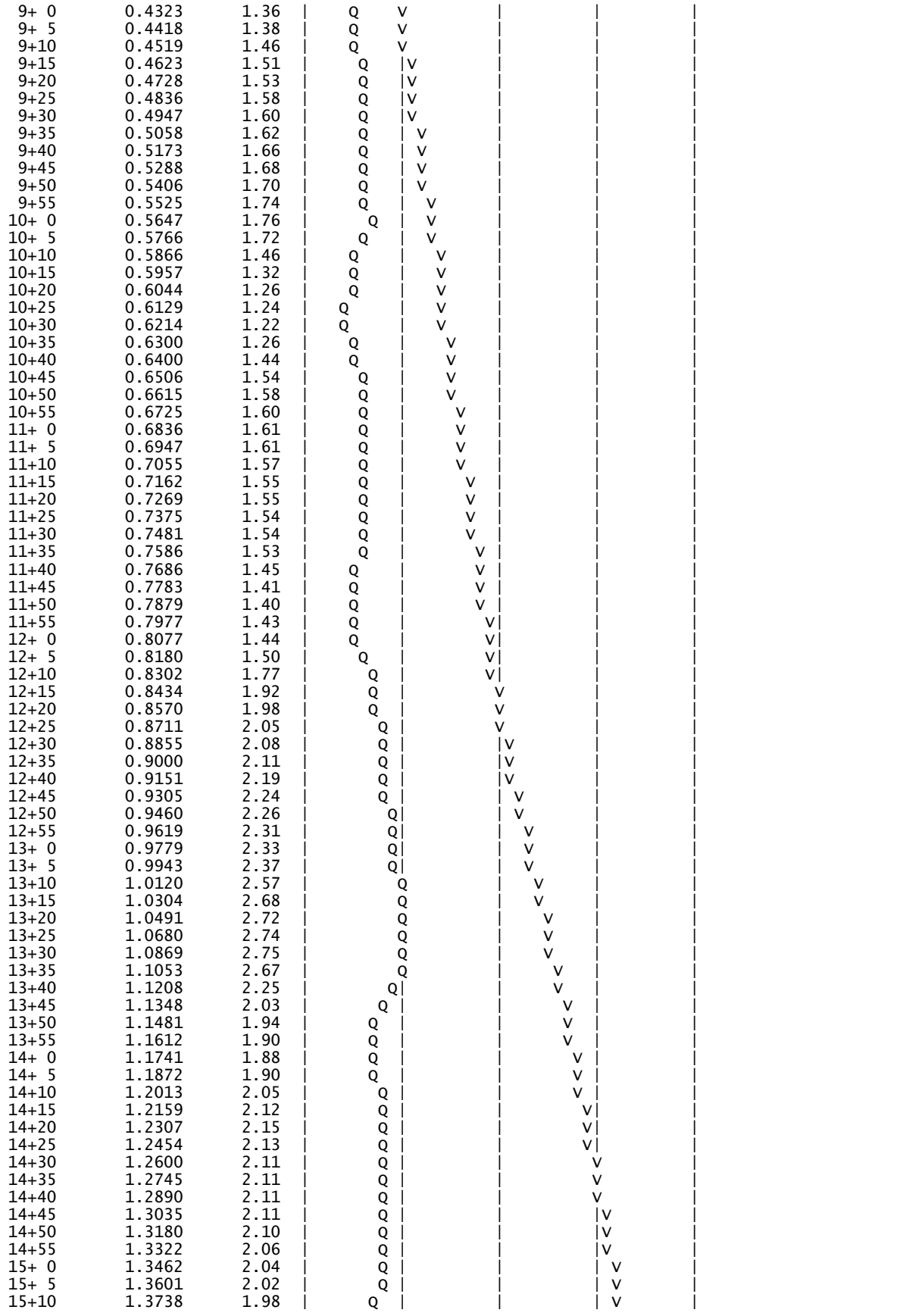
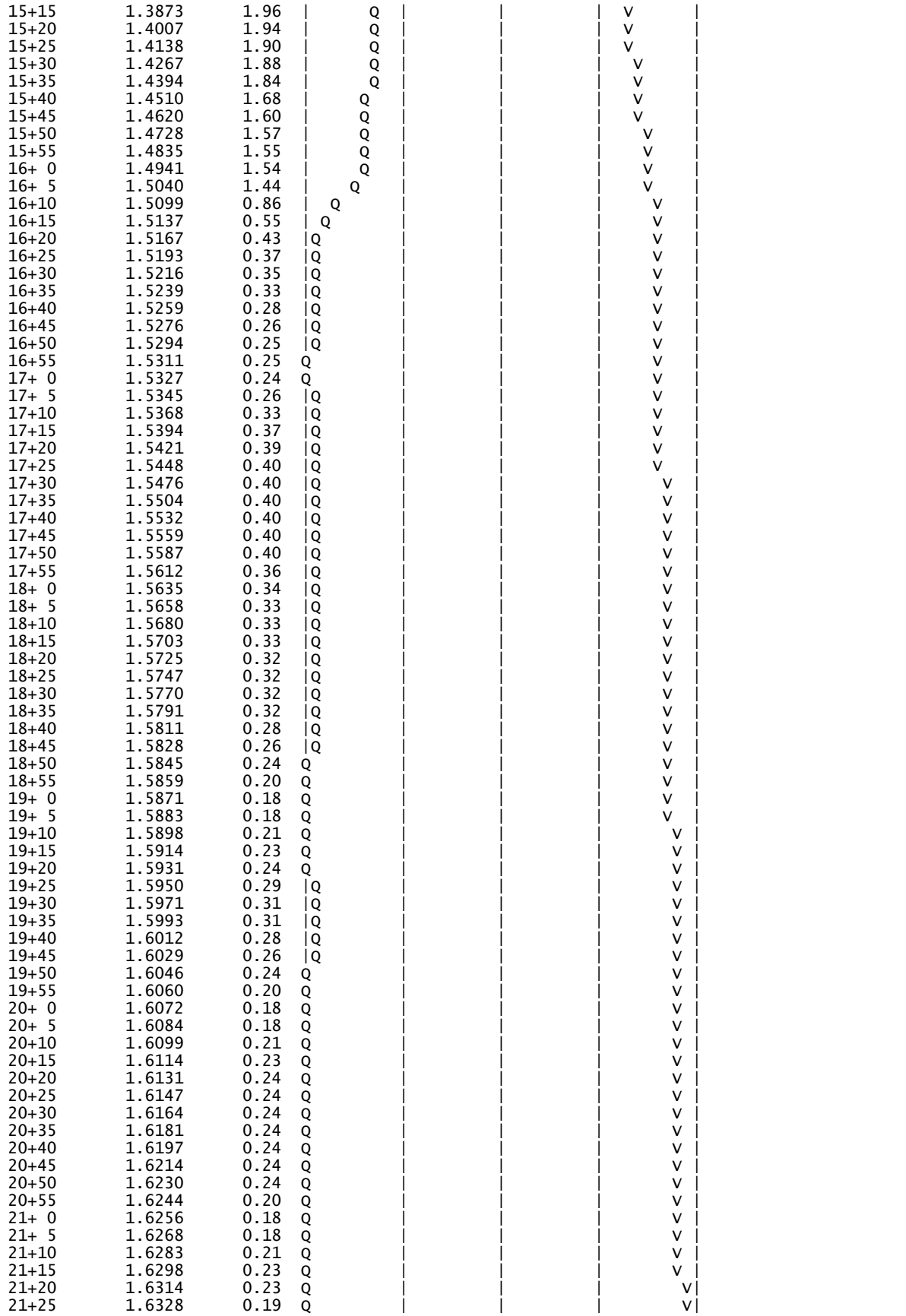
2+45       0.0589      0.39  |Q         |          |          |          |
2+50       0.0617      0.40  |Q         |          |          |          |
2+55       0.0644      0.40  |Q         |          |          |          |
3+ 0       0.0672      0.40  |Q         |          |          |          |
3+ 5       0.0700      0.40  |Q         |          |          |          |
3+10       0.0728      0.40  |Q         |          |          |          |
3+15       0.0756      0.40  |Q         |          |          |          |
3+20       0.0783      0.40  |Q         |          |          |          |
3+25       0.0811      0.40  |Q         |          |          |          |
3+30       0.0839      0.40  |QV        |          |          |          |
3+35       0.0867      0.40  |QV        |          |          |          |
3+40       0.0895      0.40  |QV        |          |          |          |
3+45       0.0923      0.40  |QV        |          |          |          |
3+50       0.0951      0.41  |QV        |          |          |          |
3+55       0.0982      0.45  |QV        |          |          |          |
4+ 0       0.1015      0.47  |QV        |          |          |          |
4+ 5       0.1048      0.48  |QV        |          |          |          |
4+10       0.1081      0.48  |QV        |          |          |          |
4+15       0.1114      0.48  |QV        |          |          |          |
4+20       0.1148      0.49  |QV        |          |          |          |
4+25       0.1185      0.53  | Q        |          |          |          |
4+30       0.1223      0.55  | Q        |          |          |          |
4+35       0.1261      0.56  | QV       |          |          |          |
4+40       0.1300      0.56  | QV       |          |          |          |
4+45       0.1339      0.57  | QV       |          |          |          |
4+50       0.1378      0.57  | QV       |          |          |          |
4+55       0.1420      0.61  | QV       |          |          |          |
5+ 0       0.1464      0.63  | QV       |          |          |          |
5+ 5       0.1507      0.63  | QV       |          |          |          |
5+10       0.1545      0.55  | QV       |          |          |          |
5+15       0.1581      0.51  | QV       |          |          |          |
5+20       0.1616      0.51  | QV       |          |          |          |
5+25       0.1653      0.54  | QV       |          |          |          |
5+30       0.1691      0.55  | Q V      |          |          |          |
5+35       0.1730      0.57  | Q V      |          |          |          |
5+40       0.1772      0.61  | Q V      |          |          |          |
5+45       0.1815      0.63  | Q V      |          |          |          |
5+50       0.1859      0.64  | Q V      |          |          |          |
5+55       0.1904      0.64  | Q V      |          |          |          |
6+ 0       0.1948      0.65  | Q V      |          |          |          |
6+ 5       0.1993      0.65  | Q V      |          |          |          |
6+10       0.2041      0.69  | Q V      |          |          |          |
6+15       0.2090      0.71  | Q V      |          |          |          |
6+20       0.2140      0.72  | Q  V     |          |          |          |
6+25       0.2190      0.73  | Q  V     |          |          |          |
6+30       0.2240      0.73  | Q  V     |          |          |          |
6+35       0.2290      0.73  | Q  V     |          |          |          |
6+40       0.2344      0.77  |  Q V     |          |          |          |
6+45       0.2398      0.79  |  Q V     |          |          |          |
6+50       0.2454      0.80  |  Q V     |          |          |          |
6+55       0.2509      0.81  |  Q  V    |          |          |          |
7+ 0       0.2565      0.81  |  Q  V    |          |          |          |
7+ 5       0.2621      0.81  |  Q  V    |          |          |          |
7+10       0.2676      0.81  |  Q  V    |          |          |          |
7+15       0.2732      0.81  |  Q  V    |          |          |          |
7+20       0.2788      0.82  |  Q  V    |          |          |          |
7+25       0.2847      0.85  |  Q  V    |          |          |          |
7+30       0.2908      0.88  |  Q  V    |          |          |          |
7+35       0.2969      0.89  |  Q   V   |          |          |          |
7+40       0.3033      0.93  |  Q   V   |          |          |          |
7+45       0.3099      0.95  |  Q   V   |          |          |          |
7+50       0.3166      0.97  |  Q   V   |          |          |          |
7+55       0.3236      1.01  |   Q  V   |          |          |          |
8+ 0       0.3307      1.04  |   Q  V   |          |          |          |
8+ 5       0.3380      1.06  |   Q   V  |          |          |          |
8+10       0.3458      1.14  |   Q   V  |          |          |          |
8+15       0.3540      1.18  |   Q   V  |          |          |          |
8+20       0.3622      1.20  |   Q   V  |          |          |          |
8+25       0.3705      1.21  |   Q   V  |          |          |          |
8+30       0.3789      1.21  |   Q    V |          |          |          |
8+35       0.3873      1.22  |   Q    V |          |          |          |
8+40       0.3960      1.26  |    Q   V |          |          |          |
8+45       0.4048      1.28  |    Q   V |          |          |          |
8+50       0.4137      1.30  |    Q   V |          |          |          |
8+55       0.4229      1.34  |    Q    V|          |          |          |
```





21+30	1.6340	0.18	Q	|	|	|	v|
21+35	1.6352	0.18	Q	|	|	|	v|
21+40	1.6366	0.21	Q	|	|	|	v|
21+45	1.6382	0.23	Q	|	|	|	v|
21+50	1.6398	0.23	Q	|	|	|	v|
21+55	1.6411	0.19	Q	|	|	|	v|
22+ 0	1.6423	0.18	Q	|	|	|	v|
22+ 5	1.6436	0.18	Q	|	|	|	v|
22+10	1.6450	0.21	Q	|	|	|	v|
22+15	1.6466	0.23	Q	|	|	|	v|
22+20	1.6482	0.23	Q	|	|	|	v|
22+25	1.6495	0.19	Q	|	|	|	v|
22+30	1.6507	0.18	Q	|	|	|	v|
22+35	1.6519	0.17	Q	|	|	|	v|
22+40	1.6530	0.16	Q	|	|	|	v|
22+45	1.6541	0.16	Q	|	|	|	v|
22+50	1.6552	0.16	Q	|	|	|	v|
22+55	1.6564	0.16	Q	|	|	|	v|
23+ 0	1.6575	0.16	Q	|	|	|	v|
23+ 5	1.6586	0.16	Q	|	|	|	v|
23+10	1.6597	0.16	Q	|	|	|	v|
23+15	1.6608	0.16	Q	|	|	|	v|
23+20	1.6619	0.16	Q	|	|	|	v|
23+25	1.6631	0.16	Q	|	|	|	v|
23+30	1.6642	0.16	Q	|	|	|	v|
23+35	1.6653	0.16	Q	|	|	|	v|
23+40	1.6664	0.16	Q	|	|	|	v|
23+45	1.6675	0.16	Q	|	|	|	v|
23+50	1.6686	0.16	Q	|	|	|	v|
23+55	1.6697	0.16	Q	|	|	|	v|
24+ 0	1.6709	0.16	Q	|	|	|	v|
24+ 5	1.6719	0.15	Q	|	|	|	v|
24+10	1.6724	0.07	Q	|	|	|	v|
24+15	1.6726	0.03	Q	|	|	|	v|
24+20	1.6727	0.01	Q	|	|	|	v|
24+25	1.6727	0.01	Q	|	|	|	v|
24+30	1.6727	0.00	Q	|	|	|	v|
24+35	1.6728	0.00	Q	|	|	|	v|
24+40	1.6728	0.00	Q	|	|	|	v|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/23/21 File: PROP2YR7B242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV BLDG B AREA 7 DEVELOPED CONDITION
2 YR 24 HR STORM EVENT
21-0034
2021-11-23 EP

Drainage Area = 12.50(Ac.) = 0.020 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.50(Ac.) = 0.020 Sq. Mi.
Length along longest watercourse = 1378.00(Ft.)
Length along longest watercourse measured to centroid = 1136.00(Ft.)
Length along longest watercourse = 0.261 Mi.
Length along longest watercourse measured to centroid = 0.215 Mi.
Difference in elevation = 3.50(Ft.)
Slope along watercourse = 13.4107 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.074 Hr.
Lag time = 4.42 Min.
25% of lag time = 1.10 Min.
40% of lag time = 1.77 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.50	2.40	30.00

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.50	6.20	77.50

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.500	62.70	0.730

Total Area Entered = 12.50(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

62.7 42.7 0.644 0.730 0.221 1.000 0.221
Sum (F) = 0.221

Area averaged mean soil loss (F) (In/Hr) = 0.221
Minimum soil loss rate ((In/Hr)) = 0.110
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.320

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	113.234	19.099	2.406
2	0.167	226.467	56.183	7.078
3	0.250	339.701	16.413	2.068
4	0.333	452.935	5.834	0.735
5	0.417	566.168	1.491	0.188
6	0.500	679.402	0.743	0.094
7	0.583	792.636	0.237	0.030
			Sum = 100.000	Sum= 12.598

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.391)	0.006	0.013
2	0.17	0.07	0.019	(0.390)	0.006	0.013
3	0.25	0.07	0.019	(0.388)	0.006	0.013
4	0.33	0.10	0.029	(0.387)	0.009	0.020
5	0.42	0.10	0.029	(0.385)	0.009	0.020
6	0.50	0.10	0.029	(0.384)	0.009	0.020
7	0.58	0.10	0.029	(0.382)	0.009	0.020
8	0.67	0.10	0.029	(0.381)	0.009	0.020
9	0.75	0.10	0.029	(0.379)	0.009	0.020
10	0.83	0.13	0.038	(0.378)	0.012	0.026
11	0.92	0.13	0.038	(0.376)	0.012	0.026
12	1.00	0.13	0.038	(0.375)	0.012	0.026
13	1.08	0.10	0.029	(0.373)	0.009	0.020
14	1.17	0.10	0.029	(0.372)	0.009	0.020
15	1.25	0.10	0.029	(0.370)	0.009	0.020
16	1.33	0.10	0.029	(0.369)	0.009	0.020
17	1.42	0.10	0.029	(0.367)	0.009	0.020
18	1.50	0.10	0.029	(0.366)	0.009	0.020
19	1.58	0.10	0.029	(0.365)	0.009	0.020
20	1.67	0.10	0.029	(0.363)	0.009	0.020
21	1.75	0.10	0.029	(0.362)	0.009	0.020
22	1.83	0.13	0.038	(0.360)	0.012	0.026
23	1.92	0.13	0.038	(0.359)	0.012	0.026
24	2.00	0.13	0.038	(0.357)	0.012	0.026
25	2.08	0.13	0.038	(0.356)	0.012	0.026
26	2.17	0.13	0.038	(0.354)	0.012	0.026
27	2.25	0.13	0.038	(0.353)	0.012	0.026
28	2.33	0.13	0.038	(0.351)	0.012	0.026
29	2.42	0.13	0.038	(0.350)	0.012	0.026
30	2.50	0.13	0.038	(0.349)	0.012	0.026
31	2.58	0.17	0.048	(0.347)	0.015	0.033
32	2.67	0.17	0.048	(0.346)	0.015	0.033
33	2.75	0.17	0.048	(0.344)	0.015	0.033
34	2.83	0.17	0.048	(0.343)	0.015	0.033
35	2.92	0.17	0.048	(0.342)	0.015	0.033
36	3.00	0.17	0.048	(0.340)	0.015	0.033
37	3.08	0.17	0.048	(0.339)	0.015	0.033
38	3.17	0.17	0.048	(0.337)	0.015	0.033
39	3.25	0.17	0.048	(0.336)	0.015	0.033
40	3.33	0.17	0.048	(0.334)	0.015	0.033
41	3.42	0.17	0.048	(0.333)	0.015	0.033
42	3.50	0.17	0.048	(0.332)	0.015	0.033
43	3.58	0.17	0.048	(0.330)	0.015	0.033

44	3.67	0.17	0.048	(0.329)	0.015	0.033
45	3.75	0.17	0.048	(0.328)	0.015	0.033
46	3.83	0.20	0.058	(0.326)	0.018	0.039
47	3.92	0.20	0.058	(0.325)	0.018	0.039
48	4.00	0.20	0.058	(0.323)	0.018	0.039
49	4.08	0.20	0.058	(0.322)	0.018	0.039
50	4.17	0.20	0.058	(0.321)	0.018	0.039
51	4.25	0.20	0.058	(0.319)	0.018	0.039
52	4.33	0.23	0.067	(0.318)	0.022	0.046
53	4.42	0.23	0.067	(0.317)	0.022	0.046
54	4.50	0.23	0.067	(0.315)	0.022	0.046
55	4.58	0.23	0.067	(0.314)	0.022	0.046
56	4.67	0.23	0.067	(0.313)	0.022	0.046
57	4.75	0.23	0.067	(0.311)	0.022	0.046
58	4.83	0.27	0.077	(0.310)	0.025	0.052
59	4.92	0.27	0.077	(0.308)	0.025	0.052
60	5.00	0.27	0.077	(0.307)	0.025	0.052
61	5.08	0.20	0.058	(0.306)	0.018	0.039
62	5.17	0.20	0.058	(0.304)	0.018	0.039
63	5.25	0.20	0.058	(0.303)	0.018	0.039
64	5.33	0.23	0.067	(0.302)	0.022	0.046
65	5.42	0.23	0.067	(0.301)	0.022	0.046
66	5.50	0.23	0.067	(0.299)	0.022	0.046
67	5.58	0.27	0.077	(0.298)	0.025	0.052
68	5.67	0.27	0.077	(0.297)	0.025	0.052
69	5.75	0.27	0.077	(0.295)	0.025	0.052
70	5.83	0.27	0.077	(0.294)	0.025	0.052
71	5.92	0.27	0.077	(0.293)	0.025	0.052
72	6.00	0.27	0.077	(0.291)	0.025	0.052
73	6.08	0.30	0.086	(0.290)	0.028	0.059
74	6.17	0.30	0.086	(0.289)	0.028	0.059
75	6.25	0.30	0.086	(0.287)	0.028	0.059
76	6.33	0.30	0.086	(0.286)	0.028	0.059
77	6.42	0.30	0.086	(0.285)	0.028	0.059
78	6.50	0.30	0.086	(0.284)	0.028	0.059
79	6.58	0.33	0.096	(0.282)	0.031	0.065
80	6.67	0.33	0.096	(0.281)	0.031	0.065
81	6.75	0.33	0.096	(0.280)	0.031	0.065
82	6.83	0.33	0.096	(0.279)	0.031	0.065
83	6.92	0.33	0.096	(0.277)	0.031	0.065
84	7.00	0.33	0.096	(0.276)	0.031	0.065
85	7.08	0.33	0.096	(0.275)	0.031	0.065
86	7.17	0.33	0.096	(0.274)	0.031	0.065
87	7.25	0.33	0.096	(0.272)	0.031	0.065
88	7.33	0.37	0.106	(0.271)	0.034	0.072
89	7.42	0.37	0.106	(0.270)	0.034	0.072
90	7.50	0.37	0.106	(0.269)	0.034	0.072
91	7.58	0.40	0.115	(0.267)	0.037	0.078
92	7.67	0.40	0.115	(0.266)	0.037	0.078
93	7.75	0.40	0.115	(0.265)	0.037	0.078
94	7.83	0.43	0.125	(0.264)	0.040	0.085
95	7.92	0.43	0.125	(0.262)	0.040	0.085
96	8.00	0.43	0.125	(0.261)	0.040	0.085
97	8.08	0.50	0.144	(0.260)	0.046	0.098
98	8.17	0.50	0.144	(0.259)	0.046	0.098
99	8.25	0.50	0.144	(0.258)	0.046	0.098
100	8.33	0.50	0.144	(0.256)	0.046	0.098
101	8.42	0.50	0.144	(0.255)	0.046	0.098
102	8.50	0.50	0.144	(0.254)	0.046	0.098
103	8.58	0.53	0.154	(0.253)	0.049	0.104
104	8.67	0.53	0.154	(0.252)	0.049	0.104
105	8.75	0.53	0.154	(0.250)	0.049	0.104
106	8.83	0.57	0.163	(0.249)	0.052	0.111
107	8.92	0.57	0.163	(0.248)	0.052	0.111
108	9.00	0.57	0.163	(0.247)	0.052	0.111
109	9.08	0.63	0.182	(0.246)	0.058	0.124
110	9.17	0.63	0.182	(0.245)	0.058	0.124
111	9.25	0.63	0.182	(0.243)	0.058	0.124
112	9.33	0.67	0.192	(0.242)	0.061	0.131
113	9.42	0.67	0.192	(0.241)	0.061	0.131
114	9.50	0.67	0.192	(0.240)	0.061	0.131
115	9.58	0.70	0.202	(0.239)	0.065	0.137
116	9.67	0.70	0.202	(0.238)	0.065	0.137
117	9.75	0.70	0.202	(0.236)	0.065	0.137
118	9.83	0.73	0.211	(0.235)	0.068	0.144

119	9.92	0.73	0.211	(0.234)	0.068	0.144
120	10.00	0.73	0.211	(0.233)	0.068	0.144
121	10.08	0.50	0.144	(0.232)	0.046	0.098
122	10.17	0.50	0.144	(0.231)	0.046	0.098
123	10.25	0.50	0.144	(0.230)	0.046	0.098
124	10.33	0.50	0.144	(0.229)	0.046	0.098
125	10.42	0.50	0.144	(0.227)	0.046	0.098
126	10.50	0.50	0.144	(0.226)	0.046	0.098
127	10.58	0.67	0.192	(0.225)	0.061	0.131
128	10.67	0.67	0.192	(0.224)	0.061	0.131
129	10.75	0.67	0.192	(0.223)	0.061	0.131
130	10.83	0.67	0.192	(0.222)	0.061	0.131
131	10.92	0.67	0.192	(0.221)	0.061	0.131
132	11.00	0.67	0.192	(0.220)	0.061	0.131
133	11.08	0.63	0.182	(0.219)	0.058	0.124
134	11.17	0.63	0.182	(0.218)	0.058	0.124
135	11.25	0.63	0.182	(0.217)	0.058	0.124
136	11.33	0.63	0.182	(0.216)	0.058	0.124
137	11.42	0.63	0.182	(0.214)	0.058	0.124
138	11.50	0.63	0.182	(0.213)	0.058	0.124
139	11.58	0.57	0.163	(0.212)	0.052	0.111
140	11.67	0.57	0.163	(0.211)	0.052	0.111
141	11.75	0.57	0.163	(0.210)	0.052	0.111
142	11.83	0.60	0.173	(0.209)	0.055	0.118
143	11.92	0.60	0.173	(0.208)	0.055	0.118
144	12.00	0.60	0.173	(0.207)	0.055	0.118
145	12.08	0.83	0.240	(0.206)	0.077	0.163
146	12.17	0.83	0.240	(0.205)	0.077	0.163
147	12.25	0.83	0.240	(0.204)	0.077	0.163
148	12.33	0.87	0.250	(0.203)	0.080	0.170
149	12.42	0.87	0.250	(0.202)	0.080	0.170
150	12.50	0.87	0.250	(0.201)	0.080	0.170
151	12.58	0.93	0.269	(0.200)	0.086	0.183
152	12.67	0.93	0.269	(0.199)	0.086	0.183
153	12.75	0.93	0.269	(0.198)	0.086	0.183
154	12.83	0.97	0.278	(0.197)	0.089	0.189
155	12.92	0.97	0.278	(0.196)	0.089	0.189
156	13.00	0.97	0.278	(0.195)	0.089	0.189
157	13.08	1.13	0.326	(0.194)	0.104	0.222
158	13.17	1.13	0.326	(0.193)	0.104	0.222
159	13.25	1.13	0.326	(0.192)	0.104	0.222
160	13.33	1.13	0.326	(0.191)	0.104	0.222
161	13.42	1.13	0.326	(0.190)	0.104	0.222
162	13.50	1.13	0.326	(0.189)	0.104	0.222
163	13.58	0.77	0.221	(0.188)	0.071	0.150
164	13.67	0.77	0.221	(0.187)	0.071	0.150
165	13.75	0.77	0.221	(0.186)	0.071	0.150
166	13.83	0.77	0.221	(0.185)	0.071	0.150
167	13.92	0.77	0.221	(0.184)	0.071	0.150
168	14.00	0.77	0.221	(0.183)	0.071	0.150
169	14.08	0.90	0.259	(0.182)	0.083	0.176
170	14.17	0.90	0.259	(0.181)	0.083	0.176
171	14.25	0.90	0.259	(0.181)	0.083	0.176
172	14.33	0.87	0.250	(0.180)	0.080	0.170
173	14.42	0.87	0.250	(0.179)	0.080	0.170
174	14.50	0.87	0.250	(0.178)	0.080	0.170
175	14.58	0.87	0.250	(0.177)	0.080	0.170
176	14.67	0.87	0.250	(0.176)	0.080	0.170
177	14.75	0.87	0.250	(0.175)	0.080	0.170
178	14.83	0.83	0.240	(0.174)	0.077	0.163
179	14.92	0.83	0.240	(0.173)	0.077	0.163
180	15.00	0.83	0.240	(0.172)	0.077	0.163
181	15.08	0.80	0.230	(0.172)	0.074	0.157
182	15.17	0.80	0.230	(0.171)	0.074	0.157
183	15.25	0.80	0.230	(0.170)	0.074	0.157
184	15.33	0.77	0.221	(0.169)	0.071	0.150
185	15.42	0.77	0.221	(0.168)	0.071	0.150
186	15.50	0.77	0.221	(0.167)	0.071	0.150
187	15.58	0.63	0.182	(0.166)	0.058	0.124
188	15.67	0.63	0.182	(0.165)	0.058	0.124
189	15.75	0.63	0.182	(0.165)	0.058	0.124
190	15.83	0.63	0.182	(0.164)	0.058	0.124
191	15.92	0.63	0.182	(0.163)	0.058	0.124
192	16.00	0.63	0.182	(0.162)	0.058	0.124
193	16.08	0.13	0.038	(0.161)	0.012	0.026

194	16.17	0.13	0.038	(0.160)	0.012	0.026
195	16.25	0.13	0.038	(0.160)	0.012	0.026
196	16.33	0.13	0.038	(0.159)	0.012	0.026
197	16.42	0.13	0.038	(0.158)	0.012	0.026
198	16.50	0.13	0.038	(0.157)	0.012	0.026
199	16.58	0.10	0.029	(0.156)	0.009	0.020
200	16.67	0.10	0.029	(0.156)	0.009	0.020
201	16.75	0.10	0.029	(0.155)	0.009	0.020
202	16.83	0.10	0.029	(0.154)	0.009	0.020
203	16.92	0.10	0.029	(0.153)	0.009	0.020
204	17.00	0.10	0.029	(0.152)	0.009	0.020
205	17.08	0.17	0.048	(0.152)	0.015	0.033
206	17.17	0.17	0.048	(0.151)	0.015	0.033
207	17.25	0.17	0.048	(0.150)	0.015	0.033
208	17.33	0.17	0.048	(0.149)	0.015	0.033
209	17.42	0.17	0.048	(0.149)	0.015	0.033
210	17.50	0.17	0.048	(0.148)	0.015	0.033
211	17.58	0.17	0.048	(0.147)	0.015	0.033
212	17.67	0.17	0.048	(0.146)	0.015	0.033
213	17.75	0.17	0.048	(0.146)	0.015	0.033
214	17.83	0.13	0.038	(0.145)	0.012	0.026
215	17.92	0.13	0.038	(0.144)	0.012	0.026
216	18.00	0.13	0.038	(0.144)	0.012	0.026
217	18.08	0.13	0.038	(0.143)	0.012	0.026
218	18.17	0.13	0.038	(0.142)	0.012	0.026
219	18.25	0.13	0.038	(0.141)	0.012	0.026
220	18.33	0.13	0.038	(0.141)	0.012	0.026
221	18.42	0.13	0.038	(0.140)	0.012	0.026
222	18.50	0.13	0.038	(0.139)	0.012	0.026
223	18.58	0.10	0.029	(0.139)	0.009	0.020
224	18.67	0.10	0.029	(0.138)	0.009	0.020
225	18.75	0.10	0.029	(0.137)	0.009	0.020
226	18.83	0.07	0.019	(0.137)	0.006	0.013
227	18.92	0.07	0.019	(0.136)	0.006	0.013
228	19.00	0.07	0.019	(0.135)	0.006	0.013
229	19.08	0.10	0.029	(0.135)	0.009	0.020
230	19.17	0.10	0.029	(0.134)	0.009	0.020
231	19.25	0.10	0.029	(0.134)	0.009	0.020
232	19.33	0.13	0.038	(0.133)	0.012	0.026
233	19.42	0.13	0.038	(0.132)	0.012	0.026
234	19.50	0.13	0.038	(0.132)	0.012	0.026
235	19.58	0.10	0.029	(0.131)	0.009	0.020
236	19.67	0.10	0.029	(0.131)	0.009	0.020
237	19.75	0.10	0.029	(0.130)	0.009	0.020
238	19.83	0.07	0.019	(0.129)	0.006	0.013
239	19.92	0.07	0.019	(0.129)	0.006	0.013
240	20.00	0.07	0.019	(0.128)	0.006	0.013
241	20.08	0.10	0.029	(0.128)	0.009	0.020
242	20.17	0.10	0.029	(0.127)	0.009	0.020
243	20.25	0.10	0.029	(0.126)	0.009	0.020
244	20.33	0.10	0.029	(0.126)	0.009	0.020
245	20.42	0.10	0.029	(0.125)	0.009	0.020
246	20.50	0.10	0.029	(0.125)	0.009	0.020
247	20.58	0.10	0.029	(0.124)	0.009	0.020
248	20.67	0.10	0.029	(0.124)	0.009	0.020
249	20.75	0.10	0.029	(0.123)	0.009	0.020
250	20.83	0.07	0.019	(0.123)	0.006	0.013
251	20.92	0.07	0.019	(0.122)	0.006	0.013
252	21.00	0.07	0.019	(0.122)	0.006	0.013
253	21.08	0.10	0.029	(0.121)	0.009	0.020
254	21.17	0.10	0.029	(0.121)	0.009	0.020
255	21.25	0.10	0.029	(0.120)	0.009	0.020
256	21.33	0.07	0.019	(0.120)	0.006	0.013
257	21.42	0.07	0.019	(0.119)	0.006	0.013
258	21.50	0.07	0.019	(0.119)	0.006	0.013
259	21.58	0.10	0.029	(0.119)	0.009	0.020
260	21.67	0.10	0.029	(0.118)	0.009	0.020
261	21.75	0.10	0.029	(0.118)	0.009	0.020
262	21.83	0.07	0.019	(0.117)	0.006	0.013
263	21.92	0.07	0.019	(0.117)	0.006	0.013
264	22.00	0.07	0.019	(0.117)	0.006	0.013
265	22.08	0.10	0.029	(0.116)	0.009	0.020
266	22.17	0.10	0.029	(0.116)	0.009	0.020
267	22.25	0.10	0.029	(0.115)	0.009	0.020
268	22.33	0.07	0.019	(0.115)	0.006	0.013

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269  22.42     0.07      0.019       (  0.115)       0.006        0.013
270  22.50     0.07      0.019       (  0.114)       0.006        0.013
271  22.58     0.07      0.019       (  0.114)       0.006        0.013
272  22.67     0.07      0.019       (  0.114)       0.006        0.013
273  22.75     0.07      0.019       (  0.113)       0.006        0.013
274  22.83     0.07      0.019       (  0.113)       0.006        0.013
275  22.92     0.07      0.019       (  0.113)       0.006        0.013
276  23.00     0.07      0.019       (  0.113)       0.006        0.013
277  23.08     0.07      0.019       (  0.112)       0.006        0.013
278  23.17     0.07      0.019       (  0.112)       0.006        0.013
279  23.25     0.07      0.019       (  0.112)       0.006        0.013
280  23.33     0.07      0.019       (  0.112)       0.006        0.013
281  23.42     0.07      0.019       (  0.111)       0.006        0.013
282  23.50     0.07      0.019       (  0.111)       0.006        0.013
283  23.58     0.07      0.019       (  0.111)       0.006        0.013
284  23.67     0.07      0.019       (  0.111)       0.006        0.013
285  23.75     0.07      0.019       (  0.111)       0.006        0.013
286  23.83     0.07      0.019       (  0.111)       0.006        0.013
287  23.92     0.07      0.019       (  0.110)       0.006        0.013
288  24.00     0.07      0.019       (  0.110)       0.006        0.013
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    19.6
      Flood volume = Effective rainfall      1.63(In)
       times area      12.5(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
      Total soil loss =      0.77(In)
      Total soil loss =     0.800(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       74050.2 Cubic Feet
      Total soil loss =       34847.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.796(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0002      0.03  Q         |         |         |         |
   0+10       0.0011      0.12  Q         |         |         |         |
   0+15       0.0021      0.15  Q         |         |         |         |
   0+20       0.0033      0.18  Q         |         |         |         |
   0+25       0.0049      0.22  Q         |         |         |         |
   0+30       0.0065      0.24  Q         |         |         |         |
   0+35       0.0082      0.24  Q         |         |         |         |
   0+40       0.0099      0.25  Q         |         |         |         |
   0+45       0.0116      0.25  Q         |         |         |         |
   0+50       0.0134      0.26  VQ        |         |         |         |
   0+55       0.0155      0.31  VQ        |         |         |         |
   1+ 0       0.0178      0.32  VQ        |         |         |         |
   1+ 5       0.0199      0.31  VQ        |         |         |         |
   1+10       0.0217      0.27  VQ        |         |         |         |
   1+15       0.0235      0.25  VQ        |         |         |         |
   1+20       0.0252      0.25  Q         |         |         |         |
   1+25       0.0269      0.25  Q         |         |         |         |
   1+30       0.0286      0.25  Q         |         |         |         |
   1+35       0.0303      0.25  Q         |         |         |         |
   1+40       0.0320      0.25  Q         |         |         |         |
   1+45       0.0337      0.25  Q         |         |         |         |
   1+50       0.0355      0.26  VQ        |         |         |         |
   1+55       0.0376      0.31  VQ        |         |         |         |
   2+ 0       0.0399      0.32  VQ        |         |         |         |
   2+ 5       0.0421      0.33  VQ        |         |         |         |
   2+10       0.0444      0.33  |Q        |         |         |         |
   2+15       0.0466      0.33  |Q        |         |         |         |
   2+20       0.0489      0.33  |Q        |         |         |         |
   2+25       0.0512      0.33  |Q        |         |         |         |
   2+30       0.0534      0.33  |Q        |         |         |         |
   2+35       0.0558      0.34  |Q        |         |         |         |
   2+40       0.0585      0.39  |Q        |         |         |         |
   2+45       0.0613      0.40  |Q        |         |         |         |
   2+50       0.0641      0.41  |Q        |         |         |         |
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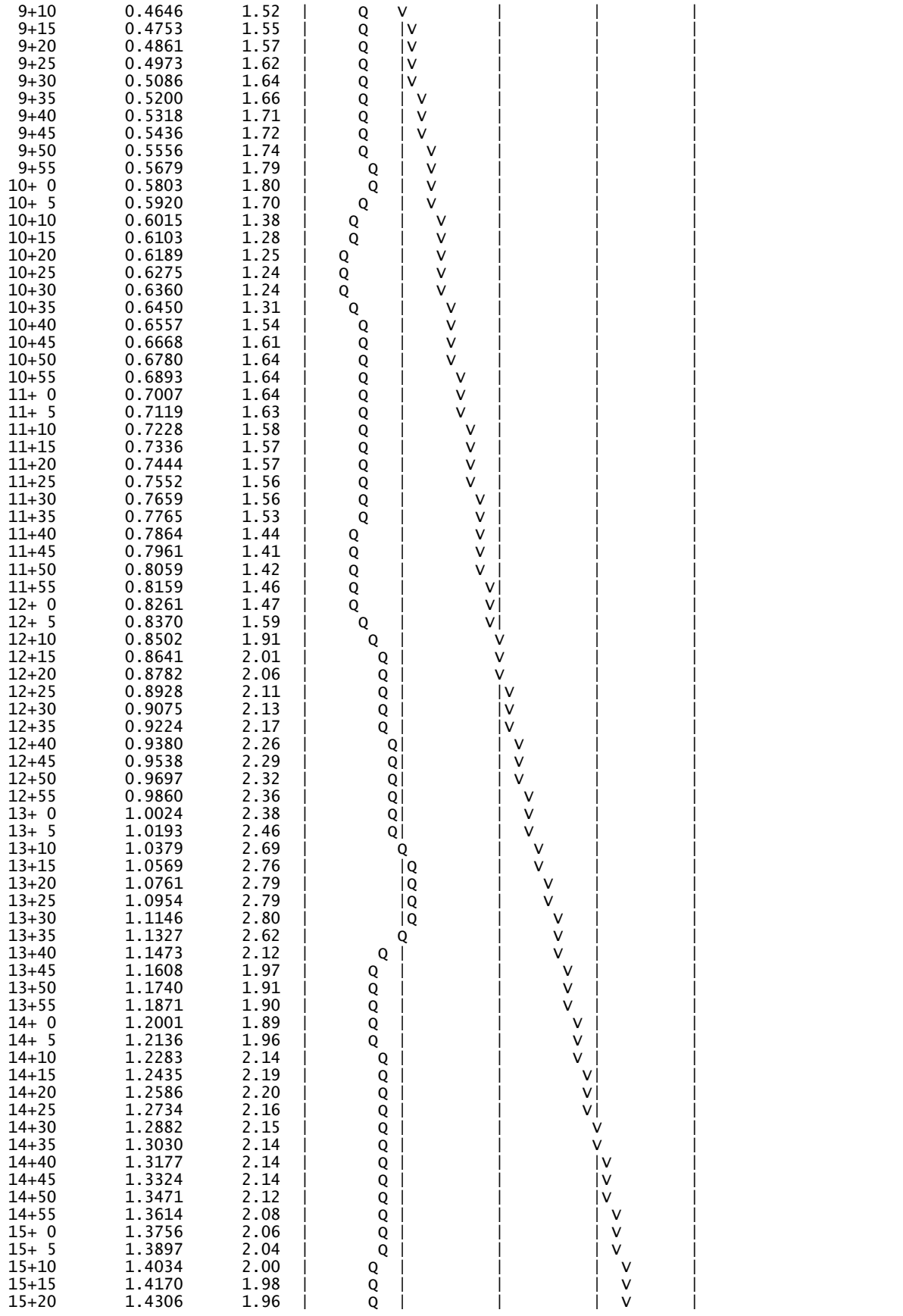
2+55	0.0669	0.41	Q			
3+ 0	0.0698	0.41	Q			
3+ 5	0.0726	0.41	Q			
3+10	0.0754	0.41	Q			
3+15	0.0783	0.41	Q			
3+20	0.0811	0.41	Q			
3+25	0.0839	0.41	Q			
3+30	0.0868	0.41	QV			
3+35	0.0896	0.41	QV			
3+40	0.0924	0.41	QV			
3+45	0.0953	0.41	QV			
3+50	0.0982	0.43	QV			
3+55	0.1015	0.47	QV			
4+ 0	0.1048	0.49	QV			
4+ 5	0.1082	0.49	QV			
4+10	0.1116	0.49	QV			
4+15	0.1150	0.49	QV			
4+20	0.1185	0.51	Q			
4+25	0.1223	0.56	Q			
4+30	0.1263	0.57	Q			
4+35	0.1302	0.57	QV			
4+40	0.1342	0.58	QV			
4+45	0.1381	0.58	QV			
4+50	0.1422	0.59	QV			
4+55	0.1466	0.64	QV			
5+ 0	0.1511	0.65	QV			
5+ 5	0.1554	0.62	QV			
5+10	0.1591	0.53	QV			
5+15	0.1626	0.51	QV			
5+20	0.1661	0.51	QV			
5+25	0.1699	0.56	QV			
5+30	0.1739	0.57	Q V			
5+35	0.1779	0.59	Q V			
5+40	0.1823	0.64	Q V			
5+45	0.1868	0.65	Q V			
5+50	0.1913	0.66	Q V			
5+55	0.1958	0.66	Q V			
6+ 0	0.2004	0.66	Q V			
6+ 5	0.2050	0.67	Q V			
6+10	0.2100	0.72	Q V			
6+15	0.2150	0.73	Q V			
6+20	0.2201	0.74	Q V			
6+25	0.2252	0.74	Q V			
6+30	0.2303	0.74	Q V			
6+35	0.2355	0.76	Q V			
6+40	0.2410	0.80	Q V			
6+45	0.2467	0.82	Q V			
6+50	0.2523	0.82	Q V			
6+55	0.2580	0.82	Q V			
7+ 0	0.2636	0.82	Q V			
7+ 5	0.2693	0.82	Q V			
7+10	0.2750	0.82	Q V			
7+15	0.2806	0.82	Q V			
7+20	0.2864	0.84	Q V			
7+25	0.2925	0.88	Q V			
7+30	0.2987	0.90	Q V			
7+35	0.3050	0.92	Q V			
7+40	0.3117	0.97	Q V			
7+45	0.3184	0.98	Q V			
7+50	0.3253	1.00	Q V			
7+55	0.3325	1.05	Q V			
8+ 0	0.3398	1.06	Q V			
8+ 5	0.3474	1.10	Q V			
8+10	0.3556	1.19	Q V			
8+15	0.3640	1.22	Q V			
8+20	0.3725	1.23	Q V			
8+25	0.3810	1.23	Q V			
8+30	0.3895	1.23	Q V			
8+35	0.3981	1.25	Q V			
8+40	0.4070	1.30	Q V			
8+45	0.4160	1.31	Q V			
8+50	0.4252	1.33	Q V			
8+55	0.4347	1.38	Q V			
9+ 0	0.4443	1.39	Q V			
9+ 5	0.4541	1.43	Q V			



15+25	1.4437	1.91	| Q |	|	|	| V |
15+30	1.4568	1.90	| Q |	|	|	| V |
15+35	1.4694	1.83	| Q |	|	|	| V |
15+40	1.4808	1.65	| Q |	|	|	| V |
15+45	1.4917	1.59	| Q |	|	|	| V |
15+50	1.5025	1.57	| Q |	|	|	| V |
15+55	1.5133	1.57	| Q |	|	|	| V |
16+ 0	1.5241	1.56	| Q |	|	|	| V |
16+ 5	1.5332	1.33	| Q |	|	|	| V |
16+10	1.5376	0.63	| Q |	|	|	| V |
16+15	1.5406	0.43	|Q |	|	|	| V |
16+20	1.5431	0.36	|Q |	|	|	| V |
16+25	1.5454	0.34	|Q |	|	|	| V |
16+30	1.5477	0.33	|Q |	|	|	| V |
16+35	1.5499	0.31	|Q |	|	|	| V |
16+40	1.5517	0.27	|Q |	|	|	| V |
16+45	1.5534	0.25	|Q |	|	|	| V |
16+50	1.5552	0.25	Q |	|	|	| V |
16+55	1.5569	0.25	Q |	|	|	| V |
17+ 0	1.5586	0.25	Q |	|	|	| V |
17+ 5	1.5605	0.28	|Q |	|	|	| V |
17+10	1.5630	0.37	|Q |	|	|	| V |
17+15	1.5658	0.40	|Q |	|	|	| V |
17+20	1.5686	0.41	|Q |	|	|	| V |
17+25	1.5714	0.41	|Q |	|	|	| V |
17+30	1.5742	0.41	|Q |	|	|	| V |
17+35	1.5771	0.41	|Q |	|	|	| V |
17+40	1.5799	0.41	|Q |	|	|	| V |
17+45	1.5827	0.41	|Q |	|	|	| V |
17+50	1.5855	0.40	|Q |	|	|	| V |
17+55	1.5879	0.35	|Q |	|	|	| V |
18+ 0	1.5902	0.34	|Q |	|	|	| V |
18+ 5	1.5925	0.33	|Q |	|	|	| V |
18+10	1.5947	0.33	|Q |	|	|	| V |
18+15	1.5970	0.33	|Q |	|	|	| V |
18+20	1.5993	0.33	|Q |	|	|	| V |
18+25	1.6015	0.33	|Q |	|	|	| V |
18+30	1.6038	0.33	|Q |	|	|	| V |
18+35	1.6060	0.31	|Q |	|	|	| V |
18+40	1.6078	0.27	|Q |	|	|	| V |
18+45	1.6095	0.25	|Q |	|	|	| V |
18+50	1.6111	0.23	Q |	|	|	| V |
18+55	1.6124	0.19	Q |	|	|	| V |
19+ 0	1.6136	0.17	Q |	|	|	| V |
19+ 5	1.6149	0.18	Q |	|	|	| V |
19+10	1.6164	0.23	Q |	|	|	| V |
19+15	1.6181	0.24	Q |	|	|	| V |
19+20	1.6199	0.26	|Q |	|	|	| V |
19+25	1.6220	0.31	|Q |	|	|	| V |
19+30	1.6242	0.32	|Q |	|	|	| V |
19+35	1.6264	0.31	|Q |	|	|	| V |
19+40	1.6282	0.27	|Q |	|	|	| V |
19+45	1.6299	0.25	|Q |	|	|	| V |
19+50	1.6315	0.23	Q |	|	|	| V |
19+55	1.6328	0.19	Q |	|	|	| V |
20+ 0	1.6340	0.17	Q |	|	|	| V |
20+ 5	1.6353	0.18	Q |	|	|	| V |
20+10	1.6368	0.23	Q |	|	|	| V |
20+15	1.6385	0.24	Q |	|	|	| V |
20+20	1.6402	0.24	Q |	|	|	| V |
20+25	1.6419	0.25	Q |	|	|	| V |
20+30	1.6436	0.25	Q |	|	|	| V |
20+35	1.6453	0.25	Q |	|	|	| V |
20+40	1.6470	0.25	Q |	|	|	| V |
20+45	1.6487	0.25	Q |	|	|	| V |
20+50	1.6503	0.23	Q |	|	|	| V |
20+55	1.6515	0.18	Q |	|	|	| V |
21+ 0	1.6527	0.17	Q |	|	|	| V |
21+ 5	1.6540	0.18	Q |	|	|	| V |
21+10	1.6555	0.23	Q |	|	|	| V |
21+15	1.6572	0.24	Q |	|	|	| V |
21+20	1.6588	0.23	Q |	|	|	| V|
21+25	1.6600	0.18	Q |	|	|	| V|
21+30	1.6612	0.17	Q |	|	|	| V|
21+35	1.6625	0.18	Q |	|	|	| V|

```
  21+40       1.6640      0.23  Q          |          |          |         v|
  21+45       1.6657      0.24  Q          |          |          |         v|
  21+50       1.6673      0.23  Q          |          |          |         v|
  21+55       1.6685      0.18  Q          |          |          |         v|
  22+ 0       1.6697      0.17  Q          |          |          |         v|
  22+ 5       1.6710      0.18  Q          |          |          |         v|
  22+10       1.6725      0.23  Q          |          |          |         v|
  22+15       1.6742      0.24  Q          |          |          |         v|
  22+20       1.6758      0.23  Q          |          |          |         v|
  22+25       1.6770      0.18  Q          |          |          |         v|
  22+30       1.6782      0.17  Q          |          |          |         v|
  22+35       1.6794      0.17  Q          |          |          |         v|
  22+40       1.6805      0.17  Q          |          |          |         v|
  22+45       1.6816      0.16  Q          |          |          |         v|
  22+50       1.6828      0.16  Q          |          |          |         v|
  22+55       1.6839      0.16  Q          |          |          |         v|
  23+ 0       1.6850      0.16  Q          |          |          |         v|
  23+ 5       1.6862      0.16  Q          |          |          |         v|
  23+10       1.6873      0.16  Q          |          |          |         v|
  23+15       1.6884      0.16  Q          |          |          |         v|
  23+20       1.6896      0.16  Q          |          |          |         v|
  23+25       1.6907      0.16  Q          |          |          |         v|
  23+30       1.6918      0.16  Q          |          |          |         v|
  23+35       1.6930      0.16  Q          |          |          |         v|
  23+40       1.6941      0.16  Q          |          |          |         v|
  23+45       1.6952      0.16  Q          |          |          |         v|
  23+50       1.6964      0.16  Q          |          |          |         v|
  23+55       1.6975      0.16  Q          |          |          |         v|
  24+ 0       1.6986      0.16  Q          |          |          |         v|
  24+ 5       1.6995      0.13  Q          |          |          |         v|
  24+10       1.6998      0.04  Q          |          |          |         v|
  24+15       1.6999      0.01  Q          |          |          |         v|
  24+20       1.6999      0.00  Q          |          |          |         v|
  24+25       1.7000      0.00  Q          |          |          |         v|
  24+30       1.7000      0.00  Q          |          |          |          v
-------------------------------------------------------------------------
```

STAGE-STORAGE/OUTFLOW TABLES

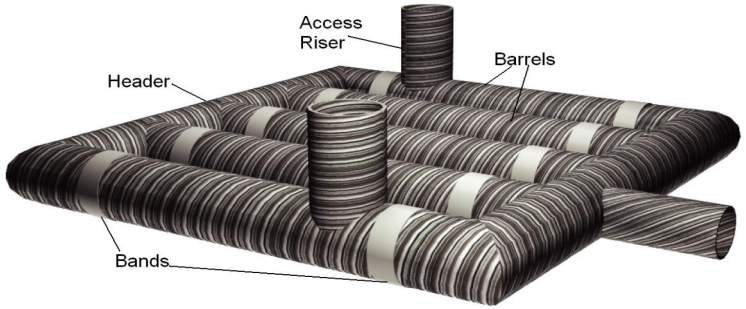
CMP CHAMBERS B1

DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings,
and pricing send completed worksheet to:
dyods@contech-cpi.com



Project Summary

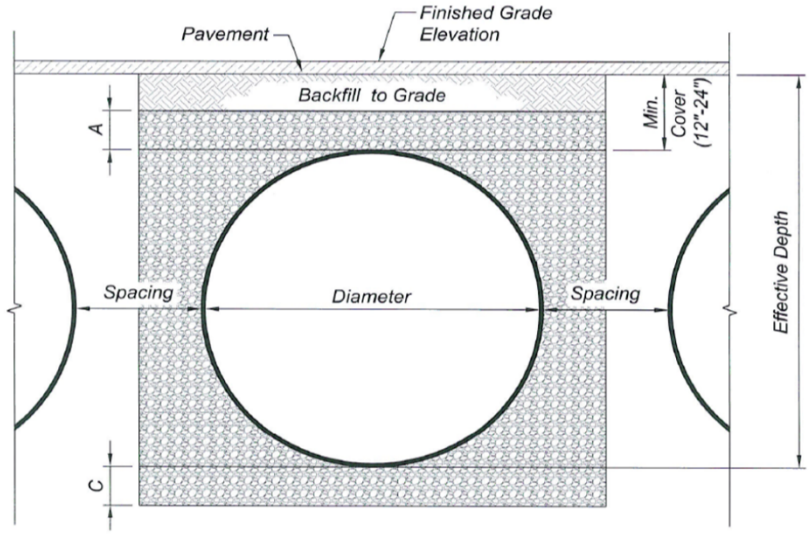
Date:	12/1/2021
Project Name:	BCCOV BLDG B AREA 3
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	65,000
Limiting Width (ft):	100.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	65,295	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	65,295	cf	100.5% Of Required Storage
Number of Barrels:	9	barrels	
Length per Barrel:	123.0	ft	
Length Per Header:	96.0	ft	
Rectangular Footprint (W x L):	99. ft x 142. ft		

CONTECH Materials

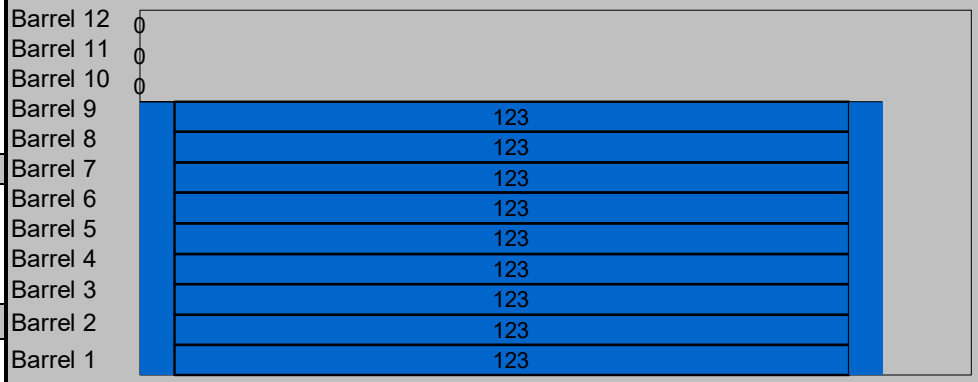
Total CMP Footage:	1,299	ft
Approximate Total Pieces:	62	pcs
Approximate Coupling Bands:	69	bands
Approximate Truckloads:	31	trucks

Construction Quantities**

Total Excavation:	5207	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	2789	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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CMP CHAMBERS B2

DYODS™
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CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings,
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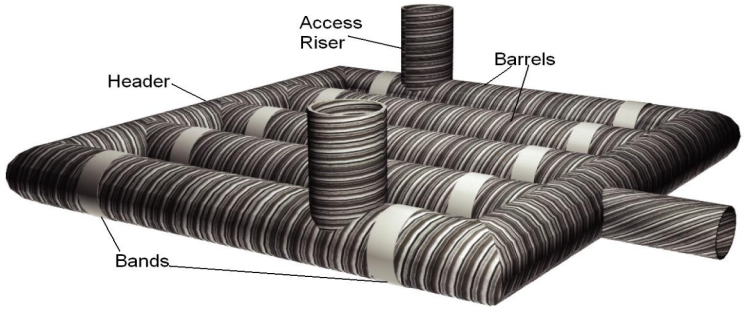
dyods@contech-cpi.com



Project Summary

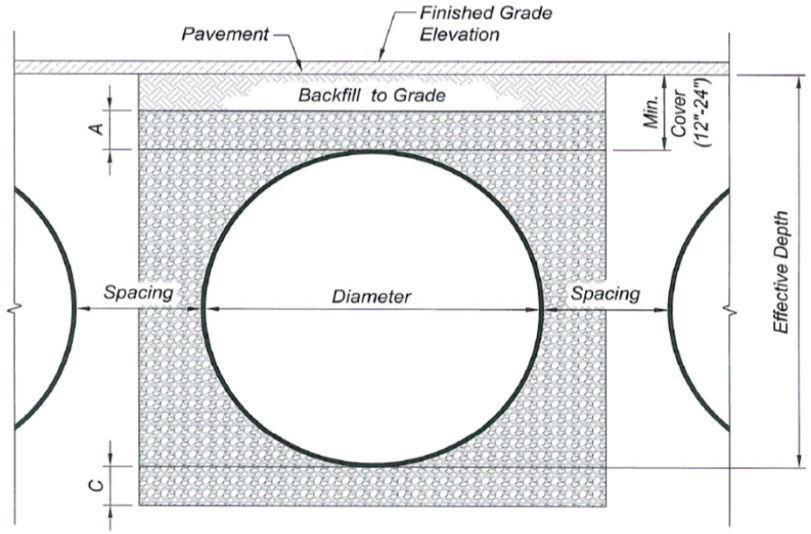
Date:	12/6/2021
Project Name:	BCCOV BLDG B AREA 7
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	16,250
Limiting Width (ft):	60.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	16,286	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	16,286	cf	100.2% Of Required Storage
Number of Barrels:	5	barrels	
Length per Barrel:	44.0	ft	
Length Per Header:	52.0	ft	
Rectangular Footprint (W x L):	55. ft x 63. ft		

CONTECH Materials

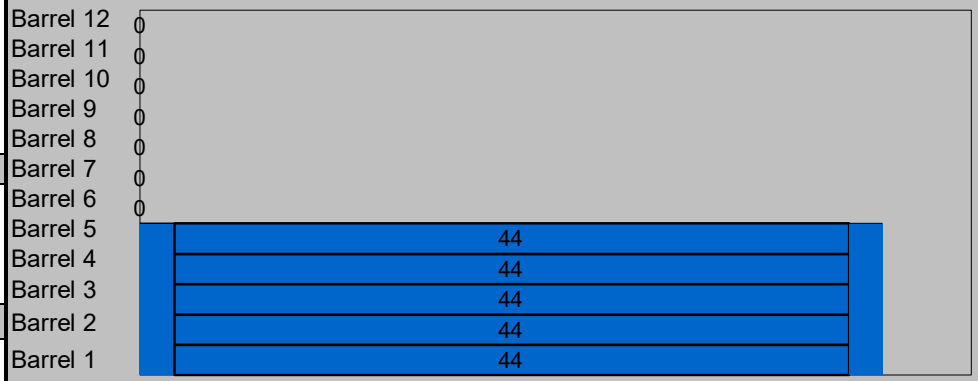
Total CMP Footage:	324	ft
Approximate Total Pieces:	16	pcs
Approximate Coupling Bands:	19	bands
Approximate Truckloads:	8	trucks

Construction Quantities**

Total Excavation:	1284	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	681	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



FOUR CHAMBER SYSTEMS CONNECTED BY AN EQUALIZER PIPE ARE PROPOSED TO DETAIN A TOTAL 65,000 CF

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BLDG B CMP CHAMBERS B1- Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

$Q_{ORIFICE}$= Cd*Area*(2*G*H)$^{0.5}$

Q_{WEIR}= C*L*H$^{3/2}$

2-Year	ORIFICE
Q EXISTING	0.41
Opening (in)	2
# of Orifices	2
Area (sf)	0.0218
Opening (ft)	0.1667
Total Area (sf)	0.0436
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.083	**0.08333**	**283.19**	**0.007**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1699.15**	**0.039**	**0.416666667**	0.15	0.15	
4	2209	1	**4710.82**	**0.108**	**0.916666667**	0.22	0.22	
5	**2209.5**	1.5	**8475.18**	**0.195**	**1.416666667**	0.28	0.28	
6	2210	2	**12765.22**	**0.293**	**1.916666667**	0.32	0.32	
7	**2210.5**	2.5	**17432.90**	**0.400**	**2.416666667**	0.36	0.36	
8	2211	3	**22364.72**	**0.513**	**2.916666667**	0.39	0.39	
9	**2211.5**	**3.5**	**27464.99**	**0.631**	**3.416666667**	**0.43**	0.43	
10	2212	4	**32647.43**	**0.749**	**3.916666667**	0.46	0.46	
11	**2212.5**	4.5	**37829.87**	**0.868**	**4.416666667**	0.49	0.49	
12	2213	5	**42930.14**	**0.986**	**4.916666667**	0.51	0.51	
13	**2213.5**	5.5	**47861.96**	**1.099**	**5.416666667**	0.54	0.54	
14	2214	6	**52529.64**	**1.206**	**5.916666667**	0.56	0.56	
15	**2214.5**	6.5	**56819.68**	**1.304**	**6.416666667**	0.59	0.59	
16	2215	7	**60584.05**	**1.391**	**6.916666667**	0.61	0.61	
17	**2215.5**	7.50	**63595.71**	**1.460**	**7.416666667**	0.63	0.63	
18	2216	8	**65294.86**	**1.499**	**7.916666667**	0.65	0.65	Top of chambers

BLDG B CMP CHAMBERS B2 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

	2-Year	ORIFICE
Q EXISTING	0.71	
Opening (in)	**3.5**	
# of Orifices	**1**	
Area (sf)	**0.0668**	
Opening (ft)	**0.2917**	
Total Area (sf)	**0.0668**	
G (ft/s^2)	**32.2**	
Cd	**0.66**	
Invert H (ft)	2.125	

$Q_{ORIFICE}$= **Cd*Area*(2*G*H)$^{0.5}$**

Q_{WEIR}= **C*L*H$^{3/2}$**

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.146	**0.14583**	**496.73**	**0.011**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1703.08**	**0.039**	**0.354166667**	0.21	0.21	
4	2209	1	**4721.70**	**0.108**	**0.854166667**	0.33	0.33	
5	**2209.5**	1.5	**8494.75**	**0.195**	**1.354166667**	0.41	0.41	
6	2210	2	**12794.70**	**0.294**	**1.854166667**	0.48	0.48	
7	**2210.5**	2.5	**17473.16**	**0.401**	**2.354166667**	0.54	0.54	
8	2211	3	**22416.37**	**0.515**	**2.854166667**	0.60	0.60	
9	**2211.5**	**3.5**	**27528.42**	**0.632**	**3.354166667**	**0.65**	0.65	
10	2212	4	**32722.83**	**0.751**	**3.854166667**	0.69	0.69	
11	**2212.5**	4.5	**37917.23**	**0.870**	**4.354166667**	0.74	0.74	
12	2213	5	**43029.29**	**0.988**	**4.854166667**	0.78	0.78	
13	**2213.5**	5.5	**47972.50**	**1.101**	**5.354166667**	0.82	0.82	
14	2214	6	**52650.96**	**1.209**	**5.854166667**	0.86	0.86	
15	**2214.5**	6.5	**56950.90**	**1.307**	**6.354166667**	0.89	0.89	
16	2215	7	**60723.96**	**1.394**	**6.854166667**	0.93	0.93	
17	**2215.5**	7.50	**63742.58**	**1.463**	**7.354166667**	0.96	0.96	
18	2216	8	**65445.66**	**1.502**	**7.854166667**	0.99	0.99	Top of chambers

BASIN ROUTING (2-YEAR, 24-HOUR STORM EVENT)

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV BLDG B AREA 3
2-YR, 24-HR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR3B242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 296
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.746 (CFS)
Total volume = 1.673 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++++++++++

Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 296
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

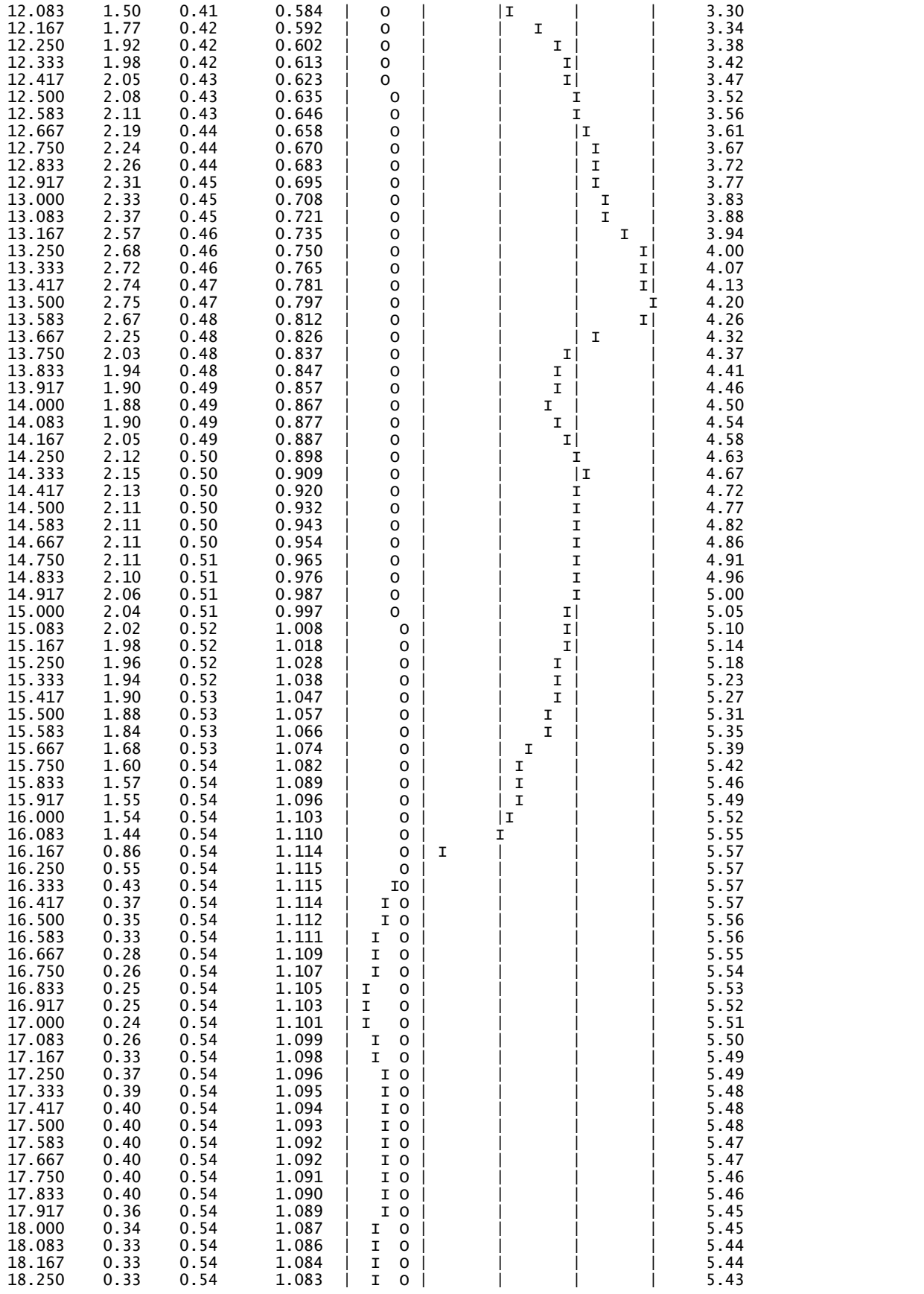
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.083	0.007	0.001	0.007	0.007
0.500	0.039	0.150	0.038	0.040
1.000	0.108	0.220	0.107	0.109
1.500	0.195	0.280	0.194	0.196
2.000	0.293	0.320	0.292	0.294
2.500	0.400	0.360	0.399	0.401
3.000	0.513	0.390	0.512	0.514
3.500	0.631	0.430	0.630	0.632
4.000	0.749	0.460	0.747	0.751
4.500	0.868	0.490	0.866	0.870
5.000	0.986	0.510	0.984	0.988
5.500	1.099	0.540	1.097	1.101
6.000	1.206	0.560	1.204	1.208
6.500	1.304	0.590	1.302	1.306
7.000	1.391	0.610	1.389	1.393
7.500	1.460	0.630	1.458	1.462
8.000	1.499	0.650	1.497	1.501

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.7	1.37	2.06	2.75	Depth (Ft.)
0.083	0.01	0.00	0.000	O					0.00
0.167	0.09	0.00	0.000	OI					0.00
0.250	0.13	0.00	0.001	OI					0.01
0.333	0.15	0.00	0.002	OI					0.03
0.417	0.20	0.00	0.003	O I					0.04
0.500	0.22	0.00	0.005	O I					0.06
0.583	0.23	0.00	0.006	O I					0.08
0.667	0.24	0.01	0.008	O I					0.10
0.750	0.24	0.01	0.010	O I					0.12
0.833	0.25	0.02	0.011	O I					0.14
0.917	0.29	0.03	0.013	O I					0.16
1.000	0.31	0.04	0.015	O I					0.18
1.083	0.31	0.05	0.017	O I					0.21
1.167	0.28	0.05	0.018	O I					0.23
1.250	0.26	0.06	0.020	O I					0.25
1.333	0.25	0.07	0.021	O I					0.27
1.417	0.25	0.07	0.022	O I					0.28
1.500	0.24	0.08	0.023	O I					0.30
1.583	0.24	0.08	0.025	O I					0.31
1.667	0.24	0.09	0.026	OI					0.33
1.750	0.24	0.09	0.027	OI					0.34
1.833	0.25	0.10	0.028	OI					0.35
1.917	0.29	0.10	0.029	O I					0.37
2.000	0.31	0.11	0.030	O I					0.39
2.083	0.32	0.12	0.032	O I					0.40
2.167	0.32	0.12	0.033	O I					0.42
2.250	0.32	0.13	0.034	O I					0.44
2.333	0.32	0.13	0.036	O I					0.46
2.417	0.32	0.14	0.037	O I					0.47
2.500	0.32	0.15	0.038	O I					0.49
2.583	0.33	0.15	0.039	O I					0.50
2.667	0.37	0.15	0.041	O I					0.51
2.750	0.39	0.15	0.042	O I					0.52
2.833	0.40	0.16	0.044	O I					0.54
2.917	0.40	0.16	0.046	O I					0.55
3.000	0.40	0.16	0.047	O I					0.56
3.083	0.40	0.16	0.049	O I					0.57
3.167	0.40	0.16	0.051	O I					0.58
3.250	0.40	0.16	0.052	O I					0.60
3.333	0.40	0.17	0.054	O I					0.61
3.417	0.40	0.17	0.056	O I					0.62
3.500	0.40	0.17	0.057	O I					0.63
3.583	0.40	0.17	0.059	O I					0.64
3.667	0.40	0.17	0.061	O I					0.66
3.750	0.40	0.17	0.062	O I					0.67
3.833	0.41	0.18	0.064	O I					0.68
3.917	0.45	0.18	0.065	O I					0.69
4.000	0.47	0.18	0.067	O I					0.71
4.083	0.48	0.18	0.069	O I					0.72
4.167	0.48	0.18	0.072	O I					0.74
4.250	0.48	0.19	0.074	O I					0.75
4.333	0.49	0.19	0.076	O I					0.77
4.417	0.53	0.19	0.078	O I					0.78
4.500	0.55	0.19	0.080	O I					0.80
4.583	0.56	0.19	0.083	O I					0.82
4.667	0.56	0.20	0.085	O I					0.84
4.750	0.57	0.20	0.088	O I					0.85
4.833	0.57	0.20	0.090	O I					0.87
4.917	0.61	0.20	0.093	O I					0.89
5.000	0.63	0.21	0.096	O I					0.91
5.083	0.63	0.21	0.099	O I					0.93
5.167	0.55	0.21	0.101	O I					0.95
5.250	0.51	0.22	0.104	O I					0.97
5.333	0.51	0.22	0.106	O I					0.98
5.417	0.54	0.22	0.108	O I					1.00
5.500	0.55	0.22	0.110	O I					1.01
5.583	0.57	0.22	0.112	O I					1.02
5.667	0.61	0.22	0.115	O I					1.04
5.750	0.63	0.23	0.118	O I					1.05

5.833	0.64	0.23	0.120	o	I			1.07
5.917	0.64	0.23	0.123	o	I			1.09
6.000	0.65	0.23	0.126	o	I			1.10
6.083	0.65	0.23	0.129	o	I			1.12
6.167	0.69	0.24	0.132	o	I			1.14
6.250	0.71	0.24	0.135	o	I			1.16
6.333	0.72	0.24	0.138	o	I			1.17
6.417	0.73	0.24	0.142	o	I			1.19
6.500	0.73	0.25	0.145	o	I			1.21
6.583	0.73	0.25	0.148	o	I			1.23
6.667	0.77	0.25	0.152	o	I			1.25
6.750	0.79	0.25	0.156	o	I			1.27
6.833	0.80	0.26	0.159	o	I			1.29
6.917	0.81	0.26	0.163	o	I			1.32
7.000	0.81	0.26	0.167	o	I			1.34
7.083	0.81	0.26	0.171	o	I			1.36
7.167	0.81	0.27	0.174	o	I			1.38
7.250	0.81	0.27	0.178	o	I			1.40
7.333	0.82	0.27	0.182	o	I			1.42
7.417	0.85	0.27	0.186	o	I			1.45
7.500	0.88	0.28	0.190	o	I			1.47
7.583	0.89	0.28	0.194	o	I			1.49
7.667	0.93	0.28	0.198	o	I			1.52
7.750	0.95	0.28	0.203	o	I			1.54
7.833	0.97	0.29	0.208	o	I			1.56
7.917	1.01	0.29	0.212	o	I			1.59
8.000	1.04	0.29	0.217	o	I			1.61
8.083	1.06	0.29	0.223	o	I			1.64
8.167	1.14	0.29	0.228	o	I			1.67
8.250	1.18	0.30	0.234	o	I			1.70
8.333	1.20	0.30	0.240	o	I			1.73
8.417	1.21	0.30	0.247	o	I			1.76
8.500	1.21	0.30	0.253	o	I			1.79
8.583	1.22	0.31	0.259	o	I			1.83
8.667	1.26	0.31	0.265	o	I			1.86
8.750	1.28	0.31	0.272	o	I			1.89
8.833	1.30	0.31	0.279	o	I			1.93
8.917	1.34	0.32	0.286	o	I			1.96
9.000	1.36	0.32	0.293	o	I			2.00
9.083	1.38	0.32	0.300	o	I			2.03
9.167	1.46	0.33	0.308	o	I			2.07
9.250	1.51	0.33	0.316	o	I			2.11
9.333	1.53	0.33	0.324	o	I			2.14
9.417	1.58	0.33	0.332	o	I			2.18
9.500	1.60	0.34	0.341	o	I			2.22
9.583	1.62	0.34	0.350	o	I			2.26
9.667	1.66	0.34	0.358	o	I			2.31
9.750	1.68	0.35	0.368	o	I			2.35
9.833	1.70	0.35	0.377	o	I			2.39
9.917	1.74	0.35	0.386	o	I			2.44
10.000	1.76	0.36	0.396	o	I			2.48
10.083	1.72	0.36	0.405	o	I			2.52
10.167	1.46	0.36	0.414	o	I			2.56
10.250	1.32	0.37	0.421	o	I			2.59
10.333	1.26	0.37	0.427	o	I			2.62
10.417	1.24	0.37	0.433	o	I			2.65
10.500	1.22	0.37	0.439	o	I			2.67
10.583	1.26	0.37	0.445	o	I			2.70
10.667	1.44	0.37	0.452	o	I			2.73
10.750	1.54	0.38	0.460	o	I			2.76
10.833	1.58	0.38	0.468	o	I			2.80
10.917	1.60	0.38	0.476	o	I			2.84
11.000	1.61	0.38	0.485	o	I			2.87
11.083	1.61	0.38	0.493	o	I			2.91
11.167	1.57	0.39	0.501	o	I			2.95
11.250	1.55	0.39	0.510	o	I			2.98
11.333	1.55	0.39	0.518	o	I			3.02
11.417	1.54	0.39	0.525	o	I			3.05
11.500	1.54	0.40	0.533	o	I			3.09
11.583	1.53	0.40	0.541	o	I			3.12
11.667	1.45	0.40	0.549	o	I			3.15
11.750	1.41	0.40	0.556	o	I			3.18
11.833	1.40	0.41	0.563	o	I			3.21
11.917	1.43	0.41	0.569	o	I			3.24
12.000	1.44	0.41	0.577	o	I			3.27



18.333	0.32	0.54	1.082	| I o |	|	|	|	5.42
18.417	0.32	0.53	1.080	| I o |	|	|	|	5.42
18.500	0.32	0.53	1.079	| I o |	|	|	|	5.41
18.583	0.32	0.53	1.077	| I o |	|	|	|	5.40
18.667	0.28	0.53	1.076	| I o |	|	|	|	5.40
18.750	0.26	0.53	1.074	| I o |	|	|	|	5.39
18.833	0.24	0.53	1.072	| I o |	|	|	|	5.38
18.917	0.20	0.53	1.070	| I o |	|	|	|	5.37
19.000	0.18	0.53	1.067	| I o |	|	|	|	5.36
19.083	0.18	0.53	1.065	| I o |	|	|	|	5.35
19.167	0.21	0.53	1.063	| I o |	|	|	|	5.34
19.250	0.23	0.53	1.060	| I o |	|	|	|	5.33
19.333	0.24	0.53	1.058	| I o |	|	|	|	5.32
19.417	0.29	0.53	1.057	| I o |	|	|	|	5.31
19.500	0.31	0.53	1.055	| I o |	|	|	|	5.31
19.583	0.31	0.53	1.053	| I o |	|	|	|	5.30
19.667	0.28	0.53	1.052	| I o |	|	|	|	5.29
19.750	0.26	0.53	1.050	| I o |	|	|	|	5.28
19.833	0.24	0.53	1.048	| I o |	|	|	|	5.27
19.917	0.20	0.53	1.046	| I o |	|	|	|	5.27
20.000	0.18	0.53	1.044	| I o |	|	|	|	5.26
20.083	0.18	0.52	1.041	| I o |	|	|	|	5.24
20.167	0.21	0.52	1.039	| I o |	|	|	|	5.23
20.250	0.23	0.52	1.037	| I o |	|	|	|	5.23
20.333	0.24	0.52	1.035	| I o |	|	|	|	5.22
20.417	0.24	0.52	1.033	| I o |	|	|	|	5.21
20.500	0.24	0.52	1.031	| I o |	|	|	|	5.20
20.583	0.24	0.52	1.029	| I o |	|	|	|	5.19
20.667	0.24	0.52	1.027	| I o |	|	|	|	5.18
20.750	0.24	0.52	1.025	| I o |	|	|	|	5.17
20.833	0.24	0.52	1.023	| I o |	|	|	|	5.17
20.917	0.20	0.52	1.021	| I o |	|	|	|	5.16
21.000	0.18	0.52	1.019	| I o |	|	|	|	5.15
21.083	0.18	0.52	1.017	| I o |	|	|	|	5.14
21.167	0.21	0.52	1.014	| I o |	|	|	|	5.13
21.250	0.23	0.52	1.012	| I o |	|	|	|	5.12
21.333	0.23	0.52	1.010	| I o |	|	|	|	5.11
21.417	0.19	0.52	1.008	| I o |	|	|	|	5.10
21.500	0.18	0.52	1.006	| I o |	|	|	|	5.09
21.583	0.18	0.51	1.004	| I o |	|	|	|	5.08
21.667	0.21	0.51	1.001	| I o |	|	|	|	5.07
21.750	0.23	0.51	0.999	| I o |	|	|	|	5.06
21.833	0.23	0.51	0.997	| I o |	|	|	|	5.05
21.917	0.19	0.51	0.995	| I o |	|	|	|	5.04
22.000	0.18	0.51	0.993	| I o |	|	|	|	5.03
22.083	0.18	0.51	0.991	| I o |	|	|	|	5.02
22.167	0.21	0.51	0.989	| I o |	|	|	|	5.01
22.250	0.23	0.51	0.987	| I o |	|	|	|	5.00
22.333	0.23	0.51	0.985	| I o |	|	|	|	4.99
22.417	0.19	0.51	0.983	| I o |	|	|	|	4.99
22.500	0.18	0.51	0.980	| I o |	|	|	|	4.98
22.583	0.17	0.51	0.978	| I o |	|	|	|	4.97
22.667	0.16	0.51	0.976	| I o |	|	|	|	4.96
22.750	0.16	0.51	0.973	| I o |	|	|	|	4.95
22.833	0.16	0.51	0.971	| I o |	|	|	|	4.94
22.917	0.16	0.51	0.969	| I o |	|	|	|	4.93
23.000	0.16	0.51	0.966	| I o |	|	|	|	4.92
23.083	0.16	0.51	0.964	| I o |	|	|	|	4.91
23.167	0.16	0.51	0.962	| I o |	|	|	|	4.90
23.250	0.16	0.51	0.959	| I o |	|	|	|	4.89
23.333	0.16	0.51	0.957	| I o |	|	|	|	4.88
23.417	0.16	0.50	0.954	| I o |	|	|	|	4.87
23.500	0.16	0.50	0.952	| I o |	|	|	|	4.86
23.583	0.16	0.50	0.950	| I o |	|	|	|	4.85
23.667	0.16	0.50	0.947	| I o |	|	|	|	4.84
23.750	0.16	0.50	0.945	| I o |	|	|	|	4.83
23.833	0.16	0.50	0.943	| I o |	|	|	|	4.82
23.917	0.16	0.50	0.940	| I o |	|	|	|	4.81
24.000	0.16	0.50	0.938	| I o |	|	|	|	4.80
24.083	0.15	0.50	0.936	| I o |	|	|	|	4.79
24.167	0.07	0.50	0.933	I o |	|	|	|	4.77
24.250	0.03	0.50	0.930	I o |	|	|	|	4.76
24.333	0.01	0.50	0.926	I o |	|	|	|	4.75
24.417	0.01	0.50	0.923	I o |	|	|	|	4.73
24.500	0.00	0.50	0.920	I o |	|	|	|	4.72

24.583	0.00	0.50	0.916	I	O	|	|	|	|	4.70
24.667	0.00	0.50	0.913	I	O	|	|	|	|	4.69
24.750	0.00	0.50	0.909	I	O	|	|	|	|	4.68
24.833	0.00	0.50	0.906	I	O	|	|	|	|	4.66
24.917	0.00	0.50	0.903	I	O	|	|	|	|	4.65
25.000	0.00	0.50	0.899	I	O	|	|	|	|	4.63
25.083	0.00	0.49	0.896	I	O	|	|	|	|	4.62
25.167	0.00	0.49	0.892	I	O	|	|	|	|	4.60
25.250	0.00	0.49	0.889	I	O	|	|	|	|	4.59
25.333	0.00	0.49	0.886	I	O	|	|	|	|	4.57
25.417	0.00	0.49	0.882	I	O	|	|	|	|	4.56
25.500	0.00	0.49	0.879	I	O	|	|	|	|	4.55
25.583	0.00	0.49	0.875	I	O	|	|	|	|	4.53
25.667	0.00	0.49	0.872	I	O	|	|	|	|	4.52
25.750	0.00	0.49	0.869	I	O	|	|	|	|	4.50
25.833	0.00	0.49	0.865	I	O	|	|	|	|	4.49
25.917	0.00	0.49	0.862	I	O	|	|	|	|	4.47
26.000	0.00	0.49	0.859	I	O	|	|	|	|	4.46
26.083	0.00	0.49	0.855	I	O	|	|	|	|	4.45
26.167	0.00	0.49	0.852	I	O	|	|	|	|	4.43
26.250	0.00	0.49	0.849	I	O	|	|	|	|	4.42
26.333	0.00	0.48	0.845	I	O	|	|	|	|	4.40
26.417	0.00	0.48	0.842	I	O	|	|	|	|	4.39
26.500	0.00	0.48	0.839	I	O	|	|	|	|	4.38
26.583	0.00	0.48	0.835	I	O	|	|	|	|	4.36
26.667	0.00	0.48	0.832	I	O	|	|	|	|	4.35
26.750	0.00	0.48	0.829	I	O	|	|	|	|	4.33
26.833	0.00	0.48	0.825	I	O	|	|	|	|	4.32
26.917	0.00	0.48	0.822	I	O	|	|	|	|	4.31
27.000	0.00	0.48	0.819	I	O	|	|	|	|	4.29
27.083	0.00	0.48	0.815	I	O	|	|	|	|	4.28
27.167	0.00	0.48	0.812	I	O	|	|	|	|	4.27
27.250	0.00	0.48	0.809	I	O	|	|	|	|	4.25
27.333	0.00	0.47	0.806	I	O	|	|	|	|	4.24
27.417	0.00	0.47	0.802	I	O	|	|	|	|	4.22
27.500	0.00	0.47	0.799	I	O	|	|	|	|	4.21
27.583	0.00	0.47	0.796	I	O	|	|	|	|	4.20
27.667	0.00	0.47	0.793	I	O	|	|	|	|	4.18
27.750	0.00	0.47	0.789	I	O	|	|	|	|	4.17
27.833	0.00	0.47	0.786	I	O	|	|	|	|	4.16
27.917	0.00	0.47	0.783	I	O	|	|	|	|	4.14
28.000	0.00	0.47	0.780	I	O	|	|	|	|	4.13
28.083	0.00	0.47	0.776	I	O	|	|	|	|	4.12
28.167	0.00	0.47	0.773	I	O	|	|	|	|	4.10
28.250	0.00	0.47	0.770	I	O	|	|	|	|	4.09
28.333	0.00	0.46	0.767	I	O	|	|	|	|	4.07
28.417	0.00	0.46	0.764	I	O	|	|	|	|	4.06
28.500	0.00	0.46	0.760	I	O	|	|	|	|	4.05
28.583	0.00	0.46	0.757	I	O	|	|	|	|	4.03
28.667	0.00	0.46	0.754	I	O	|	|	|	|	4.02
28.750	0.00	0.46	0.751	I	O	|	|	|	|	4.01
28.833	0.00	0.46	0.748	I	O	|	|	|	|	3.99
28.917	0.00	0.46	0.745	I	O	|	|	|	|	3.98
29.000	0.00	0.46	0.741	I	O	|	|	|	|	3.97
29.083	0.00	0.46	0.738	I	O	|	|	|	|	3.95
29.167	0.00	0.46	0.735	I	O	|	|	|	|	3.94
29.250	0.00	0.46	0.732	I	O	|	|	|	|	3.93
29.333	0.00	0.45	0.729	I	O	|	|	|	|	3.91
29.417	0.00	0.45	0.726	I	O	|	|	|	|	3.90
29.500	0.00	0.45	0.723	I	O	|	|	|	|	3.89
29.583	0.00	0.45	0.719	I	O	|	|	|	|	3.87
29.667	0.00	0.45	0.716	I	O	|	|	|	|	3.86
29.750	0.00	0.45	0.713	I	O	|	|	|	|	3.85
29.833	0.00	0.45	0.710	I	O	|	|	|	|	3.84
29.917	0.00	0.45	0.707	I	O	|	|	|	|	3.82
30.000	0.00	0.45	0.704	I	O	|	|	|	|	3.81
30.083	0.00	0.45	0.701	I	O	|	|	|	|	3.80
30.167	0.00	0.45	0.698	I	O	|	|	|	|	3.78
30.250	0.00	0.45	0.695	I	O	|	|	|	|	3.77
30.333	0.00	0.45	0.692	I	O	|	|	|	|	3.76
30.417	0.00	0.44	0.689	I	O	|	|	|	|	3.74
30.500	0.00	0.44	0.685	I	O	|	|	|	|	3.73
30.583	0.00	0.44	0.682	I	O	|	|	|	|	3.72
30.667	0.00	0.44	0.679	I	O	|	|	|	|	3.70
30.750	0.00	0.44	0.676	I	O	|	|	|	|	3.69

30.833	0.00	0.44	0.673	I	o	|	|	|	|	3.68
30.917	0.00	0.44	0.670	I	o	|	|	|	|	3.67
31.000	0.00	0.44	0.667	I	o	|	|	|	|	3.65
31.083	0.00	0.44	0.664	I	o	|	|	|	|	3.64
31.167	0.00	0.44	0.661	I	o	|	|	|	|	3.63
31.250	0.00	0.44	0.658	I	o	|	|	|	|	3.62
31.333	0.00	0.44	0.655	I	o	|	|	|	|	3.60
31.417	0.00	0.44	0.652	I	o	|	|	|	|	3.59
31.500	0.00	0.43	0.649	I	o	|	|	|	|	3.58
31.583	0.00	0.43	0.646	I	o	|	|	|	|	3.56
31.667	0.00	0.43	0.643	I	o	|	|	|	|	3.55
31.750	0.00	0.43	0.640	I	o	|	|	|	|	3.54
31.833	0.00	0.43	0.637	I	o	|	|	|	|	3.53
31.917	0.00	0.43	0.634	I	o	|	|	|	|	3.51
32.000	0.00	0.43	0.631	I	o	|	|	|	|	3.50
32.083	0.00	0.43	0.628	I	o	|	|	|	|	3.49
32.167	0.00	0.43	0.625	I	o	|	|	|	|	3.48
32.250	0.00	0.43	0.622	I	o	|	|	|	|	3.46
32.333	0.00	0.43	0.620	I	o	|	|	|	|	3.45
32.417	0.00	0.43	0.617	I	o	|	|	|	|	3.44
32.500	0.00	0.42	0.614	I	o	|	|	|	|	3.43
32.583	0.00	0.42	0.611	I	o	|	|	|	|	3.41
32.667	0.00	0.42	0.608	I	o	|	|	|	|	3.40
32.750	0.00	0.42	0.605	I	o	|	|	|	|	3.39
32.833	0.00	0.42	0.602	I	o	|	|	|	|	3.38
32.917	0.00	0.42	0.599	I	o	|	|	|	|	3.37
33.000	0.00	0.42	0.596	I	o	|	|	|	|	3.35
33.083	0.00	0.42	0.593	I	o	|	|	|	|	3.34
33.167	0.00	0.42	0.591	I	o	|	|	|	|	3.33
33.250	0.00	0.42	0.588	I	o	|	|	|	|	3.32
33.333	0.00	0.41	0.585	I	o	|	|	|	|	3.30
33.417	0.00	0.41	0.582	I	o	|	|	|	|	3.29
33.500	0.00	0.41	0.579	I	o	|	|	|	|	3.28
33.583	0.00	0.41	0.576	I	o	|	|	|	|	3.27
33.667	0.00	0.41	0.573	I	o	|	|	|	|	3.26
33.750	0.00	0.41	0.571	I	o	|	|	|	|	3.24
33.833	0.00	0.41	0.568	I	o	|	|	|	|	3.23
33.917	0.00	0.41	0.565	I	o	|	|	|	|	3.22
34.000	0.00	0.41	0.562	I	o	|	|	|	|	3.21
34.083	0.00	0.41	0.559	I	o	|	|	|	|	3.20
34.167	0.00	0.40	0.557	I	o	|	|	|	|	3.18
34.250	0.00	0.40	0.554	I	o	|	|	|	|	3.17
34.333	0.00	0.40	0.551	I	o	|	|	|	|	3.16
34.417	0.00	0.40	0.548	I	o	|	|	|	|	3.15
34.500	0.00	0.40	0.545	I	o	|	|	|	|	3.14
34.583	0.00	0.40	0.543	I	o	|	|	|	|	3.13
34.667	0.00	0.40	0.540	I	o	|	|	|	|	3.11
34.750	0.00	0.40	0.537	I	o	|	|	|	|	3.10
34.833	0.00	0.40	0.534	I	o	|	|	|	|	3.09
34.917	0.00	0.40	0.532	I	o	|	|	|	|	3.08
35.000	0.00	0.40	0.529	I	o	|	|	|	|	3.07
35.083	0.00	0.39	0.526	I	o	|	|	|	|	3.06
35.167	0.00	0.39	0.524	I	o	|	|	|	|	3.04
35.250	0.00	0.39	0.521	I	o	|	|	|	|	3.03
35.333	0.00	0.39	0.518	I	o	|	|	|	|	3.02
35.417	0.00	0.39	0.515	I	o	|	|	|	|	3.01
35.500	0.00	0.39	0.513	I	o	|	|	|	|	3.00
35.583	0.00	0.39	0.510	I	o	|	|	|	|	2.99
35.667	0.00	0.39	0.507	I	o	|	|	|	|	2.98
35.750	0.00	0.39	0.505	I	o	|	|	|	|	2.96
35.833	0.00	0.39	0.502	I	o	|	|	|	|	2.95
35.917	0.00	0.39	0.499	I	o	|	|	|	|	2.94
36.000	0.00	0.39	0.497	I	o	|	|	|	|	2.93
36.083	0.00	0.38	0.494	I	o	|	|	|	|	2.92
36.167	0.00	0.38	0.491	I	o	|	|	|	|	2.90
36.250	0.00	0.38	0.489	I	o	|	|	|	|	2.89
36.333	0.00	0.38	0.486	I	o	|	|	|	|	2.88
36.417	0.00	0.38	0.484	I	o	|	|	|	|	2.87
36.500	0.00	0.38	0.481	I	o	|	|	|	|	2.86
36.583	0.00	0.38	0.478	I	o	|	|	|	|	2.85
36.667	0.00	0.38	0.476	I	o	|	|	|	|	2.83
36.750	0.00	0.38	0.473	I	o	|	|	|	|	2.82
36.833	0.00	0.38	0.470	I	o	|	|	|	|	2.81
36.917	0.00	0.38	0.468	I	o	|	|	|	|	2.80
37.000	0.00	0.38	0.465	I	o	|	|	|	|	2.79

37.083	0.00	0.38	0.463	I	o	|	|	|	2.78
37.167	0.00	0.38	0.460	I	o	|	|	|	2.77
37.250	0.00	0.38	0.457	I	o	|	|	|	2.75
37.333	0.00	0.37	0.455	I	o	|	|	|	2.74
37.417	0.00	0.37	0.452	I	o	|	|	|	2.73
37.500	0.00	0.37	0.450	I	o	|	|	|	2.72
37.583	0.00	0.37	0.447	I	o	|	|	|	2.71
37.667	0.00	0.37	0.445	I	o	|	|	|	2.70
37.750	0.00	0.37	0.442	I	o	|	|	|	2.69
37.833	0.00	0.37	0.439	I	o	|	|	|	2.67
37.917	0.00	0.37	0.437	I	o	|	|	|	2.66
38.000	0.00	0.37	0.434	I	o	|	|	|	2.65
38.083	0.00	0.37	0.432	I	o	|	|	|	2.64
38.167	0.00	0.37	0.429	I	o	|	|	|	2.63
38.250	0.00	0.37	0.427	I	o	|	|	|	2.62
38.333	0.00	0.37	0.424	I	o	|	|	|	2.61
38.417	0.00	0.37	0.422	I	o	|	|	|	2.60
38.500	0.00	0.37	0.419	I	o	|	|	|	2.59
38.583	0.00	0.36	0.417	I	o	|	|	|	2.57
38.667	0.00	0.36	0.414	I	o	|	|	|	2.56
38.750	0.00	0.36	0.412	I	o	|	|	|	2.55
38.833	0.00	0.36	0.409	I	o	|	|	|	2.54
38.917	0.00	0.36	0.407	I	o	|	|	|	2.53
39.000	0.00	0.36	0.404	I	o	|	|	|	2.52
39.083	0.00	0.36	0.402	I	o	|	|	|	2.51
39.167	0.00	0.36	0.399	I	o	|	|	|	2.50
39.250	0.00	0.36	0.397	I	o	|	|	|	2.49
39.333	0.00	0.36	0.394	I	o	|	|	|	2.47
39.417	0.00	0.36	0.392	I	o	|	|	|	2.46
39.500	0.00	0.36	0.389	I	o	|	|	|	2.45
39.583	0.00	0.36	0.387	I	o	|	|	|	2.44
39.667	0.00	0.35	0.385	I	o	|	|	|	2.43
39.750	0.00	0.35	0.382	I	o	|	|	|	2.42
39.833	0.00	0.35	0.380	I	o	|	|	|	2.40
39.917	0.00	0.35	0.377	I	o	|	|	|	2.39
40.000	0.00	0.35	0.375	I	o	|	|	|	2.38
40.083	0.00	0.35	0.372	I	o	|	|	|	2.37
40.167	0.00	0.35	0.370	I	o	|	|	|	2.36
40.250	0.00	0.35	0.368	I	o	|	|	|	2.35
40.333	0.00	0.35	0.365	I	o	|	|	|	2.34
40.417	0.00	0.35	0.363	I	o	|	|	|	2.33
40.500	0.00	0.35	0.360	I	o	|	|	|	2.32
40.583	0.00	0.34	0.358	I	o	|	|	|	2.30
40.667	0.00	0.34	0.356	I	o	|	|	|	2.29
40.750	0.00	0.34	0.353	I	o	|	|	|	2.28
40.833	0.00	0.34	0.351	I	o	|	|	|	2.27
40.917	0.00	0.34	0.349	I	o	|	|	|	2.26
41.000	0.00	0.34	0.346	I	o	|	|	|	2.25
41.083	0.00	0.34	0.344	I	o	|	|	|	2.24
41.167	0.00	0.34	0.342	I	o	|	|	|	2.23
41.250	0.00	0.34	0.339	I	o	|	|	|	2.22
41.333	0.00	0.34	0.337	I	o	|	|	|	2.21
41.417	0.00	0.34	0.335	I	o	|	|	|	2.19
41.500	0.00	0.33	0.332	I	o	|	|	|	2.18
41.583	0.00	0.33	0.330	I	o	|	|	|	2.17
41.667	0.00	0.33	0.328	I	o	|	|	|	2.16
41.750	0.00	0.33	0.325	I	o	|	|	|	2.15
41.833	0.00	0.33	0.323	I	o	|	|	|	2.14
41.917	0.00	0.33	0.321	I	o	|	|	|	2.13
42.000	0.00	0.33	0.319	I	o	|	|	|	2.12
42.083	0.00	0.33	0.316	I	o	|	|	|	2.11
42.167	0.00	0.33	0.314	I	o	|	|	|	2.10
42.250	0.00	0.33	0.312	I	o	|	|	|	2.09
42.333	0.00	0.33	0.310	I	o	|	|	|	2.08
42.417	0.00	0.33	0.307	I	o	|	|	|	2.07
42.500	0.00	0.32	0.305	I	o	|	|	|	2.06
42.583	0.00	0.32	0.303	I	o	|	|	|	2.05
42.667	0.00	0.32	0.301	I	o	|	|	|	2.04
42.750	0.00	0.32	0.298	I	o	|	|	|	2.03
42.833	0.00	0.32	0.296	I	o	|	|	|	2.01
42.917	0.00	0.32	0.294	I	o	|	|	|	2.00
43.000	0.00	0.32	0.292	I	o	|	|	|	1.99
43.083	0.00	0.32	0.290	I	o	|	|	|	1.98
43.167	0.00	0.32	0.287	I	o	|	|	|	1.97
43.250	0.00	0.32	0.285	I	o	|	|	|	1.96

43.333	0.00	0.32	0.283	I o	|	|	|	1.95
43.417	0.00	0.32	0.281	I o	|	|	|	1.94
43.500	0.00	0.31	0.279	I o	|	|	|	1.93
43.583	0.00	0.31	0.277	I o	|	|	|	1.92
43.667	0.00	0.31	0.274	I o	|	|	|	1.91
43.750	0.00	0.31	0.272	I o	|	|	|	1.89
43.833	0.00	0.31	0.270	I o	|	|	|	1.88
43.917	0.00	0.31	0.268	I o	|	|	|	1.87
44.000	0.00	0.31	0.266	I o	|	|	|	1.86
44.083	0.00	0.31	0.264	I o	|	|	|	1.85
44.167	0.00	0.31	0.262	I o	|	|	|	1.84
44.250	0.00	0.31	0.259	I o	|	|	|	1.83
44.333	0.00	0.31	0.257	I o	|	|	|	1.82
44.417	0.00	0.30	0.255	I o	|	|	|	1.81
44.500	0.00	0.30	0.253	I o	|	|	|	1.80
44.583	0.00	0.30	0.251	I o	|	|	|	1.79
44.667	0.00	0.30	0.249	I o	|	|	|	1.78
44.750	0.00	0.30	0.247	I o	|	|	|	1.76
44.833	0.00	0.30	0.245	I o	|	|	|	1.75
44.917	0.00	0.30	0.243	I o	|	|	|	1.74
45.000	0.00	0.30	0.241	I o	|	|	|	1.73
45.083	0.00	0.30	0.239	I o	|	|	|	1.72
45.167	0.00	0.30	0.237	I o	|	|	|	1.71
45.250	0.00	0.30	0.235	I o	|	|	|	1.70
45.333	0.00	0.30	0.233	I o	|	|	|	1.69
45.417	0.00	0.29	0.231	I o	|	|	|	1.68
45.500	0.00	0.29	0.228	I o	|	|	|	1.67
45.583	0.00	0.29	0.226	I o	|	|	|	1.66
45.667	0.00	0.29	0.224	I o	|	|	|	1.65
45.750	0.00	0.29	0.222	I o	|	|	|	1.64
45.833	0.00	0.29	0.220	I o	|	|	|	1.63
45.917	0.00	0.29	0.218	I o	|	|	|	1.62
46.000	0.00	0.29	0.216	I o	|	|	|	1.61
46.083	0.00	0.29	0.214	I o	|	|	|	1.60
46.167	0.00	0.29	0.212	I o	|	|	|	1.59
46.250	0.00	0.29	0.211	I o	|	|	|	1.58
46.333	0.00	0.29	0.209	I o	|	|	|	1.57
46.417	0.00	0.28	0.207	I o	|	|	|	1.56
46.500	0.00	0.28	0.205	I o	|	|	|	1.55
46.583	0.00	0.28	0.203	I o	|	|	|	1.54
46.667	0.00	0.28	0.201	I o	|	|	|	1.53
46.750	0.00	0.28	0.199	I o	|	|	|	1.52
46.833	0.00	0.28	0.197	I o	|	|	|	1.51
46.917	0.00	0.28	0.195	I o	|	|	|	1.50
47.000	0.00	0.28	0.193	I o	|	|	|	1.49
47.083	0.00	0.28	0.191	I o	|	|	|	1.48
47.167	0.00	0.28	0.189	I o	|	|	|	1.47
47.250	0.00	0.27	0.187	I o	|	|	|	1.46
47.333	0.00	0.27	0.185	I o	|	|	|	1.44
47.417	0.00	0.27	0.184	I o	|	|	|	1.43
47.500	0.00	0.27	0.182	I o	|	|	|	1.42
47.583	0.00	0.27	0.180	I o	|	|	|	1.41
47.667	0.00	0.27	0.178	I o	|	|	|	1.40
47.750	0.00	0.27	0.176	I o	|	|	|	1.39
47.833	0.00	0.27	0.174	I o	|	|	|	1.38
47.917	0.00	0.26	0.172	I o	|	|	|	1.37
48.000	0.00	0.26	0.171	I o	|	|	|	1.36
48.083	0.00	0.26	0.169	I o	|	|	|	1.35
48.167	0.00	0.26	0.167	I o	|	|	|	1.34
48.250	0.00	0.26	0.165	I o	|	|	|	1.33
48.333	0.00	0.26	0.163	I o	|	|	|	1.32
48.417	0.00	0.26	0.162	I o	|	|	|	1.31
48.500	0.00	0.26	0.160	I o	|	|	|	1.30
48.583	0.00	0.25	0.158	I o	|	|	|	1.29
48.667	0.00	0.25	0.156	I o	|	|	|	1.28
48.750	0.00	0.25	0.155	I o	|	|	|	1.27
48.833	0.00	0.25	0.153	I o	|	|	|	1.26
48.917	0.00	0.25	0.151	I o	|	|	|	1.25
49.000	0.00	0.25	0.149	I o	|	|	|	1.24
49.083	0.00	0.25	0.148	I o	|	|	|	1.23
49.167	0.00	0.25	0.146	I o	|	|	|	1.22
49.250	0.00	0.25	0.144	I o	|	|	|	1.21
49.333	0.00	0.24	0.143	I o	|	|	|	1.20
49.417	0.00	0.24	0.141	I o	|	|	|	1.19
49.500	0.00	0.24	0.139	I o	|	|	|	1.18

49.583	0.00	0.24	0.138	I O	|	|	|	1.17
49.667	0.00	0.24	0.136	I O	|	|	|	1.16
49.750	0.00	0.24	0.134	I O	|	|	|	1.15
49.833	0.00	0.24	0.133	I O	|	|	|	1.14
49.917	0.00	0.24	0.131	I O	|	|	|	1.13
50.000	0.00	0.23	0.129	I O	|	|	|	1.12
50.083	0.00	0.23	0.128	I O	|	|	|	1.11
50.167	0.00	0.23	0.126	I O	|	|	|	1.11
50.250	0.00	0.23	0.125	I O	|	|	|	1.10
50.333	0.00	0.23	0.123	I O	|	|	|	1.09
50.417	0.00	0.23	0.122	I O	|	|	|	1.08
50.500	0.00	0.23	0.120	I O	|	|	|	1.07
50.583	0.00	0.23	0.118	I O	|	|	|	1.06
50.667	0.00	0.23	0.117	I O	|	|	|	1.05
50.750	0.00	0.22	0.115	I O	|	|	|	1.04
50.833	0.00	0.22	0.114	I O	|	|	|	1.03
50.917	0.00	0.22	0.112	I O	|	|	|	1.02
51.000	0.00	0.22	0.111	I O	|	|	|	1.02
51.083	0.00	0.22	0.109	I O	|	|	|	1.01
51.167	0.00	0.22	0.108	I O	|	|	|	1.00
51.250	0.00	0.22	0.106	I O	|	|	|	0.99
51.333	0.00	0.22	0.105	I O	|	|	|	0.98
51.417	0.00	0.22	0.103	I O	|	|	|	0.96
51.500	0.00	0.21	0.102	I O	|	|	|	0.95
51.583	0.00	0.21	0.100	I O	|	|	|	0.94
51.667	0.00	0.21	0.099	I O	|	|	|	0.93
51.750	0.00	0.21	0.097	I O	|	|	|	0.92
51.833	0.00	0.21	0.096	I O	|	|	|	0.91
51.917	0.00	0.21	0.094	I O	|	|	|	0.90
52.000	0.00	0.20	0.093	I O	|	|	|	0.89
52.083	0.00	0.20	0.092	I O	|	|	|	0.88
52.167	0.00	0.20	0.090	I O	|	|	|	0.87
52.250	0.00	0.20	0.089	I O	|	|	|	0.86
52.333	0.00	0.20	0.087	I O	|	|	|	0.85
52.417	0.00	0.20	0.086	I O	|	|	|	0.84
52.500	0.00	0.20	0.085	I O	|	|	|	0.83
52.583	0.00	0.19	0.083	I O	|	|	|	0.82
52.667	0.00	0.19	0.082	I O	|	|	|	0.81
52.750	0.00	0.19	0.081	I O	|	|	|	0.80
52.833	0.00	0.19	0.079	I O	|	|	|	0.79
52.917	0.00	0.19	0.078	I O	|	|	|	0.78
53.000	0.00	0.19	0.077	I O	|	|	|	0.77
53.083	0.00	0.19	0.075	I O	|	|	|	0.76
53.167	0.00	0.19	0.074	I O	|	|	|	0.75
53.250	0.00	0.18	0.073	I O	|	|	|	0.75
53.333	0.00	0.18	0.072	I O	|	|	|	0.74
53.417	0.00	0.18	0.070	I O	|	|	|	0.73
53.500	0.00	0.18	0.069	I O	|	|	|	0.72
53.583	0.00	0.18	0.068	I O	|	|	|	0.71
53.667	0.00	0.18	0.067	I O	|	|	|	0.70
53.750	0.00	0.18	0.065	I O	|	|	|	0.69
53.833	0.00	0.18	0.064	I O	|	|	|	0.68
53.917	0.00	0.17	0.063	I O	|	|	|	0.67
54.000	0.00	0.17	0.062	I O	|	|	|	0.67
54.083	0.00	0.17	0.061	I O	|	|	|	0.66
54.167	0.00	0.17	0.059	IO	|	|	|	0.65
54.250	0.00	0.17	0.058	IO	|	|	|	0.64
54.333	0.00	0.17	0.057	IO	|	|	|	0.63
54.417	0.00	0.17	0.056	IO	|	|	|	0.62
54.500	0.00	0.17	0.055	IO	|	|	|	0.61
54.583	0.00	0.16	0.054	IO	|	|	|	0.61
54.667	0.00	0.16	0.053	IO	|	|	|	0.60
54.750	0.00	0.16	0.051	IO	|	|	|	0.59
54.833	0.00	0.16	0.050	IO	|	|	|	0.58
54.917	0.00	0.16	0.049	IO	|	|	|	0.57
55.000	0.00	0.16	0.048	IO	|	|	|	0.57
55.083	0.00	0.16	0.047	IO	|	|	|	0.56
55.167	0.00	0.16	0.046	IO	|	|	|	0.55
55.250	0.00	0.16	0.045	IO	|	|	|	0.54
55.333	0.00	0.15	0.044	IO	|	|	|	0.53
55.417	0.00	0.15	0.043	IO	|	|	|	0.53
55.500	0.00	0.15	0.042	IO	|	|	|	0.52
55.583	0.00	0.15	0.041	IO	|	|	|	0.51
55.667	0.00	0.15	0.040	IO	|	|	|	0.50
55.750	0.00	0.15	0.039	IO	|	|	|	0.49

55.833	0.00	0.14	0.038	IO	|	|	|	|	0.48
55.917	0.00	0.14	0.037	IO	|	|	|	|	0.47
56.000	0.00	0.13	0.036	IO	|	|	|	|	0.46
56.083	0.00	0.13	0.035	IO	|	|	|	|	0.44
56.167	0.00	0.13	0.034	IO	|	|	|	|	0.43
56.250	0.00	0.12	0.033	IO	|	|	|	|	0.42
56.333	0.00	0.12	0.032	IO	|	|	|	|	0.41
56.417	0.00	0.11	0.031	IO	|	|	|	|	0.40
56.500	0.00	0.11	0.031	IO	|	|	|	|	0.39
56.583	0.00	0.11	0.030	IO	|	|	|	|	0.38
56.667	0.00	0.10	0.029	IO	|	|	|	|	0.37
56.750	0.00	0.10	0.028	IO	|	|	|	|	0.36
56.833	0.00	0.10	0.028	IO	|	|	|	|	0.35
56.917	0.00	0.09	0.027	IO	|	|	|	|	0.34
57.000	0.00	0.09	0.026	IO	|	|	|	|	0.34
57.083	0.00	0.09	0.026	IO	|	|	|	|	0.33
57.167	0.00	0.09	0.025	O	|	|	|	|	0.32
57.250	0.00	0.08	0.025	O	|	|	|	|	0.31
57.333	0.00	0.08	0.024	O	|	|	|	|	0.31
57.417	0.00	0.08	0.024	O	|	|	|	|	0.30
57.500	0.00	0.08	0.023	O	|	|	|	|	0.29
57.583	0.00	0.07	0.022	O	|	|	|	|	0.28
57.667	0.00	0.07	0.022	O	|	|	|	|	0.28
57.750	0.00	0.07	0.021	O	|	|	|	|	0.27
57.833	0.00	0.07	0.021	O	|	|	|	|	0.27
57.917	0.00	0.06	0.021	O	|	|	|	|	0.26
58.000	0.00	0.06	0.020	O	|	|	|	|	0.25
58.083	0.00	0.06	0.020	O	|	|	|	|	0.25
58.167	0.00	0.06	0.019	O	|	|	|	|	0.24
58.250	0.00	0.06	0.019	O	|	|	|	|	0.24
58.333	0.00	0.05	0.019	O	|	|	|	|	0.23
58.417	0.00	0.05	0.018	O	|	|	|	|	0.23
58.500	0.00	0.05	0.018	O	|	|	|	|	0.22
58.583	0.00	0.05	0.017	O	|	|	|	|	0.22
58.667	0.00	0.05	0.017	O	|	|	|	|	0.21
58.750	0.00	0.05	0.017	O	|	|	|	|	0.21
58.833	0.00	0.05	0.016	O	|	|	|	|	0.21
58.917	0.00	0.04	0.016	O	|	|	|	|	0.20
59.000	0.00	0.04	0.016	O	|	|	|	|	0.20
59.083	0.00	0.04	0.016	O	|	|	|	|	0.19
59.167	0.00	0.04	0.015	O	|	|	|	|	0.19
59.250	0.00	0.04	0.015	O	|	|	|	|	0.19
59.333	0.00	0.04	0.015	O	|	|	|	|	0.18
59.417	0.00	0.04	0.015	O	|	|	|	|	0.18
59.500	0.00	0.03	0.014	O	|	|	|	|	0.18
59.583	0.00	0.03	0.014	O	|	|	|	|	0.17
59.667	0.00	0.03	0.014	O	|	|	|	|	0.17
59.750	0.00	0.03	0.014	O	|	|	|	|	0.17
59.833	0.00	0.03	0.013	O	|	|	|	|	0.17
59.917	0.00	0.03	0.013	O	|	|	|	|	0.16
60.000	0.00	0.03	0.013	O	|	|	|	|	0.16
60.083	0.00	0.03	0.013	O	|	|	|	|	0.16
60.167	0.00	0.03	0.013	O	|	|	|	|	0.16
60.250	0.00	0.03	0.012	O	|	|	|	|	0.15
60.333	0.00	0.03	0.012	O	|	|	|	|	0.15
60.417	0.00	0.02	0.012	O	|	|	|	|	0.15
60.500	0.00	0.02	0.012	O	|	|	|	|	0.15
60.583	0.00	0.02	0.012	O	|	|	|	|	0.14
60.667	0.00	0.02	0.012	O	|	|	|	|	0.14
60.750	0.00	0.02	0.011	O	|	|	|	|	0.14
60.833	0.00	0.02	0.011	O	|	|	|	|	0.14
60.917	0.00	0.02	0.011	O	|	|	|	|	0.14
61.000	0.00	0.02	0.011	O	|	|	|	|	0.14
61.083	0.00	0.02	0.011	O	|	|	|	|	0.13
61.167	0.00	0.02	0.011	O	|	|	|	|	0.13
61.250	0.00	0.02	0.011	O	|	|	|	|	0.13
61.333	0.00	0.02	0.010	O	|	|	|	|	0.13
61.417	0.00	0.02	0.010	O	|	|	|	|	0.13
61.500	0.00	0.02	0.010	O	|	|	|	|	0.13
61.583	0.00	0.02	0.010	O	|	|	|	|	0.12
61.667	0.00	0.02	0.010	O	|	|	|	|	0.12
61.750	0.00	0.01	0.010	O	|	|	|	|	0.12
61.833	0.00	0.01	0.010	O	|	|	|	|	0.12
61.917	0.00	0.01	0.010	O	|	|	|	|	0.12
62.000	0.00	0.01	0.010	O	|	|	|	|	0.12

62.083	0.00	0.01	0.010	o	|	|	|	|	0.12
62.167	0.00	0.01	0.009	o	|	|	|	|	0.12
62.250	0.00	0.01	0.009	o	|	|	|	|	0.11
62.333	0.00	0.01	0.009	o	|	|	|	|	0.11
62.417	0.00	0.01	0.009	o	|	|	|	|	0.11
62.500	0.00	0.01	0.009	o	|	|	|	|	0.11
62.583	0.00	0.01	0.009	o	|	|	|	|	0.11
62.667	0.00	0.01	0.009	o	|	|	|	|	0.11
62.750	0.00	0.01	0.009	o	|	|	|	|	0.11
62.833	0.00	0.01	0.009	o	|	|	|	|	0.11
62.917	0.00	0.01	0.009	o	|	|	|	|	0.11
63.000	0.00	0.01	0.009	o	|	|	|	|	0.11
63.083	0.00	0.01	0.009	o	|	|	|	|	0.10
63.167	0.00	0.01	0.009	o	|	|	|	|	0.10
63.250	0.00	0.01	0.009	o	|	|	|	|	0.10
63.333	0.00	0.01	0.009	o	|	|	|	|	0.10
63.417	0.00	0.01	0.008	o	|	|	|	|	0.10
63.500	0.00	0.01	0.008	o	|	|	|	|	0.10
63.583	0.00	0.01	0.008	o	|	|	|	|	0.10
63.667	0.00	0.01	0.008	o	|	|	|	|	0.10
63.750	0.00	0.01	0.008	o	|	|	|	|	0.10
63.833	0.00	0.01	0.008	o	|	|	|	|	0.10
63.917	0.00	0.01	0.008	o	|	|	|	|	0.10
64.000	0.00	0.01	0.008	o	|	|	|	|	0.10
64.083	0.00	0.01	0.008	o	|	|	|	|	0.10
64.167	0.00	0.01	0.008	o	|	|	|	|	0.10
64.250	0.00	0.01	0.008	o	|	|	|	|	0.10
64.333	0.00	0.01	0.008	o	|	|	|	|	0.10
64.417	0.00	0.01	0.008	o	|	|	|	|	0.09
64.500	0.00	0.01	0.008	o	|	|	|	|	0.09
64.583	0.00	0.00	0.008	o	|	|	|	|	0.09
64.667	0.00	0.00	0.008	o	|	|	|	|	0.09
64.750	0.00	0.00	0.008	o	|	|	|	|	0.09
64.833	0.00	0.00	0.008	o	|	|	|	|	0.09
64.917	0.00	0.00	0.008	o	|	|	|	|	0.09
65.000	0.00	0.00	0.008	o	|	|	|	|	0.09
65.083	0.00	0.00	0.008	o	|	|	|	|	0.09
65.167	0.00	0.00	0.008	o	|	|	|	|	0.09
65.250	0.00	0.00	0.008	o	|	|	|	|	0.09
65.333	0.00	0.00	0.008	o	|	|	|	|	0.09
65.417	0.00	0.00	0.008	o	|	|	|	|	0.09
65.500	0.00	0.00	0.008	o	|	|	|	|	0.09
65.583	0.00	0.00	0.008	o	|	|	|	|	0.09
65.667	0.00	0.00	0.007	o	|	|	|	|	0.09
65.750	0.00	0.00	0.007	o	|	|	|	|	0.09
65.833	0.00	0.00	0.007	o	|	|	|	|	0.09
65.917	0.00	0.00	0.007	o	|	|	|	|	0.09
66.000	0.00	0.00	0.007	o	|	|	|	|	0.09
66.083	0.00	0.00	0.007	o	|	|	|	|	0.09
66.167	0.00	0.00	0.007	o	|	|	|	|	0.09
66.250	0.00	0.00	0.007	o	|	|	|	|	0.09
66.333	0.00	0.00	0.007	o	|	|	|	|	0.09
66.417	0.00	0.00	0.007	o	|	|	|	|	0.09
66.500	0.00	0.00	0.007	o	|	|	|	|	0.09
66.583	0.00	0.00	0.007	o	|	|	|	|	0.09
66.667	0.00	0.00	0.007	o	|	|	|	|	0.09
66.750	0.00	0.00	0.007	o	|	|	|	|	0.09
66.833	0.00	0.00	0.007	o	|	|	|	|	0.09
66.917	0.00	0.00	0.007	o	|	|	|	|	0.09
67.000	0.00	0.00	0.007	o	|	|	|	|	0.09
67.083	0.00	0.00	0.007	o	|	|	|	|	0.09
67.167	0.00	0.00	0.007	o	|	|	|	|	0.09
67.250	0.00	0.00	0.007	o	|	|	|	|	0.09
67.333	0.00	0.00	0.007	o	|	|	|	|	0.08
67.417	0.00	0.00	0.007	o	|	|	|	|	0.08
67.500	0.00	0.00	0.007	o	|	|	|	|	0.08
67.583	0.00	0.00	0.007	o	|	|	|	|	0.08
67.667	0.00	0.00	0.007	o	|	|	|	|	0.08
67.750	0.00	0.00	0.007	o	|	|	|	|	0.08
67.833	0.00	0.00	0.007	o	|	|	|	|	0.08
67.917	0.00	0.00	0.007	o	|	|	|	|	0.08
68.000	0.00	0.00	0.007	o	|	|	|	|	0.08
68.083	0.00	0.00	0.007	o	|	|	|	|	0.08
68.167	0.00	0.00	0.007	o	|	|	|	|	0.08
68.250	0.00	0.00	0.007	o	|	|	|	|	0.08

68.333	0.00	0.00	0.007	o	|	|	|	0.08
68.417	0.00	0.00	0.007	o	|	|	|	0.08
68.500	0.00	0.00	0.007	o	|	|	|	0.08
68.583	0.00	0.00	0.007	o	|	|	|	0.08
68.667	0.00	0.00	0.007	o	|	|	|	0.08
68.750	0.00	0.00	0.007	o	|	|	|	0.08

Remaining water in basin = 0.01 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 825
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.543 (CFS)
Total volume = 1.666 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV BLDG B AREA 7
2 YR 24 HR STORM EVENT
21-0034
2021-11-24 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR7B242.rte
**********HYDROGRAPH DATA**********
Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.796 (CFS)
Total volume = 1.700 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 294
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

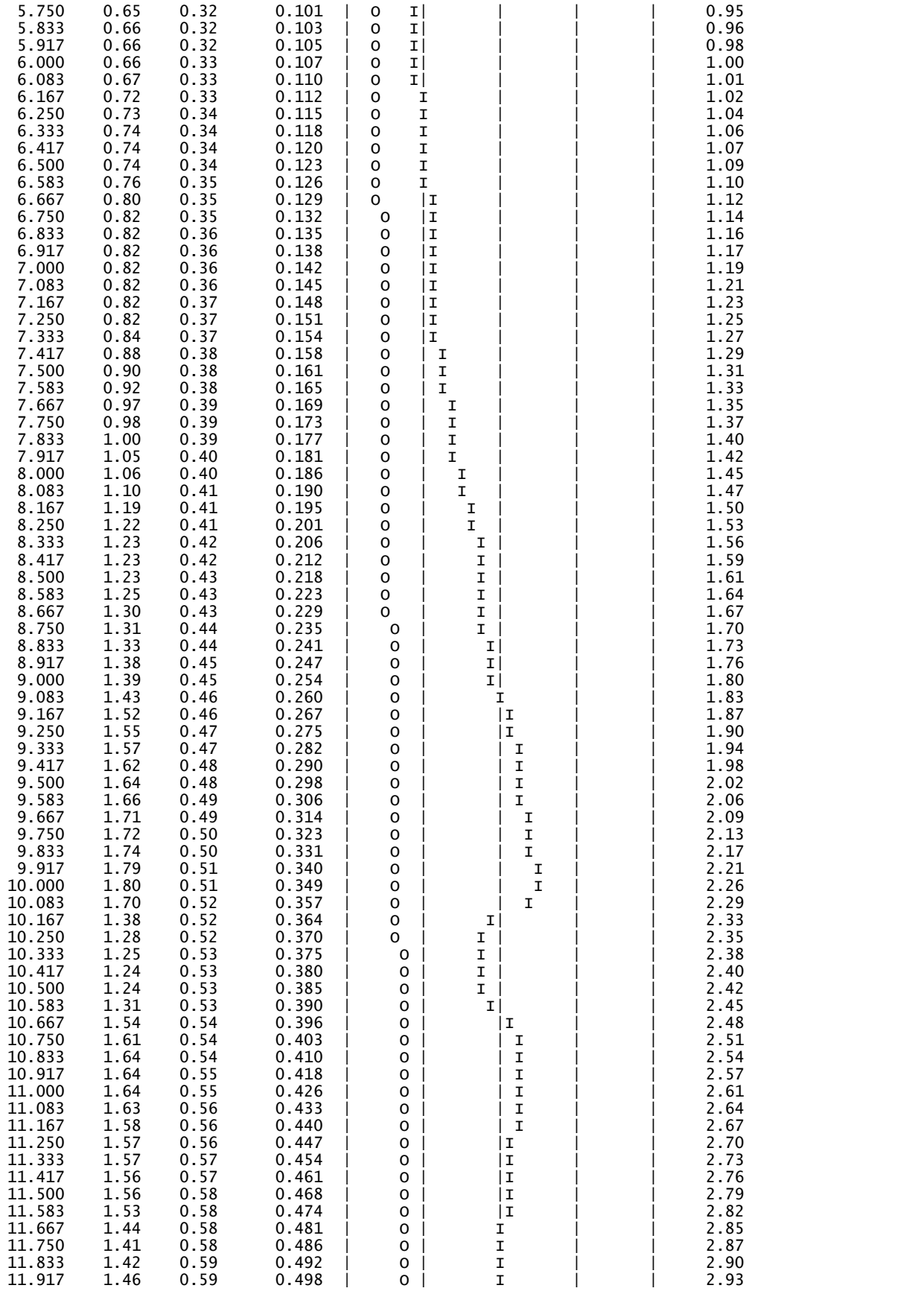
Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.146	0.011	0.001	0.011	0.011
0.500	0.039	0.210	0.038	0.040
1.000	0.108	0.330	0.107	0.109
1.500	0.195	0.410	0.194	0.196
2.000	0.294	0.480	0.292	0.296
2.500	0.401	0.540	0.399	0.403
3.000	0.515	0.600	0.513	0.517
3.500	0.632	0.650	0.630	0.634
4.000	0.751	0.690	0.749	0.753
4.500	0.870	0.740	0.867	0.873
5.000	0.988	0.780	0.985	0.991
5.500	1.101	0.820	1.098	1.104
6.000	1.209	0.860	1.206	1.212
6.500	1.307	0.890	1.304	1.310
7.000	1.394	0.930	1.391	1.397
7.500	1.463	0.960	1.460	1.466
8.000	1.502	0.990	1.499	1.505

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 0.7 1.40 2.10 2.80	Depth (Ft.)
0.083	0.03	0.00	0.000	O	0.00
0.167	0.12	0.00	0.001	OI	0.01
0.250	0.15	0.00	0.002	OI	0.02
0.333	0.18	0.00	0.003	O I	0.04
0.417	0.22	0.00	0.004	O I	0.05
0.500	0.24	0.00	0.006	O I	0.08
0.583	0.24	0.00	0.007	O I	0.10
0.667	0.25	0.00	0.009	O I	0.12
0.750	0.25	0.00	0.011	O I	0.14
0.833	0.26	0.01	0.012	O I	0.16
0.917	0.31	0.03	0.014	O I	0.19
1.000	0.32	0.04	0.016	O I	0.21
1.083	0.31	0.05	0.018	O I	0.24
1.167	0.27	0.07	0.020	O I	0.26
1.250	0.25	0.08	0.021	O I	0.27
1.333	0.25	0.08	0.022	O I	0.29
1.417	0.25	0.09	0.023	|OI	0.30
1.500	0.25	0.10	0.024	|OI	0.31
1.583	0.25	0.11	0.025	|OI	0.33
1.667	0.25	0.11	0.026	|OI	0.34
1.750	0.25	0.12	0.027	|OI	0.35
1.833	0.26	0.13	0.028	|O I	0.36
1.917	0.31	0.14	0.029	|O I	0.37
2.000	0.32	0.14	0.030	|O I	0.39
2.083	0.33	0.15	0.031	|O I	0.40
2.167	0.33	0.16	0.033	|O I	0.42
2.250	0.33	0.17	0.034	|O I	0.43
2.333	0.33	0.18	0.035	| OI	0.45
2.417	0.33	0.19	0.036	| OI	0.46
2.500	0.33	0.19	0.037	| OI	0.47
2.583	0.34	0.20	0.038	| OI	0.48
2.667	0.39	0.21	0.039	| O I	0.50
2.750	0.40	0.21	0.040	| O I	0.51
2.833	0.41	0.21	0.041	| O I	0.52
2.917	0.41	0.22	0.043	| O I	0.53
3.000	0.41	0.22	0.044	| O I	0.54
3.083	0.41	0.22	0.045	| O I	0.55
3.167	0.41	0.22	0.047	| O I	0.56
3.250	0.41	0.23	0.048	| O I	0.57
3.333	0.41	0.23	0.049	| O I	0.57
3.417	0.41	0.23	0.051	| O I	0.58
3.500	0.41	0.23	0.052	| O I	0.59
3.583	0.41	0.23	0.053	| O I	0.60
3.667	0.41	0.24	0.054	| O I	0.61
3.750	0.41	0.24	0.055	| O I	0.62
3.833	0.43	0.24	0.057	| O I	0.63
3.917	0.47	0.24	0.058	| O I	0.64
4.000	0.49	0.25	0.060	| O I	0.65
4.083	0.49	0.25	0.061	| O I	0.66
4.167	0.49	0.25	0.063	| O I	0.67
4.250	0.49	0.25	0.065	| O I	0.69
4.333	0.51	0.26	0.066	| O I	0.70
4.417	0.56	0.26	0.068	| O I	0.71
4.500	0.57	0.26	0.070	| O I	0.73
4.583	0.57	0.27	0.072	| O I	0.74
4.667	0.58	0.27	0.075	| O I	0.76
4.750	0.58	0.28	0.077	| O I	0.77
4.833	0.59	0.28	0.079	| O I	0.79
4.917	0.64	0.28	0.081	| O I	0.80
5.000	0.65	0.29	0.084	| O I	0.82
5.083	0.62	0.29	0.086	| O I	0.84
5.167	0.53	0.30	0.088	| O I	0.85
5.250	0.51	0.30	0.089	| O I	0.87
5.333	0.51	0.30	0.091	| O I	0.88
5.417	0.56	0.30	0.093	| O I	0.89
5.500	0.57	0.31	0.094	| O I	0.90
5.583	0.59	0.31	0.096	| O I	0.91
5.667	0.64	0.31	0.098	| O I	0.93



12.000	1.47	0.59	0.504	| o |	I |	|	|	2.95
12.083	1.59	0.60	0.511	| o |	| I |	|	|	2.98
12.167	1.91	0.60	0.518	| o |	| I |	|	|	3.01
12.250	2.01	0.61	0.528	| o |	| I |	|	|	3.05
12.333	2.06	0.61	0.538	| o |	| I|	|	|	3.10
12.417	2.11	0.61	0.548	| o|	| I |	|	|	3.14
12.500	2.13	0.62	0.558	| o|	| I |	|	|	3.18
12.583	2.17	0.62	0.569	| o|	| I |	|	|	3.23
12.667	2.26	0.63	0.580	| o|	| |I |	|	|	3.28
12.750	2.29	0.63	0.591	| o|	| | I |	|	|	3.32
12.833	2.32	0.64	0.602	| o|	| | I |	|	|	3.37
12.917	2.36	0.64	0.614	| o|	| | | I |	|	|	3.42
13.000	2.38	0.65	0.626	| o|	| | | I |	|	|	3.47
13.083	2.46	0.65	0.638	| o|	| | | | I |	|	|	3.53
13.167	2.69	0.66	0.651	| o|	| | | | | I |	|	|	3.58
13.250	2.76	0.66	0.666	| o|	| | | | | | I|	|	|	3.64
13.333	2.79	0.67	0.680	| o|	| | | | | | I|	|	|	3.70
13.417	2.79	0.67	0.695	| o|	| | | | | | I|	|	|	3.76
13.500	2.80	0.68	0.710	| o|	| | | | | | | I	|	|	3.83
13.583	2.62	0.68	0.724	| o|	| | | | | | I |	|	|	3.88
13.667	2.12	0.68	0.735	| o|	| | | | I |	|	|	3.93
13.750	1.97	0.69	0.744	| o|	| | | I |	|	|	3.97
13.833	1.91	0.69	0.753	| o|	| | I |	|	|	4.01
13.917	1.90	0.69	0.761	| o|	| | I |	|	|	4.04
14.000	1.89	0.70	0.770	| o|	| | I |	|	|	4.08
14.083	1.96	0.70	0.778	| o	| | I |	|	|	4.11
14.167	2.14	0.71	0.787	| o	| | | I |	|	|	4.15
14.250	2.19	0.71	0.797	| o	| | | |I |	|	|	4.20
14.333	2.20	0.71	0.808	| o	| | | |I |	|	|	4.24
14.417	2.16	0.72	0.818	| o	| | | I |	|	|	4.28
14.500	2.15	0.72	0.828	| o	| | | I |	|	|	4.32
14.583	2.14	0.73	0.837	| o	| | | I |	|	|	4.36
14.667	2.14	0.73	0.847	| o	| | | I |	|	|	4.40
14.750	2.14	0.73	0.857	| o	| | | I |	|	|	4.44
14.833	2.12	0.74	0.866	| o	| | | I |	|	|	4.48
14.917	2.08	0.74	0.876	| o	| | | I|	|	|	4.52
15.000	2.06	0.75	0.885	| o	| | | I|	|	|	4.56
15.083	2.04	0.75	0.894	| o	| | | I|	|	|	4.60
15.167	2.00	0.75	0.903	| o	| | I |	|	|	4.64
15.250	1.98	0.75	0.911	| o	| | I |	|	|	4.67
15.333	1.96	0.76	0.920	| o	| | I |	|	|	4.71
15.417	1.91	0.76	0.928	| o	| | I |	|	|	4.74
15.500	1.90	0.76	0.936	| o	| | I |	|	|	4.78
15.583	1.83	0.76	0.943	| o	| | I |	|	|	4.81
15.667	1.65	0.77	0.950	| o	| | I |	|	|	4.84
15.750	1.59	0.77	0.956	| o	| | I |	|	|	4.86
15.833	1.57	0.77	0.961	| o	| |I |	|	|	4.89
15.917	1.57	0.77	0.967	| o	| |I |	|	|	4.91
16.000	1.56	0.77	0.972	| o	| |I |	|	|	4.93
16.083	1.33	0.78	0.977	| o	| I| |	|	|	4.95
16.167	0.63	0.78	0.978	| Io	| |	|	|	4.96
16.250	0.43	0.78	0.977	| I o	| |	|	|	4.95
16.333	0.36	0.78	0.974	| I o	| |	|	|	4.94
16.417	0.34	0.77	0.971	| I o	| |	|	|	4.93
16.500	0.33	0.77	0.968	| I o	| |	|	|	4.92
16.583	0.31	0.77	0.965	| I o	| |	|	|	4.90
16.667	0.27	0.77	0.962	| I o	| |	|	|	4.89
16.750	0.25	0.77	0.958	| I o	| |	|	|	4.87
16.833	0.25	0.77	0.955	| I o	| |	|	|	4.86
16.917	0.25	0.77	0.951	| I o	| |	|	|	4.84
17.000	0.25	0.77	0.947	| I o	| |	|	|	4.83
17.083	0.28	0.77	0.944	| I o	| |	|	|	4.81
17.167	0.37	0.76	0.941	| I o	| |	|	|	4.80
17.250	0.40	0.76	0.938	| I o	| |	|	|	4.79
17.333	0.41	0.76	0.936	| I o	| |	|	|	4.78
17.417	0.41	0.76	0.933	| I o	| |	|	|	4.77
17.500	0.41	0.76	0.931	| I o	| |	|	|	4.76
17.583	0.41	0.76	0.929	| I o	| |	|	|	4.75
17.667	0.41	0.76	0.926	| I o	| |	|	|	4.74
17.750	0.41	0.76	0.924	| I o	| |	|	|	4.73
17.833	0.40	0.76	0.921	| I o	| |	|	|	4.72
17.917	0.35	0.76	0.919	| I o	| |	|	|	4.71
18.000	0.34	0.76	0.916	| I o	| |	|	|	4.69
18.083	0.33	0.75	0.913	| I o	| |	|	|	4.68
18.167	0.33	0.75	0.910	| I o	| |	|	|	4.67

18.250	0.33	0.75	0.907	| I o	|	|	|	4.66
18.333	0.33	0.75	0.904	| I o	|	|	|	4.64
18.417	0.33	0.75	0.901	| I o	|	|	|	4.63
18.500	0.33	0.75	0.898	| I o	|	|	|	4.62
18.583	0.31	0.75	0.895	| I o	|	|	|	4.61
18.667	0.27	0.75	0.892	| I o	|	|	|	4.59
18.750	0.25	0.75	0.889	| I o	|	|	|	4.58
18.833	0.23	0.75	0.885	| I o	|	|	|	4.57
18.917	0.19	0.74	0.882	| I o	|	|	|	4.55
19.000	0.17	0.74	0.878	|I o	|	|	|	4.53
19.083	0.18	0.74	0.874	| I o	|	|	|	4.52
19.167	0.23	0.74	0.870	| I o	|	|	|	4.50
19.250	0.24	0.74	0.867	| I o	|	|	|	4.49
19.333	0.26	0.74	0.863	| I o	|	|	|	4.47
19.417	0.31	0.74	0.860	| I o	|	|	|	4.46
19.500	0.32	0.73	0.857	| I o	|	|	|	4.45
19.583	0.31	0.73	0.855	| I o	|	|	|	4.44
19.667	0.27	0.73	0.852	| I o	|	|	|	4.42
19.750	0.25	0.73	0.848	| I o	|	|	|	4.41
19.833	0.23	0.73	0.845	| I o	|	|	|	4.39
19.917	0.19	0.73	0.841	| I o	|	|	|	4.38
20.000	0.17	0.73	0.838	|I o	|	|	|	4.36
20.083	0.18	0.72	0.834	| I o	|	|	|	4.35
20.167	0.23	0.72	0.830	| I o	|	|	|	4.33
20.250	0.24	0.72	0.827	| I o	|	|	|	4.32
20.333	0.24	0.72	0.824	| I o	|	|	|	4.30
20.417	0.25	0.72	0.820	| I o	|	|	|	4.29
20.500	0.25	0.72	0.817	| I o	|	|	|	4.28
20.583	0.25	0.72	0.814	| I o	|	|	|	4.26
20.667	0.25	0.72	0.811	| I o	|	|	|	4.25
20.750	0.25	0.71	0.807	| I o	|	|	|	4.24
20.833	0.23	0.71	0.804	| I o	|	|	|	4.22
20.917	0.18	0.71	0.801	| I o	|	|	|	4.21
21.000	0.17	0.71	0.797	|I o	|	|	|	4.19
21.083	0.18	0.71	0.793	| I o	|	|	|	4.18
21.167	0.23	0.71	0.790	| I o	|	|	|	4.16
21.250	0.24	0.70	0.787	| I o	|	|	|	4.15
21.333	0.23	0.70	0.783	| I o	|	|	|	4.14
21.417	0.18	0.70	0.780	| I o	|	|	|	4.12
21.500	0.17	0.70	0.776	|I o	|	|	|	4.11
21.583	0.18	0.70	0.773	| I o	|	|	|	4.09
21.667	0.23	0.70	0.769	| I o|	|	|	|	4.08
21.750	0.24	0.70	0.766	| I o|	|	|	|	4.06
21.833	0.23	0.70	0.763	| I o|	|	|	|	4.05
21.917	0.18	0.69	0.760	| I o|	|	|	|	4.04
22.000	0.17	0.69	0.756	|I o|	|	|	|	4.02
22.083	0.18	0.69	0.752	| I o|	|	|	|	4.01
22.167	0.23	0.69	0.749	| I o|	|	|	|	3.99
22.250	0.24	0.69	0.746	| I o|	|	|	|	3.98
22.333	0.23	0.69	0.743	| I o|	|	|	|	3.97
22.417	0.18	0.69	0.740	| I o|	|	|	|	3.95
22.500	0.17	0.68	0.736	|I o|	|	|	|	3.94
22.583	0.17	0.68	0.733	|I o|	|	|	|	3.92
22.667	0.17	0.68	0.729	|I o|	|	|	|	3.91
22.750	0.16	0.68	0.725	|I o|	|	|	|	3.89
22.833	0.16	0.68	0.722	|I o|	|	|	|	3.88
22.917	0.16	0.68	0.718	|I o|	|	|	|	3.86
23.000	0.16	0.68	0.715	|I o|	|	|	|	3.85
23.083	0.16	0.68	0.711	|I o|	|	|	|	3.83
23.167	0.16	0.68	0.708	|I o|	|	|	|	3.82
23.250	0.16	0.67	0.704	|I o|	|	|	|	3.80
23.333	0.16	0.67	0.701	|I o|	|	|	|	3.79
23.417	0.16	0.67	0.697	|I o|	|	|	|	3.77
23.500	0.16	0.67	0.694	|I o|	|	|	|	3.76
23.583	0.16	0.67	0.690	|I o|	|	|	|	3.74
23.667	0.16	0.67	0.687	|I o|	|	|	|	3.73
23.750	0.16	0.67	0.683	|I o|	|	|	|	3.72
23.833	0.16	0.67	0.680	|I o|	|	|	|	3.70
23.917	0.16	0.66	0.676	|I o|	|	|	|	3.69
24.000	0.16	0.66	0.673	|I o|	|	|	|	3.67
24.083	0.13	0.66	0.669	|I o|	|	|	|	3.66
24.167	0.04	0.66	0.665	I o|	|	|	|	3.64
24.250	0.01	0.66	0.661	I o|	|	|	|	3.62
24.333	0.00	0.66	0.657	I o|	|	|	|	3.60
24.417	0.00	0.66	0.652	I o|	|	|	|	3.58

24.500	0.00	0.66	0.648	I	o	|	|	|	3.57
24.583	0.00	0.65	0.643	I	o	|	|	|	3.55
24.667	0.00	0.65	0.639	I	o	|	|	|	3.53
24.750	0.00	0.65	0.634	I	o	|	|	|	3.51
24.833	0.00	0.65	0.630	I	o	|	|	|	3.49
24.917	0.00	0.65	0.625	I	o	|	|	|	3.47
25.000	0.00	0.65	0.621	I	o	|	|	|	3.45
25.083	0.00	0.64	0.616	I	o	|	|	|	3.43
25.167	0.00	0.64	0.612	I	o	|	|	|	3.41
25.250	0.00	0.64	0.607	I	o	|	|	|	3.40
25.333	0.00	0.64	0.603	I	o	|	|	|	3.38
25.417	0.00	0.64	0.599	I	o	|	|	|	3.36
25.500	0.00	0.63	0.594	I	o	|	|	|	3.34
25.583	0.00	0.63	0.590	I	o	|	|	|	3.32
25.667	0.00	0.63	0.586	I	o	|	|	|	3.30
25.750	0.00	0.63	0.581	I	o	|	|	|	3.28
25.833	0.00	0.63	0.577	I	o	|	|	|	3.26
25.917	0.00	0.62	0.573	I	o	|	|	|	3.25
26.000	0.00	0.62	0.568	I	o	|	|	|	3.23
26.083	0.00	0.62	0.564	I	o	|	|	|	3.21
26.167	0.00	0.62	0.560	I	o	|	|	|	3.19
26.250	0.00	0.62	0.556	I	o	|	|	|	3.17
26.333	0.00	0.62	0.551	I	o	|	|	|	3.15
26.417	0.00	0.61	0.547	I	o	|	|	|	3.14
26.500	0.00	0.61	0.543	I	o	|	|	|	3.12
26.583	0.00	0.61	0.539	I	o	|	|	|	3.10
26.667	0.00	0.61	0.534	I	o	|	|	|	3.08
26.750	0.00	0.61	0.530	I	o	|	|	|	3.07
26.833	0.00	0.60	0.526	I	o	|	|	|	3.05
26.917	0.00	0.60	0.522	I	o	|	|	|	3.03
27.000	0.00	0.60	0.518	I	o	|	|	|	3.01
27.083	0.00	0.60	0.514	I	o	|	|	|	2.99
27.167	0.00	0.60	0.509	I	o	|	|	|	2.98
27.250	0.00	0.59	0.505	I	o	|	|	|	2.96
27.333	0.00	0.59	0.501	I	o	|	|	|	2.94
27.417	0.00	0.59	0.497	I	o	|	|	|	2.92
27.500	0.00	0.59	0.493	I	o	|	|	|	2.90
27.583	0.00	0.59	0.489	I	o	|	|	|	2.89
27.667	0.00	0.58	0.485	I	o	|	|	|	2.87
27.750	0.00	0.58	0.481	I	o	|	|	|	2.85
27.833	0.00	0.58	0.477	I	o	|	|	|	2.83
27.917	0.00	0.58	0.473	I	o	|	|	|	2.82
28.000	0.00	0.58	0.469	I	o	|	|	|	2.80
28.083	0.00	0.57	0.465	I	o	|	|	|	2.78
28.167	0.00	0.57	0.461	I	o	|	|	|	2.76
28.250	0.00	0.57	0.457	I	o	|	|	|	2.75
28.333	0.00	0.57	0.453	I	o	|	|	|	2.73
28.417	0.00	0.57	0.449	I	o	|	|	|	2.71
28.500	0.00	0.56	0.446	I	o	|	|	|	2.70
28.583	0.00	0.56	0.442	I	o	|	|	|	2.68
28.667	0.00	0.56	0.438	I	o	|	|	|	2.66
28.750	0.00	0.56	0.434	I	o	|	|	|	2.64
28.833	0.00	0.56	0.430	I	o	|	|	|	2.63
28.917	0.00	0.55	0.426	I	o	|	|	|	2.61
29.000	0.00	0.55	0.423	I	o	|	|	|	2.59
29.083	0.00	0.55	0.419	I	o	|	|	|	2.58
29.167	0.00	0.55	0.415	I	o	|	|	|	2.56
29.250	0.00	0.55	0.411	I	o	|	|	|	2.54
29.333	0.00	0.54	0.407	I	o	|	|	|	2.53
29.417	0.00	0.54	0.404	I	o	|	|	|	2.51
29.500	0.00	0.54	0.400	I	o	|	|	|	2.50
29.583	0.00	0.54	0.396	I	o	|	|	|	2.48
29.667	0.00	0.54	0.393	I	o	|	|	|	2.46
29.750	0.00	0.53	0.389	I	o	|	|	|	2.44
29.833	0.00	0.53	0.385	I	o	|	|	|	2.43
29.917	0.00	0.53	0.382	I	o	|	|	|	2.41
30.000	0.00	0.53	0.378	I	o	|	|	|	2.39
30.083	0.00	0.53	0.374	I	o	|	|	|	2.38
30.167	0.00	0.52	0.371	I	o	|	|	|	2.36
30.250	0.00	0.52	0.367	I	o	|	|	|	2.34
30.333	0.00	0.52	0.364	I	o	|	|	|	2.33
30.417	0.00	0.52	0.360	I	o	|	|	|	2.31
30.500	0.00	0.52	0.356	I	o	|	|	|	2.29
30.583	0.00	0.51	0.353	I	o	|	|	|	2.28
30.667	0.00	0.51	0.349	I	o	|	|	|	2.26

30.750	0.00	0.51	0.346	I	o	|	|	|	2.24
30.833	0.00	0.51	0.342	I	o	|	|	|	2.23
30.917	0.00	0.51	0.339	I	o	|	|	|	2.21
31.000	0.00	0.50	0.335	I	o	|	|	|	2.19
31.083	0.00	0.50	0.332	I	o	|	|	|	2.18
31.167	0.00	0.50	0.328	I	o	|	|	|	2.16
31.250	0.00	0.50	0.325	I	o	|	|	|	2.15
31.333	0.00	0.50	0.322	I	o	|	|	|	2.13
31.417	0.00	0.49	0.318	I	o	|	|	|	2.11
31.500	0.00	0.49	0.315	I	o	|	|	|	2.10
31.583	0.00	0.49	0.311	I	o	|	|	|	2.08
31.667	0.00	0.49	0.308	I	o	|	|	|	2.07
31.750	0.00	0.49	0.305	I	o	|	|	|	2.05
31.833	0.00	0.48	0.301	I	o	|	|	|	2.03
31.917	0.00	0.48	0.298	I	o	|	|	|	2.02
32.000	0.00	0.48	0.295	I	o	|	|	|	2.00
32.083	0.00	0.48	0.291	I	o	|	|	|	1.99
32.167	0.00	0.48	0.288	I	o	|	|	|	1.97
32.250	0.00	0.47	0.285	I	o	|	|	|	1.95
32.333	0.00	0.47	0.282	I	o	|	|	|	1.94
32.417	0.00	0.47	0.278	I	o	|	|	|	1.92
32.500	0.00	0.47	0.275	I	o	|	|	|	1.90
32.583	0.00	0.46	0.272	I	o	|	|	|	1.89
32.667	0.00	0.46	0.269	I	o	|	|	|	1.87
32.750	0.00	0.46	0.266	I	o	|	|	|	1.86
32.833	0.00	0.46	0.262	I	o	|	|	|	1.84
32.917	0.00	0.46	0.259	I	o	|	|	|	1.82
33.000	0.00	0.45	0.256	I	o	|	|	|	1.81
33.083	0.00	0.45	0.253	I	o	|	|	|	1.79
33.167	0.00	0.45	0.250	I	o	|	|	|	1.78
33.250	0.00	0.45	0.247	I	o	|	|	|	1.76
33.333	0.00	0.44	0.244	I	o	|	|	|	1.75
33.417	0.00	0.44	0.241	I	o	|	|	|	1.73
33.500	0.00	0.44	0.238	I	o	|	|	|	1.72
33.583	0.00	0.44	0.235	I	o	|	|	|	1.70
33.667	0.00	0.44	0.232	I	o	|	|	|	1.69
33.750	0.00	0.43	0.229	I	o	|	|	|	1.67
33.833	0.00	0.43	0.226	I	o	|	|	|	1.66
33.917	0.00	0.43	0.223	I	o	|	|	|	1.64
34.000	0.00	0.43	0.220	I	o	|	|	|	1.63
34.083	0.00	0.43	0.217	I	o	|	|	|	1.61
34.167	0.00	0.42	0.214	I	o	|	|	|	1.60
34.250	0.00	0.42	0.211	I	o	|	|	|	1.58
34.333	0.00	0.42	0.208	I	o	|	|	|	1.57
34.417	0.00	0.42	0.205	I	o	|	|	|	1.55
34.500	0.00	0.42	0.202	I	o	|	|	|	1.54
34.583	0.00	0.41	0.200	I	o	|	|	|	1.52
34.667	0.00	0.41	0.197	I	o	|	|	|	1.51
34.750	0.00	0.41	0.194	I	o	|	|	|	1.49
34.833	0.00	0.41	0.191	I	o	|	|	|	1.48
34.917	0.00	0.40	0.188	I	o	|	|	|	1.46
35.000	0.00	0.40	0.186	I	o	|	|	|	1.45
35.083	0.00	0.40	0.183	I	o	|	|	|	1.43
35.167	0.00	0.40	0.180	I	o	|	|	|	1.41
35.250	0.00	0.39	0.177	I	o	|	|	|	1.40
35.333	0.00	0.39	0.175	I	o	|	|	|	1.38
35.417	0.00	0.39	0.172	I	o	|	|	|	1.37
35.500	0.00	0.39	0.169	I	o	|	|	|	1.35
35.583	0.00	0.38	0.167	I	o	|	|	|	1.34
35.667	0.00	0.38	0.164	I	o	|	|	|	1.32
35.750	0.00	0.38	0.161	I	o	|	|	|	1.31
35.833	0.00	0.38	0.159	I	o	|	|	|	1.29
35.917	0.00	0.37	0.156	I	o	|	|	|	1.28
36.000	0.00	0.37	0.154	I	o	|	|	|	1.26
36.083	0.00	0.37	0.151	I	o	|	|	|	1.25
36.167	0.00	0.37	0.148	I	o	|	|	|	1.23
36.250	0.00	0.36	0.146	I	o	|	|	|	1.22
36.333	0.00	0.36	0.143	I	o	|	|	|	1.20
36.417	0.00	0.36	0.141	I	o	|	|	|	1.19
36.500	0.00	0.36	0.138	I	o	|	|	|	1.18
36.583	0.00	0.36	0.136	I	o	|	|	|	1.16
36.667	0.00	0.35	0.134	I	o	|	|	|	1.15
36.750	0.00	0.35	0.131	I	o	|	|	|	1.13
36.833	0.00	0.35	0.129	I	o	|	|	|	1.12
36.917	0.00	0.35	0.126	I	o	|	|	|	1.11

37.000	0.00	0.34	0.124	I o	|	|	|	1.09
37.083	0.00	0.34	0.122	I o	|	|	|	1.08
37.167	0.00	0.34	0.119	I o	|	|	|	1.06
37.250	0.00	0.34	0.117	I o	|	|	|	1.05
37.333	0.00	0.34	0.115	I o	|	|	|	1.04
37.417	0.00	0.33	0.112	I o	|	|	|	1.02
37.500	0.00	0.33	0.110	I o	|	|	|	1.01
37.583	0.00	0.33	0.108	I o	|	|	|	1.00
37.667	0.00	0.33	0.105	I o	|	|	|	0.98
37.750	0.00	0.32	0.103	I o	|	|	|	0.97
37.833	0.00	0.32	0.101	I o	|	|	|	0.95
37.917	0.00	0.31	0.099	I o	|	|	|	0.93
38.000	0.00	0.31	0.097	I o	|	|	|	0.92
38.083	0.00	0.31	0.095	I o	|	|	|	0.90
38.167	0.00	0.30	0.092	I o	|	|	|	0.89
38.250	0.00	0.30	0.090	I o	|	|	|	0.87
38.333	0.00	0.30	0.088	I o	|	|	|	0.86
38.417	0.00	0.29	0.086	I o	|	|	|	0.84
38.500	0.00	0.29	0.084	I o	|	|	|	0.83
38.583	0.00	0.29	0.082	I o	|	|	|	0.81
38.667	0.00	0.28	0.080	I o	|	|	|	0.80
38.750	0.00	0.28	0.078	I o	|	|	|	0.79
38.833	0.00	0.28	0.077	I o	|	|	|	0.77
38.917	0.00	0.27	0.075	I o	|	|	|	0.76
39.000	0.00	0.27	0.073	I o	|	|	|	0.75
39.083	0.00	0.27	0.071	I o	|	|	|	0.73
39.167	0.00	0.26	0.069	I o	|	|	|	0.72
39.250	0.00	0.26	0.067	I o	|	|	|	0.71
39.333	0.00	0.26	0.066	I o	|	|	|	0.69
39.417	0.00	0.25	0.064	I o	|	|	|	0.68
39.500	0.00	0.25	0.062	I o	|	|	|	0.67
39.583	0.00	0.25	0.060	I o	|	|	|	0.65
39.667	0.00	0.24	0.059	I o	|	|	|	0.64
39.750	0.00	0.24	0.057	I o	|	|	|	0.63
39.833	0.00	0.24	0.055	I o	|	|	|	0.62
39.917	0.00	0.24	0.054	I o	|	|	|	0.61
40.000	0.00	0.23	0.052	I o	|	|	|	0.60
40.083	0.00	0.23	0.051	I o	|	|	|	0.58
40.167	0.00	0.23	0.049	I o	|	|	|	0.57
40.250	0.00	0.22	0.047	I o	|	|	|	0.56
40.333	0.00	0.22	0.046	I o	|	|	|	0.55
40.417	0.00	0.22	0.044	I o	|	|	|	0.54
40.500	0.00	0.22	0.043	I o	|	|	|	0.53
40.583	0.00	0.21	0.041	I o	|	|	|	0.52
40.667	0.00	0.21	0.040	I o	|	|	|	0.51
40.750	0.00	0.21	0.038	I o	|	|	|	0.49
40.833	0.00	0.20	0.037	I o	|	|	|	0.48
40.917	0.00	0.19	0.036	I o	|	|	|	0.46
41.000	0.00	0.18	0.035	I o	|	|	|	0.44
41.083	0.00	0.17	0.033	Io	|	|	|	0.43
41.167	0.00	0.16	0.032	Io	|	|	|	0.41
41.250	0.00	0.15	0.031	Io	|	|	|	0.40
41.333	0.00	0.14	0.030	Io	|	|	|	0.39
41.417	0.00	0.14	0.029	Io	|	|	|	0.38
41.500	0.00	0.13	0.028	Io	|	|	|	0.36
41.583	0.00	0.12	0.027	Io	|	|	|	0.35
41.667	0.00	0.12	0.027	Io	|	|	|	0.34
41.750	0.00	0.11	0.026	Io	|	|	|	0.33
41.833	0.00	0.11	0.025	Io	|	|	|	0.32
41.917	0.00	0.10	0.024	Io	|	|	|	0.31
42.000	0.00	0.10	0.024	Io	|	|	|	0.31
42.083	0.00	0.09	0.023	Io	|	|	|	0.30
42.167	0.00	0.09	0.022	o	|	|	|	0.29
42.250	0.00	0.08	0.022	o	|	|	|	0.28
42.333	0.00	0.08	0.021	o	|	|	|	0.28
42.417	0.00	0.07	0.021	o	|	|	|	0.27
42.500	0.00	0.07	0.020	o	|	|	|	0.26
42.583	0.00	0.07	0.020	o	|	|	|	0.26
42.667	0.00	0.06	0.019	o	|	|	|	0.25
42.750	0.00	0.06	0.019	o	|	|	|	0.25
42.833	0.00	0.06	0.018	o	|	|	|	0.24
42.917	0.00	0.05	0.018	o	|	|	|	0.24
43.000	0.00	0.05	0.018	o	|	|	|	0.23
43.083	0.00	0.05	0.017	o	|	|	|	0.23
43.167	0.00	0.05	0.017	o	|	|	|	0.22

43.250	0.00	0.04	0.017	o	|	|	|	|	0.22
43.333	0.00	0.04	0.016	o	|	|	|	|	0.22
43.417	0.00	0.04	0.016	o	|	|	|	|	0.21
43.500	0.00	0.04	0.016	o	|	|	|	|	0.21
43.583	0.00	0.04	0.016	o	|	|	|	|	0.21
43.667	0.00	0.03	0.015	o	|	|	|	|	0.20
43.750	0.00	0.03	0.015	o	|	|	|	|	0.20
43.833	0.00	0.03	0.015	o	|	|	|	|	0.20
43.917	0.00	0.03	0.015	o	|	|	|	|	0.19
44.000	0.00	0.03	0.015	o	|	|	|	|	0.19
44.083	0.00	0.03	0.014	o	|	|	|	|	0.19
44.167	0.00	0.03	0.014	o	|	|	|	|	0.19
44.250	0.00	0.02	0.014	o	|	|	|	|	0.18
44.333	0.00	0.02	0.014	o	|	|	|	|	0.18
44.417	0.00	0.02	0.014	o	|	|	|	|	0.18
44.500	0.00	0.02	0.014	o	|	|	|	|	0.18
44.583	0.00	0.02	0.013	o	|	|	|	|	0.18
44.667	0.00	0.02	0.013	o	|	|	|	|	0.18
44.750	0.00	0.02	0.013	o	|	|	|	|	0.17
44.833	0.00	0.02	0.013	o	|	|	|	|	0.17
44.917	0.00	0.02	0.013	o	|	|	|	|	0.17
45.000	0.00	0.01	0.013	o	|	|	|	|	0.17
45.083	0.00	0.01	0.013	o	|	|	|	|	0.17
45.167	0.00	0.01	0.013	o	|	|	|	|	0.17
45.250	0.00	0.01	0.013	o	|	|	|	|	0.17
45.333	0.00	0.01	0.012	o	|	|	|	|	0.16
45.417	0.00	0.01	0.012	o	|	|	|	|	0.16
45.500	0.00	0.01	0.012	o	|	|	|	|	0.16
45.583	0.00	0.01	0.012	o	|	|	|	|	0.16
45.667	0.00	0.01	0.012	o	|	|	|	|	0.16
45.750	0.00	0.01	0.012	o	|	|	|	|	0.16
45.833	0.00	0.01	0.012	o	|	|	|	|	0.16
45.917	0.00	0.01	0.012	o	|	|	|	|	0.16
46.000	0.00	0.01	0.012	o	|	|	|	|	0.16
46.083	0.00	0.01	0.012	o	|	|	|	|	0.16
46.167	0.00	0.01	0.012	o	|	|	|	|	0.16
46.250	0.00	0.01	0.012	o	|	|	|	|	0.16
46.333	0.00	0.01	0.012	o	|	|	|	|	0.16
46.417	0.00	0.01	0.012	o	|	|	|	|	0.15
46.500	0.00	0.01	0.012	o	|	|	|	|	0.15
46.583	0.00	0.01	0.012	o	|	|	|	|	0.15
46.667	0.00	0.01	0.012	o	|	|	|	|	0.15
46.750	0.00	0.01	0.012	o	|	|	|	|	0.15
46.833	0.00	0.00	0.012	o	|	|	|	|	0.15
46.917	0.00	0.00	0.011	o	|	|	|	|	0.15
47.000	0.00	0.00	0.011	o	|	|	|	|	0.15
47.083	0.00	0.00	0.011	o	|	|	|	|	0.15
47.167	0.00	0.00	0.011	o	|	|	|	|	0.15
47.250	0.00	0.00	0.011	o	|	|	|	|	0.15
47.333	0.00	0.00	0.011	o	|	|	|	|	0.15
47.417	0.00	0.00	0.011	o	|	|	|	|	0.15
47.500	0.00	0.00	0.011	o	|	|	|	|	0.15
47.583	0.00	0.00	0.011	o	|	|	|	|	0.15
47.667	0.00	0.00	0.011	o	|	|	|	|	0.15
47.750	0.00	0.00	0.011	o	|	|	|	|	0.15
47.833	0.00	0.00	0.011	o	|	|	|	|	0.15
47.917	0.00	0.00	0.011	o	|	|	|	|	0.15
48.000	0.00	0.00	0.011	o	|	|	|	|	0.15
48.083	0.00	0.00	0.011	o	|	|	|	|	0.15
48.167	0.00	0.00	0.011	o	|	|	|	|	0.15
48.250	0.00	0.00	0.011	o	|	|	|	|	0.15
48.333	0.00	0.00	0.011	o	|	|	|	|	0.15
48.417	0.00	0.00	0.011	o	|	|	|	|	0.15
48.500	0.00	0.00	0.011	o	|	|	|	|	0.15
48.583	0.00	0.00	0.011	o	|	|	|	|	0.15
48.667	0.00	0.00	0.011	o	|	|	|	|	0.15
48.750	0.00	0.00	0.011	o	|	|	|	|	0.15
48.833	0.00	0.00	0.011	o	|	|	|	|	0.15
48.917	0.00	0.00	0.011	o	|	|	|	|	0.15
49.000	0.00	0.00	0.011	o	|	|	|	|	0.15
49.083	0.00	0.00	0.011	o	|	|	|	|	0.15
49.167	0.00	0.00	0.011	o	|	|	|	|	0.15
49.250	0.00	0.00	0.011	o	|	|	|	|	0.15
49.333	0.00	0.00	0.011	o	|	|	|	|	0.15
49.417	0.00	0.00	0.011	o	|	|	|	|	0.15

```
Remaining water in basin =    0.01 (Ac.Ft)


****************************HYDROGRAPH DATA****************************
               Number of intervals =   593
               Time interval =    5.0 (Min.)
               Maximum/Peak flow rate =        0.777 (CFS)
               Total volume =       1.689 (Ac.Ft)
        Status of hydrographs being held in storage
                    Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
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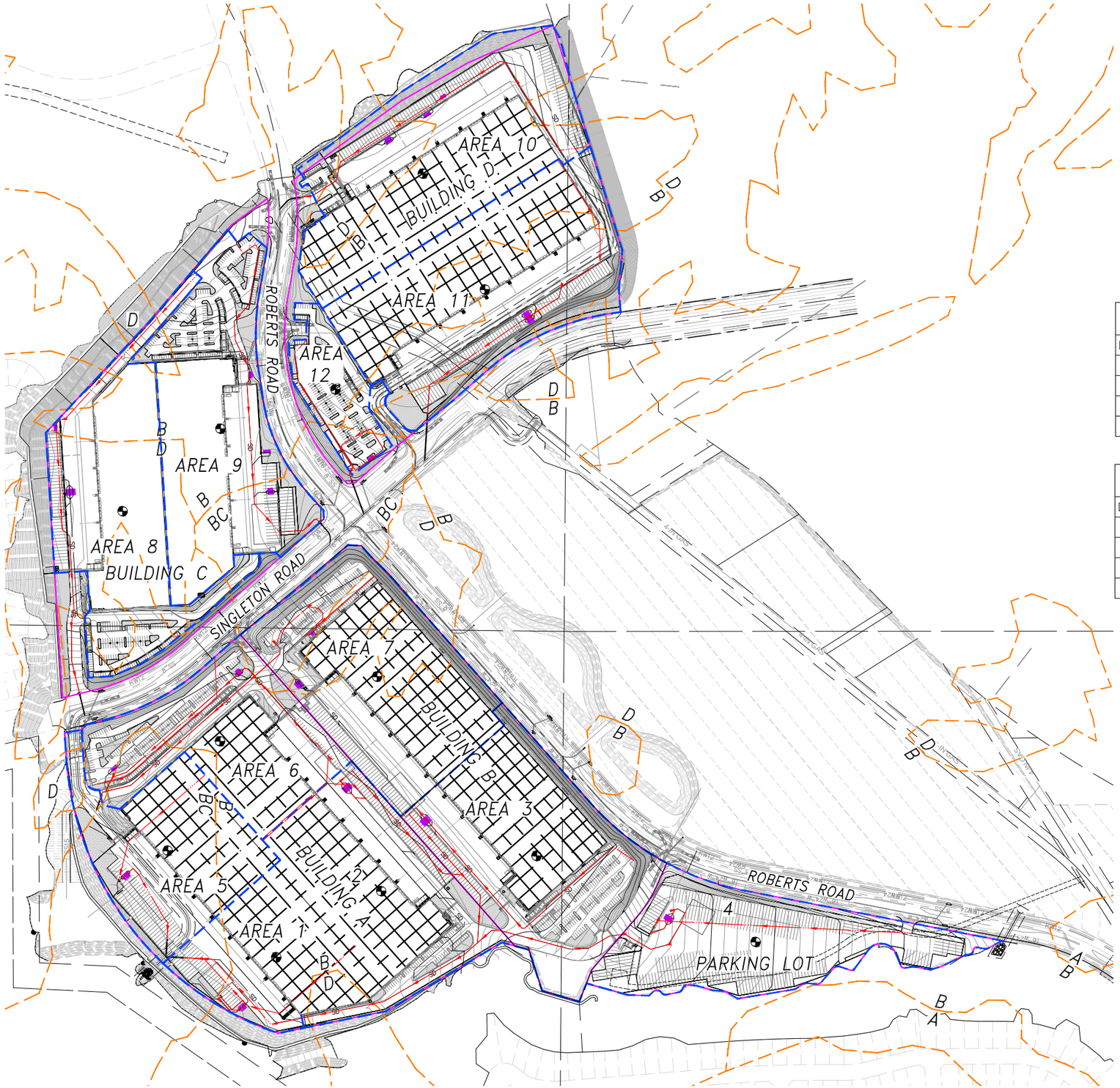
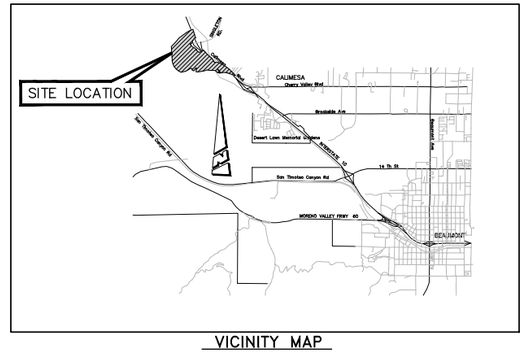
UNIT HYDROGRAPH HYDROLOGY MAP





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

PROPOSED AREAS						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA	6.8 AC	9.5 AC	12.3 AC	9.2 AC	8.1 AC	9.0 AC
L_T	1116 Ft	2462 Ft	2287 Ft	3348 Ft	899 Ft	1634 Ft
L_{CA}	860 Ft	2251 Ft	2251 Ft	2754 Ft	602 Ft	512 Ft
ΔH	6.5 Ft	6.50 Ft	9.30 Ft	37.50 Ft	6.50	3.70 Ft

PROPOSED AREAS						
DRAINAGE AREA	7	8	9	10	11	12
TOTAL AREA	12.5 AC	11.2 AC	12.1 AC	14.1 AC	14.1 AC	2.9 AC
L_T	1378 Ft	1821 Ft	1395 Ft	1473 Ft	1370 Ft	621 Ft
L_{CA}	1136 Ft	683 Ft	552 Ft	540 Ft	486 Ft	341 Ft
ΔH	3.3 Ft	29.30 Ft	18 Ft	7 Ft	2.80 Ft	9 Ft

LEGEND

NODE / ELEV – NODE NUMBER / ELEVATION (FT)

AC / FT – AREA (AC) / LENGTH (FT)

– DRAINAGE AREA BOUNDARY (PROPOSED)

– FLOWLINE (PROPOSED)

– PROJECT BOUNDARY

– NRCS SOIL BOUNDARY

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N W WEBB E S

1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
PRELIMINARY PROPOSED UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

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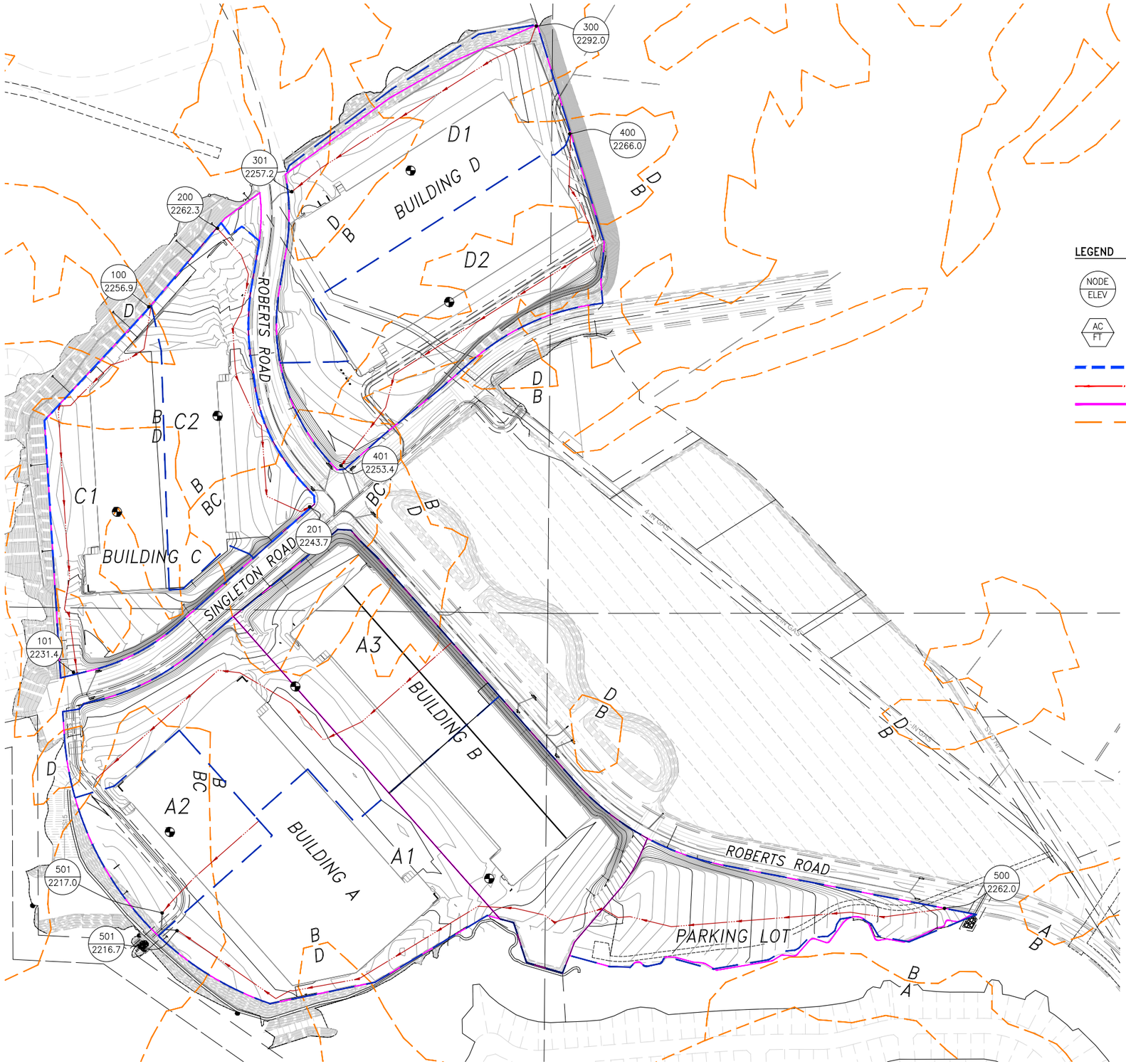

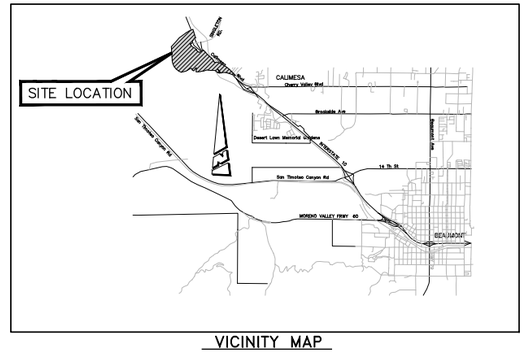

VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

LEGEND

NODE / ELEV	– NODE NUMBER – ELEVATION (FT)
AC / FT	– AREA (AC) – LENGTH (FT)
	– DRAINAGE AREA BOUNDARY
	– FLOWLINE (PROPOSED)
	– PROJECT BOUNDARY
	– NRCS SOIL BOUNDARY

EXISTING AREAS			
DRAINAGE AREA	A1	A2	A3
TOTAL AREA	37.7 AC	7.5 AC	21.7 AC
L_T	3231 Ft	526 Ft	1790 Ft
L_{CA}	1394 Ft	234 Ft	939 Ft
ΔH	45.0 Ft	7 Ft	23 Ft

EXISTING AREAS		
DRAINAGE AREA	C1	C2
TOTAL AREA	13.2 AC	11.8 AC
L_T	1645 Ft	1321 Ft
L_{CA}	629 Ft	574 Ft
ΔH	25.0 Ft	19 Ft

EXISTING AREAS		
DRAINAGE AREA	D1	D2
TOTAL AREA	15.8 AC	16.9 AC
L_T	1174 Ft	1828 Ft
L_{CA}	440 Ft	756 Ft
ΔH	35.0 Ft	13 Ft

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
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1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
EXISTING UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	W.O.	21-0034
DATE:	12/14/2020	SHEET	1
DESIGNED:	EP	OF	1 SHEETS
CHECKED:	BJV	DWG. NO.	
PLN CK REF:			
F.B.			

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be provided during Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided during Final Engineering

FOR REVIEW ONLY

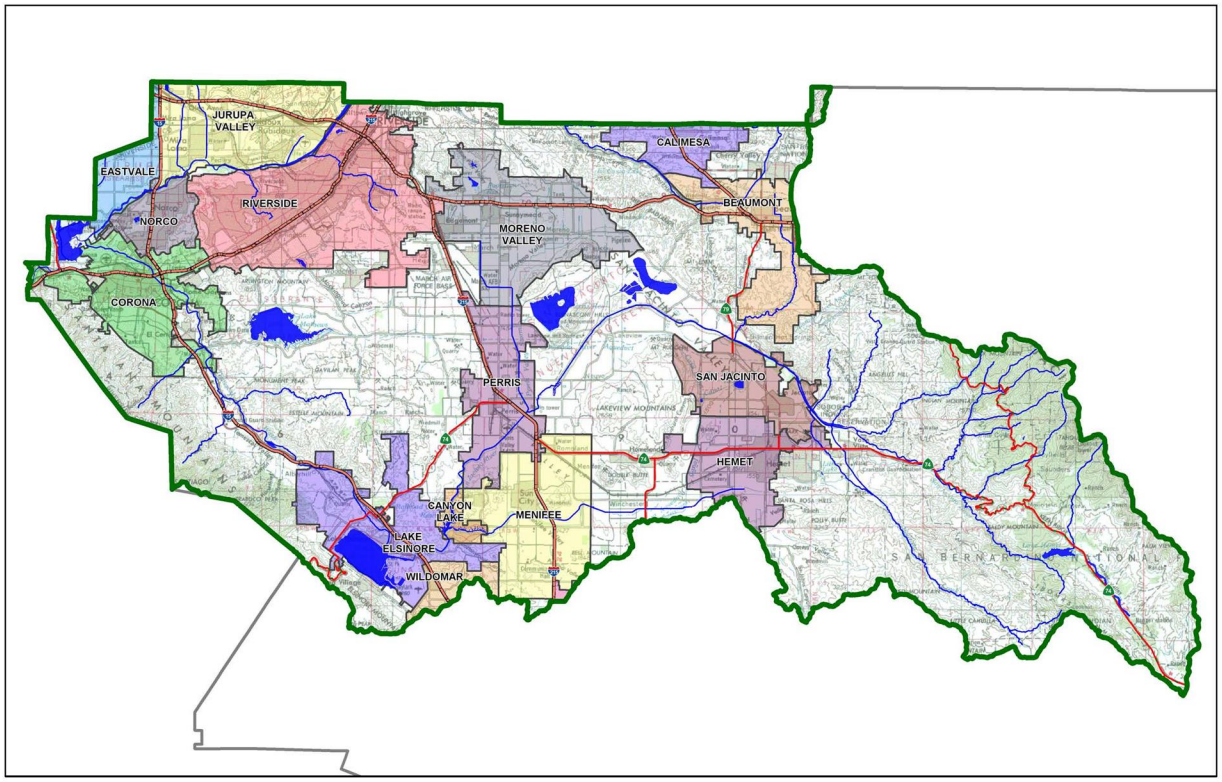
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Birtcher Commerce Center Oak Valley – Building C

Development No: DPR 21-05

Design Review/Case No:



Contact Information:

Prepared for: Birtcher Development
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(714) 728-9070

☒ **Preliminary**
☐ **Final**

Original Date Prepared: May 2021

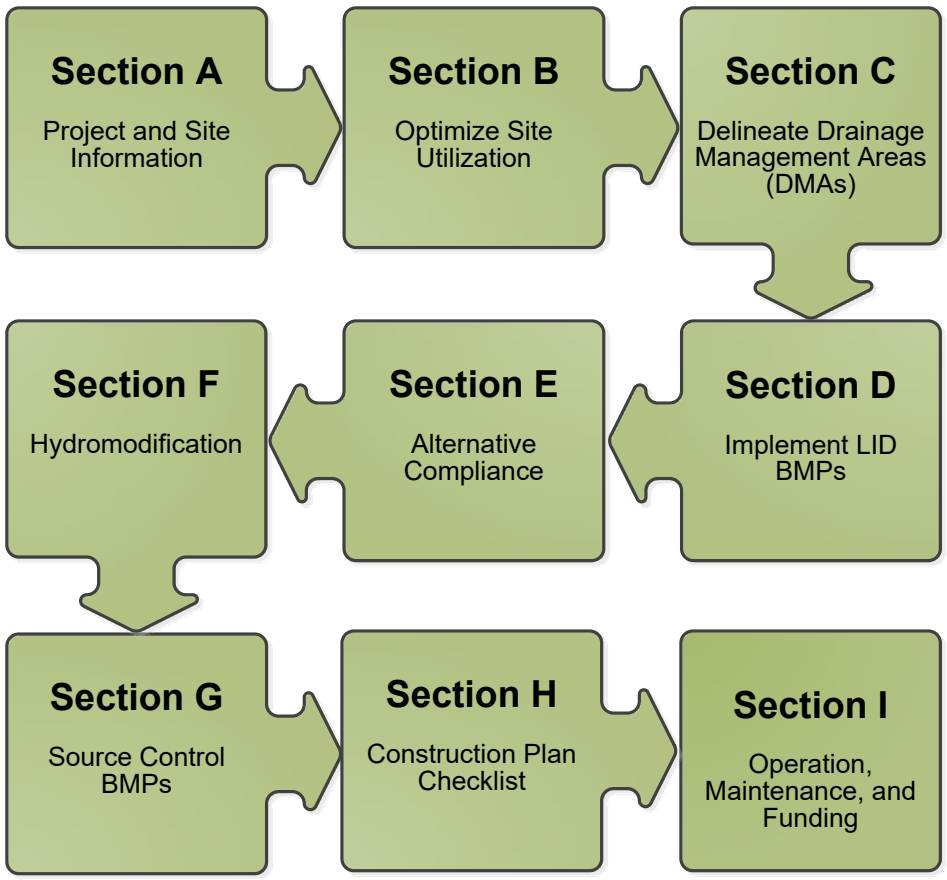
Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Prepared by:
Albert A. Webb Associates
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Birtcher Development by Albert A. Webb Associates for the Birtcher Commerce Center Oak Valley – Building C project.

This WQMP is intended to comply with the requirements of City of Calimesa, County of Riverside for County of Riverside Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (Municipal Code Section 13.12 – Stormwater Drainage System Protection Regulations).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 8
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 10

Section C: Delineate Drainage Management Areas (DMAs) 12

Section D: Implement LID BMPs 14

D.1 Infiltration Applicability 14
D.2 Harvest and Use Assessment 15
D.3 Bioretention and Biotreatment Assessment 17
D.4 Feasibility Assessment Summaries 18
D.5 LID BMP Sizing 19

Section E: Alternative Compliance (LID Waiver Program) 23

E.1 Identify Pollutants of Concern 24
E.2 Stormwater Credits 25
E.3 Sizing Criteria 25
E.4 Treatment Control BMP Selection 26

Section F: Hydromodification 27

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 27
F.2 HCOC Mitigation 28

Section G: Source Control BMPs 29

Section H: Construction Plan Checklist 33

Section I: Operation, Maintenance and Funding 34

List of Tables

Table A.1 Identification of Receiving Waters....8
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....12
Table C.2 Type 'A', Self-Treating Areas....12
Table C.3 Type 'B', Self-Retaining Areas....12
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....13
Table C.5 Type 'D', Areas Draining to BMPs....13
Table D.1 Infiltration Feasibility....14
Table D.2 LID Prioritization Summary Matrix....18
Table D.3 DCV Calculations for LID BMPs....19
Table E.1 Potential Pollutants by Land Use Type....24
Table E.2 Water Quality Credits....25
Table E.3 Treatment Control BMP Sizing....25
Table E.4 Treatment Control BMP Selection....26
Table F.1 Hydrologic Conditions of Concern Summary....27
Table G.1 Permanent and Operational Source Control Measures....29
Table H.1 Construction Plan Cross-reference....33

List of Appendices

Appendix 1: Maps and Site Plans....35
Appendix 2: Construction Plans....36
Appendix 3: Soils Information....37
Appendix 4: Historical Site Conditions....38
Appendix 5: LID Infeasibility....39
Appendix 6: BMP Design Details....40
Appendix 7: Hydromodification....41
Appendix 8: Source Control....42
Appendix 9: O&M....43
Appendix 10: Educational Materials....44

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial / Business Park
Planning Area:	Summerwind Ranch at Oak Valley Specific Plan
Community Name:	Birtcher Commerce Center Oak Valley
Development Name:	Birtcher Commerce Center Oak Valley – Building C
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°58'26.55"N / 117°03'10.24"W	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
APN(s): 413-190-025 & 413-290-047	
Map Book and Page No.: Thomas Bros Page: 689, Grid: H3, H4, J3, J4 ; Page: 690, Grid: A4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial, Business Park
Proposed or Potential SIC Code(s)	1541 – General Contractors-Industrial Buildings and Warehouses 1542 – General Contractors- Non-Residential Other than Industrial and Warehouses
Area of Impervious Project Footprint (SF)	953,121 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	953,121 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B, C, D
What is the Water Quality Design Storm Depth for the project?	0.78
Design rainfall intensity for QBMP calculations	0.2 inches/hr

Project Description

The Birtcher Commerce Center Oak Valley (BCCOV) - Building C project proposes an industrial development in the City of Calimesa on approximately 25.3 acres of vacant land located within the boundaries of the 220-acre PM 37862 (overall BCCOV project site). The overall BCCOV project site consists of approximately 220 acres of vacant land and is bounded by the Interstate-10 (I-10) highway along its northeast, the single-family residential tract TR 32702 (currently under construction) along its southeastern boundary, vacant land along its southern boundary, and a future residential development to its northwest. The San Timoteo Creek runs from north to south along the eastern boundary of the

overall BCCOV site and continues south of the site. The BCCOV - Building C project is bounded by Singleton Road to its south, Roberts Road to its east, and vacant land (future residential developments) to its north and west.

The overall BCCOV project site is currently vacant. Runoff from the onsite area and offsite areas north of the project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from north to south. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue through the southern boundary before ultimately discharging into the San Timoteo Creek.

Prior to any construction commencing for the BCCOV - Building C project, the overall BCCOV project site will be mass graded. The mass grading phase also includes the construction of retaining walls along the boundaries of the overall BCCOV project, graded pads, the construction of backbone street improvements for Singleton Road and Roberts Road, the installation of backbone storm drain facilities, and the installation of storm drain stub-outs for the individual BCCOV industrial developments to discharge into. The overall drainage pattern of the mass grade phase will perpetuate the drainage pattern of the existing, vacant project site. However, runoff in the mass graded phase will be captured in temporary inlets and conveyed towards the backbone storm drain facilities. The backbone storm drain facilities have been designed to convey the fully developed flows from the overall BCCOV project as well as the existing offsite flows generated north of the I-10 highway southerly towards the San Timoteo Creek. A separate drainage study titled "Hydrology and Hydraulics Study: Oak Valley Town Center Parcel Map No. 37862 Mass Grading Plan" was conducted for the mass grade phase of the project and encompasses the design and layout of the backbone storm drain facilities.

For the proposed condition, runoff is captured through a series of catch basins and grate inlets located throughout the site at localized low points. Flows are then conveyed towards the existing stub-outs via proposed onsite storm drain pipe that connect into the backbone storm drain facilities. Flows are then conveyed towards the existing stub-outs via proposed onsite storm drain pipe that connect into the backbone storm drain facilities. Flows generated by the BCCOV - Building C project development ultimately discharge south of the overall BCCOV project site and into the San Timoteo Creek similar to the existing condition.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to highly variable infiltration rates of the existing soil as well as potentially collapsible soil being present throughout the site. Due to site constraints, most notably the significant offsite grading requirements of the overall BCCOV site, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary actually drains offsite and into the backbone streets. However, in this preliminary analysis all areas within the project boundary have been considered in the Qbmp calculations in order to provide a conservative treatment flow rate.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharging into the proposed CMP chamber detention systems. Mitigated flows outlet to the provided stub-outs. The

proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm events to bypass the vault and enter the onsite storm drain facilities. All captured onsite flows will be directed towards the provided lateral stub-outs constructed in the mass grade phase.

The project is required to address increased runoff mitigation for the 24-hour, 2-year storm event to meet HCOC requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	N/A	GWR, MUN, REC1, REC2, WARM, WILD	20± miles
San Timoteo Creek Reach 2	N/A	GWR, MUN, REC1, REC2, WARM, WILD	10± miles
San Timoteo Creek Reach 1B & 1A	N/A	AGR, MUN, REC1, REC2, WARM, WILD	5± miles
Santa Ana River Reach #5	N/A	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.
Santa Ana River Reach #4	Pathogens	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* *City of Calimesa Grading Permit*	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The currently vacant site generally drains from north to south towards the San Timoteo Creek. In this existing condition, flows are generally conveyed via smaller streambed areas that run from north to south through the overall BCCOV site. These smaller streambed areas discharge flows south, offsite into the San Timoteo Creek. In the mass grade phase, the project site generally sheet flows towards temporary inlets that discharge into the backbone storm drain facilities located along Singleton Road/Roberts Road. This backbone storm drain discharges flows towards the San Timoteo Creek south of the overall project site similar to the vacant site conditions.

In the developed condition, a network of catch basins and inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards existing stub-outs located along the southern border of the project area provided in the mass grade phase. From there, flows are conveyed into the backbone storm drain line located along Singleton Road before ultimately discharging south, offsite towards the San Timoteo Creek similar to the existing condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing vegetation is very minimal. The existing project site is primarily barren, so no vegetation is proposed to be protected.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Due to poor infiltration capacities and potentially collapsible underlying soils throughout the site, an infiltration-based BMP is not feasible to treat for water quality requirements.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious areas will be minimized as much as possible while maintaining safe and usable facilities onsite. Landscaped areas have been provided throughout the projects site along concrete walkways, around the proposed building, adjacent to parking areas, and in other feasible locations throughout the site.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, however, based on the nature of the industrial development, not all runoff can feasibly be directed towards a pervious area before being captured. Pervious landscaped areas are proposed throughout the site where possible in order to maximize the chances of runoff dispersing into landscaped areas before being captured. All runoff that is captured onsite will be directed towards an MWS vault (or series of MWS vaults) to provide water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA C-1	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	232,861	D
DMA C-2	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	135,322	D
DMA C-3	Mixed Use – Roofs, Concrete or Asphalt	420,922	D
DMA C-4	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	188,768	D
DMA C-6	Mixed Use – Concrete or Asphalt, Ornamental Landscaping	121,165	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	**Area (Sq. Ft.)**	**Stabilization Type**	**Irrigation Type (if any)**

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product		Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA C-1	MWS Vaults (2 - 8'x16' vaults in series)
DMA C-2	MWS Vault (8'x20')
DMA C-3	MWS Vaults (3 - 8'x20' vaults in series)
DMA C-4	MWS Vault (8'x24')
DMA C-6	MWS Vault (8'x20')

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: All DMAs		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Soils underlying project site are potentially collapsible and not suitable for infiltration		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA C-1	☐	☐	☐	☒	☐
DMA C-2	☐	☐	☐	☒	☐
DMA C-3	☐	☐	☐	☒	☐
DMA C-4	☐	☐	☐	☒	☐
DMA C-6	☐	☐	☐	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the BCCOV - Building C project will utilize biotreatment (MWS vaults) throughout the site to treat for water quality requirements. Infiltration-based BMPs are not feasible due to poor infiltration capacities of underlying soils and potentially collapsible soils (see Appendix 3 for preliminary geotechnical investigation). Harvest and use BMPs are not feasible as reclaimed water will be used for non-potable water demands. Bioretention BMPs are not feasible due to site constraints including minimum parking density requirements and significant offsite grading conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA C-1*		
	[A]		[B]	[C]	[A] x [C]			
Building	*126873*	*Roofs*	*1*	*0.89*				
Concrete / Asphalt	*80997*	*Concrete or Asphalt*	*1*	*0.89*				
Landscape	*24991*	*Ornamental Landscaping*	*0.1*	*.11*				
						Design Rainfall Intensity (in/hr)	*Design Flow Rate,* $\mathbf{Q_{BMP}}$ *(cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma$[A] **232861**				Σ= [D] **188180.5**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.9**	[G] ***0.9***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA C-2*		
	[A]		[B]	[C]	[A] x [C]			
Building	*73758*	*Roofs*	*1*	*0.89*	*65792.1*			
Concrete / Asphalt	*60384*	*Concrete or Asphalt*	*1*	*0.89*	*53862.5*			
Landscape	*1180*	*Ornamental Landscaping*	*0.1*	*.11*	*130.3*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **135322**				$\Sigma = [D]$ **119784.9**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.5**	[G] ***0.5***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA C-3*		
	[A]		[B]	[C]	[A] x [C]			
Building	*156570*	*Roofs*	*1*	*0.89*	*139660.4*			
Concrete / Asphalt	*188482*	*Concrete or Asphalt*	*1*	*0.89*	*168125.9*			
Landscape	*75870*	*Ornamental Landscaping*	*0.1*	*.11*	*8380.4*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **420922**				$\Sigma = [D]$ **316166.7**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.5**	[G] ***1.5***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA C-4*		
	[A]		[B]	[C]	[A] x [C]			
Building	*98404*	*Roofs*	*1*	*0.89*	*87776.4*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*63049*	*Concrete or Asphalt*	*1*	*0.89*	*56239.7*			
Landscape	*27315*	*Ornamental Landscaping*	*0.1*	*.11*	*3017.2*			
	$A_T = \Sigma[A]$ **188768**				Σ= [D] **147033.3**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.7**	[G] ***0.7***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA C-6*		
	[A]		[B]	[C]	[A] x [C]			
Concrete / Asphalt	*95033*	*Concrete or Asphalt*	*1*	*0.89*	*84769.4*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Landscape	*26132*	*Ornamental Landscaping*	*0.1*	*.11*	*2886.5*			
	$A_T = \Sigma[A]$ **121165**				Σ= [D] **87655.9**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.4**	[G] ***0.4***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
All DMAs	Bacteria/ Pathogens	Medium

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition C in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study. The 24-hour, 2-year unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. A routing analysis was performed to demonstrate that the proposed CMP chamber systems have substantial volume needed to mitigate flows to existing condition flow rates and determine the required orifice outlet sizing. See Appendix 7 for the unit hydrograph and routing analysis details. Further details can also be found in the "Preliminary Drainage Study – BCCOV Building C".

EXISTING CONDITION 2-YEAR, 24-HOUR STORM		
	VOL (AC-FT)	PEAK FLOW (CFS)
AREA C1	0.32	1.29
AREA C2	0.24	0.60

PROPOSED CONDITION 2-YEAR, 24-HOUR STORM			
	VOL (AC-FT)	PEAK FLOW (CFS)	ROUTING PEAK FLOW (CFS)
AREA 8	1.74	2.88	1.15
AREA 9	1.70	2.87	0.59

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	*Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.*	*Maintain and periodically repaint or replace inlet markings.* *Provide stormwater pollution prevention information to new site owners, lessees, or operators.* *See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Interior floor drains and elevator shaft sump	*The interior floor drains and elevator shaft sump pumps will be plumbed to*	*Inspect and maintain drains to prevent blockages and overflow.*

	sanitary sewer	
Landscape/Outdoor Pesticide Use	*Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.* *Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.* *Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.* *Consider using pest-resistant plants, especially adjacent to hardscape.* *To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.*	*Maintain landscaping using minimum or no pesticides.* *See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/* *Provide IPM information to new owners, lessees and operators.* *Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Refuse Areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com*

Vehicle and Equipment Cleaning	*If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.*	*Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/*
Plazas, Sidewalks and parking lots.		*Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Loading Docks	*Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.* *Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.* *Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.*	*Move loaded and unloaded items indoors as soon as possible.* *See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fire Sprinkler Test Water	*Water discharged from the fire sprinkler systems shall not enter the storm drain system. Discharged water from fire sprinkler testing shall be collected and used for onsite landscape or disposed of at a local waste water treatment plant.*	*See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling*

		Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
All DMAs	MWS Vaults	Appendix 6

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section H will be completed and addressed during Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

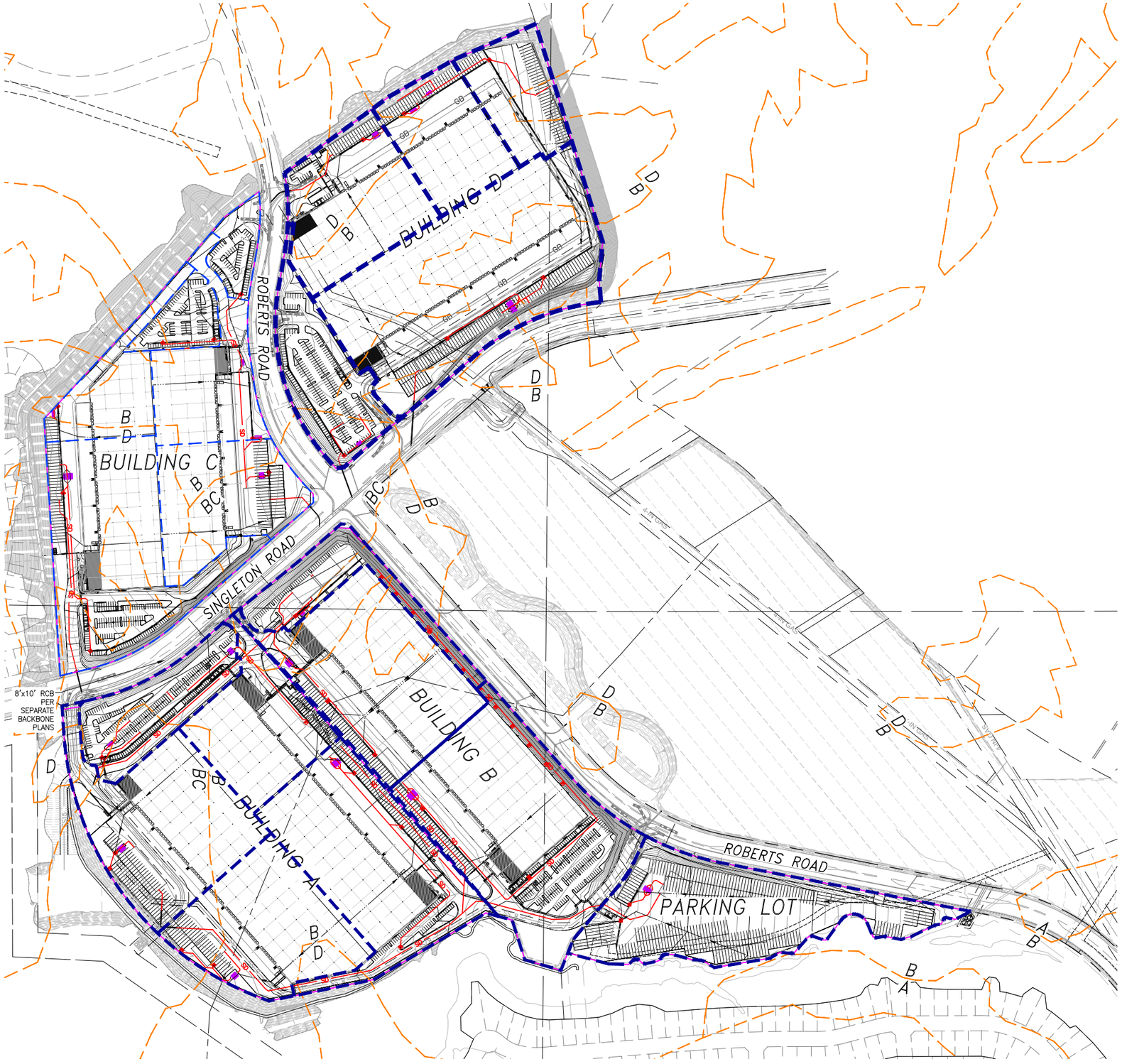
☒ Y ☐ N

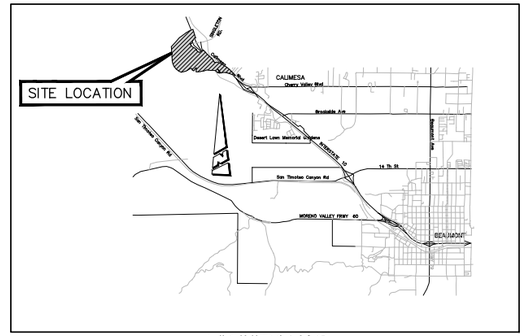
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section I will be completed and addressed during Final WQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

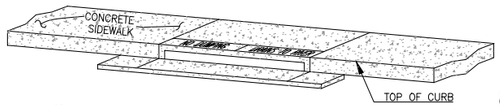


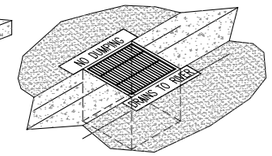


VICINITY MAP

N.T.S.

T2S, R2W, SECTION 23,24,25,26





1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING – DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NTS

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL BELOW (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).
3. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
4. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

SITE CONSTRAINTS:

1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE USE OF RECYCLED WATER FOR IRRIGATION PURPOSES.

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

N
W WEBB E
S

1" = 200'

200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

OVERALL BCCOV SITE PLAN
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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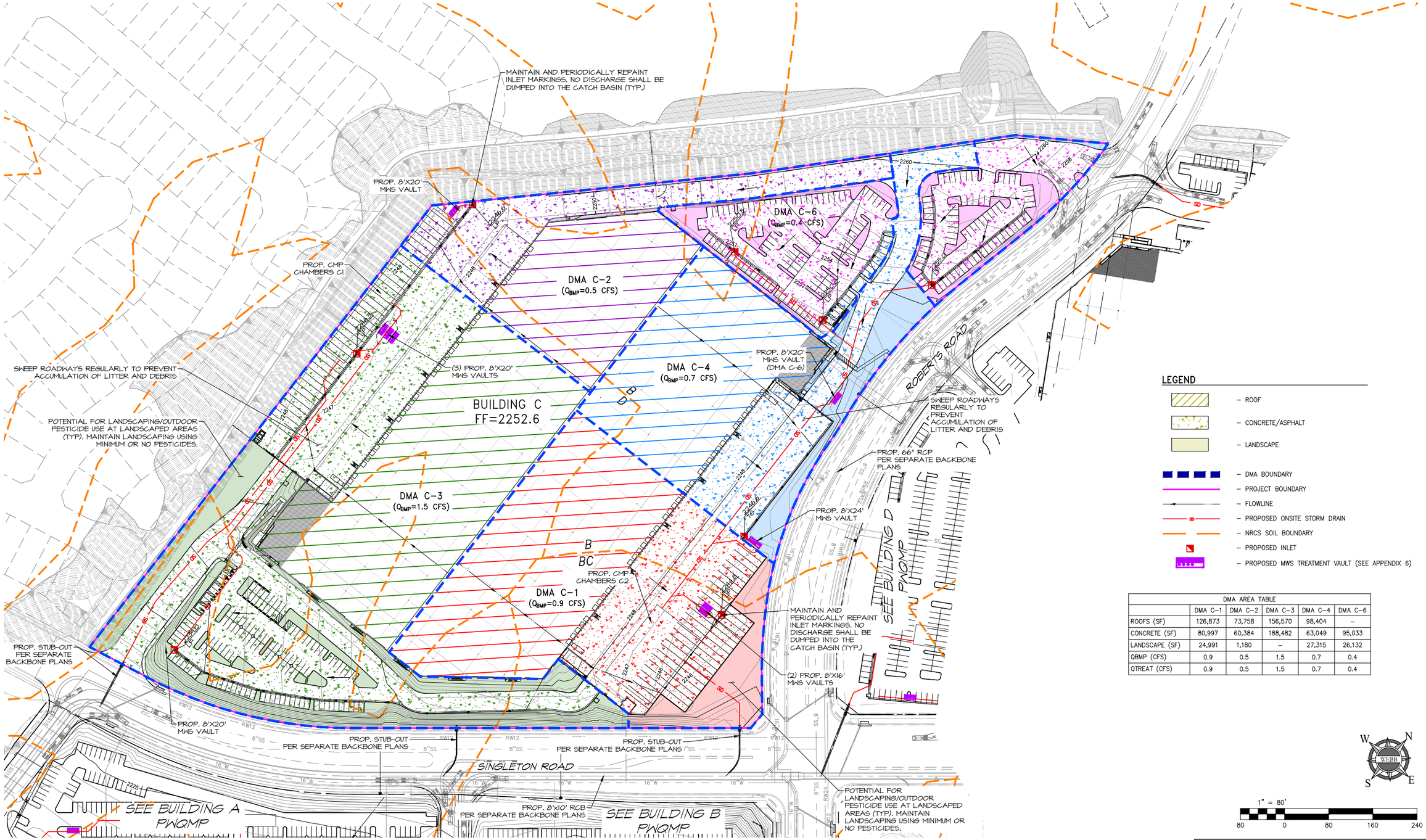

DMA AREA TABLE					
	DMA C-1	DMA C-2	DMA C-3	DMA C-4	DMA C-6
ROOFS (SF)	126,873	73,758	156,570	98,404	–
CONCRETE (SF)	80,997	60,384	188,482	63,049	95,033
LANDSCAPE (SF)	24,991	1,180	–	27,315	26,132
QBMP (CFS)	0.9	0.5	1.5	0.7	0.4
QTREAT (CFS)	0.9	0.5	1.5	0.7	0.4

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

BCCOV – BUILDING C
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=80'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 2
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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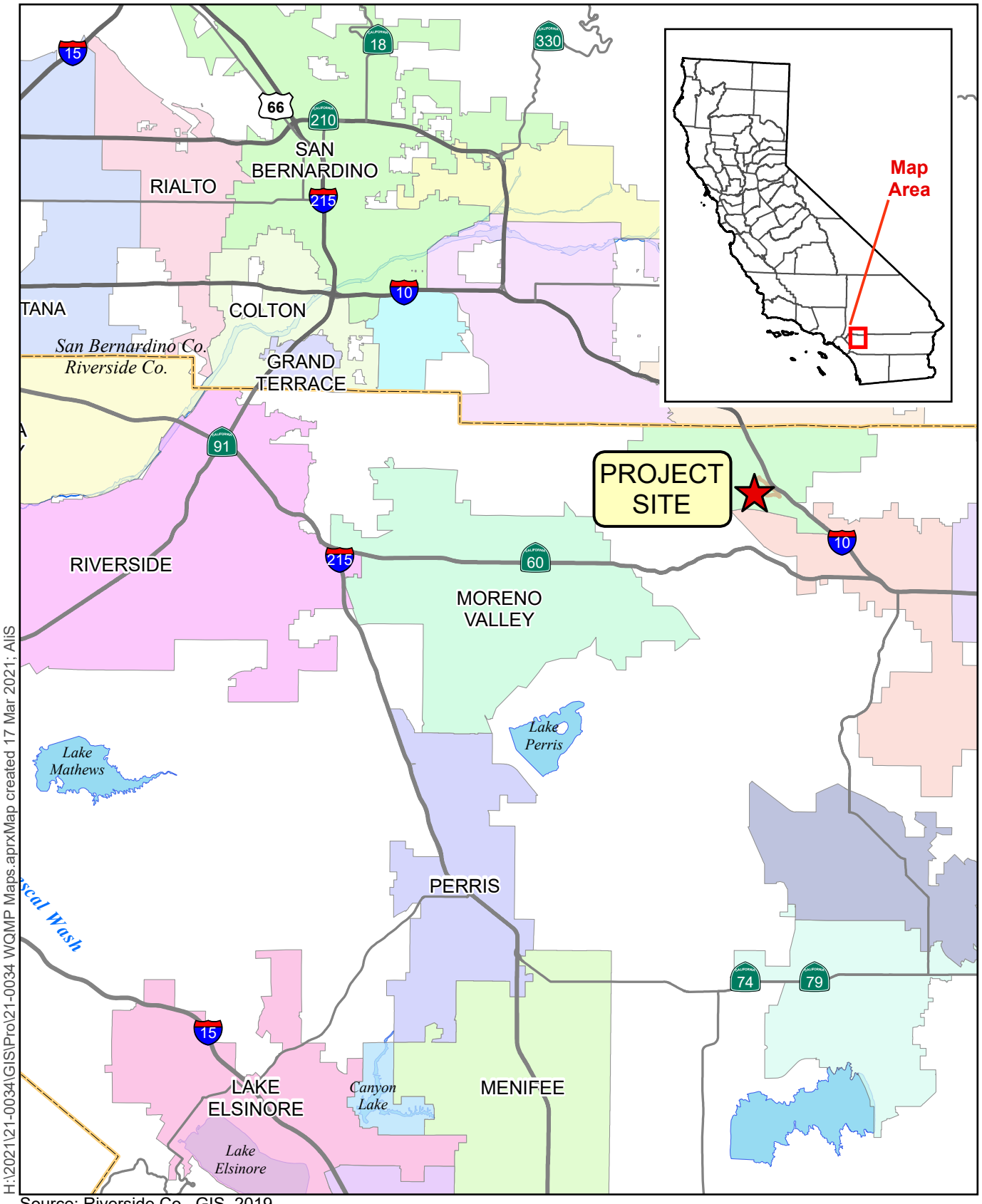


H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprxMap created 17 Mar 2021; AliS

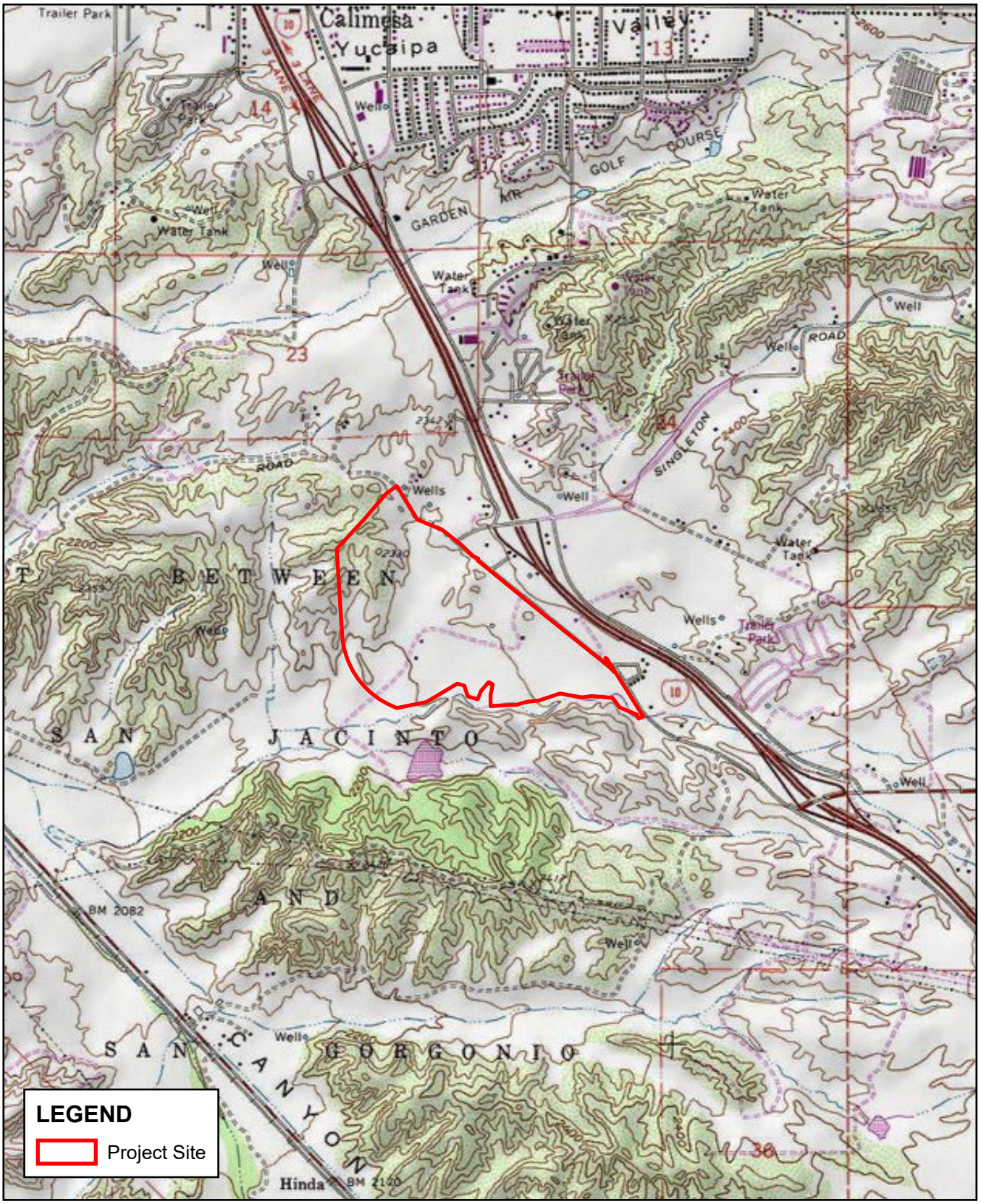
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprx; Map created 17 Mar 2021; AliS

Sources: ESRI / USGS 7.5min Quad
DRGs: EL CASCO

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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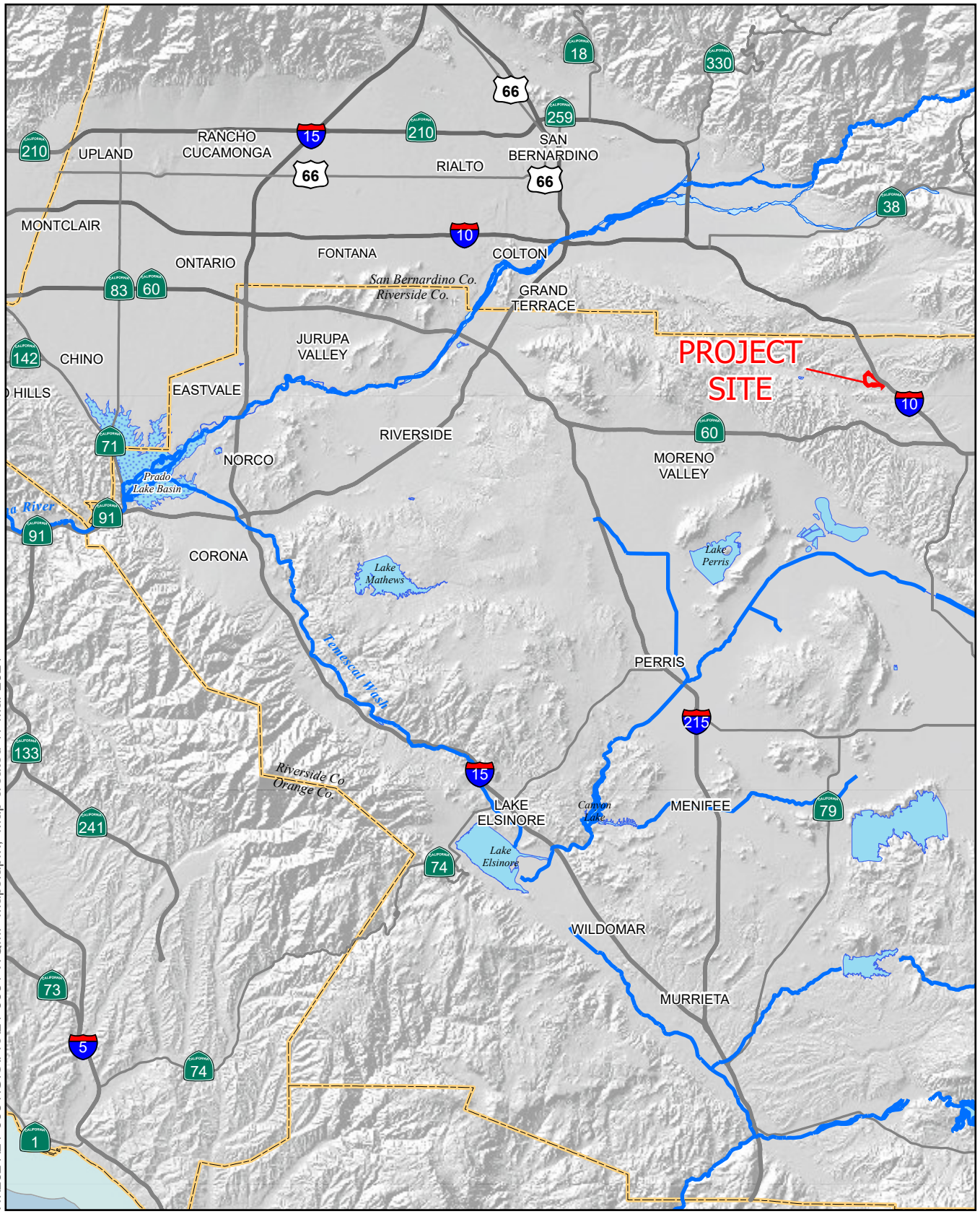
Source: Riverside Co. GIS, Jan. 2020.

0 600 1,200 1,800 Feet

Figure 3 - Aerial Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: USGS DLG; USGS 30m DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.88 PradoDam
0.50 LakeMathews
0.51 Woodcrest
0.68 PigeonPass
0.66 MorenoEast
0.68 PerrisReservoir
PROJECT SITE
0.85 Beaumont
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.90 HurkeyCreek
0.65 Anza
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.77 SantaRosaPlateau
0.52 SkinnerLake
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Appendix 2: Construction Plans

Grading and Drainage Plans

To be provided during Final Engineering

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

January 21, 2021

Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, California 92660

Attention: Mr. Randy Rankin
President of Construction

Project No.: **20G144-2**

Subject: **Geotechnical Review Letter**
Proposed Commercial/Industrial Development
Singleton Road at Roberts Road
Calimesa, California

Reference: Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, City of Calimesa, County of Riverside, California, prepared for Oak Valley Development Company by Advanced Geotechnical Solutions, Inc. (AGS), Report No. 2004-04-B-5, P/W 2004-01, dated December 23, 2020.

Dear Mr. Rankin:

In accordance with your request, we have reviewed the above-referenced geotechnical report for the proposed development. These reports were reviewed for conformance with generally accepted standards of practice for commercial/industrial development.

Document Review

Southern California Geotechnical, Inc. (SCG) was provided with copies of the above-referenced report previously prepared for the subject site. Comments generated during our review of the referenced documents are presented below:

This report consists of a geotechnical investigation performed in 2020 for a 266-acre site located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in Calimesa, California. The site is identified as being a part of Parcel Map 37862.

The overall site, which was the subject of this report, includes:

a) Four (4) new commercial/industrial buildings, ranging in size from 250,000± ft^2 to 500,000± ft^2, to be constructed in the western and southern areas of the subject site,
b) A new proposed commercial/retail center in the northeast portion of the site bounded by Singleton Road, and
c) A new sewer lift station to be constructed near the southwest corner of the tract.

Please note that only the four (4) proposed commercial/industrial buildings are included in the scope for our client, Birtcher Development. It is our understanding that the remaining proposed structures will be developed by a different developer, Oak Valley Development Company.

The stated scope of this report included providing geologic and geotechnical information and recommendations for the development of the Parcel Map 37862 relative to:

- Unsuitable soil removals,
- Cut, fill and natural slope stability,
- Buttress/stabilization fill requirements,
- Cut/fill pad overexcavation criteria,
- Remedial and design grading recommendations,
- Handling and disposal of oversize hard earth materials,
- Stabilization and removal of saturated removal bottoms, and
- Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

The report indicates that AGS conducted two phases of subsurface investigations. The first phase was performed on May 6, 2020 and May 7, 2020. The second investigation was performed between August 5, 2020 and August 14, 2020. These investigations included twenty-two (22) test pits ranging in depth from 9 to 14 feet and twenty-seven (27) borings drilled to a depth of up to 71½± feet.

The report identified five (5) main geologic units at the subject site. They are, from youngest to oldest:

- Artificial Fill – Undocumented (Map symbol Afu)
- Alluvium (Map symbol Qal)
- Older Alluvium (Map symbol Qoa) – The report states that the older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.
- Very Old Alluvial Fan Deposits (Map symbol Qvof), and
- Sedimentary Deposits of Live Oak Canyon (Map symbol Qlo)

The report indicates that groundwater was encountered throughout the site at highly variable elevations. This variability combined with the range in planned cuts and fills, will likely result in the presence of saturated soils at or near the planned removal depths. This condition will likely require mitigation that may include drying and/or mechanical stabilization of the saturated subgrade soils as well as possible dewatering.

This report states that the expansion potential of the on-site materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D-4829. AGS recommends that further testing and geologic mapping should be conducted during and upon completion of grading operations to provide design recommendations on a pad-by-pad basis.

This report states that on-site materials are significantly compressible, which includes undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. AGS recommends that these significantly compressible materials and the alluvial soils prone to hydro-consolidation be removed and replaced with compacted fill.

This report states that based on the chemical testing performed, the potential for sulfate attack on concrete in contact with the on-site soils is negligible and the on-site surface soils are not considered corrosive to buried ferrous metals.

Isolated layers of peat were encountered at the site and were recommended to be removed in their entirety due to their highly compressible nature.

Estimated depths of removal, ranging from ½ to 40+ feet, for both structural areas and landscape/parking areas for different geologic units were included in Table 7.1 on page 18 of this report.

This report included geotechnical mitigation recommendations related to overexcavation of building pads and streets related to cut/fill transition pads, steep cut and cut/fill transitions.

Comments

This report states that on-site materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. We would also include portions of the "very old alluvium."

Based on our review of the boring log data, it appears that some of the soils identified as older alluvium has similar and even lower blowcounts and relative densities than some of the soils identified as younger alluvium. **Based on our review of the blowcount and consolidation data, it is our opinion that some localized deeper removals of the Qoa and Qvof will be required.**

The report indicates Mirafi RS280i as a possible geotextile to be used to help mitigate an unstable excavation bottom. We would recommend consideration be given to include RS580i as an additional alternative for more unstable bottoms.

Page 23 of the report states that the on-site fill soils are subject to post-grading settlement and it is recommended that all fills overlying saturated soils be monitored prior to release for construction. The report recommends surface monuments. We concur with this recommendation and recommend that consideration should also be given to monitoring the settlement of the underlying bottoms using settlement plates similar to AGS's Plate 11 in the Appendix of their report.

Based on the presence of highly compressible soils at the subject site, we recommend that consideration should be given to requiring a 95 percent relative compaction standard for all new fill soils placed deeper than 20 feet below proposed site grades within the foundation influence zones of proposed buildings.

We concur with AGS's recommendation that additional investigations may be required at a later date to develop more detailed design-level recommendations after more details are provided about the proposed development including, but not limited to: final site elevations, proposed building configurations/locations, and structural requirements/settlement tolerances.

It is our opinion that the report has been prepared in general accordance with accepted geotechnical standards of practice.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, GE 2655
Principal Engineer



Daryl A. Kas, CEG 2467
Senior Geologist

Distribution: (1) Addressee

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CITY OF CALIMESA COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for:
Oak Valley Development Company
10410 Roberts Road
Calimesa, CA 92320

Prepared by:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

December 23, 2020
Report No. 2004-01-B-5
P/W 2004-01

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

Oak Valley Development Company
10410 Roberts Road
Calimesa, California 92320

December 23, 2020
P/W 2004-01
Report No. 2004-01-B-5

Attention: Mr. John Ohanian

Subject: ***Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, Calimesa, County of Riverside, California***

References: See Appendix

Gentlemen:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Geotechnical Investigation and Review of Mass Grading Plans for the Oak Valley Town Center Project, Parcel Map 37862, located in the City of Calimesa, California. In this report, AGS compiled previous investigative data, new data, and analyzed how it affects the proposed design as shown on the Mass Grading Plan prepared by Proactive Engineering Consultants West.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Prepared by:

SHANE P. SMITH
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN J. DONOVAN
GE 2790
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Reviewed by:

JOHN J. DONOVAN
RCE 65051, RGE 2790, Reg. Exp. 6-30-21

PAUL J. DERISI
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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1. Scope of Work 1
1.2. Geotechnical Study Limitations 2
2.0 SITE LOCATION AND DESCRIPTION 2
2.1. Site Location 2
2.2. Site Description 2
3.0 PROPOSED DEVELOPMENT 2
4.0 FIELD AND LABORATORY INVESTIGATION 3
4.1. Previous Investigations 3
4.2. Current Investigation 3
5.0 ENGINEERING GEOLOGY 4
5.1. Geologic Analysis 4
5.1.1. Literature Review 4
5.1.2. Aerial Photograph Review 4
5.1.3. Field Mapping 4
5.2. Geologic and Geomorphic Setting 4
5.3. Stratigraphy 5
5.3.1. Artificial Fill – Undocumented (Map Symbols afu) 5
5.3.2. Alluvium (Map Symbol Qal) 5
5.3.3. Older Alluvium (Map Symbol Qoa) 5
5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof) 6
5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo) 6
5.4. Groundwater 6
5.5. Non-seismic Geologic Hazards 7
5.5.1. Mass Wasting and Debris Flows 7
5.5.2. Flooding 7
5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring 7
5.6. Seismic Hazards 8
5.6.1. Surface Fault Rupture 8
5.6.2. Liquefaction/Dynamic Settlement 8
5.6.3. Lateral Spreading 10
5.6.4. Seismically Induced Landsliding 10
5.6.5. Earthquake Induced Flooding 10
5.7. Seismic Design Parameters 10
5.8. Site Specific Ground Motion Hazard Analysis 11
5.8.1. Probabilistic Seismic Hazard Analysis 11
5.8.2. Deterministic Seismic Hazard Analysis 12
5.8.3. Site-Specific Design Response Spectrum 12
6.0 GEOTECHNICAL ENGINEERING 14
6.1. Material Properties 14
6.1.1. Excavation Characteristics 14
6.1.2. Compressibility 14
6.1.3. Collapse Potential/Hydro-Consolidation 14
6.1.4. Expansion Potential 14
6.1.5. Shear Strength 14

6.1.6. Chemical and Resistivity Test Results 15
6.1.7. Earthwork Adjustments 15
6.1.8. Pavement Support Characteristics 16
6.2. Analytical Methods 16
6.2.1. Slope Stability Analysis 16
6.2.2. Pavement Design 16
6.2.3. Bearing Capacity and Lateral Pressure 16
7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS 16
7.1. Site Preparation and Removals/Overexcavation 17
7.1.1. Overexcavation of Building Pads and Streets 18
7.1.1.1. Cut/Fill Transition Pads 18
7.1.1.2. Steep Cut and Cut/Fill Transitions 18
7.1.1.3. Street Overexcavation 19
7.1.2. Removals Along Grading Limits and Property Lines 19
7.2. Subgrade Stabilization 19
7.3. Slope Stability and Remediation 20
7.3.1. Cut Slopes 20
7.3.2. Fill Slopes 20
7.3.3. Skin Cut and Skin Fill Slopes 21
7.3.4. Fill Over Cut Slopes 21
7.3.5. Offsite Drainage Channel Slopes 21
7.3.6. Surficial Stability 21
7.3.7. Excavation and Temporary Cut Slopes 22
7.3.8. Geologic Observation During Grading 22
7.4. Survey Control During Grading 22
7.5. Settlement Monitoring 23
7.6. Subsurface Drainage 23
7.6.1. Canyon Drains 23
7.6.2. Heel Drains 23
7.6.3. Cut Slope Toe Drains and Subdrains 23
7.7. Seepage 23
7.8. Construction Dewatering 23
7.9. Earthwork Considerations 24
7.9.1. Compaction Standards 24
7.9.2. Fill Materials/ Import Soils 24
7.9.3. Benching 24
7.9.4. Mixing and Moisture Control 24
7.9.5. Haul Roads 25
7.9.6. Oversize Rock 25
7.9.6.1. Rock Blankets 25
7.9.6.2. Rock Windrows 25
7.9.6.3. Individual Rock Burial 26
7.9.6.4. Rock Disposal Logistics 26
7.9.7. Fill Slope Construction 26
7.9.7.1. Overbuilding Fill Slopes 26
7.9.7.2. Compacting the Slope Face 26

7.9.8. Utility Trench Excavation and Backfill 27
7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation 27
8.0 DESIGN RECOMMENDATIONS 27
8.1. Structural Design Recommendations 27
8.1.1. Foundation Design 28
8.1.2. Settlement 28
8.1.3. Isolated Footings 29
8.1.4. Deepened Footings and Setbacks 29
8.1.5. Footing Excavations 29
8.1.6. Moisture and Vapor Barrier 30
8.1.7. Concrete Design 30
8.2. Retaining Wall Design 30
8.2.1. Retaining Walls (backfilled with Native Materials) 30
8.2.2. Retaining Wall Drainage 31
8.3. Civil Design Recommendations 32
8.3.1. Site Drainage 32
8.3.2. Exterior Flatwork 33
8.3.3. Pavement Design 33
8.3.3.1. Asphalt Concrete Pavement 33
8.3.3.2. Portland Cement Concrete Pavement 34
8.4. Corrosion 35
9.0 SLOPE AND LOT MAINTENANCE 35
9.1. Slope Planting 35
9.2. Pad Drainage 35
9.3. Slope Irrigation 35
9.4. Burrowing Animals 36
10.0 FUTURE STUDY NEEDS 36
10.1. Future Studies and Reviews 36
10.2. Grading Observation 36
11.0 CLOSURE 36
11.1. Geotechnical Review 36
11.2. Limitations 37

ATTACHMENTS

Figure 1 - Site Location Map
Figure 2 - Regional Geologic Map
Figure 3 - Fault Map
Figure 4 - Seismic Response Spectra

Appendix A - References
Appendix B - Subsurface Logs
Appendix C - Laboratory Test Results
Appendix D - Engineering Analyses
Appendix E - Earthwork Specifications and Grading Details
Appendix F - Homeowners Maintenance Guidelines

ENCLOSURES

Plates 1 through 9 - Geotechnical Maps (Mass Grading Plans)
Plates 10 through 12 - Geologic Cross-Sections A-A' through N-N'

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CALIMESA, COUNTY OF RIVERSIDE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of this AGS's geotechnical investigation and review of the 60-scale Mass Grading Plans for Parcel Map 37862, in the City of Calimesa, County of Riverside, California prepared by Proactive Engineering Consultants provided to AGS on December 10, 2020.

The purpose of our review and report is to present geologic and geotechnical information obtained during previous geotechnical studies by Pacific Soils Engineering (PSE) with supplemental geologic and geotechnical data obtained by AGS during the current investigation. AGS has provided remedial grading recommendations for the ultimate mass grading configuration whereas an interim grading configuration is currently depicted on the 60-Scale Mass Grading Plan, shown on the attached plates. The interim grading condition avoids drainage areas. Proposed remedial grading conditions shown on Plates 1 through 9 are based on the ultimate mass grading condition. This study is aimed at providing geologic and geotechnical information and recommendations for the development of Parcel Map 37862 relative to: 1) Unsuitable soil removals; 2) Cut, fill and natural slope stability; 3) Buttress/stabilization fill requirements; 4) Cut/fill pad overexcavation criteria; 5) Remedial and design grading recommendations; 6) Handling and disposal of oversize hard earth materials; 7) Stabilization of saturated removal bottoms; and 8) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.1. Scope of Work

This study is aimed at providing geotechnical/geologic conclusions and recommendations for development of the Parcel Map 37862 commercial/retail development. The scope of this study included the following tasks:

- Review of readily available maps, geotechnical and geologic literature and aerial photographs (Appendix A).
- Compiling available data from previous published and unpublished studies by PSE.
- Preparation of Geotechnical Maps using the 60-scale plan with a base design provided by Proactive Engineering Consultants West, Inc. (Plates 1 through 9).
- Preparation of geologic cross-sections A-A' through N-N' (Plates 10 through 12).
- Perform data analyses in relation to the site-specific proposed improvements.
- Provide analysis and discussion of the excavation characteristics (i.e. rippability) of onsite formational materials.
- Formulation of grading, remedial grading and earthwork recommendations.
- Slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Determination of engineering parameters including earthwork adjustments, bearing and friction values, active, passive, and at-rest pressures for retaining walls.

- Perform a limited seismic hazard analysis.
- Preparing and publishing this report which presents geotechnical recommendations pertinent to the accompanying 60-scale grading plans.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on data developed during previous investigations performed by PSE and the current investigation performed by AGS. The conclusions presented herein are based upon the current design as reflected on the accompanying plans. Changes to the plans would necessitate further review.

The materials immediately adjacent to or beneath those observed and sampled may have different characteristics than those observed and sampled. No representations are made as to the quality or extent of materials not observed nor subjected to laboratory testing. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE LOCATION AND DESCRIPTION

2.1. Site Location

The subject site is an irregular shaped, 266-acre parcel located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in the City of Calimesa, Riverside County, California (Figure 1).

2.2. Site Description

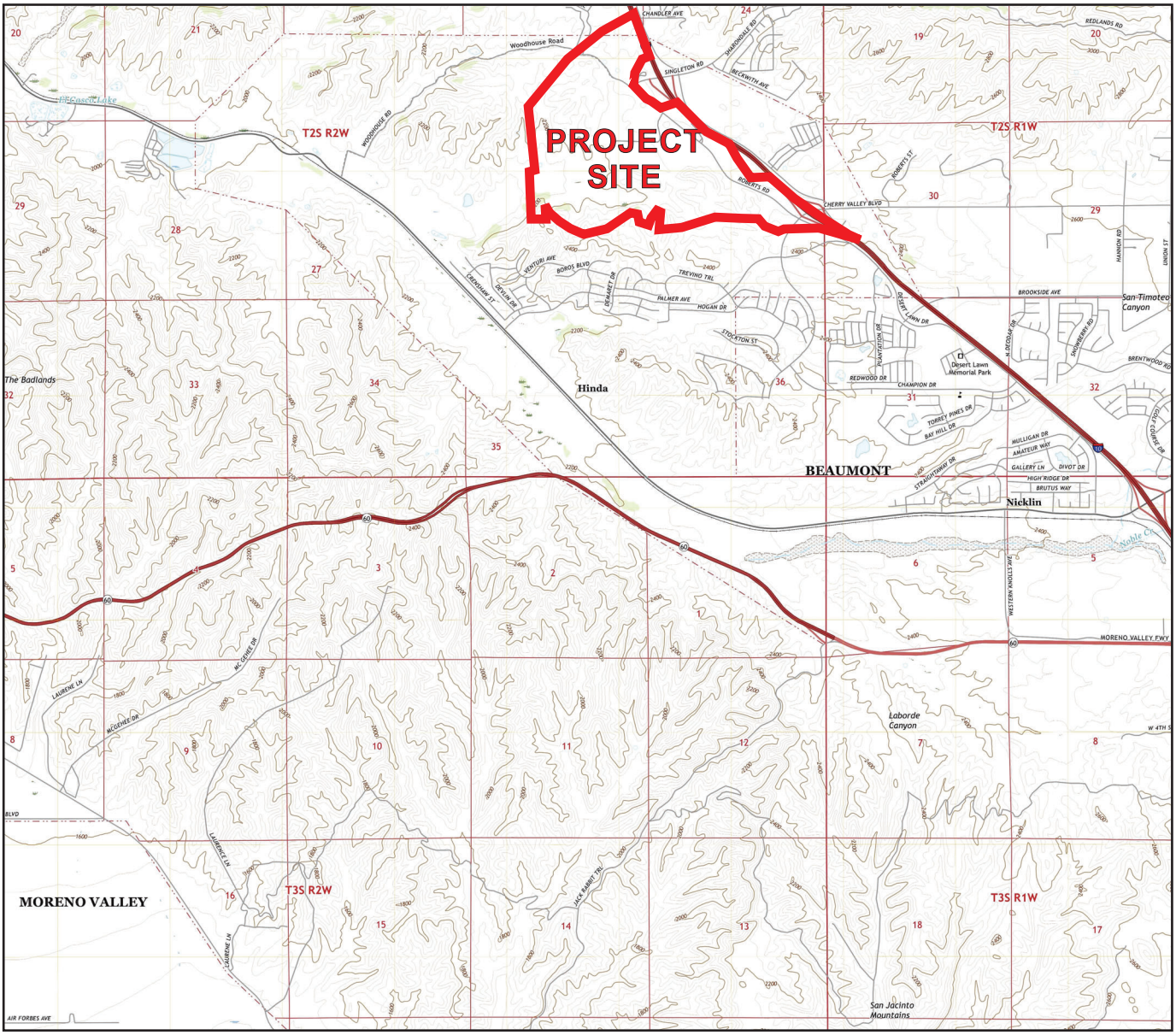
The site currently supports agricultural use (dry farming) on the southern and western portions of the site with several residential structures and outbuildings located within the northeastern, central, and southern portions of the site. Existing Roberts Road runs through the project site from southeast through the northeast. A failed concrete pipe culvert and associated headwall was observed beneath the northern portion of Roberts Road which has been undermined. The road was barricaded and closed to travel in this area.

Remnants of a prior low height dam are located across the main drainage that traverses the site, and its location is reflected by a line of artificial fill (afu) shown on Plate 1. A reservoir upstream of this dam is shown on older topographic maps of the area. Based on a review of historic aerial photographs, the active channel eroded a portion of this dam over 40 years ago.

The northwestern portion of the site consists of rolling hills underlain by formational materials consisting of the Live Oak Canyon and San Timoteo Formations. Several drainages exist onsite with two larger drainages transecting the site from northeast to southwest and one touching on the southwestern project boundary flowing from east to west.

3.0 PROPOSED DEVELOPMENT

It is our understanding that the proposed development as currently envisioned will consist of the following separate components:



SITE LOCATION MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

P/W 2004-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA (2018)

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- A commercial/retail center in the northeast portion of the site bounded by Singleton Road which will include extensive parking areas and possibly a new City Hall. These structures will likely be concrete "tilt-up" or conventional wood frame structures varying from 1 to 3 stories in height and would likely be supported by shallow slab-on-grade foundation systems. In addition to the commercial structures, a "man-made" lake would occupy the southwestern portion of the commercial/retail center.
- Large shipping and manufacturing buildings to be constructed on the western and southern areas of the property ranging in size from 250,000 to 500,000 square feet. The limits of these proposed structures are shown in blue on the attached Geotechnical Maps. It is anticipated that these structures will consist of concrete–tilt-up structures supported by shallow slab-on-grade foundation systems. Surrounding both the commercial and retail components will be interior roadways with primary access provided from Roberts Road and Singleton Road.
- A sewer lift station will be constructed near the southwest corner of the tract.

The mass grading plan shown on Plates 1 through 9 depicts an interim grading condition that avoid drainage areas. It is our understanding that the ultimate grades will be located within these areas.

4.0 FIELD AND LABORATORY INVESTIGATION

4.1. Previous Investigations

Several studies by PSE were previously completed onsite and near-by offsite. A description of the relevant data used within this current investigation is presented below.

- PSE conducted a subsurface investigation in 2004. AGS has utilized five (5) subsurface borings from this investigation (B-037, B-043, B-081, B-095, and B-096). These borings were excavated with a truck mounted drill rig equipped with 18-inch and 30-inch diameter bucket augers to depths ranging from 16 to 65 feet below ground surface (bgs). The locations of the exploratory excavations are shown on the Plates 1 through 9. Boring logs are presented in Appendix B.
- Laboratory testing was performed as a part of the PSE 2004 investigation and included chemical and resistivity testing, sieve analysis, maximum dry density and optimum moisture content, direct shear strength, and consolidation characteristics. Pertinent laboratory test results can be found in Appendix C.

4.2. Current Investigation

AGS conducted two phases of subsurface investigations, one on May 6 and 7, 2020, and the subsequent between August 5, 2020, and August 14, 2020, to evaluate the subsurface conditions as they relate to the proposed mass grading. Twenty two (22) test-pit excavations (T-1 through T-22) were excavated and logged to depths ranging from 9 to 14 feet bgs utilizing a JCB 3CX rubber-tired backhoe. Representative bulk samples were obtained and transported to our laboratory for testing to determine in-situ moisture content, maximum density and optimum moisture content, "remolded" shear strength, grain size distribution, and corrosivity. Test pit logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Twenty seven (27) borings were excavated, logged, and sampled with a truck mounted 8-inch hollow stem auger to depths of up to 71.5 feet. These borings were logged independently by both AGS and Southern California Geotechnical, Inc. (SCG). Representative bulk and relatively undisturbed samples were obtained and transported to AGS's laboratory for testing from eighteen of these borings (AGS-1 through AGS-18, except AGS-7 which was not used). Representative bulk and relatively undisturbed samples were obtained and transported to SCG's laboratory for testing from ten of these borings (SCG-1 through SCG-10). Test pit and boring logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Plates 1 through 9 show the locations of these exploratory excavations.

5.0 ENGINEERING GEOLOGY

5.1. Geologic Analysis

5.1.1. Literature Review

As part of this study, AGS has reviewed the geologic documents referenced in Appendix A. Where deemed appropriate, relevant geologic information has been included in this report.

5.1.2. Aerial Photograph Review

AGS has reviewed current and historical aerial photographs available through sources on the internet.

5.1.3. Field Mapping

Geologic field mapping was performed during our subsurface explorations.

5.2. Geologic and Geomorphic Setting

The Oak Valley Town Center lies on the Beaumont Plains at the north edge of the San Jacinto Mountains – one of the several northwest-trending mountain ranges that comprise the Peninsular Ranges Province of Southern California. Displacements along a series of northwest-trending active faults that extends from the Mojave Desert in the east, to the California Channel Islands in the west have and are elevating the mountain ranges above intervening lowlands. The faults include nearby San Andres fault zone, and the related San Gorgonio Pass Fault, and San Jacinto faults. These faults are, respectively, about 7-miles northeast, 3-miles east, and 5-miles southwest of the site.

According to Matti (2016), the sedimentary section below the Beaumont Plains near the study site includes in decreasing age: Pliocene to Pleistocene alluvial fan and flood plain deposits (5 Mya to ~1.3 Mya), perhaps up to several thousand feet thick, assigned to the San Timoteo Formation which were sourced from San Gabriel Mountains northwest of the area; Pleistocene alluvial and flood plain deposits, assigned sediments of the Live Oak Canyon, that were deposited after the San Timoteo Anticline disrupted the previous depositional pattern around 1.3 Mya; Holocene alluvium and colluvium within active stream channels and swales; topsoil; and local prisms of artificial fill.

West-flowing San Timoteo Creek drains the Beaumont Plains. That high-order drainage has kept pace with uplift in the plains and the west-adjacent San Timoteo Badlands, resulting in ongoing

incision and headward erosion of its channel. Many low-order drainages have consequently formed as tributaries to San Timoteo Creek. These drainages dissect the Beaumont Plains and form distinctive badlands topography common to the area. The canyons and swales on the study site are part of this system.

5.3. Stratigraphy

Mapping and nomenclature following Matti, Morton and Langenheim (2015) are being used for this report (Figure 2, Regional Geologic Map). The site has been mapped as being underlain by Pleistocene and Pliocene age sedimentary deposits of Live Oak Canyon (formerly described as the upper member of the San Timoteo Formation) within the northern rolling hills portion of the site. The majority of the site is mapped as Pleistocene age very old alluvial fan deposits overlain by Holocene age young alluvial axial-valley and fan deposits. The existing channels onsite are mapped as modern age very young wash deposits. Undocumented fill exists in areas where the land surface has been modified in order to support access roads and berms, especially in the vicinity of the existing structures and Roberts Road. For the purpose of this report, the three younger (Holocene) alluvial deposits described below have been labeled as one unit (Qal) on Plates 1 through 9. Approximate surface geologic contacts are shown on Plates 1 through 9. Brief descriptions of the geologic units encountered at the site are presented below, from youngest to oldest.

5.3.1. Artificial Fill – Undocumented (Map Symbols afu)

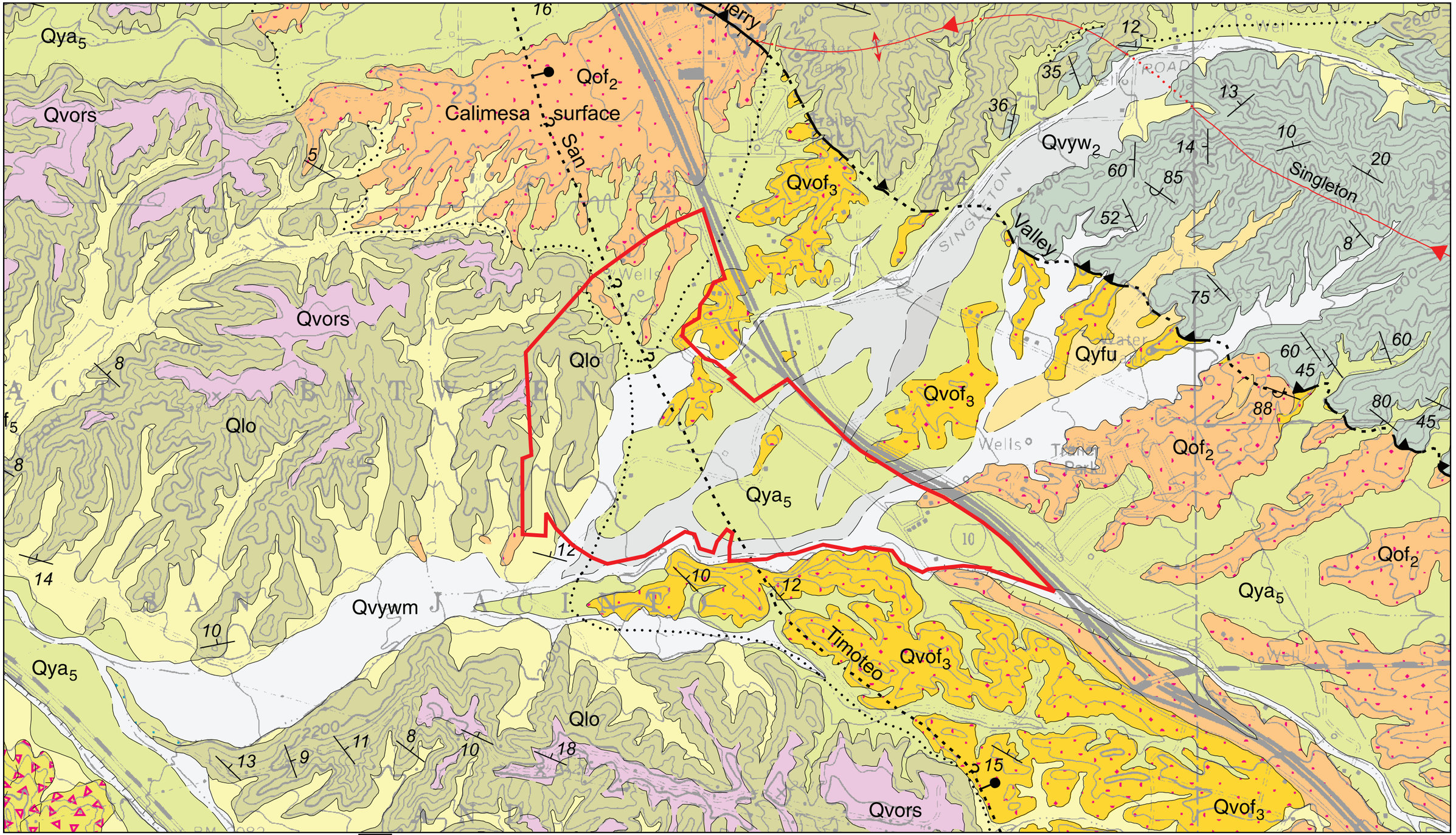
Artificial fill soils were observed throughout the site specifically along margins of adjacent residential developments, underlying existing structures and at roadway improvements including Roberts Road and other disturbed access roads onsite. Artificial fill was not encountered within our subsurface excavations however it is anticipated to be locally derived.

5.3.2. Alluvium (Map Symbol Qal)

Holocene age alluvium are located surrounding the major drainages onsite and cover most of the southerly portion of the site. The alluvium includes very young wash deposits, located within the active drainage channels, young axial valley deposits, and young alluvial fan deposits. These deposits have not been differentiated on the plans or boring logs. These deposits consisted of poorly consolidated sediments within the active drainage channels to more consolidated sediments elsewhere. The alluvium ranges from dry to wet with consistencies that generally range from soft/loose to medium dense/stiff. Up to 60 feet of alluvium was encountered in boring AGS-3. Abundant peat was encountered within boring AGS-4 at depths of up to 35 feet. Additional layers may be present between the roughly 5-foot sampling intervals. Cone penetration tests may be useful in identifying thin layers of peat deposits that may be present as well as the lateral extents.

5.3.3. Older Alluvium (Map Symbol Qoa)

An intermediate age alluvial deposit was observed in several borings and test pits underlying the young alluvial deposits. The older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.



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SOURCE MAP - GEOLOGIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE CALIFORNIA. HIRSCHBERG, MATTI AND COSSETTE (2015)

SCALE: 1 in. = 1000 ft.

Qvywm	Very young wash deposits (modern)
Qya_5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf_5	Young alluvial-fan deposits, unit 5 (middle Holocene)
$Qvof_3$	Very old alluvial-fan deposits, unit 3 (middle Pleistocene)
Qlo	Live Oak Canyon Formation (Pleistocene)

REGIONAL GEOLOGIC MAP

FIGURE 2

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The older alluvium has consistencies that range from medium dense/stiff to very dense/hard. This unit is considered to be late Pleistocene in age.

5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof)

Middle to Lower Pleistocene age very old alluvial fan deposits were encountered within the majority of test pit excavations underlying younger alluvial deposits. This unit was observed to be composed mainly of silty sand in a medium dense to dense condition. The very old alluvium is distinguished from the overlying younger alluvial deposits by its higher relative density, weakly cemented nature, and iron oxide development. Generally minor porosity within the upper five feet existed within this unit.

5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo)

Sedimentary deposits of Live Oak Canyon is a new unit name designated by Morton & Matti (2015) that applies to a sequence of sandy and conglomeratic rock that crops out in low hills and mesas north of San Timoteo Canyon. These materials were previously assigned to the upper member of the San Timoteo Formation and range in age from late Pliocene to early Pleistocene. The sedimentary deposits of Live Oak Canyon have been mapped within the rolling hills located in the northwestern portion of the project site. As encountered onsite, this unit is mostly composed of thickly bedded fine to medium-grained silty sandstone and conglomerate that is yellowish brown to light gray brown and moderately hard. In PSE's B-43 boring, some light grey moderately hard sandy siltstone was encountered. Iron oxide staining was observed in this unit. Although not encountered in exploratory excavations onsite, occasional clay beds may be present within this unit. Regionally, bedding within this unit has been mapped to dip at shallow inclinations (~10 degrees) to the northeast. One bedding attitude taken from B-43 indicates that the bedding dips at 10 degrees to the north-northeast.

5.4. Groundwater

Groundwater was encountered within several exploratory borings and Test Pit T-2 at various depths and elevations in the main drainage course that crosses the site. Standing water was present at the time of our current investigation within the drainage channel running under existing Roberts Road south of the Singleton and Roberts Road intersection. However, groundwater was not encountered in AGS-13, which was excavated just to the north of this drainage course to a depth of 50 feet (elevation 2195). The depth/elevation of the observed groundwater varied across the site and may be difficult to accurately predict. The presence of the concealed San Timoteo Canyon fault may have an impact on groundwater conditions. Matti, et al (2006) has shown groundwater to generally flow to the west in the area, and describes the presence of a groundwater barrier, which has been inferred to be a splay of the San Timoteo Canyon fault. There are four known active wells on the site. The depths of two are known (288 and 319 feet) whereas the other two are not known. The type of well construction, including limits of the screened zones, are unknown. Recent measurements maintained by the USGS California Water Science Center (July and December 2020) indicate that groundwater depths are around 100 to 170 feet (elevations 2105 to 2140). In Spring of 2000, groundwater elevations in the area upstream of the fault have been generalized at

an elevation of around 2175 feet (Matti 2006, Figure 28), which appear to be based on the nearby well readings (depths ranged from 59 to 102 feet in April 2020, which corresponded to an elevation of around 2175). Matti (2006) mentions the location of the fault coincides where springs have been documented historically in this area. However, Matti does not describe the precise locations of these springs. The well readings may be measuring a lower groundwater surface than those encountered in the recent borings.

Shallow groundwater conditions were encountered near the intersection of proposed Roberts and Singleton Roads and the northwest side of Lot 3. In this area, groundwater was encountered at depths of 15 feet (elevation 2216) in PSE-96, 11 feet (elevation 2217) in AGS-3, 10 feet in test pit T-10 (elevation 2216), 15 feet (elevation 2208) in AGS-16, and 40 feet (elevation 2210) in PSE-95. Just upstream of this area, groundwater was not encountered in AGS-13, which was excavated to a maximum depth of around 50 feet (elevation 2195). Groundwater was not encountered in SCG-10 located to the southeast, which was excavated to a maximum depth of around 50 feet (elevation 2180) nor in AGS-4, located downstream and drilled to a maximum depth of around 45 feet (elevation 2150).

Groundwater depths across the site will vary in relation to the time of year, rainfall, and discharge from upstream bodies of water. It should be anticipated that groundwater will be encountered during construction and will require mitigation, especially near the northwest corner of Lot 3. This mitigation may include dewatering areas where the remedial excavation extends below the groundwater level and stabilization of removal bottoms that are near the groundwater level. Subdrains are proposed in this area to mitigate the potential for groundwater rising and impacting surface improvements.

5.5. Non-seismic Geologic Hazards

5.5.1. Mass Wasting and Debris Flows

The site is gently sloping with some steeper topography within the northwestern portion of the project site. Due to the gently sloping existing terrain and proposed mass grading, mass wasting and debris flows are not considered a site hazard.

5.5.2. Flooding

The project site has been mapped as FEMA flood zone “X” which is characterized as an “Area of Minimal Flood Hazard”.

5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring

Some layers of peat were identified in the recent alluvial deposits. Settlement of peat deposits can occur when the moisture content is reduced and oxidation/decomposition is allowed to occur. Subsidence is also related to groundwater withdrawal and changes in stresses. Hazards associated with subsidence can be mitigated with proper design and construction practices. It is proposed to remove peat within building pad areas to mitigate the potential for settlement. Other improvements located outside the areas of deep removals

may be subject to possible settlement/subsidence due to groundwater withdrawal and changes in stresses.

Evidence of ground fissuring has not been identified on the site, and AGS is unaware of ground fissuring in the surrounding areas

5.6. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding.

The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

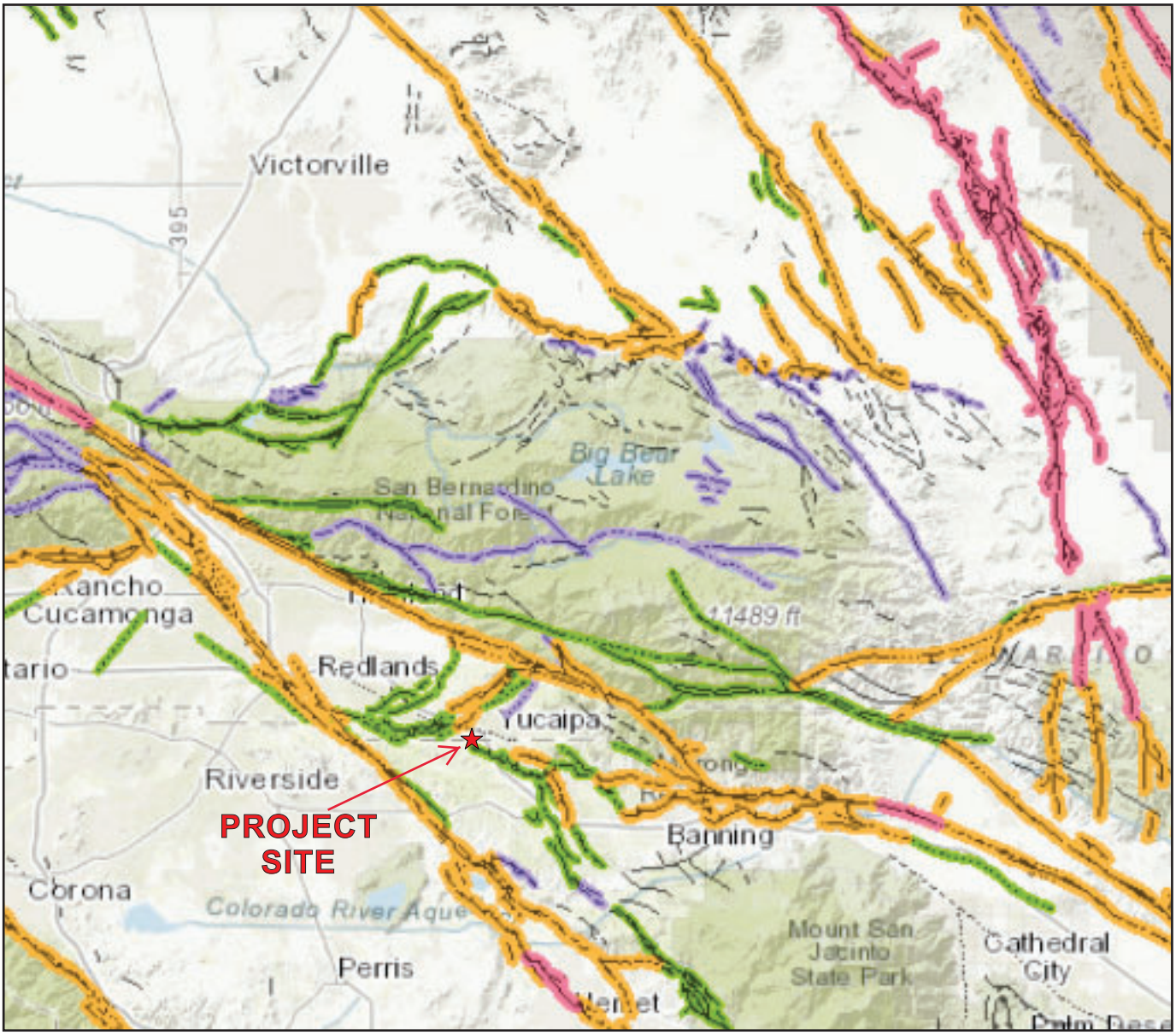
5.6.1. Surface Fault Rupture

There are no known active faults that transect or project into the site. The nearest known active fault is the San Gorgonio Pass Fault located approximately 1.5 miles northeast of the project site (See Figure 3, Regional Fault Map). The San Timoteo Canyon Fault is mapped transecting the site from the southeast to the northwest. The San Timoteo Canyon Fault is an inferred and concealed structure that is tagged with question marks to indicate that its existence is questionable and the evidence for the fault's existence is indirect. The San Timoteo Canyon Fault in the area is entirely concealed by younger Quaternary-age alluvial deposits. The fault is considered to be older than late Quaternary in age but its lower age limit is unknown. Accordingly, the potential for fault surface rupture within the project is considered low.

5.6.2. Liquefaction/Dynamic Settlement

Liquefaction is the phenomenon in which the buildup of excess pore pressures, in saturated granular soils due to seismic agitation, results in a temporary "quick" or "liquefied" condition. Loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. Once the excess pore water pressure dissipates, the liquefied zones/lenses will likely consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways, and may include ground deformation, loss of bearing strength, lateral spreading, flow failure, and dynamic settlement.

The very young wash deposits, young axial-valley deposits, and young alluvial fan deposits are potentially liquefiable in their present condition. Saturated younger alluvial deposits were encountered near the northeast corner of Lot 3. The potential for liquefaction of the saturated deposits was evaluated. The analyses were performed using LiqSVS software (Version 2.0.1.7 by GeoLogismiki, 2019). The deterministic methods presented in NCEER



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FAULT MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

SOURCE MAP - CALIFORNIA DEPARTMENT OF CONSERVATION FAULT ACTIVITY MAP OF CALIFORNIA (2010)

P/W 2004-01

FIGURE 3

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(1997) were used, and a corresponding dynamic settlement was estimated by the program using the curves proposed by Ishihara and Yoshimine (1992) as described in Zhang et al. (2002) and a groundwater level of 11 feet. Borings AGS-3 and AGS-16 form the basis of our analysis. The peak ground acceleration was determined in accordance with ASCE 7-16 and was determined to be 0.87g. Based on the deaggregation analysis results from the USGS Unified Hazard Tool website, a mean earthquake magnitude of 7.5 for the 2% in 50 year risk was used for the analysis using 100 percent of the PGA_M.

The upper 10 feet of soils were excluded from the analysis since these soils should be removed during remedial grading efforts. Based on test results, certain layers were assumed to behave more "clay-like" and were considered non-liquefiable. Laboratory test results were used to substantiate which soil layers are considered potentially liquefiable or subject to cyclic softening. The moisture contents of the samples (most of which are considered saturated and below the ground water table) were determined and compared with the plasticity indices. The results indicate that fine-grained soils encountered are not considered sensitive and subject to cyclic softening. The liquidity index (LI) indicates that the clayey soils are generally low. Based on the test results, the finer-grained soils onsite are considered to behave clay-like and are not considered susceptible to liquefaction or cyclic softening.

Based on a calibration report for 2R Drilling, an Energy Transfer Ratio of 85.5 percent was used, which corresponds to a Hammer Efficiency Ratio (Ce) of 1.43. The blow counts obtained from the SPT were used in the analyses. Samples were also collected using the Modified California Sampler, and the blow counts were used after applying a reduction factor of 0.6.

The calculations, included in Appendix D, indicate that potentially liquefiable soil layers are located at depths of around 30 feet in AGS-3 and AGS-16. The significant 30-foot thick non-liquefiable crust is anticipated to mitigate the potential for surface manifestations, including settlement, reduced bearing capacity, ground deformation, and lateral spreading. Additionally, it is recommended that a geotextile such as Mirafi RS280i be placed on the saturated subgrade in order to stabilize the subgrade. The related total dynamic settlements summarized in Table 5.6.2, below, are based on methods described in Zhang et al. (2002), and are considered conservative estimates based on the significant thickness of a non-liquefiable soil crust and recommended placement of the geotextile fabric. According to SP-117A (CDMG 2008), up to two thirds of the total settlement should be considered as differential settlement unless more precise predictions of differential settlement can be made. Considering the thick non-liquefiable crust, and placement of 10 to 15 feet of newly compacted fill over a geotextile fabric, it is AGS's opinion that the differential settlement may be less than 2/3 of the total settlement. AGS has estimated that the differential settlement is one half of the total. The structural engineer should design the structures within the northwest corner of Lot 3 to accommodate this settlement without collapsing.

TABLE 5.6.2 ESTIMATED DYNAMIC SETTLEMENT		
Boring	**Full PGA**	
	Total Settlement (inches)	**Differential Settlement (inches)**
AGS-3	2.2	1.1
AGS-16	3.7	1.9

5.6.3. Lateral Spreading

Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in a shallow underlying deposit during an earthquake. With the remedial grading recommendations of removing and recompacting the young alluvial soils, and the thickness of the non-liquefiable crust, the potential for lateral spread and surface manifestations is considered to be low. However, if saturated alluvial soils are left-in-place these areas may be prone to lateral spread. In that case, further evaluation of ground improvement measures may be necessary.

5.6.4. Seismically Induced Landsliding

No landslides, including shallow surficial failures have been mapped onsite. This indicates the lack of any seismically activated land sliding during past historic and ancient seismic events. Seismicially-induced landsliding is not considered a significant concern in either the pre- or post-development site conditions.

5.6.5. Earthquake Induced Flooding

Earthquake induced flooding can be caused by tsunamis, dam failures, or seiches. Also, earthquakes can cause landslides that dam rivers and streams, causing flooding upstream above the dam and also downstream when these dams are breached. A seiche is a free or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. Due to the lack of a freestanding body of water nearby, the potential for a seiche impacting the site is considered to be non-existent.

5.7. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 259 m/s. Table 5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 33.980°N and Longitude 117.051°W. The seismic provisions of 2019 CBC are different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located in Site Class D soil conditions except for certain cases noted in ASCE 7-16 Section 11.4.8.

TABLE 5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Seismic Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	2.239g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.772g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	2.687g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	1.791g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	1.099g
Seismic Design Category	N/A[3]

Notes:
[1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8
ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$.

5.8. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra including the probabilistic and deterministic seismic hazard analyses are described below.

5.8.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

5.8.2. Deterministic Seismic Hazard Analysis

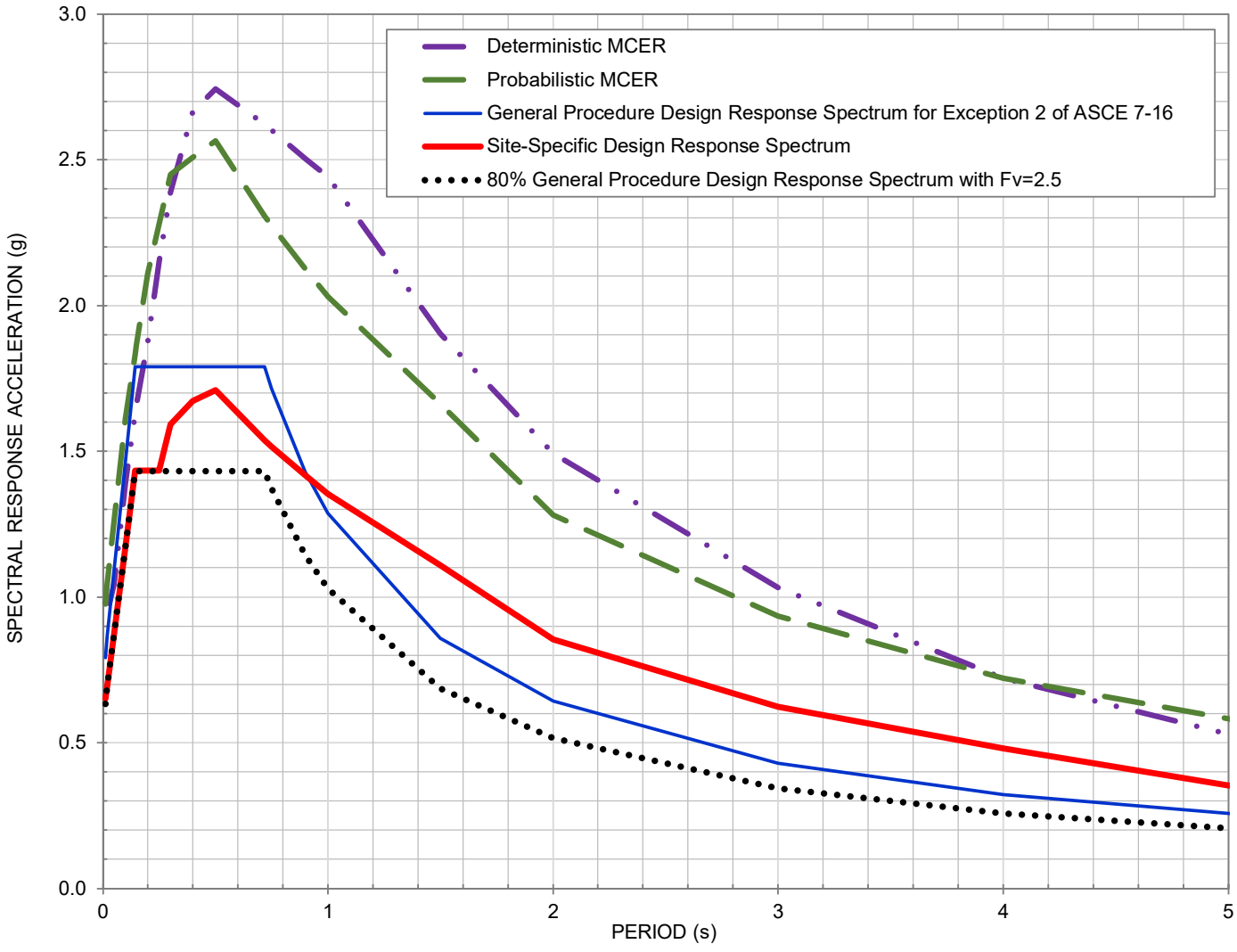
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation we selected three "controlling" sources and seismic events: the San Gorgonio Pass fault, the San Jacinto fault (San Jacinto Valley section) and the San Andreas fault (San Bernardino South section). Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

5.8.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 5.8.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.650
0.02	0.693
0.03	0.753
0.05	0.872
0.075	1.022
0.1	1.172
0.144	1.433
0.15	1.433
0.2	1.433
0.25	1.433
0.3	1.592

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	1.672
0.5	1.711
0.718	1.537
0.75	1.516
0.9	1.418
1.0	1.353
1.5	1.108
2.0	0.853
3.0	0.623
4.0	0.480
5.0	0.353



Note: See report for values of the various curves.

AGS

SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

PARCEL MAP 37862
ROBERTS RD AND CHERRY VALLEY BLVD
CALIMESA, CALIFORNIA

PROJECT NO.	DATE	
2004-01	12/20	**FIGURE 4**

TABLE 5.8.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.791	0.915	1.065	0.975	0.979	0.645	0.979	0.975	0.633	0.650
0.02	0.866	0.915	1.143	1.046	0.983	0.690	0.983	0.983	0.693	0.693
0.03	0.941	0.915	1.220	1.117	0.978	0.735	0.978	0.978	0.753	0.753
0.05	1.091	0.915	1.375	1.259	1.045	0.825	1.045	1.045	0.872	0.872
0.075	1.278	0.915	1.569	1.436	1.214	0.938	1.214	1.214	1.022	1.022
0.1	1.465	0.915	1.763	1.614	1.390	1.050	1.390	1.390	1.172	1.172
0.144	1.791	0.915	2.000	1.830	1.630	1.246	1.630	1.630	1.433	1.433
0.15	1.791	0.915	2.034	1.862	1.658	1.275	1.658	1.658	1.433	1.433
0.2	1.791	0.915	2.305	2.110	1.874	1.500	1.874	1.874	1.433	1.433
0.25	1.791	0.913	2.494	2.278	2.149	1.500	2.149	2.149	1.433	1.433
0.3	1.791	0.912	2.687	2.450	2.388	1.500	2.388	2.388	1.433	1.592
0.4	1.791	0.909	2.760	2.508	2.665	1.500	2.665	2.508	1.433	1.672
0.5	1.791	0.905	2.834	2.566	2.743	1.500	2.743	2.566	1.433	1.711
0.718	1.791	0.898	2.567	2.305	2.622	1.500	2.622	2.305	1.433	1.537
0.75	1.716	0.897	2.535	2.274	2.601	1.500	2.601	2.274	1.372	1.516
0.9	1.430	0.892	2.384	2.127	2.505	1.500	2.505	2.127	1.144	1.418
1	1.287	0.889	2.284	2.030	2.441	1.500	2.441	2.030	1.029	1.353
1.5	0.858	0.889	1.870	1.663	1.903	1.000	1.903	1.663	0.686	1.108
2	0.643	0.889	1.440	1.280	1.493	0.750	1.493	1.280	0.515	0.853
3	0.429	0.889	1.052	0.935	1.032	0.500	1.032	0.935	0.343	0.623
4	0.322	0.889	0.811	0.721	0.722	0.375	0.722	0.721	0.257	0.480
5	0.257	0.889	0.656	0.583	0.530	0.300	0.530	0.530	0.206	0.353

Site-specific design response parameters are provided in Table 5.8.3B. These parameters were derived from the Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 5.8.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	2.882g
Spectral Response Acceleration 1-second period, S_{M1}	2.882g
Design Spectral Response Acceleration for short period, S_{DS}	1.922g
Design Spectral Response Acceleration for 1-second period, S_{D1}	1.922g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.890g

6.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

6.1. Material Properties

6.1.1. Excavation Characteristics

It is anticipated that excavations within the undocumented artificial fill, topsoil, young alluvium, older alluvium, very old alluvial fan deposits, and the highly weathered portions of the formational materials can be accomplished with conventional heavy equipment. It is possible that the deep excavations within the unweathered formational materials on the northwestern portion of the property area could require heavy ripping in deeper cuts.

6.1.2. Compressibility

Onsite materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the very old alluvial deposits and Live Oak Canyon deposits. These materials will require complete removal below structural areas prior to placement of fill, where exposed at design grade, and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 7.1 and earthwork adjustment estimates are presented in Section 6.1.7.

6.1.3. Collapse Potential/Hydro-Consolidation

Some of the upper alluvial soils are susceptible to hydro-consolidation. Beneath settlement sensitive improvements, it is recommended that the upper soils prone to hydro-consolidation be removed and replaced with compacted fill.

6.1.4. Expansion Potential

Based upon AGS's observations and preliminary testing and review of relevant laboratory testing by PSE, the expansion potential of the onsite materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D4829. However, it is anticipated that the majority of materials will fall into the "very low" to "low" range. Further testing and geologic mapping should be conducted during and upon completion of the grading operations to provide design recommendations on a pad by pad basis.

6.1.5. Shear Strength

Based on our laboratory testing, reviewed laboratory testing from PSE and previous experience on similar projects, the following shear strength values may be used for design.

TABLE 6.1.5 Shear Strength Parameters Used for Design (Ultimate)			
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Moist Density (pcf)**
Artificial Compacted Fill	150	31	125
Young and Older Alluvial Deposits (Qal & Qoa))	100	30	125
Very Old Alluvial Fan Deposits (Qvoa)	200	32	125
San Timoteo and Live Oak Canyon Formations	400	34	130

6.1.6. Chemical and Resistivity Test Results

The results of previous preliminary chemical/resistivity testing are presented in Appendix C. Corrosive soils are defined as soils that have minimum resistivity less than 1,000 ohm-centimeters, chloride concentration greater than 500 ppm, sulfate concentration greater than 2,000 ppm, or pH less than 5.5 (Caltrans, 2018).

Test results indicate that the potential for sulfate attack on concrete in contact with the on-site soils is negligible in accordance with ACI 318, Table 4.3.1. In addition, test results also indicated that the potential for chloride attack of reinforcing steel in concrete structures and pipes in contact with the on-site soil is negligible.

Resistivity test results indicate that the on-site near-surface soils are not considered corrosive to buried ferrous metals. However, a corrosion specialist may be consulted regarding suitable types of piping and appropriate protection for underground metal conduits, if needed.

Final determination of the corrosivity of the site should be based upon testing of soils from the site and import soils during grading operations.

6.1.7. Earthwork Adjustments

In consideration of the proposed mass grading to develop the project as currently proposed, the following average earthwork adjustment factors presented in Table 6.1.7 have been formulated for use in the earthwork design of the project.

TABLE 6.1.7 EARTHWORK ADJUSTMENTS	
Geologic Unit	**Approximate Range**
Artificial Fill, Topsoil, Young Alluvial Deposits	5% to 15% shrinkage (average ~12%)
Old and Very Old Alluvium Live Oak Canyon Formation	5% shrinkage to 10% bulk (average ~3% bulk)

6.1.8. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. If structural pavements are to be constructed (concrete or asphaltic concrete), an R-value of 30 can be utilized for the preliminary design of pavements. Final design should be based upon representative sampling of the as-graded soils.

6.2. Analytical Methods

6.2.1. Slope Stability Analysis

Stability analyses were performed for both static and seismic (pseudo-static) conditions using the GSTABL7 computer program. The Modified Bishop method was used to analyze circular type failures. The critical failure surface determined in the static analysis was used in the pseudo-static analysis. A horizontal destabilizing seismic coefficient (kh) of 0.15g was selected for the site and used in the pseudo-static analyses.

Surficial stability analyses were conducted using an infinite height slope method assuming seepage parallel to the slope surface.

6.2.2. Pavement Design

Asphalt concrete pavement sections have been designed using the recommendations and methods presented in the Caltrans Highway Design Manual.

6.2.3. Bearing Capacity and Lateral Pressure

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases.

7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

Some of the alluvial soils onsite are considered prone to hydro-consolidation. Layers of peat were also encountered at depths of up to around 35 feet in AGS-4. Peat is considered highly compressible and is subject to significant volume changes, even with minor changes in stresses and moisture content. It is recommended that these materials be removed below proposed structural areas. Lesser removals can be considered for areas where the potential for settlement may not warrant the cost of complete removal, such as in landscape and parking areas, where the cost associated with possible additional maintenance may be less than the cost remedial grading.

7.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of Riverside and AGS's Earthwork Specifications (Appendix E).

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing foundations elements, standpipes, irrigation lines, and utility conduits should be removed and wasted off-site. Concrete can be placed in the fill provided it is broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations presented in Section 7.9.6. Cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

Topsoil, undocumented fills, the upper young alluvial deposits, and highly weathered portions of older and very old alluvial fan deposits and Live Oak Canyon deposits should be removed in areas planned to receive compacted fill. Additionally, younger alluvial deposits, peat deposits, and porous older alluvium above the groundwater should be completely removed in areas intended to support settlement-sensitive structures. The removals for building areas should extend a minimum of 10 feet outside the building limits or at a 1:1 projection down and away from the building limits until a competent bottom is achieved, whichever is greater. It is anticipated that the upper 3 feet of alluvial soils should be removed in parking and landscape areas. Deeper alluvial removals should be conducted in street areas to support utilities and facilitate trenching. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals are presented in Table 7.1 and shown on Plates 1 through 12.

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. The removal bottoms should be observed and mapped by the engineering geologist prior to fill placement.

In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

TABLE 7.1

ESTIMATED DEPTH OF REMOVALS

Geologic Unit (map symbol)	Estimated Removal Depth	
	Structural Areas	Landscape Parking Areas
Topsoil	0.5-3 feet	
Undocumented Artificial Fill (afu)	1-10+ feet	
Young Alluvial Deposits (Qal)	1-40+ feet	1-3+ feet
Old Alluvial (Qoa) and Very Old Alluvial Fan Deposits (Qvof)	1-5 feet	1-3 feet
Highly Weathered Live Oak Canyon Formation (Qlo)	1-3 feet	

7.1.1. Overexcavation of Building Pads and Streets

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur exposed at the design elevation. Overexcavation recommendations are provided below. The overexcavation should expose competent bottoms, and the replacement fill should be compacted to project specifications as described in Section 7.9.1.

7.1.1.1. Cut/Fill Transition Pads

Where design grades and/or remedial grading activities create a cut/fill transition beneath building pads, the cut and shallow fill portions of the commercial building pad should be over-excavated a minimum depth of five (5) feet and replaced to design grade with compacted fill. In Lot 3 where deeper removals are planned, the cut portions of the building pad exposing Very Old Alluvial Deposits and Live Oak Canyon Formation should be overexcavated a minimum of 10 feet. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas. At this time specific locations of the buildings on the east side of Roberts Road are not known. Accordingly, it may be prudent to sheet grade the lots, and wait to conduct the undercuts once final foundation depths and building locations are determined.

7.1.1.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) of the deepest fill section within the pad but need not exceed 10 feet. The transition between the deep fill and cut (capped) portion of the lot should not exceed a 2:1 gradient.

7.1.1.3. Street Overexcavation

The overexcavation of street areas to facilitate utility installation is not anticipated to be required.

7.1.2. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

It is our understanding that development is planned on the adjacent parcels. Development of one parcel may impact remedial grading efforts needed to support the adjacent parcel development. Coordination with the adjacent property owner should be considered to avoid negatively impacting future development efforts on the adjacent parcel.

7.2. Subgrade Stabilization

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of 1½" angular rock wrapped in geotextile (such as Mirafi RS280i) over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water

truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

7.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. If field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

7.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 or flatter (horizontal to vertical). The highest proposed cut slope is 72 feet in height- 35 feet of 3:1 (H:V) above a 37 foot 2:1 (H:V). It is anticipated that slopes excavated in very old alluvium will be grossly and surficially stable to the proposed heights. If unconsolidated coarse-grained lenses of materials are encountered on the slope face, local stabilization may be necessary.

Although not encountered during the subsurface investigation, occasional weak beds are present in the Live Oak Canyon Formation. It is anticipated that slopes excavated in Live Oak Canyon Formation will be grossly and surficially stable to the proposed heights unless out-of-slope bedding conditions are encountered. Bedding generally dips to the northeast, so cut slopes facing this direction may need to be stabilized. Generally, the proposed cut slopes within the Live Oak Canyon Formation face to the east, southeast and south.

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcut. Terrace drains and benches should be constructed on cut slopes in accordance with the County of Riverside Grading Ordinance.

7.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 46 feet. Fill slopes, when properly constructed with onsite materials and maintained as described herein, are expected to be grossly and surficially stable as designed.

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will

improve surficial stability and should be considered. Areas subject to potential scour should be armored.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of ascending slope, whichever is greater. Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward, from the catch point of the design toe at a minimum 1:1 projection, to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County of Riverside Grading Ordinance.

7.3.3. Skin Cut and Skin Fill Slopes

A review of the mass grading plans did not indicate any significant design skin fill and skin cut conditions, however, skin cut or thin fill sections may be created during grading. If these conditions occur, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half the remaining slope height, and not less than 15 feet, is provided. Where the design cut is insufficient to remove all unsuitable materials, overexcavation and replacement with a stabilization fill will be required, as shown on Grading Detail 6 in Appendix E.

7.3.4. Fill Over Cut Slopes

Fill over cut slopes should be constructed such that the cut portion is excavated first for geologic mapping and stability determination. If deemed stable then a "tilt-back" keyway half the remaining slope height or minimally twenty (20) feet wide should be established. Drains will be required for this condition with the locations determined based upon exposed field conditions.

7.3.5. Offsite Drainage Channel Slopes

Along the southerly boundary, steep natural slopes are present along the active drainage channel and outside the grading limits (See Cross Sections K-K', L-L', M-M', N-N'). Continued migration of this channel, scour, and/or undercutting of these slopes may impact onsite improvement and/or lead to slopes having a factor of safety that is less than desired. It is our understanding that future plans may include stabilization of portions of this channel. AGS should evaluate the proposed channel improvements to determine if additional stabilization measures or setbacks are warranted on this boundary.

7.3.6. Surficial Stability

The surficial stability of 2:1 (or flatter) fill and cut slopes have been analyzed, and the analysis presented in Appendix D indicates a factor-of-safety in excess of code minimums. When fill and cut slopes are properly constructed and maintained, satisfactory performance can be anticipated although slopes will be subject to erosion, particularly before landscaping is fully established.

7.3.7. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials (Live Oak Canyon Formation) can be considered a Type "A" soil. Very Old Alluvial Fan Deposits and Engineered Fill can be considered Type "B" soils. Young and older alluvial soils can be considered Type "C". Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material, 1:1 in fill soils, and 1.5:1 in young alluvial soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations. Final determination should be made during construction by the project Geotechnical Engineer based upon field observation.

For vertical excavations less than approximately 15 feet in height, cantilevered shoring may be used. Where cantilevered shoring is used for deeper excavations, the total deflection at the top of the wall tends to exceed acceptable magnitudes. Shoring of excavations deeper than approximately 15 feet may need to be accomplished with the aid of tied back earth anchors.

The shoring design should be provided by a California Registered Civil Engineer experienced in the design and construction of shoring under similar conditions. Once the final excavation and shoring plans are complete, the plans and the design should be reviewed by AGS for conformance with the design intent and recommendations. Further, the shoring system should satisfy applicable requirements of Cal-OSHA.

Personnel from AGS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including Cal-OSHA requirements, should be met.

7.3.8. Geologic Observation During Grading

All temporary slope excavations, including front, side and backcuts, and all cut slopes should be mapped to verify the geologic conditions that were modeled prior to grading are consistent with the exposures during the grading. Slope stability analyses and designed keyways may have to be modified based on conditions exposed during grading.

7.4. Survey Control During Grading

Removal bottoms, keyways, sub drains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations. Survey support will also be required to monitor settlement as discussed in Section 7.5.

7.5. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated alluvial soils be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix E).

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

7.6. Subsurface Drainage

7.6.1. Canyon Drains

Six- (6), eight- (8), and ten- (10) inch diameter canyon subdrains are recommended along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. The diameter and approximate locations of proposed subdrains are shown on Plates 1 and 9. Final determination of drain locations will be made in the field, based on exposed conditions. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

7.6.2. Heel Drains

Heel drains will be required for all stabilization fill keyways. Tentative heel drain locations can be provided when more detailed grading plans become available. Heel drains should be constructed in accordance with the details shown on Detail 3 (Appendix E).

7.6.3. Cut Slope Toe Drains and Subdrains

Consideration should be given to placing a toe drain on all major cut slopes in order to provide drainage for possible future nuisance water on the cut slopes.

Subdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

7.7. Seepage

Seepage, when encountered during grading, should be evaluated by the Geotechnical Consultant. If seepage is excessive, remedial measures such as horizontal drains or under drains may need to be installed.

7.8. Construction Dewatering

Due to the presence of shallow groundwater encountered during our field exploration, dewatering measures may be necessary during the excavation operation. It should be noted that controlling and maintaining of groundwater during construction is the responsibility of the contractor. As part of

the groundwater control, the quality of collected water should also be checked in accordance with applicable permits and regulations for water discharge.

7.9. Earthwork Considerations

7.9.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction listed below as determined by ASTM Test Method: D 1557. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

- Minimum 90% relative compaction: general fills unless higher compaction standard applies.
- Minimum 93% relative compaction: below subdrains.
- Minimum 95% relative compaction: upper 12-inches below pavement areas and fills deeper than 40 feet.

7.9.2. Fill Materials/ Import Soils

Most of the soils encountered during our subsurface exploration should be suitable for use as engineered fill provided oversize rock is disposed of in accordance with the recommendations in Section 7.9.6.

Any imported fill material should consist of granular soil having a "very low" expansion potential (expansion index of 20 or less). Import should also have a low corrosion potential (chloride content less than 500 parts per million, soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Import soils should be tested and approved by the Geotechnical Consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

7.9.3. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

7.9.4. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

7.9.5. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

7.9.6. Oversize Rock

Allow large quantities of oversize materials are not expected, some oversized rock material [i.e., rock fragments greater than eight (8) inches] may be encountered during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within commercial pads and to two (2) foot below the deepest utility in street and building utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

7.9.6.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

7.9.6.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural

fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

7.9.6.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

7.9.6.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

7.9.7. Fill Slope Construction

Fill slopes may be constructed by preferably overbuilding and cutting back to the compacted core or by back-rolling and compacting the slope face. The following recommendations should be incorporated into construction of the proposed fill slopes.

Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal before compaction, shaping and grid rolling.

Seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

7.9.7.1. Overbuilding Fill Slopes

Fill slopes should be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the compaction of the slope face meets the minimum project requirements for compaction. Compaction of each lift should extend out to the temporary slope face.

7.9.7.2. Compacting the Slope Face

As an alternative to overbuilding the fill slopes, the slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Back-rolling at more frequent intervals may be required. Compaction of each fill should extend to the face of the slope. Upon completion, the slopes should be watered, shaped, and track-walked with a D-8 bulldozer or

similar equipment until the compaction of the slope face meets the minimum project requirements. Multiple passes may be required.

7.9.8. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation

The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc., should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content prior to concrete placement.

8.0 DESIGN RECOMMENDATIONS

From a geotechnical perspective, the proposed development is feasible provided the following recommendations are incorporated into the design and construction. Preliminary design recommendations are presented herein and are based on some of the general soils conditions encountered during the geotechnical investigations. As such, recommendations provided herein are considered preliminary and subject to change based on the results of additional subsurface exploratory investigation.. Final design recommendations should be provided in a final rough/precise grading report.

8.1. Structural Design Recommendations

Precise building products, loading conditions, and locations are not currently available. It is anticipated that the as-graded near-surface soils could vary from “very low” to “medium” in

expansion potential when tested in general accordance with ASTM D 4829, although a majority is expected to be "very low" to "low". AGS has provided recommendations below assuming a "very low" to "low" expansion potential, which should be verified during grading.

8.1.1. Foundation Design

At this time specific building types, heights and locations have not been determined. Accordingly, the following general design parameters can be used for preliminary design and budgeting. Once the proposed buildings type and locations are known, site specific foundation design parameters should be developed by the project Geotechnical Engineer. The following values may be used in preliminary foundation design.

The values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

TABLE 8.1.1
FOUNDATION DESIGN PARAMETERS (COMMERCIAL/RETAIL)

Allowable Bearing	2,000 psf, increasing by 300 psf for each additional foot of embedment and width beyond the minimum provided, up to 3,000 psf assuming a minimum embedment of 18 inches below lowest adjacent finish grade.
Lateral Bearing	250 psf per foot of depth to a maximum of 2,000 psf for level conditions. Reduced values may be appropriate for descending slope conditions.
Sliding Coefficient	0.35
Assumed Expansion Potential	"Very Low" to "Low"
Slab-on-Grade Thickness	Minimum 4 inches
Slab-on-Grade Reinforcement	No. 3 rebar 18-inches on center each way
Continuous Footing Width	Minimum 12 inches (one-story), 15 inches (two stories)
Continuous Footing Depth*	Minimum 12 inches
Min. Footing Reinforcement	No. 4 rebar - 2 on top, 2 on bottom or No. 5 rebar, 1 on top and bottom
*Notes on Footing Embedment: Depth of embedment should be measured below lowest adjacent finish grade. Footings Adjacent to Swales and Slopes: If exterior footings adjacent to drainage swales are to exist within 5 feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least 5 feet is provided horizontally from edge of the footing to the face of the slope.	

8.1.2. Settlement

Settlements are likely to be produced from structural loads and long term settlement of the fill and underlying alluvial soils. As verified by settlement monitoring, primary settlement of the compacted fill materials should be completed prior to the release of lots for construction. AGS has provided a preliminary estimate of settlement for a typical one to two story building with shallow foundations. However, AGS should re-evaluate the settlement based on as-graded soil conditions and actual structural loads.

For lots with less than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 3/4 inch total and 3/8-inch across 20 feet.

For lots with greater than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 1 inch total and 1/2-inch across 20 feet.

For lots with left-in-place saturated alluvial soils, estimated settlements are 1.5 inches total and 3/4-inch across 20 feet. Structures should also be designed to accommodate the potential seismic settlement described in Section 5.6.2.

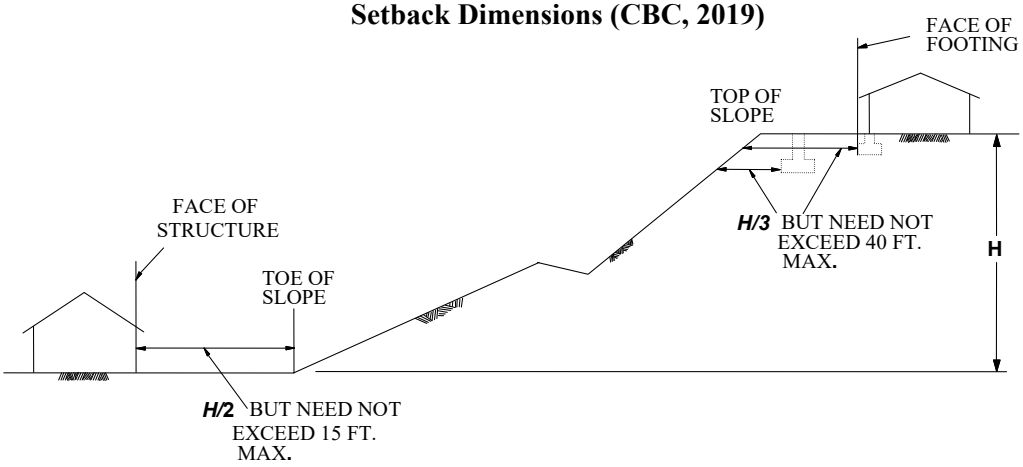
8.1.3. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

8.1.4. Deepened Footings and Setbacks

Improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code, require that structures be set back or footings deepened where subject to the influence of these natural processes. For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in the following figure.

FIGURE 8.1.4
Setback Dimensions (CBC, 2019)



8.1.5. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Spoils from the footing excavations should not be placed on slab-on-grade areas unless the soils are properly compacted. The footing excavations should not be allowed to dry back and should be kept moist until concrete is poured. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

8.1.6. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

8.1.7. Concrete Design

The test results from a sample collected during the current investigation indicated a sulfate concentration that corresponds to a S0 sulfate exposure class when classified in accordance with ACI 318.

Additional testing should be conducted after mass grading. It should be recognized that some fertilizers have been known to leach water-soluble sulfate compounds into soils containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. Accordingly, it is suggested that Portland cement type II/V be used for concrete in contact with soil.

8.2. Retaining Wall Design

8.2.1. Retaining Walls (backfilled with Native Materials)

The foundations for retaining walls should be founded on compacted fill, competent very old alluvial fan deposits, or Live Oak Canyon Formation and may be designed in accordance with the recommendations provided in Table 8.1.1. When calculating the lateral resistance, the upper 12 inches of soil cover should be ignored in areas that are not covered with hardscape. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance.

Retaining walls should be designed to resist earth pressures presented in the following table. These values assume that the retaining walls will be backfilled with native materials as shown in Detail RTW-A. Retaining walls should be designed to resist additional loads such as construction loads, temporary loads, traffic loads, and other surcharges as evaluated by the structural engineer.

The following Rankine earth pressure coefficients are recommended for the design of retaining walls onsite:

Static Case

"Native" backfill (C =150 psf, ϕ= 31°, density = 125 pcf)

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	390
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	63
Coefficient of Passive Pressure:	$K_p = 1.18$	148
Coefficient of At Rest Pressure:	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density (pcf)

k_h = seismic pseudostatic coefficient = $0.5 * PGA_M / g$

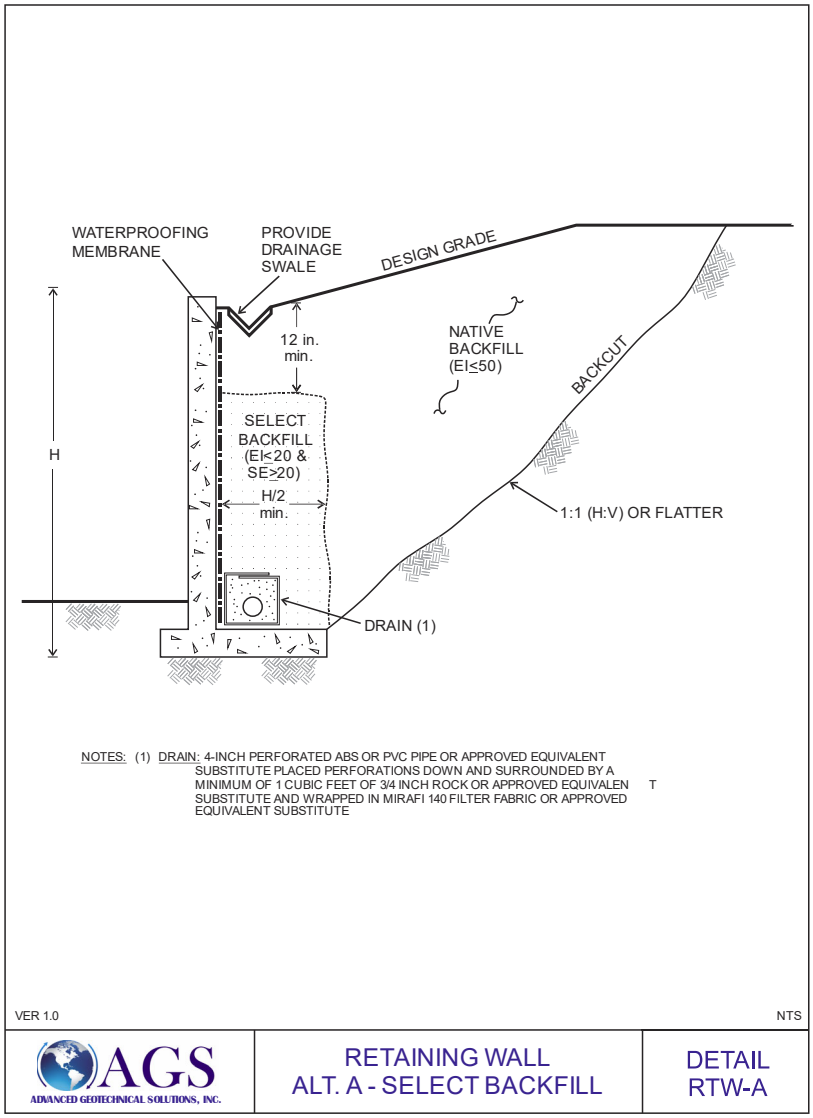
Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

8.2.2. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces as shown in Details RTW-A and RTW-B. Otherwise, the retaining walls should be designed to resist hydrostatic forces. Proper drainage devices should be installed along the top of the wall backfill and should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8 inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by

compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



8.3. Civil Design Recommendations

8.3.1. Site Drainage

Final site grading should assure positive drainage away from structures. Planter areas should be provided with area drains to transmit irrigation and rain water away from structures. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

8.3.2. Exterior Flatwork

- **Slab Thickness:** Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- **Control Joints:** Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.
- **Flatwork Reinforcement:** Consideration should be given to reinforcing any exterior flatwork.
- **Thickened Edge:** Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.3.3. Pavement Design

Preliminary pavement recommendations for streets and driveways are provided below. The performance of pavement is highly dependent on providing positive surface drainage away from the edge of pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed towards controlled drainage structures and not towards pavement areas. Landscaped areas adjacent to pavement areas are not recommended due the potential for surface or irrigation water infiltrating into the aggregate base and pavement subgrade. If landscaped areas are placed adjacent to pavement areas, consideration should be given to implementing measures that will reduce the potential for water to be introduced into the aggregate base. Such measures may include installing impermeable vertical barriers between the landscaped area and pavement areas including deepened curbs or 10 mil thick plastic liners extending a minimum of 6 inches below the bottom of the aggregate base.

8.3.3.1. Asphalt Concrete Pavement

Presented below are preliminary pavement sections for a range of traffic indices and an assumed Resistance-Value (R-Value) of 30 for the subgrade soils. R-Value testing of the subgrade soils should be performed during precise grading operations. The project Civil Engineer or Traffic Engineer should select traffic indices that are appropriate for the anticipated pavement usage and level of maintenance desired through the pavement life. Final pavement structural sections will be dependent on the R-value of the subgrade materials and the traffic index for the specific street or area being addressed. The pavement sections are subject to the review and approval by the County of Riverside.

TABLE 8.3.3.1. PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS*			
Traffic Index	**Assumed R-Value**	**Asphalt Concrete (inches)**	**Class II Aggregate Base (inches)**
4.5	30	3	5
5.0	30	3	6
5.5	30	3	7
6.0	30	3.5	8
6.5	30	4	8
7.0	30	4	10
7.5	30	4.5	10
8.0	30	5	11
*Note: See additional recommendations for subgrade preparation below.			

Pavement subgrade soils should be moisture conditioned to near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557 and should conform with the specifications listed in Section 26 of the *Standard Specifications for the State of California Department of Transportation* (Caltrans) or Section 200-2 of the *Standard Specifications for Public Works Construction* (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans *Standard Specifications* or Section 203-6 of the Green Book.

8.3.3.2. Portland Cement Concrete Pavement

Portland cement concrete may be used for the onsite driveways, trash enclosures, and truck loading docks. The following concrete pavement sections were determined using the recommendations provided in "Design of Concrete Pavement for City Streets" by the American Concrete Pavement Association. Testing of subgrade soils should be performed once driveway subgrades are achieved to determine the actual R-Value of the subgrade soils and/or corresponding modulus of subgrade reaction.

TABLE 8.3.3.2 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS				
Traffic Classification	**Maximum ADTT***	**Portland Cement Concrete Section (inches)**	**k* (pci)**	**MR* (psi)**
Collector	100	6.5	200	550
Industrial	300	8.0	200	550
*Notes: k = Modulus of subgrade reaction; ADDT = Average daily truck traffic; MR=Flexural strength of concrete (Modulus of Rupture) 550 corresponds to concrete having a minimum compressive strength of roughly 3,000 psi				

Joints should be provided at a minimum spacing of 8 feet. The joints should be caulked and sealed with a flexible compound to reduce the potential for moisture

infiltration. The civil engineer should determine the need for reinforcement and doweling.

The subgrade should be moisture conditioned and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Subgrade soils should be at or near the optimum moisture content to a depth of 12-inches immediately prior to placing concrete.

8.4. Corrosion

As discussed in Section 6.1.6, previous testing (pH, electrical resistivity, chloride content, and sulfate content) indicate that the soil conditions are not anticipated to be corrosive according to the Caltrans definition of a corrosive site. Final verification of site corrosivity will be based upon testing of import soil and soil from the site during grading operations. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of the construction materials.

9.0 SLOPE AND LOT MAINTENANCE

Maintenance of improvements is essential to the long-term performance of structures and slopes. Although the design and construction during mass grading created slopes that are considered both grossly and surficially stable, certain factors are beyond the control of the soil engineer and geologist. The property owners must implement certain maintenance procedures.

9.1. Slope Planting

Slope planting should consist of ground cover, shrubs and trees that possess deep, dense root structures and require a minimum of irrigation. The property owner should be advised of their responsibility to maintain such planting.

9.2. Pad Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure, or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water away from structures and slopes. Property owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, downdrains, and other devices that have been installed to promote structure and slope stability.

9.3. Slope Irrigation

The property owner should be advised of their responsibility to maintain irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful run-off and ground saturation should be avoided. If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

9.4. Burrowing Animals

Property owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

10.0 FUTURE STUDY NEEDS

10.1. Future Studies and Reviews

This report represents a geotechnical review of the current 60-scale mass grading plans for the project. From a geotechnical standpoint, it is AGS's opinion that additional subsurface investigation and analysis is required before construction of the proposed project begins.

As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Additional subsurface investigation and analysis
- Review of Rough Grading plans
- Review of Precise Grading plans
- Review of Foundation plans
- Review of Retaining Wall plans
- Review of road improvements, including potential impacts to existing improvements.

Project plans should be forwarded to the geotechnical engineer/geologist for evaluation and comment, as necessary

10.2. Grading Observation

Geologic exposures afforded during remedial and rough grading operations provide the best opportunity to evaluate the anticipated site geologic structure. Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional near-surface samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from the exploratory excavations at the locations indicated on the plans. The findings are based on the review of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

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APPENDIX B

SUBSURFACE LOGS

APPENDIX B-1

SUBSURFACE LOGS (AGS)

Date Excavated 5/6/2020, 5/7/2020 & 8/5/2020
Logged by SS
Equipment: JCB 3CX Backhoe

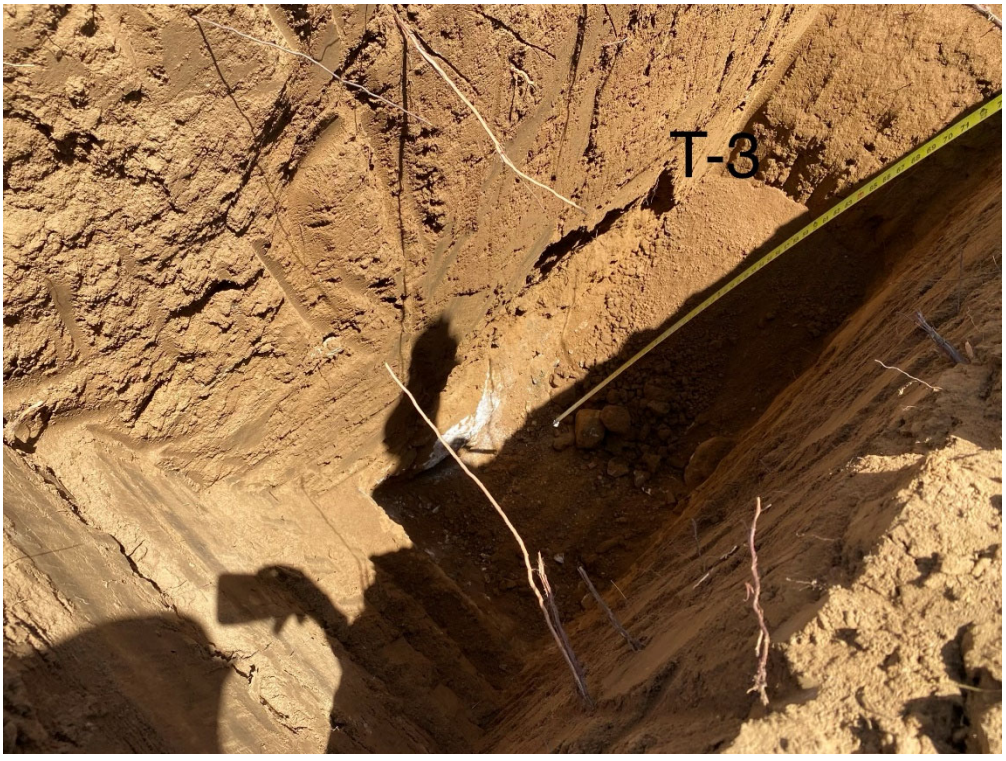
LOG OF TEST PITS

Excavation No.	Depth	USCS	Description
T-1	0.0 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @1.0 ft., moist; occasional gravel
	6.5 – 11.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @11.0 ft., increased density TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-2	0.0 – 4.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous
	4.5 – 11.5 ft.	SM/CL	@4.5 ft., Clayey SAND to Sandy CLAY, fine- to medium-grained, dark gray brown, very moist, loose to firm; micaceous @6.0 ft., wet @10.0 ft., Seepage, caving TOTAL DEPTH = 11.5 ft. SEEPAGE @ 10 ft., CAVING BELOW 10 ft.

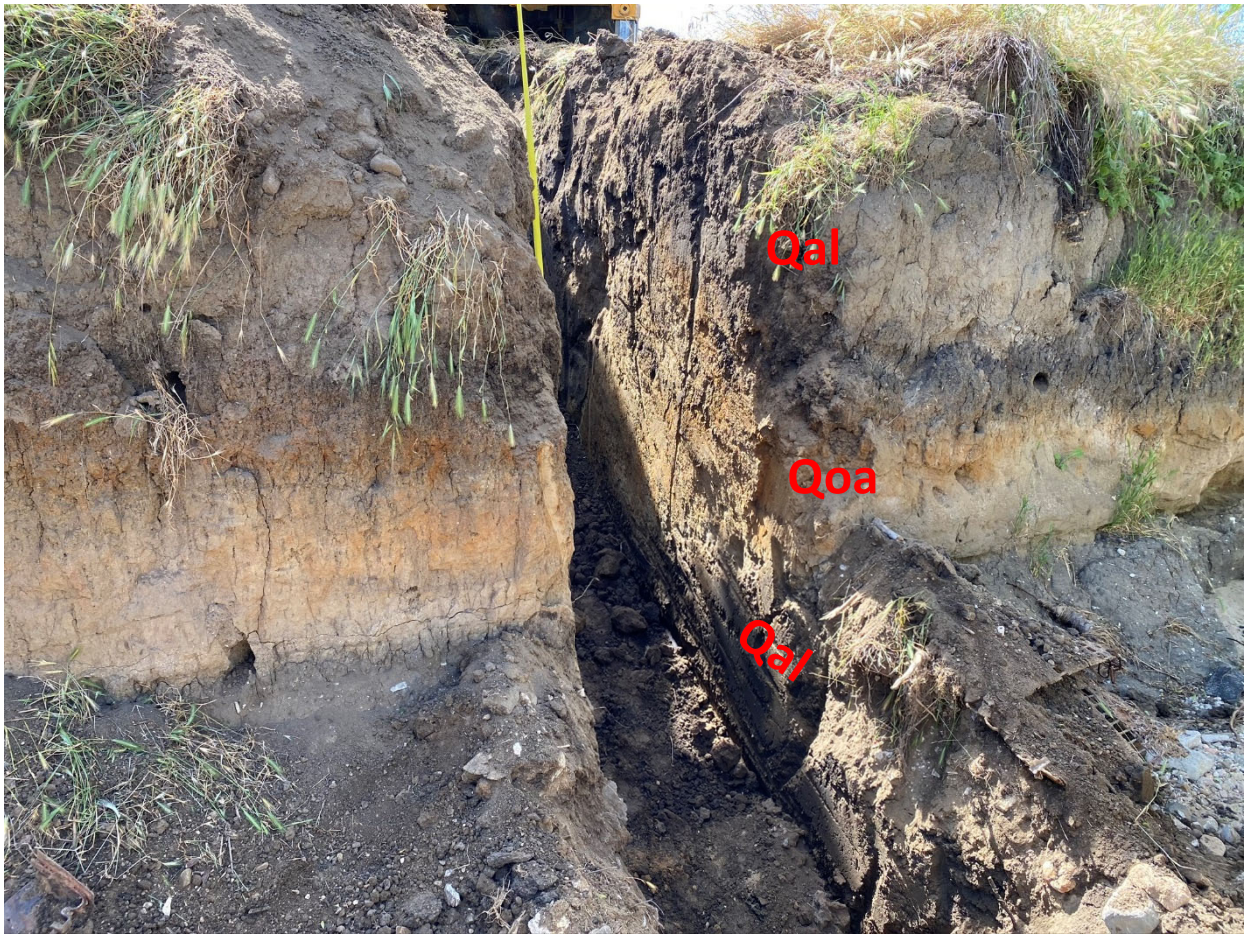


Excavation No.	Depth	USCS	Description
T-3	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to medium-grained SAND, brown, slightly moist, loose; roots
	1.0 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown, moist, medium dense; occasional gravel @6.0 ft., Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense; abundant sub-rounded to sub-angular gravel to cobble
	8.0 – 13.0 ft.	GM	@8.0 ft., Sandy sub-rounded GRAVEL layer, yellow brown to orange brown, slightly moist, medium dense; 2-3-foot boulder in sidewall
	13.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, slightly moist, medium dense to dense; micaceous, iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-4	0.0 – 4.0 ft.	SM	**Alluvium (Qal)** Clayey fine- to coarse-grained SAND, dark gray brown, moist, loose
	4.0 – 8.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense to dense; micaceous, iron oxide staining, weakly cemented @6.0 ft., Silty fine-grained SAND
	8.0 – 12.0 ft.	SM/SC	**Alluvium (Qal)** Silty SAND to Clayey SAND, fine- to coarse-grained, dark gray brown, moist, loose; rounded to sub-rounded gravel to cobble. (Channel deposits undermining the side wall of channel)

TOTAL DEPTH = 12.0 ft.
NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-5	0.0 – 2.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.5 – 11.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; minor porosity, weakly cemented @4.0 ft., Yellow brown to orange brown; occasional sub-rounded gravel @8.0 ft., no longer porous @10.0 ft., increased density; occasional sub-angular gravel to cobble TOTAL DEPTH = 11.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-6	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous, roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, yellow brown, slightly moist to moist, loose to medium dense
	6.5 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; weakly cemented, micaceous, minor porosity, trace coarse-grained sand to fine gravel @9.0 ft., Dense; no longer porous
	11.0 – 12.0 ft.	GM	Fine- to coarse-grained Sandy GRAVEL to COBBLE, yellow brown, slightly moist, dense
			TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-7	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 14.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine- to coarse grained SAND, dark yellow brown, slightly moist, medium dense to dense; occasional gravel @3.0 ft., moist; weakly cemented @8.0 ft., trace clay
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-8	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @2.0 ft., occasional gravel @4.5 ft., increased moisture; minor porosity
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse grained SAND, yellow brown to gray brown, moist, medium dense to dense; some gravel to cobble @9.0 ft., trace clay; weakly cemented, minor porosity, micaceous @10.0 ft., trace clay TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-9	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous @6.0 ft., yellow brown to gray brown, medium dense
	8.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented @11.0 ft., no longer porous TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-10	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 12.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @3.0 ft., occasional sub-rounded gravel @7.0 ft., yellow brown to gray brown, increased moisture, loose to medium dense; porous @11.0 ft., with clay, moist to very moist
	12.0 – 13.0 ft.	ML/CL	Sandy SILT to Sandy CLAY, wet; occasional sub-rounded gravel to cobble
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-11	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	3.0 – 7.5 ft.	ML/SM	Sandy SILT to Silty SAND, fine-grained, dark gray brown, moist, firm to medium dense; micaceous
	7.5 – 13.0 ft.	ML	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented
	8.0 – 13.0 ft.	SM	Silty fine-grained SAND, gray brown to yellow brown, moist, dense; trace clay, micaceous, manganese oxide nodules
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-12	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, slightly moist, loose; micaceous
	3.0 – 7.0 ft.	SW	Fine- to coarse-grained SAND with Silt with sub-rounded gravel
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; micaceous, weakly cemented
			TOTAL DEPTH = 14.0 ft. NO WATER, CAVING FROM 0 to 7 ft.

Excavation No.	Depth	USCS	Description
T-13	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @2.0 ft., moist; occasional gravel, micaceous
	7.5 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @10.0 ft., increased density TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-14	0.0 – 2.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.0 – 11.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous @5.0 ft., abundant sub-rounded gravel to cobble TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-15	0.0 – 4.0 ft.	SW	**Alluvium (Qal)** Fine- to coarse-grained SAND, yellow brown to gray brown, dry to slightly moist, loose; with sub-angular gravel
	4.0 – 9.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, moist, medium dense to dense; micaceous
			TOTAL DEPTH = 9.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-16	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense; trace clay
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, minor porosity
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, yellow brown to gray brown, moist, dense to moderately hard; trace clay, micaceous TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-17	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark gray brown, slightly moist, loose to medium dense; occasional sub-angular gravel to cobble
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, micaceous, manganese oxide
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, dense to moderately hard; trace clay and gravel @13.0 becomes fine- to coarse-grained TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-18	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 6.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, red brown, slightly moist, medium dense
	6.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor porosity @11.0 ft., decreasing moisture TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-19	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, medium dense; trace clay
	6.5 – 11.0 ft.	SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to medium-grained SAND, light yellow brown to light gray brown, very dense; iron oxide staining
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING





Excavation No.	Depth	USCS	Description
T-20	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 10.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, slightly moist, medium dense; trace gravel
	10.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-21	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist, loose; roots
	1.0 – 3.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, moist, medium dense; minor porosity
	3.5.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to gray brown, moist, dense; minor iron oxide staining, manganese oxide nodules
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-22	0.0 – 9.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	9.0 – 13.0 ft.	SM	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, stiff; occasional fine gravel, minor porosity, weakly cemented
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

BORING NUMBER AGS-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to orange brown, moist, medium dense; trace coarse sand, micaceous										
5				SPT	5-7-9 (16)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; iron oxide staining, micaceous										
10			@10.0 ft., very dense	MC	24-38-50/3"	112	2.9	16	Consol				
15			@15.0 ft., Silty fine-grained SAND, orange brown to red brown, moist, very dense; trace clay, iron oxide staining, micaceous	SPT	40-47-50/5"								
20				MC	47-50/3"	124	6.1	46					
25			@25.0 ft., Silty fine- to coarse-grained, orange brown, slightly moist, very dense; iron oxide staining, micaceous	SPT	37-50/5"								

Total depth = 25.9 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to brown, moist, medium dense; trace coarse sand, micaceous										
5				MC	4-4-5 (9)								
10		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND, yellow brown, slightly moist, dense; iron oxide staining, calcium carbonate development, micaceous	SPT	8-12-16 (28)								
15			@15.0 ft., occasional gray brown to blue gray siltstone fragments	MC	50								
20				SPT	25-50								
25		SM	@25.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown, moist, very dense; trace clay, occasional quartz fragments, iron oxide development, micaceous	MC	50	117	10.2	62	Shear				
			Total depth = 25.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2228 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 11.00 ft / Elev 2217.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5				MC	3-3-5 (8)	105	7.5	33					
10		ML	▽ @10.0 ft., Fine-grained Sandy SILT with Clay, dark gray brown, wet, soft; micaceous, mottled, minor iron oxide development	SPT	1-1-1 (2)								74
15			@15.0 ft., becomes gray brown	MC	3-4-6 (10)	106	16.9	77	Consol				
20			@20.0 ft., increased clay content; minor iron oxide development	SPT	3-3-3 (6)					46	29	17	71
25		CL	@25.0 ft., Silty CLAY with fine-grained Sand, brown to gray brown, wet, soft; minor iron oxide development	MC	5-7-9 (16)	95	25.6	89	Consol				
30		SC	@30.0 ft., Clayey SAND, blue gray to gray brown; occasional fine quartz fragments, trace root fibers	SPT	2-3-7 (10)					32	22	10	36
35													

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ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	@35.0 ft., Clayey SILT grades down to Silty fine-grained SAND, dark gray to dark olive brown, wet, stiff to medium dense	MC	6-9-12 (21)	89	17.0	51					
40		CL	@40.0 ft., Silty to Sandy CLAY, dark gray, wet, stiff	SPT	3-5-8 (13)								
45		SM	@45 ft., Silty fine-grained SAND with clay, blue gray to gray brown, wet, medium dense	MC	6-12-20 (32)	121	12.4	86					
50			@50.0 ft., Interbedded: from Silty fine- to coarse-grained SAND with fine quartz fragments to Clayey SILT with fine-grained Sand	SPT	4-4-7 (11)								59
55			@55.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown, wet, medium dense	SPT	6-5-11 (16)								
60		SC-SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to Clayey fine-grained SAND, dark yellow brown, wet, dense; iron oxide staining, micaceous	MC	11-22-35 (57)								
65			@65.0 ft., Sand becomes fine- to coarse-grained	SPT	8-10-10 (20)								
70		SP	@70.0 ft., Coarse-grained SAND with rock fragments	MC	30-20-26 (46)	115	13.3	78					
			@71.0 ft., Silty fine-grained SAND with Clay										
		SM	Total depth = 71.5 feet Groundwater encountered at 11 feet Backfilled with soil cuttings										

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2197 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND with Clay, dark gray brown, dry to slightly moist, loose										
5			@5.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown to olive, moist, medium dense to firm; micaceous	MC	10-12-14 (26)	103	19.4	83	Consol				
10		CL	@10.0 ft., Silty CLAY with fine-grained Sand, yellow brow to gray brown to black, moist, soft; abundant decomposing organic matter, minor iron oxide staining, micaceous	SPT	2-2-3 (5)								
15		CL-ML	@15.0 ft., Fine-grained Sandy SILT, yellow brown to gray brown with Silty CLAY, black, moist, medium dense to stiff; abundant decomposing organic matter, iron oxide staining, micaceous	MC	3-5-10 (15)	93	18.3	61	Consol				
20		OL	@20.0 ft., Organic SILT/PEAT, blue gray to black, moist, soft; abundant decomposing organic matter	SPT	1-2-4 (6)								
25			@25.0 ft., Silty CLAY to Clayey SILT with Peat layers, dark gray to blue gray to black, moist, soft; abundant decomposing organic matter	MC	4-5-6 (11)	60	37.8	57	Consol				
30		CL-ML	@30.0 ft., With fine-grained sand, very moist; trace fine root fibers	SPT	3-5-5 (10)								
35													

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	**Older Alluvium (Qoa)** Fine- to coarse-grained Sandy SILT with Clay, yellow brown to gray brown to olive, moist, very stiff; iron oxide staining, micaceous	MC	7-10-13 (23)	121	12.2	84					
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to orange brown, slightly moist, very dense; trace fine gravel, iron oxide staining, micaceous	SPT	17-21-21 (42)								
45				MC	50	110	4.8	24					

Total depth = 45.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
5		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, light yellow brown to light gray brown, slightly moist, dense; minor iron oxide staining, micaceous, weakly cemented	MC	25-34-35 (69)	103	5.1	21	Consol				
10		SM	@10.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, medium dense to very stiff; iron oxide staining, micaceous	SPT	5-7-9 (16)								
15			@15.0 ft., becomes dark yellow brown to orange brown, increased fines and moisture content	MC	9-13-16 (29)	119	9.5	62	Shear				
20		SM	@20.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to orange brown, moist, dense; trace gravel, iron oxide staining, micaceous	SPT	9-14-11 (25)								
25				MC	18-50	126	6.5	52					

Total depth = 26.0 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2190 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to olive brown, slightly moist, medium dense; micaceous										
5				MC	15-13-20 (33)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND with gravel, yellow brown to gray brown, slightly moist, dense; iron oxide staining, micaceous										
10				SPT	4-8-14 (22)								
15		ML	@15.0 ft., Clayey SILT with fine-grained Sand, gray brown to olive, moist, hard; iron oxide staining, manganese oxide nodules, micaceous	MC	9-15-26 (41)	120	11.7	24	Shear				
20		ML	@20.0 ft., Fine-grained Sandy SILT, blue green to gray, moist, very stiff; minor iron oxide staining, micaceous	SPT	5-5-8 (13)								
25				MC	17-22-30 (52)	122	8.6	61	Shear				
30		ML	@30.0 ft., with Clay, very moist; occasional quartz fragments	SPT	8-8-7 (15)								
35													

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Silty fine-grained SAND, blue gray, slightly moist to moist, dense; iron oxide staining, micaceous	MC	9-19-24 (43)	110	11.4	58					
40		CL-ML	@40.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, blue gray, moist to very moist, very stiff; micaceous, trace root fibers	SPT	3-5-9 (14)								
45		SM	@45.0 ft., Silty fine-grained SAND	MC	20-36-50 (86)	127	7.6	63					
50		CL-ML	@50.0 ft., Silty CLAY to Clayey SILT	SPT	4-4-5 (9)								

Total depth = 51.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2238 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND with Clay, dark gray brown to black, moist, medium dense; micaceous										
5				MC	5-7-14 (21)	120	7.1	47					
10		SM	**Older Alluvium (Qoa)** Silty fine- to medium-grained SAND, dark yellow brown to olive brown, slightly moist, dense; iron oxide staining, carbonate, micaceous	SPT	5-11-12 (23)								
15		SM	@15.0 ft., Silty fine-grained SAND to fine-grained SILT, olive, moist, dense to hard; trace clay, iron oxide staining, micaceous	MC	10-26-49 (75)	122	11.4	81	Shear, Consol				
20			@20.0 ft., becomes yellow brown to orange brown to olive, increased clay content	SPT	8-11-25 (36)								
25				MC	18-40-50/4"	115	11.6	68					
			Total depth = 26.3 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-9

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	1-1-0 (1)								
10			@10.0 ft., trace coarse sand, trace fine gravel, micaceous	MC	10-15-15 (30)								
15		ML	Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, loose to stiff; trace coarse sand, trace fine gravel, micaceous	SPT	3-3-4 (7)								
20		ML	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, dense to hard; trace coarse sand, trace fine gravel, iron oxide staining, micaceous	MC	12-19-26 (45)	128	8.5	71	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND, yellow brown to gray brown, slightly moist, medium dense; trace fine gravel, iron oxide staining, micaceous	SPT	9-7-8 (15)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	5-6-7 (13)								
10		SM	**Older Alluvium (Qoa)** Silty fine-gained SAND with gravel, yellow brown to gray brown, slightly moist, dense; trace fine sand, iron oxide staining, micaceous	MC	20-20-30 (50)	126	2.0	16	Consol				
15			@15.0 ft., becomes dark yellow brown to orange brown, moist, trace clay	SPT	7-11-11 (22)								
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, dense to hard; trace clay, trace fine gravel, iron oxide staining, micaceous	MC	21-25-29 (54)	120	7.2	48					
25		SW	@25.0 ft., Fine- to coarse-grained SAND with gravel, light yellow brown to light gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	SPT	11-16-17 (33)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-11

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2220 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		ML	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine-grained SAND to fine-grained Sandy SILT, yellow brown to orange brown, slightly moist, medium dense to very stiff; iron oxide staining, micaceous										
5				SPT	7-7-8 (15)								
10		SM	@10.0 ft., Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	22-50/5"	113	9.3	51					
15		ML	@15.0 ft., Clayey SILT with fine-grained SAND, dark yellow brown to gray brown to olive, moist, hard; iron oxide, micaceous	SPT	9-16-18 (34)								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with fine Gravel, yellow brown to gray, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	20-34-50/5"	115	3.1	18					
25				SPT	20-27-33 (60)								

Total depth = 26.5 feet
No groundwater encountered
backfilled with soil cuttings

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2320 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND with gravel to cobble, yellow brown, dry to slightly moist, dense										
5			@5.0 ft., Sand becomes fine-grained, minor iron oxide staining	SPT	16-22-26 (48)								
10				MC	50/4"	99	2.4	9					
15			@15.0 ft., quartz fragments	SPT	50/5"								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50	113	2.5	14					
25		SP	@25.0 ft., Fine-grained SAND with Silt, dark yellow brown to gray brown to olive, moist, dense; trace clay, iron oxide staining, micaceous	SPT	12-17-20 (37)								
30		SW	@30.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50/5"	111	1.7	9					
35													

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW		SPT	50/5"								
40		SM	@40.0 ft., Silty fine-grained SAND, yellow brown to orange brown to gray brown, moist very dense; trace clay, iron oxide staining, micaceous	MC	50	105	12.8	58					
45			@45.5 ft., occasional quartz fragments	SPT	11-26-36 (62)								
50			@50.0 ft., increased clay content, manganese oxide nodules	MC	50/5"	115	9.5	55					

Total depth = 50.4 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/7/20
GROUND ELEVATION 2235 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, slightly moist, loose; trace fine gravel, micaceous										
		SP	@5.0 ft., Coarse-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose; trace fine gravel	SPT	3-2-5 (7)								
10				MC	11-19-29 (48)	122	2.4	17	Consol				
15		SM	@15.0 ft., Silty fine- to coarse-grained SAND, dark gray brown, moist, loose; trace clay, trace fine gravel, micaceous	SPT	1-2-4 (6)								
20		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to olive, dense; trace fine gravel, iron oxide staining, micaceous	MC	11-21-31 (52)	129	9.0	79	Consol				
25				SPT	8-10-14 (24)								
30		SM	@30.0 ft., becomes dark yellow brown to orange brown, moist, very dense; iron oxide staining, micaceous, weakly cemented	MC	30-50/5"	131	6.2	59					
35													

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW	@35.0 ft., Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, slightly moist, dense; trace gravel	SPT	15-16-17 (33)								
40				MC	25-47-50/5"	120	4.3	28					
45				SPT	10-13-23 (36)								
50				MC	50	115	3.9	22					
			Total depth = 50.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-14

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2275 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; trace fine gravel, micaceous										
5			SPT	1-1-3 (4)								
10		@10.0 ft., medium dense	MC	9-11-13 (24)	102	3.5	14					
15	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-9-9 (18)								
20	ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	MC	8-11-12 (23)	128	5.1	43	Consol				
25		@25.0 ft., with gravel	SPT	7-8-12 (20)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-15

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2254 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, medium dense; micaceous										
5				MC	10-6-9 (15)	107	6.7	32					
10		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-10-8 (18)								
15				MC	13-21-23 (44)	108	5.7	28					
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	SPT	6-8-8 (16)								
25			@25.0 ft., with gravel	MC	11-17-20 (37)	126	9.8	79	Consol				

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 15.00 ft / Elev 2208.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 22.25 ft / Elev 2200.75 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SP	**Alluvium (Qal)** Coarse-grained SAND with fine gravel, light yellow brown to light gray brown, slightly moist, loose; trace fine gravel, micaceous @0.5 ft., becomes fine-grained, dark gray brown to dark yellow brown, moist										
5		ML	@5.0 ft., Silty fine-grained SAND to Sandy SILT with Clay, gray brown to olive to dark yellow brown, moist, loose to soft; micaceous	SPT	3-1-2 (3)								
10		CL-ML	@10.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, dark gray brown, moist, stiff; micaceous	MC	3-6-8 (14)	92	21.2	68	Consol				
15		CL	▽ @15.0 ft., Silty CLAY with fine-grained Sand, gray brown, wet, stiff	SPT	1-2-4 (6)								78
20			@20.0 ft., brown to dark gray brown, mottled	MC	4-5-6 (11)	93	25.3	84	Consol				
25			▼	SPT	3-3-5 (8)					43	23	20	54
30		SC	@30.0 ft., Clayey fine- to coarse-grained SAND, gray brown to dark olive, saturated, medium dense; minor iron oxide staining, micaceous, trace organics	MC	10-8-13 (21)	122	12.3	88	Consol				
35													

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AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	**Older Alluvium (Qoa)** Clayey fine- to coarse-grained SAND to fine- to coarse-grained Sandy CLAY	SPT	5-5-6 (11)								
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to gray brown, mottled, saturated, medium dense; trace fine gravel, iron oxide development	MC	6-8-12 (20)	118	14.9	95					
45		SC-SM	@45.0 ft., becomes Silty fine- to coarse-grained SAND to Clayey fine- to coarse-grained SAND; manganese oxide nodules	SPT	4-6-8 (14)								
50				MC	13-17-20 (37)	123	9.8	72					
55				SPT	9-11-13 (24)								

Total depth = 56.5 feet
Seepage @ 15 feet
groundwater measured at 22.25 feet
Backfilled with soil cuttings

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2252 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark red brown, slightly moist, loose										
5				MC	4-10-12 (22)	111	4.5	23					
10			@8.0 ft., becomes dark red brown to dark yellow brown, minor porosity	SPT	4-5-7 (12)								
15		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, dense; iron oxide staining	MC	21-27-41 (68)	127	4.5	37	Consol				
20			@20.0 ft., trace clay	SPT	7-9-10 (19)								
25				MC	18-50/5"	123	4.1	30					
30		SM	@30.0 ft., becomes yellow brown to orange brown, slightly moist, dense; iron oxide staining, minor carbonate development	SPT	13-17-18 (35)								
35													

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AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Sand becomes more fine-grained; weakly cemented, micaceous	MC	12-24-35 (59)	120	3.2	21					
40			@40.0 ft., becomes dark yellow brown to gray brown, dry to slightly moist, very dense; occasional gravel, micaceous	SPT	13-29-50/3"								
45				MC	50/5"	110	1.6	8					
50				SPT	50/1"								
			Total depth = 50.1 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2219 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, brown to gray brown, slightly moist, loose										
5		SW	@5.0 ft., Fine- to coarse-grained SAND with Gravel, light yellow brown, light gray brown, dry to slightly moist, medium dense	SPT	4-7-7 (14)								
10		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT with Clay, gray brown to olive, moist, medium dense to very stiff; occasional gravel, iron oxide staining, micaceous	MC	13-16-21 (37)	124	8.9	67					
15				SPT	6-12-21 (33)								
20		CL-ML	@20.0 ft., Silty CLAY to Clayey SILT with fine-grained SAND, blue green to blue gray, moist, very stiff; occasional fine quartz fragments, iron oxide staining, micaceous	MC	3-7-15 (22)	117	12.3	75	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND with Gravel, blue gray, moist, very dense; micaceous	SPT	32-40-15 (55)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

APPENDIX B-2

DRAFT SUBSURFACE LOGS (SCG)

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium Sand, trace fine root fibers, slightly porous, medium dense-damp							
5		15				106	6					
10		15			@ 8.5', little medium to coarse Sand, trace fine Gravel, medium dense-damp		4					
15		34			Light Red Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp	112	3			27		
20		81			Light Gray Brown Silty fine Sand, trace medium Sand, very dense-damp		5					
25		50/5"			Light Gray Brown fine to coarse Sand, trace fine Gravel, trace Silt, very dense-dry	105	2					
30		89			Light Gray Brown fine Sandy Silt, trace medium Sand, very dense-damp		7					
		50/5"			Light Red Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, very dense-damp	108	4					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, very dense-moist							
40		50/4"					12					
		50/3"				118	11					
45					Light Gray Silty fine to coarse Sand, trace fine Gravel, very dense-dry to damp							
		50/4"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-2

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Orange Brown fine Sandy Silt, trace Clay, very dense-moist							
5		54					14					
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, very dense-moist							
10		50/5"				126	12					
15		50/5"					10					
					Red Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, very dense-damp							
20		50/5"				124	10					
					Red Brown fine Sandy Silt, trace Clay, very dense-moist							
25		67					15					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					COLLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, slightly porous, trace fine root fibers, medium dense-damp							
5		16				81	4					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
10		10					5					
15		39			@ 13.5', trace Clay	108	4					
20		18					4			33		
					OLDER ALLUVIUM: Orange Brown Silty fine to medium Sand, trace coarse Sand, very dense-dry to damp							
25		50/6"				92	3					
					LIVE OAK CANYON FORMATION: Light Gray Silty fine-grained Sandstone to fine-grained Siltstone, highly weathered, friable, weakly cemented, very dense-damp							
30		67					6			51		
					Gray Brown Silty fine to coarse-grained Conglomeratic Sandstone, little fine to coarse Gravel, highly weathered, friable, weakly cemented, very dense-dry to damp							
		50/3"					2					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/6"					5					
					Light Gray Brown Silty fine-grained Sandstone, some Iron Oxide staining, highly weathered, friable, weakly cemented, very dense-damp							
45		50/6"				103	5					
		50/5"					3					
50					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-4

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		16			ALLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace to little fine Gravel, trace Clay, medium dense-damp	107	6					
10		17			Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		2					
15		39			Brown Silty fine Sand, trace medium to coarse Sand, trace Clay, medium dense-damp	117	4					
20		26			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense to very dense-dry to damp		4					
25		50/6"				116	3					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		17	3.5		POSSIBLE FILL: Black to Dark Brown Clayey Silt, trace fine to medium Sand, slightly organic, very stiff-damp to moist	111	9					
10		13	3.5		ALLUVIUM: Light Gray Clayey Silt to Silty Clay, trace fine Sand, stiff-damp		8					
15		50/6"			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace clay, very dense-damp	124	7					
20		14			Brown Silty fine Sand, little medium to coarse Sand, medium dense-moist		13			44		
25		50			Gray Brown Silty Clay, little fine to medium Sand, abundant Calcareous veining, hard-moist to very moist	116	17			72		
30		50/6"			Light Gray Brown Gravelly fine to coarse Sand, little Silt, very dense-damp		6					
		59			Gray Brown Clayey Silt, trace fine Sand, hard-moist	115	16					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium to coarse Sand, dense-damp							
		40					6			30		
40												
					Light Gray Brown Gravelly fine to coarse Sand, very dense-damp							
		50/4"				114	4					
45												
		56					5					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-6

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Light Gray Clayey Silt, trace fine Sand, stiff-moist		18					
10		17	4.5		Dark Brown Silty Clay, trace fine Sand, stiff-moist	107	15					
15		12	4.5		Gray Brown Clayey Silt, trace fine Sand, stiff-moist		16					
20		22			Light Brown Silty fine Sand, medium dense-damp to moist	94	11					
25		22			Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		8					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Dark Brown Clayey Silt, trace fine to coarse Sand, trace Iron Oxide staining, loose-moist	113	14					
10		7			Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, trace fine Gravel, loose-very moist		17					
15		13	4.5		Light Brown to Dark Brown Clayey Silt, trace fine Sand, trace fine root fibers, loose-moist	112	15			74		
20		10	1.0				19	29	17	66		
25		21	3.0			110	20	27	14	77		
30		16			Dark Gray fine Sandy Silt interbedded with 5" Dark Gray Silty Clay lenses, medium dense-moist		16			76		
		28				116	16			57		

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Light Brown to Brown fine Sandy Silt interbedded with Brown Silty fine to coarse Sand with trace fine Gravel and 3" lenses of Dark Gray Silty Clay, medium dense to very stiff-wet							
40		19					32			48		
					Gray Brown Silty fine to coarse Sand, trace Silt, trace fine Gravel, dense-dry to damp							
45		61				111	3			10		
					Dark Gray Silty Clay with lenses of Dark Gray Silty fine Sand, very stiff-very moist							
50		16	1.5				26	40	24	73		
					Dark Gray Clayey fine Sand, trace medium to coarse Sand, trace fine root fibers, very stiff-moist to very moist							
55		43	4.5			113	16					
					Boring Terminated at 55'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-8

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		9			ALLUVIUM: Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, loose to medium dense-damp		7					
10		36				118	13					
15		15			@ 13.5,' trace Iron Oxide staining		9					
20		24			Dark Brown Clayey fine Sand, trace medium to coarse Sand, little Silt, little Iron Oxide staining, medium dense-damp to moist	114	14					
25		18			Dark Gray fine Sandy Silt with 3" lenses of Dark Gray Silty fine Sand, trace to little fine to coarse Sand, trace to little fine Gravel, medium dense-damp to moist		13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-9

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine Sand, trace fine root fibers, trace Clay, trace Calcareous nodules and veining, medium dense-damp to moist							
5		21				115	9					
10		29					9					
15		38				122	8					
20		20					11					
25		56				122	13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		7			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-damp		6					
10		58			Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, dense-damp	126	10			40		
15		14			Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Clay, medium dense-damp to moist		14					
20		50/6"			OLDER ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous nodules, trace to little fine Gravel, dense to very dense-damp	130	8					
25		34					7					
30		41			@ 28.5', medium dense-very moist	114	17					
		28			Brown Silty fine Sand, trace medium Sand, medium dense-damp		5					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		24				105	10					
40												
					Dark Gray Silty fine Sand, trace to little medium to coarse Sand, trace Clay, trace fine Gravel, medium dense-very moist							
		25					24					
45												
		34				116	14					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10b

APPENDIX B-3

SUBSURFACE LOGS (PSE)

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-037
DATE STARTED	4/8/04	GROUND ELEV.	2268	LOGGED BY	DMP
DATE FINISHED	4/9/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ALLUVIUM** (Qal): SANDY SILT, fine grained, light brown, slightly moist, firm, trace coarse grains, visible porosity.				
	2265									
						@ 4.0 ft. color change to yellow brown.				
5		R	Push				5.4	100	22	
	2260					@ 8.0 ft. trace gravel.				
10		R	3		SM	@ 10.0 ft. SILTY SAND, fine grained, yellow brown, slightly moist to moist, medium dense, visible porosity, trace coarse grains, gravel.	4.4	115	27	
	2255	B								
						SAN TIMOTEO FORMATION (QTst): SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard to hard.				
15		R	9				8.6	131	85	CON, HY
						TOTAL DEPTH 16.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=49911b.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=38411b.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=24461b.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2275				CL	**TOPSOIL** (No Map Symbol): SANDY CLAY, sand is fine to coarse grained, dark red brown, moist, stiff, trace gravel, secondary clay development.				
						SAN TIMOTEO FORMATION (QTst): CONGLOMERATE, matrix supported, mostly granule sized clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard some secondary clay, calcium carbonate cementation.				
5	2270					@ 3.0 ft. SANDY SILTSTONE, fine grained, light yellow brown, dry, moderately hard, pinches out, interfingered contact with below.				
						@ 4.0 ft. PEBBLE CONGLOMERATE, matrix supported, 1/4-3" clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard, clasts are igneous and metamorphic, subrounded, occasional 4-5" clasts.				
						@ 6.0 ft. low cohesion, slight caving.				
10	2265					@ 8.0 ft. SILTY SAND matrix, greater cohesion, fewer clasts.				
						@ 11.0 ft. coarser grained, mostly medium to coarse grained SAND and granules, visible porosity, low cohesion.				
						@ 13.0 ft. occasional interfingered lenses of SANDY SILTSTONE, and SILTY SANDSTONE, fine grained, yellow brown, moist, moderately hard.				
15	2260									
						@ 17.0 ft. gradational change to SILTY SANDSTONE, fine to coarse grained, (coarse grained locally), yellow brown to reddish brown, moist, moderately hard, trace pebbles and granules.				
20	2255					@ 20.0 ft. 1.5' thick CONGLOMERATE bed, clast supported, up to 9" clasts.				
						@ 22.0 ft. N78W , 10NE-approximate attitude of bedding on coarse grained SANDSTONE bed, 6" thick.				
25	2250									
						@ 28.0 ft. SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard, trace granules and pebbles, locally SILTY SANDSTONE.				
30	2245	R B	6				11.3	123	87	
						@ 33.0 ft. 2' thick SANDSTONE bed, fine to coarse grained, light gray, moist, moderately hard, trace pebbles and granules.				
35	2240									
	2235					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2235					**SAN TIMOTEO FORMATION** (QTst): Continued. @ 38.0 ft. interfingered contact with below, gradational change, alternating SANDY SILTSTONE and PEBBLE CONGLOMERATE, 3"-1' thick.				
45	2230	R	19			@ 43.0 ft. PEBBLE CONGLOMERATE, matrix supported, mostly 1/2-2" in diameter clasts in a fine to coarse grained sand matrix, yellow brown to yellow gray, moist, hard.	3.9	132	41	
						@ 46.0 ft. faint biotite rich laminations in sandy lenses, cross bedded, discontinuous, overall decrease in clast size to mostly granules for 3'.				
50	2225	R	22				2.3	128	21	
55	2220	B				@ 56.0 ft. increased cohesion/cementation, hard.				
						@ 57.0 ft. greater abundance of clasts, mostly 1/2-1" in diameter, subangular to subrounded, igneous and metamorphic.				
60	2215									
65	2210					TOTAL DEPTH 65.0 FT NO GROUNDWATER ENCOUNTERED CAVING OBSERVED @ 6.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind		
DATE STARTED	7/22/04	GROUND ELEV.	2280	BORING DESIG.	B-081
DATE FINISHED	7/22/04	GW DEPTH (FT)		LOGGED BY	SJD
DRILLER	Al Roy Drilling	DRIVE WT.	SEE NOTE	NOTE	0-24'=2150 lb
TYPE OF DRILL RIG	18" Bucket Auger	DROP	12 in.		25-44'=1350 lb
					45-65=650lb/65+=1150lb

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2280				SM	ALLUVIUM (Qal): SILTY SAND, fine to coarse-grained, trace gravel, reddish brown, dry to slightly moist.				
5	2275	R	4			@ 5 ft. slightly moist, medium dense.	5.2	96	19	
10	2270	R	3				5.0	110	26	
15	2265	R	5				5.5	112	31	CON, HY
						@ 17 ft. slightly moist to moist, fine-grained.				
20	2260	R/B	3			@ 20 ft. moist.	6.1	110	32	
25	2255	R	30 for 11"		SM	OLDER ALLUVIUM (QTst): SILTY SAND, fine-grained, trace medium to coarse-grained, reddish brown to yellowish brown, moist, dense.	6.8	128	61	
30	2250	R	32 for 8"			@ 30 ft. coarse-grained, reddish brown.	5.6	119	38	
					ML	@ 32 ft. SANDY SILT, fine-grained SAND, yellowish brown to reddish brown, moist, stiff.				
35	2245	R	30 for 8"		SM	@ 35 ft. SILTY SAND, fine to coarse-grained, some GRAVEL, reddish brown, slightly moist, dense.	5.3	118	35	
						TOTAL DEPTH 36 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-47

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-095
DATE STARTED	9/15/04	GROUND ELEV.	2225	LOGGED BY	FE
DATE FINISHED	9/15/04	GW DEPTH (FT)	15	NOTE	0-22'=2400lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		23-42'=
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		1200lb.43-65'=850lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2225				SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SAND, light yellow brown, dry, loose.				
5	2220	R	1				3.0			
					SM	ALLUVIUM (Qal): SILTY SAND, medium gray brown, moist, moderately dense, fine to medium grained.				
10	2215	R B	1			@ 10.0 ft. moist to very moist.	13.2	113	75	CON, HY MAX. CHEM HY
15	2210	R	2		SM	INTERMEDIATE-AGE ALLUVIUM (Qia): SILTY SAND, fine grained, dense, very moist to wet, some clay, brown and olive gray, slightly mottled, water entering boring @ 15.0 ft and 24.0 ft.	14.6	121	95	
20	2205	R	Push		ML	@ 20.0 ft. SANDY SILT to CLAYEY SILT, brown, very moist, soft, some fine grained sand.	19.1	110	95	
25	2200	R B	1			@ 25.0 ft. interlensed SAND and CLAYEY SILT, light gray to brown, soft, very moist to wet, sand is fine to coarse grained.	21.0	105	92	
30	2195	R	1				22.4	104	94	
35	2190					@ 34.0 ft. dark blueish gray.				
40	2185					TOTAL DEPTH 40.0 FT GROUNDWATER ENCOUNTERED @ 15.0 & 20.0 FT CAVING @ 40.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-54

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-096
DATE STARTED	9/16/04	GROUND ELEV.	2232	LOGGED BY	FE
DATE FINISHED	9/16/04	GW DEPTH (FT)		NOTE	0-22'=2400lb, 23-42'=1200lb, 43-65'=850lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	2230				SM/SP	**ALLUVIUM** (Qal): interlensed SAND and SILTY SAND, light brown to light gray, fine to coarse grained, dry to slightly moist, abundant visible porosity, some clay, trace of gravel, loose, trace gravel.				
5		R	Push				3.9	103	17	CON, HY
	2225									
10						@ 10.0 ft. subrounded metamorphic clasts to 2" in diameter.				
		R	1			@ 11.0 ft. sharp contact, dark gray to black, moist, firm, some visible porosity.	14.4	112	79	CON, HY
	2220	B								DSR, MAX, HY, CHEM
					SM	**INTERMEDIATE-AGE ALLUVIUM** (Qia): SILTY SAND, light brown and olive gray, slightly mottled, moist, moderately dense, fine to medium gray, iron oxide, some clay, weathered.				
15		R	1				12.3	115	75	
						@ 16.0 ft. less weathered, dense.				
	2215									
20		R	4			@ 20.0 ft. brown and olive gray, mottled, moist, very dense, fine to coarse grained.	6.6	123	50	
	2210				SP	@ 22.0 ft. SAND, light yellow brown, fine to coarse grained, slightly moist, dense, some gravel to 1/8" in diameter.				
25		B								
					SM	@ 26.0 ft. SILTY SAND, light yellow brown, fine to coarse grained, slightly moist, dense.				
	2205					@ 26.0 ft. N35E, 20SE - erosional surface.				
30		R	3				12.5	118	82	
						SAN TIMOTEO FORMATION (QTst): fine SANDY SILTSTONE, light yellow brown, moist to very moist, moderately hard, massive, trace gravel.				
	2200					@ 31.0 ft. N30E, 15SE - contact.				
35						@ 33.0 ft. CLAYEY SILTSTONE, light olive gray, moist to very moist, very stiff, massive, some fine grained SAND.				
	2195	B								
40		R	10				12.5	118	82	
						TOTAL DEPTH 41.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-55

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C-1

LABORATORY TEST RESULTS (AGS)

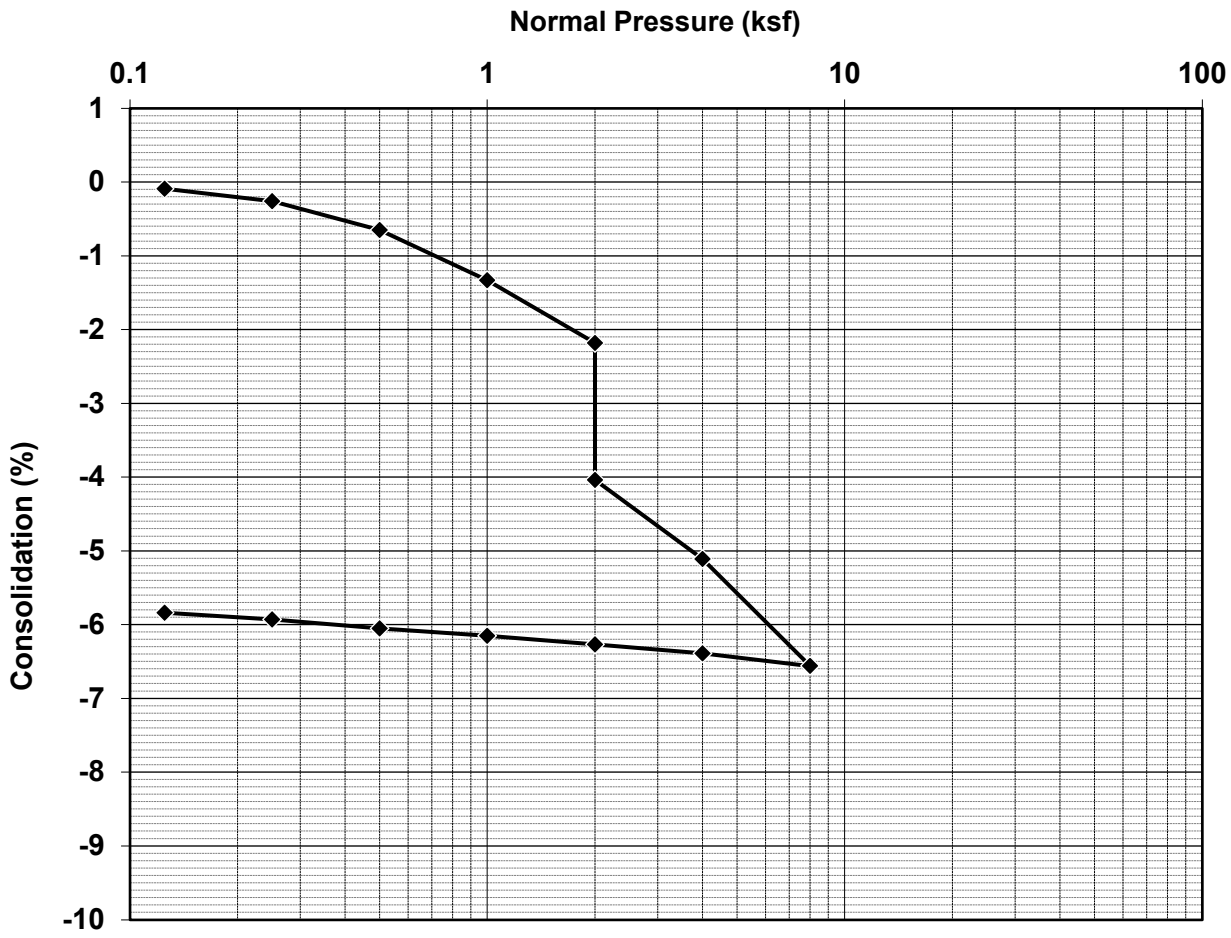
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-1
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.9%	15.3%
Void Ratio, e	0.57	0.48
Saturation, S	14%	86%
Dry Density (pcf)	107.4	114.1
Wet Density (pcf)	110.5	131.5

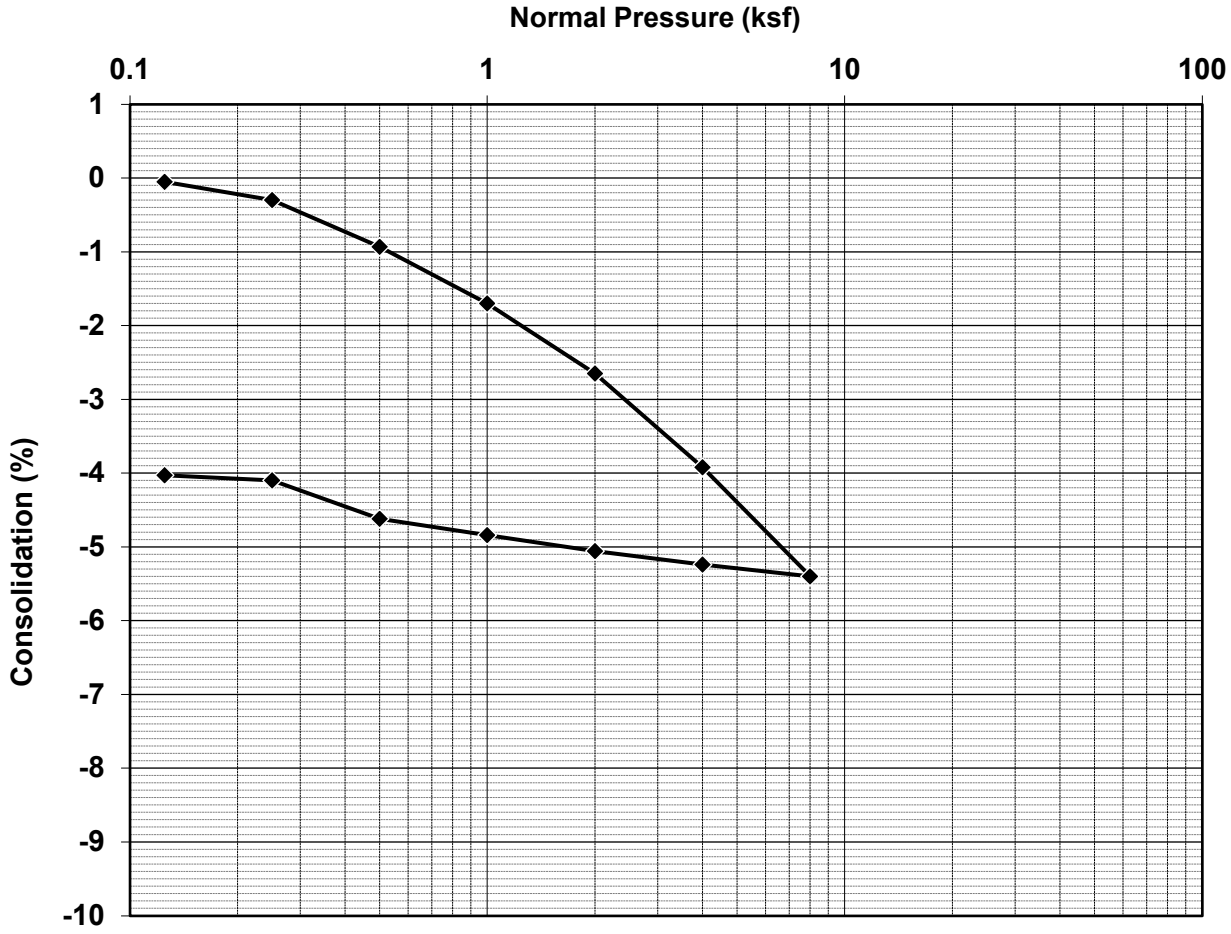
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	15 ft
Project No:	2001-04	Description:	Qal- Sandy Silt with Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	16.9%	22.2%
Void Ratio, e	0.64	0.57
Saturation, S	72%	105%
Dry Density (pcf)	102.8	107.1
Wet Density (pcf)	120.2	131.0

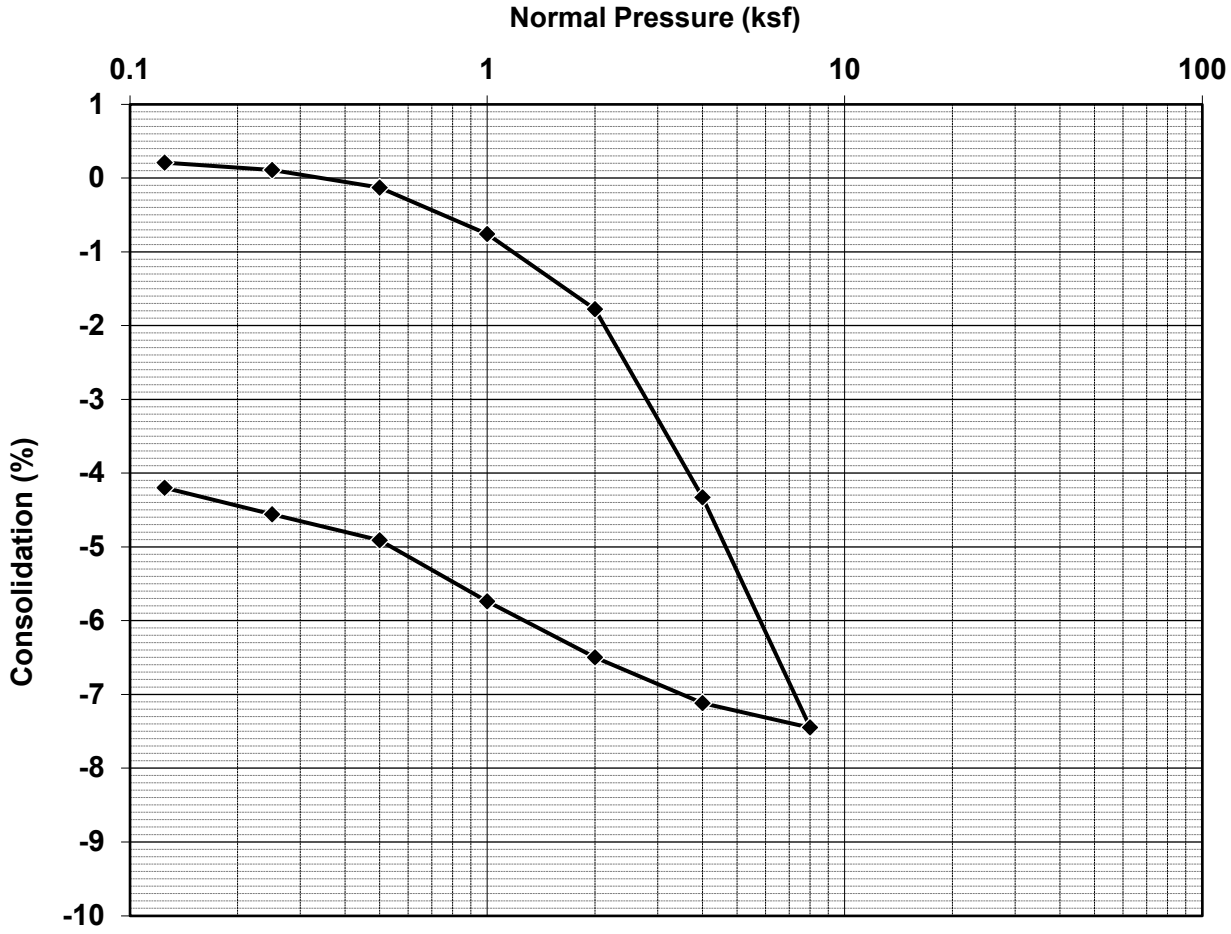
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	25 ft
Project No:	2001-04	Description:	Qal- Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.6%	27.4%
Void Ratio, e	0.82	0.74
Saturation, S	85%	100%
Dry Density (pcf)	92.7	96.8
Wet Density (pcf)	116.5	123.2

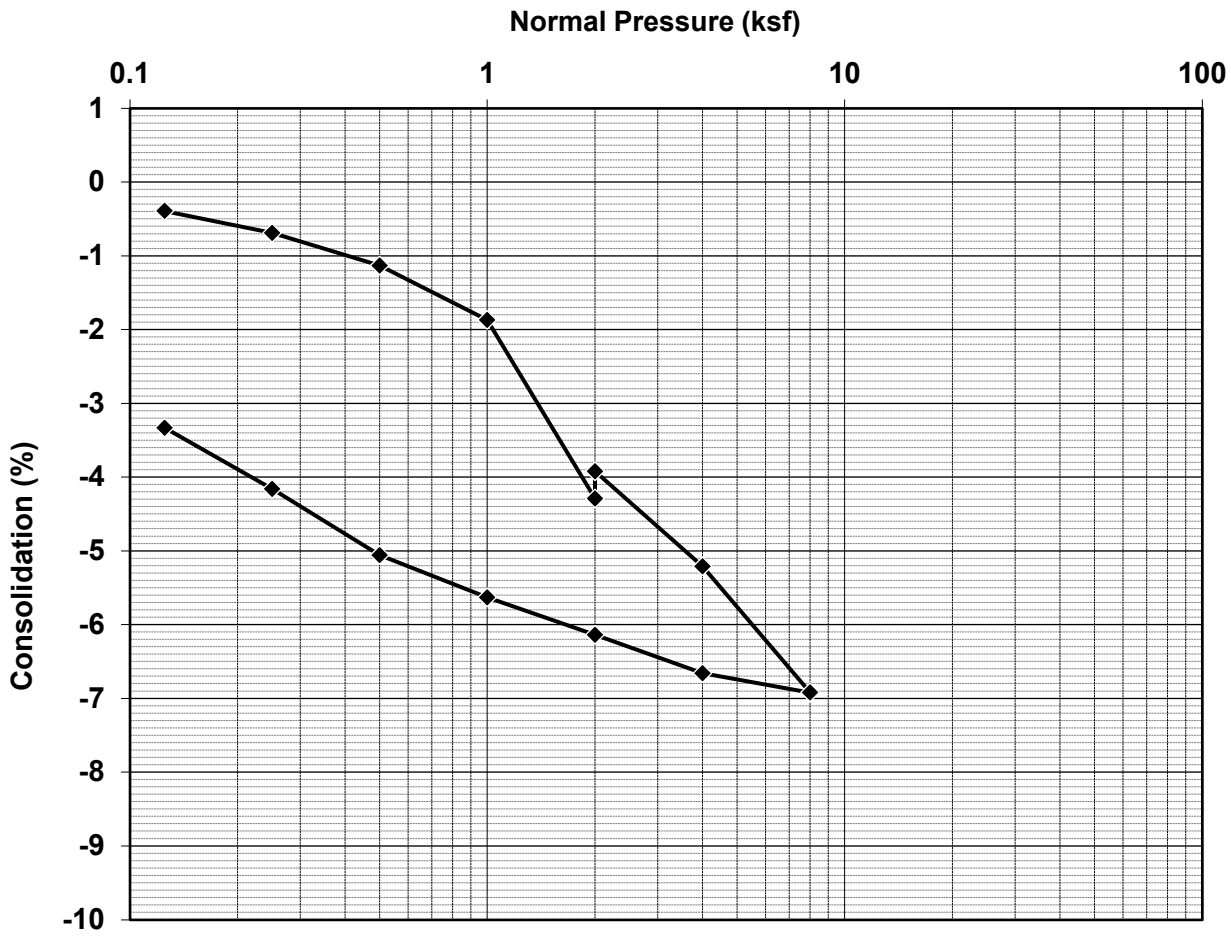
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qal- Sandy Silt
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	19.4%	34.5%
Void Ratio, e	0.91	0.84
Saturation, S	58%	111%
Dry Density (pcf)	88.4	91.5
Wet Density (pcf)	105.5	123.0

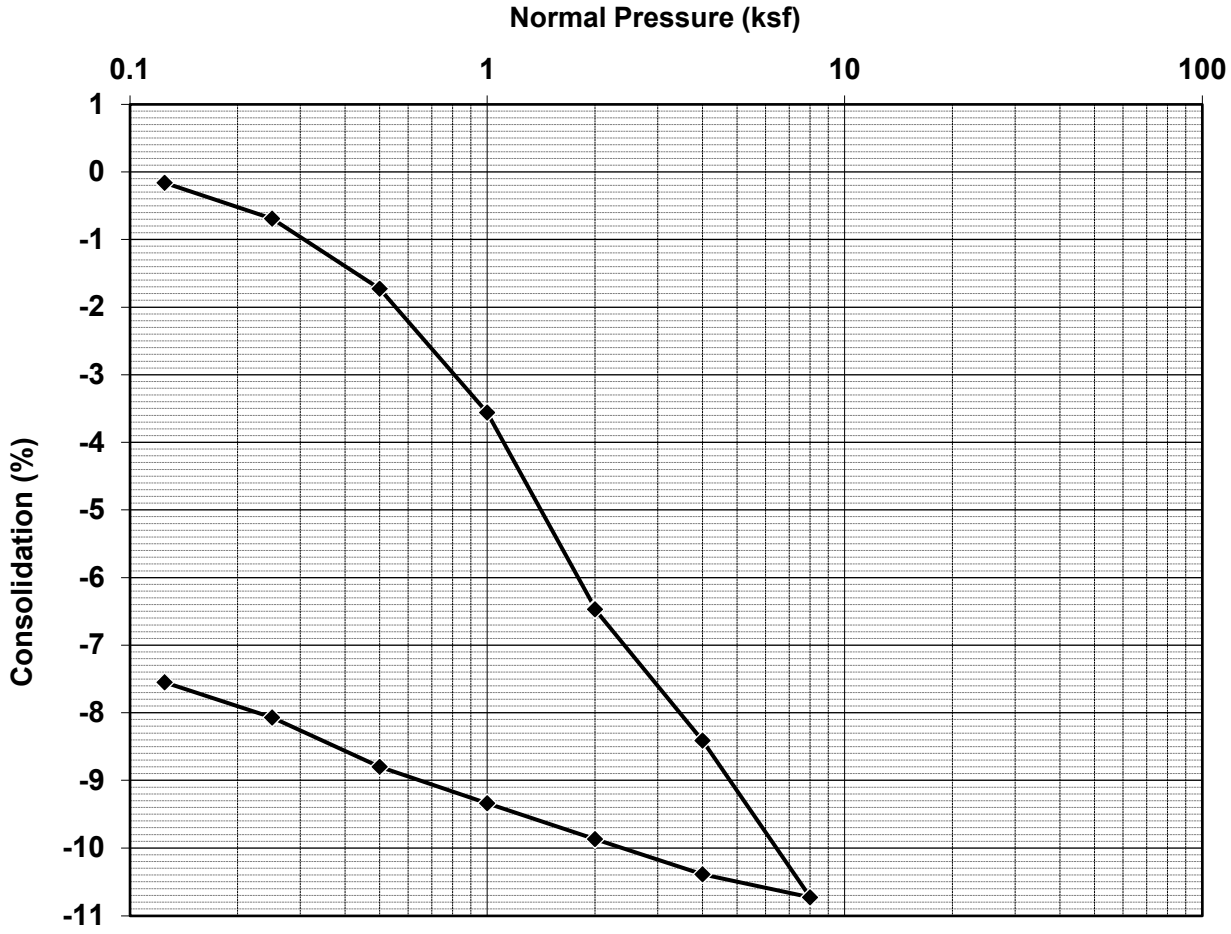
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qal- Sandy Silt with Peat
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	18.3%	34.0%
Void Ratio, e	0.81	0.67
Saturation, S	61%	137%
Dry Density (pcf)	93.3	100.9
Wet Density (pcf)	110.4	135.3

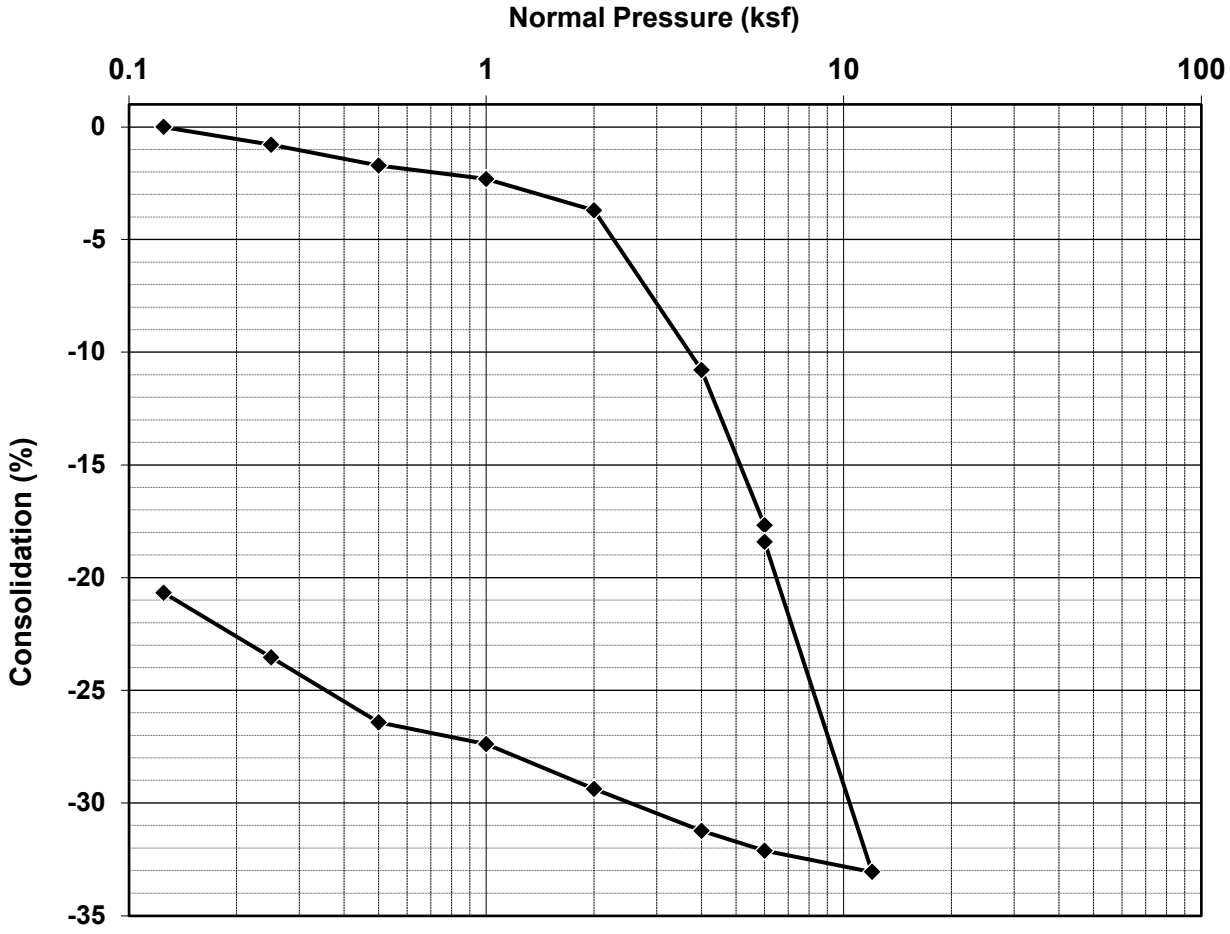
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Black Peat
Date:	9/10/2011	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w		143.9%
Void Ratio, e		
Saturation, S		
Dry Density (pcf)		33.1
Wet Density (pcf)	75.6	80.7

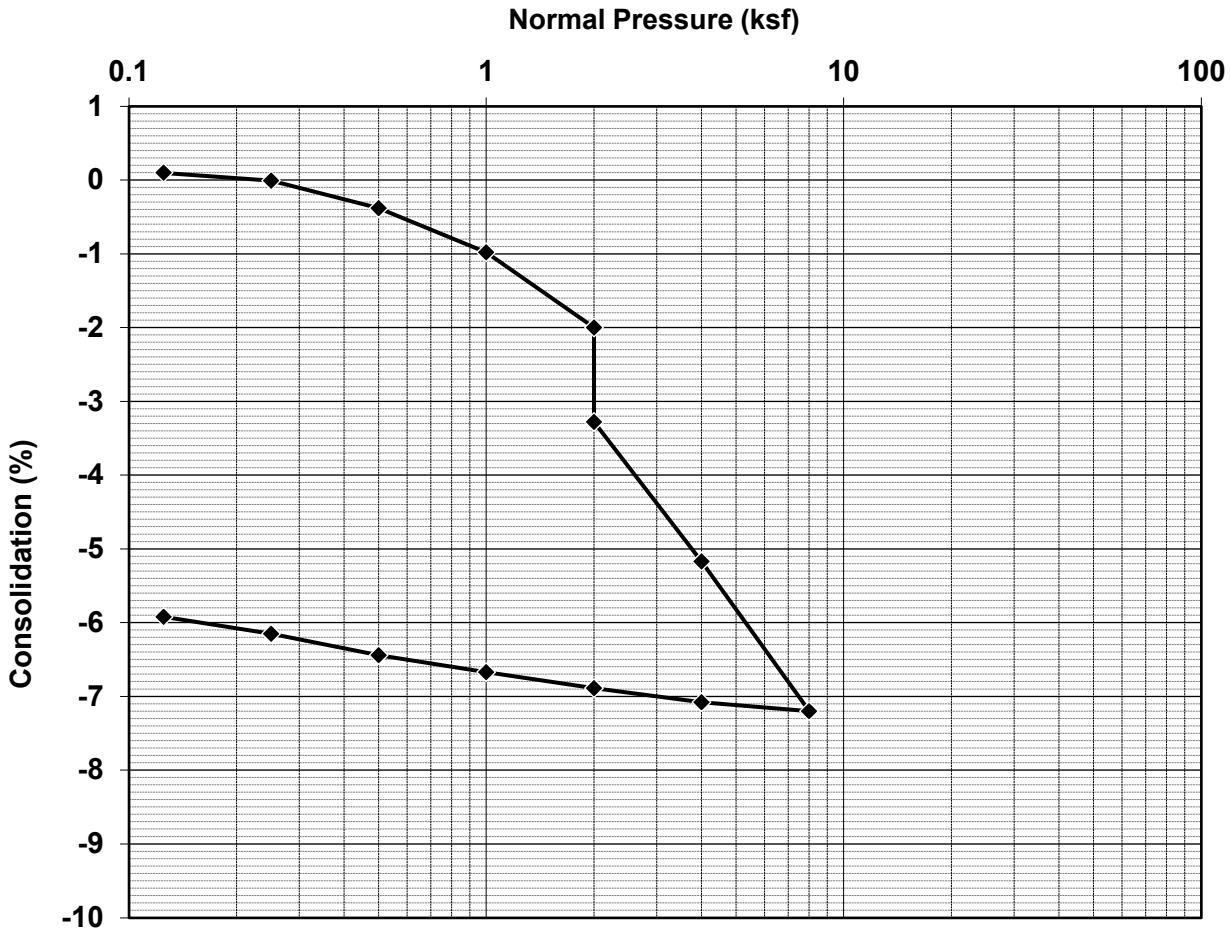
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	15.0%
Void Ratio, e	0.53	0.43
Saturation, S	26%	93%
Dry Density (pcf)	110.5	117.4
Wet Density (pcf)	116.1	135.0

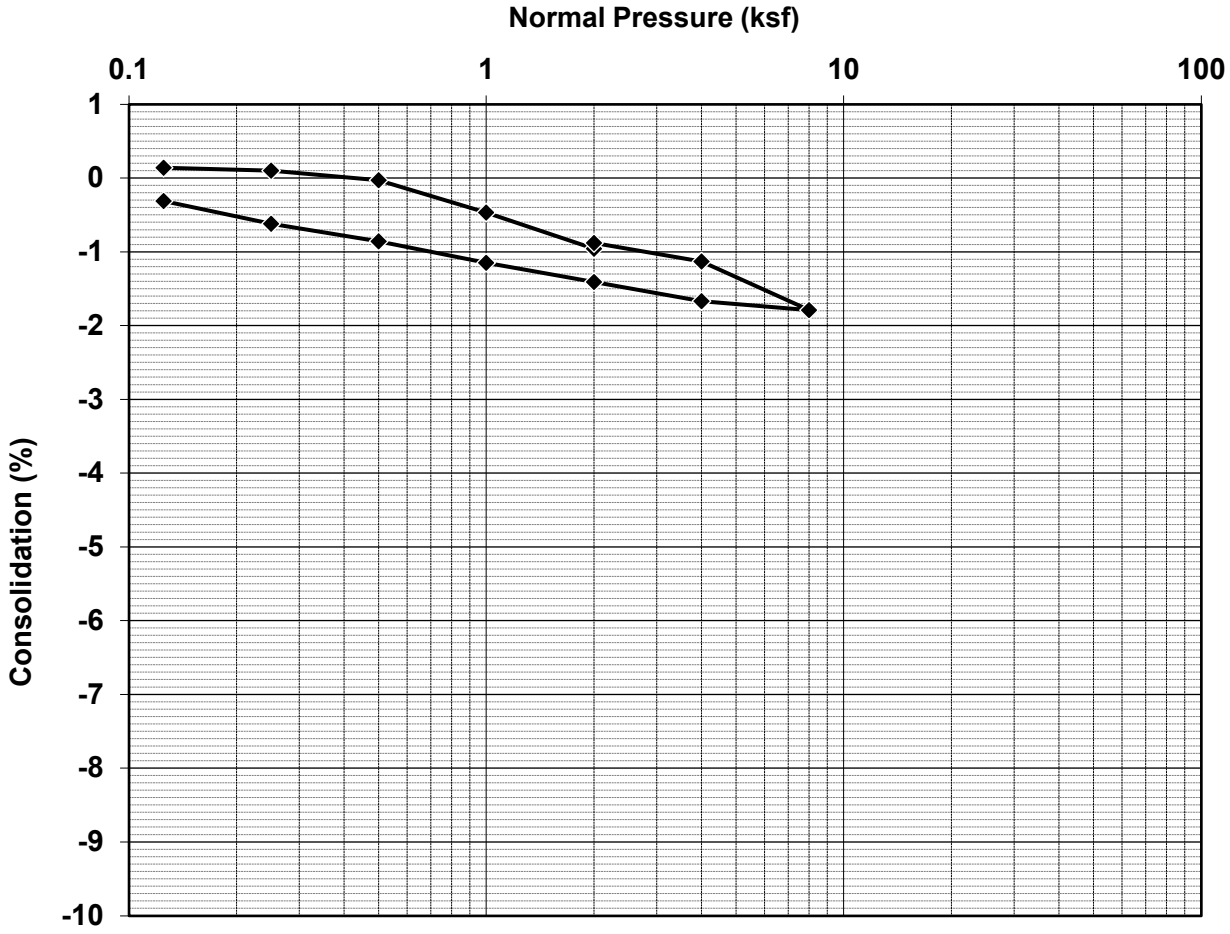
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/10/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	11.4%	17.0%
Void Ratio, e	0.46	0.46
Saturation, S	66%	100%
Dry Density (pcf)	115.1	115.5
Wet Density (pcf)	128.3	135.1

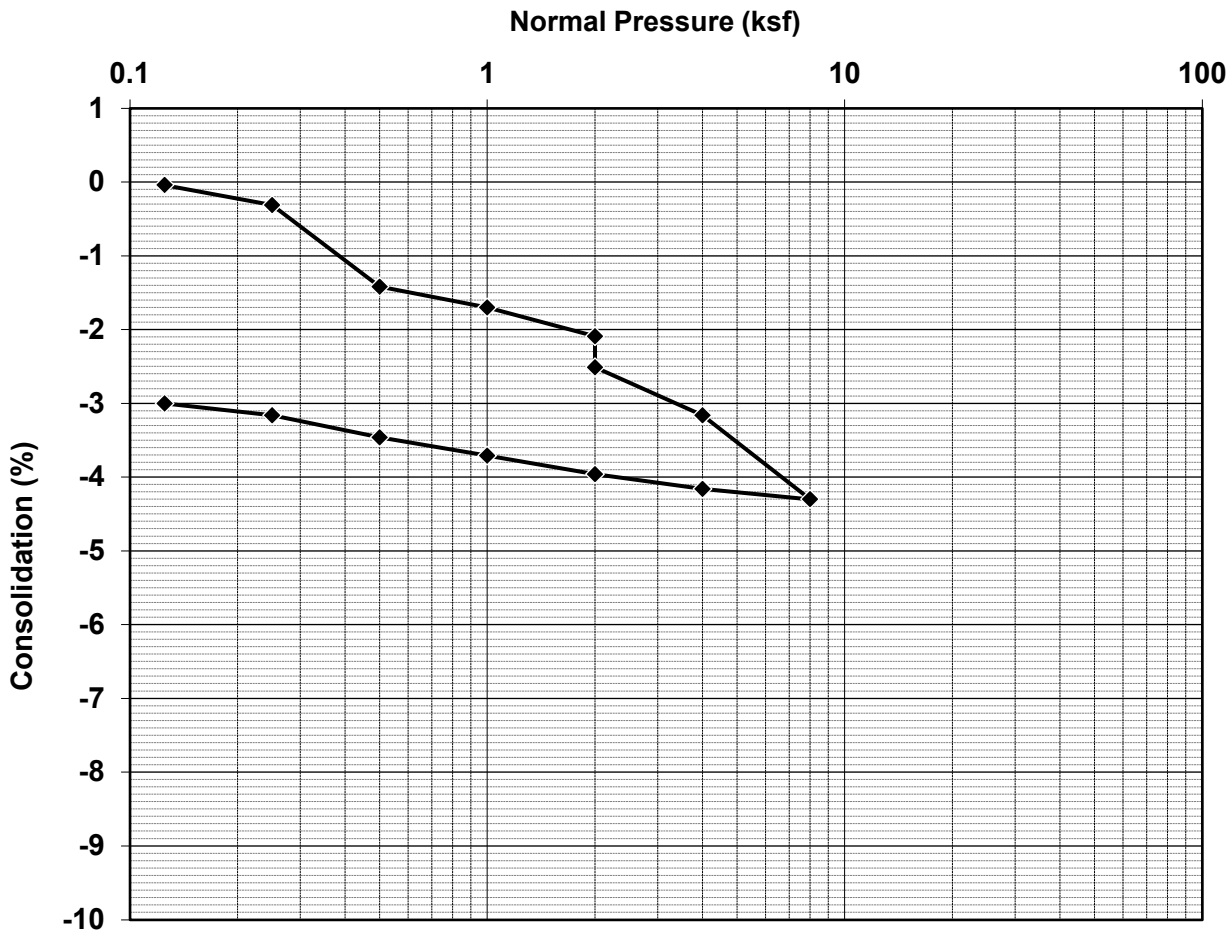
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-9
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand/Sandy Silt
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	8.5%	16.5%
Void Ratio, e	0.37	0.33
Saturation, S	62%	135%
Dry Density (pcf)	122.9	126.7
Wet Density (pcf)	133.4	147.6

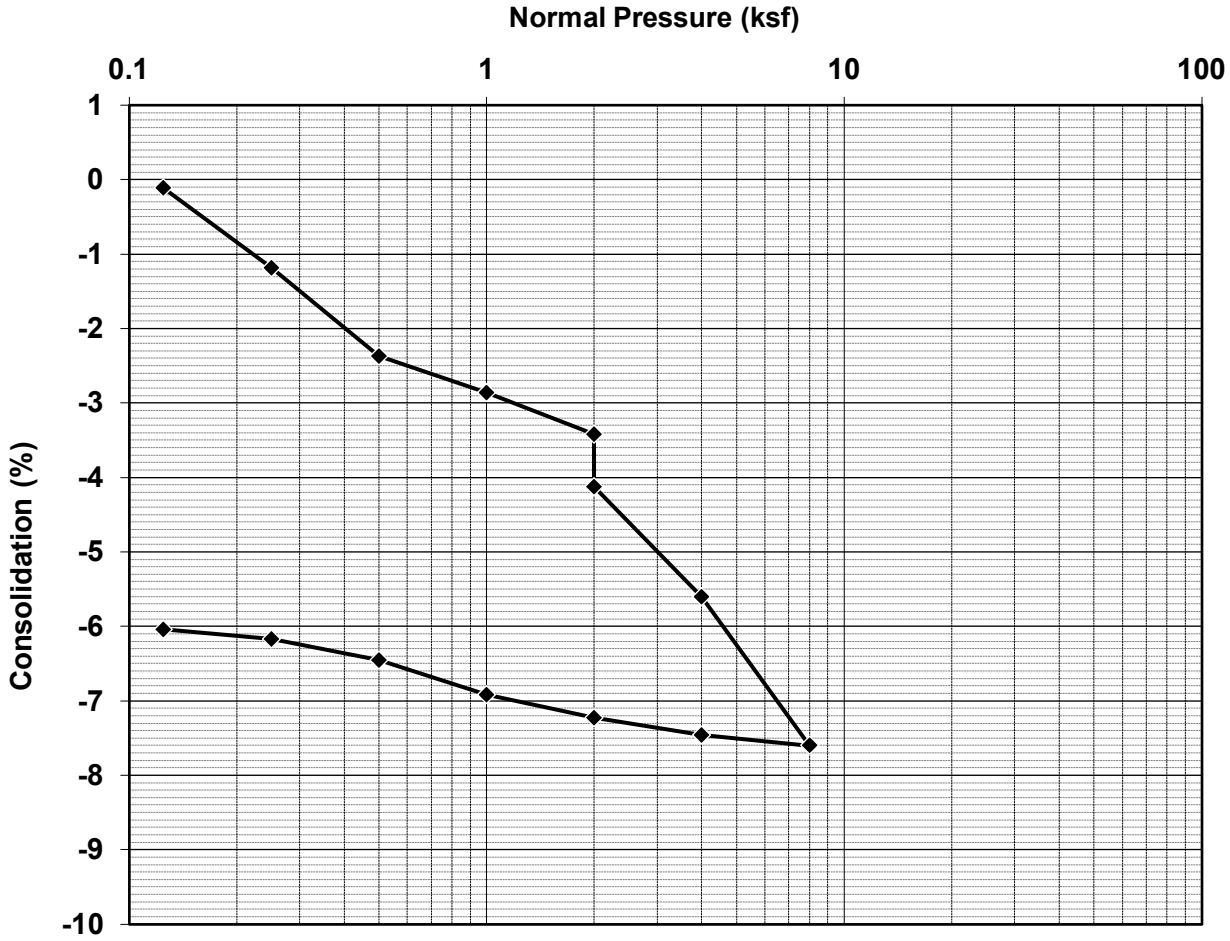
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-10
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.0%	15.9%
Void Ratio, e	0.40	0.31
Saturation, S	14%	138%
Dry Density (pcf)	120.7	128.5
Wet Density (pcf)	123.2	149.0

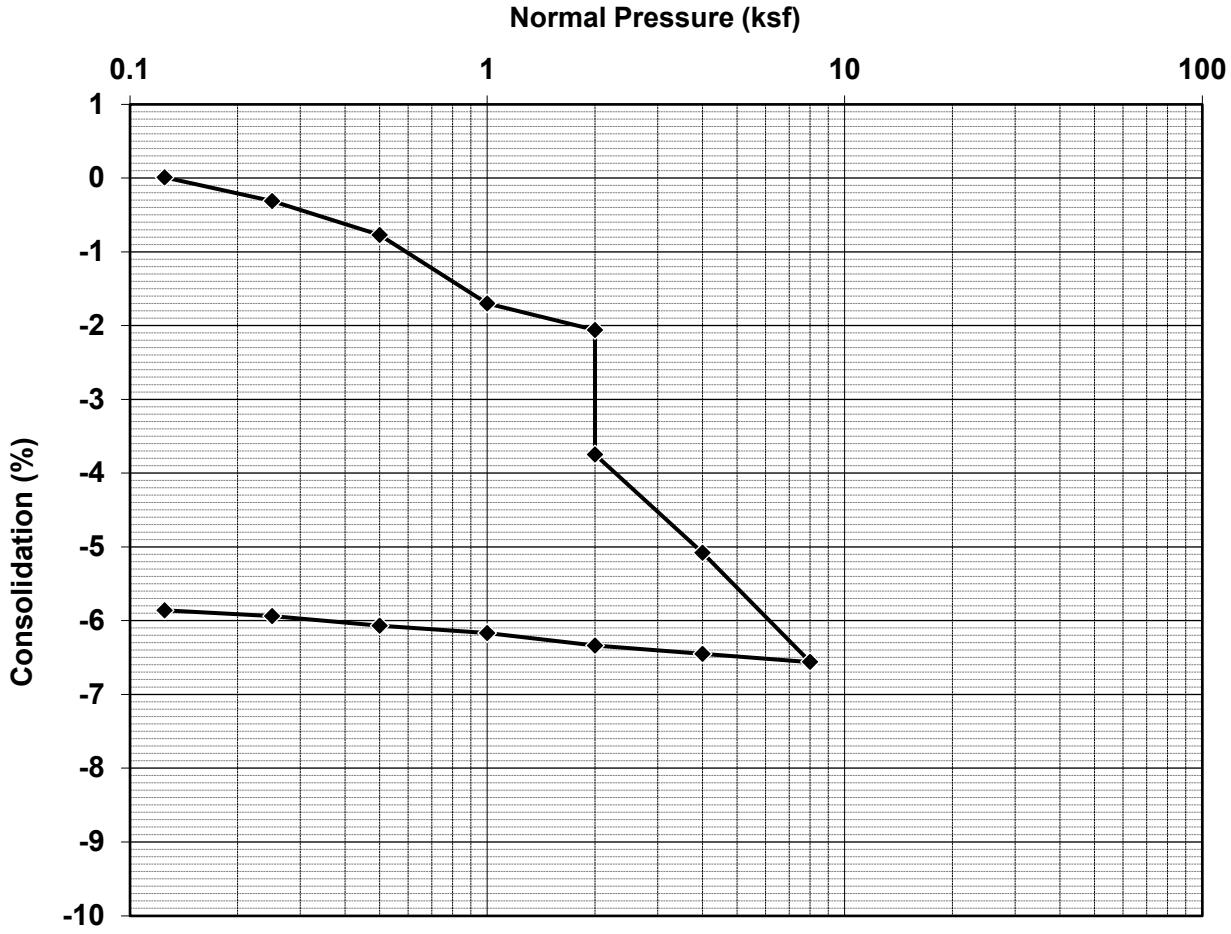
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qal- Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.4%	13.0%
Void Ratio, e	0.48	0.39
Saturation, S	13%	89%
Dry Density (pcf)	113.9	121.0
Wet Density (pcf)	116.6	136.7

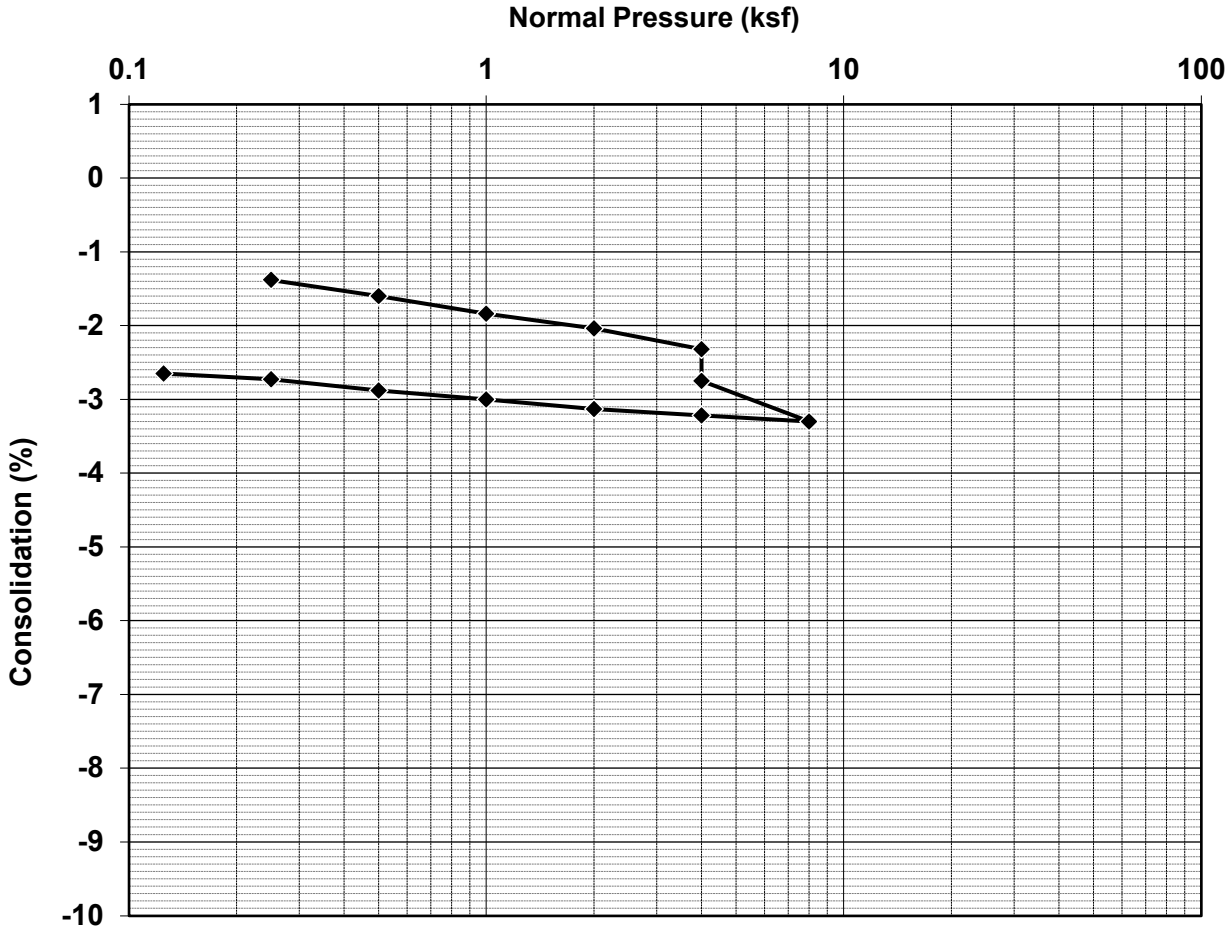
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.0%	12.0%
Void Ratio, e	0.34	0.31
Saturation, S	71%	106%
Dry Density (pcf)	125.6	129.0
Wet Density (pcf)	136.9	144.5

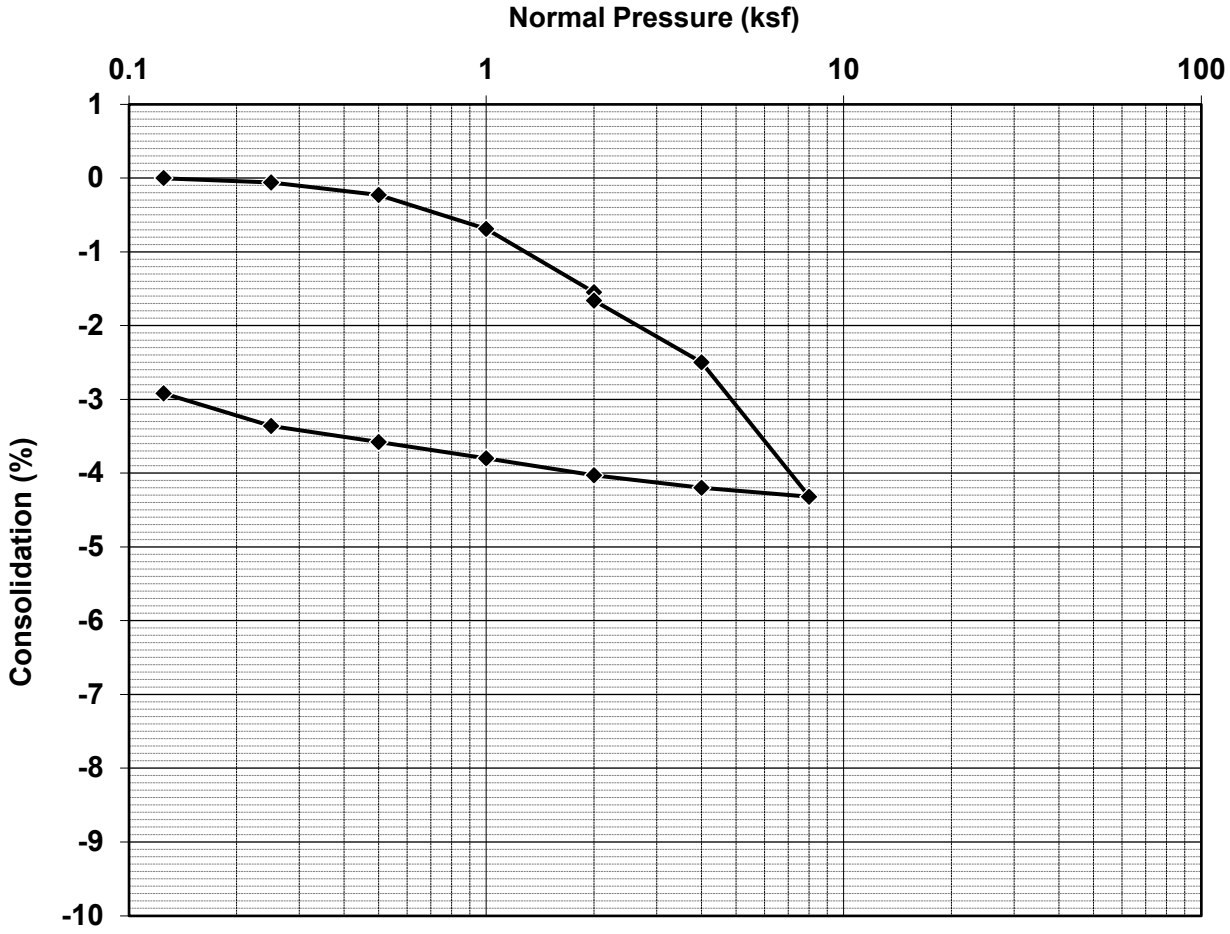
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS -14
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/22/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	14.9%
Void Ratio, e	0.40	0.36
Saturation, S	34%	111%
Dry Density (pcf)	120.0	123.6
Wet Density (pcf)	126.1	142.0

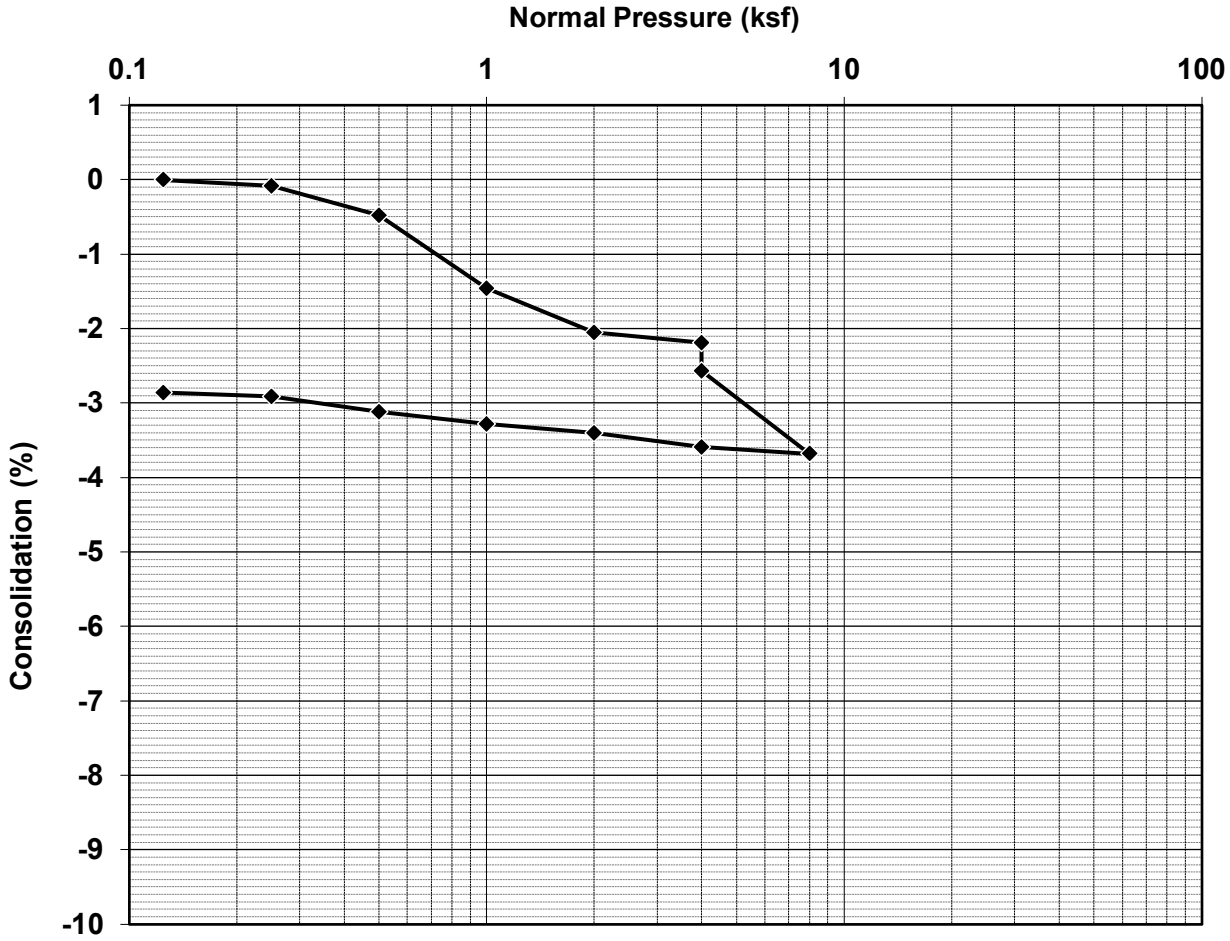
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-15
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Silty to Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.8%	12.5%
Void Ratio, e	0.36	0.32
Saturation, S	74%	106%
Dry Density (pcf)	124.1	127.8
Wet Density (pcf)	136.3	143.8

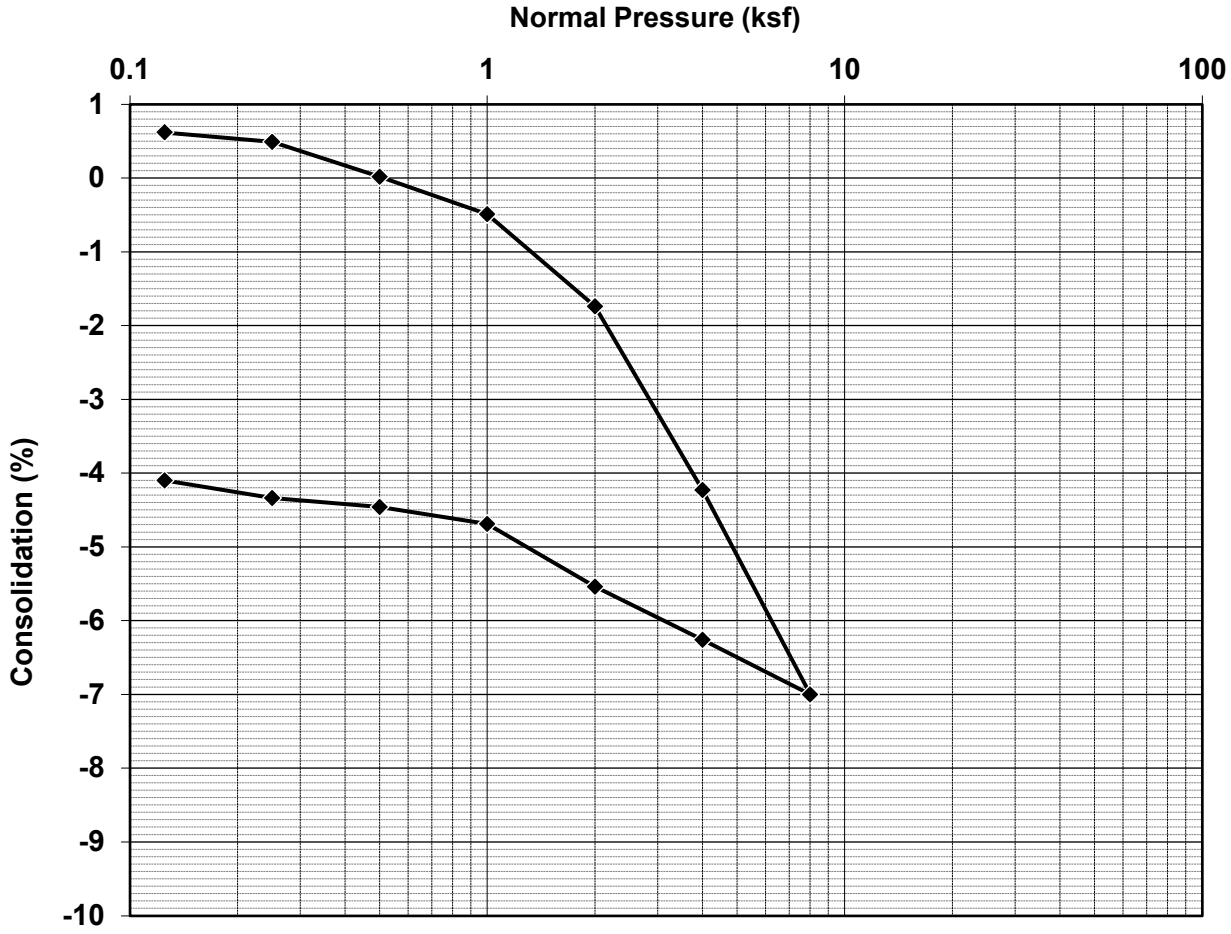
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	10 ft
Project No:	2001-04	Description:	Qal- Silty Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	21.2%	28.0%
Void Ratio, e	0.86	0.78
Saturation, S	67%	97%
Dry Density (pcf)	90.7	94.6
Wet Density (pcf)	109.9	121.1

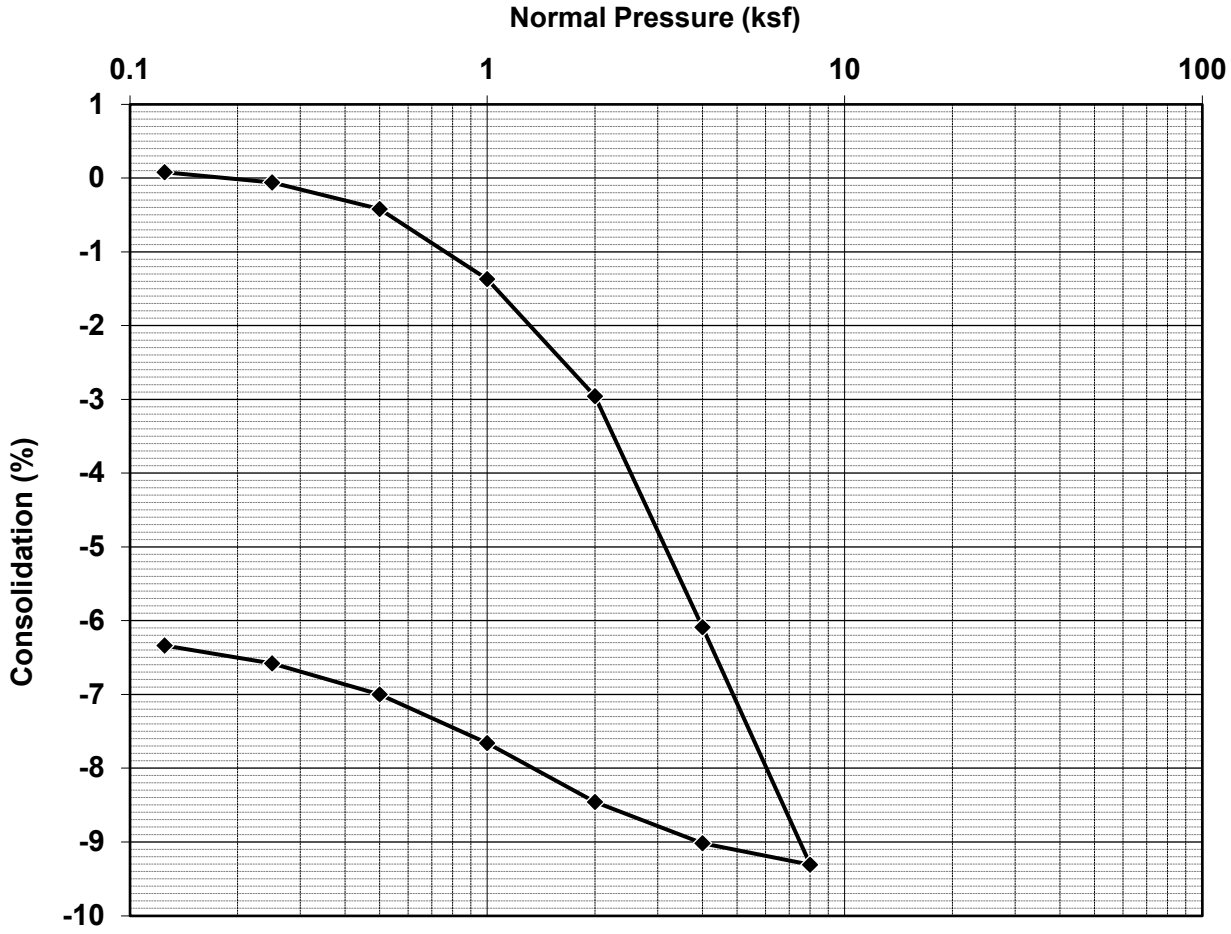
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	20 ft
Project No:	2001-04	Description:	Qal- Silty Clay with Sand
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.3%	25.5%
Void Ratio, e	0.99	0.86
Saturation, S	69%	80%
Dry Density (pcf)	84.8	90.5
Wet Density (pcf)	106.3	113.6

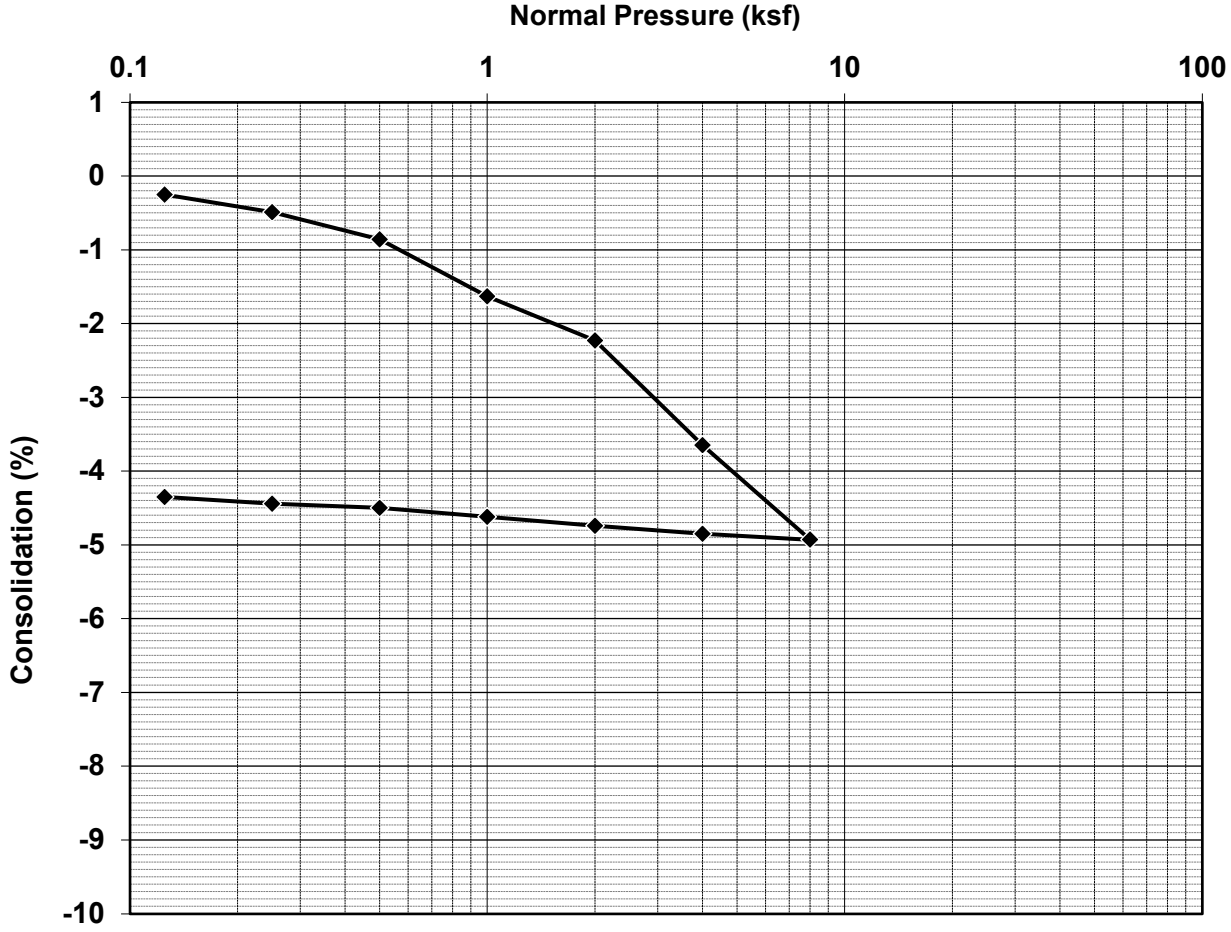
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No:	2004-01	Description:	Qoa- Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	13.9%
Void Ratio, e	0.40	0.34
Saturation, S	84%	112%
Dry Density (pcf)	120.6	126.1
Wet Density (pcf)	135.5	143.6

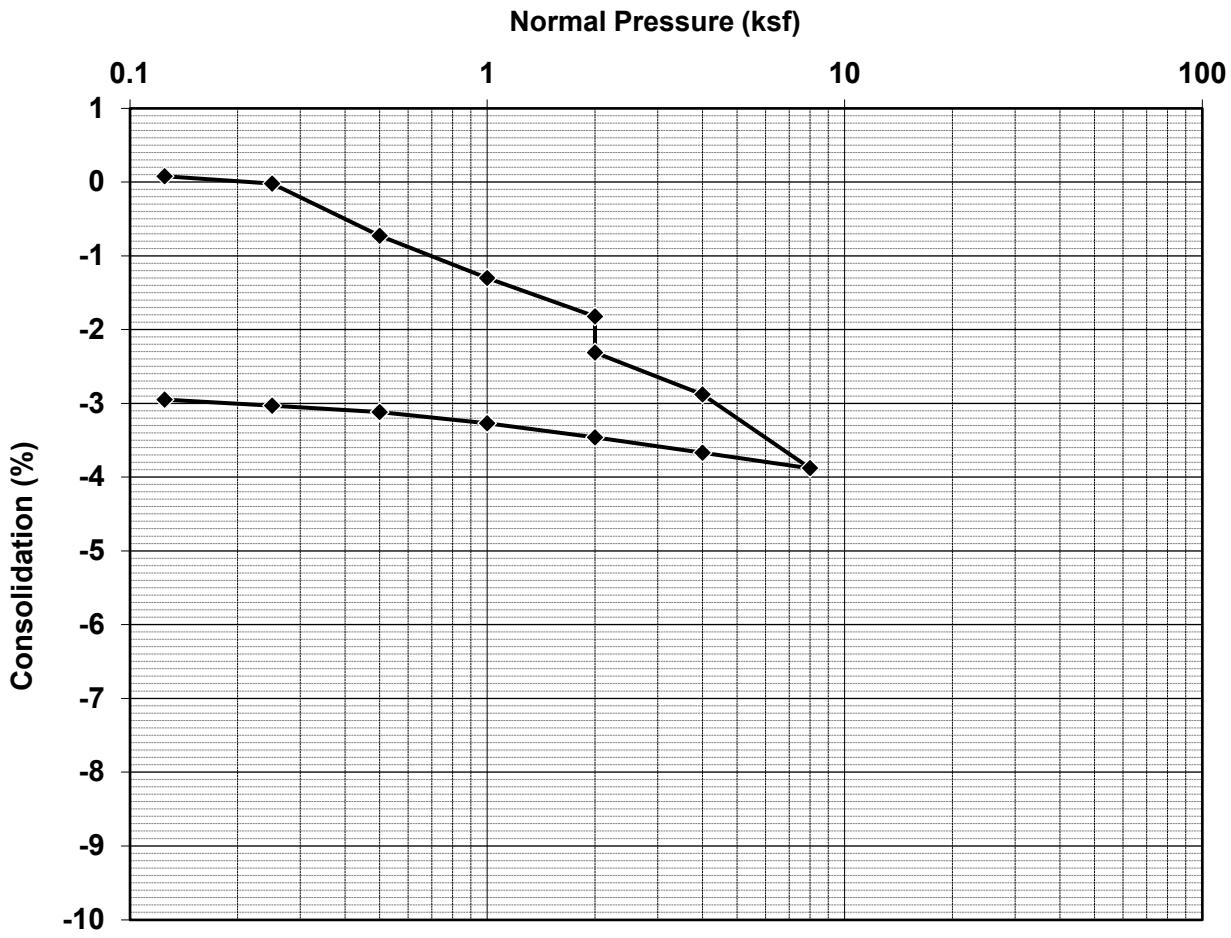
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-17
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	4.5%	14.1%
Void Ratio, e	0.41	0.37
Saturation, S	30%	104%
Dry Density (pcf)	119.6	123.3
Wet Density (pcf)	125.0	140.6

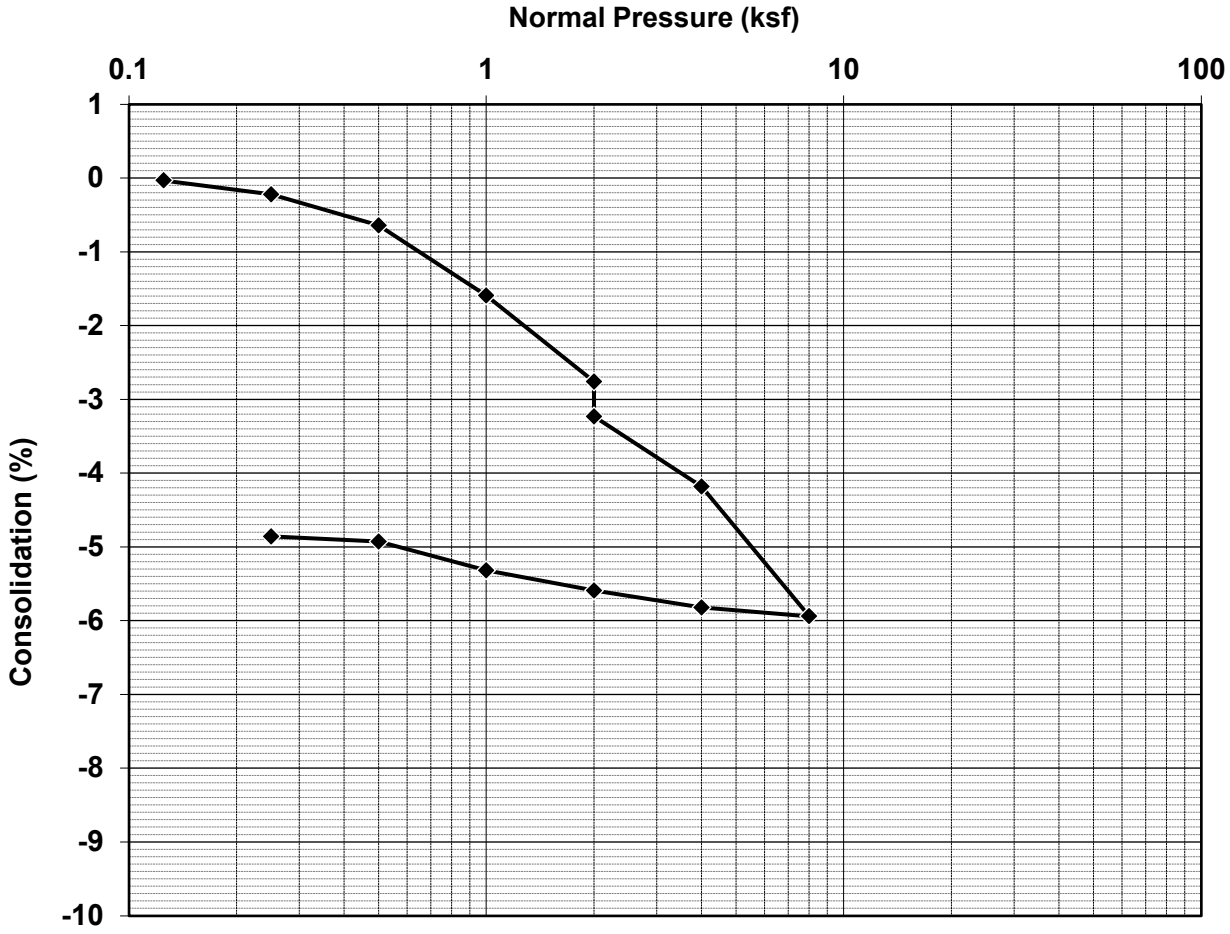
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-18
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qal- Silty Clay
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	19.0%
Void Ratio, e	0.57	0.50
Saturation, S	58%	103%
Dry Density (pcf)	107.1	112.6
Wet Density (pcf)	120.3	134.0

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

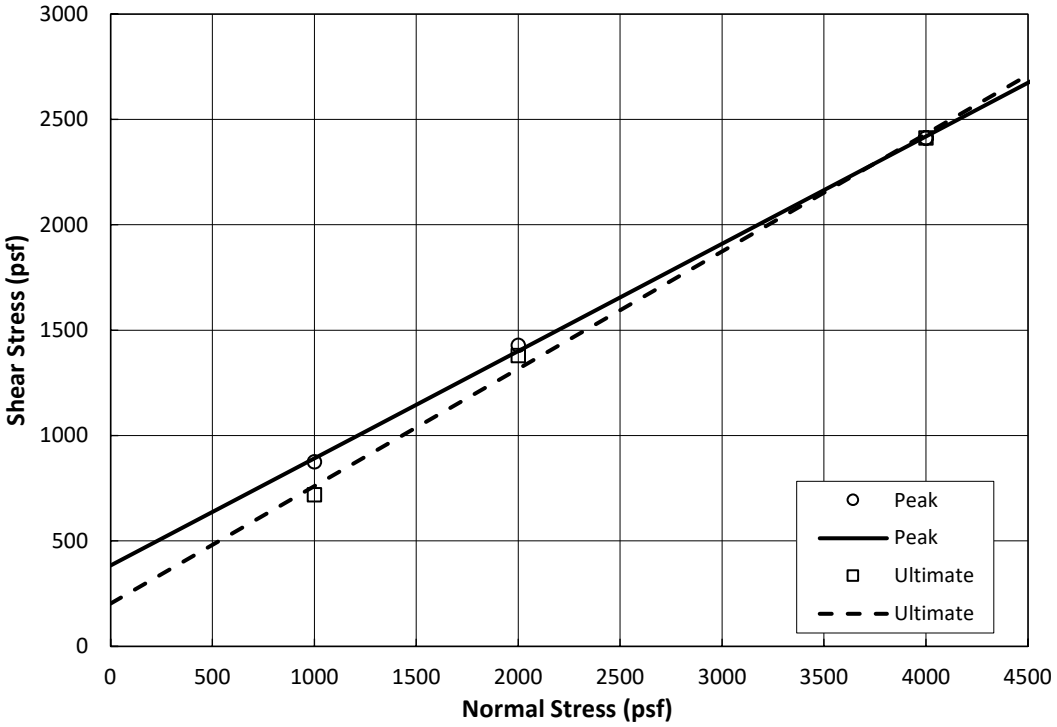
DIRECT SHEAR - ASTM D3080

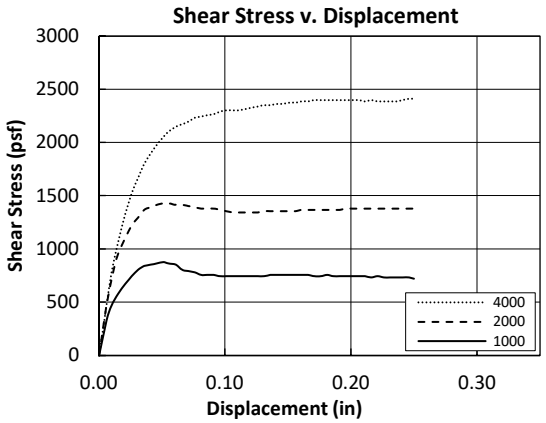
Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/19/2020	Reviewed by:	JC

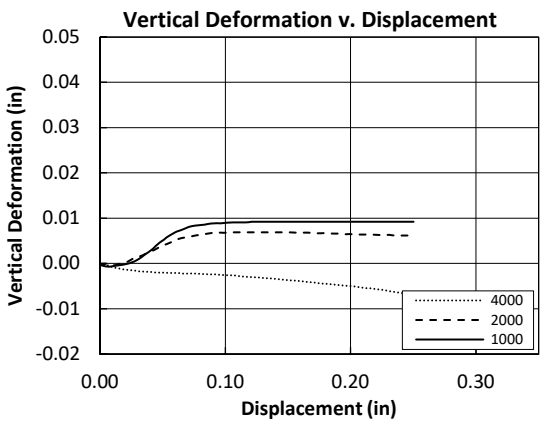
Samples Tested	1	2	3
Intial Moisture (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.5	111.5	111.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	876	1428	2412
Ult. Shear Stress (psf)	720	1380	2412

Soil Type:	Qya
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	27	29
Cohesion (psf)	384	204







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

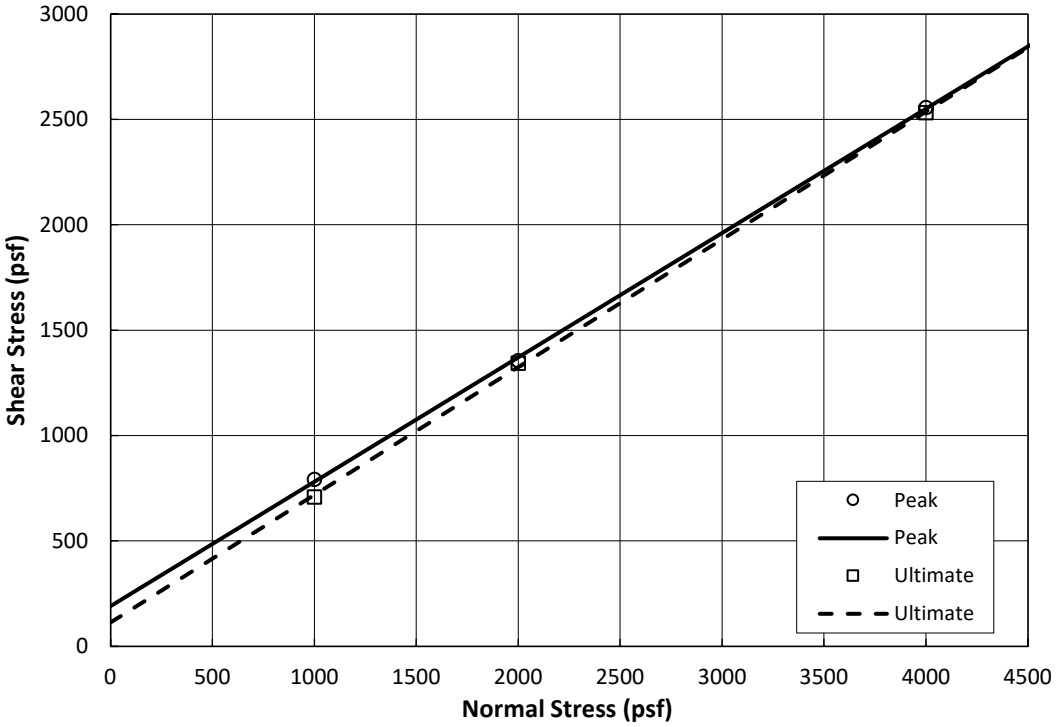
DIRECT SHEAR - ASTM D3080

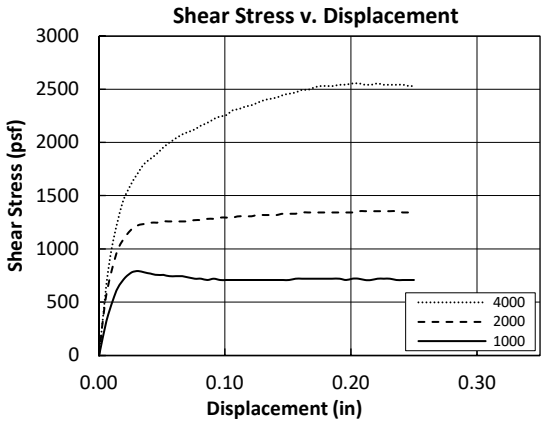
Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/20/2020	Reviewed by:	JC

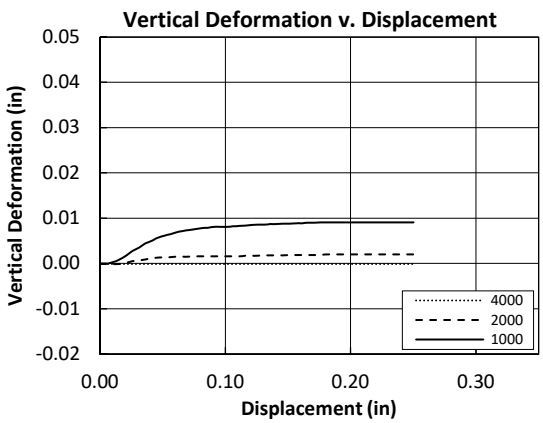
Samples Tested	1	2	3
Intial Moisture (%)	10.5	10.5	10.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	792	1356	2556
Ult. Shear Stress (psf)	708	1344	2532

Soil Type:	Qoa
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	31	31
Cohesion (psf)	192	114







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

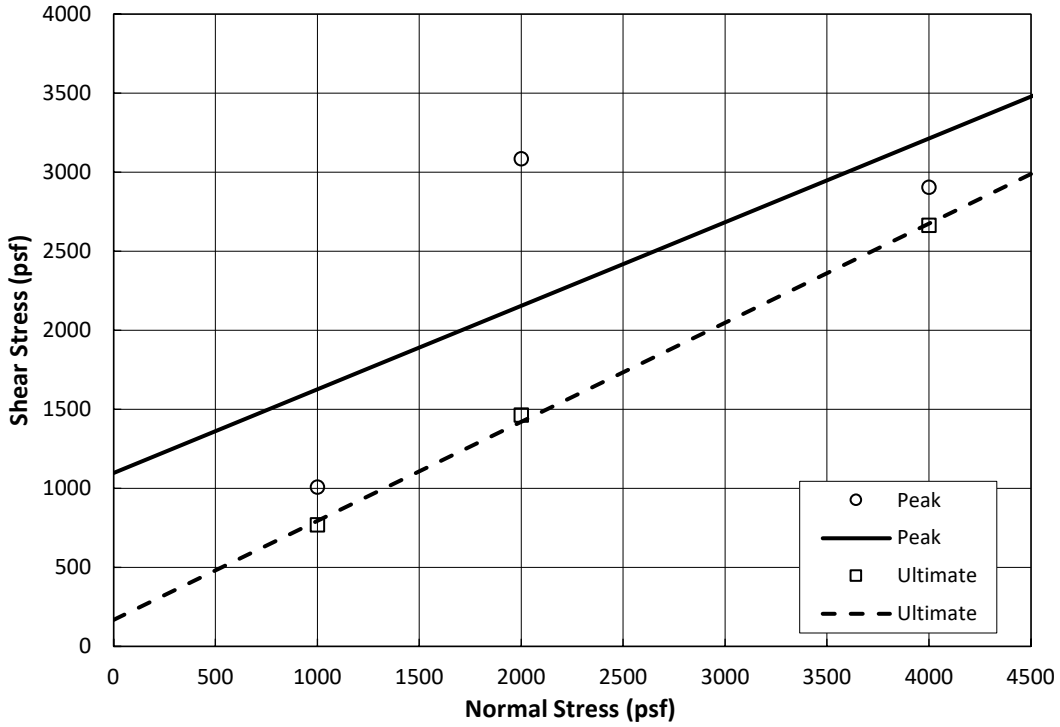
DIRECT SHEAR - ASTM D3080

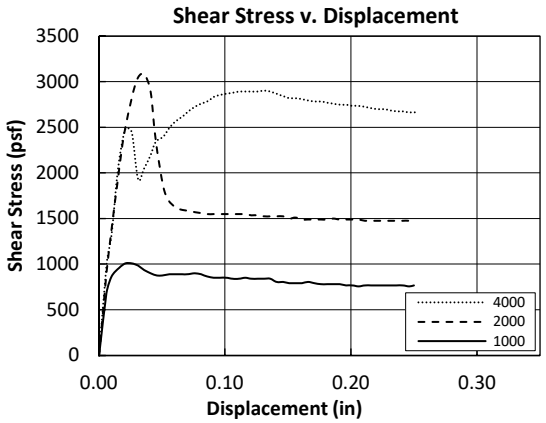
Project Name:	Oak Valley Town Center	Excavation:	AGS-2
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/3/2020	Reviewed by:	SS

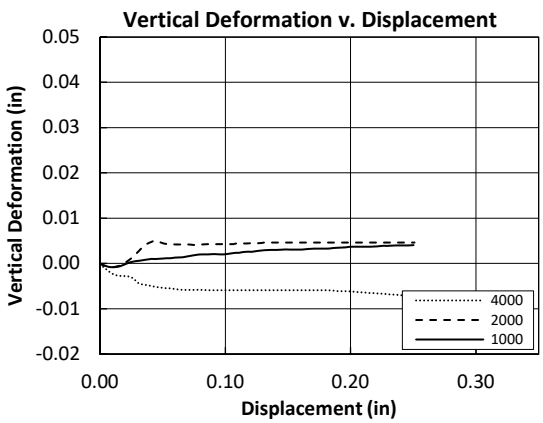
Samples Tested	1	2	3
Intial Moisture (%)	10.2	10.2	10.2
Initial Dry Density (pcf)	113.8	123.7	111.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	3084	2904
Ult. Shear Stress (psf)	768	1464	2664

Soil Type:	Yellowish SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	32
Cohesion (psf)	1098	168







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

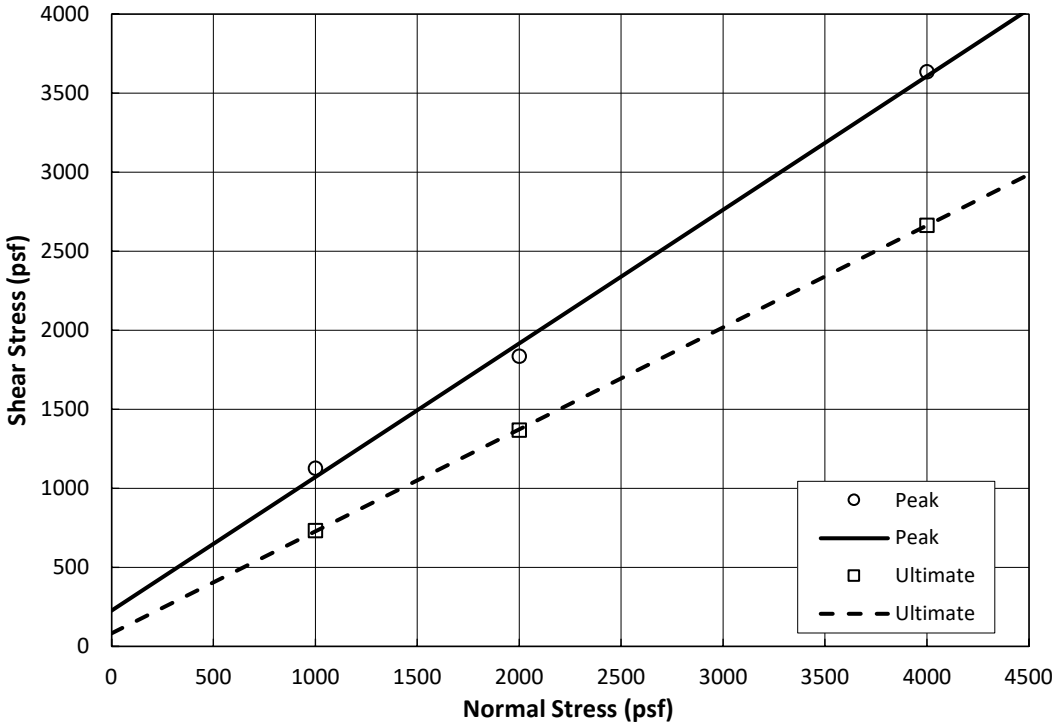
DIRECT SHEAR - ASTM D3080

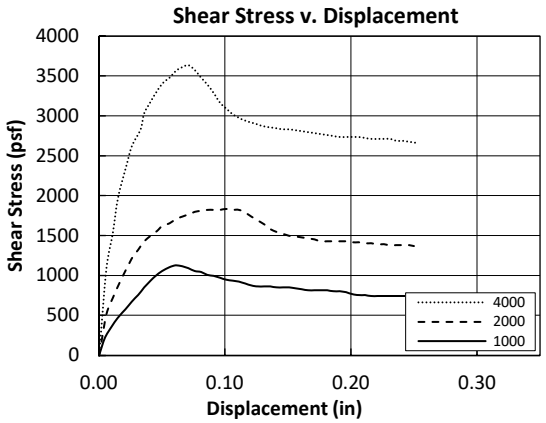
Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/31/2020	Reviewed by:	SS

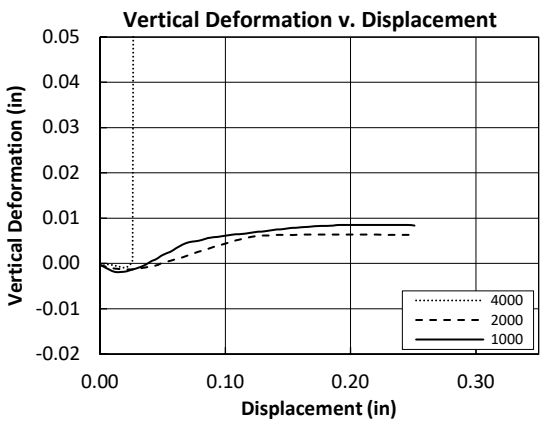
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	122.9	121.1	117.9
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1128	1836	3636
Ult. Shear Stress (psf)	732	1368	2664

Soil Type:	Light Brn SC-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	33
Cohesion (psf)	228	84







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

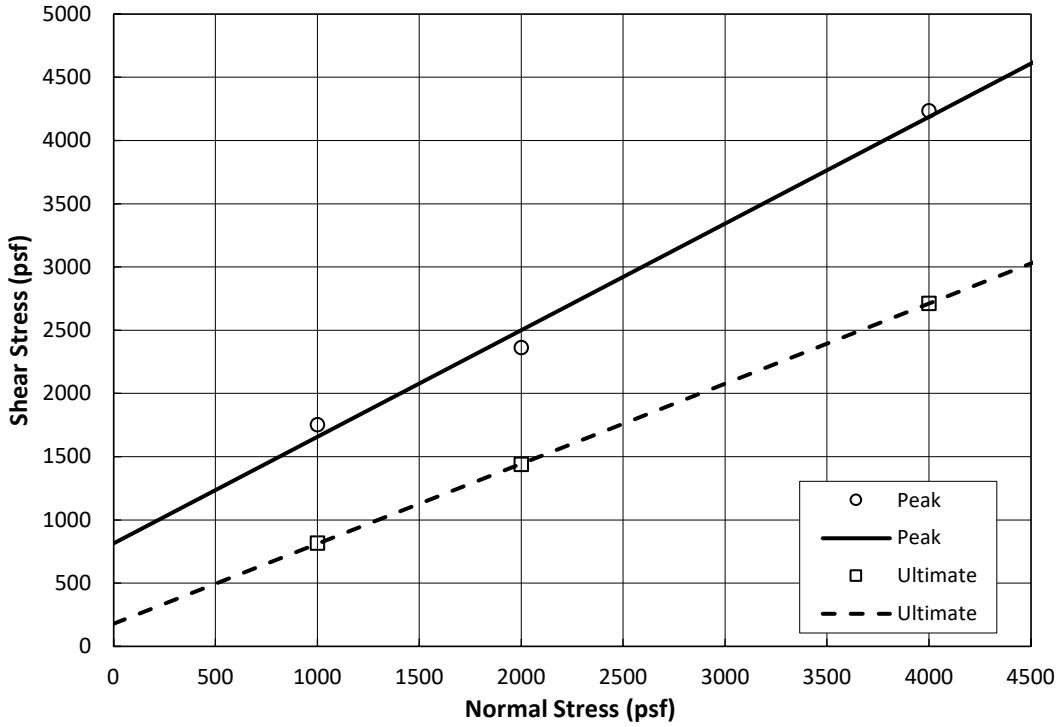
DIRECT SHEAR - ASTM D3080

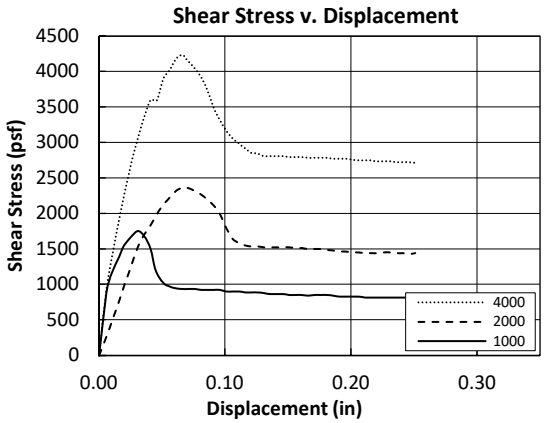
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/10/2020	Reviewed by:	SS

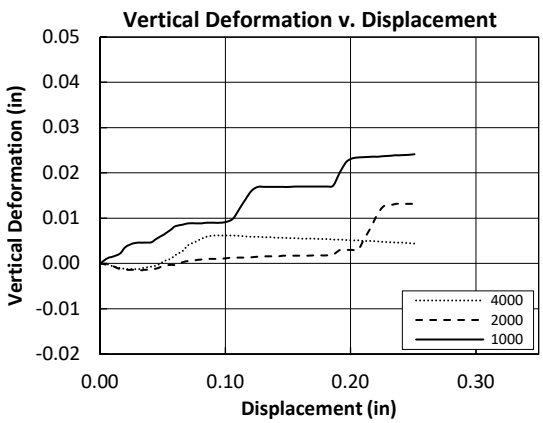
Samples Tested	1	2	3
Intial Moisture (%)	8.6	8.6	8.6
Initial Dry Density (pcf)	121.0	121.8	121.0
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1752	2364	4236
Ult. Shear Stress (psf)	816	1440	2712

Soil Type:	Blue SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	32
Cohesion (psf)	816	180







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

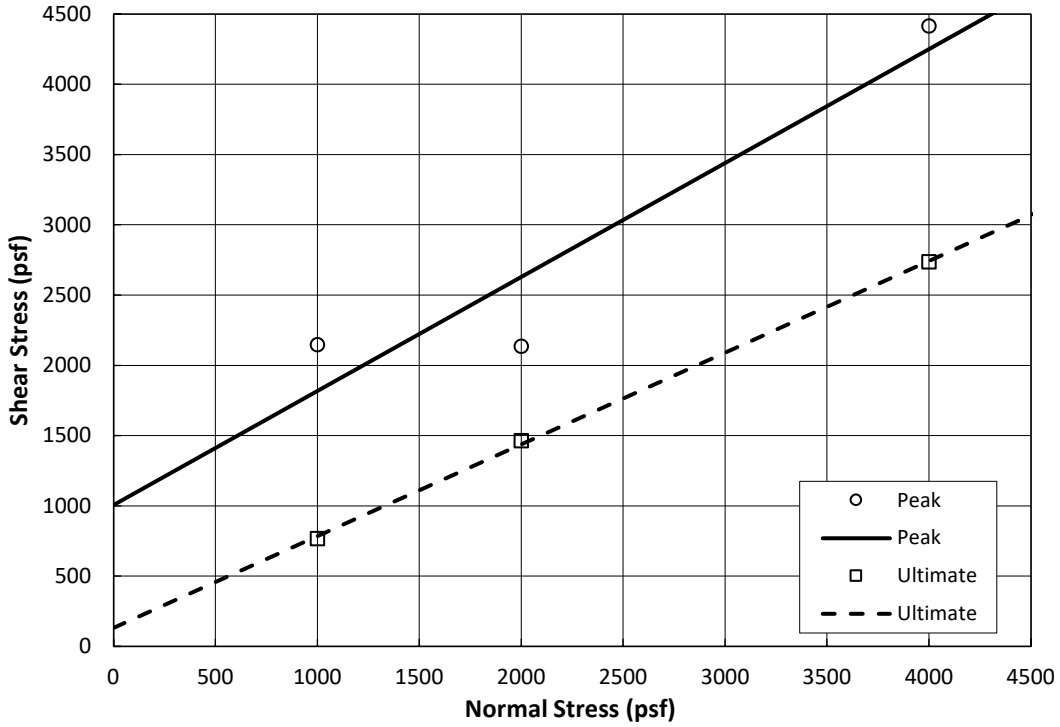
DIRECT SHEAR - ASTM D3080

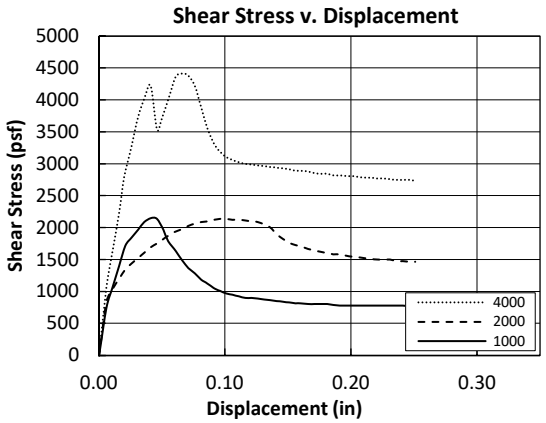
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/4/2020	Reviewed by:	SS

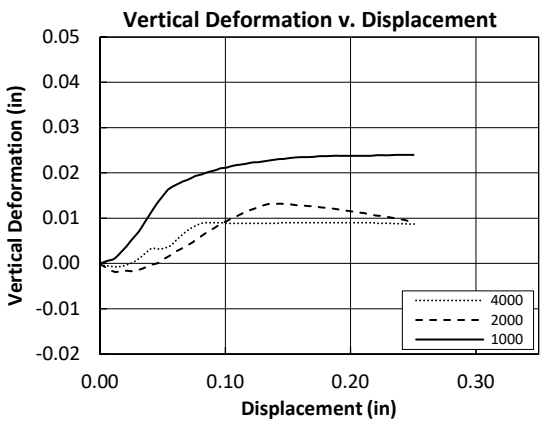
Samples Tested	1	2	3
Intial Moisture (%)	11.7	11.7	11.7
Initial Dry Density (pcf)	120.0	118.0	119.1
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	2148	2136	4416
Ult. Shear Stress (psf)	768	1464	2736

Soil Type:	Olive ML-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	39	33
Cohesion (psf)	1008	132







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

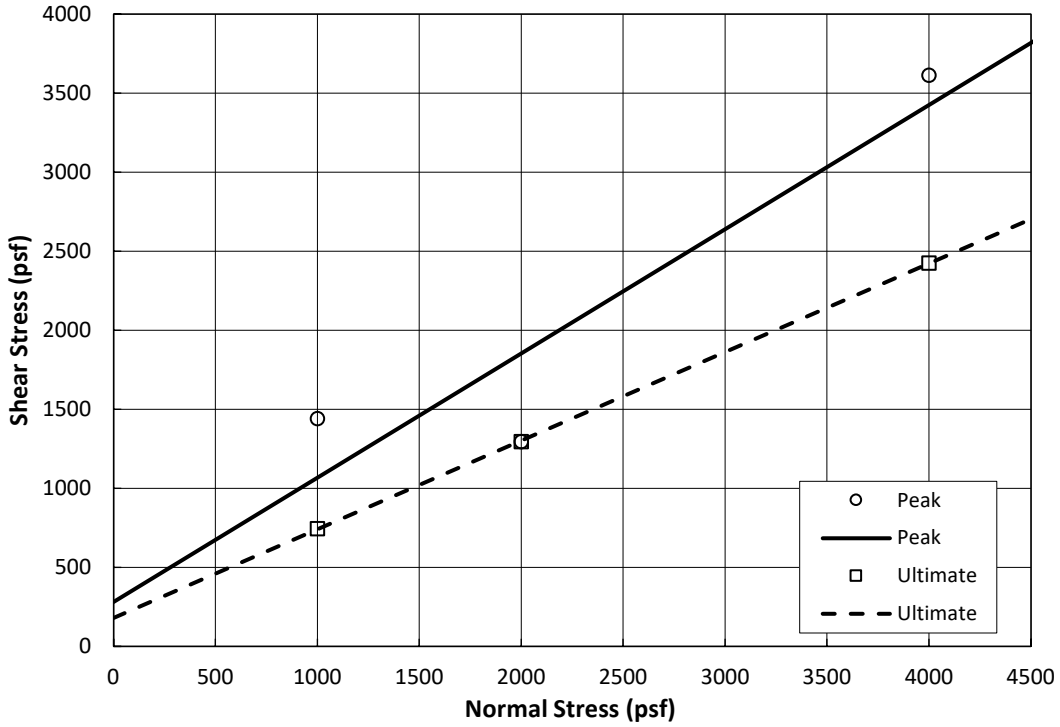
DIRECT SHEAR - ASTM D3080

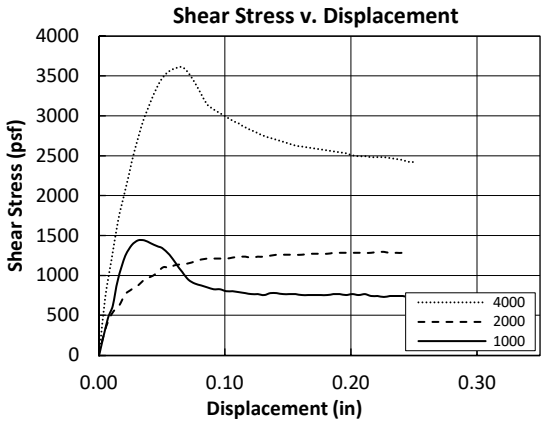
Project Name:	Oak Valeey Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/28/2020	Reviewed by:	SS

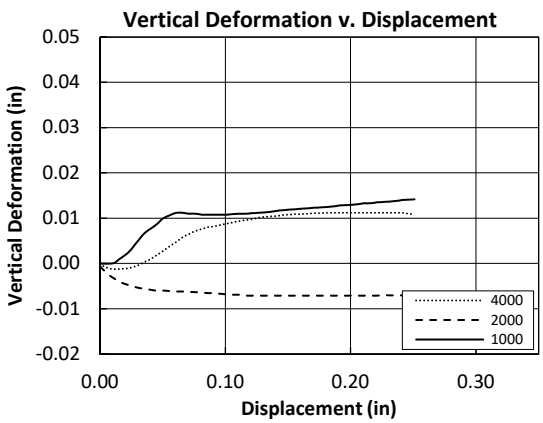
Samples Tested	1	2	3
Intial Moisture (%)	11.4	11.4	11.4
Initial Dry Density (pcf)	120.5	120.9	121.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1440	1296	3612
Ult. Shear Stress (psf)	744	1296	2424

Soil Type:	Olive SM-ML
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	38	29
Cohesion (psf)	282	180







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 05/20/2020

P.O. NO.: Chain of Custody

LAB NO.: C-3816

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 2004-01
Project: Oak Valley Town Center
Date sampled: 05/18/2020
Sample ID: T-2 @ 8'-9'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
7.5	7,600	292	111

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Oak Valley Town Center	Excavation/Tract:	T-2
Location:	Calimesa	Depth/Lot:	6-9 ft
P/W:	2004-01	Description:	Qya
Date:	5/21/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	108.3
Initial Moisture Content (%):	10.4
Initial Saturation (%):	50.6
Final Dry Density (pcf):	106.8
Final Moisture Content (%):	20.1
Final Saturation (%):	93.9
Expansion Index:	14
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

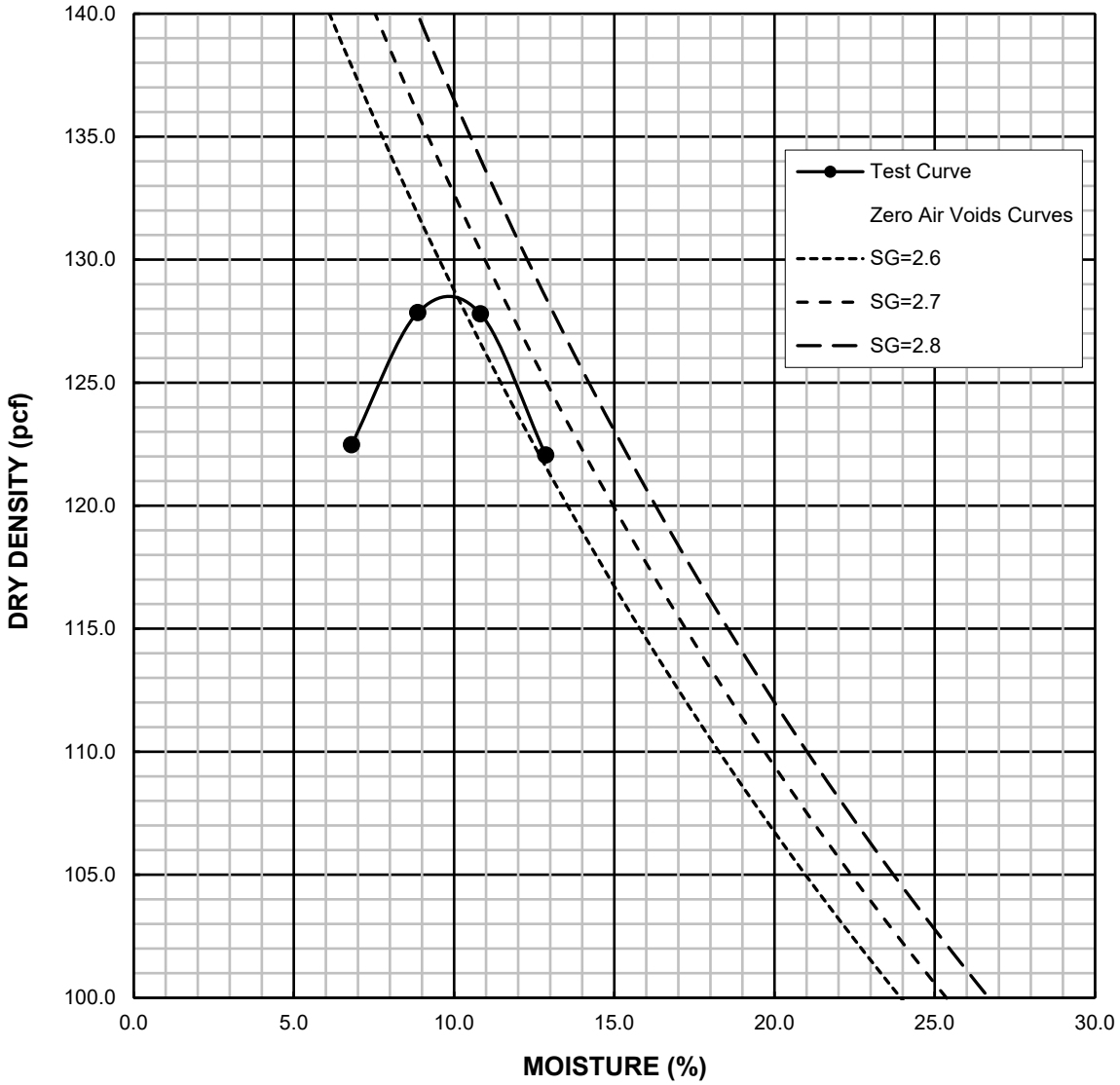
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-3
Location:	Calimesa	Depth:	8-10 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	FV
		Checked by:	SS

Method:	A	Oversize Retained: 25 %		
Point No.	1	2	3	4
Dry Density (pcf)	122.5	127.9	127.8	122.1
Moisture Content (%)	6.8	8.9	10.8	12.9

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**136.3 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**128.5 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

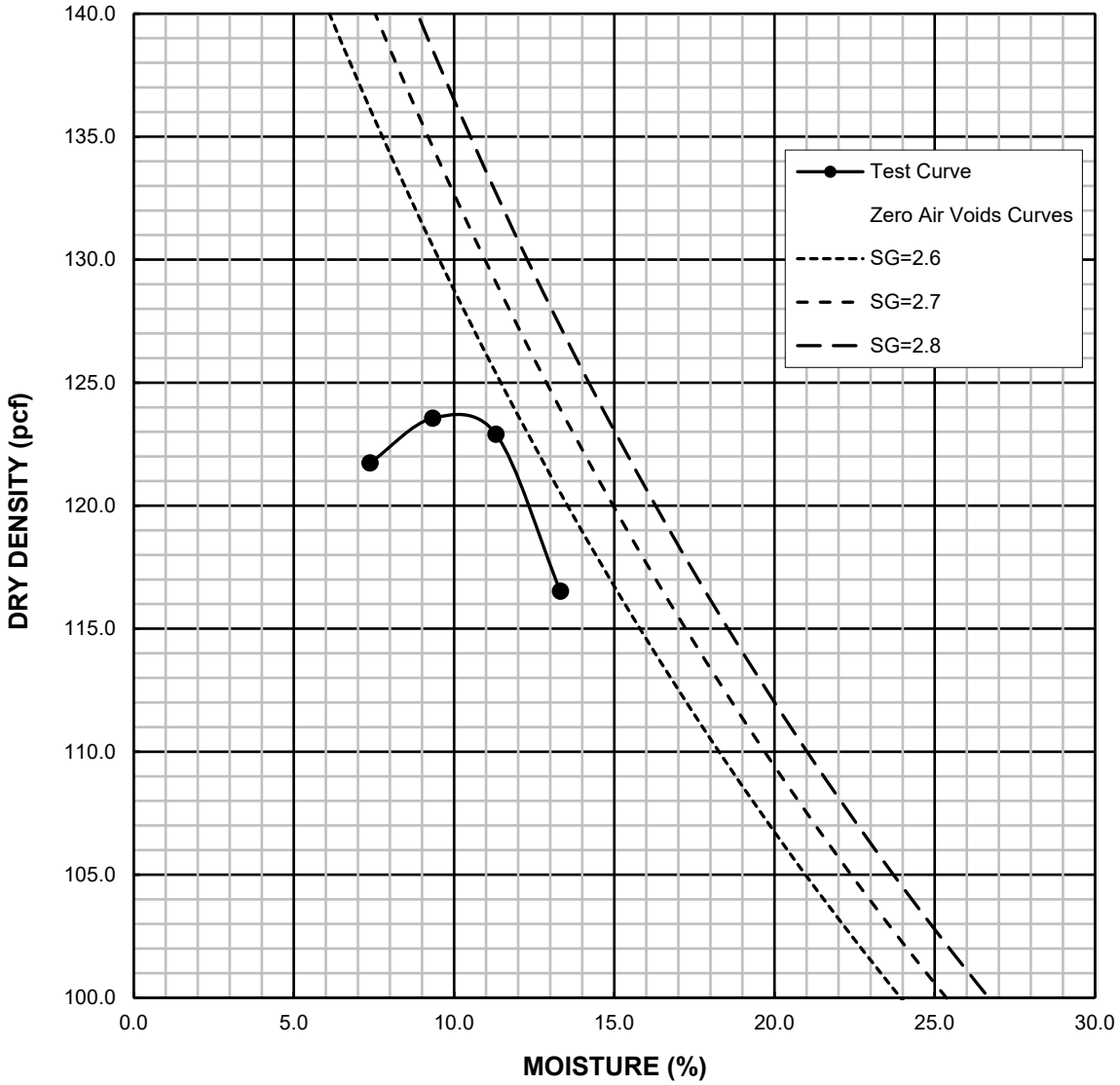
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 2.9 %		
Point No.	1	2	3	4
Dry Density (pcf)	121.7	123.6	122.9	116.5
Moisture Content (%)	7.4	9.3	11.3	13.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**124.8 pcf**	Corrected Moisture	**9.7** %
Max. Dry Density	**123.9 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

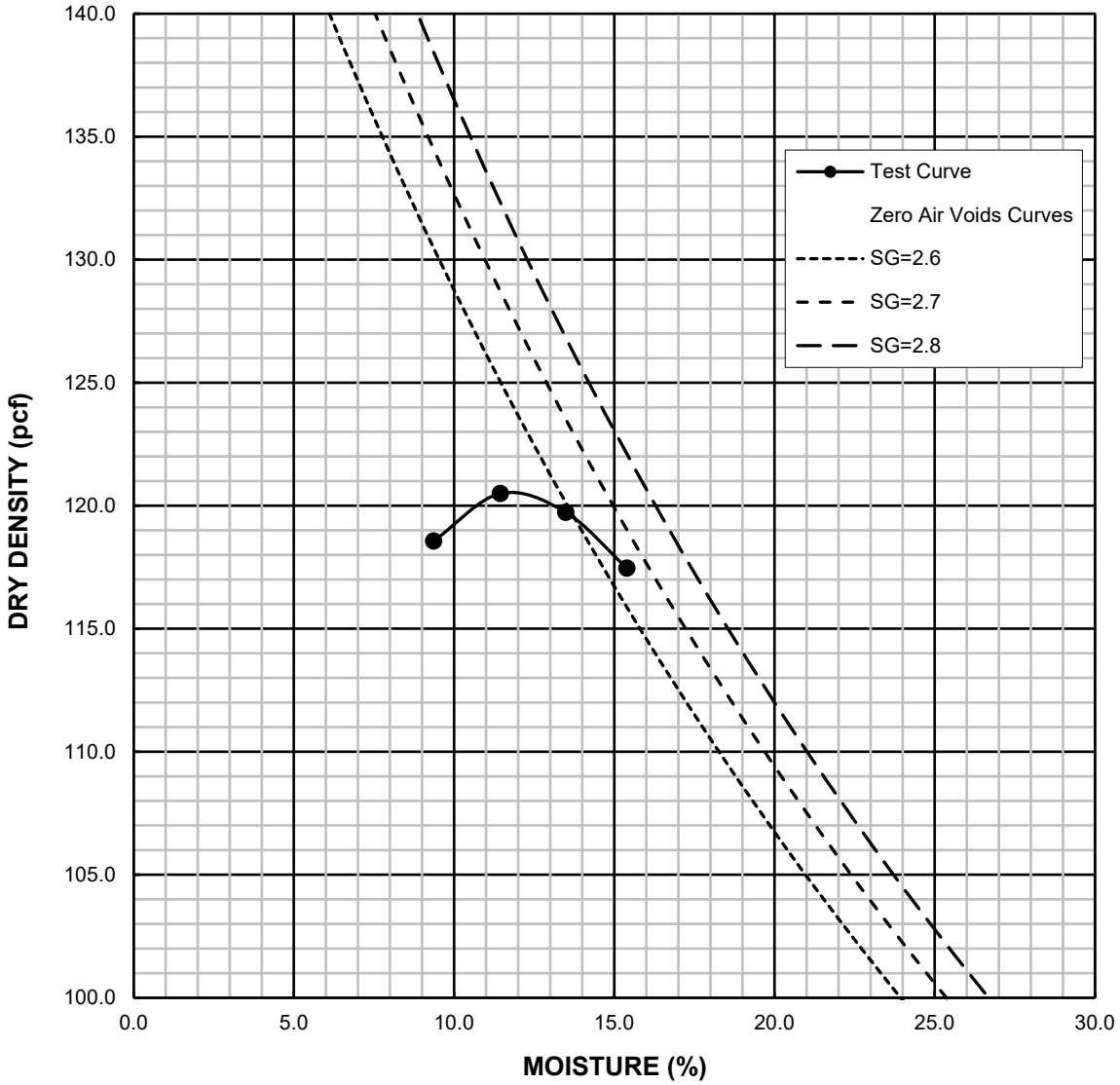
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-16
Location:	Calimesa	Depth:	7-9 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.6	120.5	119.7	117.5
Moisture Content (%)	9.4	11.4	13.5	15.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**123.9 pcf**	Corrected Moisture	**9.9** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

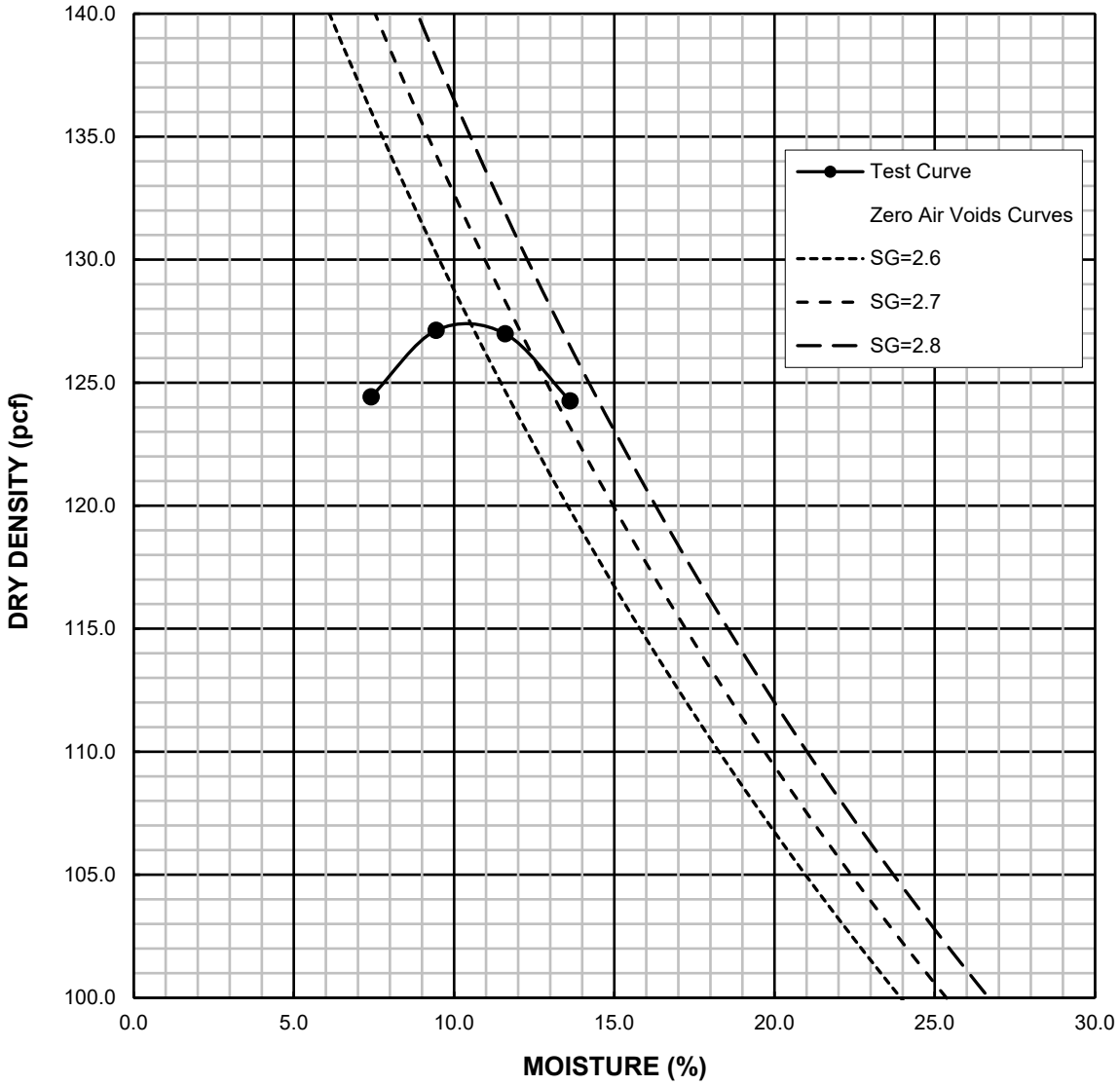
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	124.4	127.1	127.0	124.3
Moisture Content (%)	7.4	9.4	11.6	13.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**130.6 pcf**	Corrected Moisture	**9.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**10.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

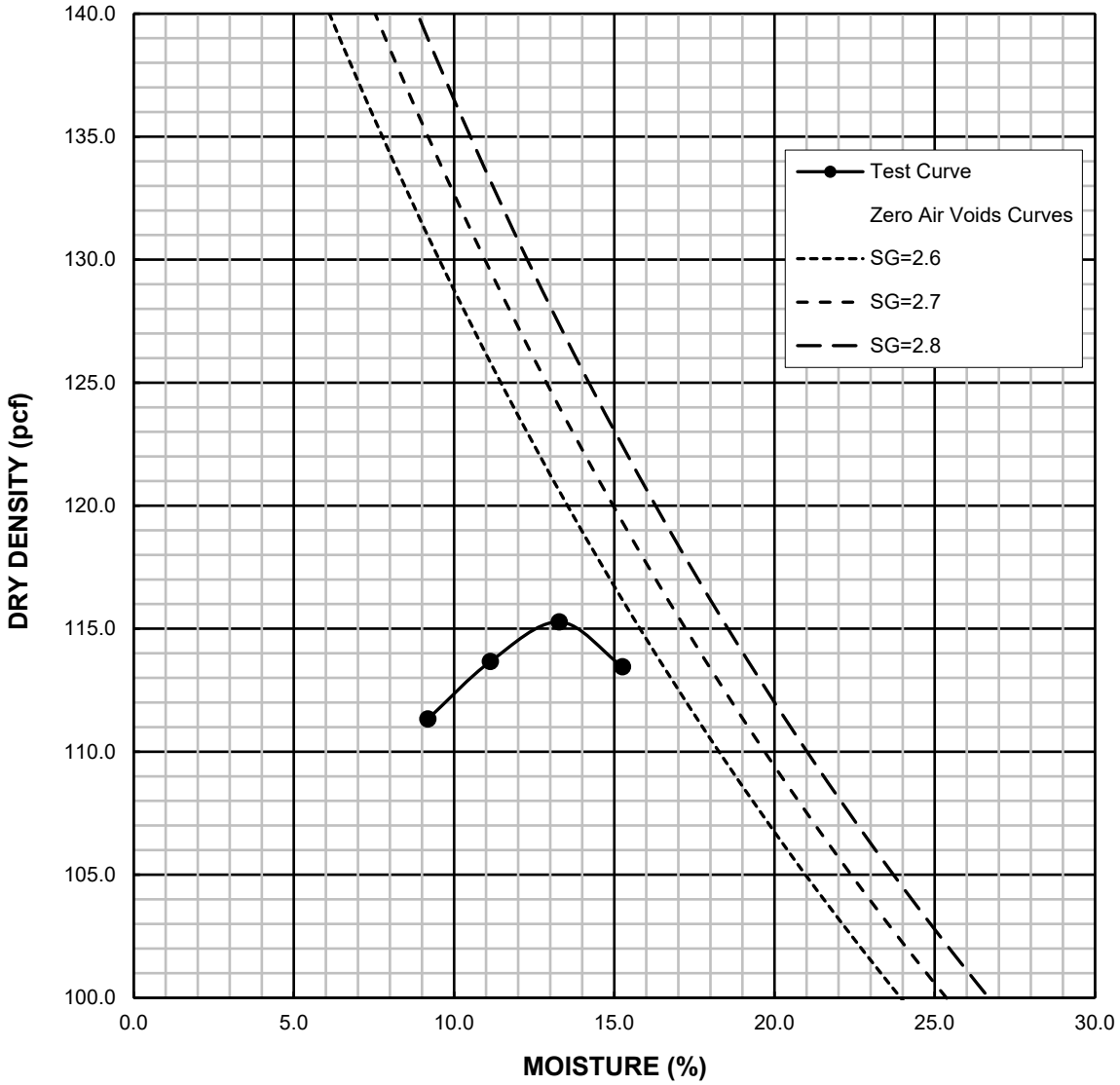
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-19
Location:	Calimesa	Depth:	6-9 ft
P/W No.:	2004-01	Soil Type:	Qlo
Date:	05-2019	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	111.3	113.7	115.3	113.5
Moisture Content (%)	9.2	11.1	13.3	15.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**118.7 pcf**	Corrected Moisture	**12.2** %
Max. Dry Density	**115 pcf**	Optimum Moisture	**13.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/24/2020

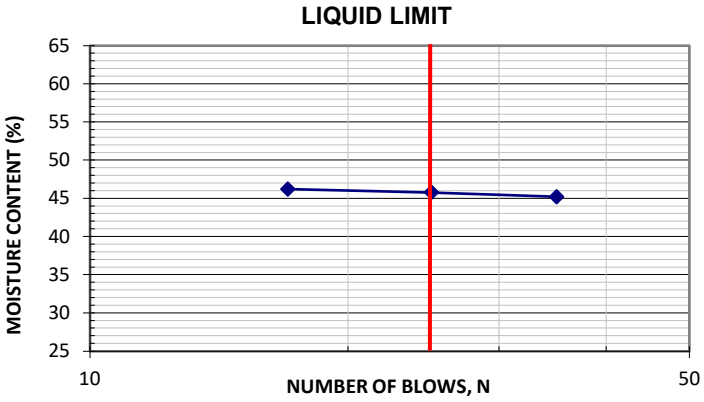
Excavation: AGS-3
Depth: 20 ft
Description: ML
By: FV

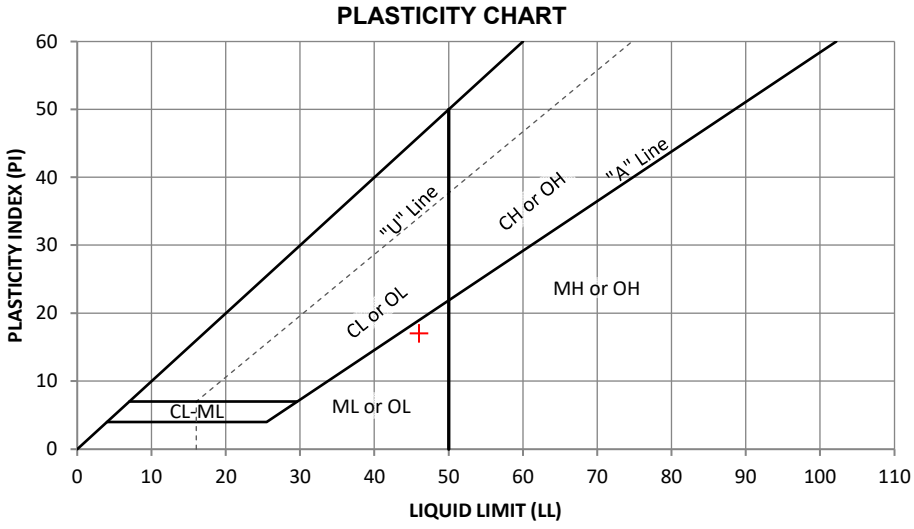
LIQUID LIMIT

Can No.	16	4	2
Wt. wet soil+can (g)	19.20	18.37	19.24
Wt. dry soil+can (g)	16.70	16.09	16.68
Wt. can (g)	11.17	11.11	11.14
Wt. mosture (g)	2.50	2.28	2.56
Wt. dry soil (g)	5.53	4.98	5.54
Water Content %	45.21	45.78	46.21
No. of Blows	35	25	17

PLASTIC LIMIT

101	105
58.85	57.22
57.12	55.77
51.09	50.74
1.73	1.45
6.03	5.03
28.69	28.83





Liquid Limit (LL) 46 Plastic Limit (PL) 29 Plasticity Index (PI) 17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

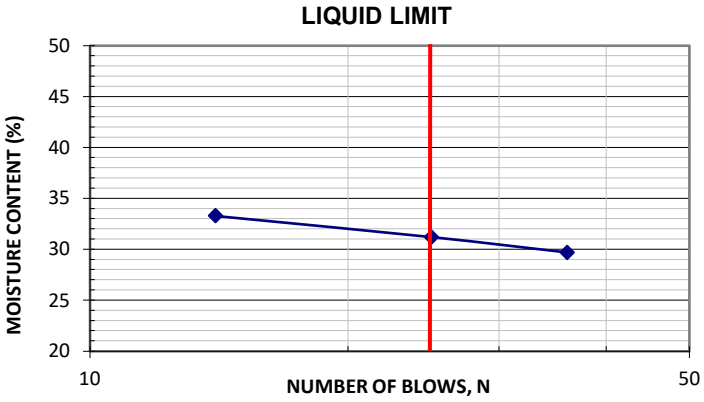
AGS Form E-2

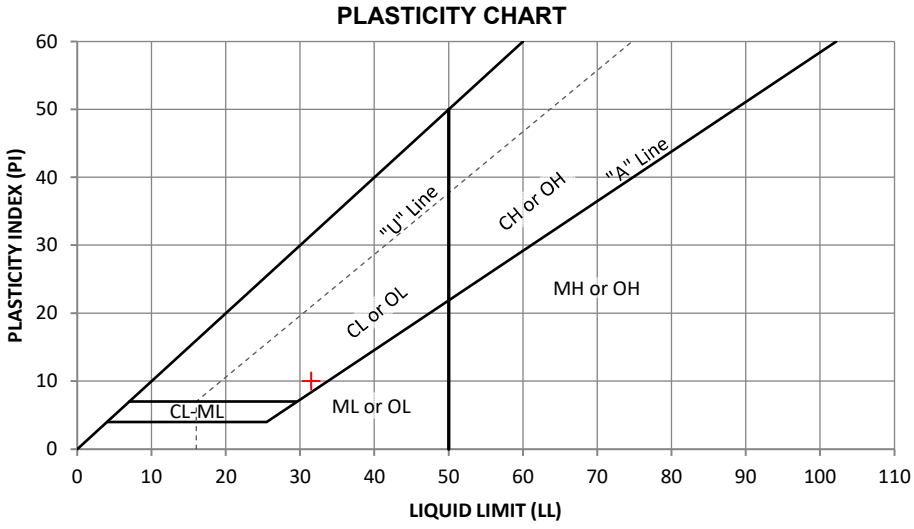
ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/21/2020

Excavation: AGS-3
Depth: 30 ft
Description: Grey Brn SC-SM
By: FV

	LIQUID LIMIT			PLASTIC LIMIT	
Can No.	3	11	1	108	102
Wt. wet soil+can (g)	21.32	23.11	23.84	60.31	62.31
Wt. dry soil+can (g)	18.80	20.29	20.96	58.63	60.41
Wt. can (g)	11.23	11.25	11.26	50.93	51.44
Wt. mosture (g)	2.52	2.82	2.88	1.68	1.90
Wt. dry soil (g)	7.57	9.04	9.70	7.70	8.97
Water Content %	33.29	31.19	29.69	21.82	21.18
No. of Blows	14	25	36		





Liquid Limit (LL) 31.5 Plastic Limit (PL) 21.5 Plasticity Index (PI) 10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

Excavation: AGS-3
Depth: 35 ft
Description: ML
By: FV

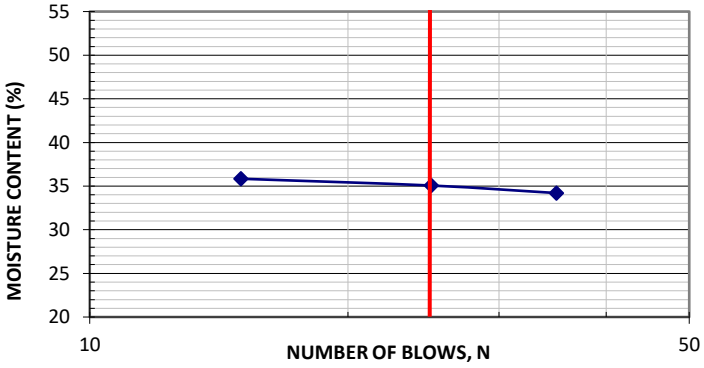
LIQUID LIMIT

Can No.	1	5	11
Wt. wet soil+can (g)	18.84	23.79	24.65
Wt. dry soil+can (g)	16.84	20.55	21.24
Wt. can (g)	11.26	11.31	11.27
Wt. mosture (g)	2.00	3.24	3.41
Wt. dry soil (g)	5.58	9.24	9.97
Water Content %	35.84	35.06	34.20
No. of Blows	15	25	35

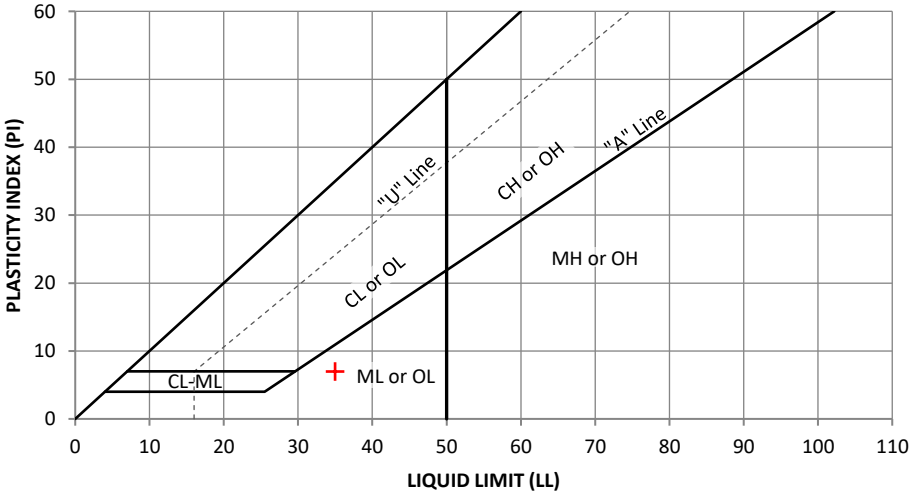
PLASTIC LIMIT

108	105
59.98	61.77
57.85	59.50
50.96	50.73
2.13	2.27
6.89	8.77
30.91	25.88

LIQUID LIMIT



PLASTICITY CHART



Liquid Limit (LL) 35 Plastic Limit (PL) 28 Plasticity Index (PI) 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

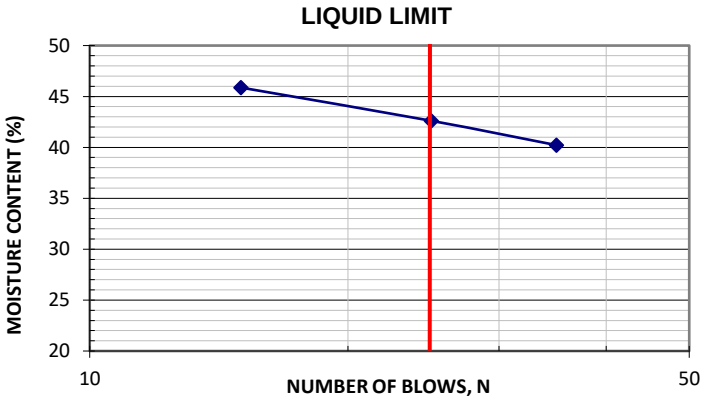
Excavation: AGS-3
Depth: 40 ft
Description: CL (Fine portion)
By: FV

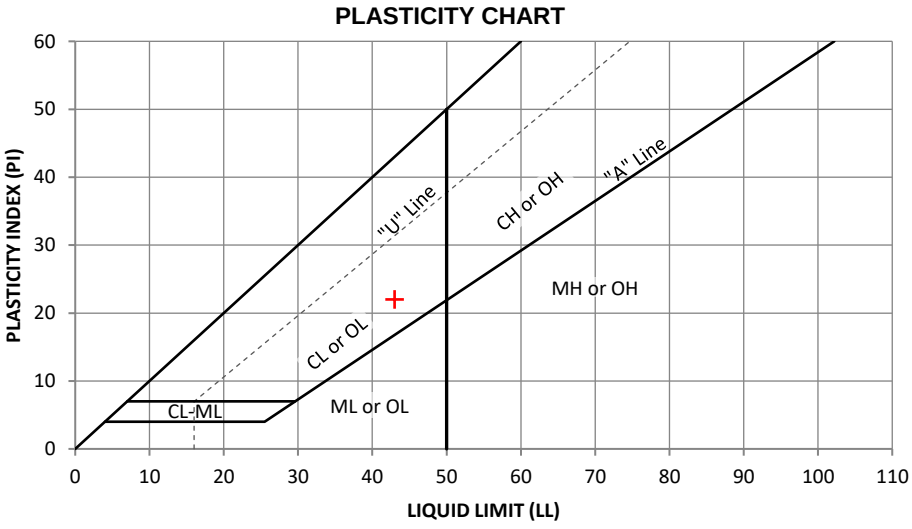
LIQUID LIMIT

Can No.	15	14	3
Wt. wet soil+can (g)	20.42	20.43	19.94
Wt. dry soil+can (g)	17.53	17.69	17.39
Wt. can (g)	11.23	11.26	11.05
Wt. mosture (g)	2.89	2.74	2.55
Wt. dry soil (g)	6.30	6.43	6.34
Water Content %	45.87	42.61	40.22
No. of Blows	15	25	35

PLASTIC LIMIT

104	102
59.27	57.85
57.87	56.74
51.04	51.47
1.40	1.11
6.83	5.27
20.50	21.06





Liquid Limit (LL) 43 Plastic Limit (PL) 21 Plasticity Index (PI) 22

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley town Center
Location: Calimesa
Project No: 2004-01
Date: 9/23/2020

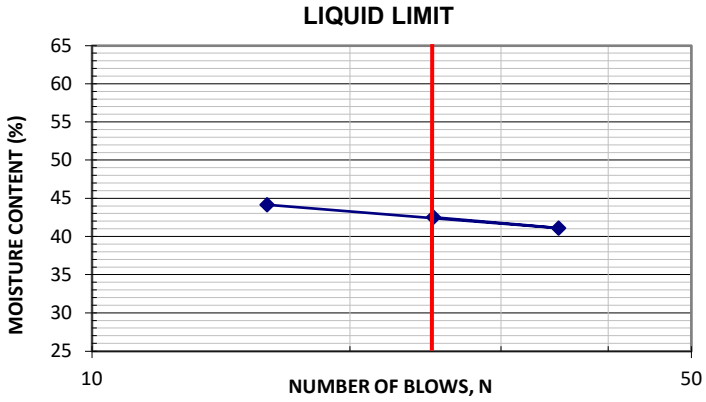
Excavation: AGS-16
Depth: 25 ft
Description: CL
By: FV

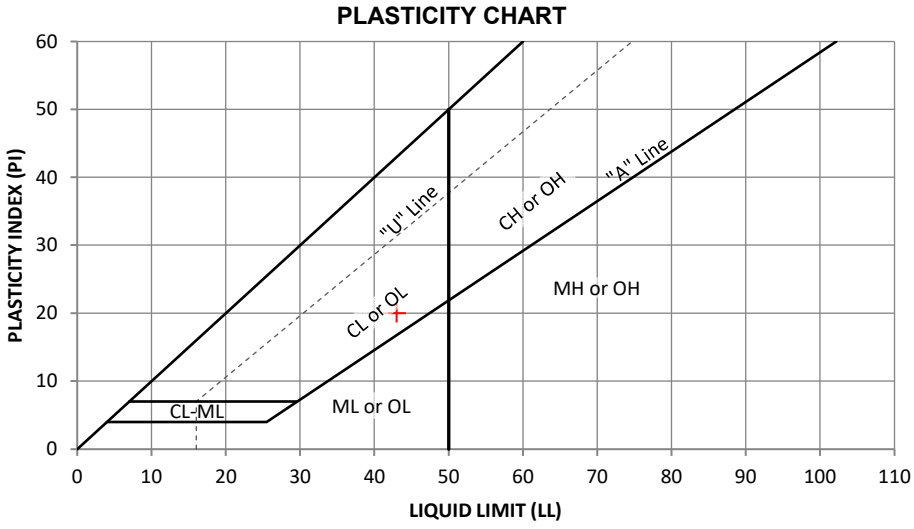
LIQUID LIMIT

Can No.	15	11	5
Wt. wet soil+can (g)	20.10	19.65	18.21
Wt. dry soil+can (g)	17.45	17.20	16.09
Wt. can (g)	11.22	11.24	11.29
Wt. mosture (g)	2.65	2.45	2.12
Wt. dry soil (g)	6.23	5.96	4.80
Water Content %	42.54	41.11	44.17
No. of Blows	25	35	16

PLASTIC LIMIT

109	106
56.91	58.04
55.89	56.78
51.56	51.34
1.02	1.26
4.33	5.44
23.56	23.16





Liquid Limit (LL) 43 Plastic Limit (PL) 23 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

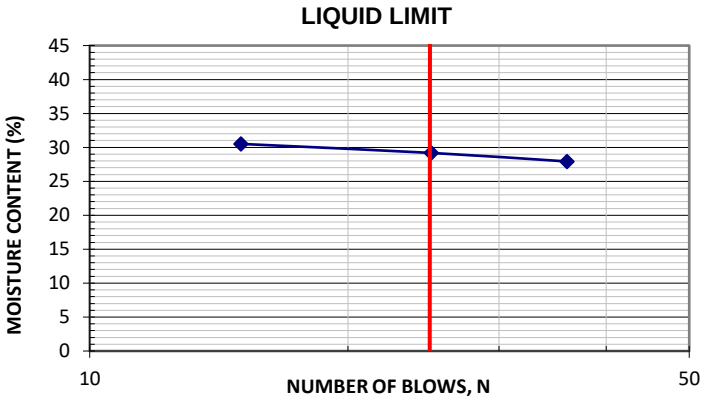
Excavation: AGS-16
Depth: 30 ft
Description: CL (Fine portion)
By: FV

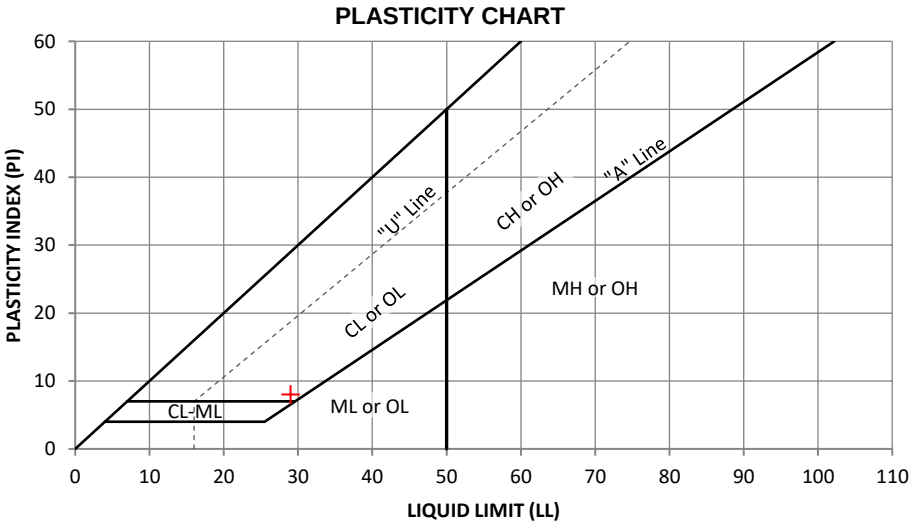
LIQUID LIMIT

Can No.	14	3	15
Wt. wet soil+can (g)	22.98	22.43	21.44
Wt. dry soil+can (g)	20.24	19.90	19.22
Wt. can (g)	11.26	11.23	11.27
Wt. mosture (g)	2.74	2.53	2.22
Wt. dry soil (g)	8.98	8.67	7.95
Water Content %	30.51	29.18	27.92
No. of Blows	15	25	36

PLASTIC LIMIT

101	109
58.25	58.32
56.94	57.20
51.08	51.55
1.31	1.12
5.86	5.65
22.35	19.82





Liquid Limit (LL) 29 Plastic Limit (PL) 21 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

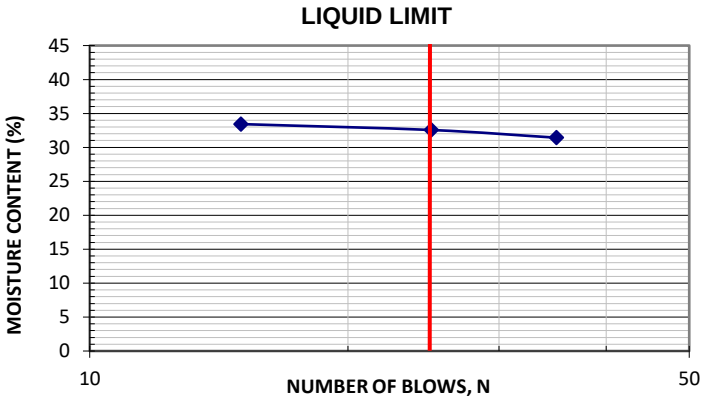
Excavation: AGS-16
Depth: 35 ft
Description: CL (Fine portion)
By: FV

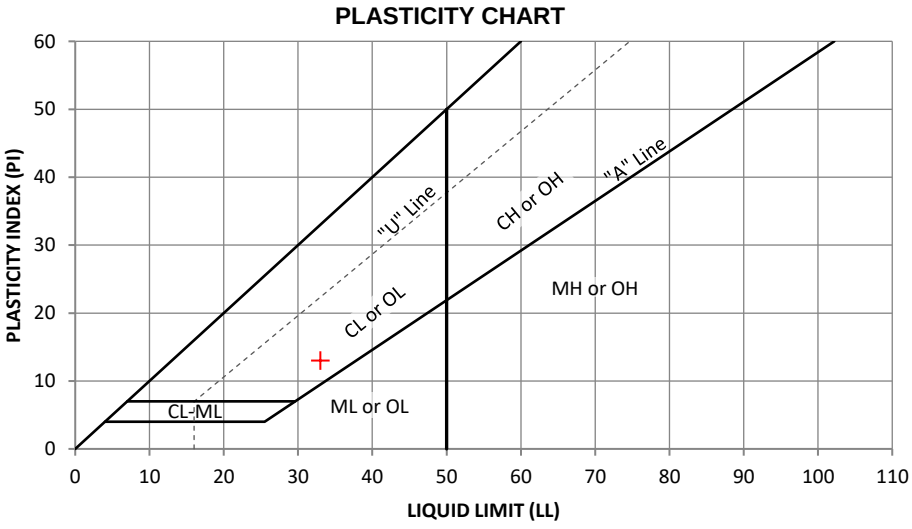
LIQUID LIMIT

Can No.	16	11	5
Wt. wet soil+can (g)	20.66	21.55	22.08
Wt. dry soil+can (g)	18.29	19.02	19.50
Wt. can (g)	11.20	11.25	11.29
Wt. mosture (g)	2.37	2.53	2.58
Wt. dry soil (g)	7.09	7.77	8.21
Water Content %	33.43	32.56	31.43
No. of Blows	15	25	35

PLASTIC LIMIT

106	111
57.80	57.64
56.66	56.63
51.34	51.42
1.14	1.01
5.32	5.21
21.43	19.39





Liquid Limit (LL) 33 Plastic Limit (PL) 20 Plasticity Index (PI) 13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

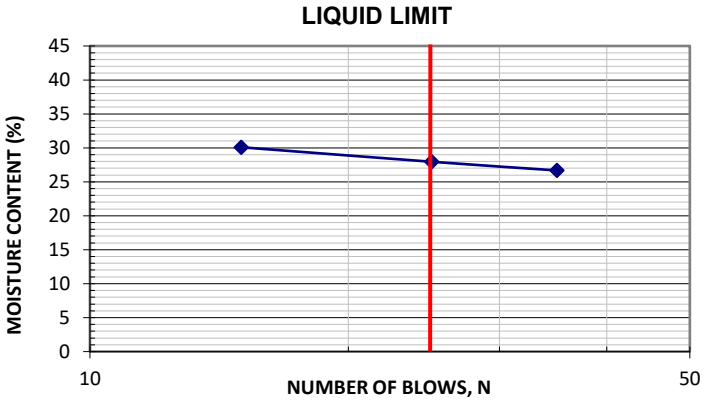
Excavation: AGS-16
Depth: 45 ft
Description: CL (Fine portion)
By: FV

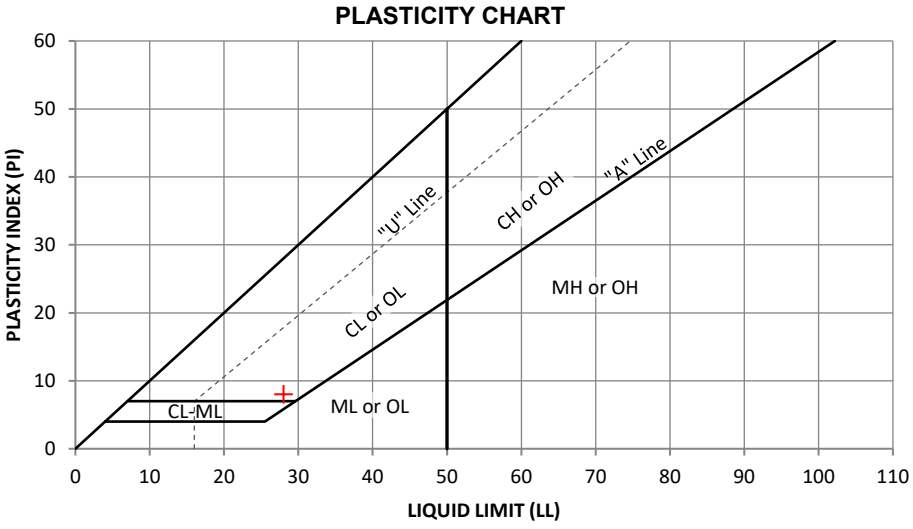
LIQUID LIMIT

Can No.	4	2	10
Wt. wet soil+can (g)	20.75	20.88	21.44
Wt. dry soil+can (g)	18.72	18.75	19.06
Wt. can (g)	11.11	11.13	11.15
Wt. mosture (g)	2.03	2.13	2.38
Wt. dry soil (g)	7.61	7.62	7.91
Water Content %	26.68	27.95	30.09
No. of Blows	35	25	15

PLASTIC LIMIT

100	103
58.69	58.58
57.45	57.40
51.53	51.47
1.24	1.18
5.92	5.93
20.95	19.90





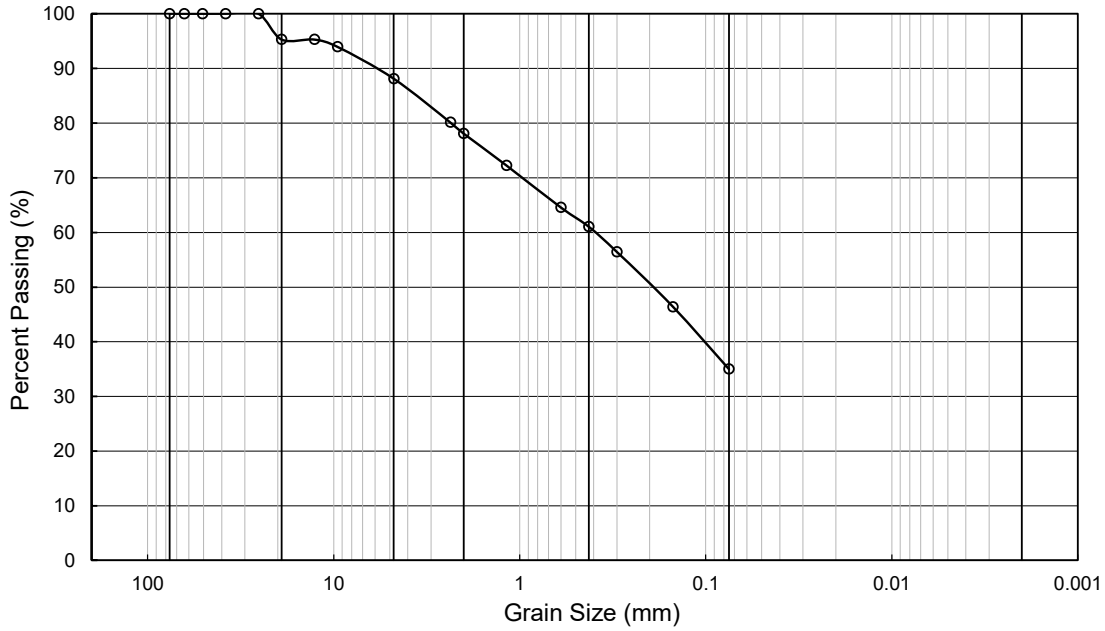
Liquid Limit (LL) 28 Plastic Limit (PL) 20 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-5
Location:	Calimesa	Depth:	4 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	95
1/2 "	12.70	95
3/8 "	9.53	94
# 4	4.75	88.1
# 8	2.36	80.1
#10	2.00	78.1
#16	1.18	72.3
# 30	0.60	64.5
# 40	0.425	61.0
# 50	0.30	56.4
# 100	0.15	46.4
# 200	0.075	35.0

Summary	
% Gravel =	11.9
% Sand =	53.1
% Fines =	35.0
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

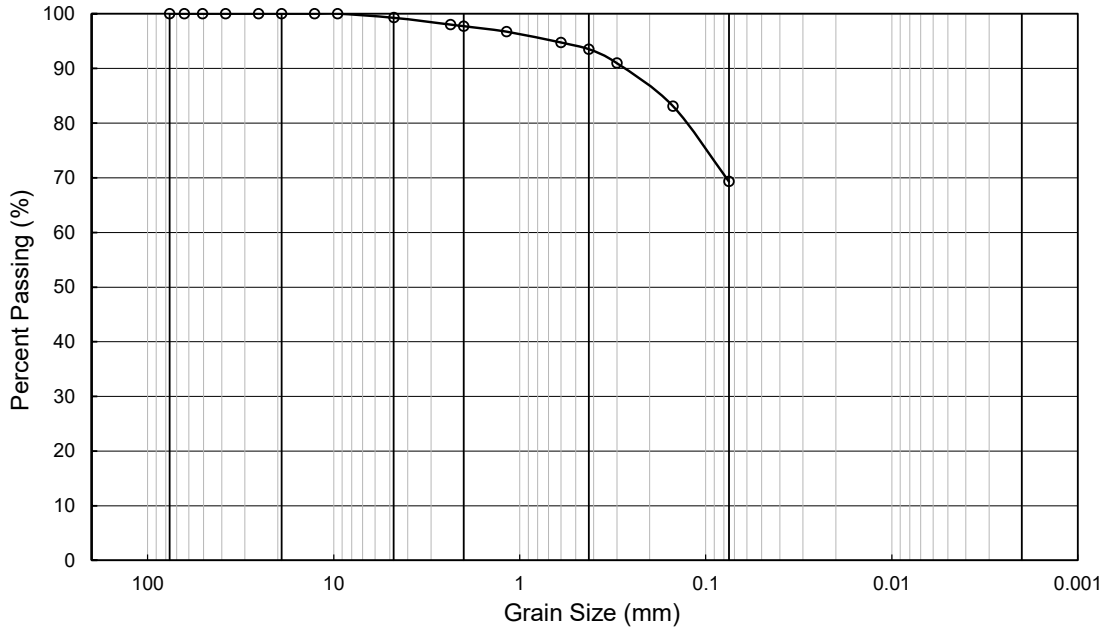
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-10
Location:	Calimesa	Depth:	12 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.3
# 8	2.36	98.0
#10	2.00	97.7
#16	1.18	96.7
# 30	0.60	94.7
# 40	0.425	93.5
# 50	0.30	91.0
# 100	0.15	83.1
# 200	0.075	69.3

Summary	
% Gravel =	0.7
% Sand =	30.0
% Fines =	69.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

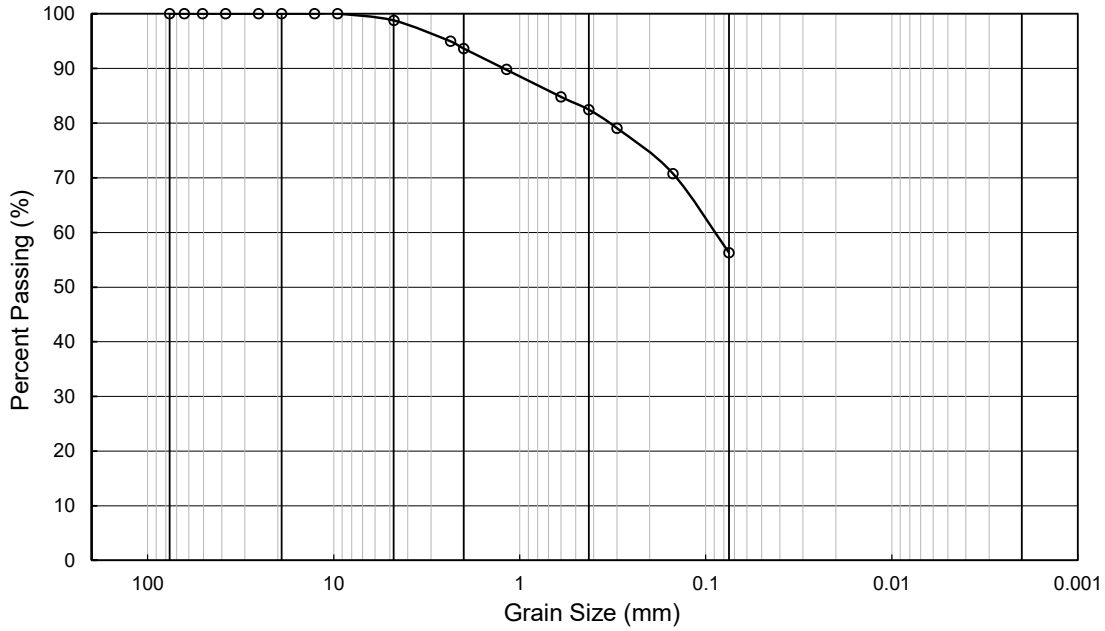
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-11
Location:	Calimesa	Depth:	7.5 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.8
# 8	2.36	95.0
#10	2.00	93.6
#16	1.18	89.8
# 30	0.60	84.8
# 40	0.425	82.4
# 50	0.30	79.1
# 100	0.15	70.7
# 200	0.075	56.3

Summary	
% Gravel =	1.2
% Sand =	42.5
% Fines =	56.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

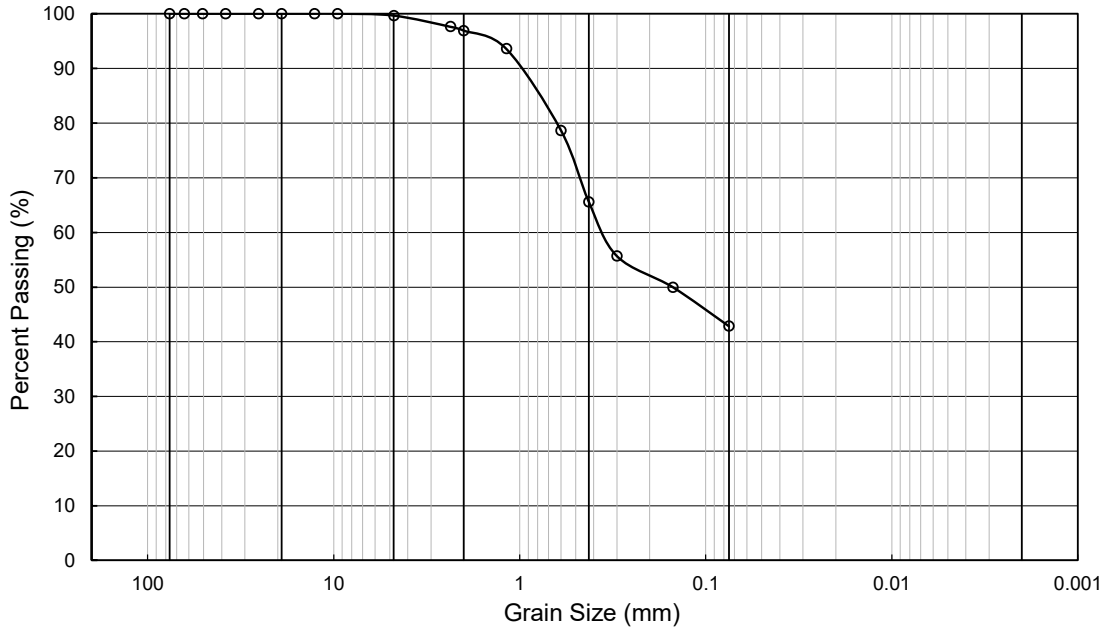
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-17
Location:	Calimesa	Depth:	13-14 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.6
# 8	2.36	97.6
#10	2.00	96.9
#16	1.18	93.6
# 30	0.60	78.6
# 40	0.425	65.6
# 50	0.30	55.7
# 100	0.15	50.0
# 200	0.075	42.8

Summary	
% Gravel =	0.4
% Sand =	56.8
% Fines =	42.8
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

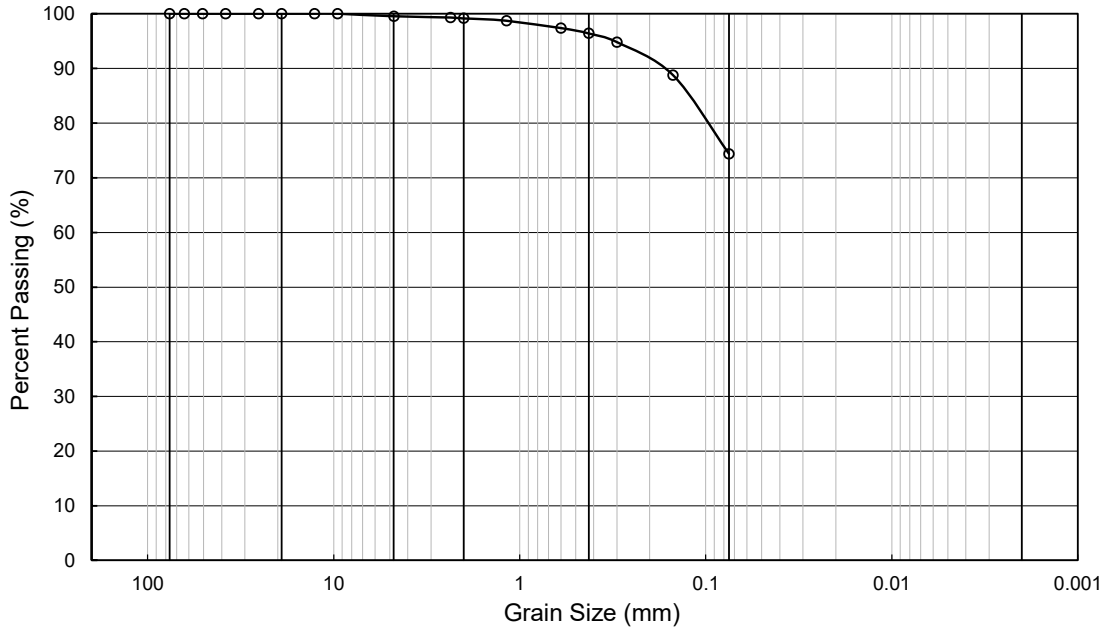
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	10 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.5
# 8	2.36	99.3
#10	2.00	99.2
#16	1.18	98.7
# 30	0.60	97.4
# 40	0.425	96.4
# 50	0.30	94.8
# 100	0.15	88.8
# 200	0.075	74.3

Summary	
% Gravel =	0.5
% Sand =	25.2
% Fines =	74.3
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

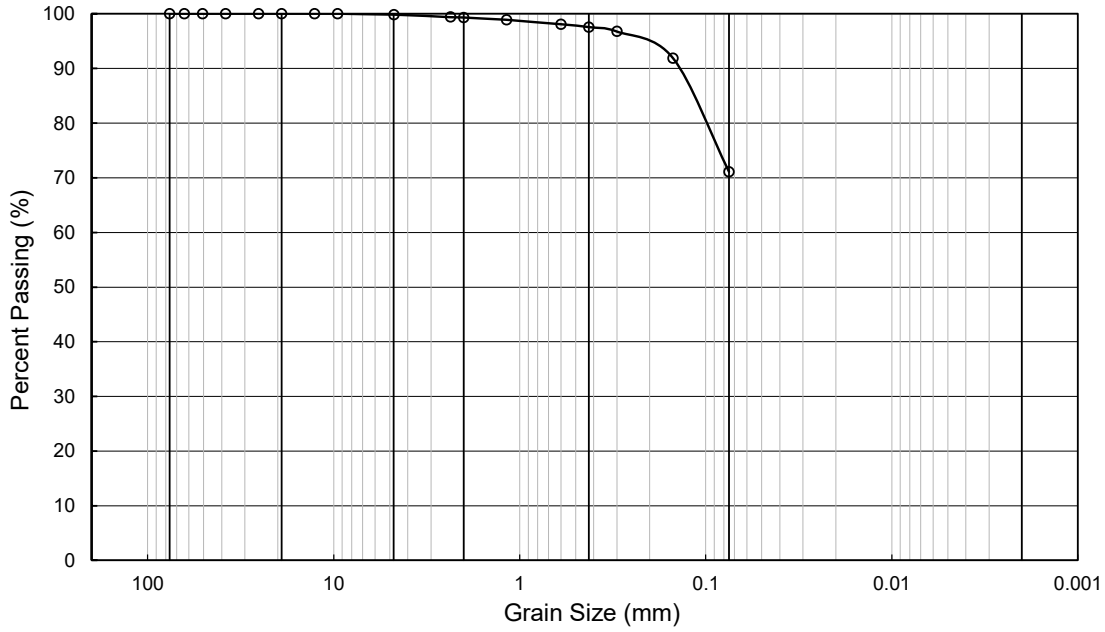
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	20 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.8
# 8	2.36	99.4
#10	2.00	99.3
#16	1.18	98.9
# 30	0.60	98.1
# 40	0.425	97.5
# 50	0.30	96.8
# 100	0.15	91.9
# 200	0.075	71.1

Summary	
% Gravel =	0.2
% Sand =	28.7
% Fines =	71.1
Sum =	100.0

LL=	46
PL=	29
PI =	17

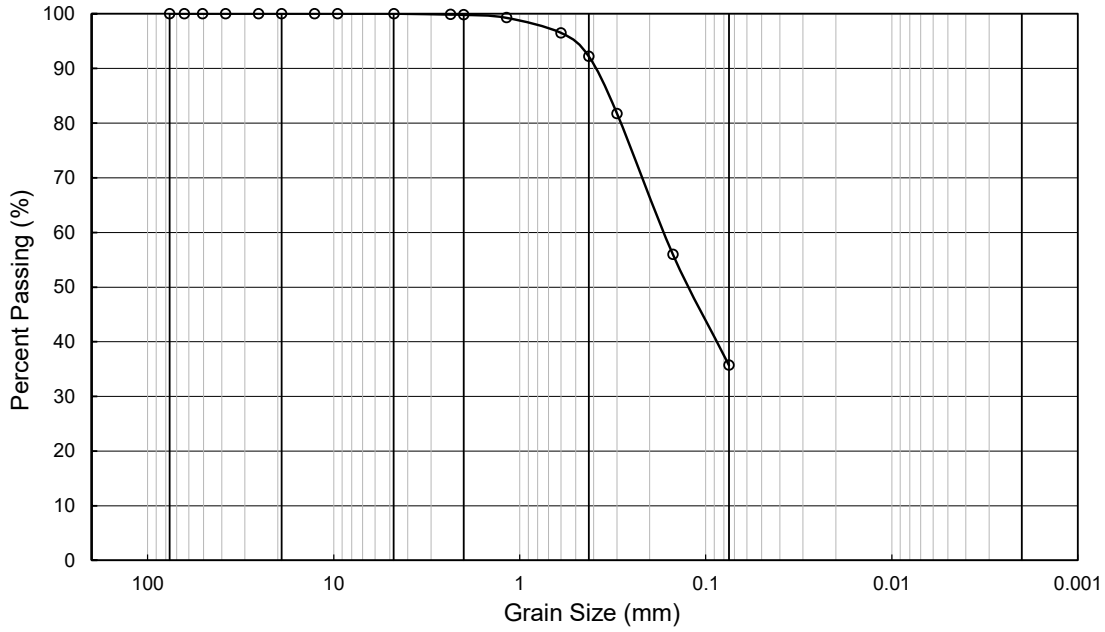
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.9
#10	2.00	99.8
#16	1.18	99.3
# 30	0.60	96.5
# 40	0.425	92.2
# 50	0.30	81.7
# 100	0.15	55.9
# 200	0.075	35.7

Summary	
% Gravel =	0.0
% Sand =	64.3
% Fines =	35.7
Sum =	100.0

LL=	31.5
PL=	21.5
PI =	10

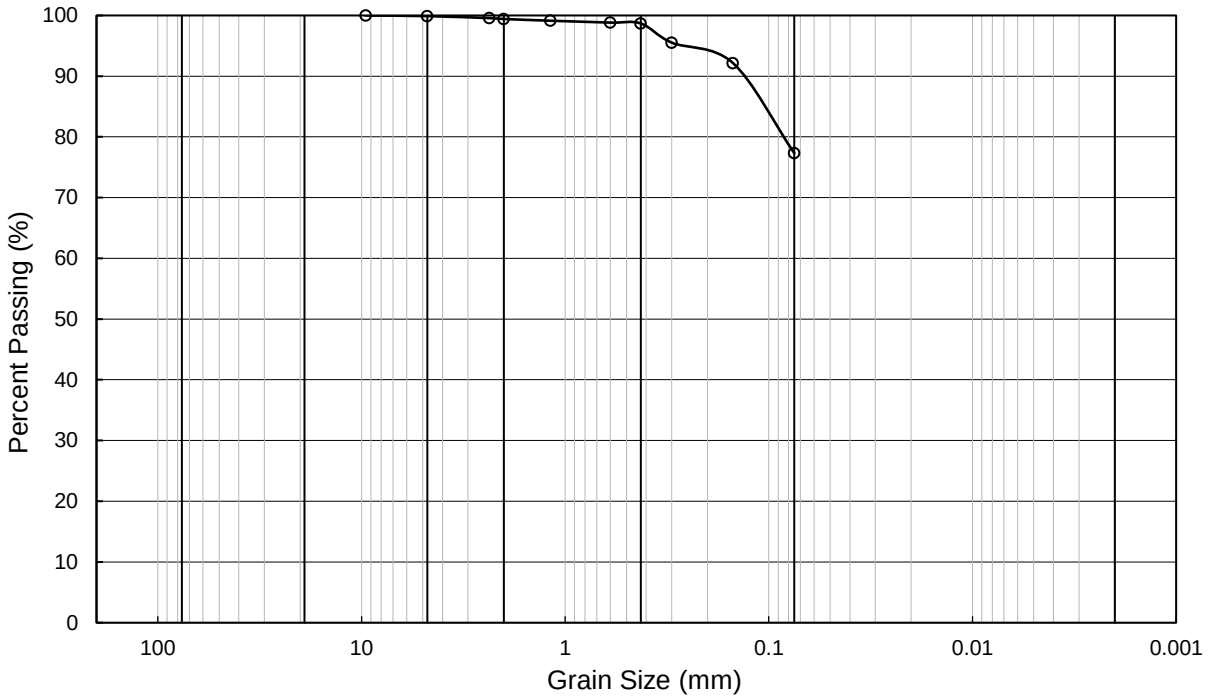
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	99.9
# 8	2.36	99.6
#10	2.00	99.4
#16	1.18	99.1
# 30	0.60	98.8
# 40	0.425	98.7
# 50	0.30	95.5
# 100	0.15	92.2
# 200	0.075	77.3

Summary	
% Gravel =	0.1
% Sand =	22.6
% Fines =	77.3
Sum =	100.0

LL=	35
PL=	28
PI =	7

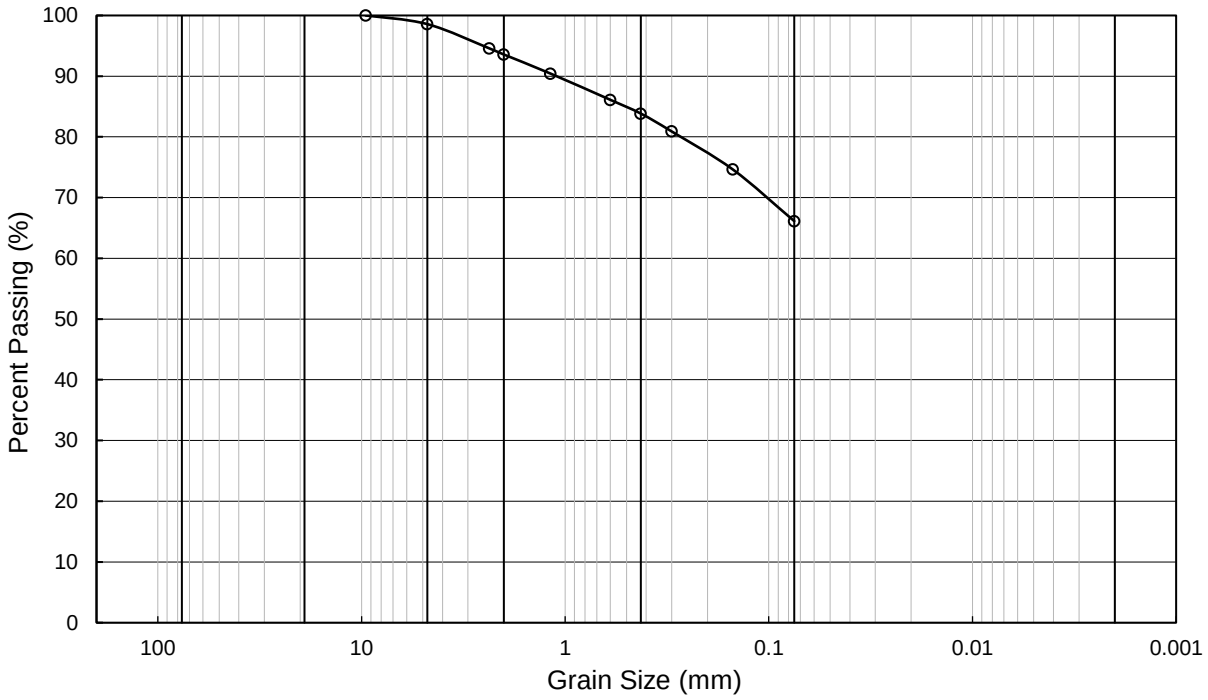
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	40 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	98.6
# 8	2.36	94.6
#10	2.00	93.6
#16	1.18	90.4
# 30	0.60	86.1
# 40	0.425	83.8
# 50	0.30	80.9
# 100	0.15	74.6
# 200	0.075	66.1

Summary	
% Gravel =	1.4
% Sand =	32.4
% Fines =	66.1
Sum =	100.0

LL=	43
PL=	21
PI =	22

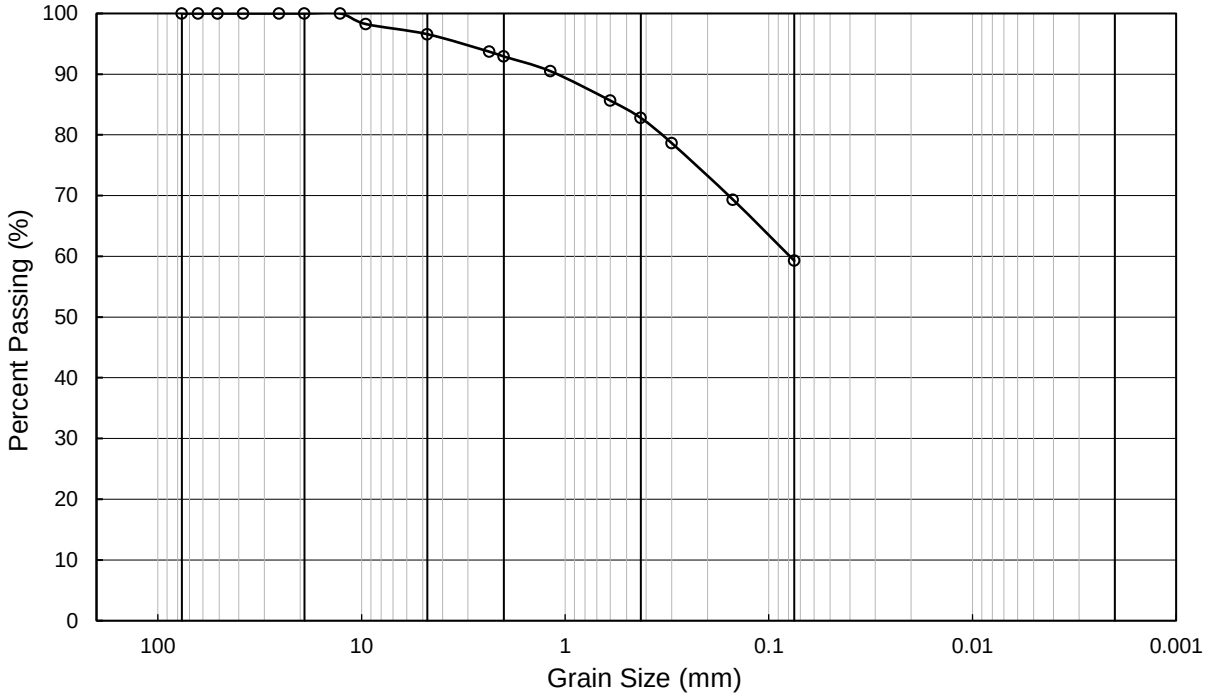
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	50 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	98
# 4	4.75	96.6
# 8	2.36	93.7
#10	2.00	92.9
#16	1.18	90.5
# 30	0.60	85.6
# 40	0.425	82.8
# 50	0.30	78.7
# 100	0.15	69.3
# 200	0.075	59.3

Summary	
% Gravel =	3.4
% Sand =	37.3
% Fines =	59.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

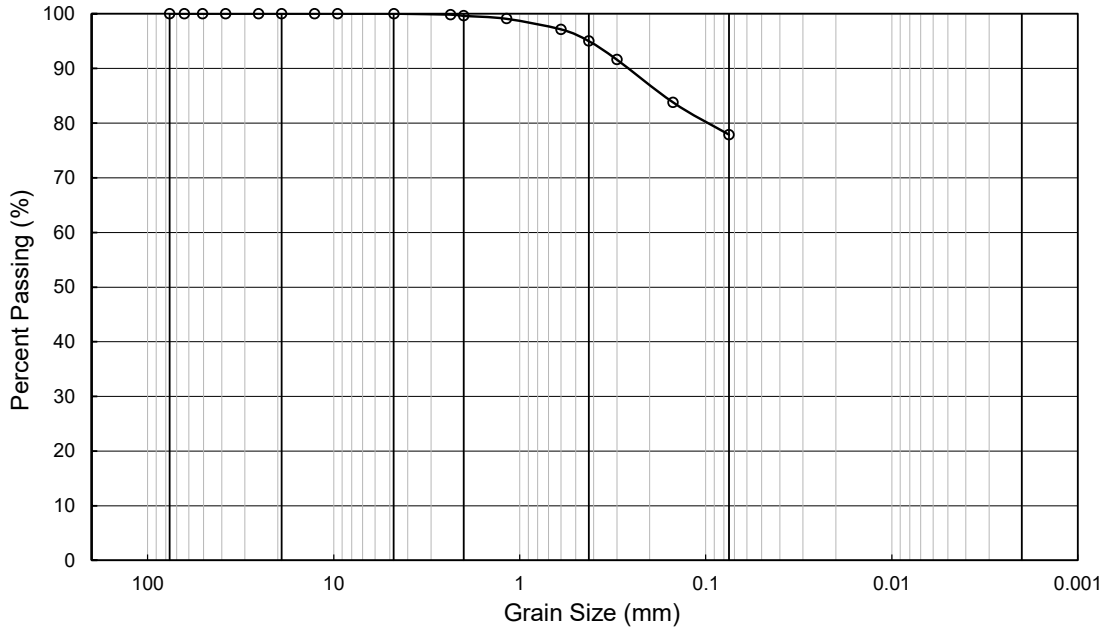
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.8
#10	2.00	99.6
#16	1.18	99.1
# 30	0.60	97.1
# 40	0.425	95.0
# 50	0.30	91.6
# 100	0.15	83.8
# 200	0.075	77.9

Summary	
% Gravel =	0.0
% Sand =	22.1
% Fines =	77.9
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

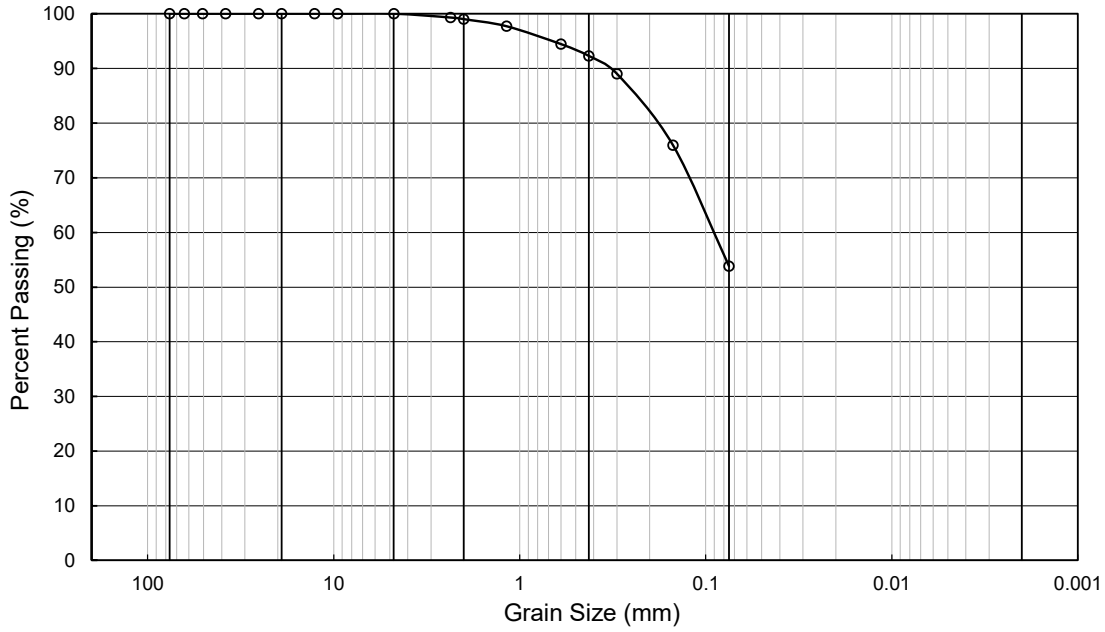
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.3
#10	2.00	99.0
#16	1.18	97.7
# 30	0.60	94.4
# 40	0.425	92.3
# 50	0.30	89.0
# 100	0.15	75.9
# 200	0.075	53.8

Summary	
% Gravel =	0.0
% Sand =	46.2
% Fines =	53.8
Sum =	100.0

LL=	43
PL=	23
PI =	20

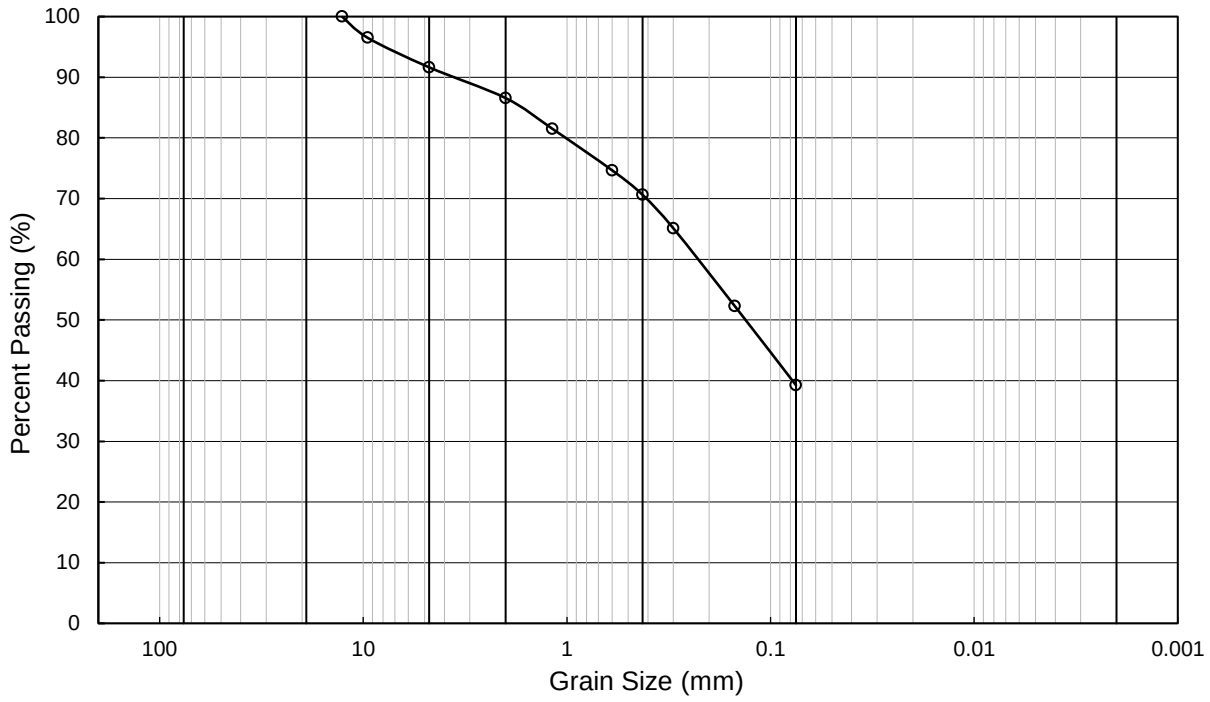
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	100
3/8 "	9.53	97
# 4	4.75	91.6
#10	2.00	86.6
#16	1.18	81.5
# 30	0.60	74.7
# 40	0.425	70.6
# 50	0.30	65.1
# 100	0.15	52.3
# 200	0.075	39.3

Summary	
% Gravel =	8.4
% Sand =	52.4
% Fines =	39.3
Sum =	100.0

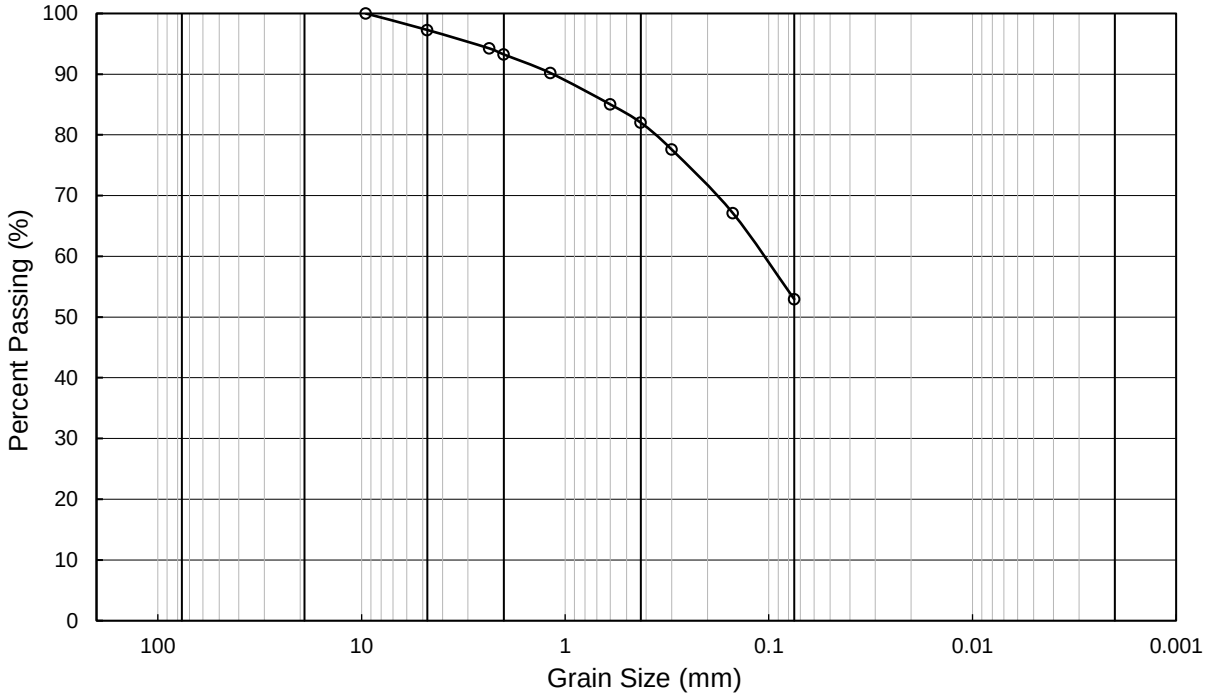
LL=	29
PL=	21
PI =	8
Soil Type:	SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.3
#10	2.00	93.2
#16	1.18	90.2
# 30	0.60	85.0
# 40	0.425	82.0
# 50	0.30	77.6
# 100	0.15	67.1
# 200	0.075	52.9

Summary	
% Gravel =	2.7
% Sand =	44.3
% Fines =	52.9
Sum =	100.0

LL=	33
PL=	20
PI =	13

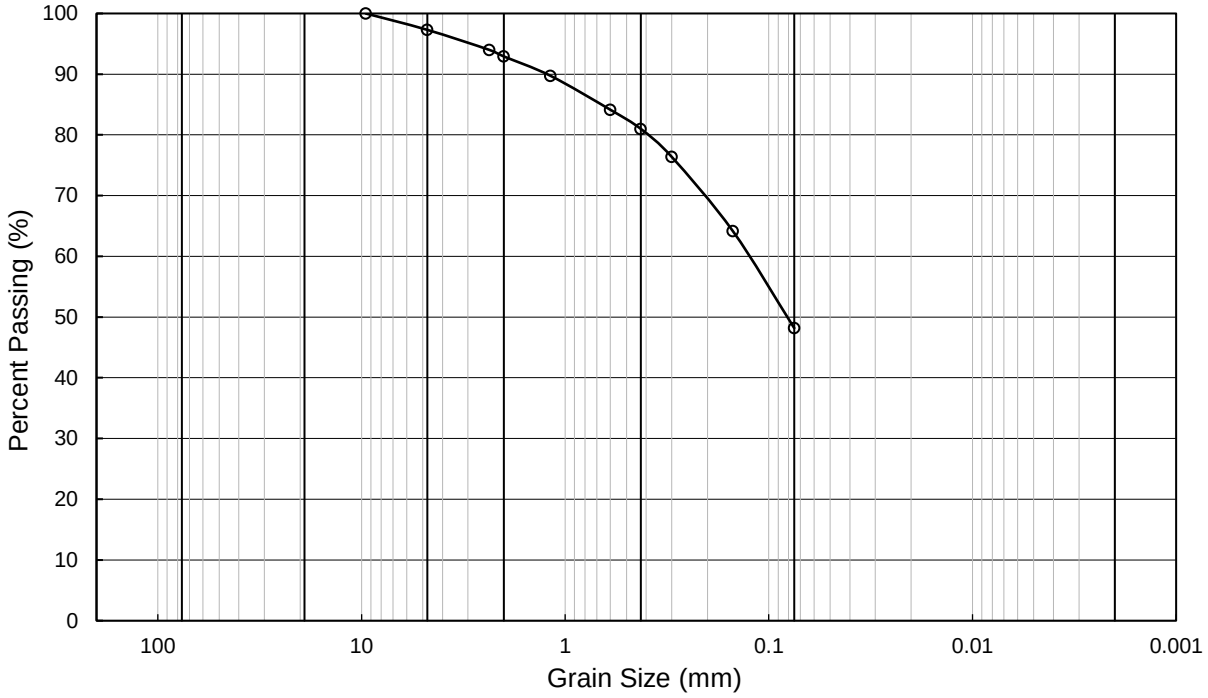
Soil Type: SC-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	45 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.0
#10	2.00	92.9
#16	1.18	89.7
# 30	0.60	84.1
# 40	0.425	81.0
# 50	0.30	76.4
# 100	0.15	64.1
# 200	0.075	48.2

Summary	
% Gravel =	2.7
% Sand =	49.1
% Fines =	48.2
Sum =	100.0

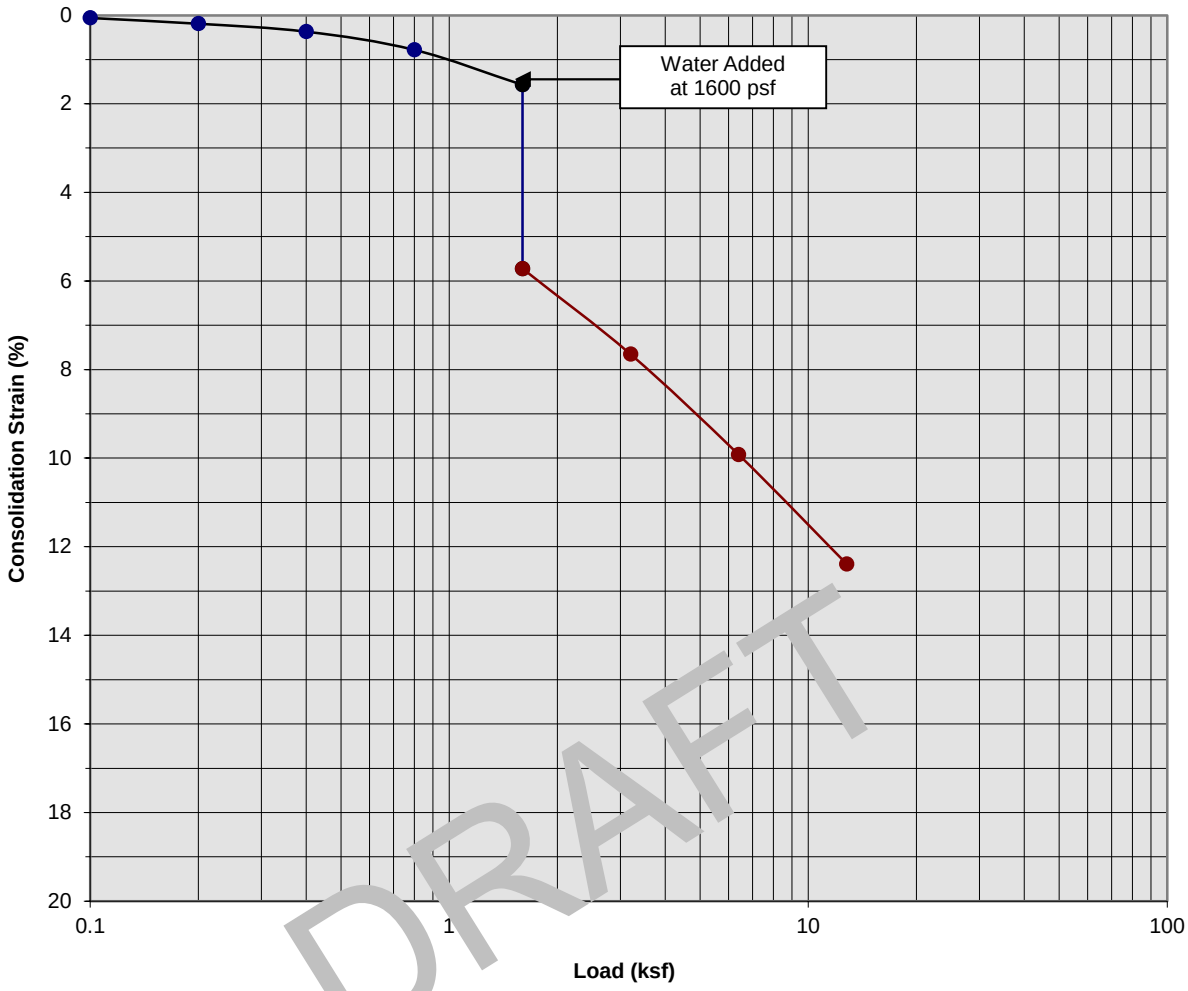
LL=	28
PL=	20
PI =	8

Soil Type: SC-CL

APPENDIX C-2

DRAFT LABORATORY TEST RESULTS (SCG)

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Light Red Brown Silty fine to coarse Sand

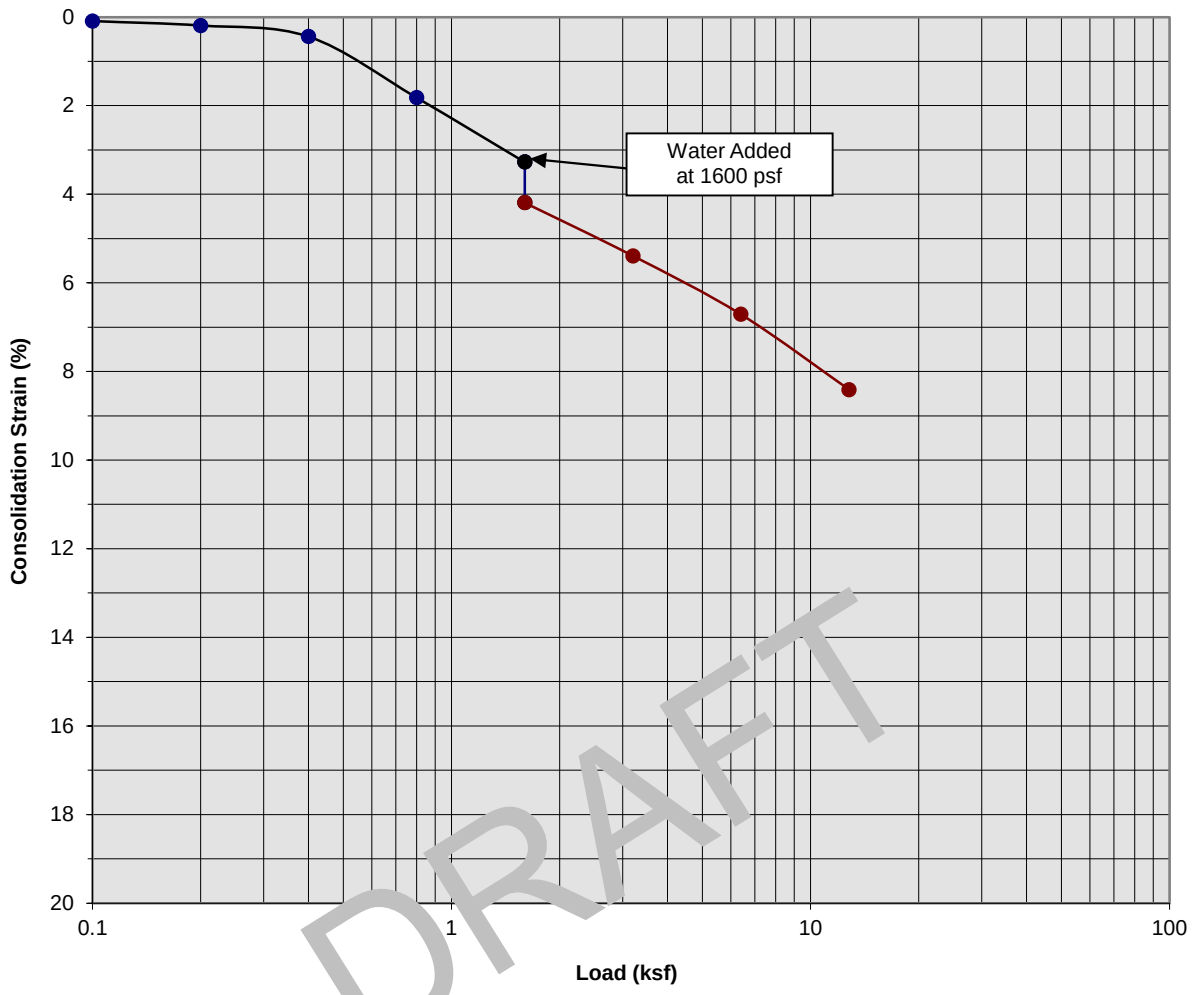
Boring Number:	SCG-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Red Brown Silty fine Sand, trace medium to coarse Sand

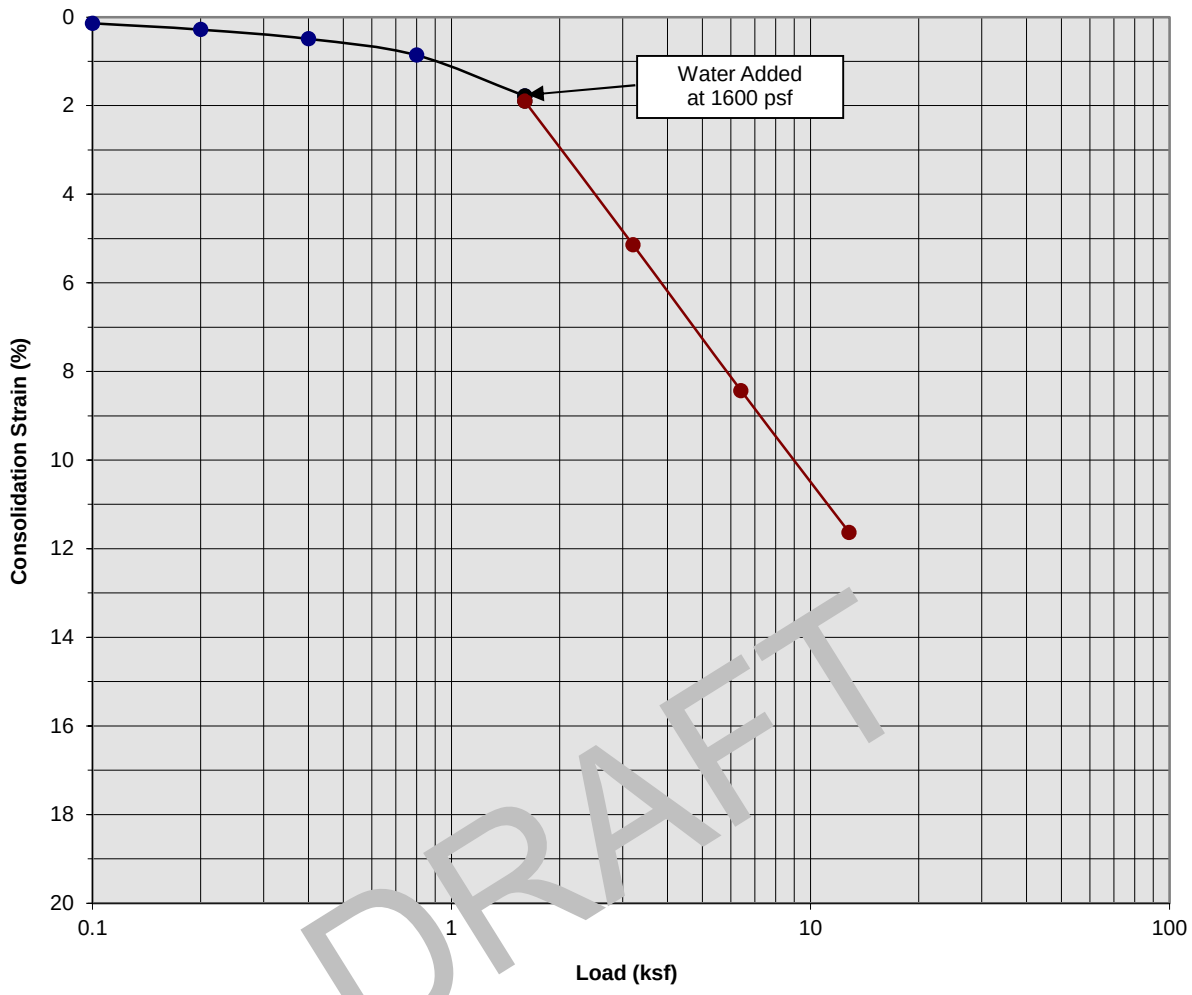
Boring Number:	SCG-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	121.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Colluvium: Dark Gray Brown Silty fine to medium Sand

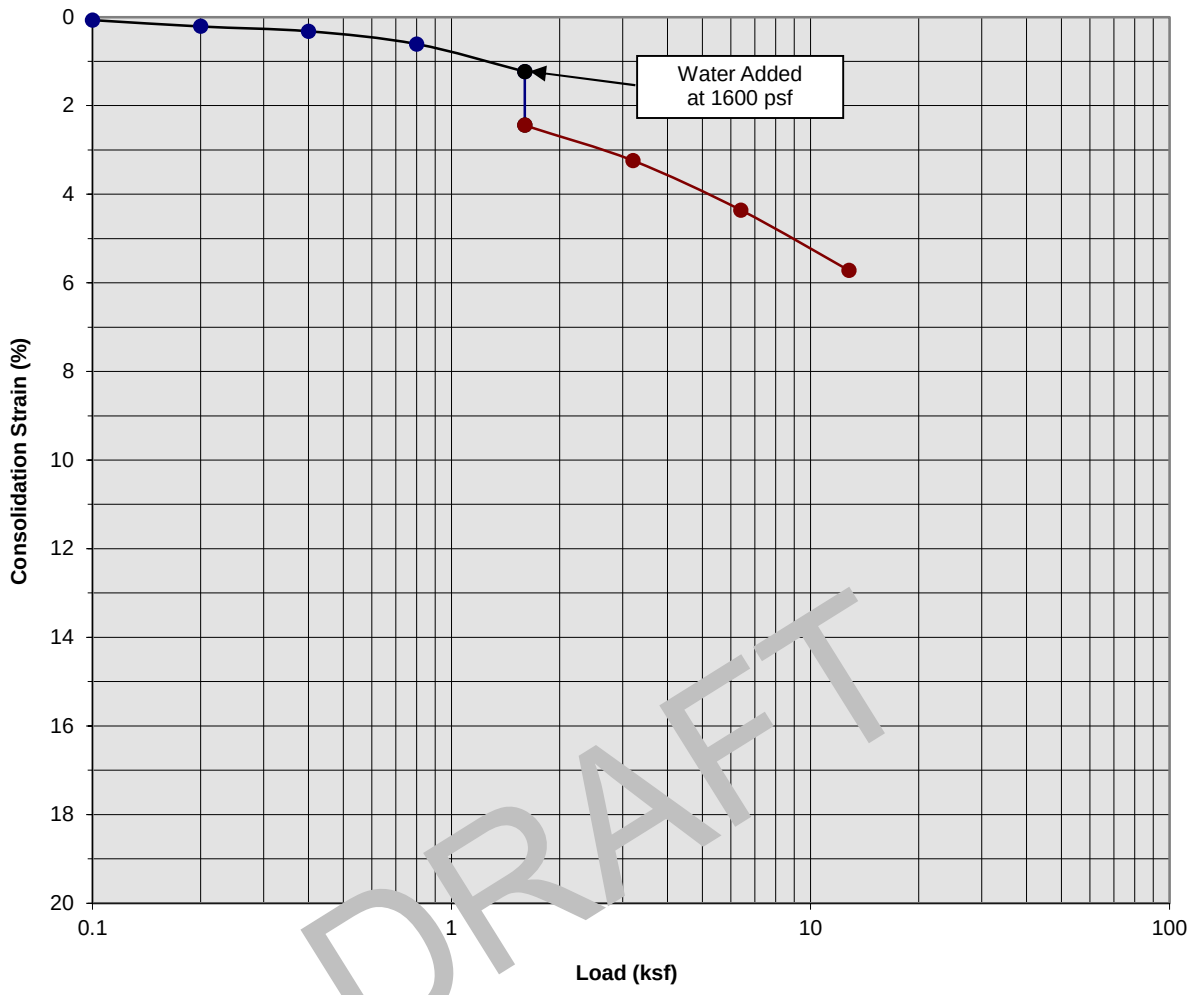
Boring Number:	SCG-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	99.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace medium to coarse Sand

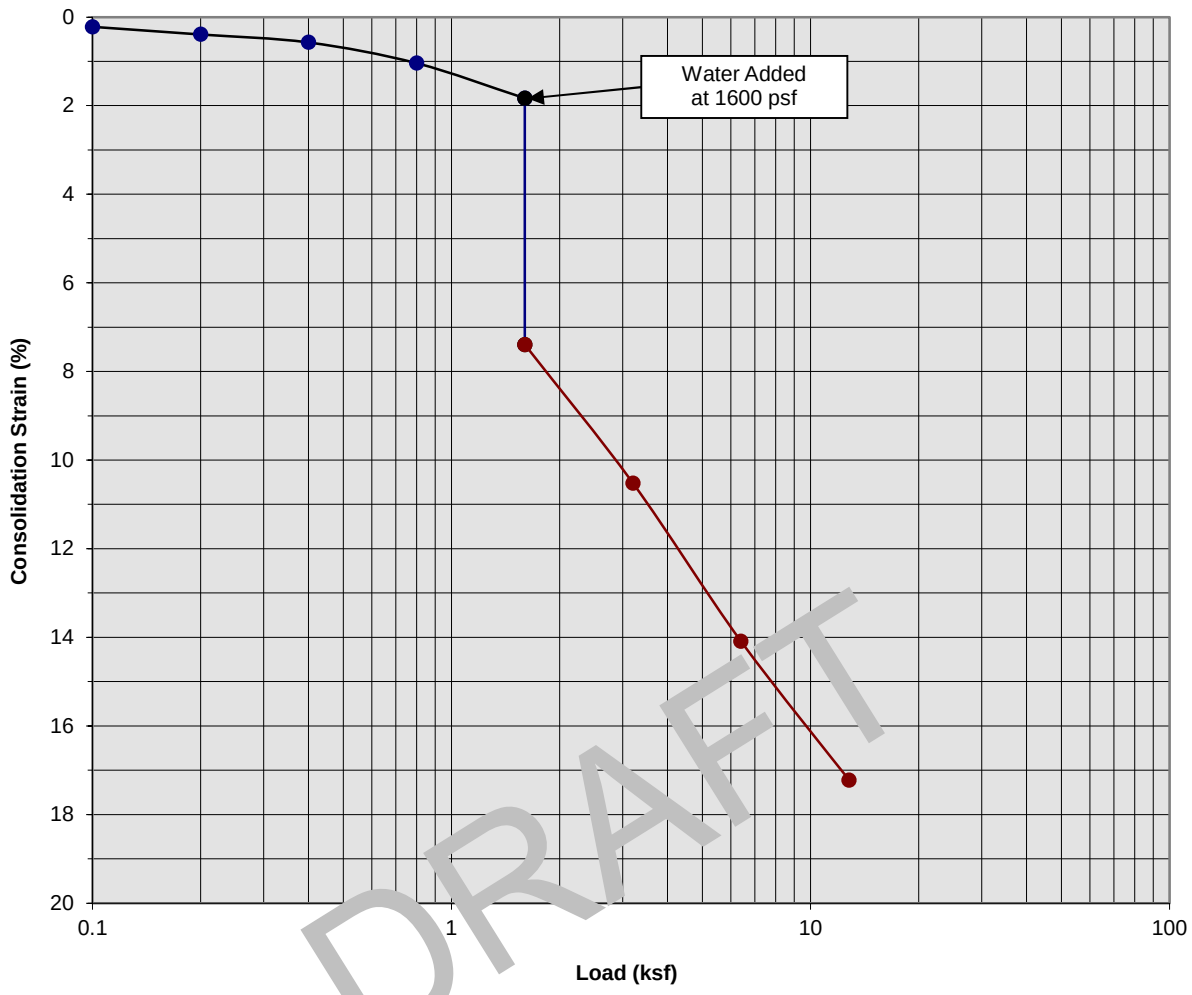
Boring Number:	SCG-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	125.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Gray Brown Silty fine to medium Sand

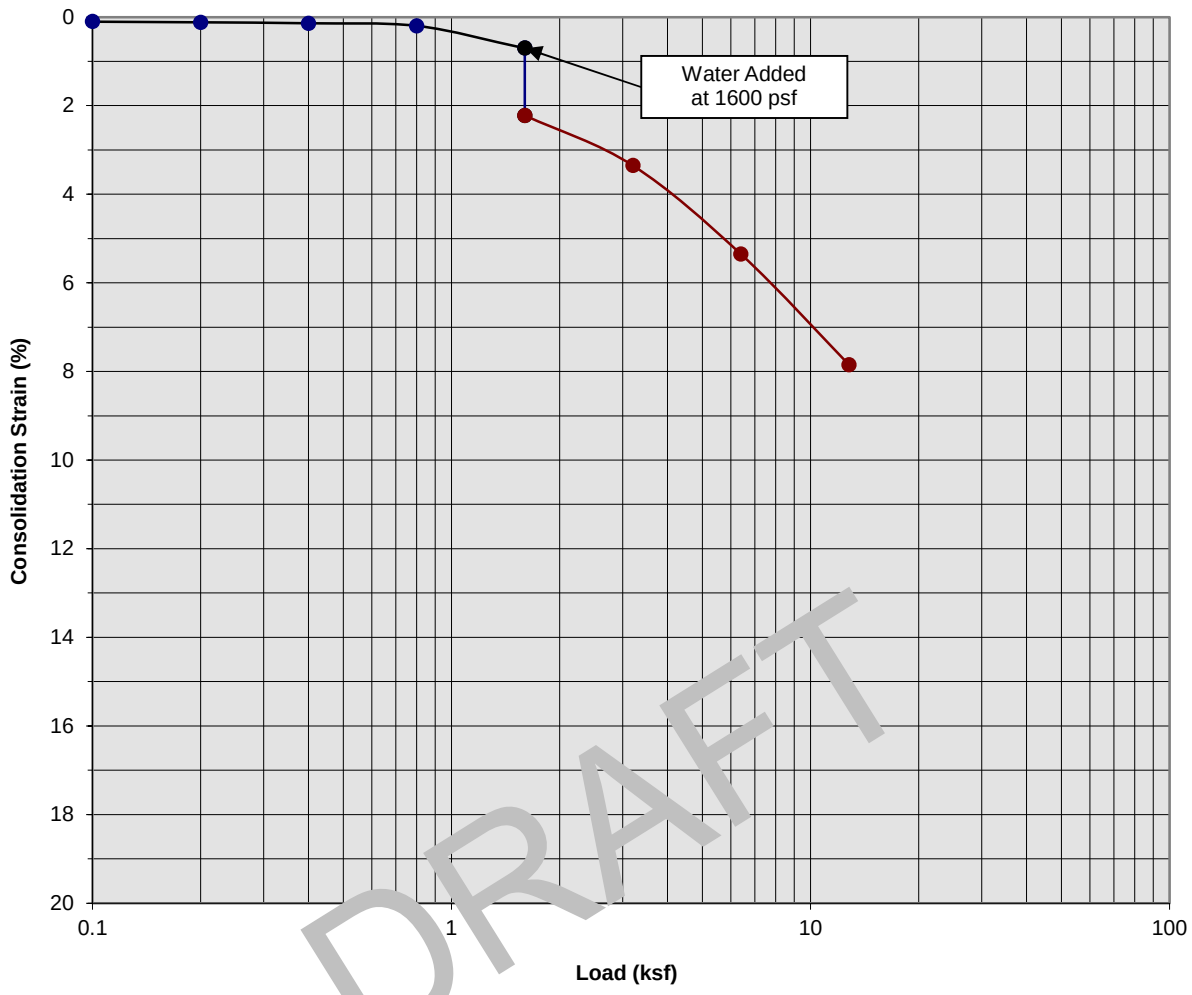
Boring Number:	SCG-4	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	102.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

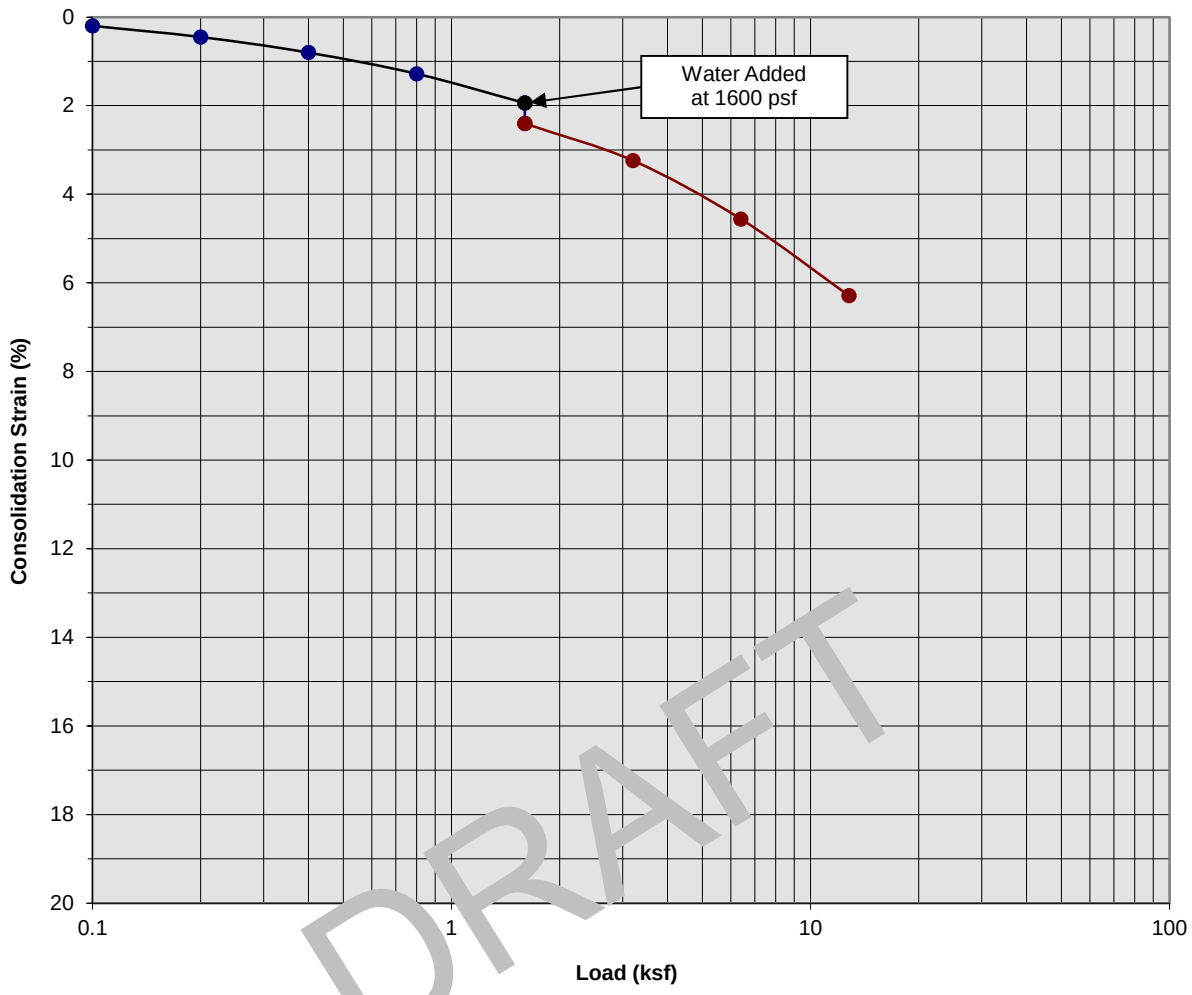
Boring Number:	SCG-4	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	126.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.52

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: FILL: Black to Dark Brown Clayey Silt

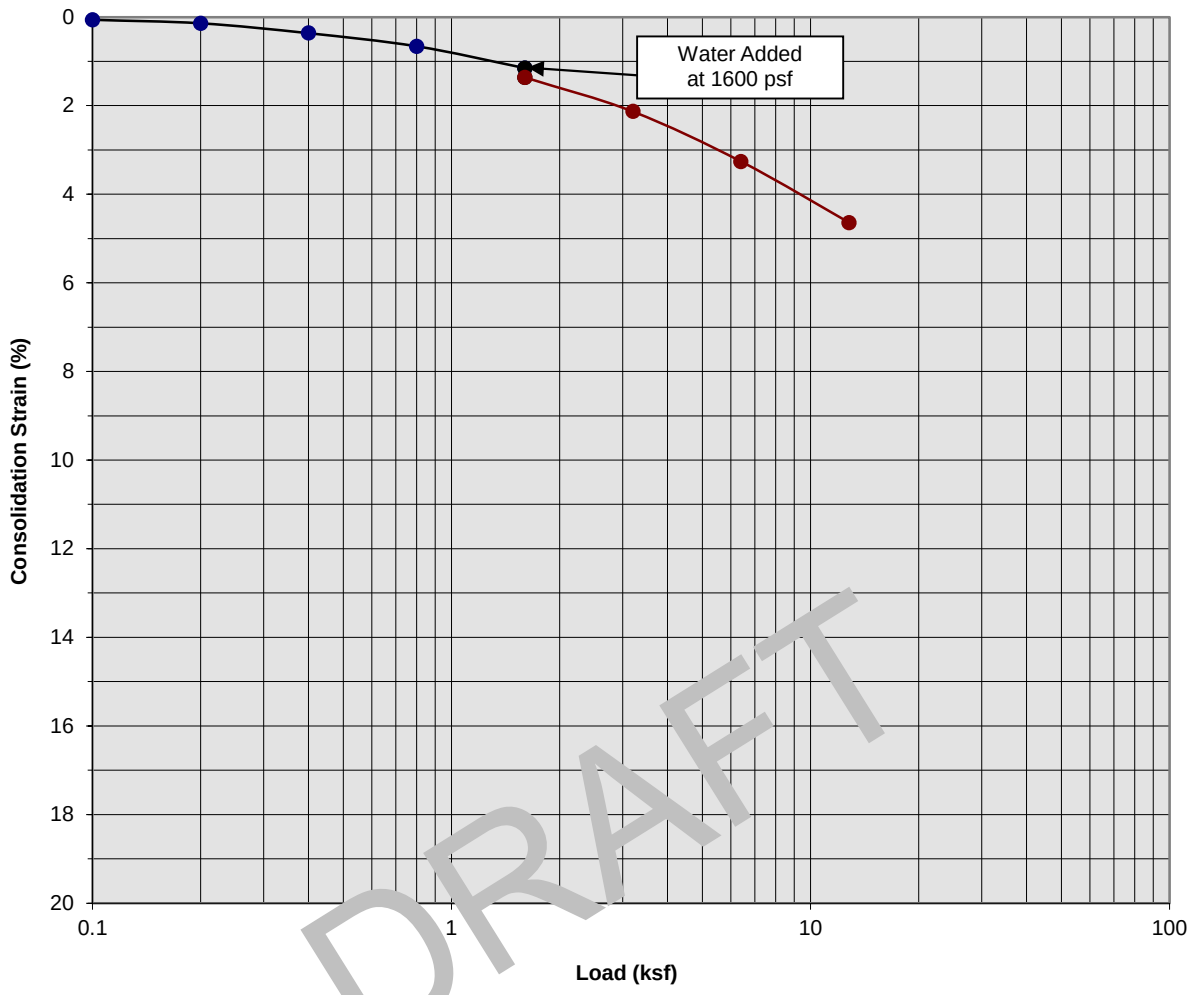
Boring Number:	SCG-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	115.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Bray Brown Silty Clay, little fine to medium Sand

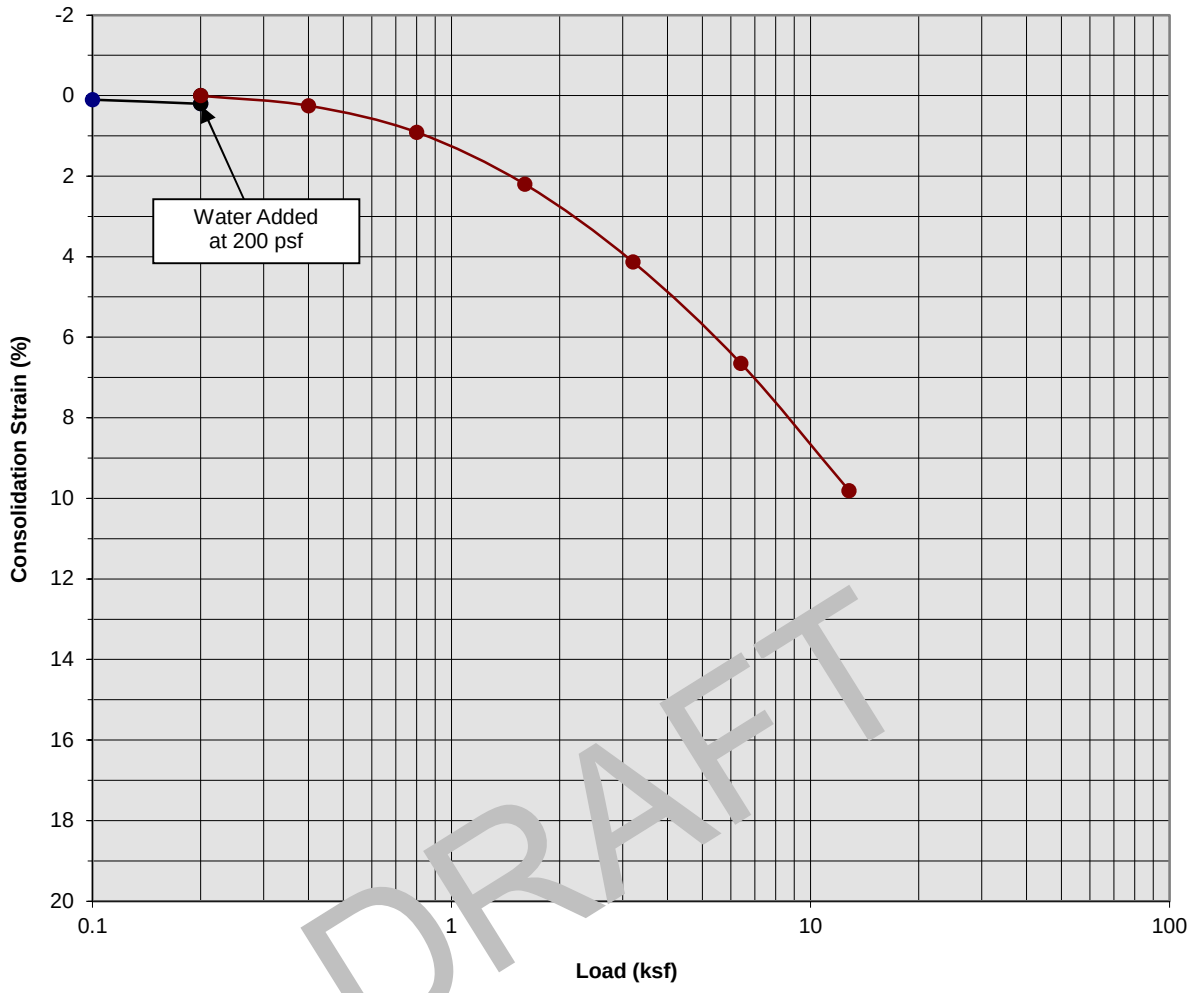
Boring Number:	SCG-5	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	131.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 8

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Silty Clay, trace fine Sand

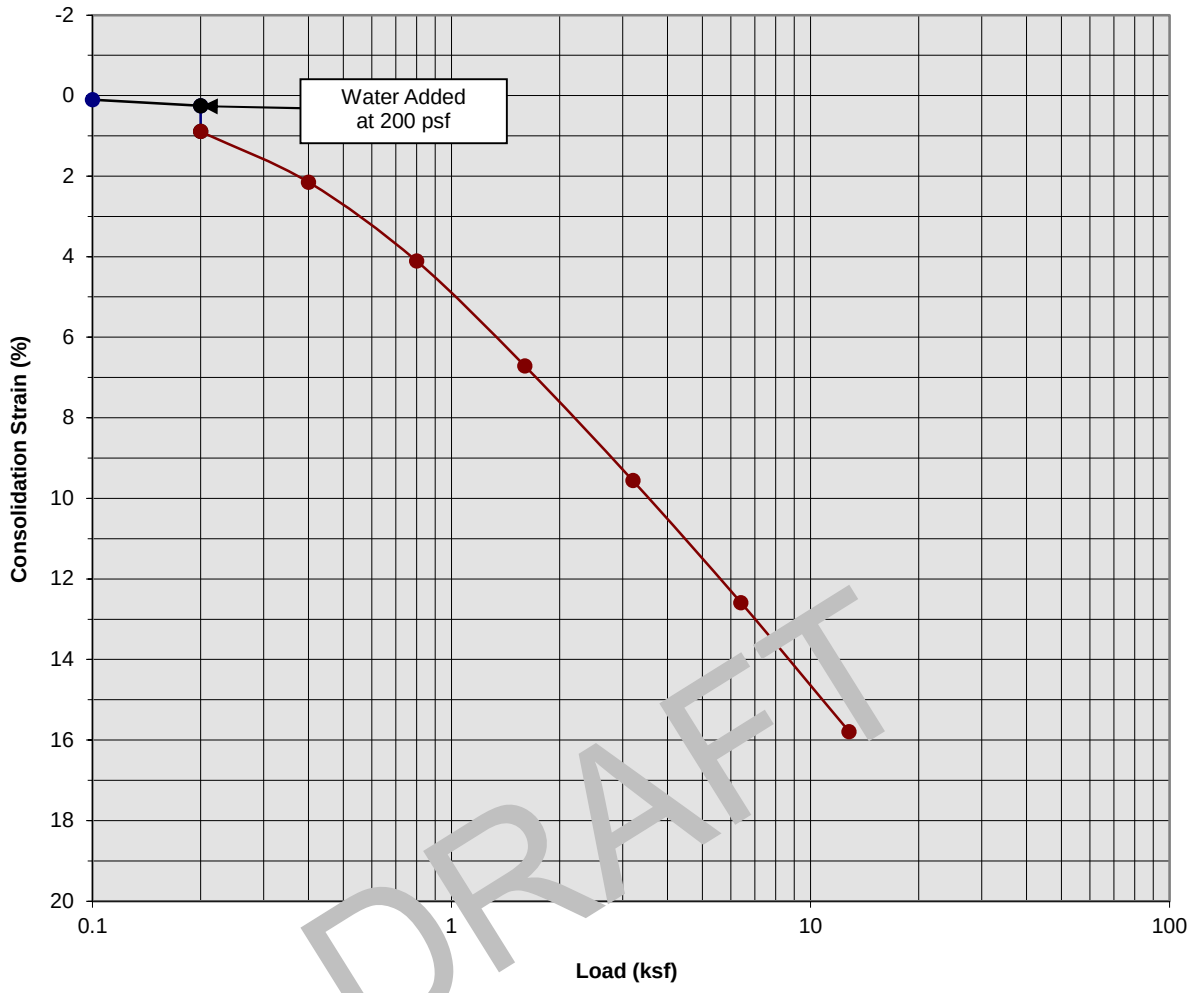
Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	102.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.20

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 9

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light Brown Silty fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	95.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.64

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 10

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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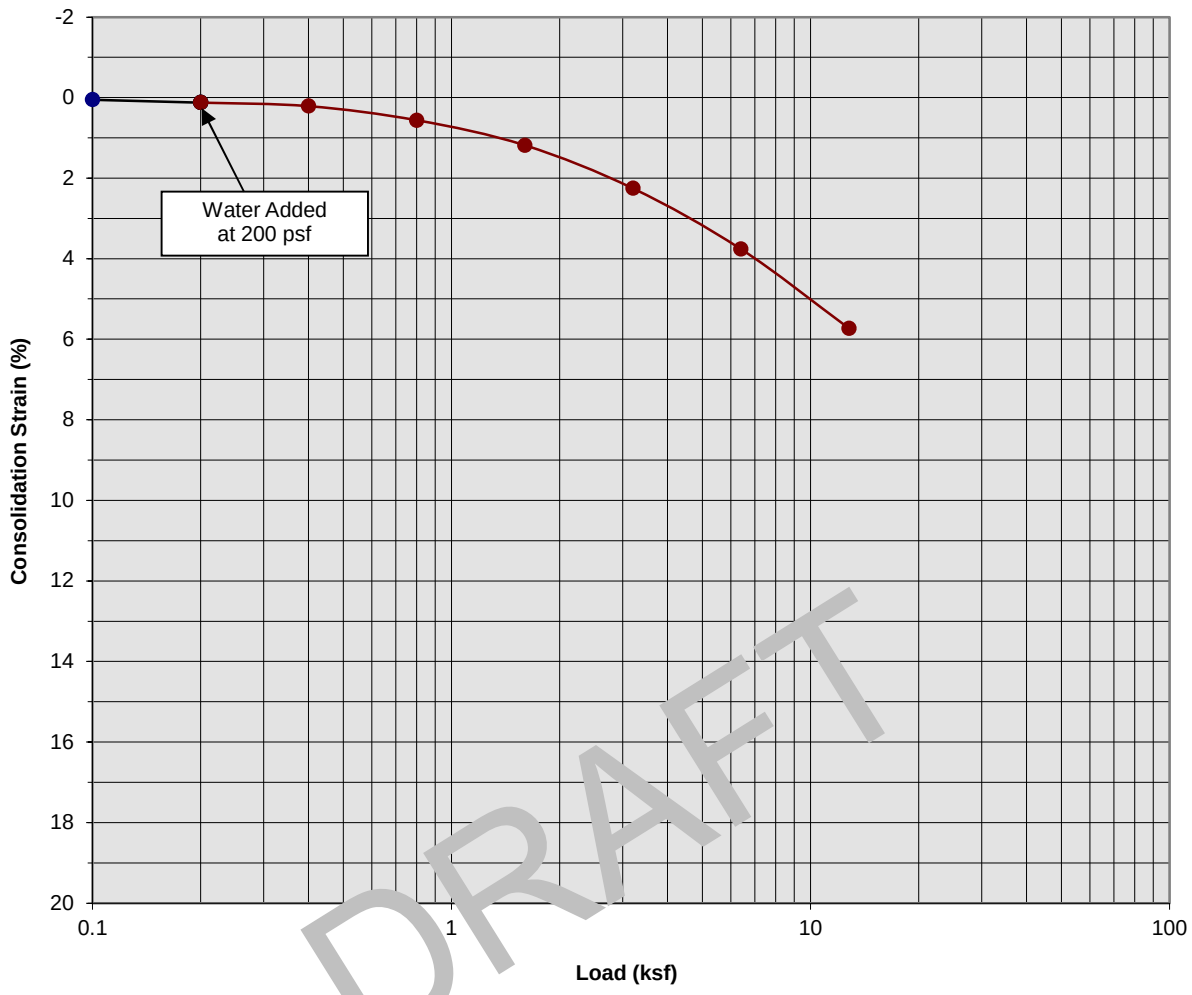
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Clayey Silt, trace fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 11

SoCalGeo
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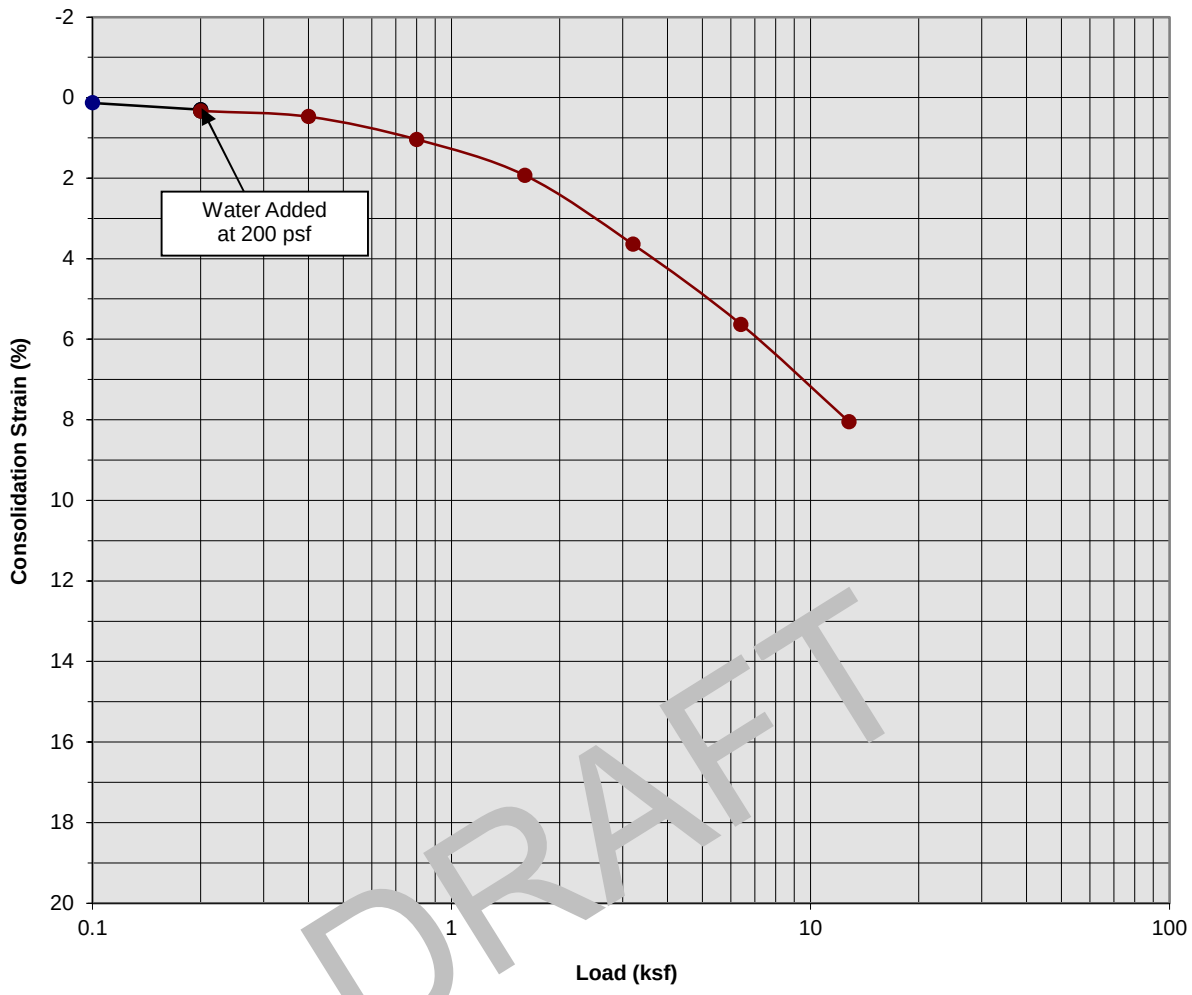
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 12

SoCalGeo
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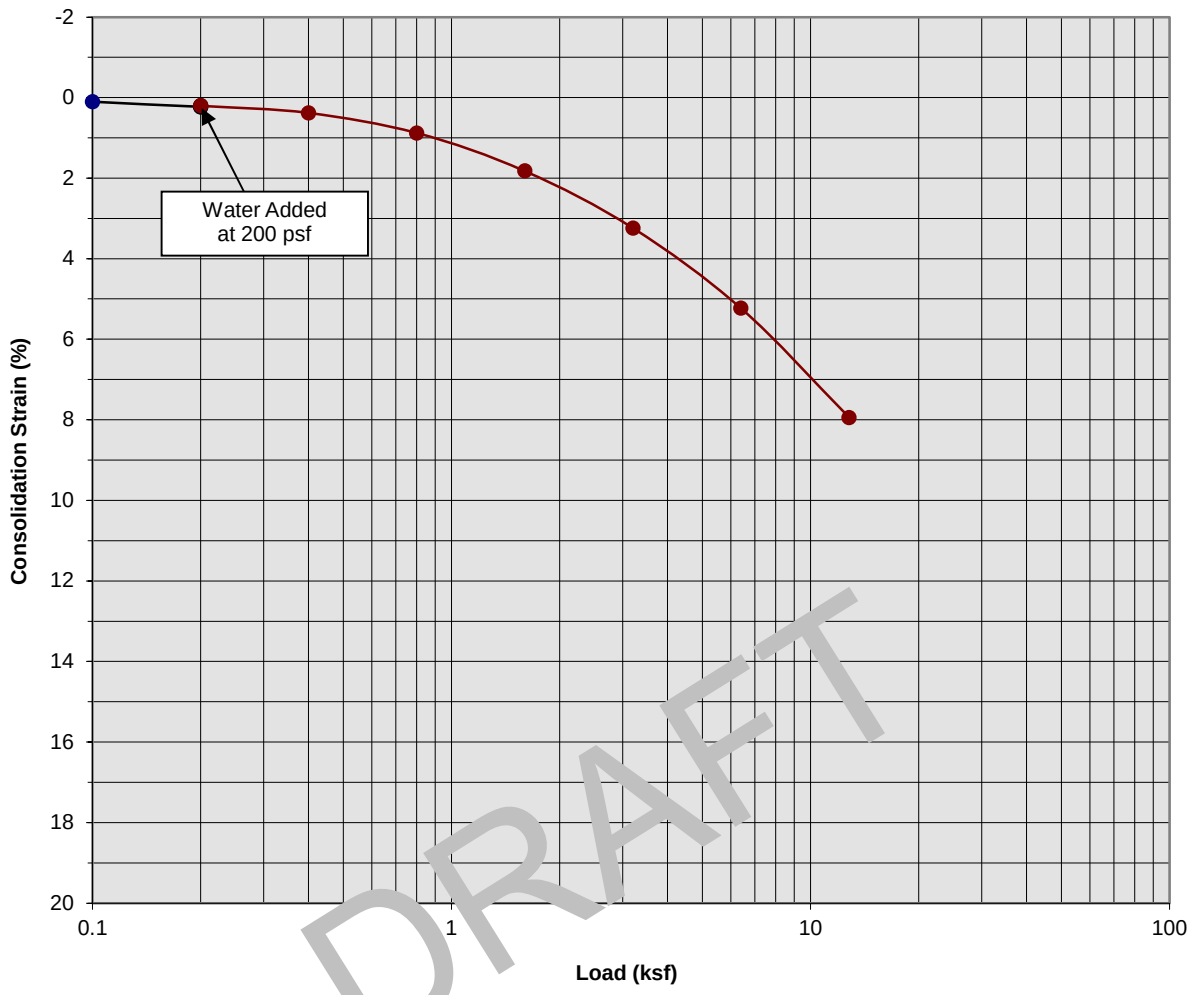
Consolidation/Collapse Test Results



DRAFT

Classification: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	109.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 13

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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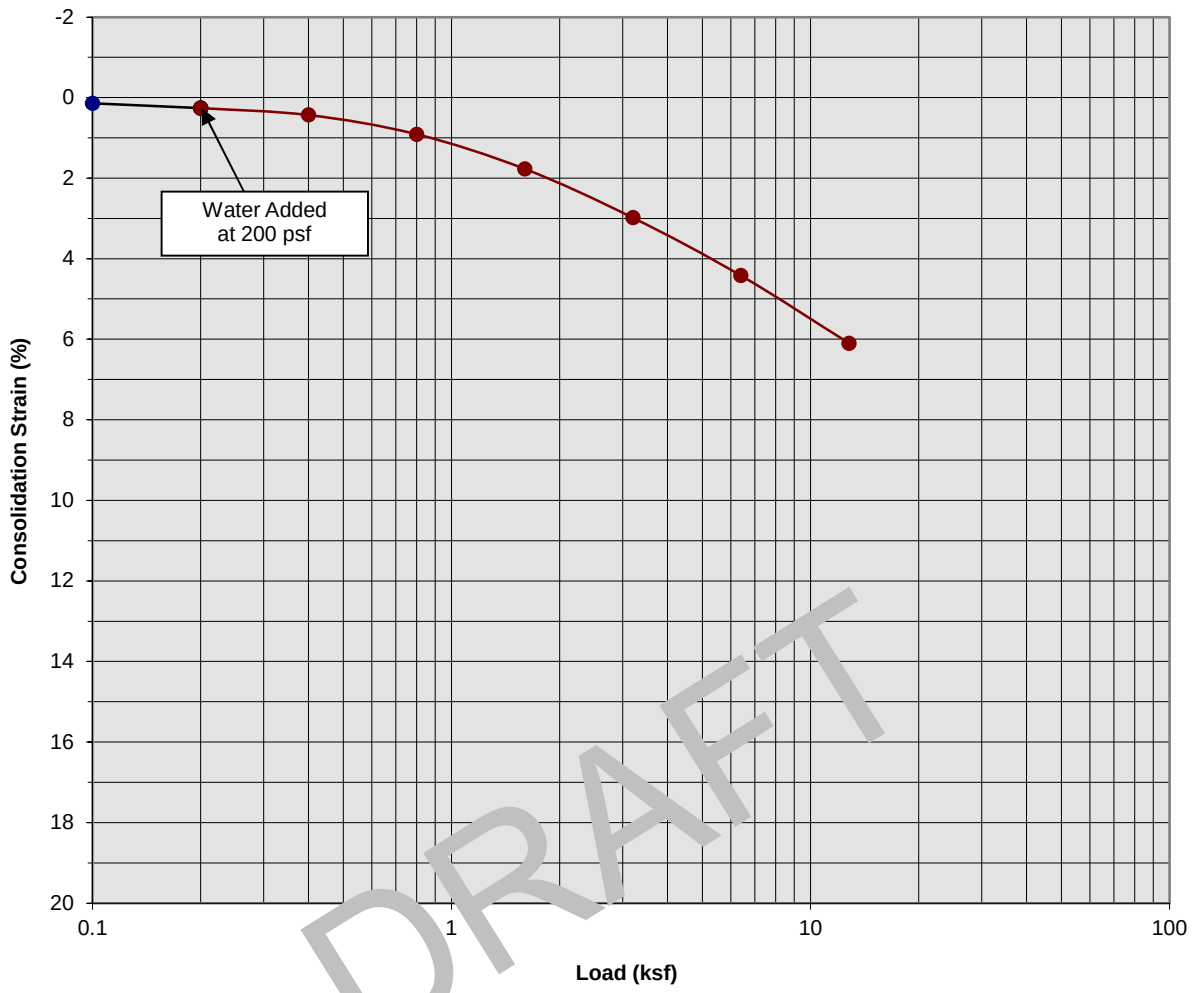
Consolidation/Collapse Test Results



DRAFT

Classification: Green Blue Silty fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	33.5 to 34.5	Initial Dry Density (pcf)	113.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 14

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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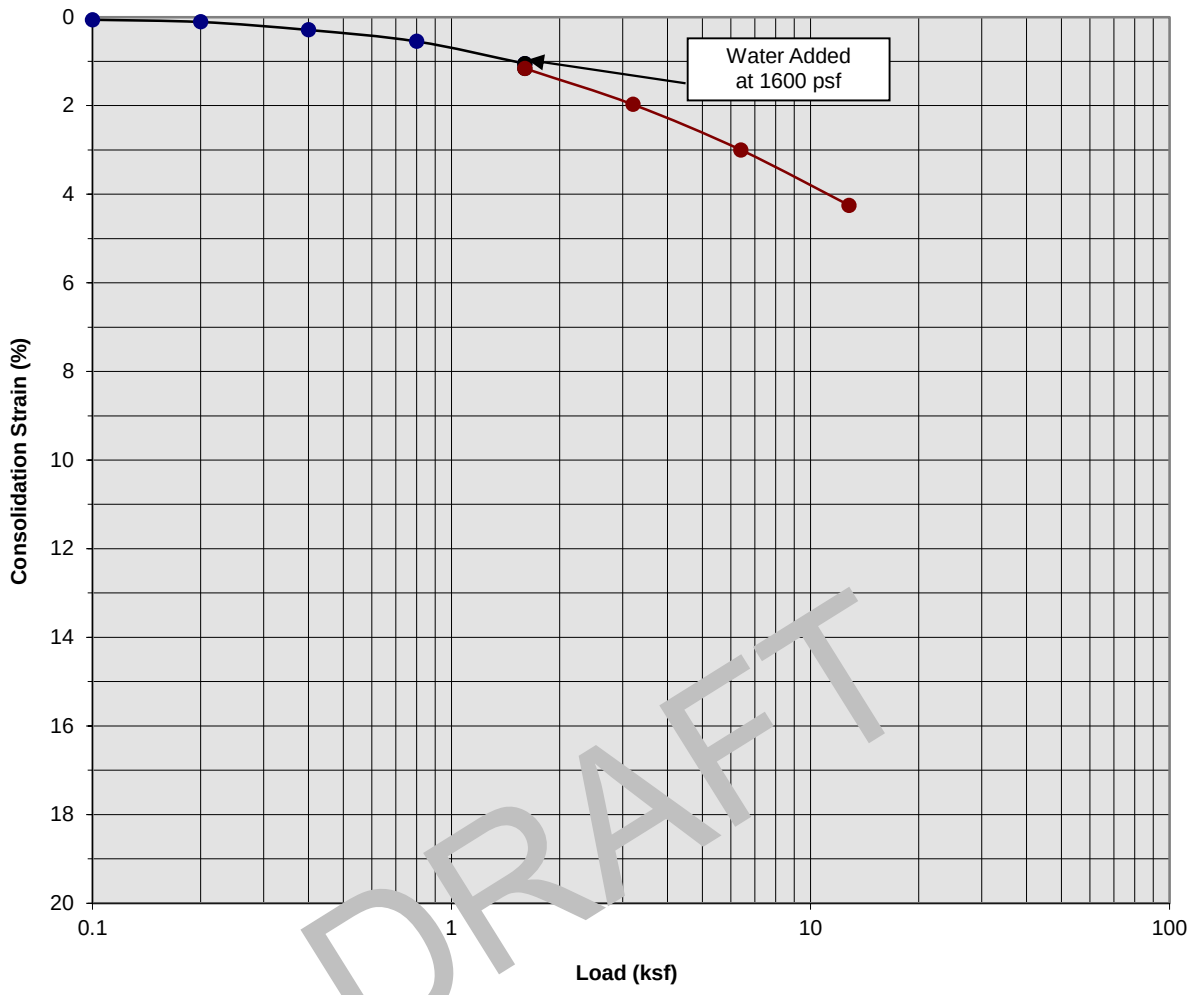
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Gray Brown Silty fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	43.5 to 44.5	Initial Dry Density (pcf)	114.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.11

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 15

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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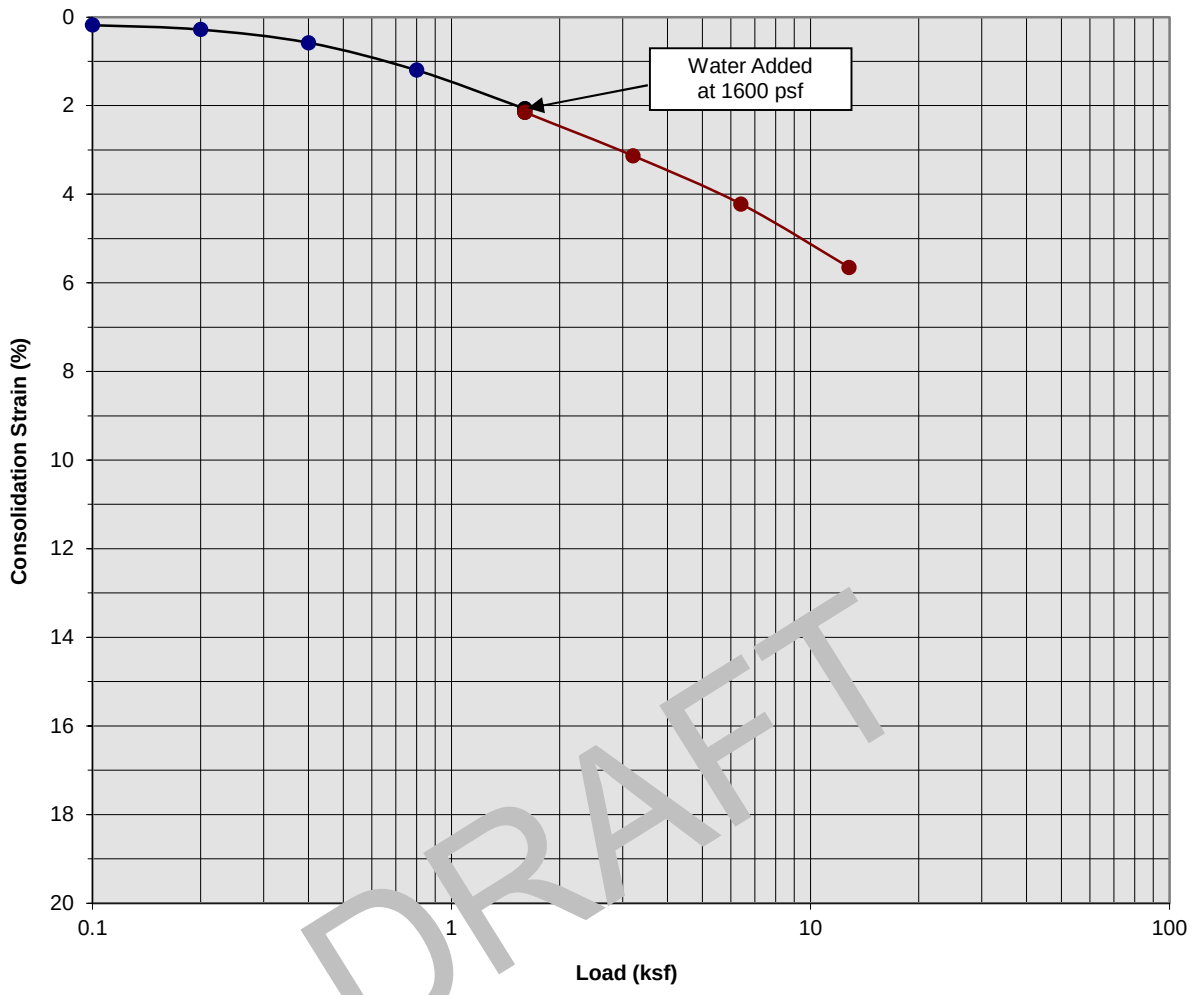
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Blue Green Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	53.5 to 54.5	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 16

SoCalGeo
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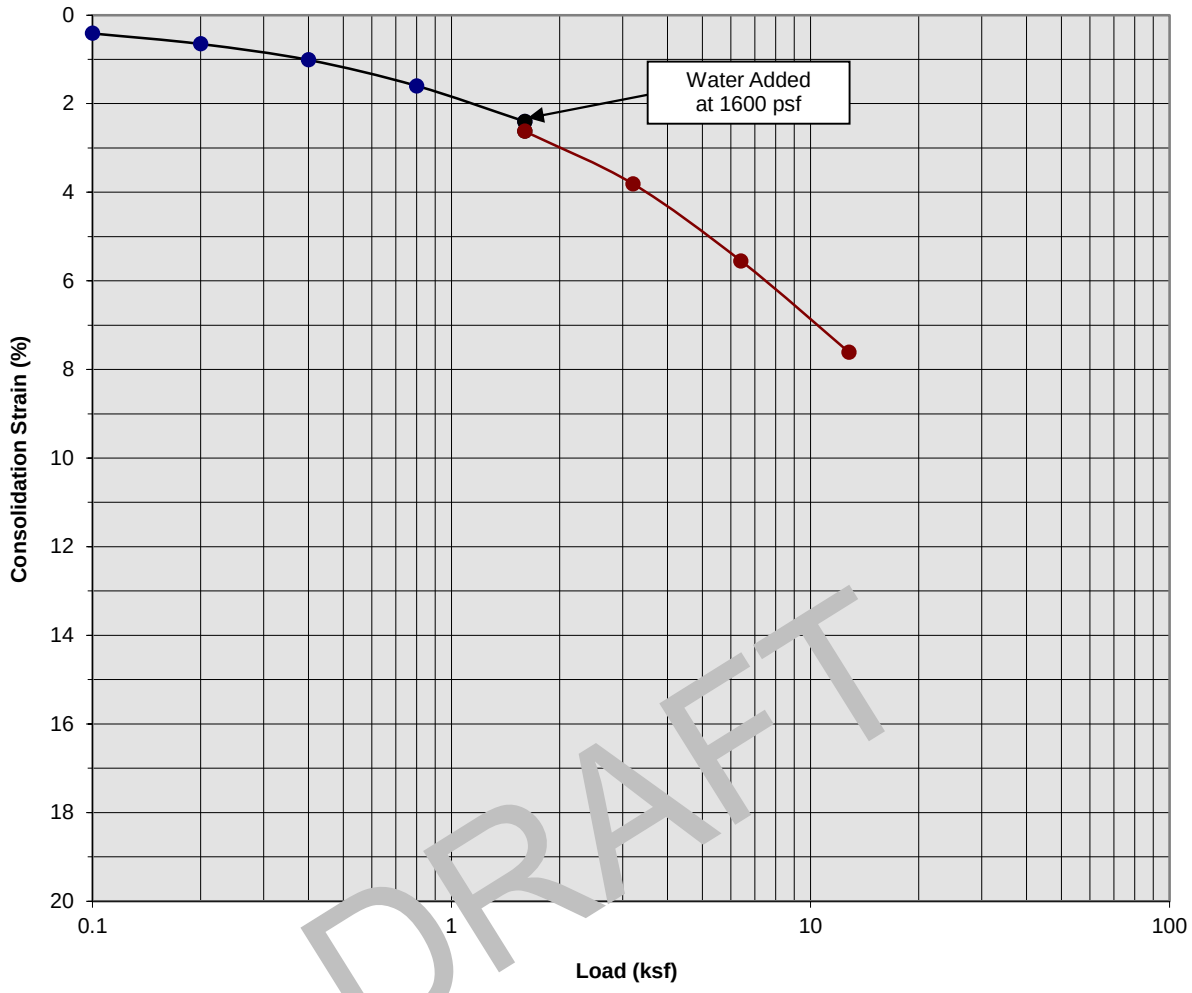
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.22

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 17

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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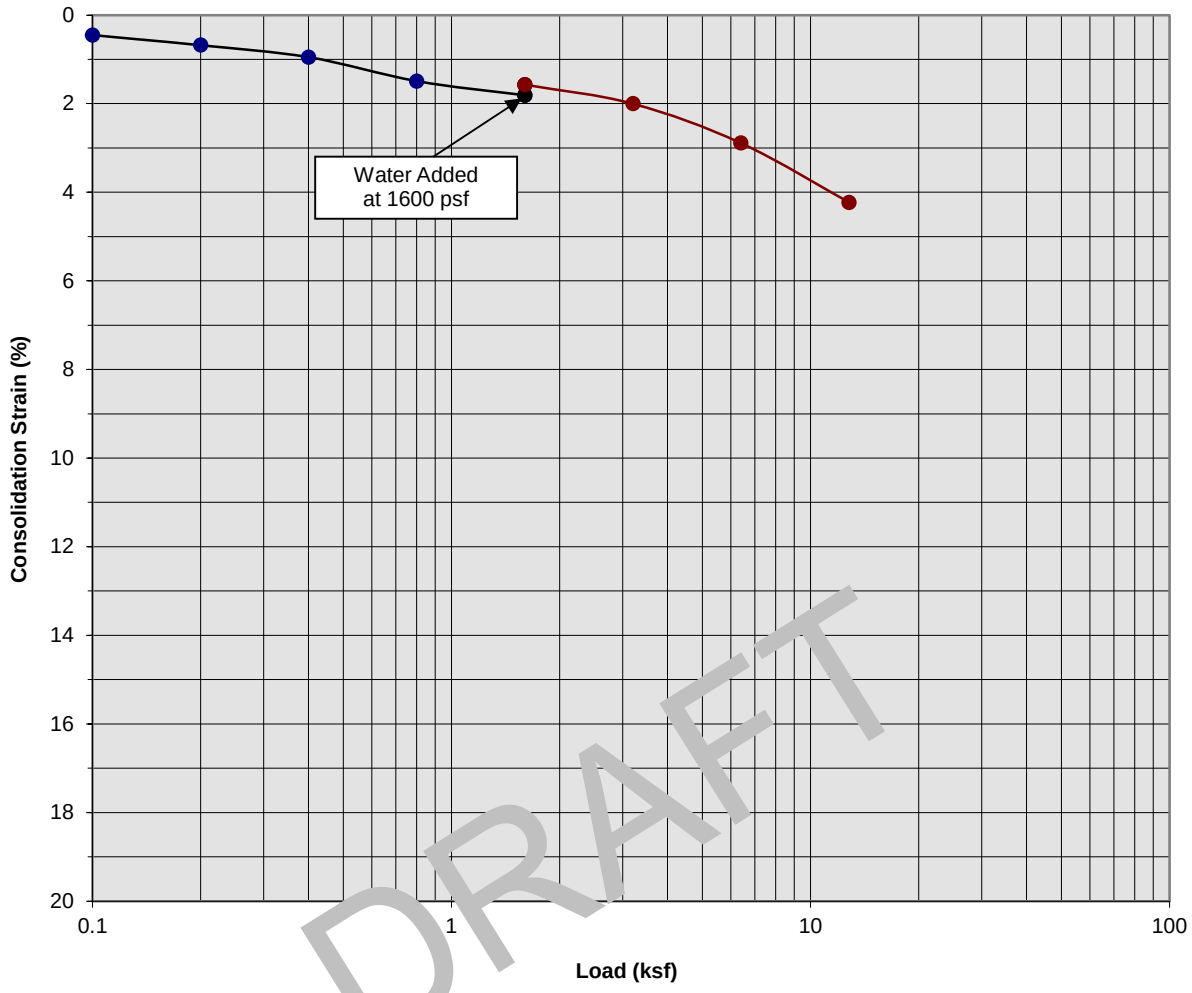
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	122.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.24

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 18

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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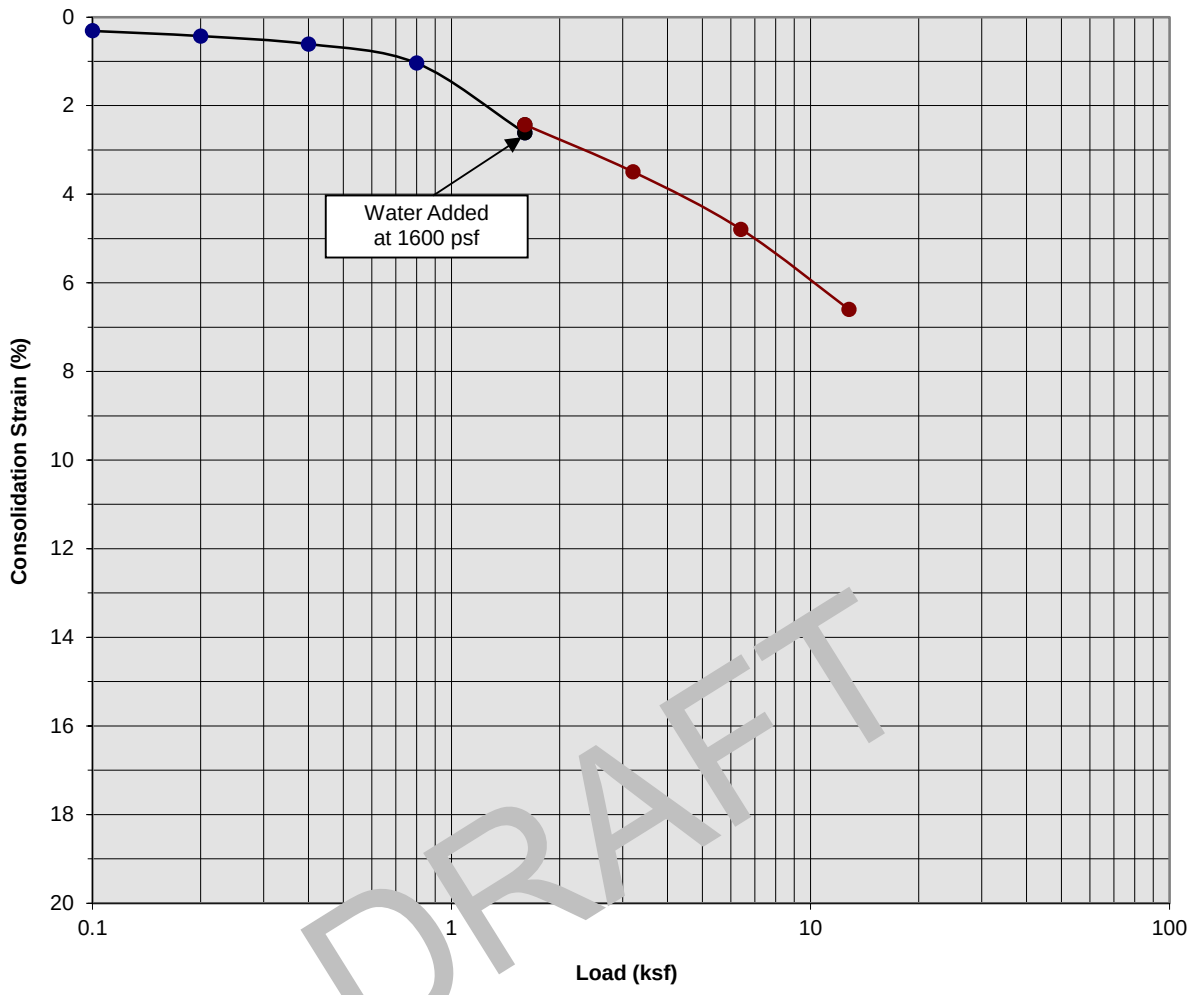
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.18

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 19

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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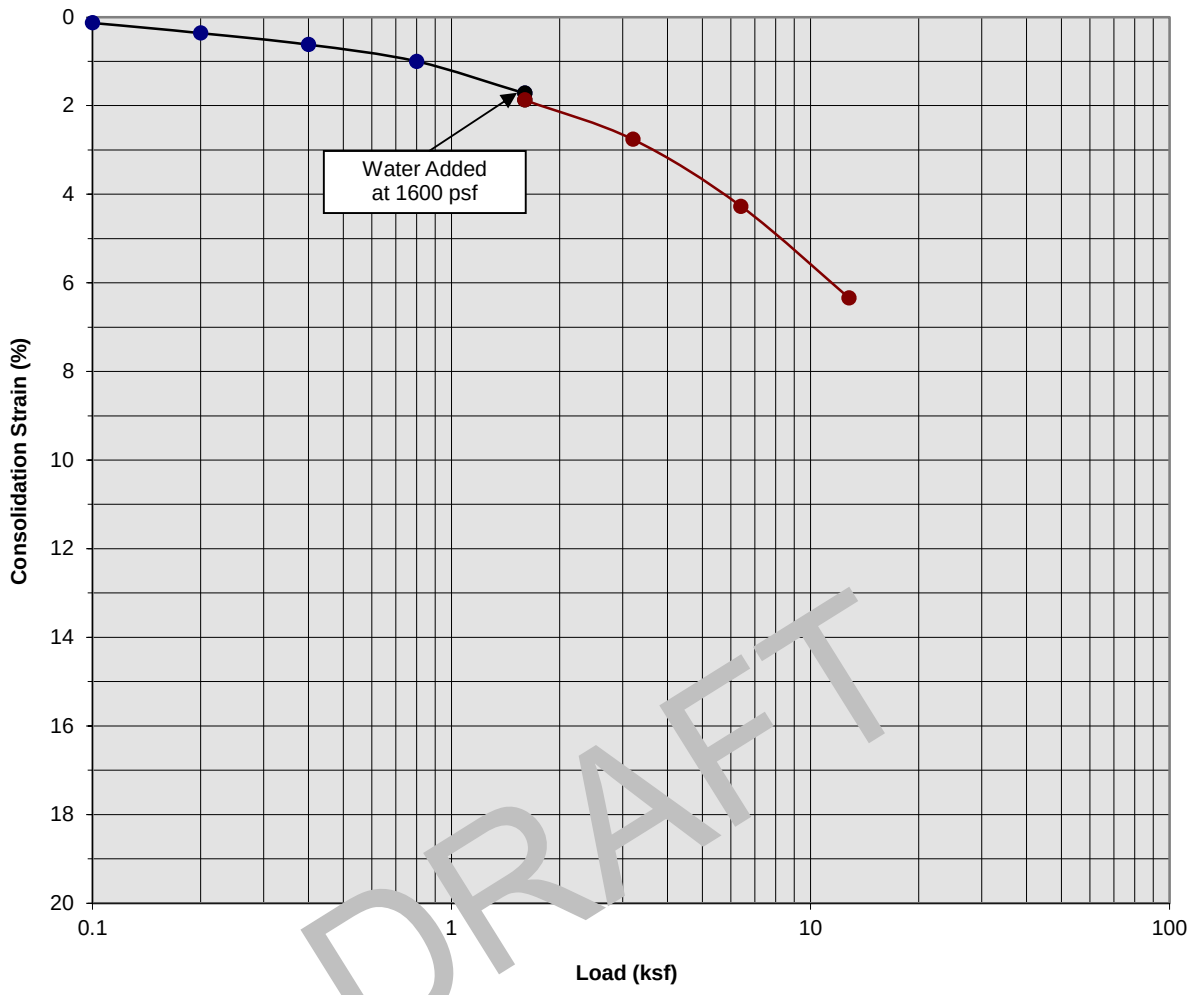
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	131.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 20

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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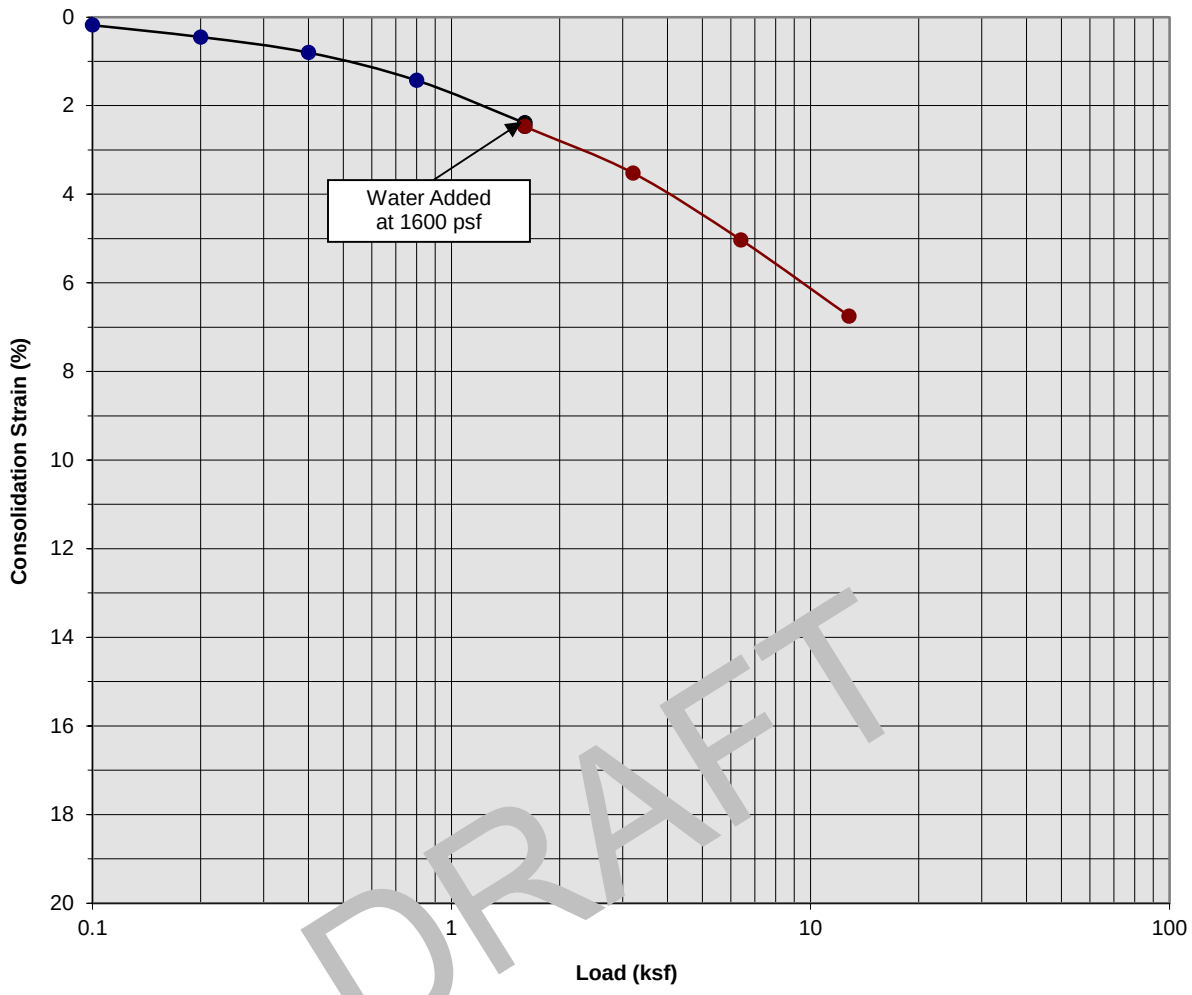
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	117.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 21

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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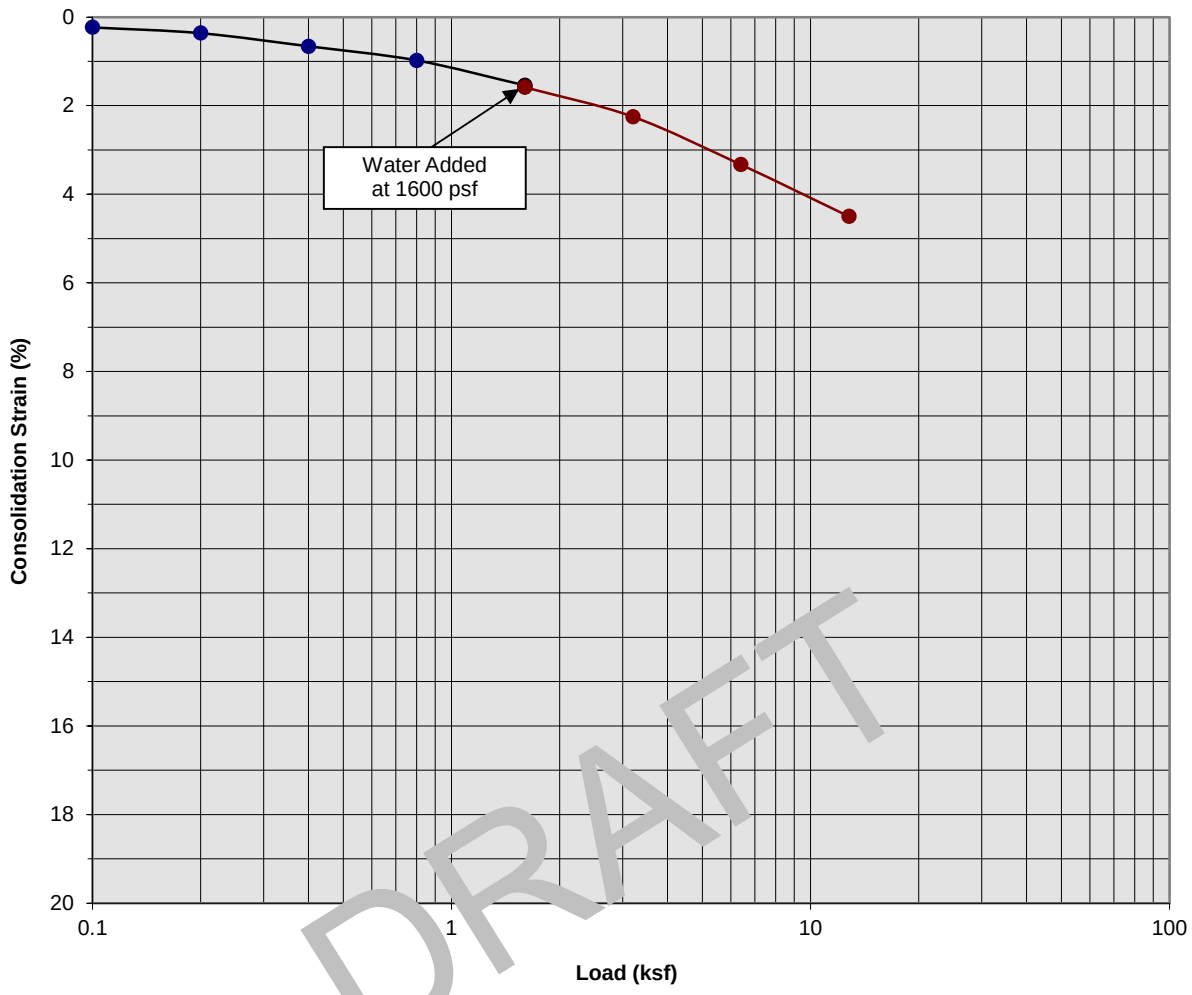
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	28.5 to 29.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.04

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 22

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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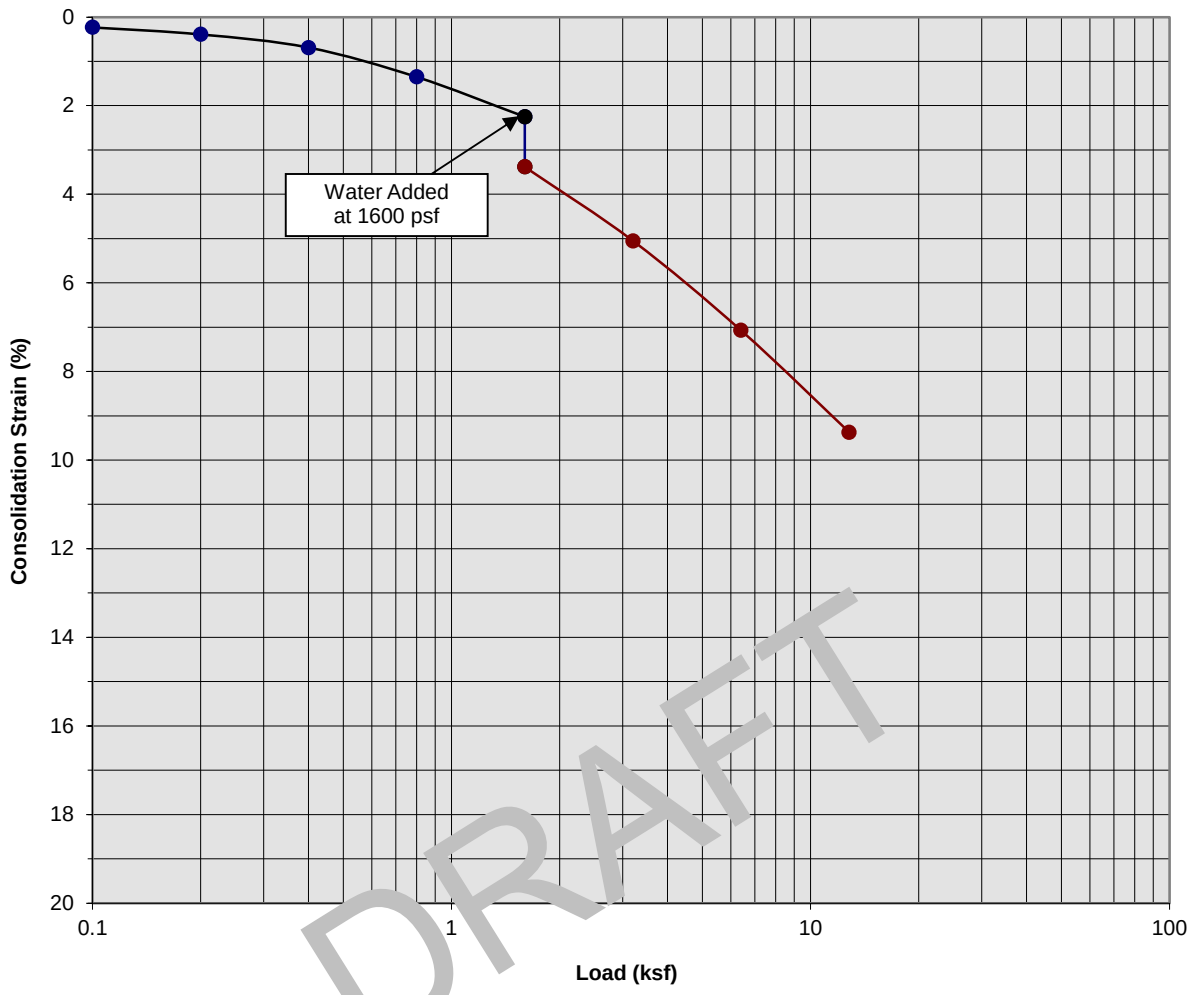
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand, trace medium Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	38.5 to 39.5	Initial Dry Density (pcf)	103.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 23

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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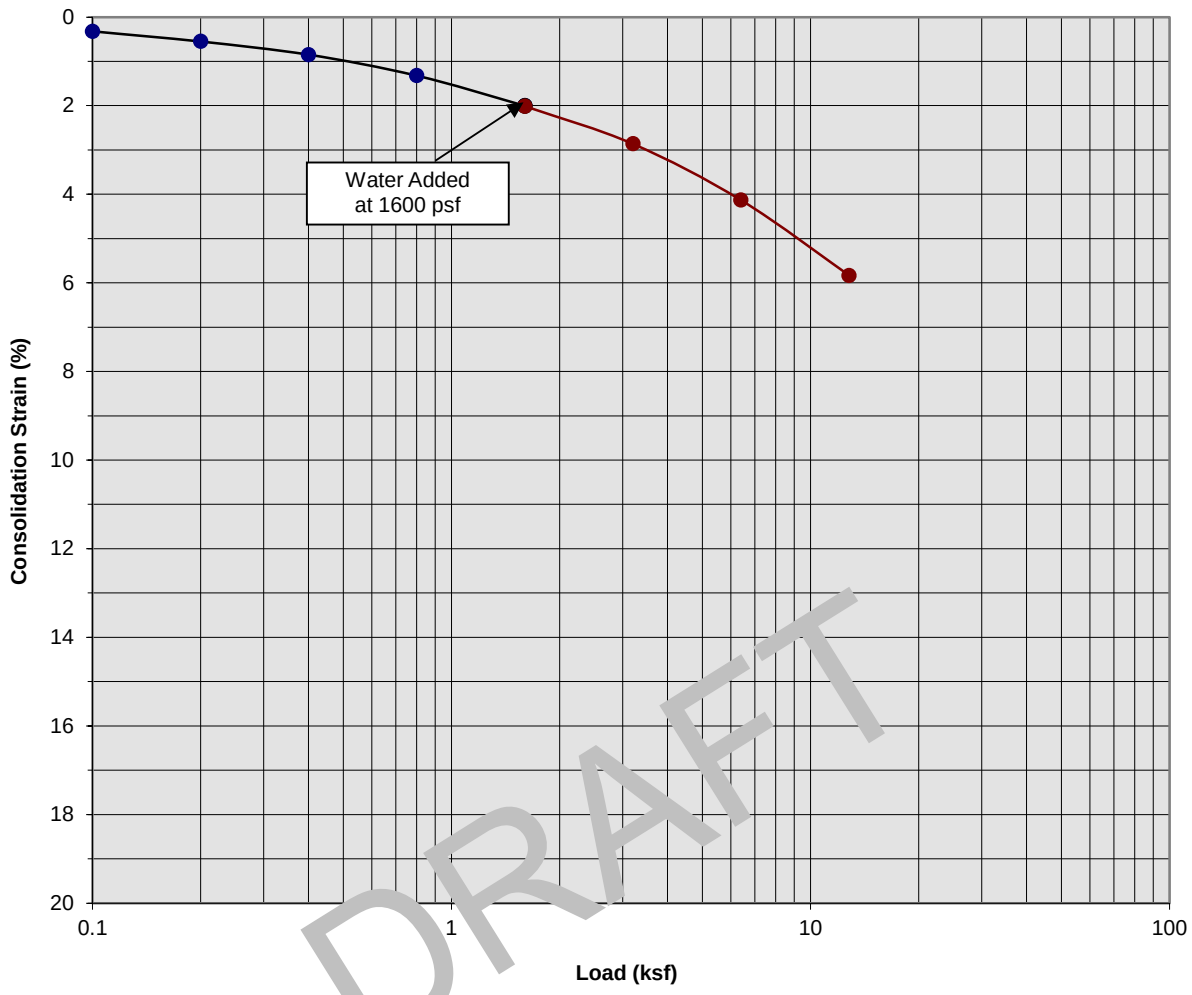
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Green Blue Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	48.5 to 49.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 24

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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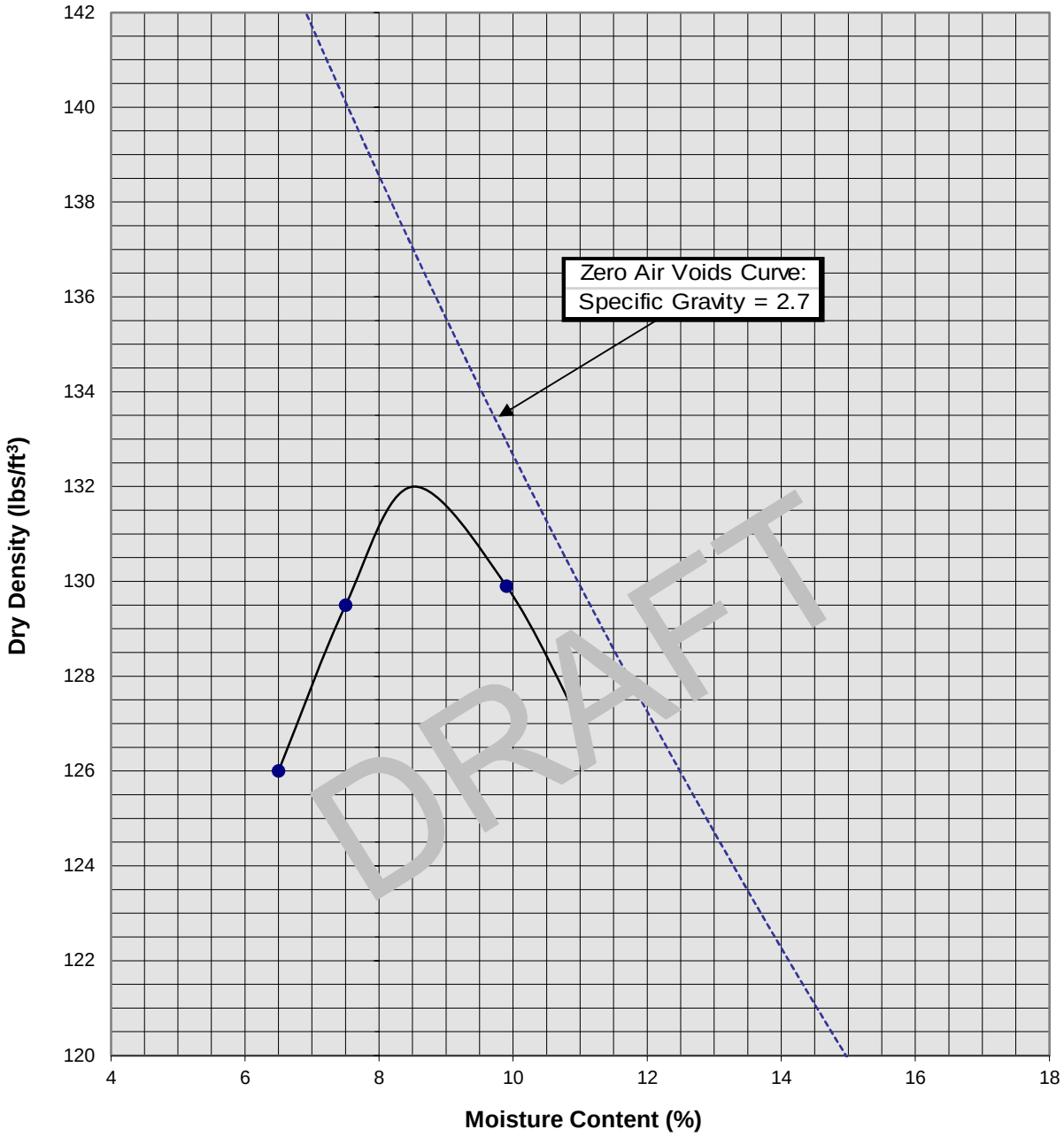
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-2 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	132
Soil Classification	Orange Brown fine Sandy Silt, trace Clay

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-25

SoCalGeo
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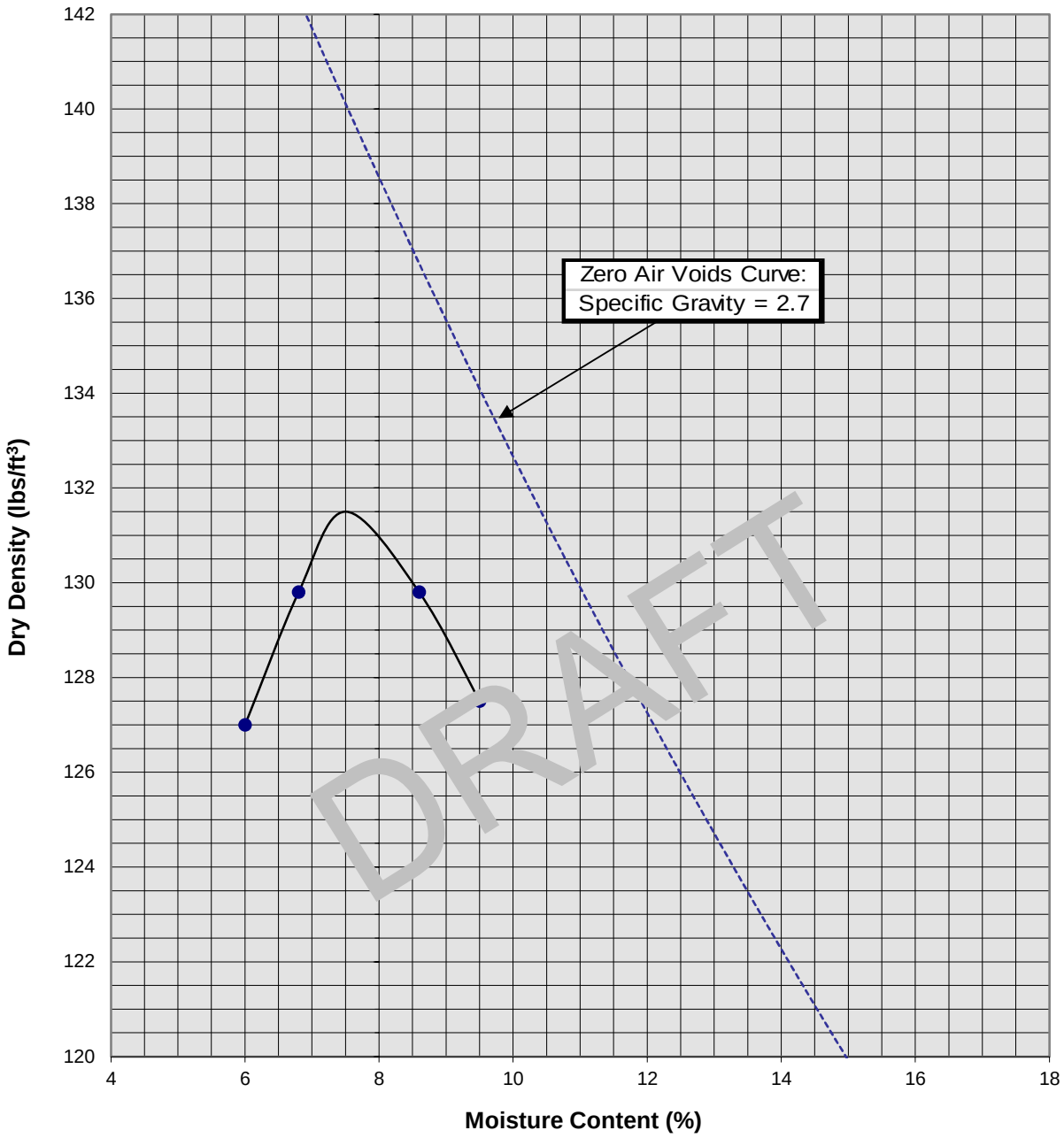
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-4 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	131.5
Soil Classification	Dark Gray Brown Silty fine to medium Sand, trace to little course Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-26

SoCalGeo
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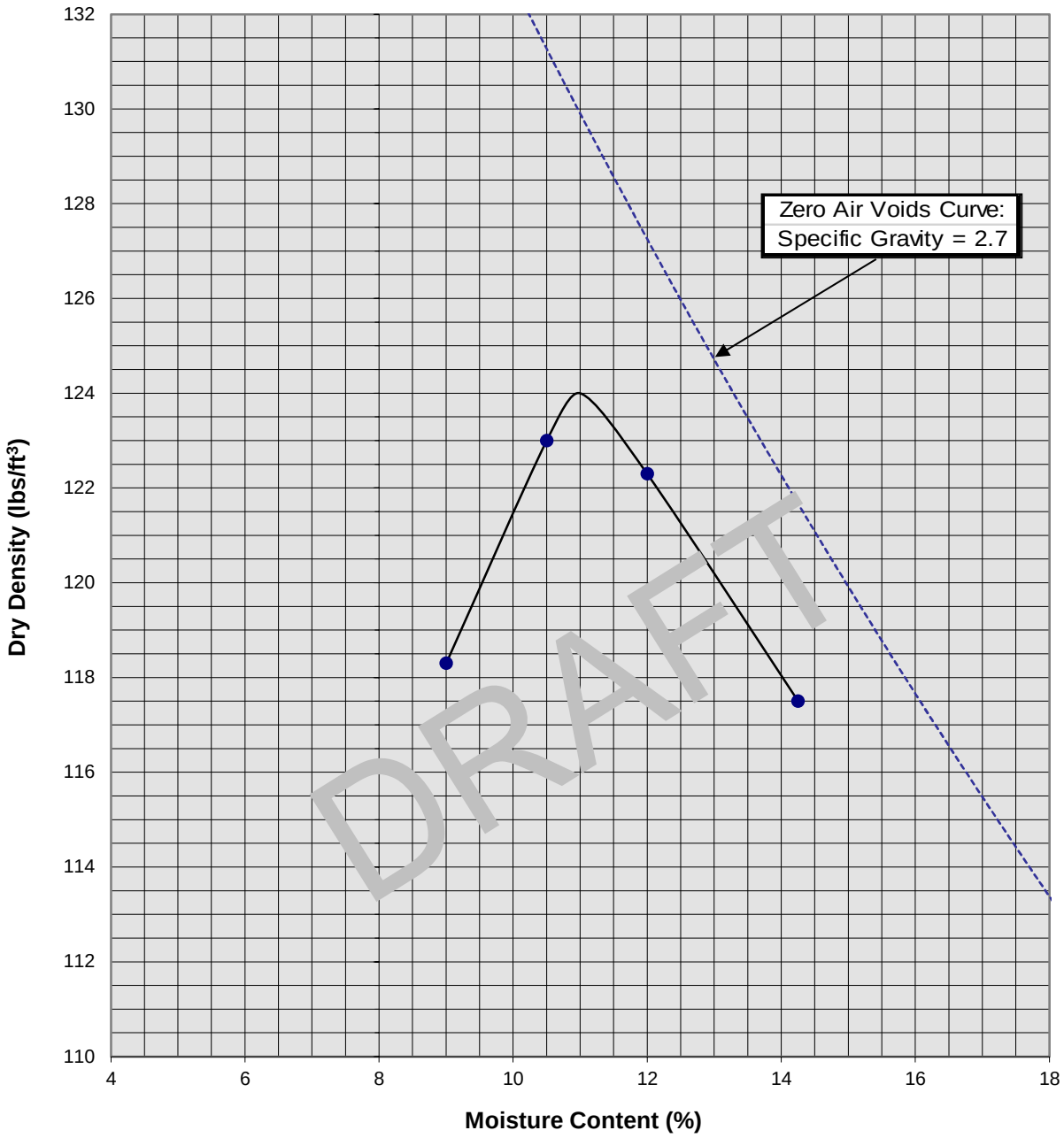
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-5 @ 0-5'
Optimum Moisture (%)	11
Maximum Dry Density (pcf)	124
Soil Classification	Dark Brown Clayey Silt, trace fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-27

SoCalGeo
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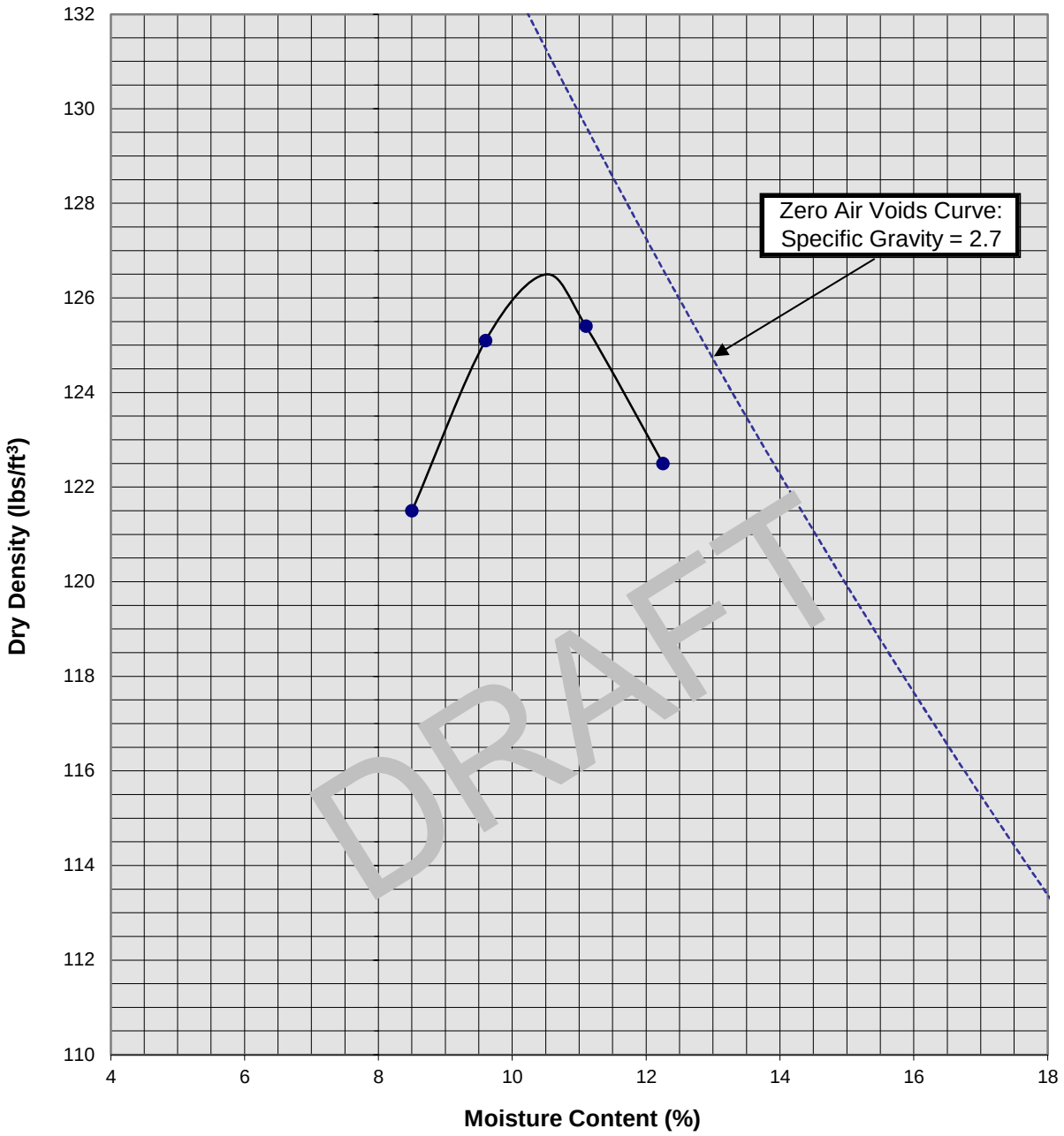
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-10 @ 0-5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-28

SoCalGeo
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APPENDIX C-3

LABORATORY TEST RESULTS (PSE)

Expansion Index Tests

Expansion Index tests were performed to evaluate the expansion potential of typical on-site soils. Testing was carried out according to UBC Method 18-2. The results are presented in Table C-1.

Corrosivity Testing

Corrosivity tests were performed to analyze the corrosion potential of the on-site soils on ferrous metals and concrete. Sulfate contents were determined and are shown on Plates 243 through 253.

The pH and electrical resistivity were also determined and are summarized in the following table.

Electrical Resistivity and pH			
Boring/Trench	**Depth**	**pH**	**Resistivity (ohms-cm)**
B-039	25	7.7	2360
B-039	55	7.0	3470
B-040	24	8.0	2090
B-054	20	7.8	3920
B-059	20	7.8	6130
B-067	5	6.6	3570
B-070	5	7.4	4200
B-073	10	7.3	4260
B-079	45	6.5	2180
B-093	6	6.8	6960
B-095	11	6.8	4090
B-096	12	6.8	3050
BB-01	16	8.2	4550
BB-03	11	8.3	4480
BB-05	11	8.3	4080
BB-08	4	8.4	3270
H-01	3	6.9	3950
H-04	3	6.9	3950
H-06	9	7.7	4100

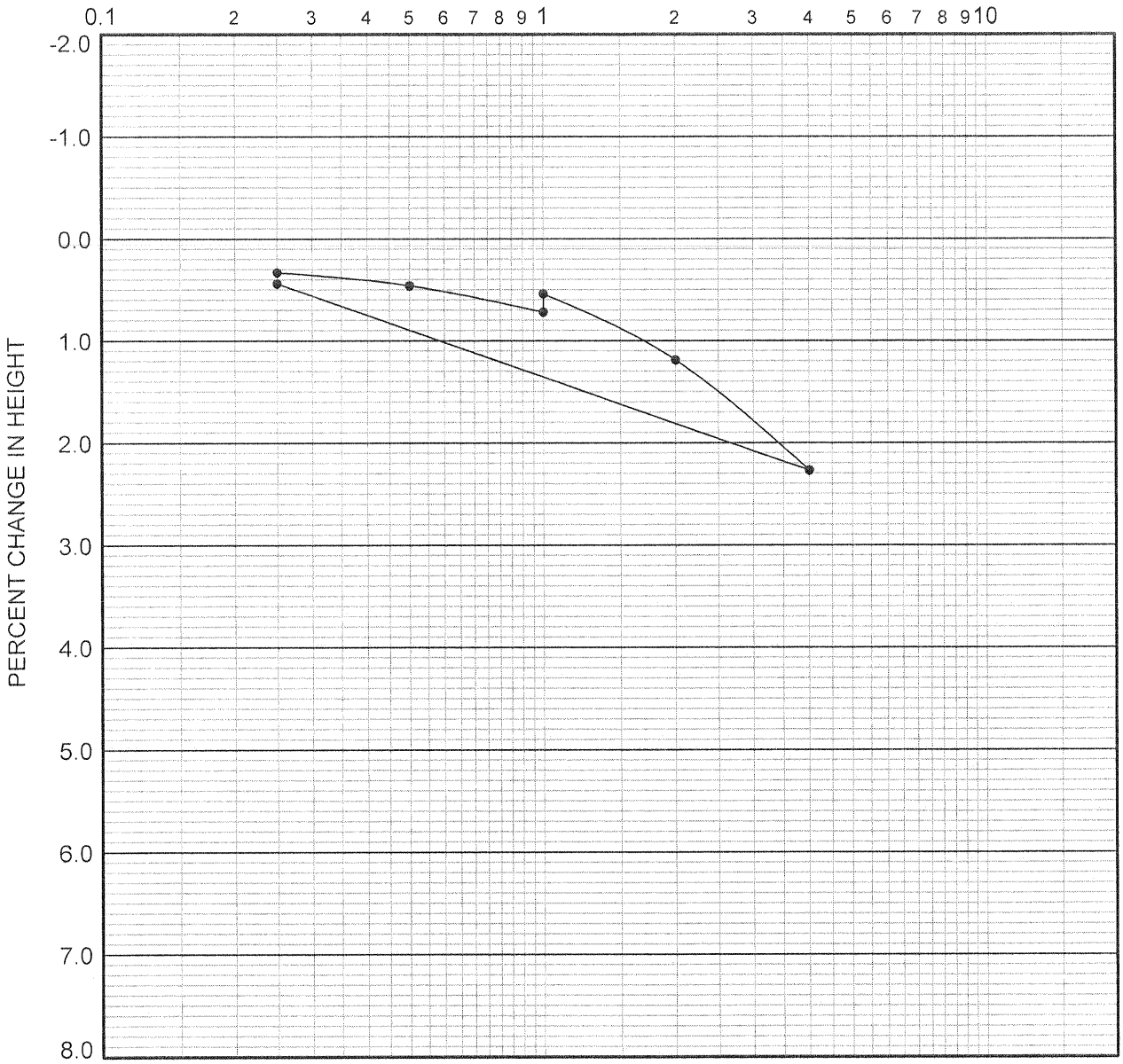
TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-035	20	Silty Sand (Qal)	SM				0	58	30	12		Consolidation-Plate C-1
B-035	27	Silty Sand (Qal)	SM	130.2	8.6		10	58	25	7		
B-035	30	Silty Sand (Qal)	SM				3	55	32	10		Consolidation-Plate C-2
B-036	21	Silty Sand (Qal)	SM	122.7	10.8		2	59	31	8		
B-037	15	Sandy Siltstone (QTst)					5	45	40	10		Consolidation-Plate C-3
B-038	20	Silty Sand (Qoa)	SM				0	76	17	7		Consolidation-Plate C-4
B-039	25	Sandy Siltstone (QTst)		120.4	12.5	SEE PLATE C-161	7	51	31	11	32	Chemical-Plate C-243 Resistivity = 2360, pH = 7.7
B-039	50	Sandy Siltstone (QTst)				SEE PLATE C-162	0	42	46	12		
B-039	55	Sandy Siltstone (QTst)		122.4	11.1	SEE PLATE C-163	5	52	33	10	11	Chemical-Plate C-243 Resistivity = 3470, pH = 7.0
B-040	24	Sandy Siltstone (QTst)		117.8	13.3	SEE PLATE C-164	5	55	29	11	42	Chemical-Plate C-243 Resistivity = 2090, pH = 8.0
B-041	30	Pebble Conglomerate (QTst)				SEE PLATE C-165	16	60	20	4		
B-041	51	Sandy Siltstone (QTst)				SEE PLATE C-166	2	51	34	13		
B-041	70	Silty Sandstone (QTst)					0	64	32	4		Consolidation - Plate C-5
B-041	71	Silty Sandstone (QTst)		125.0	9.0	SEE PLATE C-167	0	73	22	5	0	Chemical-Plate C-244
B-042	30	Sandy Siltstone (QTst)					0	63	28	9		Consolidation - Plate C-6
B-044	25	Silty Sand (Qal)	SM				14	66	16	4		Consolidation - Plate C-7
B-045	20	Gravelly Sand (Qal)	SP				17	72	8	3		Consolidation - Plate C-8
B-045	30	Silty Sand (Qal)	SM				16	52	25	7		Consolidation - Plate C-9
B-046	30	Silty Sand (Qal)	SM				9	62	21	8		Consolidation - Plate C-10
B-047	30	Silty Sand (Qal)	SM				0	53	32	15		Consolidation - Plate C-11
B-047	31	Silty Sand (Qal)	SM	128.8	9.5		2	58	30	10		
B-047	35	Silty Sand (Qal)	SM				2	53	30	15		Consolidation - Plate C-12

TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-079	70	Silty Sandstone (Qtst)		120.0	11.9	SEE PLATE C-186	0	33	44	23		
B-080	20	Silty Sand (Qoa)	SM	132.3	8.3		6	64	22	8		
B-081	15	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-58
B-082	10	Sand with Silt (Qal)	SP-SM				8	78	11	3		Consolidation-Plate C-59
B-082	20	Sandy Siltstone (Qtst)		126.2	9.1	SEE PLATE C-187	0	70	20	10		
B-082	35	Sandy Siltstone (Qtst)				SEE PLATE C-188	0	56	27	17		
B-082	45	Sandy Siltstone (Qtst)				SEE PLATE C-189	0	70	15	15		
B-083	20	Silty Sand (Qoa)	SM			SEE PLATE C-190	0	53	30	17		
B-084	20	Silty Sandstone (Qtst)				SEE PLATE C-191	0	60	30	10		
B-084	35	Sandy Siltstone (Qtst)				SEE PLATE C-192	0	45	42	13		
B-085	15	Silty Sand (Qoa)	SM	130.6	8.7		0	79	18	3		Consolidation-Plate C-60
B-090	26	Gravelly Sand (Qoa)	SP			SEE PLATE C-193						
B-093	6	Silty Sandstone (Qtst)		125.9	10.0	SEE PLATE C-194	0	71	20	9		Chemical-Plate C-249 Resistivity = 6960, pH = 6.8
B-093	13	Silty Sandstone (Qtst)				SEE PLATE C-195	0	58	22	10		
B-093	20	Sandy Siltstone (Qtst)					0	40	48	12		Consolidation-Plate C-61
B-095	10	Silty Sand (Qal)	SM				0	70	20	10		Consolidation-Plate C-62
B-095	11	Silty Sand (Qal)	SM	126.6	10.7							Chemical-Plate C-249 Resistivity = 4090, pH = 6.8
B-096	5	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-63
B-096	11	Silty Sand (Qal)	SM				0	60	20	20		Consolidation-Plate C-64
B-096	12	Silty Sand (Qal)	SM	125.1	11.9	SEE PLATE C-196	0	72	16	12		Chemical-Plate C-250 Resistivity = 3050, pH = 6.8
B-099	15	Silty Sand (Qal)	SM				10	69	12	9		Consolidation-Plate C-65
B-099	21	Gravelly Sand (Qal)	SP	130.2	7.9	SEE PLATE C-197	18	71	8	3	0	

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-037	15.0	131	8.6	85	49		Sandy Siltstone (QTst)

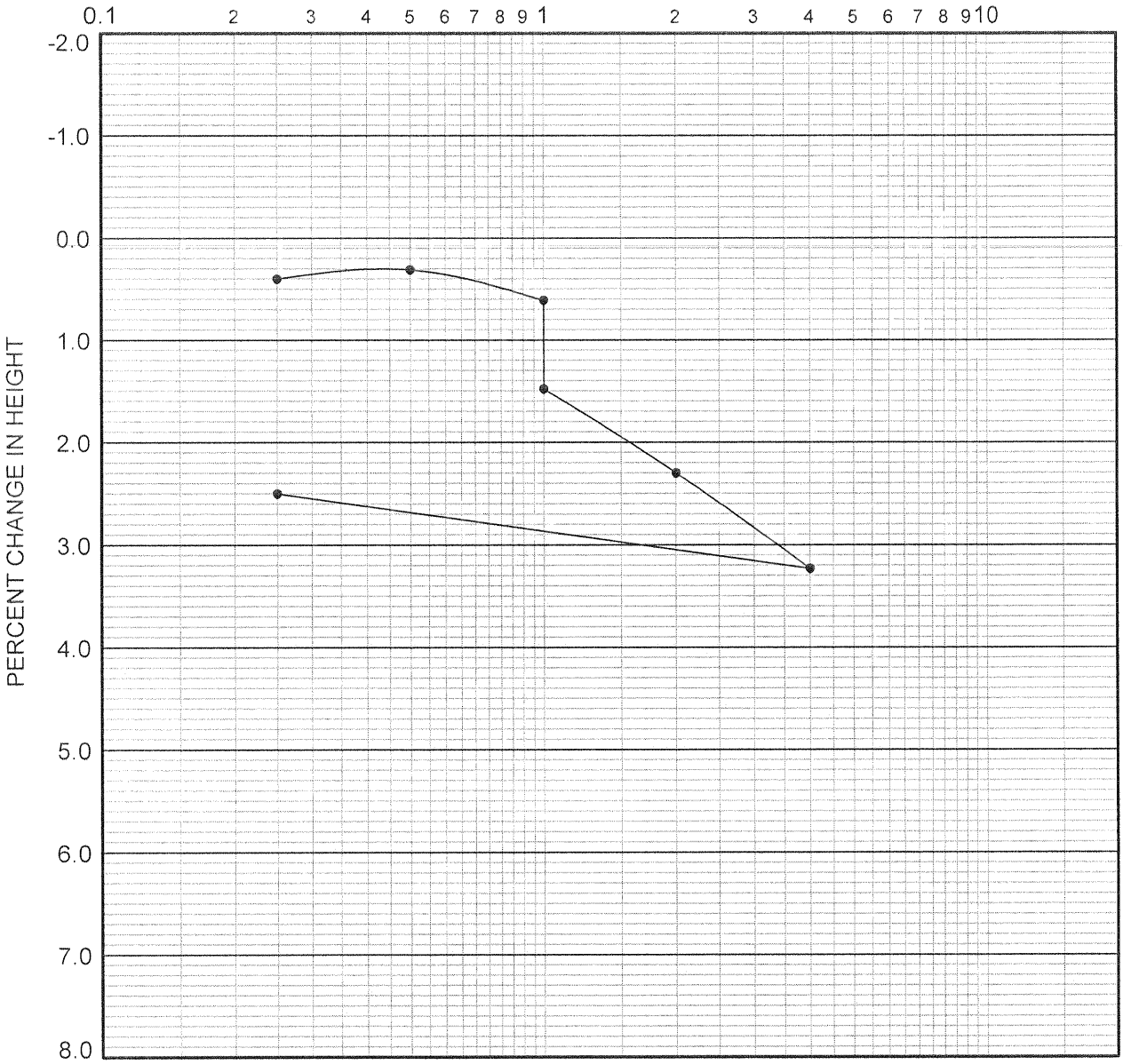
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-3

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-081	15.0	112	5.5	31	29	SM	Silty Sand (Qal)

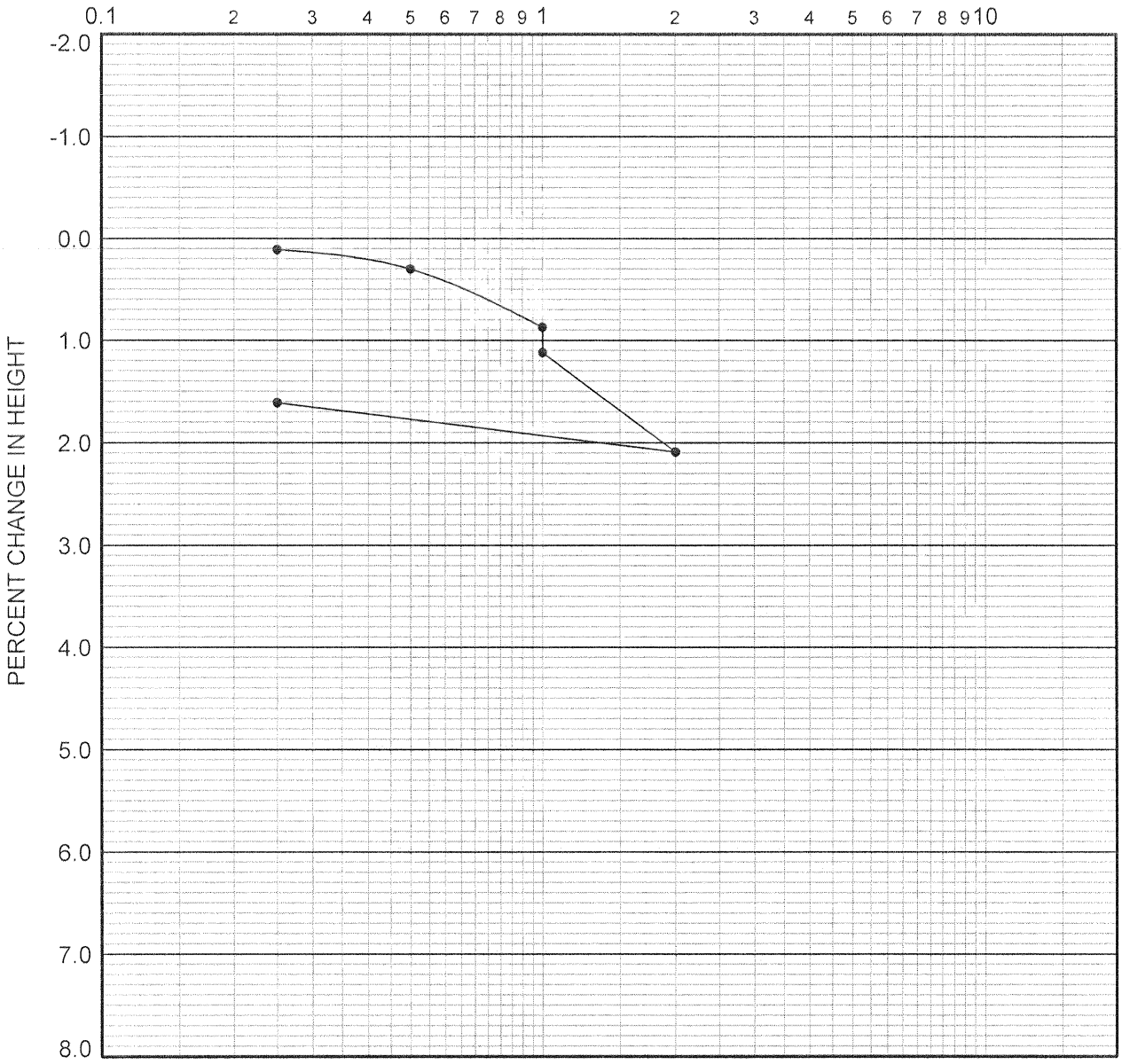
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-58

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-095	10.0	113	13.2	75	30	SM	Silty Sand (Qal)

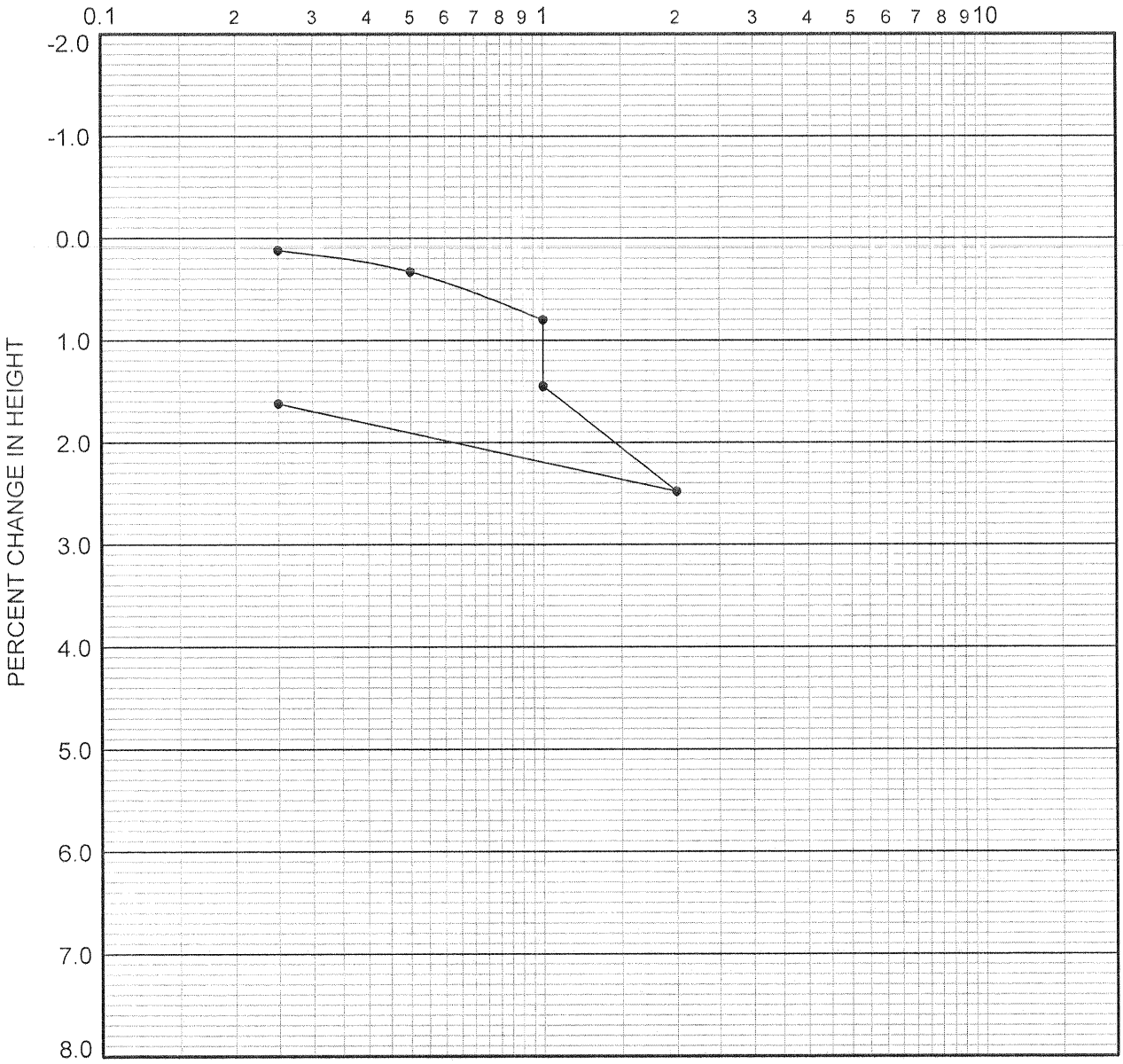
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-62

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	5.0	103	3.9	17	29	SM	Silty Sand (Qal)

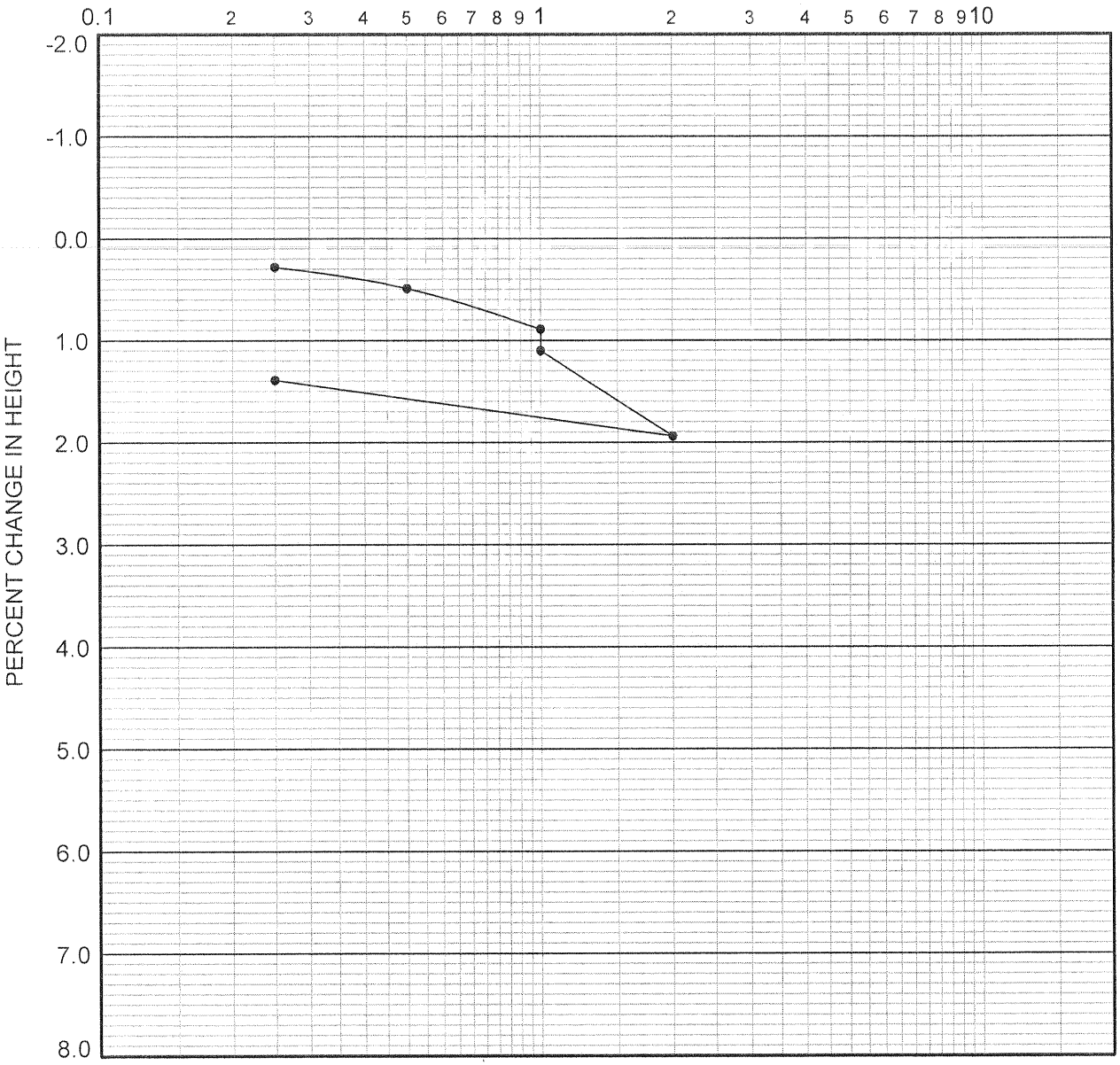
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-63

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	11.0	112	14.4	79	40	SM	Silty Sand (Qal)

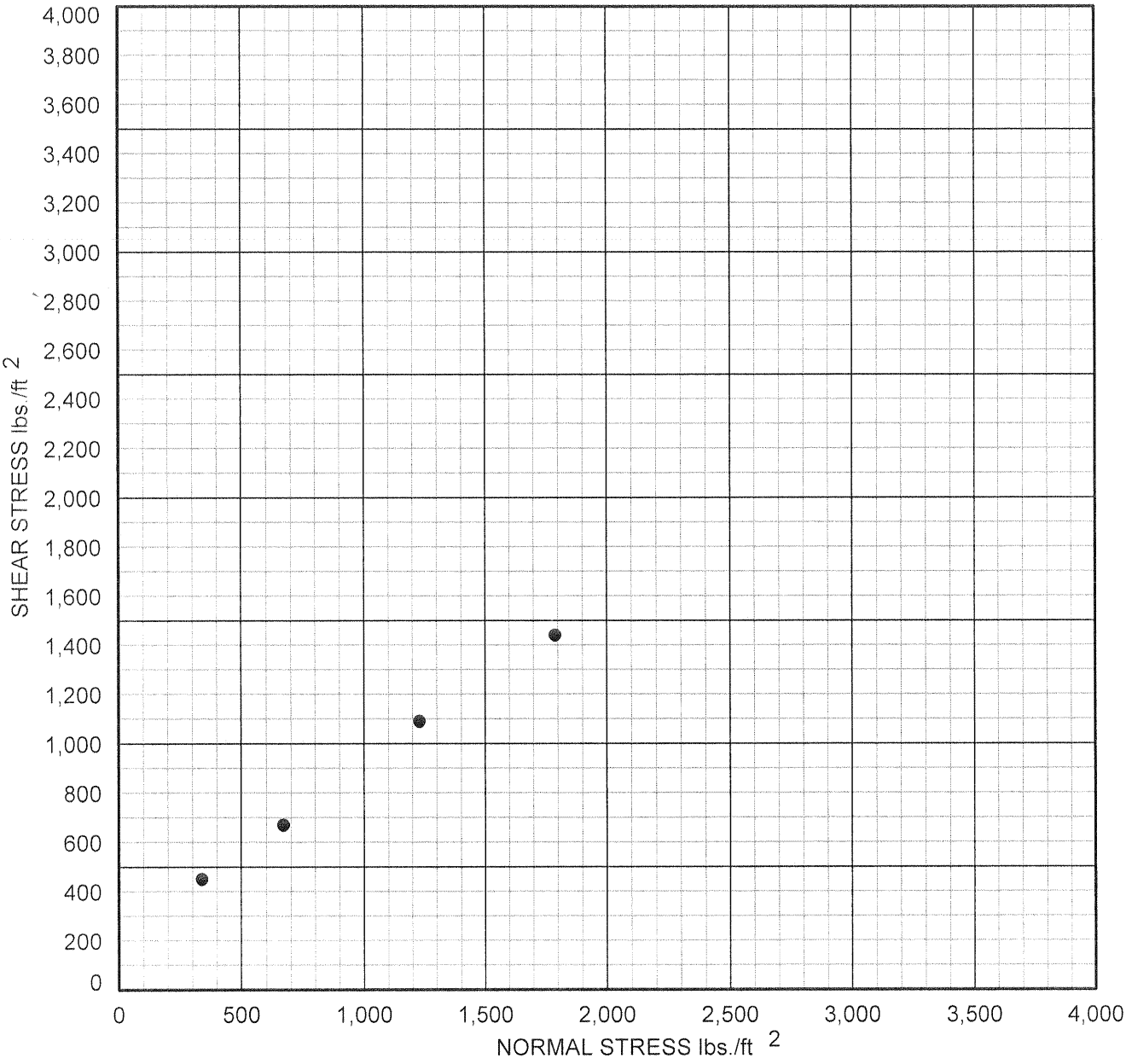
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-64

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
B-096	12.0			28	SM	Silty Sand (Qal)

COHESION	220	psf.
FRICTION ANGLE	35.0	degrees

DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-196

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 Tel: (714) 549-5824 Fax: (714) 549-8375

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246199R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.005~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.004~~	~~0.001~~
B-93 (6)	20979	11-1-2004	Chloride Content	CalTrans 422	0.002	0.001
B-93 (6)	20979	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-93 (6)	20979	11-1-2004	Alkalinity	EPA 310.1	0.002	0.001
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.001~~	~~0.001~~
B-95 (11)	20981	11-1-2004	Chloride Content	CalTrans 422	0.001	0.001
B-95 (11)	20981	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-95 (11)	20981	11-1-2004	Alkalinity	EPA 310.1	0.007	0.001

Authorized Signature

November 3, 2004
Report Date

PLATE C-249

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 *Tel: (714) 549-5824* *Fax: (714) 549-8375*

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246148R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.005~~	~~0.001~~
B-96 (12)	20856	10-5-2004	Chloride Content	CalTrans 422	0.001	0.001
B-96 (12)	20856	10-5-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-96 (12)	20856	10-5-2004	Alkalinity	EPA 310.1	0.006	0.001
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.002~~	~~0.001~~

Authorized Signature

October 11, 2004
Report Date

PLATE C-250

APPENDIX D

ENGINEERING ANALYSES

APPENDIX D-1

LIQEFACTION ANALYSIS

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

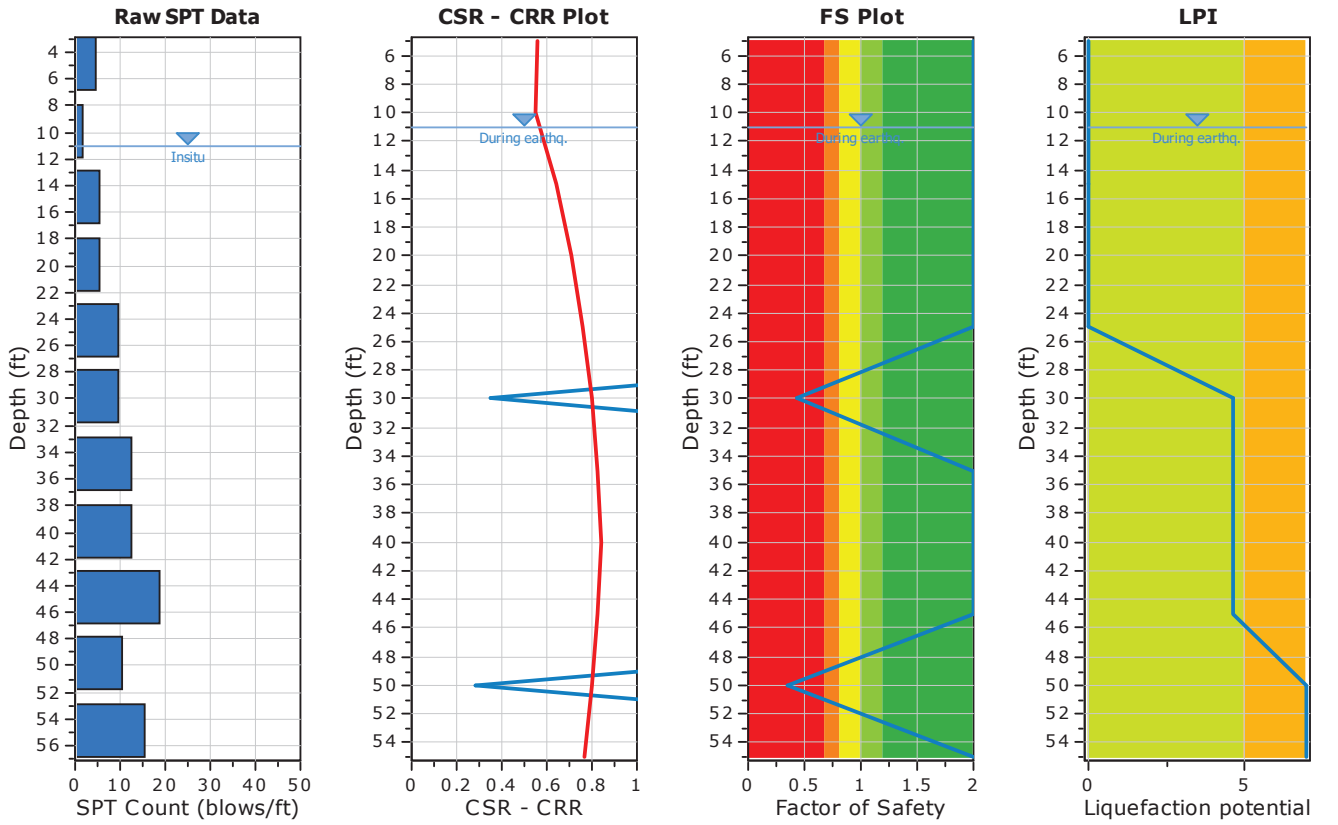
SPT BASED LIQUEFACTION ANALYSIS REPORT

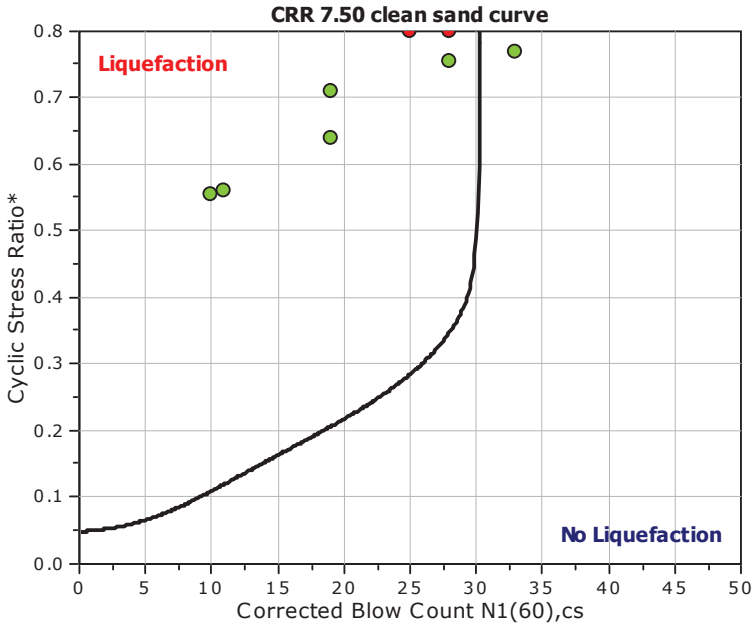
Project title : 2004-01 OVTC **SPT Name: AGS-3**

Location : Calimesa, CA

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	11.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	11.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	7.50
Borehole diameter:	200mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.42		

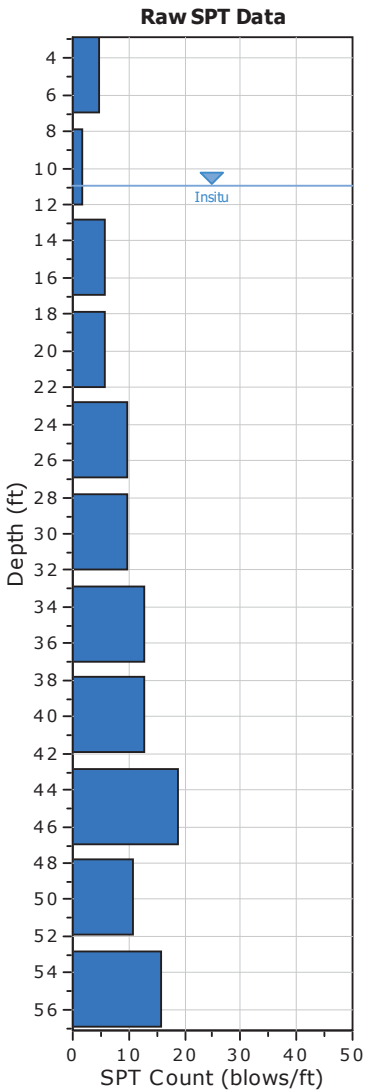


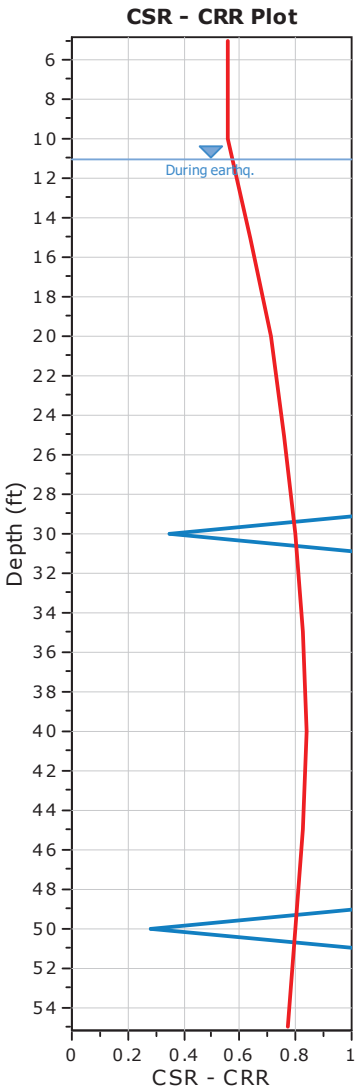


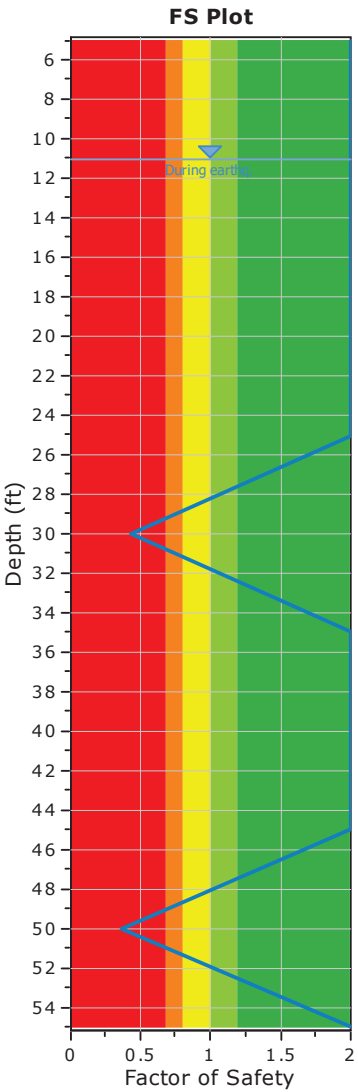
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

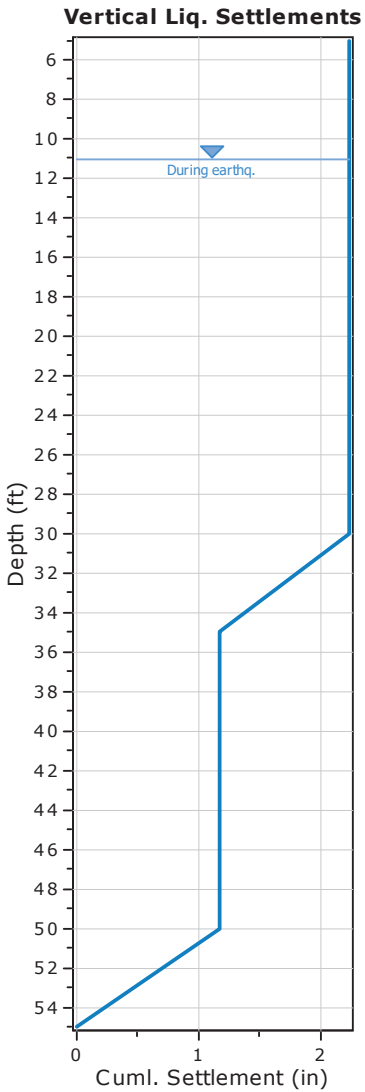
LPI color scheme
- Very high risk
- High risk
- Low risk

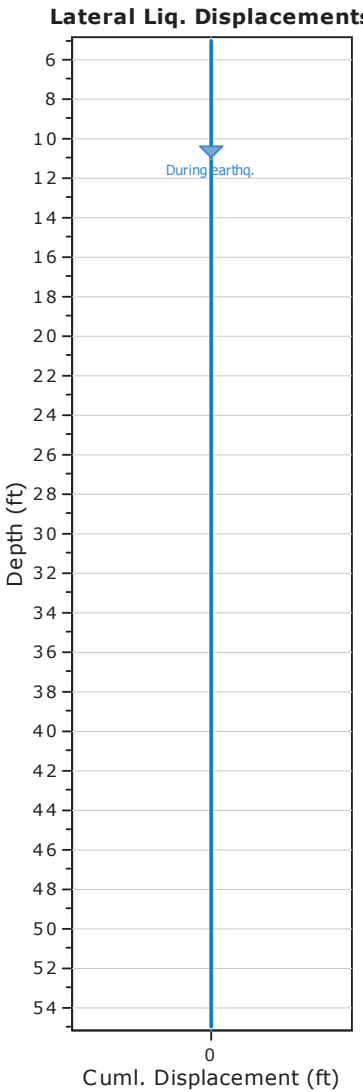
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	5	0.00	113.00	5.00	No
10.00	2	74.30	113.00	5.00	No
15.00	6	74.30	124.00	5.00	No
20.00	6	71.10	124.00	5.00	No
25.00	10	71.10	119.00	5.00	No
30.00	10	35.70	119.00	5.00	Yes
35.00	13	77.30	104.00	5.00	No
40.00	13	66.10	104.00	5.00	No
45.00	19	66.10	136.00	5.00	Yes
50.00	11	59.30	125.00	5.00	Yes
55.00	16	59.30	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	5	113.00	0.28	0.00	0.28	1.50	1.42	1.15	0.75	1.20	11	0.00	0.00	1.00	11	4.000
10.00	2	113.00	0.56	0.00	0.56	1.27	1.42	1.15	0.85	1.20	4	74.30	5.00	1.20	10	4.000
15.00	6	124.00	0.88	0.12	0.75	1.15	1.42	1.15	0.85	1.20	12	74.30	5.00	1.20	19	4.000
20.00	6	124.00	1.19	0.28	0.90	1.07	1.42	1.15	0.95	1.20	12	71.10	5.00	1.20	19	4.000
25.00	10	119.00	1.48	0.44	1.05	1.01	1.42	1.15	0.95	1.20	19	71.10	5.00	1.20	28	4.000
30.00	10	119.00	1.78	0.59	1.19	0.95	1.42	1.15	1.00	1.20	19	35.70	5.00	1.20	28	0.348
35.00	13	104.00	2.04	0.75	1.29	0.91	1.42	1.15	1.00	1.20	23	77.30	5.00	1.20	33	4.000
40.00	13	104.00	2.30	0.91	1.39	0.87	1.42	1.15	1.00	1.20	22	66.10	5.00	1.20	31	4.000
45.00	19	136.00	2.64	1.06	1.58	0.82	1.42	1.15	1.00	1.20	30	66.10	5.00	1.20	41	4.000
50.00	11	125.00	2.95	1.22	1.73	0.77	1.42	1.15	1.00	1.20	17	59.30	5.00	1.20	25	0.285
55.00	16	130.00	3.28	1.37	1.90	0.73	1.42	1.15	1.00	1.20	23	59.30	5.00	1.20	33	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	113.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	113.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	124.00	0.88	0.12	0.75	0.97	1.00	0.639	1.00	0.639	1.00	0.639	2.000	●
20.00	124.00	1.19	0.28	0.90	0.96	1.00	0.709	1.00	0.710	1.00	0.710	2.000	●
25.00	119.00	1.48	0.44	1.05	0.94	1.00	0.755	1.00	0.756	1.00	0.756	2.000	●
30.00	119.00	1.78	0.59	1.19	0.92	1.00	0.781	1.00	0.781	0.98	0.799	0.436	●
35.00	104.00	2.04	0.75	1.29	0.89	1.00	0.796	1.00	0.796	0.96	0.829	2.000	●
40.00	104.00	2.30	0.91	1.39	0.85	1.00	0.794	1.00	0.794	0.95	0.839	2.000	●
45.00	136.00	2.64	1.06	1.58	0.80	1.00	0.760	1.00	0.760	0.92	0.824	2.000	●
50.00	125.00	2.95	1.22	1.73	0.75	1.00	0.724	1.00	0.725	0.91	0.800	0.356	●
55.00	130.00	3.28	1.37	1.90	0.70	1.00	0.685	1.00	0.685	0.89	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.436	0.56	5.43	5.00	4.67
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	0.356	0.64	2.38	5.00	2.33
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 7.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
10.00	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.77	5.00	1.064
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	0.00	5.00	0.000
45.00	0.00	5.00	0.00	5.00	0.000
50.00	0.00	5.00	1.95	5.00	1.168
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 2.232

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	11	46.43	0.00	5.00	0.000	0.00
10.00	4	28.00	0.00	5.00	0.000	0.00
15.00	12	48.50	0.00	5.00	0.000	0.00
20.00	12	48.50	0.00	5.00	0.000	0.00
25.00	19	61.02	0.00	5.00	0.000	0.00
30.00	19	61.02	22.70	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	22	65.67	0.00	5.00	0.000	0.00
45.00	30	76.68	0.00	5.00	0.000	0.00
50.00	17	57.72	22.70	5.00	0.000	0.00
55.00	23	67.14	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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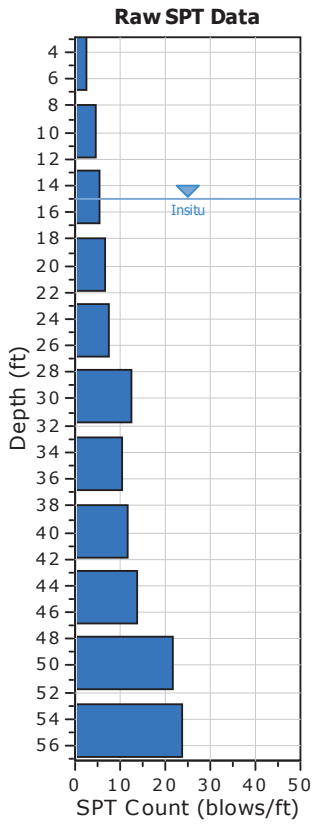
SPT BASED LIQUEFACTION ANALYSIS REPORT

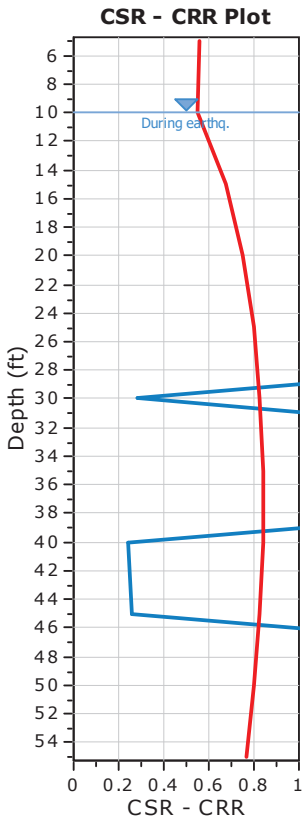
Project title : 2004-01 OVTC **SPT Name: AGS-16**

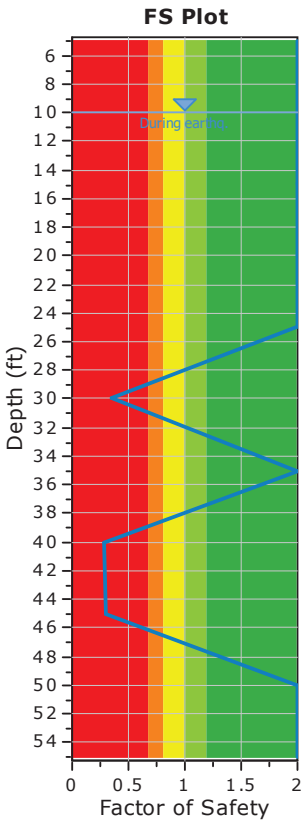
Location : Calimesa, CA

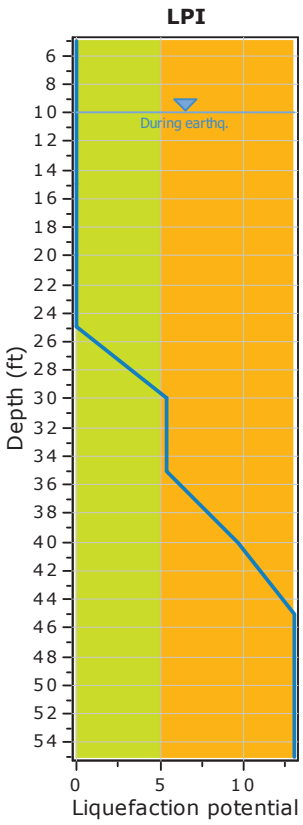
:: Input parameters and analysis properties ::

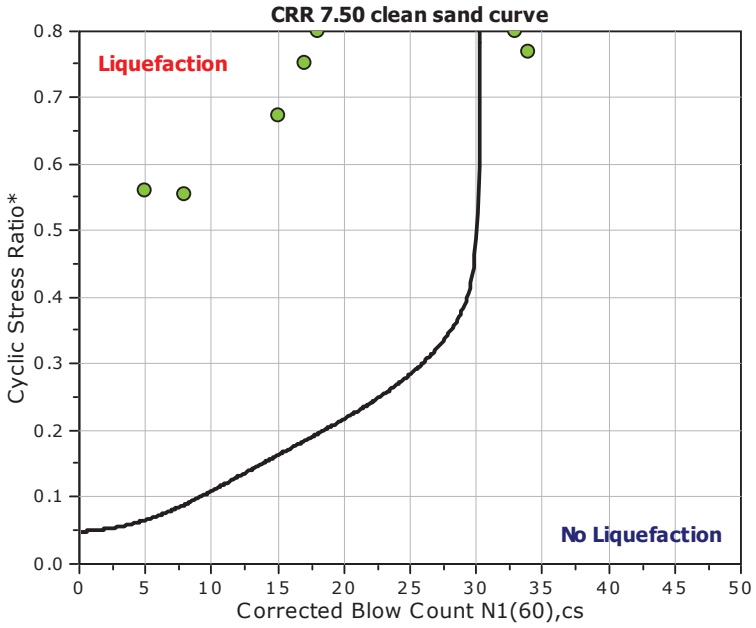
Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.50
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.45		







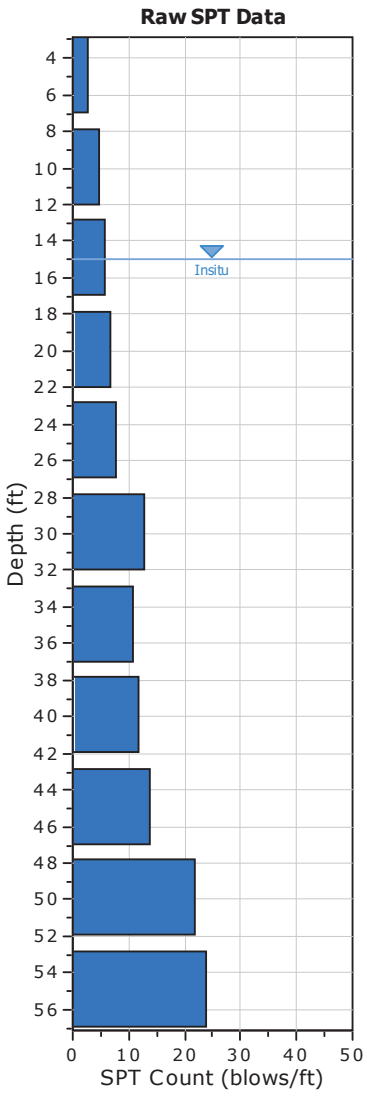


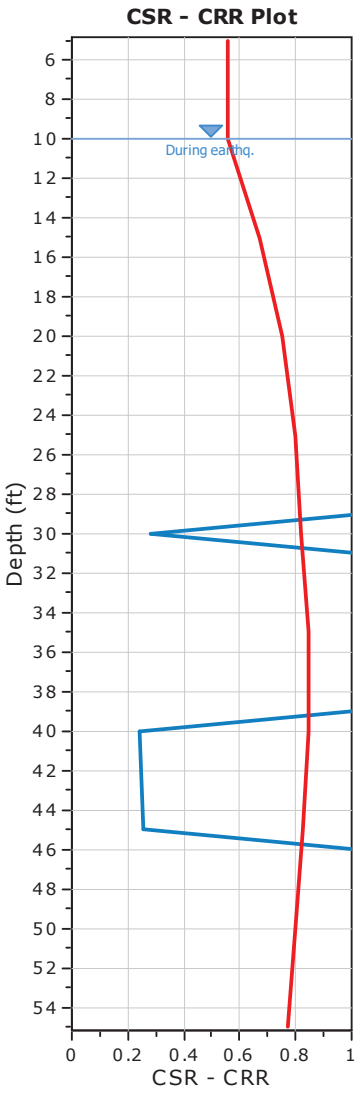


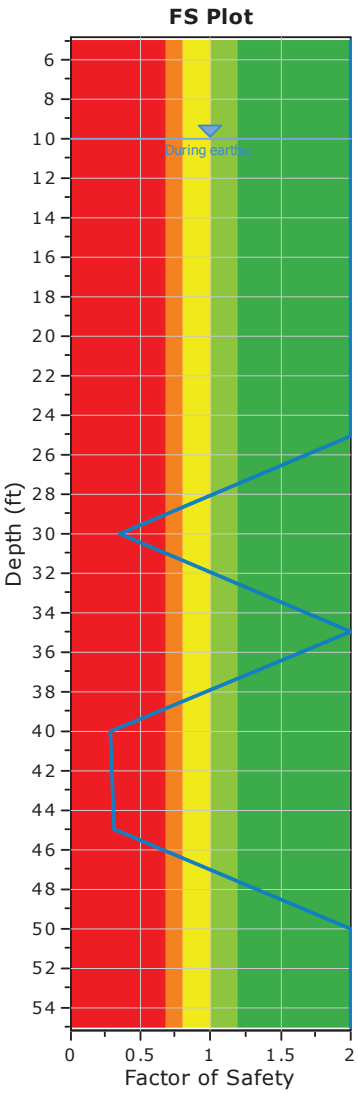
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

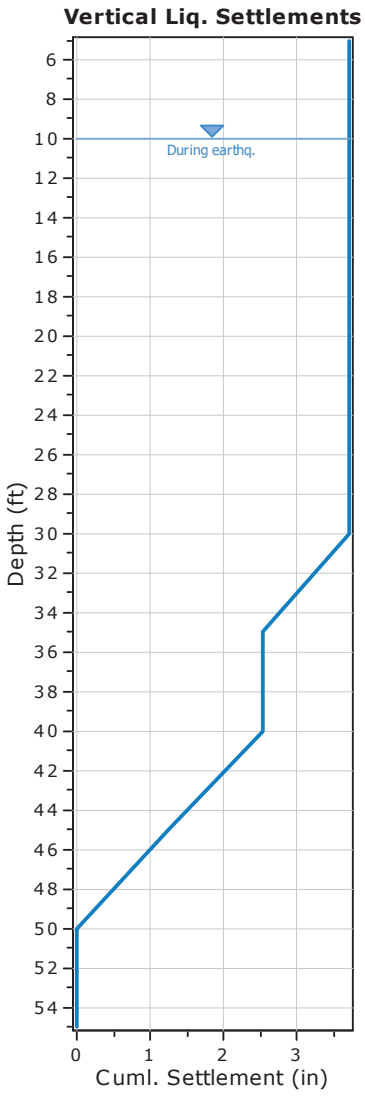
LPI color scheme
- Very high risk
- High risk
- Low risk

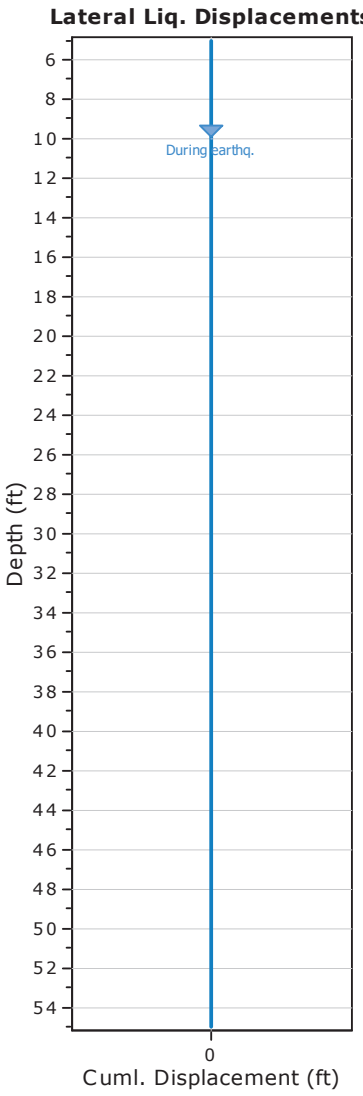
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	3	0.00	111.00	5.00	No
10.00	5	0.00	111.00	5.00	No
15.00	6	77.90	111.00	5.00	No
20.00	7	77.90	113.00	5.00	No
25.00	8	53.80	113.00	5.00	No
30.00	13	34.00	134.00	5.00	Yes
35.00	11	52.90	125.00	5.00	No
40.00	12	52.90	135.00	5.00	Yes
45.00	14	48.20	135.00	5.00	Yes
50.00	22	48.20	135.00	5.00	Yes
55.00	24	48.20	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	3	111.00	0.28	0.00	0.28	1.50	1.45	1.00	0.75	1.00	5	0.00	0.00	1.00	5	4.000
10.00	5	111.00	0.56	0.00	0.56	1.28	1.45	1.00	0.85	1.00	8	0.00	0.00	1.00	8	4.000
15.00	6	111.00	0.83	0.00	0.83	1.11	1.45	1.00	0.85	1.00	8	77.90	5.00	1.20	15	4.000
20.00	7	113.00	1.12	0.16	0.96	1.04	1.45	1.00	0.95	1.00	10	77.90	5.00	1.20	17	4.000
25.00	8	113.00	1.40	0.31	1.09	0.99	1.45	1.00	0.95	1.00	11	53.80	5.00	1.20	18	4.000
30.00	13	134.00	1.73	0.47	1.26	0.92	1.45	1.00	1.00	1.00	17	34.00	4.93	1.19	25	0.285
35.00	11	125.00	2.05	0.62	1.42	0.87	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	4.000
40.00	12	135.00	2.38	0.78	1.60	0.81	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	0.242
45.00	14	135.00	2.72	0.94	1.78	0.76	1.45	1.00	1.00	1.00	15	48.20	5.00	1.20	23	0.255
50.00	22	135.00	3.06	1.09	1.97	0.72	1.45	1.00	1.00	1.00	23	48.20	5.00	1.20	33	4.000
55.00	24	135.00	3.40	1.25	2.15	0.68	1.45	1.00	1.00	1.00	24	48.20	5.00	1.20	34	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	111.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	111.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	111.00	0.83	0.16	0.68	0.97	1.00	0.674	1.00	0.674	1.00	0.674	2.000	●
20.00	113.00	1.12	0.31	0.80	0.96	1.00	0.751	1.00	0.752	1.00	0.752	2.000	●
25.00	113.00	1.40	0.47	0.93	0.94	1.00	0.801	1.00	0.801	1.00	0.801	2.000	●
30.00	134.00	1.73	0.62	1.11	0.92	1.00	0.814	1.00	0.814	0.99	0.822	0.347	●
35.00	125.00	2.05	0.78	1.26	0.89	1.00	0.814	1.00	0.814	0.96	0.844	2.000	●
40.00	135.00	2.38	0.94	1.45	0.85	1.00	0.793	1.00	0.793	0.94	0.844	0.286	●
45.00	135.00	2.72	1.09	1.63	0.80	1.00	0.759	1.00	0.760	0.92	0.828	0.308	●
50.00	135.00	3.06	1.25	1.81	0.75	1.00	0.719	1.00	0.719	0.90	0.801	2.000	●
55.00	135.00	3.40	1.40	1.99	0.70	1.00	0.678	1.00	0.678	0.88	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.347	0.65	5.43	5.00	5.40
35.00	2.000	0.00	4.67	5.00	0.00
40.00	0.286	0.71	3.90	5.00	4.25
45.00	0.308	0.69	3.14	5.00	3.31
50.00	2.000	0.00	2.38	5.00	0.00
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 12.96

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
10.00	0.00	5.00	0.00	5.00	0.000
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.95	5.00	1.168
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	2.16	5.00	1.297
45.00	0.00	5.00	2.08	5.00	1.250
50.00	0.00	5.00	0.00	5.00	0.000
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 3.714

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	5	31.30	0.00	5.00	0.000	0.00
10.00	8	39.60	0.00	5.00	0.000	0.00
15.00	8	39.60	0.00	5.00	0.000	0.00
20.00	10	44.27	0.00	5.00	0.000	0.00
25.00	11	46.43	0.00	5.00	0.000	0.00
30.00	17	57.72	22.70	5.00	0.000	0.00
35.00	14	52.38	0.00	5.00	0.000	0.00
40.00	14	52.38	34.10	5.00	0.000	0.00
45.00	15	54.22	34.10	5.00	0.000	0.00
50.00	23	67.14	0.00	5.00	0.000	0.00
55.00	24	68.59	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX D-2

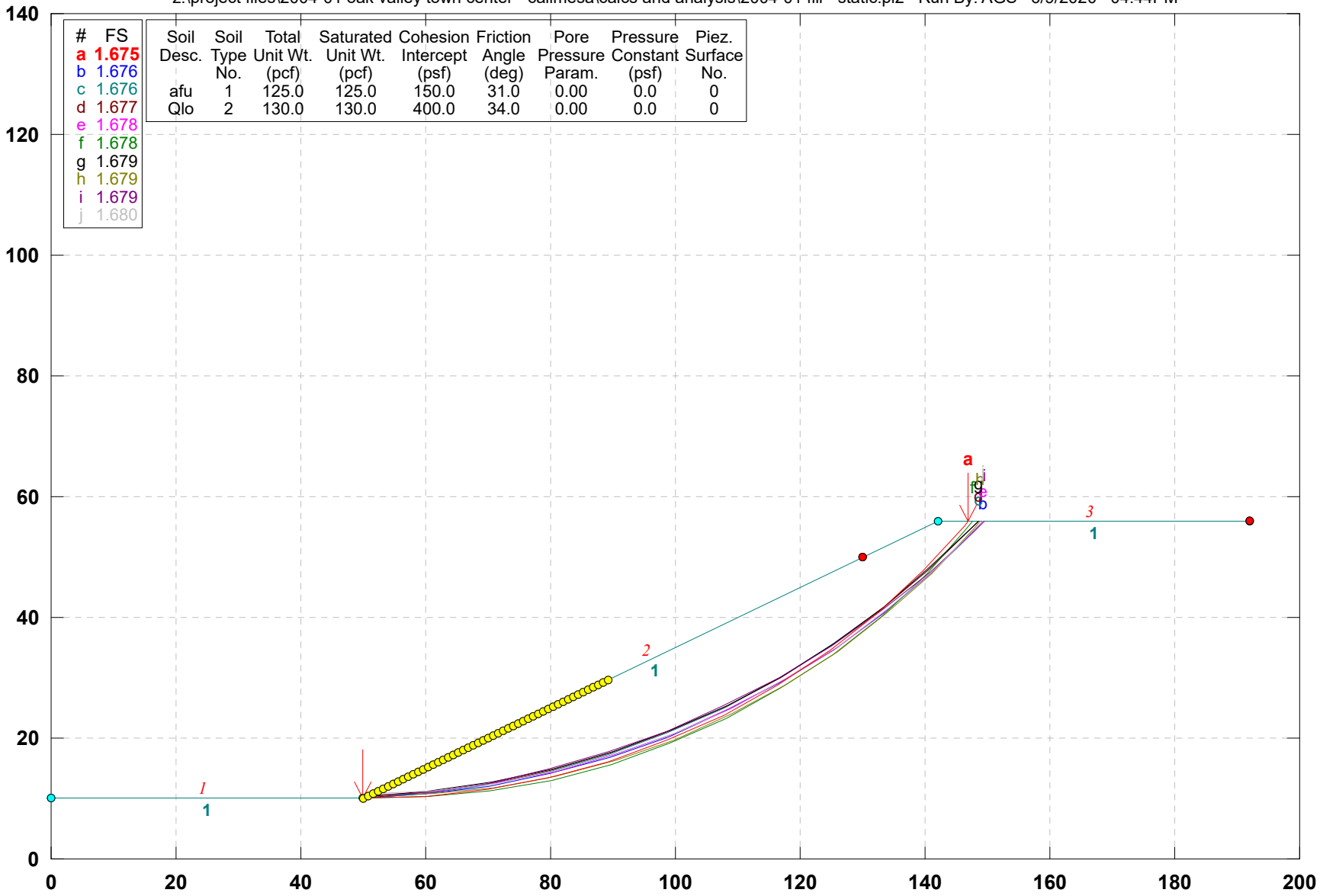
SLOPE STABILITY ANALYSIS

2004-01 OVTC 46 ft. Fill Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static.pl2 Run By: AGS 6/9/2020 04:44PM

#	FS
a	1.675
b	1.676
c	1.676
d	1.677
e	1.678
f	1.678
g	1.679
h	1.679
i	1.679
j	1.680

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.675

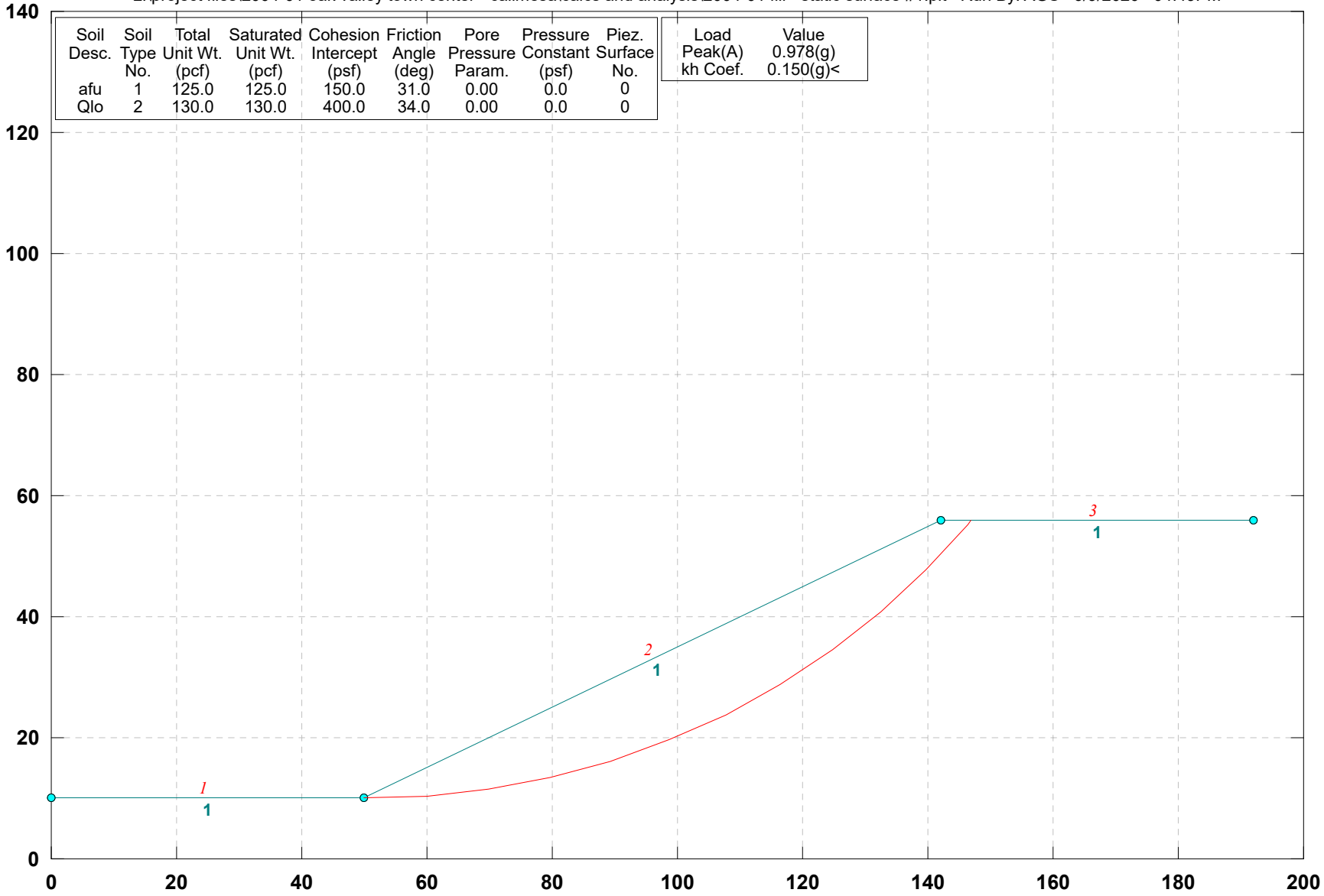
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 46 ft. Fill Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static surface #1.plt Run By: AGS 6/9/2020 04:49PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

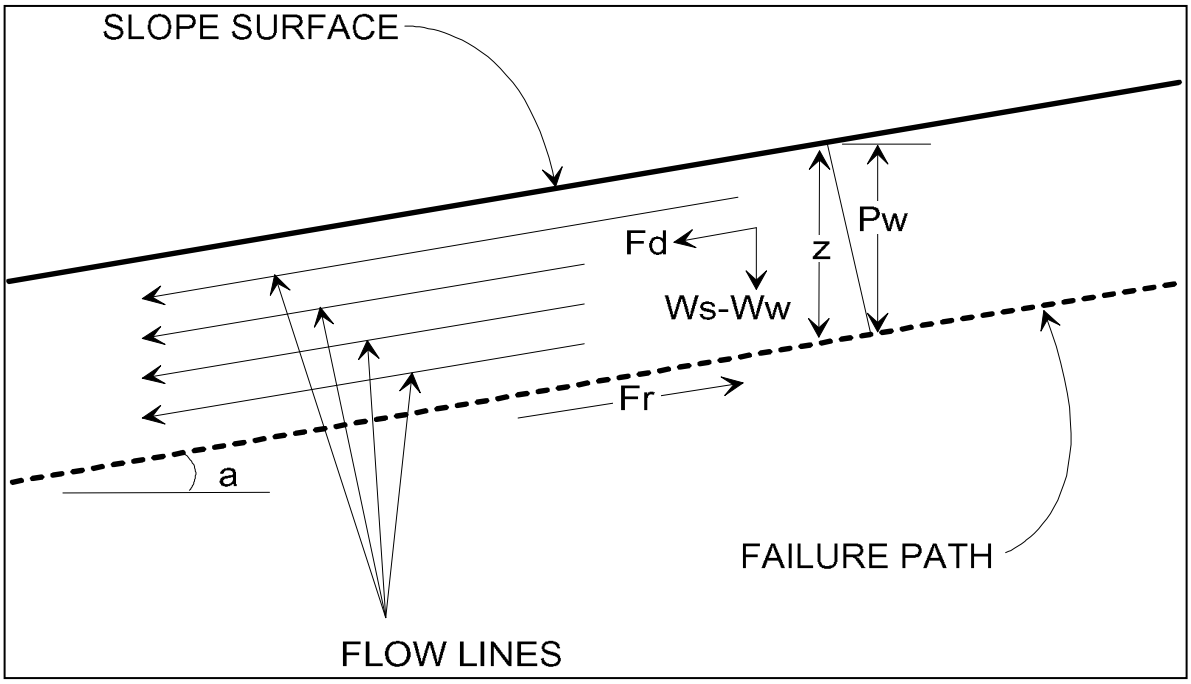
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.221

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

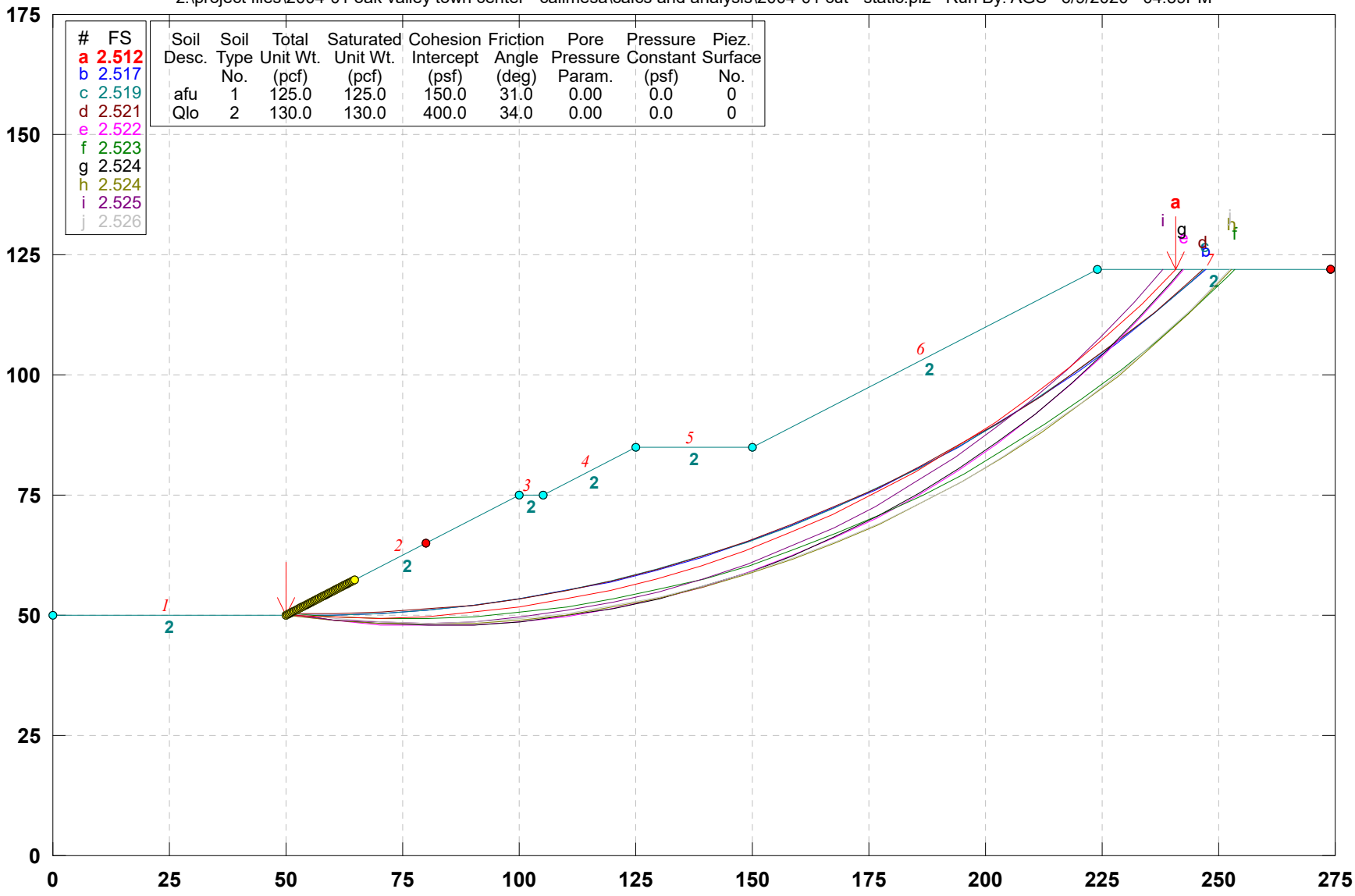
Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
125	3	26.56505	0.463648	31	0.541052	150

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	240.27	**1.60**

2004-01 OVTC 72 ft Cut Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static.pl2 Run By: AGS 6/9/2020 04:59PM



GSTABL7 v.2 FSmin=2.512

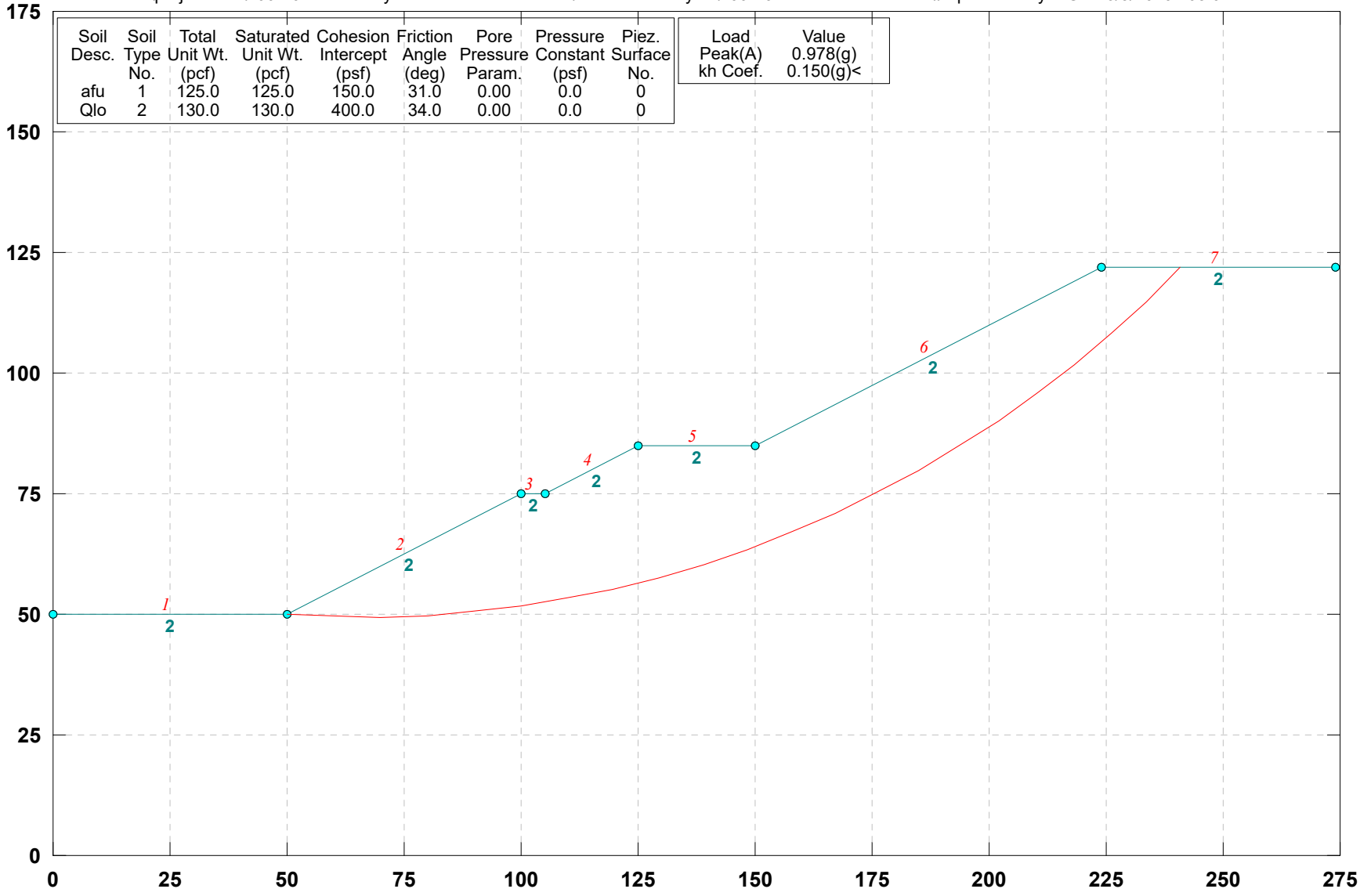
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 72 ft Cut Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static surface #1.plt Run By: AGS 6/9/2020 05:01PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

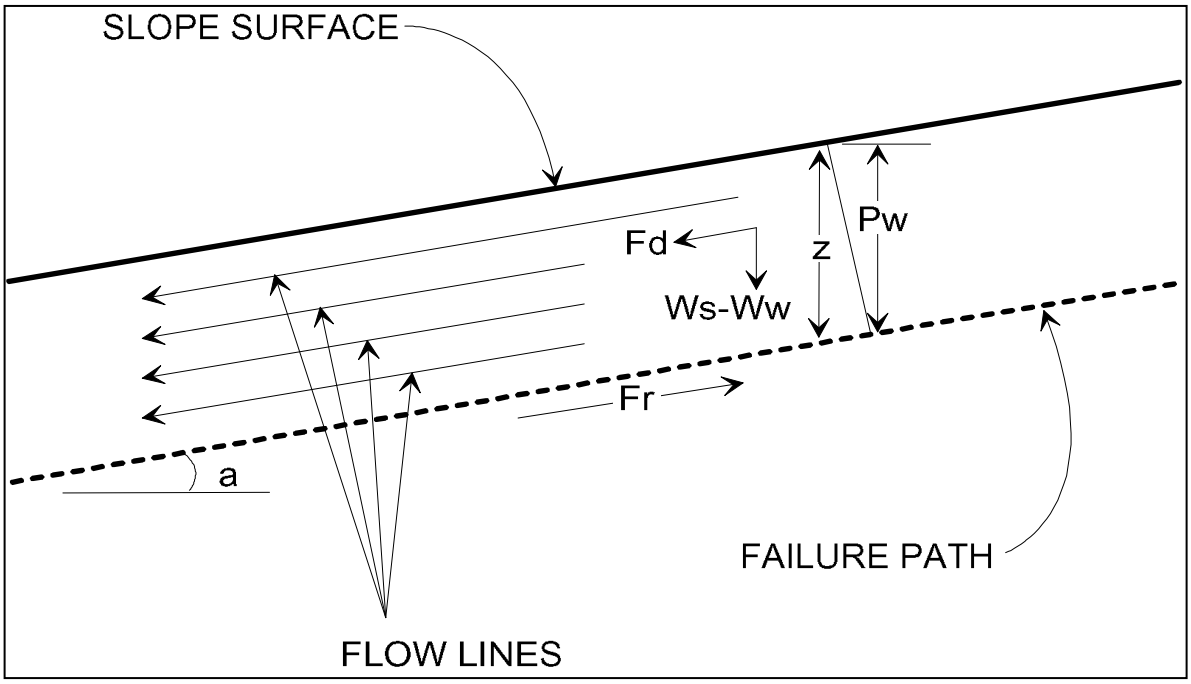
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.727

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
130	3	26.56505	0.463648	34	0.593412	400

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	156.00	509.43	**3.27**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All clearing and grubbing, remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be

properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspoles, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant. Environmental evaluation of existing conditions is not the responsibility of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be processed or scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 12 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant and do not inhibit the ability to properly compact fill materials.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to ½ the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall observe all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Civil Engineer.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation

by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials to achieve compaction is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill will be tested and evaluated by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content is not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

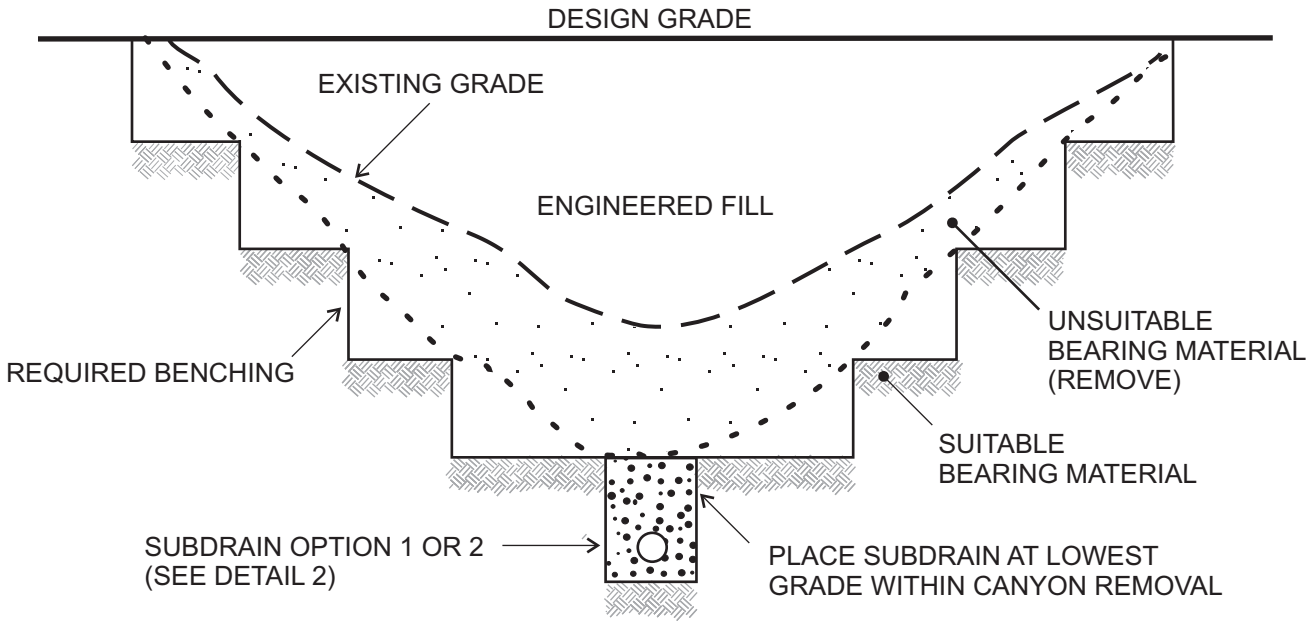
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals approximately two feet in fill height.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

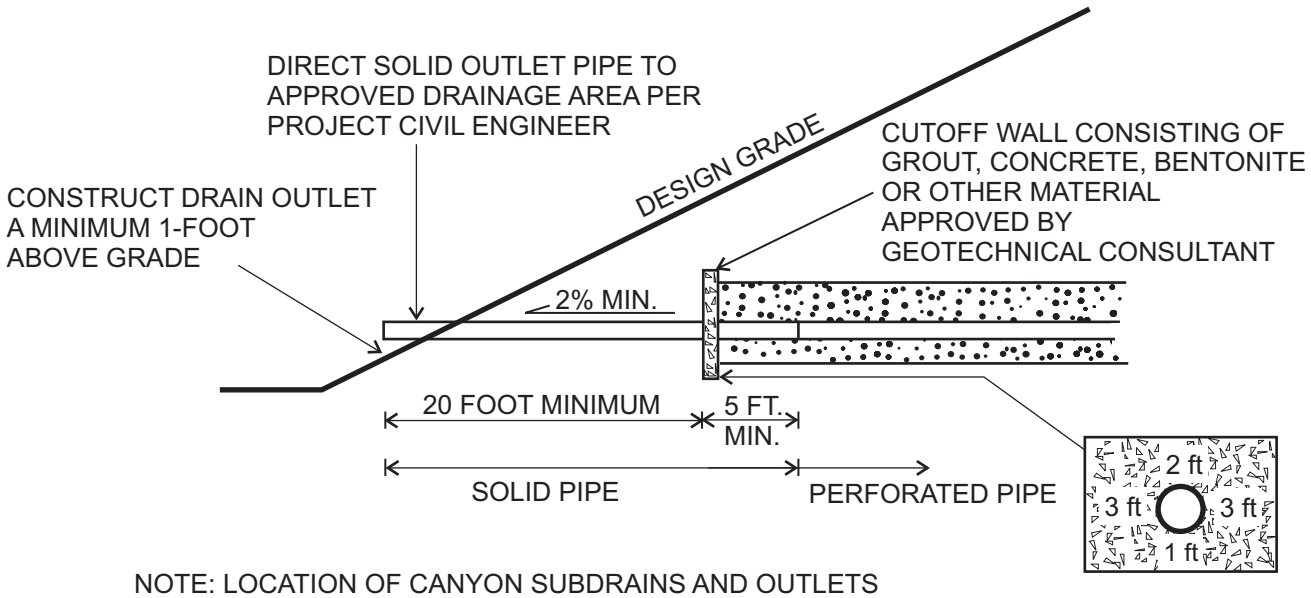
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results.



CANYON SUBDRAIN PROFILE



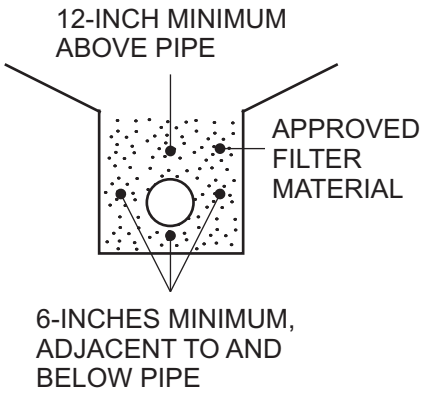
NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

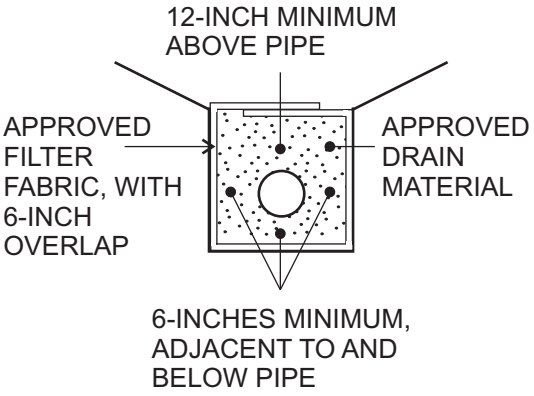
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

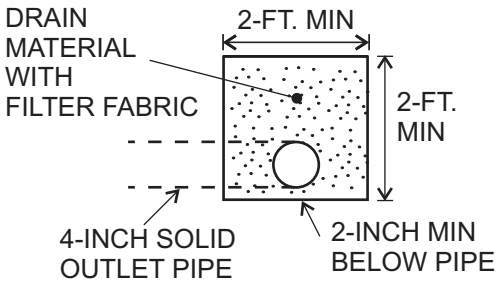
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

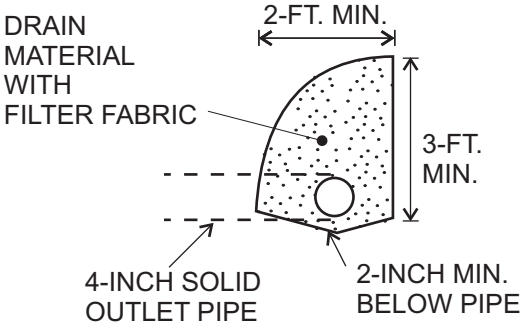
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

VER 1.0

NTS

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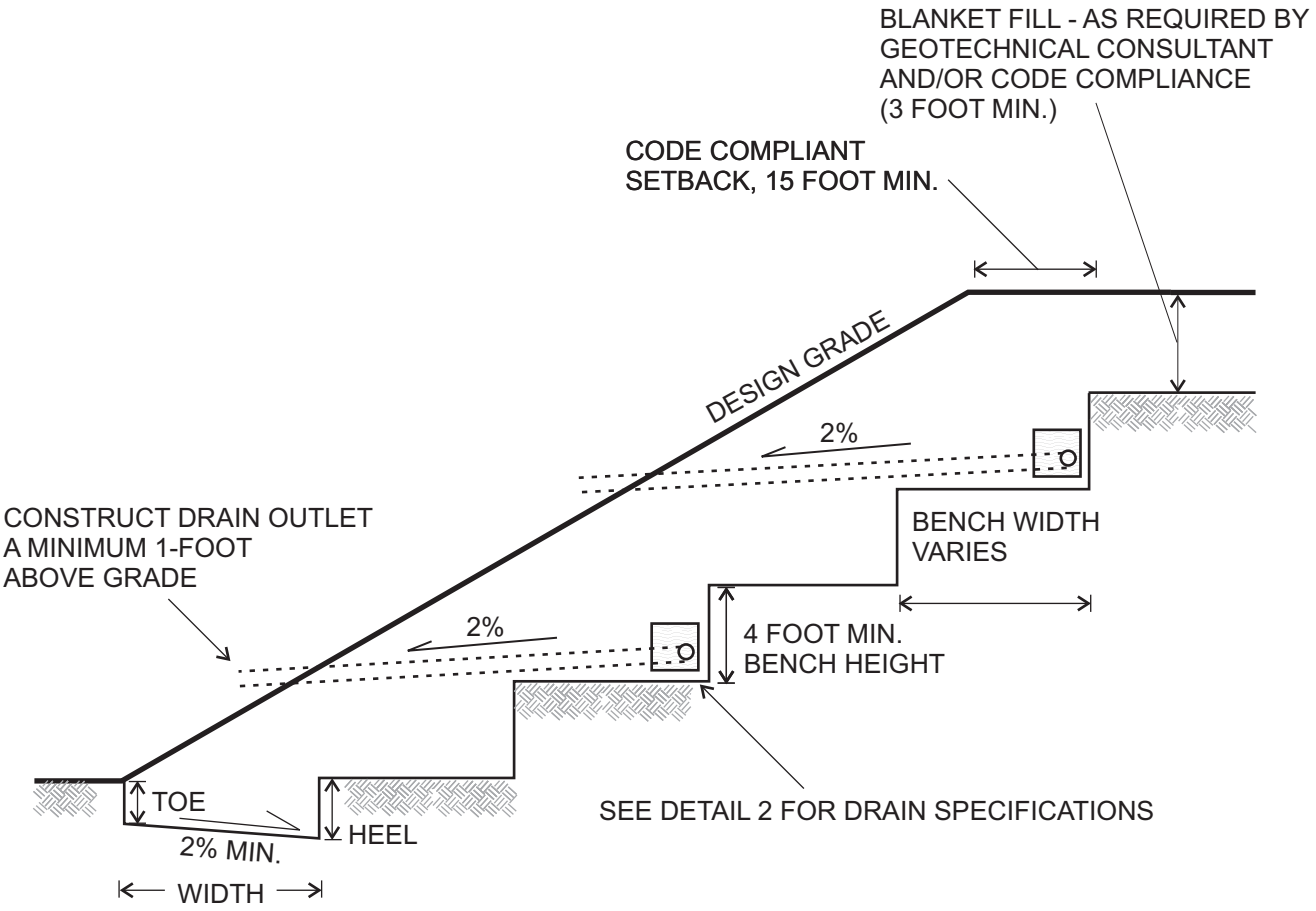
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

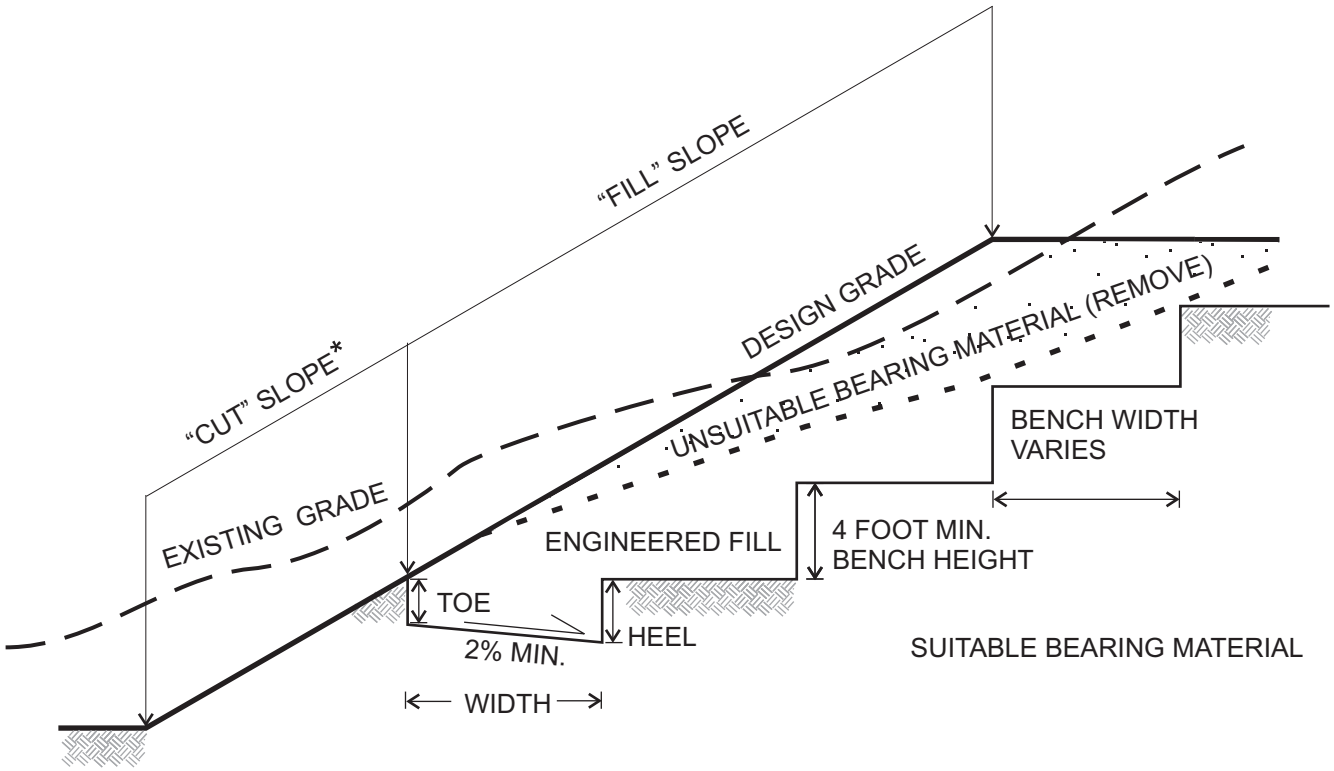
NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0 NTS

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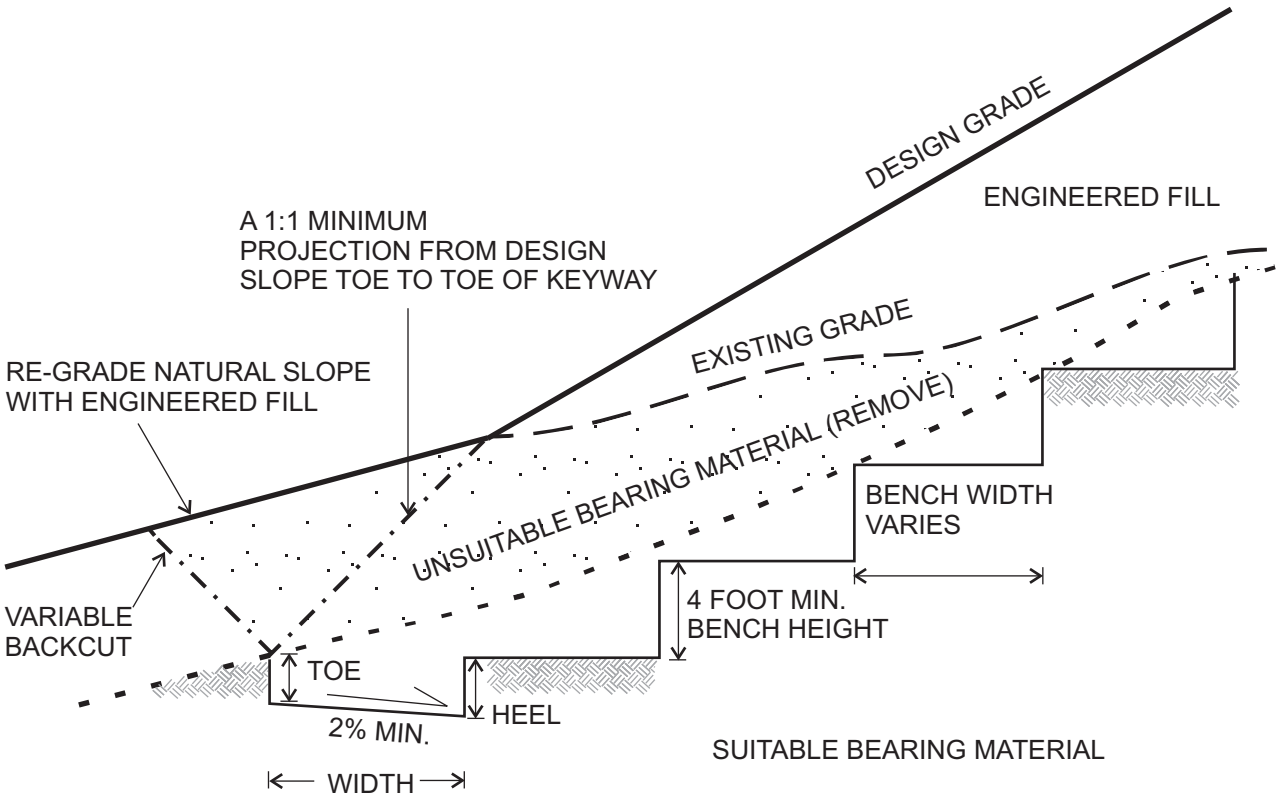
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

VER 1.0 NTS

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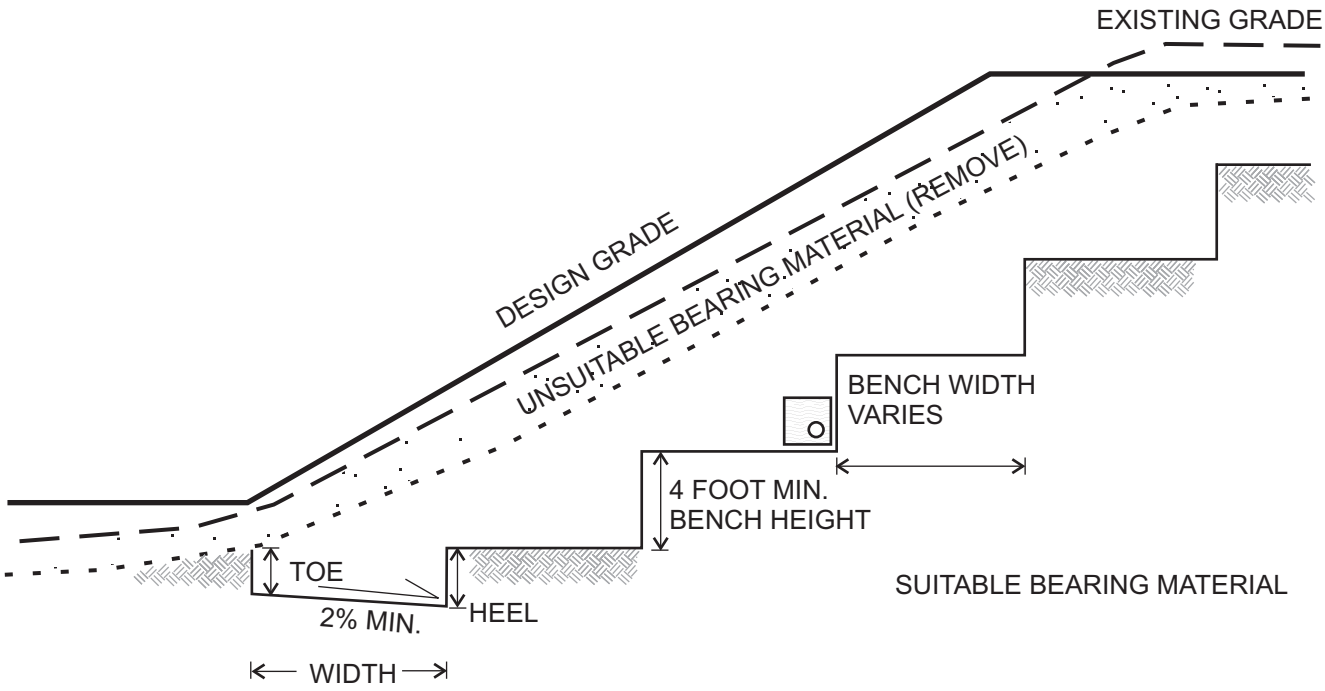
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0

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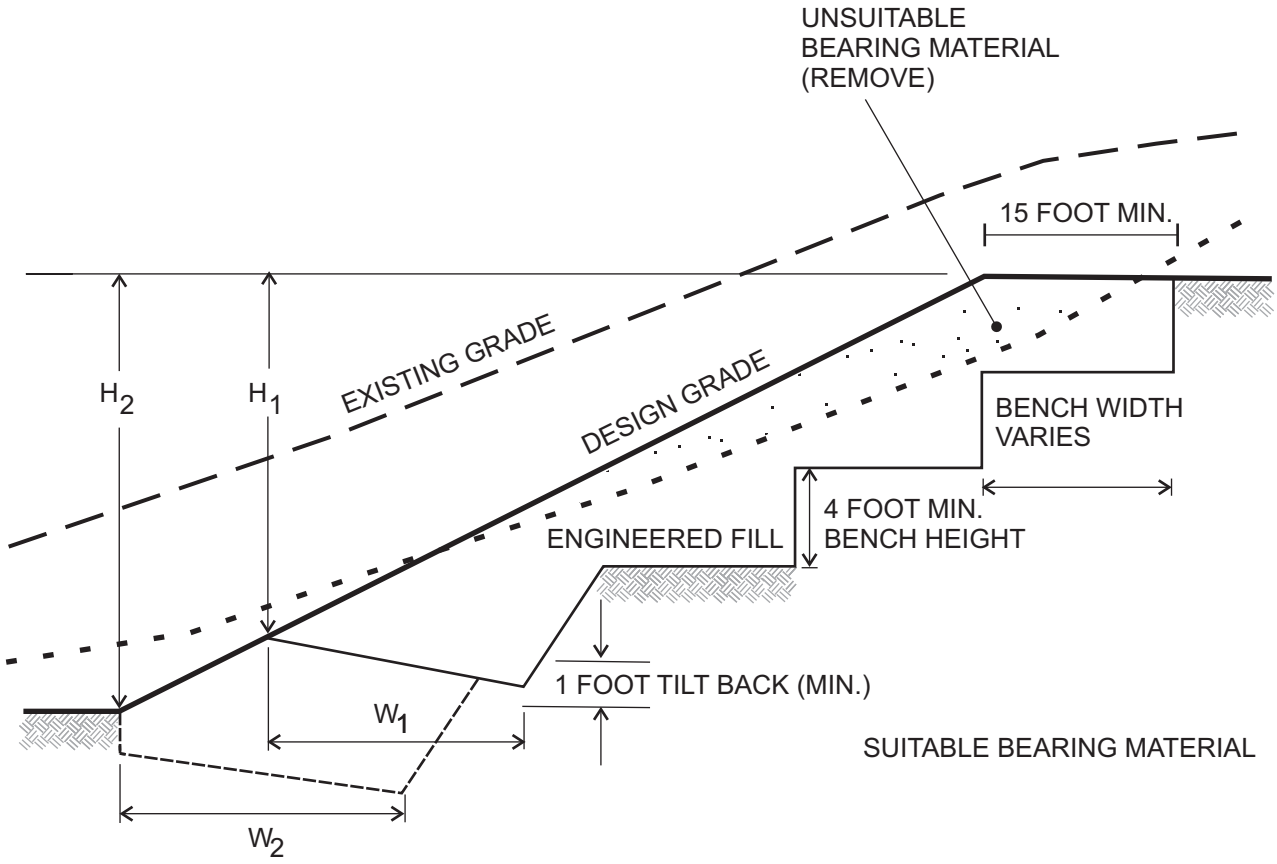
ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

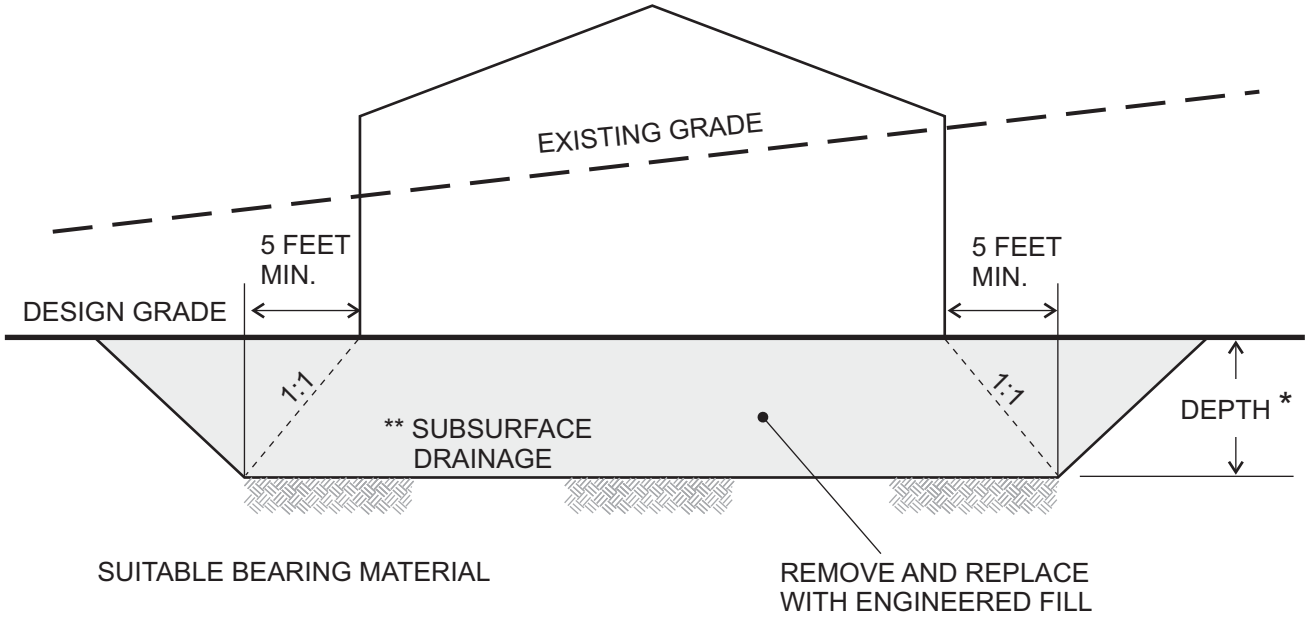
VER 1.0

NTS

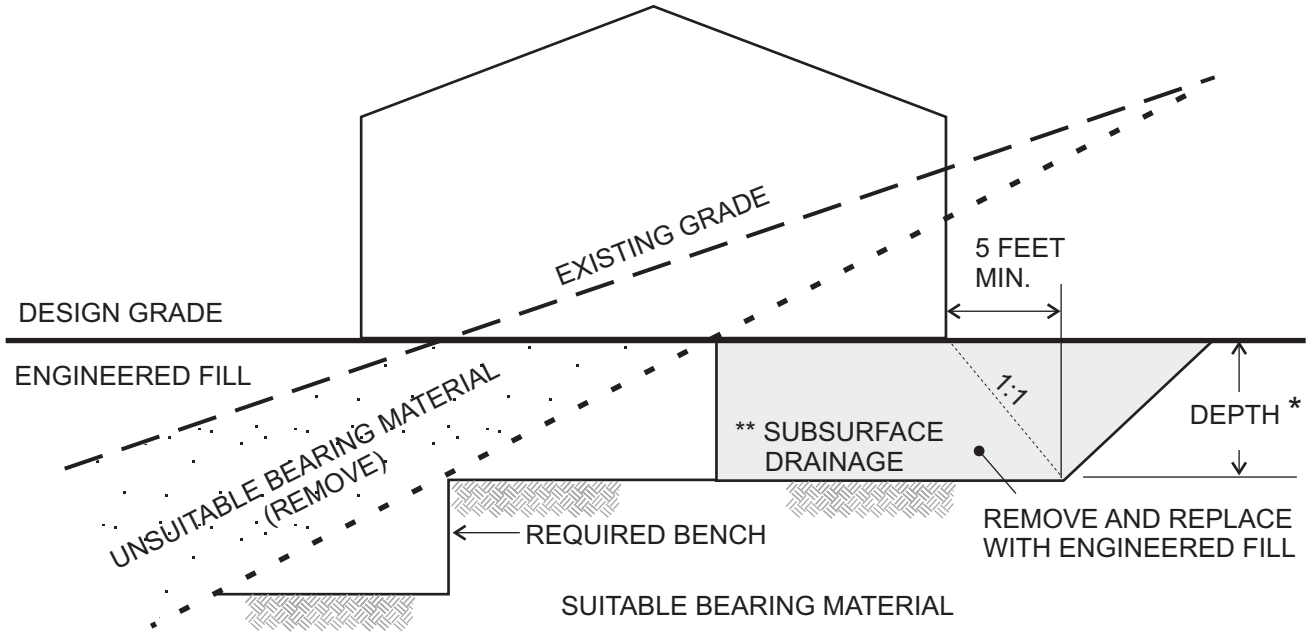
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

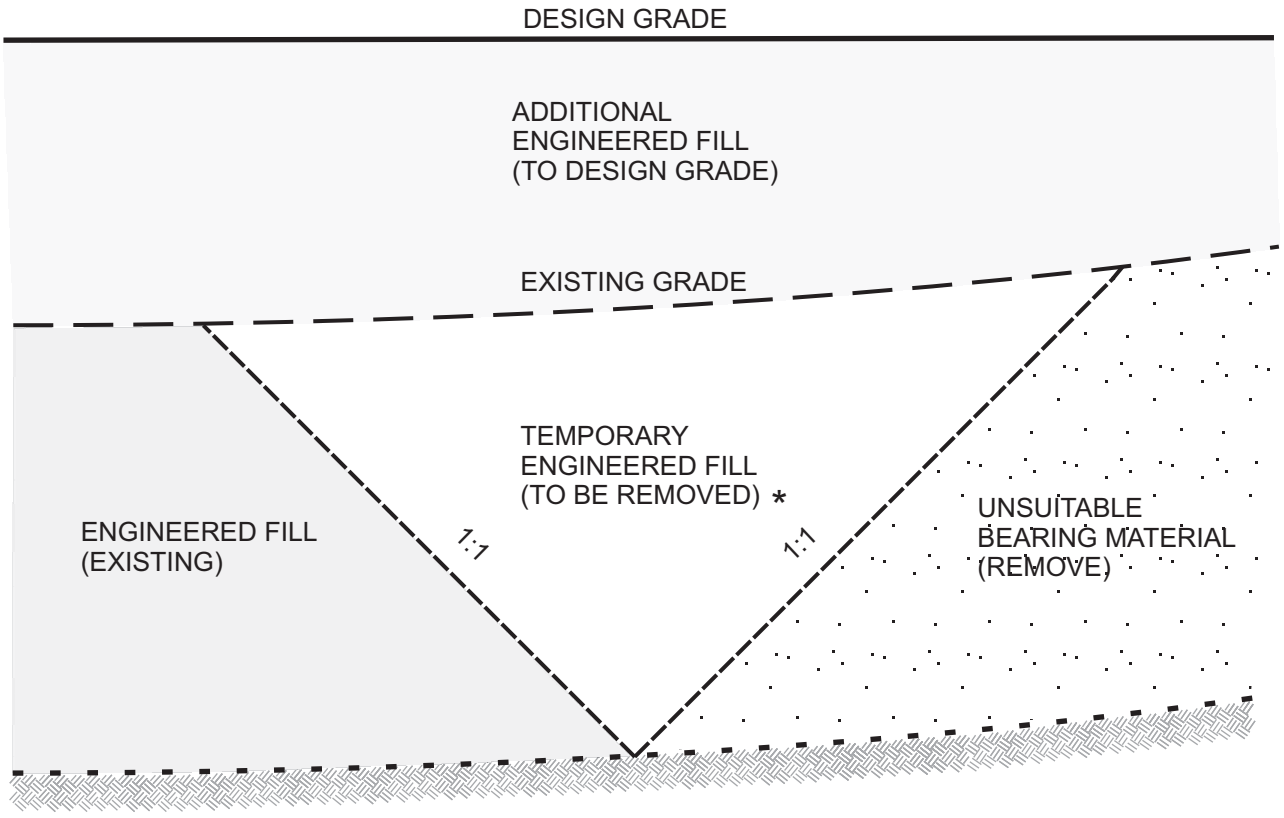
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0 NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

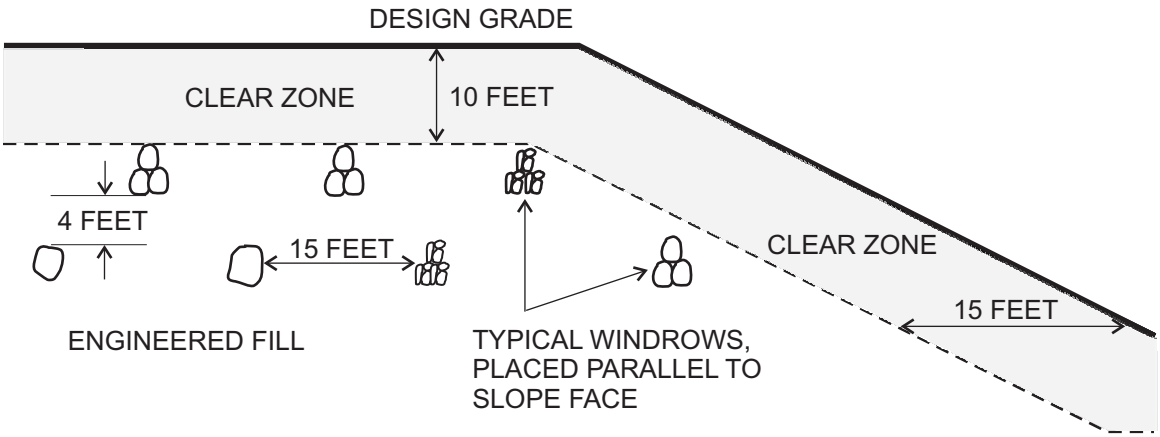
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

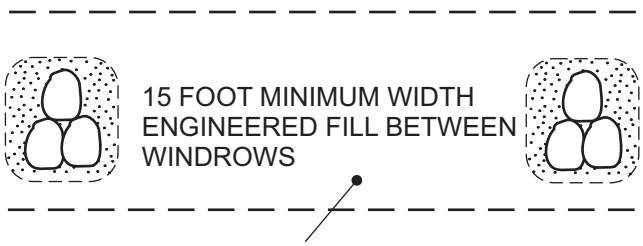
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

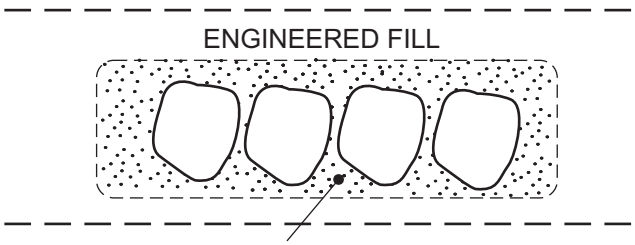
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

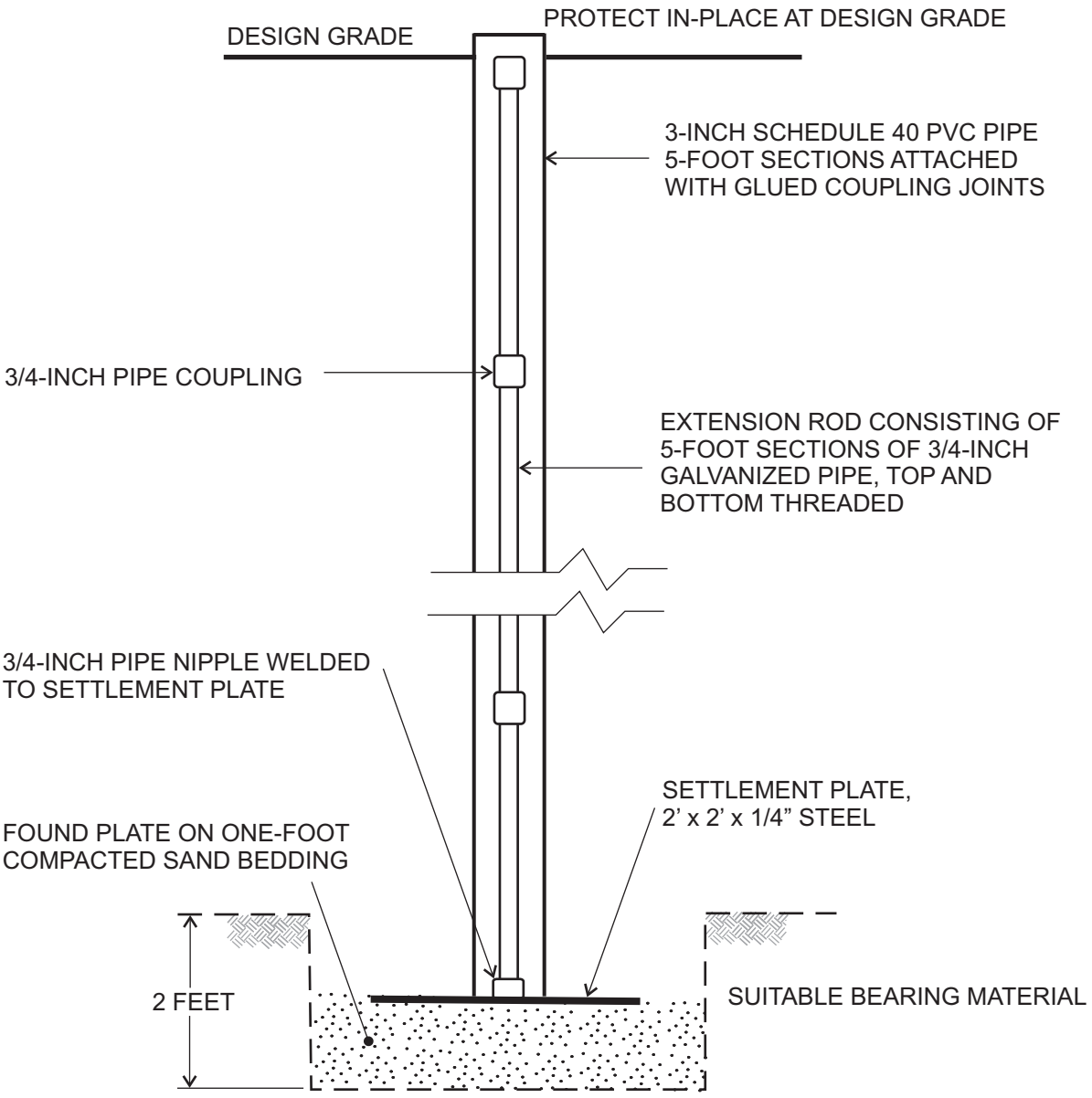
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

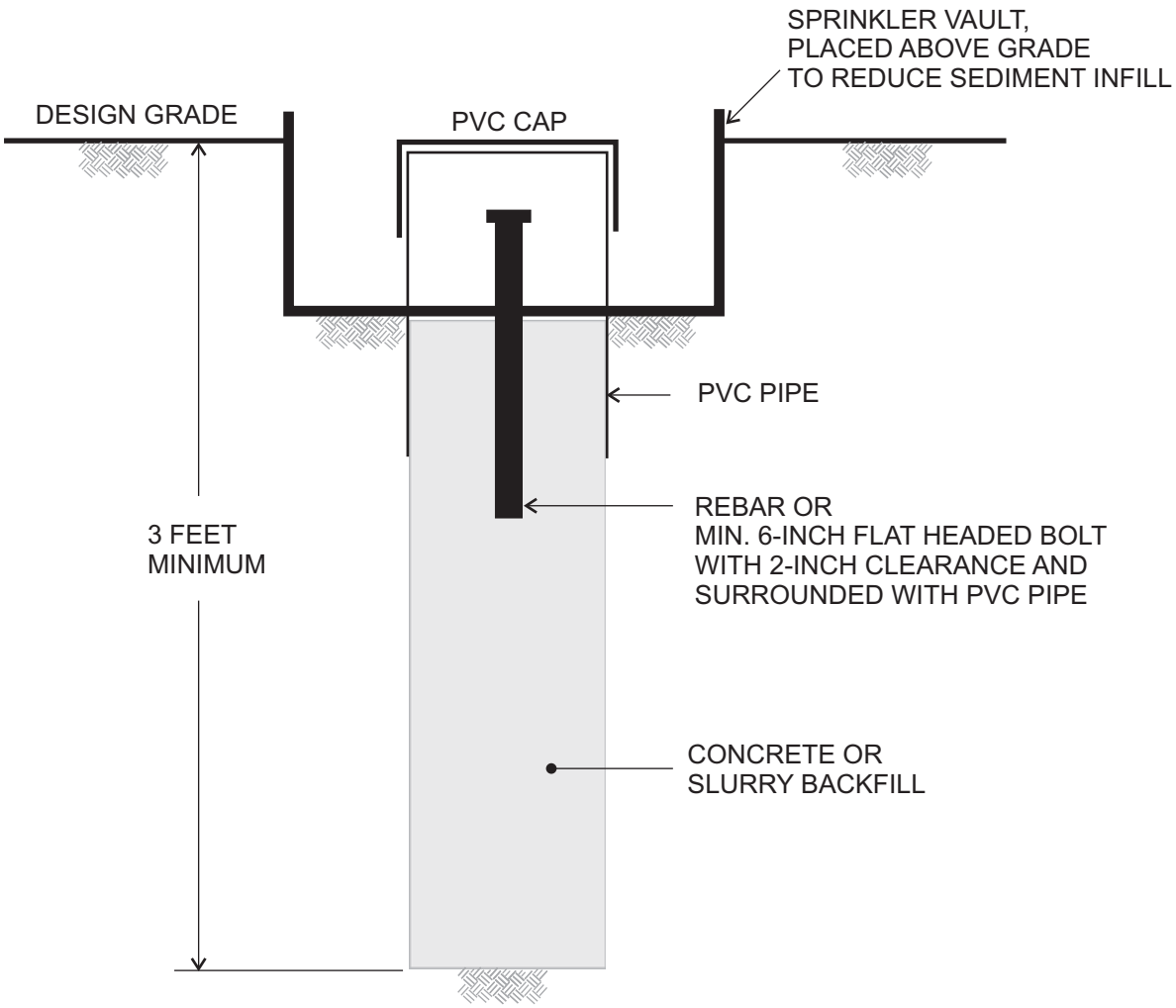
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT MONUMENT

DETAIL 12

LEGEND

afu	ARTIFICAL FILL - UNDOCUMENTED
Qya	YOUNG ALLUVIUM (DESIGNATION FOR ALL HOLOCENE, ALLUVIUMS ENCOUNTERED ONSITE)
Qoa	OLDER ALLUVIUM
$Qvof_3$	VERY OLD ALLUVIAL-FAN DEPOSITS
Qlo	SEDIMENTARY DEPOSITS OF LIVE OAK CANYON
T-22	APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (AGS, 2020)
B-37	APPROXIMATE LOCATION OF EXPLORATORY BORING (PSE)
AGS-18	APPROXIMATE LOCATION OF EXPLORATORY BORING (AGS, 2020)
SCG-10	APPROXIMATE LOCATION OF EXPLORATORY BORING (SCG, 2020)
	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
15	ESTIMATED REMOVAL DEPTH (IN FEET)
O.X. 5	PROPOSED BUILDING OVEREXCAVATION DEPTH (IN FEET)
	POSSIBLE INFILTRATION AREAS TO BE VERIFIED BY TESTING
	PROPOSED KEYWAY
8	PROPOSED SUBDRAIN WITH SIZE IN INCHES

PARCEL "A"
LLA. 05-002
INST. NO. 2005-0324926 O.R.

B-81 B

0-25.0' Qal
25.0-36.0' Qoa
T.D.=36.0'
No Water
No Caving

Install Stub for Future Development?

PROJECT BOUNDARY

15X2X3 Keyway

B'

$Qvof_3$

O.X. 5

T-15

0-8.0' Qal
8.0-25.0' Qoa
T.D.=26.0
No Water

GRADING AVOIDANCE AREA, TYP.

AGS-1

0-4.0' Qal
4.0-9.5' $Qvof_3$
T.D.=9.5'
No Water
No Caving

Qal

afu

Install Stub for Future Development?

$Qvof_3$

EXISTING STRUCTURES TO BE REMOVED, TYP.

0-15.0' Qal
15.0-50.1' Qoa
T.D.=50.1'
No Water

AGS-17

EXISTING MISC. ITEMS TO BE REMOVED & DISPOSED

0.0-25.0' $Qvof_3$
T.D.=25.0'
No Water

SCG-2

T-1

0-6.5' Qal
6.5-11.0' $Qvof_3$
T.D.=11.0'
No Water
No Caving

EXISTING WALLS TO BE REMOVED

EXISTING STRUCTURES REMOVED

SCG-1

0-13.5' Qal
13.5-49.3' Qoa
T.D.=49.3'
No Water
No Caving

Install Subdrain in Future

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

GRADING AND PROPOSED FUTURE FREEWAY OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

15X2X3 Keyway

EXISTING 30" RCP

EXISTING 36" RCP

EXISTING 48" RCP

GRADING LIMITS

CALTRANS R/W & PROJECT BOUNDARY

40' ±

WRITTEN GRADING PERMIT CLEARANCE OR PERMITS REQUIRED FROM CALTRANS PRIOR TO START OF GRADING

15X2X3 Keyway

A A'

GRADING AND OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

GRADING LIMITS

APN 413-190-006

40' WIDE ROAD & UTILITY EASEMENT (WOODHOUSE RD.)

ROBERTS ROAD

Qlo

Qal

afu

EXISTING DIRT ROAD

CAUTION: EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING POLES AND POWER LINES TO BE REMOVED, TYP.

0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

0-2.0 Topsoil

R/W

SEE SHEET 12

SEE SHEET 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
3. PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE

EXISTING EASEMENT NOTES:

24. EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
    - GRANTED TO: RIVERSIDE COUNTY
    - PURPOSE: PUBLIC HIGHWAY AND PUBLIC UTILITIES
    - RECORDED: NOVEMBER 20, 1945, IN BOOK 714 PAGE 216 O.R.
    - AFFECTS: AS SET FORTH IN SAID DOCUMENT

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
	ENGINEER		REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

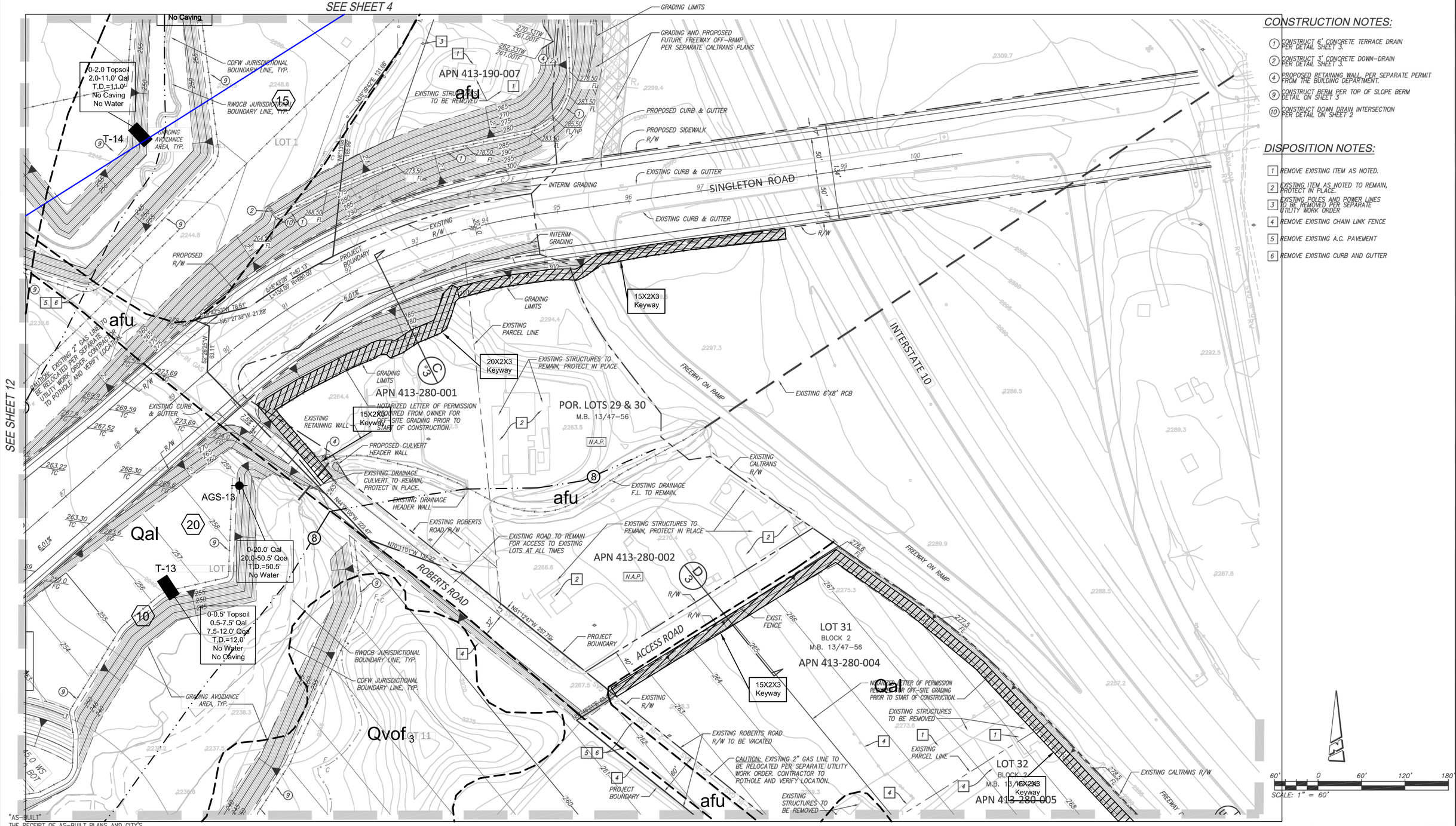
4 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg



CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
9. CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP: _____

See Plate 1 for Legend — PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM — ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

5 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberto
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 5

SEE SHEET 11

SEE SHEET 7

SEE SHEET 9

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING WEST
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 28.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

6 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

Plotted: Dec 10, 2020 - 10:42am By: gherta
DWG: N:\01_169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

LOT 32
BLOCK 2
M.B. 13/47–56

APN 413-280-005

APN 413-280-006

APN 413-280-007

APN 413-280-008

EXISTING PARCEL LINE

PROJECT BOUNDARY

INTERSTATE 10

EXISTING 30" RCP

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

A.P.N.413-280-009

A.P.N.413-280-010

EXISTING CALTRANS R/W

EXISTING DOUBLE 48" CMP

EXISTING BORING PIT PER CROSSING I-10 PLANS PERMIT NO. 08-05-6-UU-1116

EXISTING 48" CMP

N64°25'37"W 396.38'

N.A.P.

EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 4" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 2" GAS LINE TO BE RELOCATED PER / SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING COPPER DRIVE R/W TO BE VACATED

EXISTING ROBERTS ROAD R/W TO BE VACATED

EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING TELEPHONE LINE, PRIOR TO CONSTRUCTION CONTRACTOR TO VERIFY LOCATION.

EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

LOT 18
PARCEL MAP 19207
P.M. 127/10–11

A.P.N.413-280-034

A.P.N.413-280-035

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

CAUTION: EXISTING 24" DIP (CLASS 300) ZONE 11 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

CAUTION: EXISTING 16" DIP (CLASS 300) ZONE 12 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

EXISTING PARCEL LINE

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXIST. ROBERTS ROAD R/W TO BE VACATED

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXISTING PARCEL LINE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

LOT 14

LOT 15

LOT 16

LOT 17

ROBERTS ROAD

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY

RWQCB JURISDICTIONAL BOUNDARY

CUT/FILL LINE

EXISTING 90' SCE 20.00' SDGE FORCE MAIN EASEMENT

PROJECT BOUNDARY

PARCEL 9
P.M. NO. 33105
P.M. 243/99–111

TRACT BOUNDARY

TRACT 32702

N36°55'25"W 170.0

N84°30'34"W 299.43

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. NOTARIZED LETTER OF PERMISSION REQUIRED FROM SEWER AGENCY FOR GRADING OVER EXISTING SEWER PIPE PRIOR TO START OF CONSTRUCTION.

SEE SHEET 6

SEE SHEET 8

SEE SHEET 9

AGS-14

AGS-15

AGS-10

0-0.5' Topsoil
0.5-8.0' Qal
8.0-12.0' Qvof
T.D.=12.0'
No Water
No Caving

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-1.0' Topsoil
1.0-13.0' Qal
T.D.=13.0'
No Water
No Caving

0-0.5' Topsoil
0.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

60' 0 60' 120' 180'
SCALE: 1" = 60'

See Plate 1 for Legend PLATE 4

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

811 Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

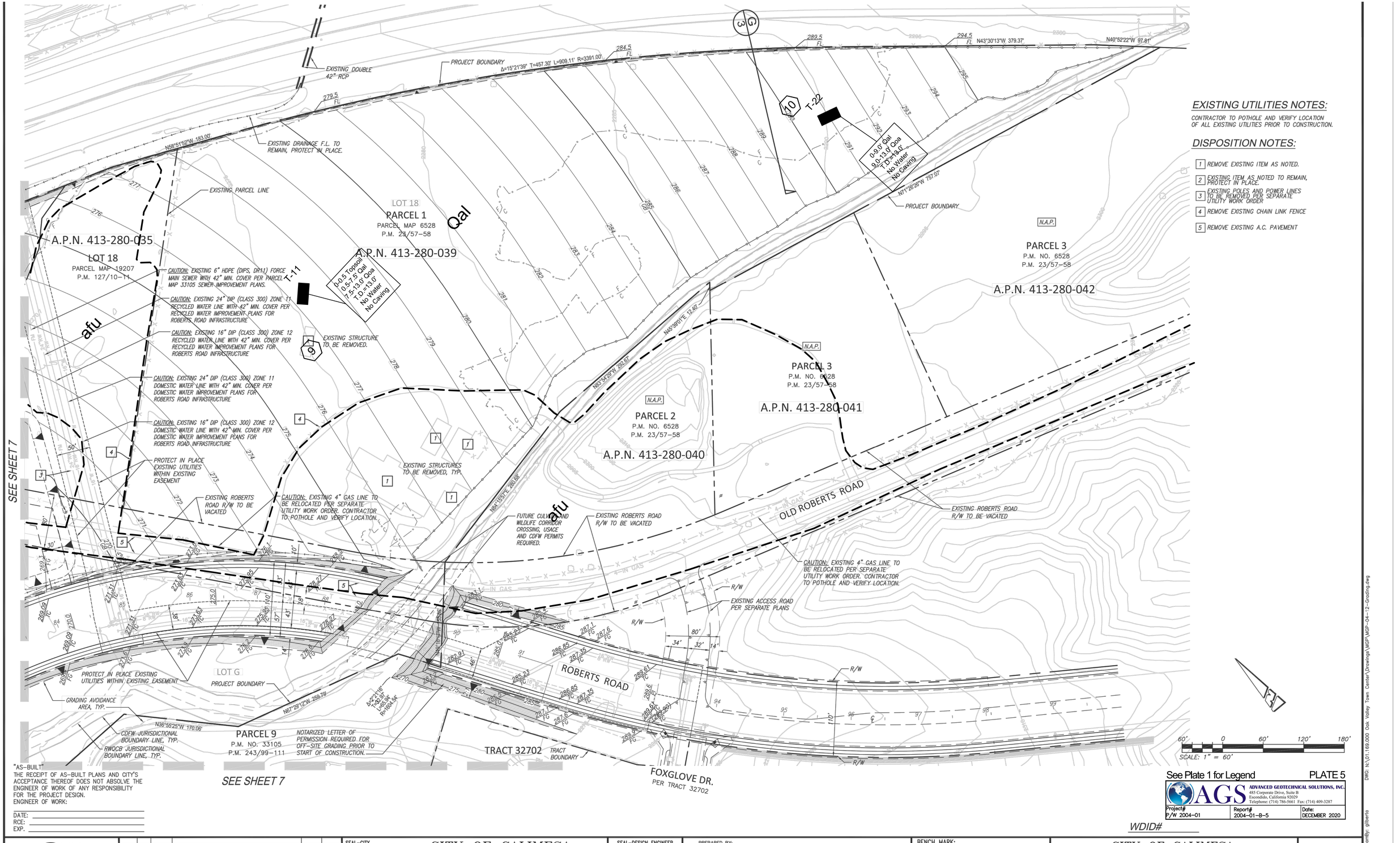
7 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 – 10:43am By: gilberta
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg



EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY

REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER

REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

8 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:43am By: gilberto DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 6

SEE SHEET 10

SEE SHEET 7

SCG-9
0-10.0' Qal
10.0-25.0' Qoa
T.D.=25.0'
No Water

T-17
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-5
0-4.0' Qya
4.0-26.0' Qoa
T.D.=26.0'
No Water

B-94
0-12' Qal
12-50.0' Qoa
T.D.=50.0'
No Water

T-8
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-15

AGS-10
0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

T-21
0-3.5' Qal
3.5-11.0' Qoa
T.D.=11.0'
No Water
No Caving

15X2X3 Keyway

15X2X3 Keyway

afu

EXISTING STRUCTURES TO BE REMOVED, TYP.

EXISTING STRUCTURES TO BE REMOVED, TYP.

45.0 WS
37.0 BOT

LOT 9
LOT C
LOT 3
LOT 15
LOT 16
LOT 5

Qal

Qal

Qal

ST4

ROBERTS ROAD

ROBERTS

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 9
P.M. NO. 33105
P.M. 243/99-111

TRACT 32702
TRACT BOUNDARY

TRACT 32702
TRACT BOUNDARY

GRADING AVOIDANCE AREA, TYP.

PROJECT BOUNDARY

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

EXISTING PARCEL LIINE

PROJECT BOUNDARY

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. CONTRACTOR TO POTHOLE AND VERIFY.

EXISTING 20.00' FORCE MAIN EASEMENT

M

M'

N

N'

L=140.57'
T=94.17'
R=350.00'
N40°35'10"E 164.17'
N12°03'25"E 150.84'
N1°43'09"E 133.04'
N0°10'01"E 161.34'

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1 REMOVE EXISTING ITEM AS NOTED.

4 REMOVE EXISTING CHAIN LINK FENCE

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

9 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01\169.000 Oak Valley Town Center\Drawings\MGP\04-12-Grading.dwg

SEE SHEET 11

Qlo
CUT/FILL LINE
Qal
Qlo
SCG-5
0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water
0-26.5' Qlo
T.D.=26.5'
No Water
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
Qal
AGS-4
0-35.0' Qal
35.0-45.5' Qoa
T.D.=45.5'
No Water
PAD=223.9
afu
EXISTING STRUCTURES TO BE REMOVED, TYP.
SCG-9
SCG-7
0-8.5' Qal
8.5-55.0' Qoa
T.D.=55.0'
No Water
ST5
ST7
ST6
T-16
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving
LOT 4
SCG-6
0-25.0' Qoa ?
T.D.=25.0'
No Water
0-4.0' Qal
4.0-8.0' Qoa
8.0-12.0' Qya
T.D.=12.0'
No Water
No Caving
Qlo
TEMP. SEWER LIFT STATION PAD
PAD=186.0
T-4
Qal
0-18.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water
AGS-18
GRADING AVOIDANCE AREA, TYP.
0-8.5' Qal
8.5-25.0' Qoa
T.D.=25.0'
No Water
SCG-8
15X2X3 Keyway
PROJECT BOUNDARY
EXISTING 100' WIDE DRAINAGE, GRADING & SLOPES EASEMENT
Δ=67°29'06" T=801.59'
L=1413.40' R=1200.00'
C.L. 4' WIDE
NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF-SITE GRADING PRIOR TO START OF CONSTRUCTION.
0-7.0' Qal
7.0-51.5' Qoa
T.D.=51.6'
No Water
AGS-6
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.

[4] REMOVE EXISTING CHAIN LINK FENCE

SEE SHEET 9

EXISTING EASEMENT NOTES:

(21) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: MARCH 9, 1971, INSTRUMENT NO. 23255 OF OFFICIAL RECORDS
AFFECTS: AS SET FORTH IN SAID DOCUMENT

(23) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: SUNCAL SUMMERWIND RANCH LLC
PURPOSE: DRAINAGE, GRADING & SLOPE EASEMENT
RECORDED: AUGUST 28, 2006, INSTRUMENT NO. 2006-0632646
AFFECTS: AS SET FORTH IN SAID DOCUMENT

S-BUILT"
E RECEIPT OF AS-BUILT PLANS AND CITY'S
CCEPTANCE THEREOF DOES NOT ABSOLVE THE
GINEER OF WORK OF ANY RESPONSIBILITY
R THE PROJECT DESIGN.
GINEER OF WORK:

TE: _____
E: _____
P. _____

See Plate 1 for Legend PLATE 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

60' 0 60' 120' 180'
SCALE: 1" = 60'

WDID#

811 now what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER MICHAEL THORNTON No. C44226 Exp. 6/30/21 CIVIL STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER GEORGE ALAN LENFESTEY No. 45920 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

10 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 12

SEE SHEET 6

SEE SHEET 10

CONSTRUCTION NOTES:

(2) CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
(3) PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
(4) PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
(5) CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
(8) CONSTRUCT 3' CONCRETE BROW DITCH PER DETAIL ON SHEET 3
(9) CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.
[4] REMOVE EXISTING CHAIN LINK FENCE

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

0-1.0' Topsoil
1.0-10.0' Qal
10.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

0-8.5' Qal
8.5-18.5' Qoa
18.5-24.0' Qlo
T.D.=24.0'
No Water

0-2.0' Topsoil
2.0-65.0' Qlo
T.D.=65.0'
No Water
Caving @ 5'

0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water

0-26.5' Qlo
T.D.=26.5'
No Water

0-30.0' Qal
30.0-56.5' Qoa
T.D.=56.5'
Seepage @
46.0-56.5'

0-11.5' Qal
T.D.=11.5'
Seepage @10'
Caving below 10

0-60.0' Qal
60.0-71.5' Qoa
T.D.=71.5'
Seepage
11.0-71.5'

0-6.5' afu
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Seepage @
15.0-42'
Caving @ 40'

Stabilize Saturated Removal Bottom

Install Subdrain for Future Development?

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 1
VACANT
RLC PHASE 1
INST. NO. 732045 O.R.

FUTURE SINGLETON ROAD EXTENSION

PROJECT BOUNDARY

EXISTING 100' WIDE DRAINAGE, ROADWAY & SLOPES EASEMENT

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE, SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020
12/10/20 DATE

BENCH MARK:
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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

11 OF 23 SHEETS

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 4

PARCEL 14
P.M. NO. 33105
P.M. 243/99–111

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

PROJECT BOUNDARY

CAUTION: EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

B-37
0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

15X2X3 Keyway

AGS-8
0-9.0' Qal
9.0-26.3' Qoa
T.D.=26.3'
No Water

AGS-12
0-50.4' Qlo
T.D.=54.4'
No Water

T-3
0-1.0' Topsoil
1.0-8.0' Qal
8.0-14.0' Qlo
T.D.=14.0'
No Water
No Caving

T-19
0-0.5' Topsoil
0.5-6.5' Qal
6.5-11.0' Qlo
T.D.=11.0'
No Water
No Caving

T-18
PAD=251.9

AGS-2
0-10' Qal
10-25.5' Qlo
T.D.=25.5'
No Water

0-1.0' Topsoil
1.0-6.0' Qal
6.0-12.0' Qoa
T.D.=12.0'
No Water
No Caving

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

B-96
0-6.5 Topsoil
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Water @ 15to42'
Caving @ 40'

Qal
Qlo
Qoa
afu
Qvof 3

ST10
ST11
ST12
ST13
ST9

LOT 2
LOT A
LOT 7

ROBARTS ROAD
SINGLETON ROAD

O.X. 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN–DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V–DITCH PER DETAIL ON SHEET 3
6. CONSTRUCT 12" DRAIN AND PIPE PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2
13. INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

SEE SHEET 5

SEE SHEET 11

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS–BUILT"
THE RECEIPT OF AS–BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 9

WDID# _____

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004–01	2004–01–B–5	DECEMBER 2020

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ENGINEER			REVISIONS	COUNTY	

SEAL–CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL–DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12–31–2020

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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

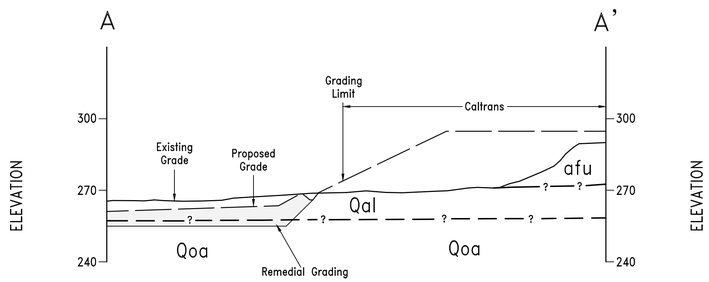
12 OF 23 SHEETS

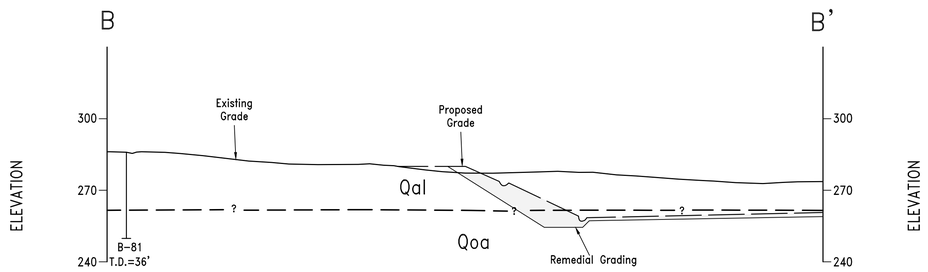
FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

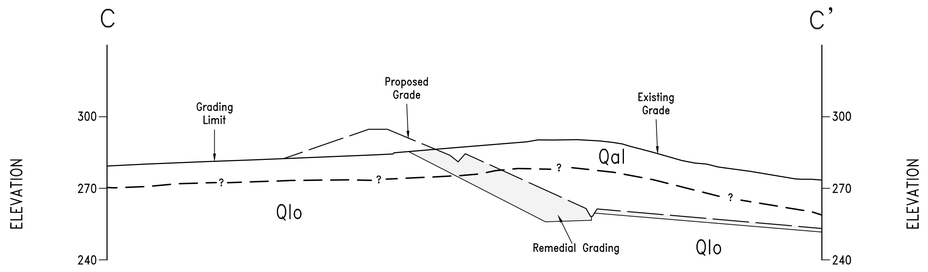
PLAN No. _____

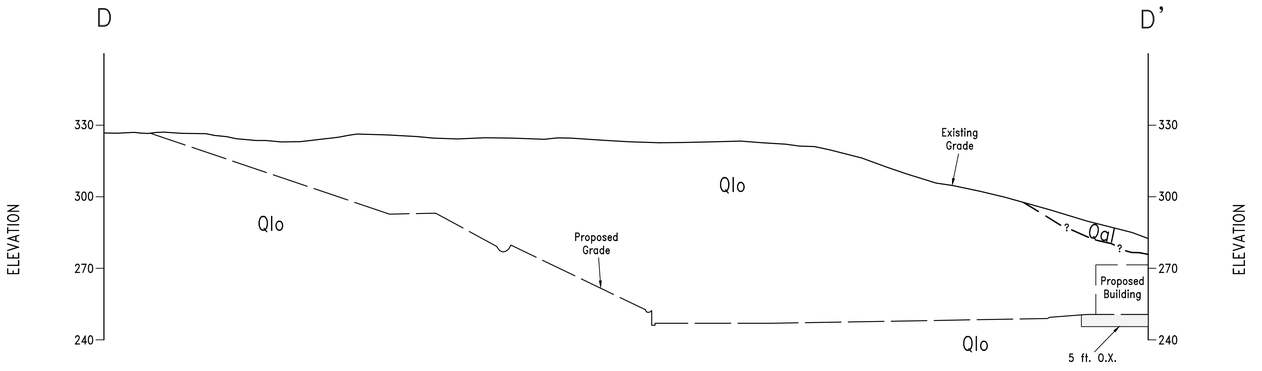
NOT FOR CONSTRUCTION

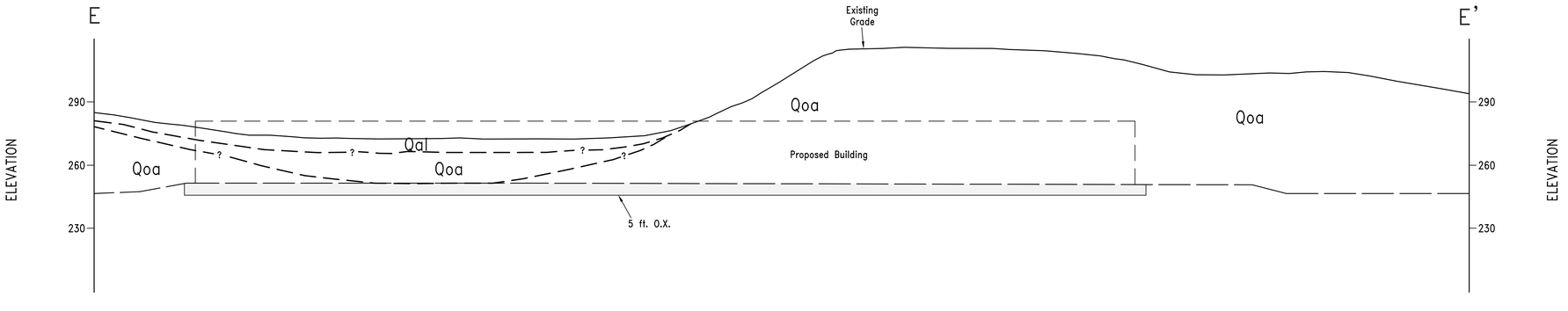
Plotted: Dec 10, 2020 – 10:45am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg











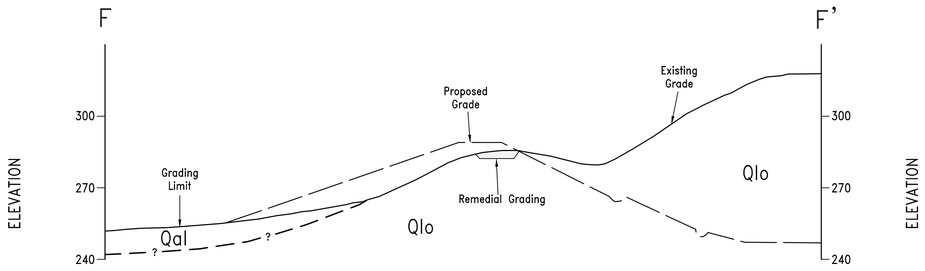
Scale: 1"=30'

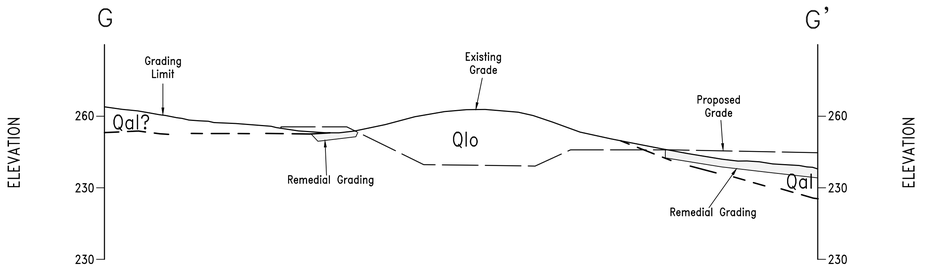
See Plate 1 for Legend

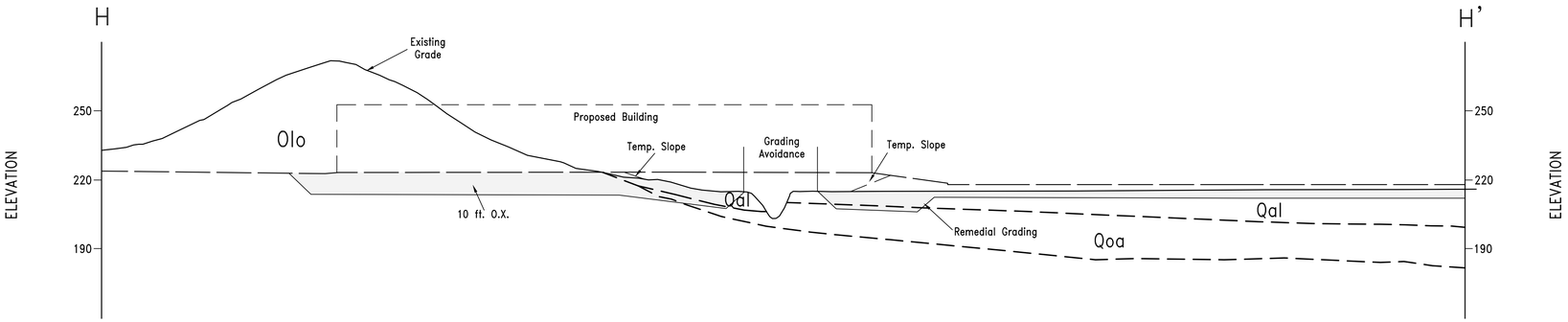
PLATE 10

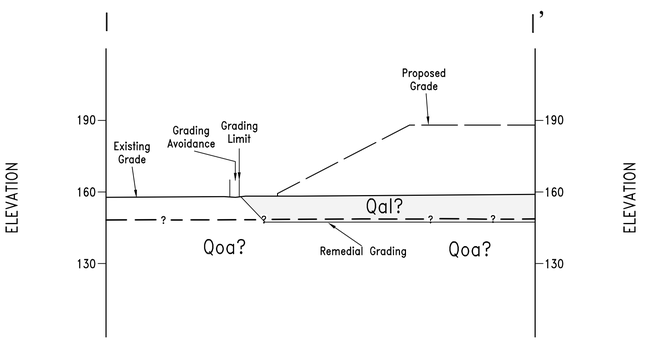
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

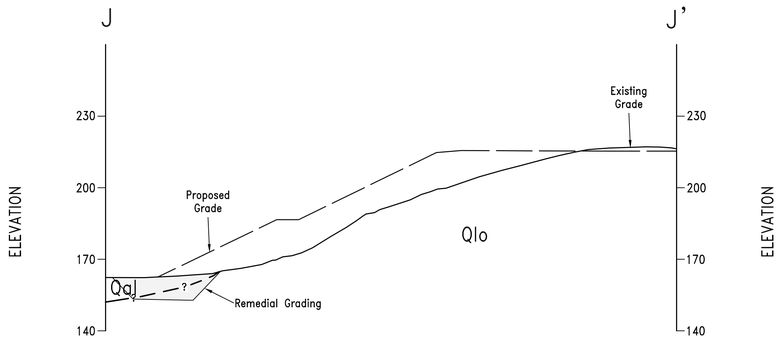
Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020











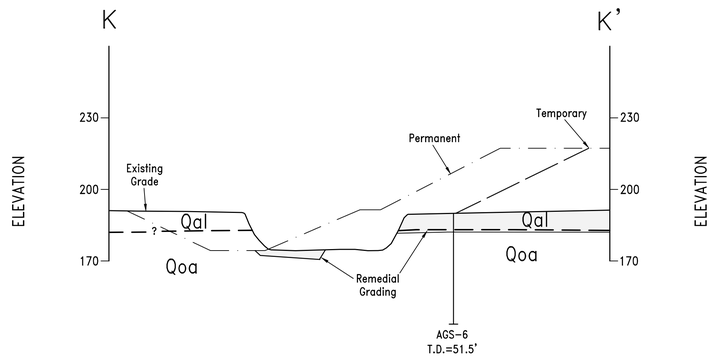
Scale: 1"=30'

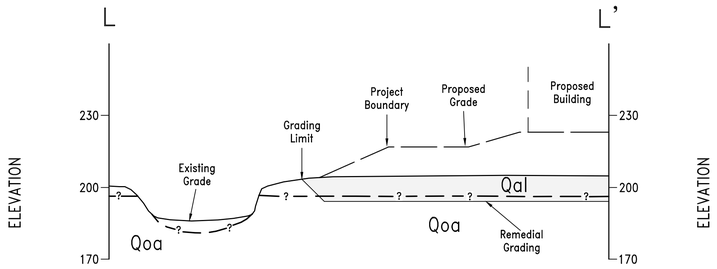
See Plate 1 for Legend

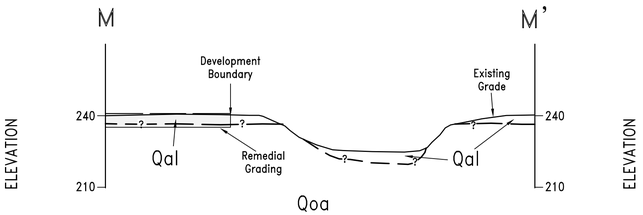
PLATE 11

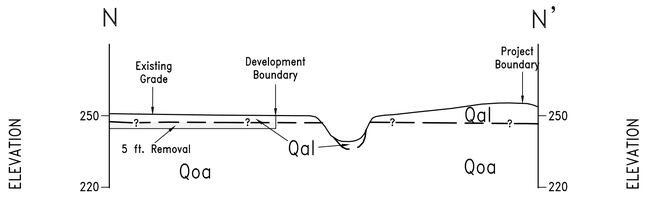
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020









Scale: 1"=30'

See Plate 1 for Legend PLATE 12

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Albert A. Webb Associates	Date	12/2/2021
Designed by	EP	Case No	
Company Project Number/Name	BLCOV - Building C		

BMP Identification

BMP NAME / ID: DMA C-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
ROOFS	126873	Roofs	1	0.89	113170.7			
CONC	80997	Concrete or Asphalt	1	0.892	72249.3			
LS	24991	Ornamental Landscaping	0.1	0.11046	2760.5			
	232861	Total			188180.5	0.20	0.9	0.9

Notes: 2 - 8'x16' MWS Vaults

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building C

BMP Identification

BMP NAME / ID: DMA C-2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
ROOFS	*73758*	*Roofs*	*1*	*0.89*	*65792.1*			
CONC	*60384*	*Concrete or Asphalt*	*1*	*0.892*	*53862.5*			
LS	*1180*	*Ornamental Landscaping*	*0.1*	*0.11046*	*130.3*			
	135322		***Total***		**119784.9**	**0.20**	***0.5***	***0.5***

Notes: 8'x20' MWS Vault

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building C

BMP Identification

BMP NAME / ID: DMA C-3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
ROOFS	*156570*	*Roofs*	*1*	*0.89*	*139660.4*			
CONC	*188482*	*Concrete or Asphalt*	*1*	*0.892*	*168125.9*			
LS	*75870*	*Ornamental Landscaping*	*0.1*	*0.11046*	*8380.4*			
	420922		***Total***		**316166.7**	**0.20**	***1.5***	***1.5***

Notes: - 8'x20' MWS Vaults

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Building C

BMP Identification

BMP NAME / ID: DMA C-4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
ROOFS	*98404*	*Roofs*	*1*	*0.89*	*87776.4*			
CONC	*63049*	*Concrete or Asphalt*	*1*	*0.892*	*56239.7*			
LS	*27315*	*Ornamental Landscaping*	*0.1*	*0.11046*	*3017.2*			
	188768	***Total***			**147033.3**	**0.20**	***0.7***	***0.7***

Notes: 8'x24' MWS Vault

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Albert A. Webb Associates	Date	12/2/2021
Designed by	EP	Case No	
Company Project Number/Name	BCCOV - Building C		

BMP Identification

BMP NAME / ID: DMA C-6

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

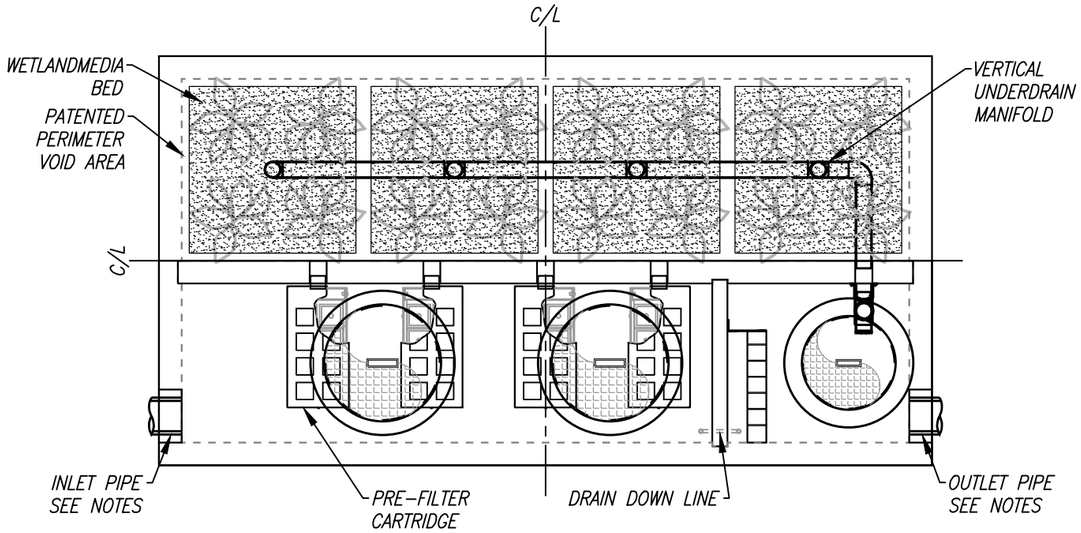
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

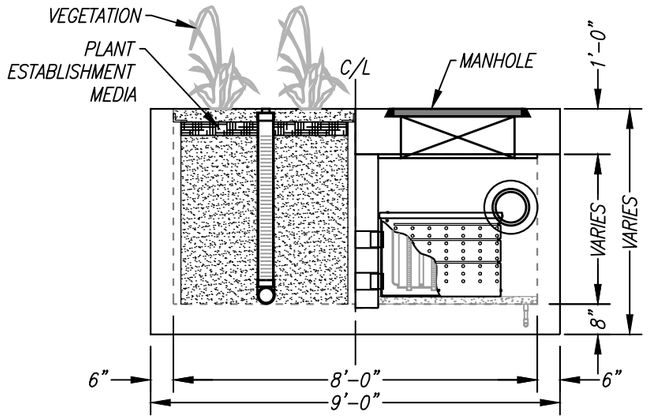
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
CONC	*95033*	*Concrete or Asphalt*	*1*	*0.89*	*84769.4*			
LS	*26132*	*Ornamental Landscaping*	*0.1*	*0.11046*	*2886.5*			

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.462	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			18
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

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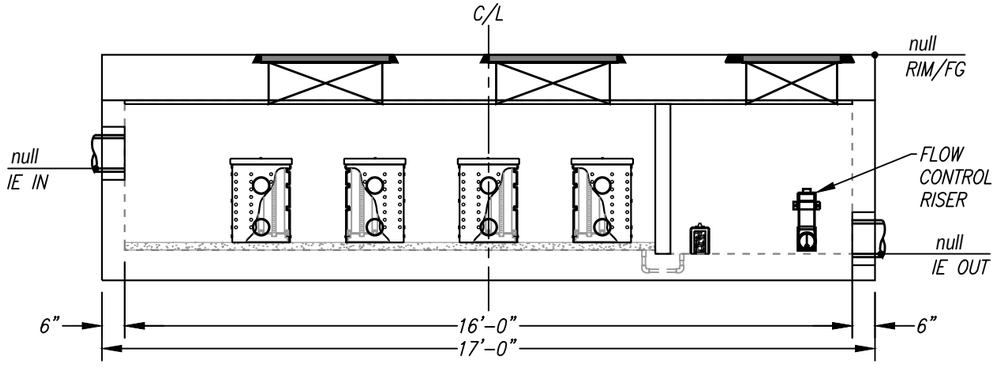
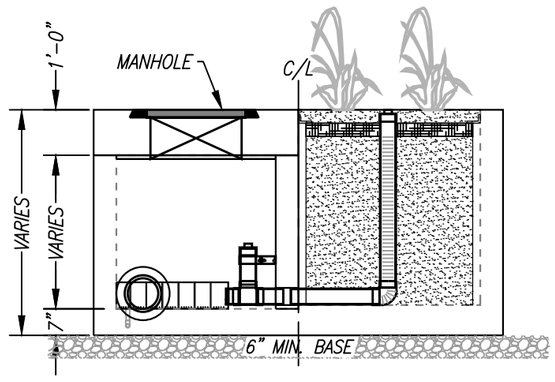
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 0.9 CFS

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

DMA C-1

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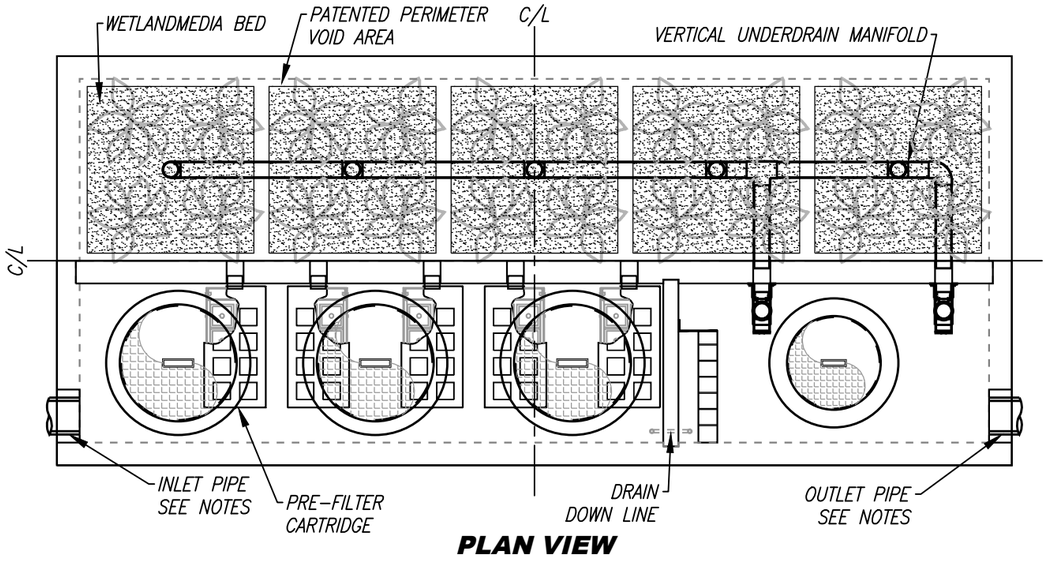
Bio Clean
A Forterra Company

MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

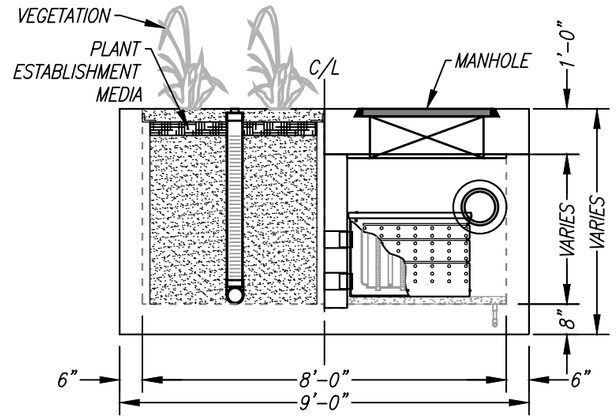
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			10
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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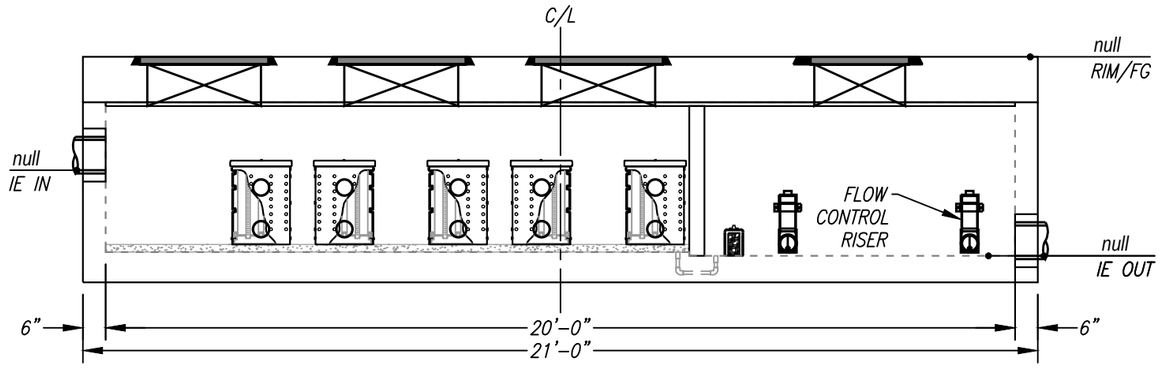
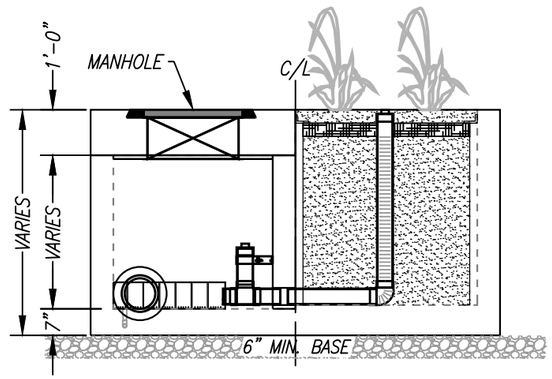


ELEVATION VIEW



RIGHT END VIEW

DMA C-2

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
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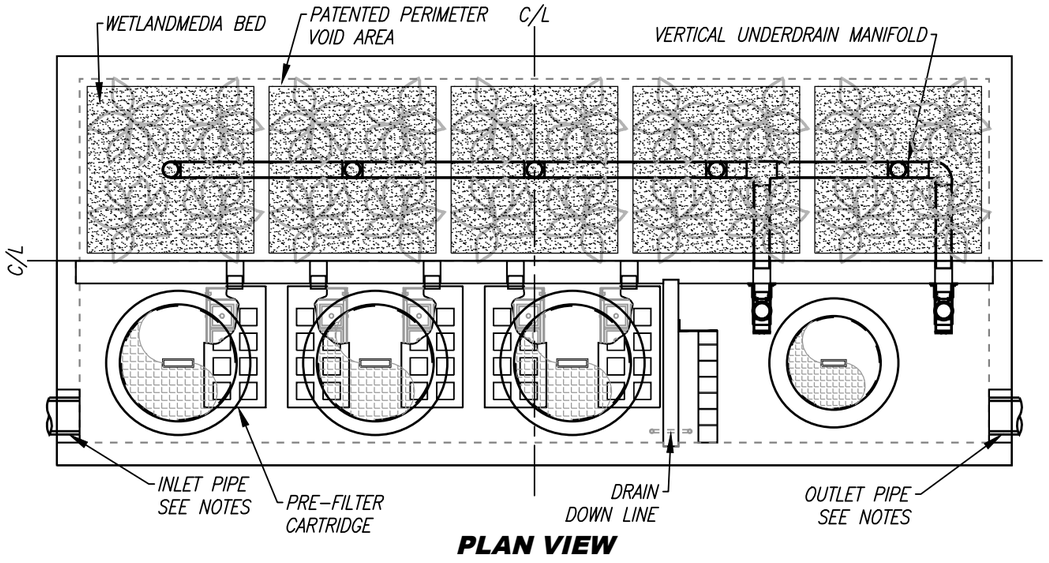
Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

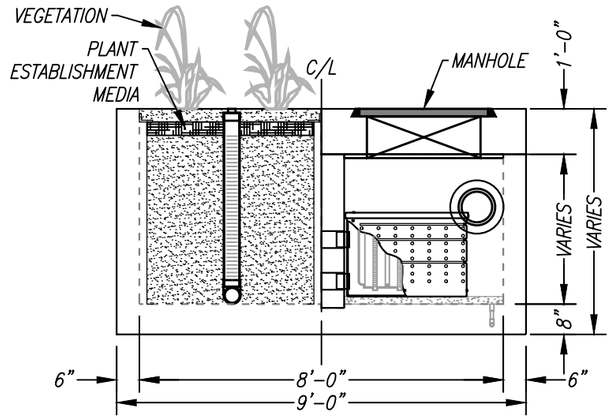
5/23/19 10:LEE

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			19
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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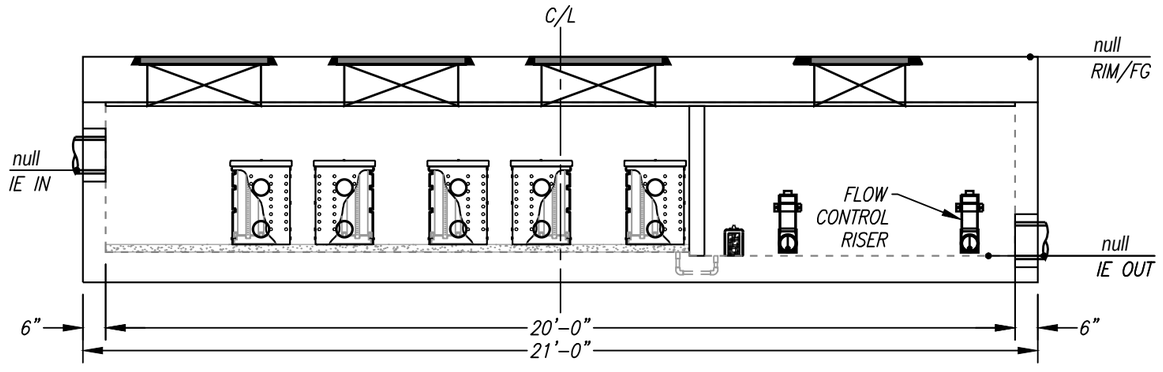
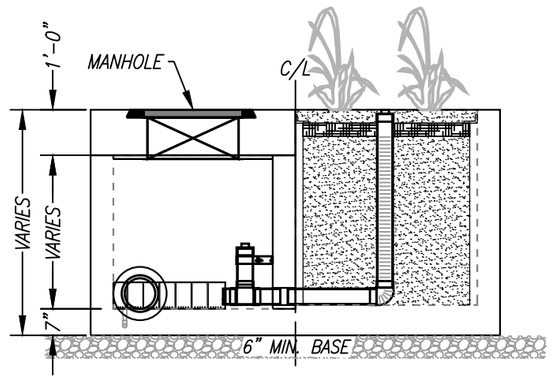


ELEVATION VIEW



RIGHT END VIEW

DMA C-3

3 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.5 CFS

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
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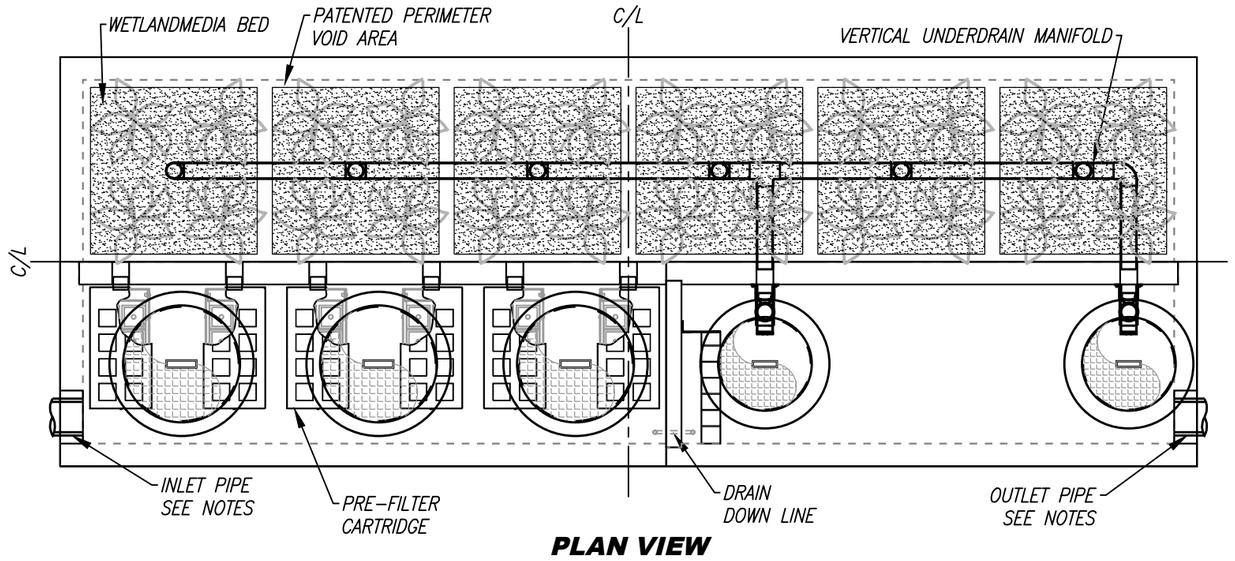
Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

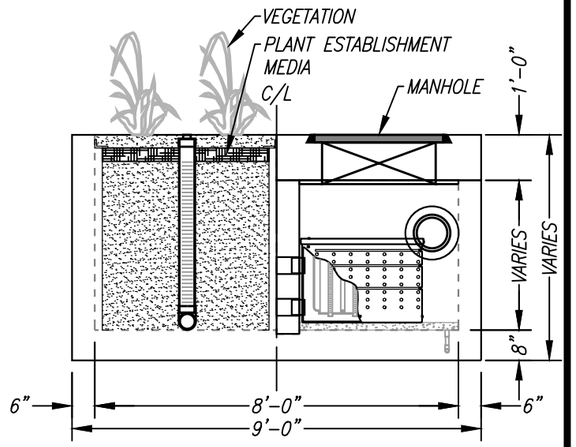
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.693	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			14
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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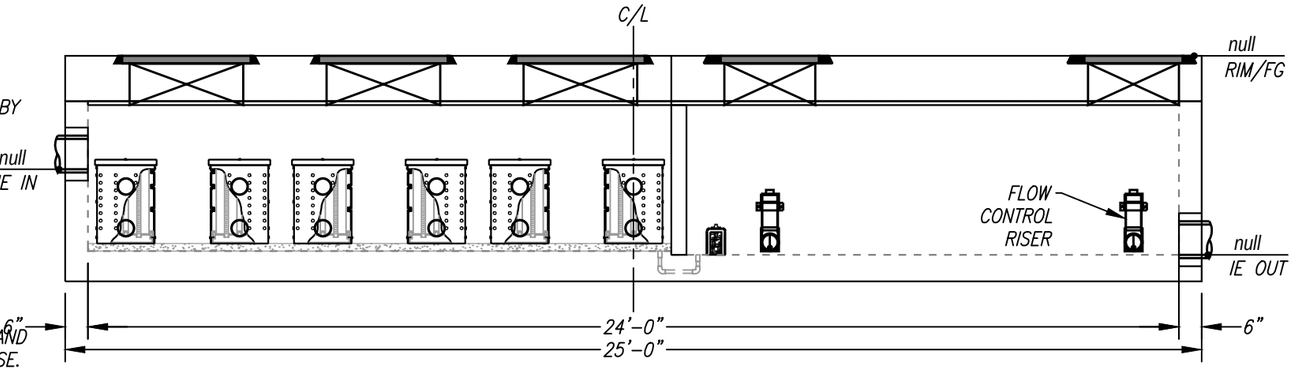
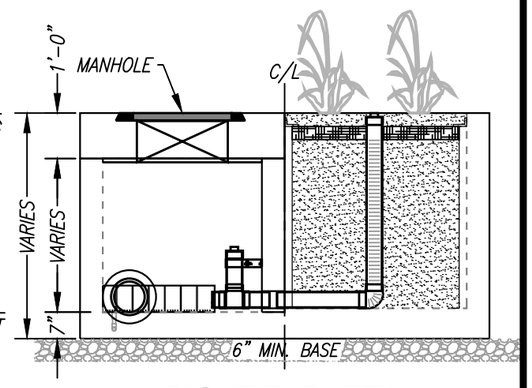


ELEVATION VIEW



RIGHT END VIEW

DMA C-4

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			9
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
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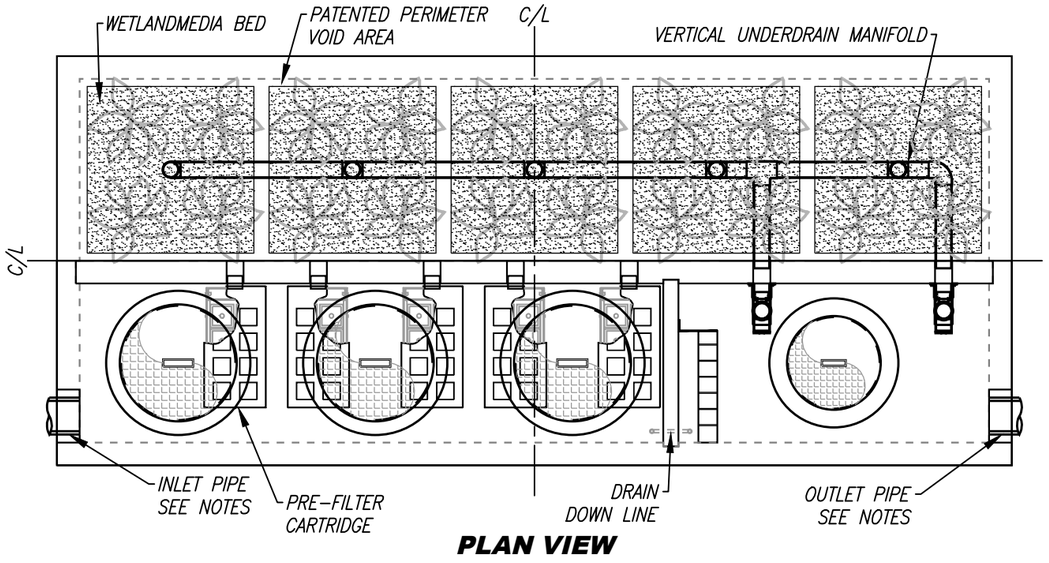
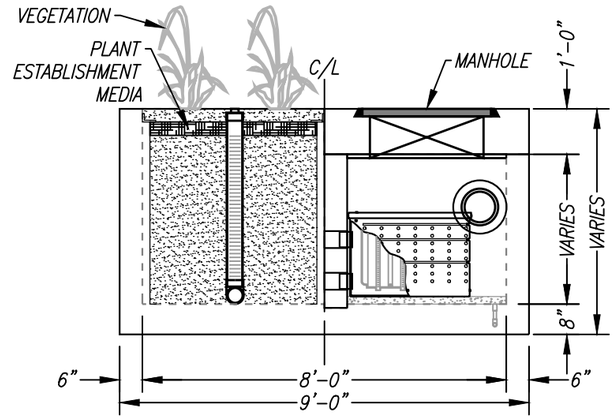


PLAN VIEW



LEFT END VIEW

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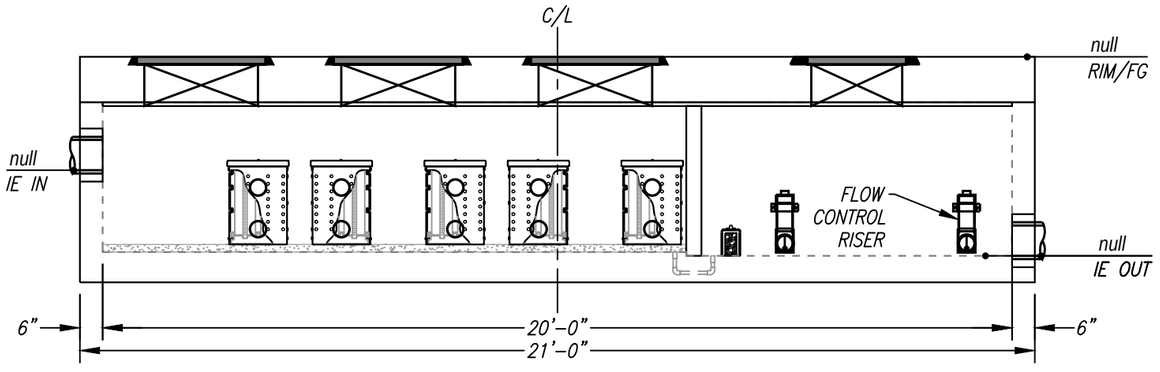
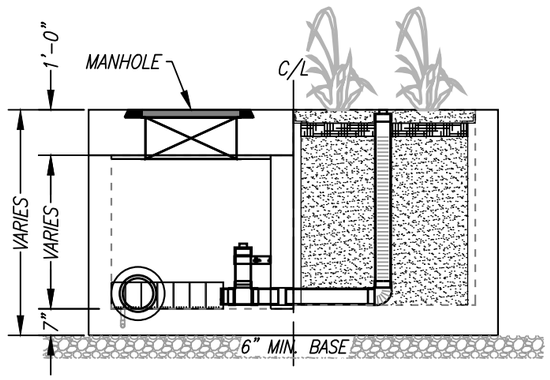


ELEVATION VIEW



RIGHT END VIEW

DMA C-6

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

5/23/19 10:LEF

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution



OVERVIEW

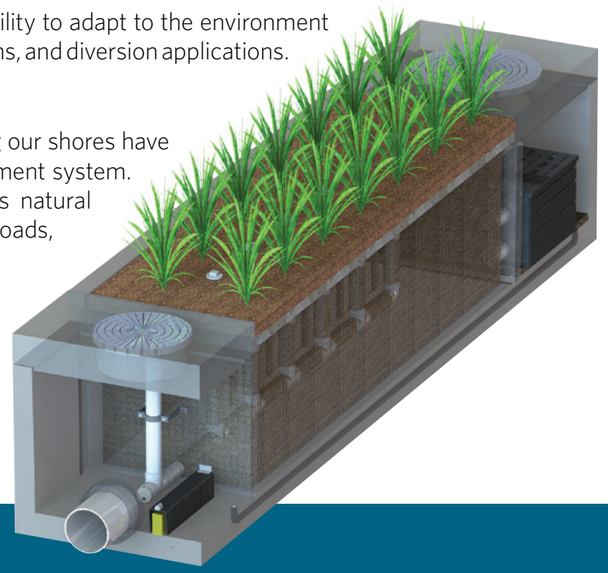
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

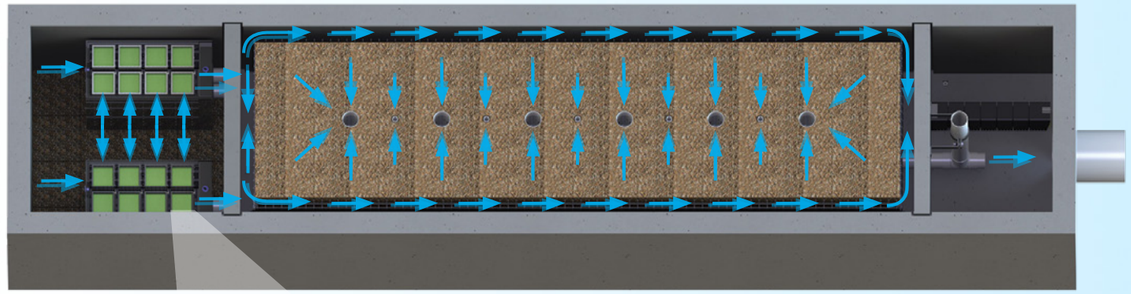


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



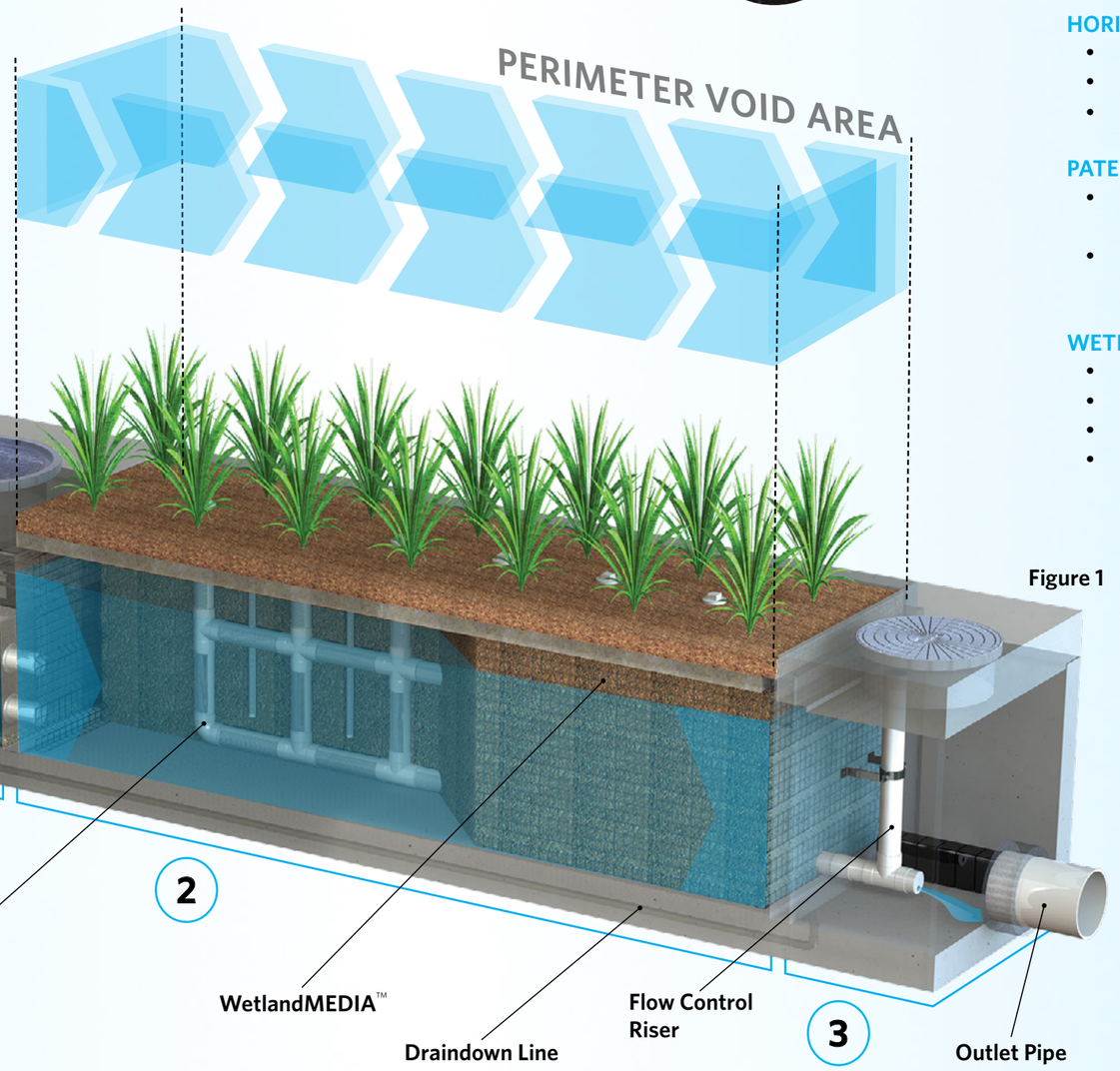


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

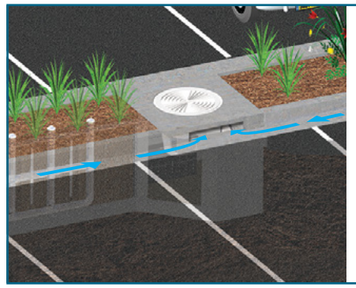
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





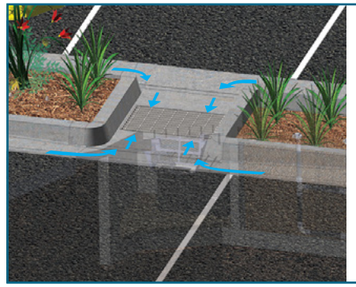
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



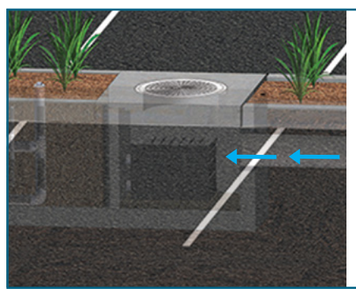
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

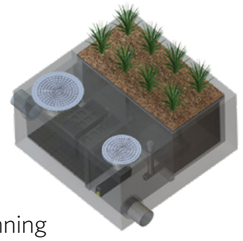


DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

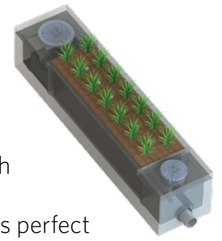
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

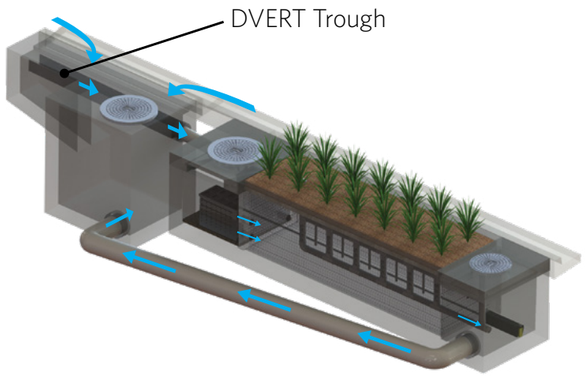
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



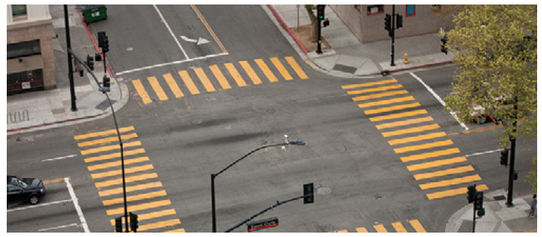
INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



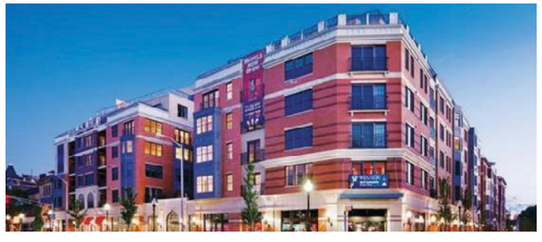
PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION



Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



Bio Clean
A Forterra Company

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/04/21 File: EX2YRB242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV - AREA C1 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
11-04-2021 EP

Drainage Area = 13.20(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.20(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 1645.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.312 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 25.50(Ft.)
Slope along watercourse = 81.8480 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.089 Hr.
Lag time = 5.35 Min.
25% of lag time = 1.34 Min.
40% of lag time = 2.14 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	2.40	31.68

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.20	6.20	81.84

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.200	90.10	0.000

Total Area Entered = 13.20(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

90.1 78.2 0.265 0.000 0.265 1.000 0.265
Sum (F) = 0.265

Area averaged mean soil loss (F) (In/Hr) = 0.265
Minimum soil loss rate ((In/Hr)) = 0.133
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	93.439	12.234	1.628
2	0.167	186.878	54.625	7.267
3	0.250	280.318	19.829	2.638
4	0.333	373.757	8.182	1.088
5	0.417	467.196	3.214	0.428
6	0.500	560.635	0.978	0.130
7	0.583	654.075	0.634	0.084
8	0.667	747.514	0.304	0.040
			Sum = 100.000	Sum= 13.303

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.471)	0.017	0.002
2	0.17	0.07	0.019	(0.469)	0.017	0.002
3	0.25	0.07	0.019	(0.467)	0.017	0.002
4	0.33	0.10	0.029	(0.465)	0.026	0.003
5	0.42	0.10	0.029	(0.463)	0.026	0.003
6	0.50	0.10	0.029	(0.462)	0.026	0.003
7	0.58	0.10	0.029	(0.460)	0.026	0.003
8	0.67	0.10	0.029	(0.458)	0.026	0.003
9	0.75	0.10	0.029	(0.456)	0.026	0.003
10	0.83	0.13	0.038	(0.454)	0.035	0.004
11	0.92	0.13	0.038	(0.453)	0.035	0.004
12	1.00	0.13	0.038	(0.451)	0.035	0.004
13	1.08	0.10	0.029	(0.449)	0.026	0.003
14	1.17	0.10	0.029	(0.447)	0.026	0.003
15	1.25	0.10	0.029	(0.445)	0.026	0.003
16	1.33	0.10	0.029	(0.444)	0.026	0.003
17	1.42	0.10	0.029	(0.442)	0.026	0.003
18	1.50	0.10	0.029	(0.440)	0.026	0.003
19	1.58	0.10	0.029	(0.438)	0.026	0.003
20	1.67	0.10	0.029	(0.437)	0.026	0.003
21	1.75	0.10	0.029	(0.435)	0.026	0.003
22	1.83	0.13	0.038	(0.433)	0.035	0.004
23	1.92	0.13	0.038	(0.431)	0.035	0.004
24	2.00	0.13	0.038	(0.430)	0.035	0.004
25	2.08	0.13	0.038	(0.428)	0.035	0.004
26	2.17	0.13	0.038	(0.426)	0.035	0.004
27	2.25	0.13	0.038	(0.424)	0.035	0.004
28	2.33	0.13	0.038	(0.423)	0.035	0.004
29	2.42	0.13	0.038	(0.421)	0.035	0.004
30	2.50	0.13	0.038	(0.419)	0.035	0.004
31	2.58	0.17	0.048	(0.418)	0.043	0.005
32	2.67	0.17	0.048	(0.416)	0.043	0.005
33	2.75	0.17	0.048	(0.414)	0.043	0.005
34	2.83	0.17	0.048	(0.412)	0.043	0.005
35	2.92	0.17	0.048	(0.411)	0.043	0.005
36	3.00	0.17	0.048	(0.409)	0.043	0.005
37	3.08	0.17	0.048	(0.407)	0.043	0.005
38	3.17	0.17	0.048	(0.406)	0.043	0.005
39	3.25	0.17	0.048	(0.404)	0.043	0.005
40	3.33	0.17	0.048	(0.402)	0.043	0.005
41	3.42	0.17	0.048	(0.401)	0.043	0.005
42	3.50	0.17	0.048	(0.399)	0.043	0.005

43	3.58	0.17	0.048	(0.397)	0.043	0.005
44	3.67	0.17	0.048	(0.396)	0.043	0.005
45	3.75	0.17	0.048	(0.394)	0.043	0.005
46	3.83	0.20	0.058	(0.392)	0.052	0.006
47	3.92	0.20	0.058	(0.391)	0.052	0.006
48	4.00	0.20	0.058	(0.389)	0.052	0.006
49	4.08	0.20	0.058	(0.387)	0.052	0.006
50	4.17	0.20	0.058	(0.386)	0.052	0.006
51	4.25	0.20	0.058	(0.384)	0.052	0.006
52	4.33	0.23	0.067	(0.382)	0.060	0.007
53	4.42	0.23	0.067	(0.381)	0.060	0.007
54	4.50	0.23	0.067	(0.379)	0.060	0.007
55	4.58	0.23	0.067	(0.377)	0.060	0.007
56	4.67	0.23	0.067	(0.376)	0.060	0.007
57	4.75	0.23	0.067	(0.374)	0.060	0.007
58	4.83	0.27	0.077	(0.373)	0.069	0.008
59	4.92	0.27	0.077	(0.371)	0.069	0.008
60	5.00	0.27	0.077	(0.369)	0.069	0.008
61	5.08	0.20	0.058	(0.368)	0.052	0.006
62	5.17	0.20	0.058	(0.366)	0.052	0.006
63	5.25	0.20	0.058	(0.365)	0.052	0.006
64	5.33	0.23	0.067	(0.363)	0.060	0.007
65	5.42	0.23	0.067	(0.361)	0.060	0.007
66	5.50	0.23	0.067	(0.360)	0.060	0.007
67	5.58	0.27	0.077	(0.358)	0.069	0.008
68	5.67	0.27	0.077	(0.357)	0.069	0.008
69	5.75	0.27	0.077	(0.355)	0.069	0.008
70	5.83	0.27	0.077	(0.354)	0.069	0.008
71	5.92	0.27	0.077	(0.352)	0.069	0.008
72	6.00	0.27	0.077	(0.350)	0.069	0.008
73	6.08	0.30	0.086	(0.349)	0.078	0.009
74	6.17	0.30	0.086	(0.347)	0.078	0.009
75	6.25	0.30	0.086	(0.346)	0.078	0.009
76	6.33	0.30	0.086	(0.344)	0.078	0.009
77	6.42	0.30	0.086	(0.343)	0.078	0.009
78	6.50	0.30	0.086	(0.341)	0.078	0.009
79	6.58	0.33	0.096	(0.340)	0.086	0.010
80	6.67	0.33	0.096	(0.338)	0.086	0.010
81	6.75	0.33	0.096	(0.337)	0.086	0.010
82	6.83	0.33	0.096	(0.335)	0.086	0.010
83	6.92	0.33	0.096	(0.334)	0.086	0.010
84	7.00	0.33	0.096	(0.332)	0.086	0.010
85	7.08	0.33	0.096	(0.331)	0.086	0.010
86	7.17	0.33	0.096	(0.329)	0.086	0.010
87	7.25	0.33	0.096	(0.327)	0.086	0.010
88	7.33	0.37	0.106	(0.326)	0.095	0.011
89	7.42	0.37	0.106	(0.325)	0.095	0.011
90	7.50	0.37	0.106	(0.323)	0.095	0.011
91	7.58	0.40	0.115	(0.322)	0.104	0.012
92	7.67	0.40	0.115	(0.320)	0.104	0.012
93	7.75	0.40	0.115	(0.319)	0.104	0.012
94	7.83	0.43	0.125	(0.317)	0.112	0.012
95	7.92	0.43	0.125	(0.316)	0.112	0.012
96	8.00	0.43	0.125	(0.314)	0.112	0.012
97	8.08	0.50	0.144	(0.313)	0.130	0.014
98	8.17	0.50	0.144	(0.311)	0.130	0.014
99	8.25	0.50	0.144	(0.310)	0.130	0.014
100	8.33	0.50	0.144	(0.308)	0.130	0.014
101	8.42	0.50	0.144	(0.307)	0.130	0.014
102	8.50	0.50	0.144	(0.305)	0.130	0.014
103	8.58	0.53	0.154	(0.304)	0.138	0.015
104	8.67	0.53	0.154	(0.303)	0.138	0.015
105	8.75	0.53	0.154	(0.301)	0.138	0.015
106	8.83	0.57	0.163	(0.300)	0.147	0.016
107	8.92	0.57	0.163	(0.298)	0.147	0.016
108	9.00	0.57	0.163	(0.297)	0.147	0.016
109	9.08	0.63	0.182	(0.296)	0.164	0.018
110	9.17	0.63	0.182	(0.294)	0.164	0.018
111	9.25	0.63	0.182	(0.293)	0.164	0.018
112	9.33	0.67	0.192	(0.291)	0.173	0.019
113	9.42	0.67	0.192	(0.290)	0.173	0.019
114	9.50	0.67	0.192	(0.289)	0.173	0.019
115	9.58	0.70	0.202	(0.287)	0.181	0.020
116	9.67	0.70	0.202	(0.286)	0.181	0.020
117	9.75	0.70	0.202	(0.284)	0.181	0.020

118	9.83	0.73	0.211	(	0.283)	0.190	0.021
119	9.92	0.73	0.211	(	0.282)	0.190	0.021
120	10.00	0.73	0.211	(	0.280)	0.190	0.021
121	10.08	0.50	0.144	(	0.279)	0.130	0.014
122	10.17	0.50	0.144	(	0.278)	0.130	0.014
123	10.25	0.50	0.144	(	0.276)	0.130	0.014
124	10.33	0.50	0.144	(	0.275)	0.130	0.014
125	10.42	0.50	0.144	(	0.274)	0.130	0.014
126	10.50	0.50	0.144	(	0.272)	0.130	0.014
127	10.58	0.67	0.192	(	0.271)	0.173	0.019
128	10.67	0.67	0.192	(	0.270)	0.173	0.019
129	10.75	0.67	0.192	(	0.268)	0.173	0.019
130	10.83	0.67	0.192	(	0.267)	0.173	0.019
131	10.92	0.67	0.192	(	0.266)	0.173	0.019
132	11.00	0.67	0.192	(	0.264)	0.173	0.019
133	11.08	0.63	0.182	(	0.263)	0.164	0.018
134	11.17	0.63	0.182	(	0.262)	0.164	0.018
135	11.25	0.63	0.182	(	0.260)	0.164	0.018
136	11.33	0.63	0.182	(	0.259)	0.164	0.018
137	11.42	0.63	0.182	(	0.258)	0.164	0.018
138	11.50	0.63	0.182	(	0.257)	0.164	0.018
139	11.58	0.57	0.163	(	0.255)	0.147	0.016
140	11.67	0.57	0.163	(	0.254)	0.147	0.016
141	11.75	0.57	0.163	(	0.253)	0.147	0.016
142	11.83	0.60	0.173	(	0.252)	0.156	0.017
143	11.92	0.60	0.173	(	0.250)	0.156	0.017
144	12.00	0.60	0.173	(	0.249)	0.156	0.017
145	12.08	0.83	0.240	(	0.248)	0.216	0.024
146	12.17	0.83	0.240	(	0.247)	0.216	0.024
147	12.25	0.83	0.240	(	0.245)	0.216	0.024
148	12.33	0.87	0.250	(	0.244)	0.225	0.025
149	12.42	0.87	0.250	(	0.243)	0.225	0.025
150	12.50	0.87	0.250	(	0.242)	0.225	0.025
151	12.58	0.93	0.269		0.240	(0.242)	0.028
152	12.67	0.93	0.269		0.239	(0.242)	0.030
153	12.75	0.93	0.269		0.238	(0.242)	0.031
154	12.83	0.97	0.278		0.237	(0.251)	0.042
155	12.92	0.97	0.278		0.236	(0.251)	0.043
156	13.00	0.97	0.278		0.234	(0.251)	0.044
157	13.08	1.13	0.326		0.233	(0.294)	0.093
158	13.17	1.13	0.326		0.232	(0.294)	0.094
159	13.25	1.13	0.326		0.231	(0.294)	0.096
160	13.33	1.13	0.326		0.230	(0.294)	0.097
161	13.42	1.13	0.326		0.229	(0.294)	0.098
162	13.50	1.13	0.326		0.227	(0.294)	0.099
163	13.58	0.77	0.221	(	0.226)	0.199	0.022
164	13.67	0.77	0.221	(	0.225)	0.199	0.022
165	13.75	0.77	0.221	(	0.224)	0.199	0.022
166	13.83	0.77	0.221	(	0.223)	0.199	0.022
167	13.92	0.77	0.221	(	0.222)	0.199	0.022
168	14.00	0.77	0.221	(	0.221)	0.199	0.022
169	14.08	0.90	0.259		0.219	(0.233)	0.040
170	14.17	0.90	0.259		0.218	(0.233)	0.041
171	14.25	0.90	0.259		0.217	(0.233)	0.042
172	14.33	0.87	0.250		0.216	(0.225)	0.034
173	14.42	0.87	0.250		0.215	(0.225)	0.035
174	14.50	0.87	0.250		0.214	(0.225)	0.036
175	14.58	0.87	0.250		0.213	(0.225)	0.037
176	14.67	0.87	0.250		0.212	(0.225)	0.038
177	14.75	0.87	0.250		0.211	(0.225)	0.039
178	14.83	0.83	0.240		0.209	(0.216)	0.031
179	14.92	0.83	0.240		0.208	(0.216)	0.032
180	15.00	0.83	0.240		0.207	(0.216)	0.033
181	15.08	0.80	0.230		0.206	(0.207)	0.024
182	15.17	0.80	0.230		0.205	(0.207)	0.025
183	15.25	0.80	0.230		0.204	(0.207)	0.026
184	15.33	0.77	0.221	(	0.203)	0.199	0.022
185	15.42	0.77	0.221	(	0.202)	0.199	0.022
186	15.50	0.77	0.221	(	0.201)	0.199	0.022
187	15.58	0.63	0.182	(	0.200)	0.164	0.018
188	15.67	0.63	0.182	(	0.199)	0.164	0.018
189	15.75	0.63	0.182	(	0.198)	0.164	0.018
190	15.83	0.63	0.182	(	0.197)	0.164	0.018
191	15.92	0.63	0.182	(	0.196)	0.164	0.018
192	16.00	0.63	0.182	(	0.195)	0.164	0.018

193	16.08	0.13	0.038	(0.194)	0.035	0.004
194	16.17	0.13	0.038	(0.193)	0.035	0.004
195	16.25	0.13	0.038	(0.192)	0.035	0.004
196	16.33	0.13	0.038	(0.191)	0.035	0.004
197	16.42	0.13	0.038	(0.190)	0.035	0.004
198	16.50	0.13	0.038	(0.189)	0.035	0.004
199	16.58	0.10	0.029	(0.188)	0.026	0.003
200	16.67	0.10	0.029	(0.187)	0.026	0.003
201	16.75	0.10	0.029	(0.186)	0.026	0.003
202	16.83	0.10	0.029	(0.185)	0.026	0.003
203	16.92	0.10	0.029	(0.184)	0.026	0.003
204	17.00	0.10	0.029	(0.183)	0.026	0.003
205	17.08	0.17	0.048	(0.182)	0.043	0.005
206	17.17	0.17	0.048	(0.182)	0.043	0.005
207	17.25	0.17	0.048	(0.181)	0.043	0.005
208	17.33	0.17	0.048	(0.180)	0.043	0.005
209	17.42	0.17	0.048	(0.179)	0.043	0.005
210	17.50	0.17	0.048	(0.178)	0.043	0.005
211	17.58	0.17	0.048	(0.177)	0.043	0.005
212	17.67	0.17	0.048	(0.176)	0.043	0.005
213	17.75	0.17	0.048	(0.175)	0.043	0.005
214	17.83	0.13	0.038	(0.174)	0.035	0.004
215	17.92	0.13	0.038	(0.174)	0.035	0.004
216	18.00	0.13	0.038	(0.173)	0.035	0.004
217	18.08	0.13	0.038	(0.172)	0.035	0.004
218	18.17	0.13	0.038	(0.171)	0.035	0.004
219	18.25	0.13	0.038	(0.170)	0.035	0.004
220	18.33	0.13	0.038	(0.169)	0.035	0.004
221	18.42	0.13	0.038	(0.168)	0.035	0.004
222	18.50	0.13	0.038	(0.168)	0.035	0.004
223	18.58	0.10	0.029	(0.167)	0.026	0.003
224	18.67	0.10	0.029	(0.166)	0.026	0.003
225	18.75	0.10	0.029	(0.165)	0.026	0.003
226	18.83	0.07	0.019	(0.164)	0.017	0.002
227	18.92	0.07	0.019	(0.164)	0.017	0.002
228	19.00	0.07	0.019	(0.163)	0.017	0.002
229	19.08	0.10	0.029	(0.162)	0.026	0.003
230	19.17	0.10	0.029	(0.161)	0.026	0.003
231	19.25	0.10	0.029	(0.161)	0.026	0.003
232	19.33	0.13	0.038	(0.160)	0.035	0.004
233	19.42	0.13	0.038	(0.159)	0.035	0.004
234	19.50	0.13	0.038	(0.158)	0.035	0.004
235	19.58	0.10	0.029	(0.158)	0.026	0.003
236	19.67	0.10	0.029	(0.157)	0.026	0.003
237	19.75	0.10	0.029	(0.156)	0.026	0.003
238	19.83	0.07	0.019	(0.156)	0.017	0.002
239	19.92	0.07	0.019	(0.155)	0.017	0.002
240	20.00	0.07	0.019	(0.154)	0.017	0.002
241	20.08	0.10	0.029	(0.153)	0.026	0.003
242	20.17	0.10	0.029	(0.153)	0.026	0.003
243	20.25	0.10	0.029	(0.152)	0.026	0.003
244	20.33	0.10	0.029	(0.151)	0.026	0.003
245	20.42	0.10	0.029	(0.151)	0.026	0.003
246	20.50	0.10	0.029	(0.150)	0.026	0.003
247	20.58	0.10	0.029	(0.150)	0.026	0.003
248	20.67	0.10	0.029	(0.149)	0.026	0.003
249	20.75	0.10	0.029	(0.148)	0.026	0.003
250	20.83	0.07	0.019	(0.148)	0.017	0.002
251	20.92	0.07	0.019	(0.147)	0.017	0.002
252	21.00	0.07	0.019	(0.147)	0.017	0.002
253	21.08	0.10	0.029	(0.146)	0.026	0.003
254	21.17	0.10	0.029	(0.145)	0.026	0.003
255	21.25	0.10	0.029	(0.145)	0.026	0.003
256	21.33	0.07	0.019	(0.144)	0.017	0.002
257	21.42	0.07	0.019	(0.144)	0.017	0.002
258	21.50	0.07	0.019	(0.143)	0.017	0.002
259	21.58	0.10	0.029	(0.143)	0.026	0.003
260	21.67	0.10	0.029	(0.142)	0.026	0.003
261	21.75	0.10	0.029	(0.142)	0.026	0.003
262	21.83	0.07	0.019	(0.141)	0.017	0.002
263	21.92	0.07	0.019	(0.141)	0.017	0.002
264	22.00	0.07	0.019	(0.140)	0.017	0.002
265	22.08	0.10	0.029	(0.140)	0.026	0.003
266	22.17	0.10	0.029	(0.139)	0.026	0.003
267	22.25	0.10	0.029	(0.139)	0.026	0.003

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268  22.33     0.07      0.019       (  0.138)       0.017        0.002
269  22.42     0.07      0.019       (  0.138)       0.017        0.002
270  22.50     0.07      0.019       (  0.138)       0.017        0.002
271  22.58     0.07      0.019       (  0.137)       0.017        0.002
272  22.67     0.07      0.019       (  0.137)       0.017        0.002
273  22.75     0.07      0.019       (  0.136)       0.017        0.002
274  22.83     0.07      0.019       (  0.136)       0.017        0.002
275  22.92     0.07      0.019       (  0.136)       0.017        0.002
276  23.00     0.07      0.019       (  0.135)       0.017        0.002
277  23.08     0.07      0.019       (  0.135)       0.017        0.002
278  23.17     0.07      0.019       (  0.135)       0.017        0.002
279  23.25     0.07      0.019       (  0.134)       0.017        0.002
280  23.33     0.07      0.019       (  0.134)       0.017        0.002
281  23.42     0.07      0.019       (  0.134)       0.017        0.002
282  23.50     0.07      0.019       (  0.134)       0.017        0.002
283  23.58     0.07      0.019       (  0.133)       0.017        0.002
284  23.67     0.07      0.019       (  0.133)       0.017        0.002
285  23.75     0.07      0.019       (  0.133)       0.017        0.002
286  23.83     0.07      0.019       (  0.133)       0.017        0.002
287  23.92     0.07      0.019       (  0.133)       0.017        0.002
288  24.00     0.07      0.019       (  0.133)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     3.5
      Flood volume = Effective rainfall      0.29(In)
       times area      13.2(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      2.11(In)
      Total soil loss =     2.323(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       13798.0 Cubic Feet
      Total soil loss =      101197.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.290(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0001      0.02  Q         |         |         |         |
   0+15       0.0003      0.02  Q         |         |         |         |
   0+20       0.0005      0.03  Q         |         |         |         |
   0+25       0.0007      0.03  Q         |         |         |         |
   0+30       0.0010      0.04  Q         |         |         |         |
   0+35       0.0012      0.04  Q         |         |         |         |
   0+40       0.0015      0.04  Q         |         |         |         |
   0+45       0.0017      0.04  Q         |         |         |         |
   0+50       0.0020      0.04  Q         |         |         |         |
   0+55       0.0023      0.05  Q         |         |         |         |
   1+ 0       0.0027      0.05  Q         |         |         |         |
   1+ 5       0.0030      0.05  Q         |         |         |         |
   1+10       0.0033      0.04  Q         |         |         |         |
   1+15       0.0036      0.04  Q         |         |         |         |
   1+20       0.0038      0.04  Q         |         |         |         |
   1+25       0.0041      0.04  Q         |         |         |         |
   1+30       0.0044      0.04  Q         |         |         |         |
   1+35       0.0046      0.04  Q         |         |         |         |
   1+40       0.0049      0.04  Q         |         |         |         |
   1+45       0.0052      0.04  Q         |         |         |         |
   1+50       0.0054      0.04  Q         |         |         |         |
   1+55       0.0058      0.05  Q         |         |         |         |
   2+ 0       0.0061      0.05  Q         |         |         |         |
   2+ 5       0.0065      0.05  Q         |         |         |         |
   2+10       0.0068      0.05  Q         |         |         |         |
   2+15       0.0072      0.05  Q         |         |         |         |
   2+20       0.0075      0.05  Q         |         |         |         |
   2+25       0.0079      0.05  Q         |         |         |         |
   2+30       0.0082      0.05  QV        |         |         |         |
   2+35       0.0086      0.05  QV        |         |         |         |
   2+40       0.0090      0.06  QV        |         |         |         |
   2+45       0.0094      0.06  QV        |         |         |         |
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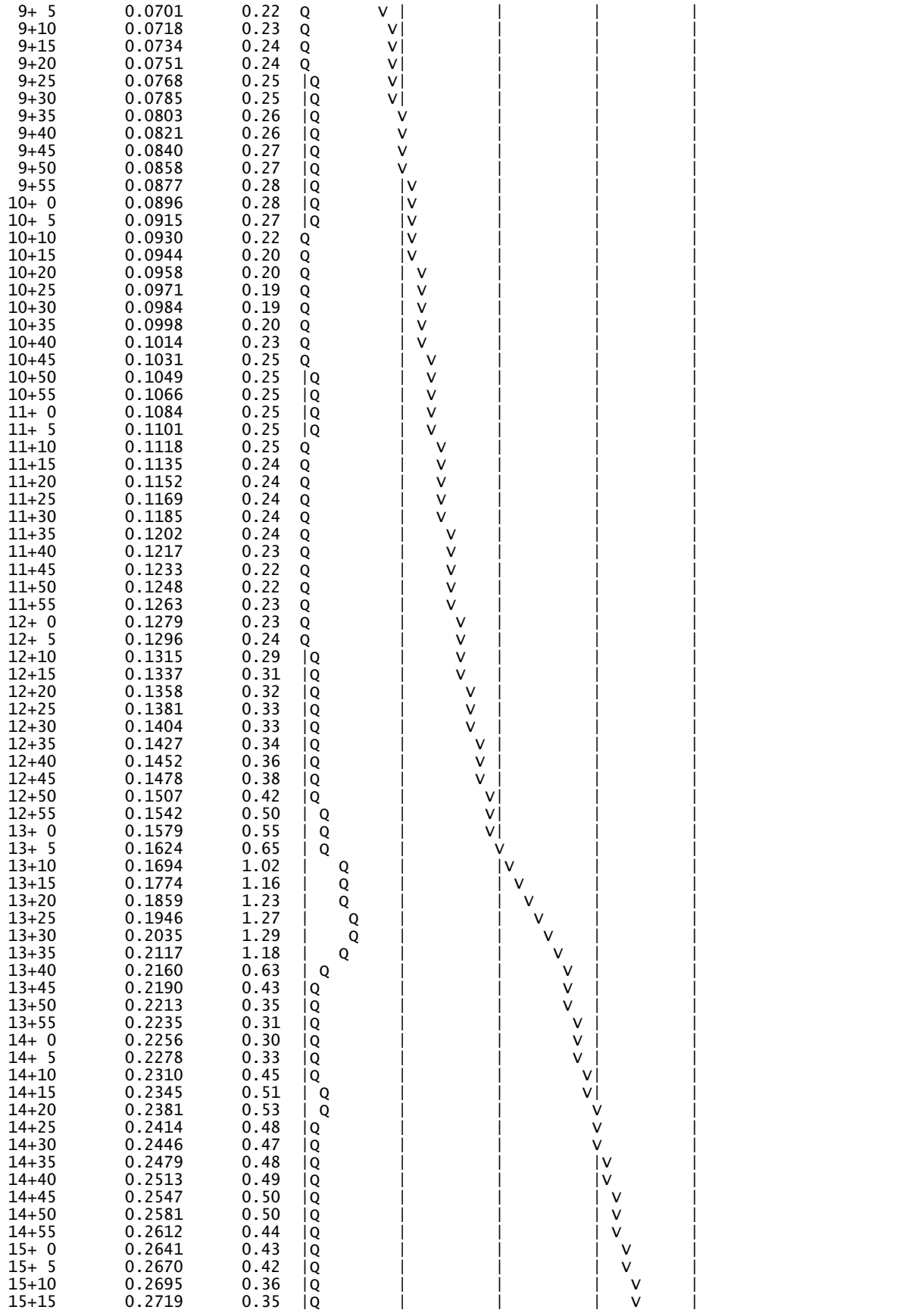
2+50       0.0098      0.06  QV        |         |         |         |
2+55       0.0103      0.06  QV        |         |         |         |
3+ 0       0.0107      0.06  QV        |         |         |         |
3+ 5       0.0112      0.06  QV        |         |         |         |
3+10       0.0116      0.06  QV        |         |         |         |
3+15       0.0120      0.06  QV        |         |         |         |
3+20       0.0125      0.06  QV        |         |         |         |
3+25       0.0129      0.06  QV        |         |         |         |
3+30       0.0134      0.06  QV        |         |         |         |
3+35       0.0138      0.06  QV        |         |         |         |
3+40       0.0142      0.06  QV        |         |         |         |
3+45       0.0147      0.06  QV        |         |         |         |
3+50       0.0151      0.07  QV        |         |         |         |
3+55       0.0156      0.07  QV        |         |         |         |
4+ 0       0.0162      0.07  Q V       |         |         |         |
4+ 5       0.0167      0.08  Q V       |         |         |         |
4+10       0.0172      0.08  Q V       |         |         |         |
4+15       0.0177      0.08  Q V       |         |         |         |
4+20       0.0183      0.08  Q V       |         |         |         |
4+25       0.0189      0.09  Q V       |         |         |         |
4+30       0.0195      0.09  Q V       |         |         |         |
4+35       0.0201      0.09  Q V       |         |         |         |
4+40       0.0207      0.09  Q V       |         |         |         |
4+45       0.0213      0.09  Q V       |         |         |         |
4+50       0.0219      0.09  Q V       |         |         |         |
4+55       0.0226      0.10  Q V       |         |         |         |
5+ 0       0.0233      0.10  Q V       |         |         |         |
5+ 5       0.0240      0.10  Q  V      |         |         |         |
5+10       0.0246      0.08  Q  V      |         |         |         |
5+15       0.0251      0.08  Q  V      |         |         |         |
5+20       0.0257      0.08  Q  V      |         |         |         |
5+25       0.0262      0.09  Q  V      |         |         |         |
5+30       0.0268      0.09  Q  V      |         |         |         |
5+35       0.0275      0.09  Q  V      |         |         |         |
5+40       0.0281      0.10  Q  V      |         |         |         |
5+45       0.0288      0.10  Q  V      |         |         |         |
5+50       0.0295      0.10  Q  V      |         |         |         |
5+55       0.0302      0.10  Q  V      |         |         |         |
6+ 0       0.0309      0.10  Q  V      |         |         |         |
6+ 5       0.0317      0.10  Q  V      |         |         |         |
6+10       0.0324      0.11  Q   V     |         |         |         |
6+15       0.0332      0.11  Q   V     |         |         |         |
6+20       0.0340      0.11  Q   V     |         |         |         |
6+25       0.0348      0.11  Q   V     |         |         |         |
6+30       0.0356      0.11  Q   V     |         |         |         |
6+35       0.0364      0.12  Q   V     |         |         |         |
6+40       0.0372      0.12  Q   V     |         |         |         |
6+45       0.0381      0.13  Q   V     |         |         |         |
6+50       0.0390      0.13  Q   V     |         |         |         |
6+55       0.0398      0.13  Q    V    |         |         |         |
7+ 0       0.0407      0.13  Q    V    |         |         |         |
7+ 5       0.0416      0.13  Q    V    |         |         |         |
7+10       0.0425      0.13  Q    V    |         |         |         |
7+15       0.0434      0.13  Q    V    |         |         |         |
7+20       0.0443      0.13  Q    V    |         |         |         |
7+25       0.0452      0.14  Q    V    |         |         |         |
7+30       0.0461      0.14  Q    V    |         |         |         |
7+35       0.0471      0.14  Q    V    |         |         |         |
7+40       0.0481      0.15  Q     V   |         |         |         |
7+45       0.0492      0.15  Q     V   |         |         |         |
7+50       0.0503      0.15  Q     V   |         |         |         |
7+55       0.0514      0.16  Q     V   |         |         |         |
8+ 0       0.0525      0.16  Q     V   |         |         |         |
8+ 5       0.0537      0.17  Q     V   |         |         |         |
8+10       0.0549      0.18  Q     V   |         |         |         |
8+15       0.0562      0.19  Q      V  |         |         |         |
8+20       0.0575      0.19  Q      V  |         |         |         |
8+25       0.0588      0.19  Q      V  |         |         |         |
8+30       0.0602      0.19  Q      V  |         |         |         |
8+35       0.0615      0.19  Q      V  |         |         |         |
8+40       0.0629      0.20  Q      V  |         |         |         |
8+45       0.0643      0.20  Q       V |         |         |         |
8+50       0.0657      0.21  Q       V |         |         |         |
8+55       0.0671      0.21  Q       V |         |         |         |
9+ 0       0.0686      0.22  Q       V |         |         |         |
```



15+20	0.2742	0.34	|Q	|	|	|	V |
15+25	0.2764	0.31	|Q	|	|	|	V |
15+30	0.2785	0.30	|Q	|	|	|	V |
15+35	0.2805	0.29	|Q	|	|	|	V |
15+40	0.2823	0.26	|Q	|	|	|	V |
15+45	0.2840	0.25	|Q	|	|	|	V |
15+50	0.2857	0.25	Q	|	|	|	V |
15+55	0.2874	0.24	Q	|	|	|	V |
16+ 0	0.2890	0.24	Q	|	|	|	V |
16+ 5	0.2905	0.22	Q	|	|	|	V |
16+10	0.2913	0.11	Q	|	|	|	V |
16+15	0.2919	0.08	Q	|	|	|	V |
16+20	0.2923	0.06	Q	|	|	|	V |
16+25	0.2927	0.05	Q	|	|	|	V |
16+30	0.2930	0.05	Q	|	|	|	V |
16+35	0.2934	0.05	Q	|	|	|	V |
16+40	0.2937	0.04	Q	|	|	|	V |
16+45	0.2939	0.04	Q	|	|	|	V |
16+50	0.2942	0.04	Q	|	|	|	V |
16+55	0.2945	0.04	Q	|	|	|	V |
17+ 0	0.2947	0.04	Q	|	|	|	V |
17+ 5	0.2950	0.04	Q	|	|	|	V |
17+10	0.2954	0.06	Q	|	|	|	V |
17+15	0.2958	0.06	Q	|	|	|	V |
17+20	0.2962	0.06	Q	|	|	|	V |
17+25	0.2967	0.06	Q	|	|	|	V |
17+30	0.2971	0.06	Q	|	|	|	V |
17+35	0.2976	0.06	Q	|	|	|	V |
17+40	0.2980	0.06	Q	|	|	|	V |
17+45	0.2984	0.06	Q	|	|	|	V |
17+50	0.2989	0.06	Q	|	|	|	V |
17+55	0.2993	0.06	Q	|	|	|	V |
18+ 0	0.2996	0.05	Q	|	|	|	V |
18+ 5	0.3000	0.05	Q	|	|	|	V |
18+10	0.3003	0.05	Q	|	|	|	V |
18+15	0.3007	0.05	Q	|	|	|	V |
18+20	0.3010	0.05	Q	|	|	|	V |
18+25	0.3014	0.05	Q	|	|	|	V |
18+30	0.3017	0.05	Q	|	|	|	V |
18+35	0.3021	0.05	Q	|	|	|	V |
18+40	0.3024	0.04	Q	|	|	|	V |
18+45	0.3026	0.04	Q	|	|	|	V |
18+50	0.3029	0.04	Q	|	|	|	V |
18+55	0.3031	0.03	Q	|	|	|	V |
19+ 0	0.3033	0.03	Q	|	|	|	V |
19+ 5	0.3035	0.03	Q	|	|	|	V |
19+10	0.3037	0.03	Q	|	|	|	V |
19+15	0.3040	0.04	Q	|	|	|	V |
19+20	0.3043	0.04	Q	|	|	|	V |
19+25	0.3046	0.05	Q	|	|	|	V |
19+30	0.3049	0.05	Q	|	|	|	V |
19+35	0.3052	0.05	Q	|	|	|	V |
19+40	0.3055	0.04	Q	|	|	|	V |
19+45	0.3058	0.04	Q	|	|	|	V |
19+50	0.3061	0.04	Q	|	|	|	V |
19+55	0.3063	0.03	Q	|	|	|	V |
20+ 0	0.3065	0.03	Q	|	|	|	V |
20+ 5	0.3067	0.03	Q	|	|	|	V |
20+10	0.3069	0.03	Q	|	|	|	V |
20+15	0.3071	0.04	Q	|	|	|	V |
20+20	0.3074	0.04	Q	|	|	|	V |
20+25	0.3077	0.04	Q	|	|	|	V |
20+30	0.3079	0.04	Q	|	|	|	V |
20+35	0.3082	0.04	Q	|	|	|	V |
20+40	0.3085	0.04	Q	|	|	|	V |
20+45	0.3087	0.04	Q	|	|	|	V |
20+50	0.3090	0.04	Q	|	|	|	V|
20+55	0.3092	0.03	Q	|	|	|	V|
21+ 0	0.3094	0.03	Q	|	|	|	V|
21+ 5	0.3096	0.03	Q	|	|	|	V|
21+10	0.3098	0.03	Q	|	|	|	V|
21+15	0.3101	0.04	Q	|	|	|	V|
21+20	0.3103	0.04	Q	|	|	|	V|
21+25	0.3105	0.03	Q	|	|	|	V|
21+30	0.3107	0.03	Q	|	|	|	V|

21+35	0.3109	0.03	Q	|	|	|	V|
21+40	0.3111	0.03	Q	|	|	|	V|
21+45	0.3114	0.04	Q	|	|	|	V|
21+50	0.3116	0.04	Q	|	|	|	V|
21+55	0.3118	0.03	Q	|	|	|	V|
22+ 0	0.3120	0.03	Q	|	|	|	V|
22+ 5	0.3122	0.03	Q	|	|	|	V|
22+10	0.3124	0.03	Q	|	|	|	V|
22+15	0.3127	0.04	Q	|	|	|	V|
22+20	0.3129	0.04	Q	|	|	|	V|
22+25	0.3131	0.03	Q	|	|	|	V|
22+30	0.3133	0.03	Q	|	|	|	V|
22+35	0.3135	0.03	Q	|	|	|	V|
22+40	0.3137	0.03	Q	|	|	|	V|
22+45	0.3139	0.03	Q	|	|	|	V|
22+50	0.3140	0.03	Q	|	|	|	V|
22+55	0.3142	0.03	Q	|	|	|	V|
23+ 0	0.3144	0.03	Q	|	|	|	V|
23+ 5	0.3146	0.03	Q	|	|	|	V|
23+10	0.3147	0.03	Q	|	|	|	V|
23+15	0.3149	0.03	Q	|	|	|	V|
23+20	0.3151	0.03	Q	|	|	|	V|
23+25	0.3153	0.03	Q	|	|	|	V|
23+30	0.3155	0.03	Q	|	|	|	V|
23+35	0.3156	0.03	Q	|	|	|	V|
23+40	0.3158	0.03	Q	|	|	|	V|
23+45	0.3160	0.03	Q	|	|	|	V|
23+50	0.3162	0.03	Q	|	|	|	V|
23+55	0.3163	0.03	Q	|	|	|	V|
24+ 0	0.3165	0.03	Q	|	|	|	V|
24+ 5	0.3167	0.02	Q	|	|	|	V|
24+10	0.3167	0.01	Q	|	|	|	V|
24+15	0.3167	0.00	Q	|	|	|	V|
24+20	0.3168	0.00	Q	|	|	|	V|
24+25	0.3168	0.00	Q	|	|	|	V|
24+30	0.3168	0.00	Q	|	|	|	V|
24+35	0.3168	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/04/21 File: EX2YRC2242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV - AREA C2 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
11-04-2021 EP

Drainage Area = 11.80(Ac.) = 0.018 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.80(Ac.) = 0.018 Sq. Mi.
Length along longest watercourse = 1321.00(Ft.)
Length along longest watercourse measured to centroid = 574.00(Ft.)
Length along longest watercourse = 0.250 Mi.
Length along longest watercourse measured to centroid = 0.109 Mi.
Difference in elevation = 18.60(Ft.)
Slope along watercourse = 74.3437 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.081 Hr.
Lag time = 4.84 Min.
25% of lag time = 1.21 Min.
40% of lag time = 1.94 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.80	2.40	28.32

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.80	6.20	73.16

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.800	87.20	0.000

Total Area Entered = 11.80(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

87.2 73.5 0.320 0.000 0.320 1.000 0.320
Sum (F) = 0.320

Area averaged mean soil loss (F) (In/Hr) = 0.320
Minimum soil loss rate ((In/Hr)) = 0.160
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	103.251	15.573	1.852
2	0.167	206.502	55.967	6.656
3	0.250	309.753	17.879	2.126
4	0.333	413.005	7.058	0.839
5	0.417	516.256	2.151	0.256
6	0.500	619.507	0.819	0.097
7	0.583	722.758	0.553	0.066
			Sum = 100.000	Sum= 11.892

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.568)	0.017	0.002
2	0.17	0.07	0.019	(0.566)	0.017	0.002
3	0.25	0.07	0.019	(0.564)	0.017	0.002
4	0.33	0.10	0.029	(0.562)	0.026	0.003
5	0.42	0.10	0.029	(0.559)	0.026	0.003
6	0.50	0.10	0.029	(0.557)	0.026	0.003
7	0.58	0.10	0.029	(0.555)	0.026	0.003
8	0.67	0.10	0.029	(0.553)	0.026	0.003
9	0.75	0.10	0.029	(0.551)	0.026	0.003
10	0.83	0.13	0.038	(0.548)	0.035	0.004
11	0.92	0.13	0.038	(0.546)	0.035	0.004
12	1.00	0.13	0.038	(0.544)	0.035	0.004
13	1.08	0.10	0.029	(0.542)	0.026	0.003
14	1.17	0.10	0.029	(0.540)	0.026	0.003
15	1.25	0.10	0.029	(0.538)	0.026	0.003
16	1.33	0.10	0.029	(0.536)	0.026	0.003
17	1.42	0.10	0.029	(0.533)	0.026	0.003
18	1.50	0.10	0.029	(0.531)	0.026	0.003
19	1.58	0.10	0.029	(0.529)	0.026	0.003
20	1.67	0.10	0.029	(0.527)	0.026	0.003
21	1.75	0.10	0.029	(0.525)	0.026	0.003
22	1.83	0.13	0.038	(0.523)	0.035	0.004
23	1.92	0.13	0.038	(0.521)	0.035	0.004
24	2.00	0.13	0.038	(0.519)	0.035	0.004
25	2.08	0.13	0.038	(0.517)	0.035	0.004
26	2.17	0.13	0.038	(0.514)	0.035	0.004
27	2.25	0.13	0.038	(0.512)	0.035	0.004
28	2.33	0.13	0.038	(0.510)	0.035	0.004
29	2.42	0.13	0.038	(0.508)	0.035	0.004
30	2.50	0.13	0.038	(0.506)	0.035	0.004
31	2.58	0.17	0.048	(0.504)	0.043	0.005
32	2.67	0.17	0.048	(0.502)	0.043	0.005
33	2.75	0.17	0.048	(0.500)	0.043	0.005
34	2.83	0.17	0.048	(0.498)	0.043	0.005
35	2.92	0.17	0.048	(0.496)	0.043	0.005
36	3.00	0.17	0.048	(0.494)	0.043	0.005
37	3.08	0.17	0.048	(0.492)	0.043	0.005
38	3.17	0.17	0.048	(0.490)	0.043	0.005
39	3.25	0.17	0.048	(0.488)	0.043	0.005
40	3.33	0.17	0.048	(0.486)	0.043	0.005
41	3.42	0.17	0.048	(0.484)	0.043	0.005
42	3.50	0.17	0.048	(0.482)	0.043	0.005
43	3.58	0.17	0.048	(0.480)	0.043	0.005

44	3.67	0.17	0.048	(0.478)	0.043	0.005
45	3.75	0.17	0.048	(0.476)	0.043	0.005
46	3.83	0.20	0.058	(0.474)	0.052	0.006
47	3.92	0.20	0.058	(0.472)	0.052	0.006
48	4.00	0.20	0.058	(0.470)	0.052	0.006
49	4.08	0.20	0.058	(0.468)	0.052	0.006
50	4.17	0.20	0.058	(0.466)	0.052	0.006
51	4.25	0.20	0.058	(0.464)	0.052	0.006
52	4.33	0.23	0.067	(0.462)	0.060	0.007
53	4.42	0.23	0.067	(0.460)	0.060	0.007
54	4.50	0.23	0.067	(0.458)	0.060	0.007
55	4.58	0.23	0.067	(0.456)	0.060	0.007
56	4.67	0.23	0.067	(0.454)	0.060	0.007
57	4.75	0.23	0.067	(0.452)	0.060	0.007
58	4.83	0.27	0.077	(0.450)	0.069	0.008
59	4.92	0.27	0.077	(0.448)	0.069	0.008
60	5.00	0.27	0.077	(0.446)	0.069	0.008
61	5.08	0.20	0.058	(0.444)	0.052	0.006
62	5.17	0.20	0.058	(0.442)	0.052	0.006
63	5.25	0.20	0.058	(0.440)	0.052	0.006
64	5.33	0.23	0.067	(0.438)	0.060	0.007
65	5.42	0.23	0.067	(0.436)	0.060	0.007
66	5.50	0.23	0.067	(0.434)	0.060	0.007
67	5.58	0.27	0.077	(0.432)	0.069	0.008
68	5.67	0.27	0.077	(0.431)	0.069	0.008
69	5.75	0.27	0.077	(0.429)	0.069	0.008
70	5.83	0.27	0.077	(0.427)	0.069	0.008
71	5.92	0.27	0.077	(0.425)	0.069	0.008
72	6.00	0.27	0.077	(0.423)	0.069	0.008
73	6.08	0.30	0.086	(0.421)	0.078	0.009
74	6.17	0.30	0.086	(0.419)	0.078	0.009
75	6.25	0.30	0.086	(0.417)	0.078	0.009
76	6.33	0.30	0.086	(0.416)	0.078	0.009
77	6.42	0.30	0.086	(0.414)	0.078	0.009
78	6.50	0.30	0.086	(0.412)	0.078	0.009
79	6.58	0.33	0.096	(0.410)	0.086	0.010
80	6.67	0.33	0.096	(0.408)	0.086	0.010
81	6.75	0.33	0.096	(0.406)	0.086	0.010
82	6.83	0.33	0.096	(0.404)	0.086	0.010
83	6.92	0.33	0.096	(0.403)	0.086	0.010
84	7.00	0.33	0.096	(0.401)	0.086	0.010
85	7.08	0.33	0.096	(0.399)	0.086	0.010
86	7.17	0.33	0.096	(0.397)	0.086	0.010
87	7.25	0.33	0.096	(0.395)	0.086	0.010
88	7.33	0.37	0.106	(0.394)	0.095	0.011
89	7.42	0.37	0.106	(0.392)	0.095	0.011
90	7.50	0.37	0.106	(0.390)	0.095	0.011
91	7.58	0.40	0.115	(0.388)	0.104	0.012
92	7.67	0.40	0.115	(0.386)	0.104	0.012
93	7.75	0.40	0.115	(0.385)	0.104	0.012
94	7.83	0.43	0.125	(0.383)	0.112	0.012
95	7.92	0.43	0.125	(0.381)	0.112	0.012
96	8.00	0.43	0.125	(0.379)	0.112	0.012
97	8.08	0.50	0.144	(0.377)	0.130	0.014
98	8.17	0.50	0.144	(0.376)	0.130	0.014
99	8.25	0.50	0.144	(0.374)	0.130	0.014
100	8.33	0.50	0.144	(0.372)	0.130	0.014
101	8.42	0.50	0.144	(0.371)	0.130	0.014
102	8.50	0.50	0.144	(0.369)	0.130	0.014
103	8.58	0.53	0.154	(0.367)	0.138	0.015
104	8.67	0.53	0.154	(0.365)	0.138	0.015
105	8.75	0.53	0.154	(0.364)	0.138	0.015
106	8.83	0.57	0.163	(0.362)	0.147	0.016
107	8.92	0.57	0.163	(0.360)	0.147	0.016
108	9.00	0.57	0.163	(0.358)	0.147	0.016
109	9.08	0.63	0.182	(0.357)	0.164	0.018
110	9.17	0.63	0.182	(0.355)	0.164	0.018
111	9.25	0.63	0.182	(0.353)	0.164	0.018
112	9.33	0.67	0.192	(0.352)	0.173	0.019
113	9.42	0.67	0.192	(0.350)	0.173	0.019
114	9.50	0.67	0.192	(0.348)	0.173	0.019
115	9.58	0.70	0.202	(0.347)	0.181	0.020
116	9.67	0.70	0.202	(0.345)	0.181	0.020
117	9.75	0.70	0.202	(0.343)	0.181	0.020
118	9.83	0.73	0.211	(0.342)	0.190	0.021

119	9.92	0.73	0.211	(0.340)	0.190	0.021
120	10.00	0.73	0.211	(0.338)	0.190	0.021
121	10.08	0.50	0.144	(0.337)	0.130	0.014
122	10.17	0.50	0.144	(0.335)	0.130	0.014
123	10.25	0.50	0.144	(0.334)	0.130	0.014
124	10.33	0.50	0.144	(0.332)	0.130	0.014
125	10.42	0.50	0.144	(0.330)	0.130	0.014
126	10.50	0.50	0.144	(0.329)	0.130	0.014
127	10.58	0.67	0.192	(0.327)	0.173	0.019
128	10.67	0.67	0.192	(0.325)	0.173	0.019
129	10.75	0.67	0.192	(0.324)	0.173	0.019
130	10.83	0.67	0.192	(0.322)	0.173	0.019
131	10.92	0.67	0.192	(0.321)	0.173	0.019
132	11.00	0.67	0.192	(0.319)	0.173	0.019
133	11.08	0.63	0.182	(0.318)	0.164	0.018
134	11.17	0.63	0.182	(0.316)	0.164	0.018
135	11.25	0.63	0.182	(0.314)	0.164	0.018
136	11.33	0.63	0.182	(0.313)	0.164	0.018
137	11.42	0.63	0.182	(0.311)	0.164	0.018
138	11.50	0.63	0.182	(0.310)	0.164	0.018
139	11.58	0.57	0.163	(0.308)	0.147	0.016
140	11.67	0.57	0.163	(0.307)	0.147	0.016
141	11.75	0.57	0.163	(0.305)	0.147	0.016
142	11.83	0.60	0.173	(0.304)	0.156	0.017
143	11.92	0.60	0.173	(0.302)	0.156	0.017
144	12.00	0.60	0.173	(0.301)	0.156	0.017
145	12.08	0.83	0.240	(0.299)	0.216	0.024
146	12.17	0.83	0.240	(0.298)	0.216	0.024
147	12.25	0.83	0.240	(0.296)	0.216	0.024
148	12.33	0.87	0.250	(0.295)	0.225	0.025
149	12.42	0.87	0.250	(0.293)	0.225	0.025
150	12.50	0.87	0.250	(0.292)	0.225	0.025
151	12.58	0.93	0.269	(0.290)	0.242	0.027
152	12.67	0.93	0.269	(0.289)	0.242	0.027
153	12.75	0.93	0.269	(0.287)	0.242	0.027
154	12.83	0.97	0.278	(0.286)	0.251	0.028
155	12.92	0.97	0.278	(0.284)	0.251	0.028
156	13.00	0.97	0.278	(0.283)	0.251	0.028
157	13.08	1.13	0.326	0.282	(0.294)	0.045
158	13.17	1.13	0.326	0.280	(0.294)	0.046
159	13.25	1.13	0.326	0.279	(0.294)	0.048
160	13.33	1.13	0.326	0.277	(0.294)	0.049
161	13.42	1.13	0.326	0.276	(0.294)	0.051
162	13.50	1.13	0.326	0.274	(0.294)	0.052
163	13.58	0.77	0.221	(0.273)	0.199	0.022
164	13.67	0.77	0.221	(0.272)	0.199	0.022
165	13.75	0.77	0.221	(0.270)	0.199	0.022
166	13.83	0.77	0.221	(0.269)	0.199	0.022
167	13.92	0.77	0.221	(0.268)	0.199	0.022
168	14.00	0.77	0.221	(0.266)	0.199	0.022
169	14.08	0.90	0.259	(0.265)	0.233	0.026
170	14.17	0.90	0.259	(0.263)	0.233	0.026
171	14.25	0.90	0.259	(0.262)	0.233	0.026
172	14.33	0.87	0.250	(0.261)	0.225	0.025
173	14.42	0.87	0.250	(0.259)	0.225	0.025
174	14.50	0.87	0.250	(0.258)	0.225	0.025
175	14.58	0.87	0.250	(0.257)	0.225	0.025
176	14.67	0.87	0.250	(0.255)	0.225	0.025
177	14.75	0.87	0.250	(0.254)	0.225	0.025
178	14.83	0.83	0.240	(0.253)	0.216	0.024
179	14.92	0.83	0.240	(0.252)	0.216	0.024
180	15.00	0.83	0.240	(0.250)	0.216	0.024
181	15.08	0.80	0.230	(0.249)	0.207	0.023
182	15.17	0.80	0.230	(0.248)	0.207	0.023
183	15.25	0.80	0.230	(0.246)	0.207	0.023
184	15.33	0.77	0.221	(0.245)	0.199	0.022
185	15.42	0.77	0.221	(0.244)	0.199	0.022
186	15.50	0.77	0.221	(0.243)	0.199	0.022
187	15.58	0.63	0.182	(0.241)	0.164	0.018
188	15.67	0.63	0.182	(0.240)	0.164	0.018
189	15.75	0.63	0.182	(0.239)	0.164	0.018
190	15.83	0.63	0.182	(0.238)	0.164	0.018
191	15.92	0.63	0.182	(0.237)	0.164	0.018
192	16.00	0.63	0.182	(0.235)	0.164	0.018
193	16.08	0.13	0.038	(0.234)	0.035	0.004

194	16.17	0.13	0.038	(0.233)	0.035	0.004
195	16.25	0.13	0.038	(0.232)	0.035	0.004
196	16.33	0.13	0.038	(0.231)	0.035	0.004
197	16.42	0.13	0.038	(0.229)	0.035	0.004
198	16.50	0.13	0.038	(0.228)	0.035	0.004
199	16.58	0.10	0.029	(0.227)	0.026	0.003
200	16.67	0.10	0.029	(0.226)	0.026	0.003
201	16.75	0.10	0.029	(0.225)	0.026	0.003
202	16.83	0.10	0.029	(0.224)	0.026	0.003
203	16.92	0.10	0.029	(0.222)	0.026	0.003
204	17.00	0.10	0.029	(0.221)	0.026	0.003
205	17.08	0.17	0.048	(0.220)	0.043	0.005
206	17.17	0.17	0.048	(0.219)	0.043	0.005
207	17.25	0.17	0.048	(0.218)	0.043	0.005
208	17.33	0.17	0.048	(0.217)	0.043	0.005
209	17.42	0.17	0.048	(0.216)	0.043	0.005
210	17.50	0.17	0.048	(0.215)	0.043	0.005
211	17.58	0.17	0.048	(0.214)	0.043	0.005
212	17.67	0.17	0.048	(0.213)	0.043	0.005
213	17.75	0.17	0.048	(0.212)	0.043	0.005
214	17.83	0.13	0.038	(0.211)	0.035	0.004
215	17.92	0.13	0.038	(0.209)	0.035	0.004
216	18.00	0.13	0.038	(0.208)	0.035	0.004
217	18.08	0.13	0.038	(0.207)	0.035	0.004
218	18.17	0.13	0.038	(0.206)	0.035	0.004
219	18.25	0.13	0.038	(0.205)	0.035	0.004
220	18.33	0.13	0.038	(0.204)	0.035	0.004
221	18.42	0.13	0.038	(0.203)	0.035	0.004
222	18.50	0.13	0.038	(0.202)	0.035	0.004
223	18.58	0.10	0.029	(0.201)	0.026	0.003
224	18.67	0.10	0.029	(0.200)	0.026	0.003
225	18.75	0.10	0.029	(0.199)	0.026	0.003
226	18.83	0.07	0.019	(0.199)	0.017	0.002
227	18.92	0.07	0.019	(0.198)	0.017	0.002
228	19.00	0.07	0.019	(0.197)	0.017	0.002
229	19.08	0.10	0.029	(0.196)	0.026	0.003
230	19.17	0.10	0.029	(0.195)	0.026	0.003
231	19.25	0.10	0.029	(0.194)	0.026	0.003
232	19.33	0.13	0.038	(0.193)	0.035	0.004
233	19.42	0.13	0.038	(0.192)	0.035	0.004
234	19.50	0.13	0.038	(0.191)	0.035	0.004
235	19.58	0.10	0.029	(0.190)	0.026	0.003
236	19.67	0.10	0.029	(0.189)	0.026	0.003
237	19.75	0.10	0.029	(0.189)	0.026	0.003
238	19.83	0.07	0.019	(0.188)	0.017	0.002
239	19.92	0.07	0.019	(0.187)	0.017	0.002
240	20.00	0.07	0.019	(0.186)	0.017	0.002
241	20.08	0.10	0.029	(0.185)	0.026	0.003
242	20.17	0.10	0.029	(0.184)	0.026	0.003
243	20.25	0.10	0.029	(0.184)	0.026	0.003
244	20.33	0.10	0.029	(0.183)	0.026	0.003
245	20.42	0.10	0.029	(0.182)	0.026	0.003
246	20.50	0.10	0.029	(0.181)	0.026	0.003
247	20.58	0.10	0.029	(0.181)	0.026	0.003
248	20.67	0.10	0.029	(0.180)	0.026	0.003
249	20.75	0.10	0.029	(0.179)	0.026	0.003
250	20.83	0.07	0.019	(0.178)	0.017	0.002
251	20.92	0.07	0.019	(0.178)	0.017	0.002
252	21.00	0.07	0.019	(0.177)	0.017	0.002
253	21.08	0.10	0.029	(0.176)	0.026	0.003
254	21.17	0.10	0.029	(0.175)	0.026	0.003
255	21.25	0.10	0.029	(0.175)	0.026	0.003
256	21.33	0.07	0.019	(0.174)	0.017	0.002
257	21.42	0.07	0.019	(0.173)	0.017	0.002
258	21.50	0.07	0.019	(0.173)	0.017	0.002
259	21.58	0.10	0.029	(0.172)	0.026	0.003
260	21.67	0.10	0.029	(0.172)	0.026	0.003
261	21.75	0.10	0.029	(0.171)	0.026	0.003
262	21.83	0.07	0.019	(0.170)	0.017	0.002
263	21.92	0.07	0.019	(0.170)	0.017	0.002
264	22.00	0.07	0.019	(0.169)	0.017	0.002
265	22.08	0.10	0.029	(0.169)	0.026	0.003
266	22.17	0.10	0.029	(0.168)	0.026	0.003
267	22.25	0.10	0.029	(0.168)	0.026	0.003
268	22.33	0.07	0.019	(0.167)	0.017	0.002

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269  22.42     0.07      0.019       (  0.167)       0.017        0.002
270  22.50     0.07      0.019       (  0.166)       0.017        0.002
271  22.58     0.07      0.019       (  0.166)       0.017        0.002
272  22.67     0.07      0.019       (  0.165)       0.017        0.002
273  22.75     0.07      0.019       (  0.165)       0.017        0.002
274  22.83     0.07      0.019       (  0.164)       0.017        0.002
275  22.92     0.07      0.019       (  0.164)       0.017        0.002
276  23.00     0.07      0.019       (  0.163)       0.017        0.002
277  23.08     0.07      0.019       (  0.163)       0.017        0.002
278  23.17     0.07      0.019       (  0.163)       0.017        0.002
279  23.25     0.07      0.019       (  0.162)       0.017        0.002
280  23.33     0.07      0.019       (  0.162)       0.017        0.002
281  23.42     0.07      0.019       (  0.162)       0.017        0.002
282  23.50     0.07      0.019       (  0.161)       0.017        0.002
283  23.58     0.07      0.019       (  0.161)       0.017        0.002
284  23.67     0.07      0.019       (  0.161)       0.017        0.002
285  23.75     0.07      0.019       (  0.161)       0.017        0.002
286  23.83     0.07      0.019       (  0.160)       0.017        0.002
287  23.92     0.07      0.019       (  0.160)       0.017        0.002
288  24.00     0.07      0.019       (  0.160)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area      11.8(Ac.)/[(In)/(Ft.)] =       0.2(Ac.Ft)
      Total soil loss =      2.15(In)
      Total soil loss =     2.116(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       10617.1 Cubic Feet
      Total soil loss =       92182.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.595(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q          |         |         |         |
   0+10       0.0001      0.02  Q          |         |         |         |
   0+15       0.0003      0.02  Q          |         |         |         |
   0+20       0.0004      0.02  Q          |         |         |         |
   0+25       0.0007      0.03  Q          |         |         |         |
   0+30       0.0009      0.03  Q          |         |         |         |
   0+35       0.0011      0.03  Q          |         |         |         |
   0+40       0.0013      0.03  Q          |         |         |         |
   0+45       0.0016      0.03  Q          |         |         |         |
   0+50       0.0018      0.04  Q          |         |         |         |
   0+55       0.0021      0.04  Q          |         |         |         |
   1+ 0       0.0024      0.04  Q          |         |         |         |
   1+ 5       0.0027      0.04  Q          |         |         |         |
   1+10       0.0030      0.04  Q          |         |         |         |
   1+15       0.0032      0.04  Q          |         |         |         |
   1+20       0.0035      0.03  Q          |         |         |         |
   1+25       0.0037      0.03  Q          |         |         |         |
   1+30       0.0039      0.03  Q          |         |         |         |
   1+35       0.0042      0.03  Q          |         |         |         |
   1+40       0.0044      0.03  Q          |         |         |         |
   1+45       0.0047      0.03  Q          |         |         |         |
   1+50       0.0049      0.04  Q          |         |         |         |
   1+55       0.0052      0.04  Q          |         |         |         |
   2+ 0       0.0055      0.04  Q          |         |         |         |
   2+ 5       0.0058      0.05  Q          |         |         |         |
   2+10       0.0061      0.05  QV         |         |         |         |
   2+15       0.0064      0.05  QV         |         |         |         |
   2+20       0.0068      0.05  QV         |         |         |         |
   2+25       0.0071      0.05  QV         |         |         |         |
   2+30       0.0074      0.05  QV         |         |         |         |
   2+35       0.0077      0.05  QV         |         |         |         |
   2+40       0.0081      0.05  QV         |         |         |         |
   2+45       0.0085      0.06  QV         |         |         |         |
   2+50       0.0089      0.06  QV         |         |         |         |
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2+55       0.0092      0.06  QV        |         |         |         |
3+ 0       0.0096      0.06  QV        |         |         |         |
3+ 5       0.0100      0.06  QV        |         |         |         |
3+10       0.0104      0.06  QV        |         |         |         |
3+15       0.0108      0.06  QV        |         |         |         |
3+20       0.0112      0.06  QV        |         |         |         |
3+25       0.0116      0.06  QV        |         |         |         |
3+30       0.0120      0.06  QV        |         |         |         |
3+35       0.0124      0.06  Q V       |         |         |         |
3+40       0.0128      0.06  Q V       |         |         |         |
3+45       0.0132      0.06  Q V       |         |         |         |
3+50       0.0136      0.06  Q V       |         |         |         |
3+55       0.0140      0.07  Q V       |         |         |         |
4+ 0       0.0145      0.07  Q V       |         |         |         |
4+ 5       0.0150      0.07  Q V       |         |         |         |
4+10       0.0154      0.07  Q V       |         |         |         |
4+15       0.0159      0.07  Q V       |         |         |         |
4+20       0.0164      0.07  Q V       |         |         |         |
4+25       0.0169      0.08  Q V       |         |         |         |
4+30       0.0175      0.08  Q V       |         |         |         |
4+35       0.0180      0.08  Q V       |         |         |         |
4+40       0.0186      0.08  Q  V      |         |         |         |
4+45       0.0191      0.08  Q  V      |         |         |         |
4+50       0.0197      0.08  Q  V      |         |         |         |
4+55       0.0203      0.09  Q  V      |         |         |         |
5+ 0       0.0209      0.09  Q  V      |         |         |         |
5+ 5       0.0215      0.09  Q  V      |         |         |         |
5+10       0.0220      0.07  Q  V      |         |         |         |
5+15       0.0225      0.07  Q  V      |         |         |         |
5+20       0.0230      0.07  Q  V      |         |         |         |
5+25       0.0235      0.08  Q  V      |         |         |         |
5+30       0.0241      0.08  Q  V      |         |         |         |
5+35       0.0246      0.08  Q   V     |         |         |         |
5+40       0.0252      0.09  Q   V     |         |         |         |
5+45       0.0259      0.09  Q   V     |         |         |         |
5+50       0.0265      0.09  Q   V     |         |         |         |
5+55       0.0271      0.09  Q   V     |         |         |         |
6+ 0       0.0277      0.09  Q   V     |         |         |         |
6+ 5       0.0284      0.09  Q   V     |         |         |         |
6+10       0.0291      0.10  Q   V     |         |         |         |
6+15       0.0298      0.10  Q   V     |         |         |         |
6+20       0.0305      0.10  Q    V    |         |         |         |
6+25       0.0312      0.10  Q    V    |         |         |         |
6+30       0.0319      0.10  Q    V    |         |         |         |
6+35       0.0326      0.10  Q    V    |         |         |         |
6+40       0.0334      0.11  Q    V    |         |         |         |
6+45       0.0342      0.11  Q    V    |         |         |         |
6+50       0.0349      0.11  Q    V    |         |         |         |
6+55       0.0357      0.11  Q    V    |         |         |         |
7+ 0       0.0365      0.11  Q    V    |         |         |         |
7+ 5       0.0373      0.11  Q     V   |         |         |         |
7+10       0.0381      0.11  Q     V   |         |         |         |
7+15       0.0389      0.11  Q     V   |         |         |         |
7+20       0.0397      0.12  Q     V   |         |         |         |
7+25       0.0405      0.12  Q     V   |         |         |         |
7+30       0.0414      0.12  Q     V   |         |         |         |
7+35       0.0422      0.13  Q     V   |         |         |         |
7+40       0.0432      0.13  Q      V  |         |         |         |
7+45       0.0441      0.14  Q      V  |         |         |         |
7+50       0.0451      0.14  Q      V  |         |         |         |
7+55       0.0461      0.15  Q      V  |         |         |         |
8+ 0       0.0471      0.15  Q      V  |         |         |         |
8+ 5       0.0481      0.15  Q      V  |         |         |         |
8+10       0.0492      0.16  Q       V |         |         |         |
8+15       0.0504      0.17  Q       V |         |         |         |
8+20       0.0516      0.17  Q       V |         |         |         |
8+25       0.0528      0.17  Q       V |         |         |         |
8+30       0.0539      0.17  Q       V |         |         |         |
8+35       0.0551      0.17  Q        V|         |         |         |
8+40       0.0564      0.18  Q        V|         |         |         |
8+45       0.0576      0.18  Q        V|         |         |         |
8+50       0.0589      0.18  Q        V|         |         |         |
8+55       0.0602      0.19  Q        V|         |         |         |
9+ 0       0.0615      0.19  Q         V        |         |         |
9+ 5       0.0629      0.20  Q         V        |         |         |
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 9+10       0.0643      0.21  Q         V         |         |         |
 9+15       0.0658      0.21  Q         V         |         |         |
 9+20       0.0673      0.22  Q         |V        |         |         |
 9+25       0.0689      0.22  Q         |V        |         |         |
 9+30       0.0704      0.23  Q         |V        |         |         |
 9+35       0.0720      0.23  Q         |V        |         |         |
 9+40       0.0736      0.24  Q         | V       |         |         |
 9+45       0.0753      0.24  Q         | V       |         |         |
 9+50       0.0769      0.24  Q         | V       |         |         |
 9+55       0.0786      0.25  Q         | V       |         |         |
10+ 0       0.0804      0.25  |Q        |  V       |         |         |
10+ 5       0.0820      0.24  Q         |  V       |         |         |
10+10       0.0833      0.19  Q         |  V       |         |         |
10+15       0.0846      0.18  Q         |  V       |         |         |
10+20       0.0858      0.17  Q         |   V      |         |         |
10+25       0.0870      0.17  Q         |   V      |         |         |
10+30       0.0882      0.17  Q         |   V      |         |         |
10+35       0.0894      0.18  Q         |   V      |         |         |
10+40       0.0909      0.21  Q         |   V      |         |         |
10+45       0.0924      0.22  Q         |    V     |         |         |
10+50       0.0940      0.23  Q         |    V     |         |         |
10+55       0.0955      0.23  Q         |    V     |         |         |
11+ 0       0.0971      0.23  Q         |    V     |         |         |
11+ 5       0.0987      0.23  Q         |     V    |         |         |
11+10       0.1002      0.22  Q         |     V    |         |         |
11+15       0.1017      0.22  Q         |     V    |         |         |
11+20       0.1032      0.22  Q         |     V    |         |         |
11+25       0.1047      0.22  Q         |      V   |         |         |
11+30       0.1062      0.22  Q         |      V   |         |         |
11+35       0.1076      0.21  Q         |      V   |         |         |
11+40       0.1090      0.20  Q         |      V   |         |         |
11+45       0.1104      0.20  Q         |       V  |         |         |
11+50       0.1117      0.20  Q         |       V  |         |         |
11+55       0.1131      0.20  Q         |       V  |         |         |
12+ 0       0.1145      0.20  Q         |       V  |         |         |
12+ 5       0.1160      0.22  Q         |        V|         |         |
12+10       0.1178      0.26  |Q        |        V|         |         |
12+15       0.1197      0.28  |Q        |        V|         |         |
12+20       0.1217      0.28  |Q        |        V|         |         |
12+25       0.1237      0.29  |Q        |         V         |         |
12+30       0.1257      0.30  |Q        |         V         |         |
12+35       0.1278      0.30  |Q        |         V         |         |
12+40       0.1300      0.31  |Q        |         |V        |         |
12+45       0.1322      0.32  |Q        |         |V        |         |
12+50       0.1344      0.32  |Q        |         | V       |         |
12+55       0.1366      0.33  |Q        |         | V       |         |
13+ 0       0.1389      0.33  |Q        |         | V       |         |
13+ 5       0.1414      0.36  |Q        |         |  V      |         |
13+10       0.1447      0.48  |Q        |         |  V      |         |
13+15       0.1483      0.53  | Q       |         |   V     |         |
13+20       0.1521      0.56  | Q       |         |   V     |         |
13+25       0.1561      0.58  | Q       |         |    V    |         |
13+30       0.1602      0.60  | Q       |         |     V   |         |
13+35       0.1640      0.55  | Q       |         |     V   |         |
13+40       0.1665      0.36  |Q        |         |      V  |         |
13+45       0.1686      0.30  |Q        |         |      V  |         |
13+50       0.1705      0.27  |Q        |         |      V  |         |
13+55       0.1723      0.27  |Q        |         |       V |         |
14+ 0       0.1741      0.26  |Q        |         |       V |         |
14+ 5       0.1760      0.27  |Q        |         |       V |         |
14+10       0.1780      0.30  |Q        |         |        V|         |
14+15       0.1801      0.30  |Q        |         |        V|         |
14+20       0.1822      0.31  |Q        |         |        V|         |
14+25       0.1843      0.30  |Q        |         |         V         |
14+30       0.1863      0.30  |Q        |         |         V         |
14+35       0.1884      0.30  |Q        |         |         V         |
14+40       0.1904      0.30  |Q        |         |         |V        |
14+45       0.1925      0.30  |Q        |         |         |V        |
14+50       0.1945      0.30  |Q        |         |         |V        |
14+55       0.1965      0.29  |Q        |         |         | V       |
15+ 0       0.1985      0.29  |Q        |         |         | V       |
15+ 5       0.2004      0.28  |Q        |         |         | V       |
15+10       0.2023      0.28  |Q        |         |         |  V      |
15+15       0.2042      0.28  |Q        |         |         |  V      |
15+20       0.2061      0.27  |Q        |         |         |  V      |
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15+25       0.2080      0.27  |Q        |         |         |   V     |
15+30       0.2098      0.26  |Q        |         |         |   V     |
15+35       0.2115      0.26  |Q        |         |         |   V     |
15+40       0.2131      0.23  Q         |         |         |   V     |
15+45       0.2147      0.22  Q         |         |         |    V    |
15+50       0.2162      0.22  Q         |         |         |    V    |
15+55       0.2177      0.22  Q         |         |         |    V    |
16+ 0       0.2192      0.22  Q         |         |         |    V    |
16+ 5       0.2205      0.19  Q         |         |         |     V   |
16+10       0.2211      0.09  Q         |         |         |     V   |
16+15       0.2216      0.06  Q         |         |         |     V   |
16+20       0.2219      0.05  Q         |         |         |     V   |
16+25       0.2222      0.05  Q         |         |         |     V   |
16+30       0.2226      0.05  Q         |         |         |     V   |
16+35       0.2229      0.04  Q         |         |         |     V   |
16+40       0.2231      0.04  Q         |         |         |     V   |
16+45       0.2234      0.04  Q         |         |         |     V   |
16+50       0.2236      0.03  Q         |         |         |     V   |
16+55       0.2238      0.03  Q         |         |         |     V   |
17+ 0       0.2241      0.03  Q         |         |         |     V   |
17+ 5       0.2243      0.04  Q         |         |         |     V   |
17+10       0.2247      0.05  Q         |         |         |     V   |
17+15       0.2251      0.05  Q         |         |         |     V   |
17+20       0.2255      0.06  Q         |         |         |     V   |
17+25       0.2258      0.06  Q         |         |         |      V  |
17+30       0.2262      0.06  Q         |         |         |      V  |
17+35       0.2266      0.06  Q         |         |         |      V  |
17+40       0.2270      0.06  Q         |         |         |      V  |
17+45       0.2274      0.06  Q         |         |         |      V  |
17+50       0.2278      0.06  Q         |         |         |      V  |
17+55       0.2281      0.05  Q         |         |         |      V  |
18+ 0       0.2285      0.05  Q         |         |         |      V  |
18+ 5       0.2288      0.05  Q         |         |         |      V  |
18+10       0.2291      0.05  Q         |         |         |      V  |
18+15       0.2294      0.05  Q         |         |         |      V  |
18+20       0.2297      0.05  Q         |         |         |      V  |
18+25       0.2300      0.05  Q         |         |         |      V  |
18+30       0.2303      0.05  Q         |         |         |      V  |
18+35       0.2307      0.04  Q         |         |         |      V  |
18+40       0.2309      0.04  Q         |         |         |      V  |
18+45       0.2312      0.04  Q         |         |         |      V  |
18+50       0.2314      0.03  Q         |         |         |      V  |
18+55       0.2316      0.03  Q         |         |         |       V |
19+ 0       0.2317      0.02  Q         |         |         |       V |
19+ 5       0.2319      0.03  Q         |         |         |       V |
19+10       0.2321      0.03  Q         |         |         |       V |
19+15       0.2323      0.03  Q         |         |         |       V |
19+20       0.2326      0.04  Q         |         |         |       V |
19+25       0.2329      0.04  Q         |         |         |       V |
19+30       0.2332      0.04  Q         |         |         |       V |
19+35       0.2335      0.04  Q         |         |         |       V |
19+40       0.2337      0.04  Q         |         |         |       V |
19+45       0.2340      0.04  Q         |         |         |       V |
19+50       0.2342      0.03  Q         |         |         |       V |
19+55       0.2344      0.03  Q         |         |         |       V |
20+ 0       0.2346      0.02  Q         |         |         |       V |
20+ 5       0.2347      0.03  Q         |         |         |       V |
20+10       0.2349      0.03  Q         |         |         |       V |
20+15       0.2352      0.03  Q         |         |         |       V |
20+20       0.2354      0.03  Q         |         |         |       V |
20+25       0.2356      0.03  Q         |         |         |       V |
20+30       0.2359      0.03  Q         |         |         |       V |
20+35       0.2361      0.03  Q         |         |         |       V |
20+40       0.2363      0.03  Q         |         |         |       V |
20+45       0.2366      0.03  Q         |         |         |       V |
20+50       0.2368      0.03  Q         |         |         |       V |
20+55       0.2370      0.03  Q         |         |         |       V |
21+ 0       0.2372      0.02  Q         |         |         |       V |
21+ 5       0.2373      0.03  Q         |         |         |       V |
21+10       0.2375      0.03  Q         |         |         |       V |
21+15       0.2378      0.03  Q         |         |         |        V|
21+20       0.2380      0.03  Q         |         |         |        V|
21+25       0.2382      0.03  Q         |         |         |        V|
21+30       0.2383      0.02  Q         |         |         |        V|
21+35       0.2385      0.03  Q         |         |         |        V|
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  21+40       0.2387      0.03  Q          |          |          |         v|
  21+45       0.2390      0.03  Q          |          |          |         v|
  21+50       0.2392      0.03  Q          |          |          |         v|
  21+55       0.2393      0.03  Q          |          |          |         v|
  22+ 0       0.2395      0.02  Q          |          |          |         v|
  22+ 5       0.2397      0.03  Q          |          |          |         v|
  22+10       0.2399      0.03  Q          |          |          |         v|
  22+15       0.2401      0.03  Q          |          |          |         v|
  22+20       0.2404      0.03  Q          |          |          |         v|
  22+25       0.2405      0.03  Q          |          |          |         v|
  22+30       0.2407      0.02  Q          |          |          |         v|
  22+35       0.2409      0.02  Q          |          |          |         v|
  22+40       0.2410      0.02  Q          |          |          |         v|
  22+45       0.2412      0.02  Q          |          |          |         v|
  22+50       0.2413      0.02  Q          |          |          |         v|
  22+55       0.2415      0.02  Q          |          |          |         v|
  23+ 0       0.2416      0.02  Q          |          |          |         v|
  23+ 5       0.2418      0.02  Q          |          |          |         v|
  23+10       0.2420      0.02  Q          |          |          |         v|
  23+15       0.2421      0.02  Q          |          |          |         v|
  23+20       0.2423      0.02  Q          |          |          |         v|
  23+25       0.2424      0.02  Q          |          |          |         v|
  23+30       0.2426      0.02  Q          |          |          |         v|
  23+35       0.2427      0.02  Q          |          |          |         v|
  23+40       0.2429      0.02  Q          |          |          |         v|
  23+45       0.2431      0.02  Q          |          |          |         v|
  23+50       0.2432      0.02  Q          |          |          |         v|
  23+55       0.2434      0.02  Q          |          |          |         v|
  24+ 0       0.2435      0.02  Q          |          |          |         v|
  24+ 5       0.2437      0.02  Q          |          |          |         v|
  24+10       0.2437      0.01  Q          |          |          |         v|
  24+15       0.2437      0.00  Q          |          |          |         v|
  24+20       0.2437      0.00  Q          |          |          |         v|
  24+25       0.2437      0.00  Q          |          |          |         v|
  24+30       0.2437      0.00  Q          |          |          |         v|
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PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/08/21 File: PROP2YRC1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA C1 PROPOSED CONDITION
2 YEAR STORM EVENT
21-0034
2021-11-08 EP

Drainage Area = 11.20(Ac.) = 0.017 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 11.20(Ac.) = 0.017 Sq. Mi.
Length along longest watercourse = 1821.00(Ft.)
Length along longest watercourse measured to centroid = 683.00(Ft.)
Length along longest watercourse = 0.345 Mi.
Length along longest watercourse measured to centroid = 0.129 Mi.
Difference in elevation = 29.30(Ft.)
Slope along watercourse = 84.9555 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.047 Hr.
Lag time = 2.85 Min.
25% of lag time = 0.71 Min.
40% of lag time = 1.14 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.20	2.40	26.88

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
11.20	6.20	69.44

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
11.200	67.60	0.850

Total Area Entered = 11.20(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

67.6 48.1 0.590 0.850 0.139 1.000 0.139
Sum (F) = 0.139

Area averaged mean soil loss (F) (In/Hr) = 0.139
Minimum soil loss rate ((In/Hr)) = 0.069
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	175.496	36.991	4.175
2	0.167	350.992	52.252	5.898
3	0.250	526.487	8.951	1.010
4	0.333	701.983	1.806	0.204
			Sum = 100.000 Sum=	11.288

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.246)	0.004	0.015
2	0.17	0.07	0.019	(0.245)	0.004	0.015
3	0.25	0.07	0.019	(0.244)	0.004	0.015
4	0.33	0.10	0.029	(0.243)	0.006	0.022
5	0.42	0.10	0.029	(0.242)	0.006	0.022
6	0.50	0.10	0.029	(0.241)	0.006	0.022
7	0.58	0.10	0.029	(0.240)	0.006	0.022
8	0.67	0.10	0.029	(0.239)	0.006	0.022
9	0.75	0.10	0.029	(0.238)	0.006	0.022
10	0.83	0.13	0.038	(0.237)	0.008	0.030
11	0.92	0.13	0.038	(0.237)	0.008	0.030
12	1.00	0.13	0.038	(0.236)	0.008	0.030
13	1.08	0.10	0.029	(0.235)	0.006	0.022
14	1.17	0.10	0.029	(0.234)	0.006	0.022
15	1.25	0.10	0.029	(0.233)	0.006	0.022
16	1.33	0.10	0.029	(0.232)	0.006	0.022
17	1.42	0.10	0.029	(0.231)	0.006	0.022
18	1.50	0.10	0.029	(0.230)	0.006	0.022
19	1.58	0.10	0.029	(0.229)	0.006	0.022
20	1.67	0.10	0.029	(0.228)	0.006	0.022
21	1.75	0.10	0.029	(0.227)	0.006	0.022
22	1.83	0.13	0.038	(0.226)	0.008	0.030
23	1.92	0.13	0.038	(0.225)	0.008	0.030
24	2.00	0.13	0.038	(0.225)	0.008	0.030
25	2.08	0.13	0.038	(0.224)	0.008	0.030
26	2.17	0.13	0.038	(0.223)	0.008	0.030
27	2.25	0.13	0.038	(0.222)	0.008	0.030
28	2.33	0.13	0.038	(0.221)	0.008	0.030
29	2.42	0.13	0.038	(0.220)	0.008	0.030
30	2.50	0.13	0.038	(0.219)	0.008	0.030
31	2.58	0.17	0.048	(0.218)	0.011	0.037
32	2.67	0.17	0.048	(0.217)	0.011	0.037
33	2.75	0.17	0.048	(0.216)	0.011	0.037
34	2.83	0.17	0.048	(0.216)	0.011	0.037
35	2.92	0.17	0.048	(0.215)	0.011	0.037
36	3.00	0.17	0.048	(0.214)	0.011	0.037
37	3.08	0.17	0.048	(0.213)	0.011	0.037
38	3.17	0.17	0.048	(0.212)	0.011	0.037
39	3.25	0.17	0.048	(0.211)	0.011	0.037
40	3.33	0.17	0.048	(0.210)	0.011	0.037
41	3.42	0.17	0.048	(0.209)	0.011	0.037
42	3.50	0.17	0.048	(0.208)	0.011	0.037
43	3.58	0.17	0.048	(0.208)	0.011	0.037
44	3.67	0.17	0.048	(0.207)	0.011	0.037
45	3.75	0.17	0.048	(0.206)	0.011	0.037
46	3.83	0.20	0.058	(0.205)	0.013	0.045

47	3.92	0.20	0.058	(0.204)	0.013	0.045
48	4.00	0.20	0.058	(0.203)	0.013	0.045
49	4.08	0.20	0.058	(0.202)	0.013	0.045
50	4.17	0.20	0.058	(0.202)	0.013	0.045
51	4.25	0.20	0.058	(0.201)	0.013	0.045
52	4.33	0.23	0.067	(0.200)	0.015	0.052
53	4.42	0.23	0.067	(0.199)	0.015	0.052
54	4.50	0.23	0.067	(0.198)	0.015	0.052
55	4.58	0.23	0.067	(0.197)	0.015	0.052
56	4.67	0.23	0.067	(0.196)	0.015	0.052
57	4.75	0.23	0.067	(0.196)	0.015	0.052
58	4.83	0.27	0.077	(0.195)	0.017	0.060
59	4.92	0.27	0.077	(0.194)	0.017	0.060
60	5.00	0.27	0.077	(0.193)	0.017	0.060
61	5.08	0.20	0.058	(0.192)	0.013	0.045
62	5.17	0.20	0.058	(0.191)	0.013	0.045
63	5.25	0.20	0.058	(0.191)	0.013	0.045
64	5.33	0.23	0.067	(0.190)	0.015	0.052
65	5.42	0.23	0.067	(0.189)	0.015	0.052
66	5.50	0.23	0.067	(0.188)	0.015	0.052
67	5.58	0.27	0.077	(0.187)	0.017	0.060
68	5.67	0.27	0.077	(0.186)	0.017	0.060
69	5.75	0.27	0.077	(0.186)	0.017	0.060
70	5.83	0.27	0.077	(0.185)	0.017	0.060
71	5.92	0.27	0.077	(0.184)	0.017	0.060
72	6.00	0.27	0.077	(0.183)	0.017	0.060
73	6.08	0.30	0.086	(0.182)	0.019	0.067
74	6.17	0.30	0.086	(0.182)	0.019	0.067
75	6.25	0.30	0.086	(0.181)	0.019	0.067
76	6.33	0.30	0.086	(0.180)	0.019	0.067
77	6.42	0.30	0.086	(0.179)	0.019	0.067
78	6.50	0.30	0.086	(0.178)	0.019	0.067
79	6.58	0.33	0.096	(0.177)	0.021	0.075
80	6.67	0.33	0.096	(0.177)	0.021	0.075
81	6.75	0.33	0.096	(0.176)	0.021	0.075
82	6.83	0.33	0.096	(0.175)	0.021	0.075
83	6.92	0.33	0.096	(0.174)	0.021	0.075
84	7.00	0.33	0.096	(0.174)	0.021	0.075
85	7.08	0.33	0.096	(0.173)	0.021	0.075
86	7.17	0.33	0.096	(0.172)	0.021	0.075
87	7.25	0.33	0.096	(0.171)	0.021	0.075
88	7.33	0.37	0.106	(0.170)	0.023	0.082
89	7.42	0.37	0.106	(0.170)	0.023	0.082
90	7.50	0.37	0.106	(0.169)	0.023	0.082
91	7.58	0.40	0.115	(0.168)	0.025	0.090
92	7.67	0.40	0.115	(0.167)	0.025	0.090
93	7.75	0.40	0.115	(0.167)	0.025	0.090
94	7.83	0.43	0.125	(0.166)	0.027	0.097
95	7.92	0.43	0.125	(0.165)	0.027	0.097
96	8.00	0.43	0.125	(0.164)	0.027	0.097
97	8.08	0.50	0.144	(0.163)	0.032	0.112
98	8.17	0.50	0.144	(0.163)	0.032	0.112
99	8.25	0.50	0.144	(0.162)	0.032	0.112
100	8.33	0.50	0.144	(0.161)	0.032	0.112
101	8.42	0.50	0.144	(0.160)	0.032	0.112
102	8.50	0.50	0.144	(0.160)	0.032	0.112
103	8.58	0.53	0.154	(0.159)	0.034	0.120
104	8.67	0.53	0.154	(0.158)	0.034	0.120
105	8.75	0.53	0.154	(0.157)	0.034	0.120
106	8.83	0.57	0.163	(0.157)	0.036	0.127
107	8.92	0.57	0.163	(0.156)	0.036	0.127
108	9.00	0.57	0.163	(0.155)	0.036	0.127
109	9.08	0.63	0.182	(0.154)	0.040	0.142
110	9.17	0.63	0.182	(0.154)	0.040	0.142
111	9.25	0.63	0.182	(0.153)	0.040	0.142
112	9.33	0.67	0.192	(0.152)	0.042	0.150
113	9.42	0.67	0.192	(0.152)	0.042	0.150
114	9.50	0.67	0.192	(0.151)	0.042	0.150
115	9.58	0.70	0.202	(0.150)	0.044	0.157
116	9.67	0.70	0.202	(0.149)	0.044	0.157
117	9.75	0.70	0.202	(0.149)	0.044	0.157
118	9.83	0.73	0.211	(0.148)	0.046	0.165
119	9.92	0.73	0.211	(0.147)	0.046	0.165
120	10.00	0.73	0.211	(0.147)	0.046	0.165
121	10.08	0.50	0.144	(0.146)	0.032	0.112

122	10.17	0.50	0.144	(0.145)	0.032	0.112
123	10.25	0.50	0.144	(0.144)	0.032	0.112
124	10.33	0.50	0.144	(0.144)	0.032	0.112
125	10.42	0.50	0.144	(0.143)	0.032	0.112
126	10.50	0.50	0.144	(0.142)	0.032	0.112
127	10.58	0.67	0.192	(0.142)	0.042	0.150
128	10.67	0.67	0.192	(0.141)	0.042	0.150
129	10.75	0.67	0.192	(0.140)	0.042	0.150
130	10.83	0.67	0.192	(0.140)	0.042	0.150
131	10.92	0.67	0.192	(0.139)	0.042	0.150
132	11.00	0.67	0.192	(0.138)	0.042	0.150
133	11.08	0.63	0.182	(0.137)	0.040	0.142
134	11.17	0.63	0.182	(0.137)	0.040	0.142
135	11.25	0.63	0.182	(0.136)	0.040	0.142
136	11.33	0.63	0.182	(0.135)	0.040	0.142
137	11.42	0.63	0.182	(0.135)	0.040	0.142
138	11.50	0.63	0.182	(0.134)	0.040	0.142
139	11.58	0.57	0.163	(0.133)	0.036	0.127
140	11.67	0.57	0.163	(0.133)	0.036	0.127
141	11.75	0.57	0.163	(0.132)	0.036	0.127
142	11.83	0.60	0.173	(0.131)	0.038	0.135
143	11.92	0.60	0.173	(0.131)	0.038	0.135
144	12.00	0.60	0.173	(0.130)	0.038	0.135
145	12.08	0.83	0.240	(0.130)	0.053	0.187
146	12.17	0.83	0.240	(0.129)	0.053	0.187
147	12.25	0.83	0.240	(0.128)	0.053	0.187
148	12.33	0.87	0.250	(0.128)	0.055	0.195
149	12.42	0.87	0.250	(0.127)	0.055	0.195
150	12.50	0.87	0.250	(0.126)	0.055	0.195
151	12.58	0.93	0.269	(0.126)	0.059	0.210
152	12.67	0.93	0.269	(0.125)	0.059	0.210
153	12.75	0.93	0.269	(0.124)	0.059	0.210
154	12.83	0.97	0.278	(0.124)	0.061	0.217
155	12.92	0.97	0.278	(0.123)	0.061	0.217
156	13.00	0.97	0.278	(0.123)	0.061	0.217
157	13.08	1.13	0.326	(0.122)	0.072	0.255
158	13.17	1.13	0.326	(0.121)	0.072	0.255
159	13.25	1.13	0.326	(0.121)	0.072	0.255
160	13.33	1.13	0.326	(0.120)	0.072	0.255
161	13.42	1.13	0.326	(0.119)	0.072	0.255
162	13.50	1.13	0.326	(0.119)	0.072	0.255
163	13.58	0.77	0.221	(0.118)	0.049	0.172
164	13.67	0.77	0.221	(0.118)	0.049	0.172
165	13.75	0.77	0.221	(0.117)	0.049	0.172
166	13.83	0.77	0.221	(0.116)	0.049	0.172
167	13.92	0.77	0.221	(0.116)	0.049	0.172
168	14.00	0.77	0.221	(0.115)	0.049	0.172
169	14.08	0.90	0.259	(0.115)	0.057	0.202
170	14.17	0.90	0.259	(0.114)	0.057	0.202
171	14.25	0.90	0.259	(0.113)	0.057	0.202
172	14.33	0.87	0.250	(0.113)	0.055	0.195
173	14.42	0.87	0.250	(0.112)	0.055	0.195
174	14.50	0.87	0.250	(0.112)	0.055	0.195
175	14.58	0.87	0.250	(0.111)	0.055	0.195
176	14.67	0.87	0.250	(0.111)	0.055	0.195
177	14.75	0.87	0.250	(0.110)	0.055	0.195
178	14.83	0.83	0.240	(0.109)	0.053	0.187
179	14.92	0.83	0.240	(0.109)	0.053	0.187
180	15.00	0.83	0.240	(0.108)	0.053	0.187
181	15.08	0.80	0.230	(0.108)	0.051	0.180
182	15.17	0.80	0.230	(0.107)	0.051	0.180
183	15.25	0.80	0.230	(0.107)	0.051	0.180
184	15.33	0.77	0.221	(0.106)	0.049	0.172
185	15.42	0.77	0.221	(0.106)	0.049	0.172
186	15.50	0.77	0.221	(0.105)	0.049	0.172
187	15.58	0.63	0.182	(0.105)	0.040	0.142
188	15.67	0.63	0.182	(0.104)	0.040	0.142
189	15.75	0.63	0.182	(0.103)	0.040	0.142
190	15.83	0.63	0.182	(0.103)	0.040	0.142
191	15.92	0.63	0.182	(0.102)	0.040	0.142
192	16.00	0.63	0.182	(0.102)	0.040	0.142
193	16.08	0.13	0.038	(0.101)	0.008	0.030
194	16.17	0.13	0.038	(0.101)	0.008	0.030
195	16.25	0.13	0.038	(0.100)	0.008	0.030
196	16.33	0.13	0.038	(0.100)	0.008	0.030

197	16.42	0.13	0.038	(0.099)	0.008	0.030
198	16.50	0.13	0.038	(0.099)	0.008	0.030
199	16.58	0.10	0.029	(0.098)	0.006	0.022
200	16.67	0.10	0.029	(0.098)	0.006	0.022
201	16.75	0.10	0.029	(0.097)	0.006	0.022
202	16.83	0.10	0.029	(0.097)	0.006	0.022
203	16.92	0.10	0.029	(0.096)	0.006	0.022
204	17.00	0.10	0.029	(0.096)	0.006	0.022
205	17.08	0.17	0.048	(0.095)	0.011	0.037
206	17.17	0.17	0.048	(0.095)	0.011	0.037
207	17.25	0.17	0.048	(0.094)	0.011	0.037
208	17.33	0.17	0.048	(0.094)	0.011	0.037
209	17.42	0.17	0.048	(0.093)	0.011	0.037
210	17.50	0.17	0.048	(0.093)	0.011	0.037
211	17.58	0.17	0.048	(0.093)	0.011	0.037
212	17.67	0.17	0.048	(0.092)	0.011	0.037
213	17.75	0.17	0.048	(0.092)	0.011	0.037
214	17.83	0.13	0.038	(0.091)	0.008	0.030
215	17.92	0.13	0.038	(0.091)	0.008	0.030
216	18.00	0.13	0.038	(0.090)	0.008	0.030
217	18.08	0.13	0.038	(0.090)	0.008	0.030
218	18.17	0.13	0.038	(0.089)	0.008	0.030
219	18.25	0.13	0.038	(0.089)	0.008	0.030
220	18.33	0.13	0.038	(0.088)	0.008	0.030
221	18.42	0.13	0.038	(0.088)	0.008	0.030
222	18.50	0.13	0.038	(0.088)	0.008	0.030
223	18.58	0.10	0.029	(0.087)	0.006	0.022
224	18.67	0.10	0.029	(0.087)	0.006	0.022
225	18.75	0.10	0.029	(0.086)	0.006	0.022
226	18.83	0.07	0.019	(0.086)	0.004	0.015
227	18.92	0.07	0.019	(0.086)	0.004	0.015
228	19.00	0.07	0.019	(0.085)	0.004	0.015
229	19.08	0.10	0.029	(0.085)	0.006	0.022
230	19.17	0.10	0.029	(0.084)	0.006	0.022
231	19.25	0.10	0.029	(0.084)	0.006	0.022
232	19.33	0.13	0.038	(0.084)	0.008	0.030
233	19.42	0.13	0.038	(0.083)	0.008	0.030
234	19.50	0.13	0.038	(0.083)	0.008	0.030
235	19.58	0.10	0.029	(0.082)	0.006	0.022
236	19.67	0.10	0.029	(0.082)	0.006	0.022
237	19.75	0.10	0.029	(0.082)	0.006	0.022
238	19.83	0.07	0.019	(0.081)	0.004	0.015
239	19.92	0.07	0.019	(0.081)	0.004	0.015
240	20.00	0.07	0.019	(0.081)	0.004	0.015
241	20.08	0.10	0.029	(0.080)	0.006	0.022
242	20.17	0.10	0.029	(0.080)	0.006	0.022
243	20.25	0.10	0.029	(0.080)	0.006	0.022
244	20.33	0.10	0.029	(0.079)	0.006	0.022
245	20.42	0.10	0.029	(0.079)	0.006	0.022
246	20.50	0.10	0.029	(0.078)	0.006	0.022
247	20.58	0.10	0.029	(0.078)	0.006	0.022
248	20.67	0.10	0.029	(0.078)	0.006	0.022
249	20.75	0.10	0.029	(0.078)	0.006	0.022
250	20.83	0.07	0.019	(0.077)	0.004	0.015
251	20.92	0.07	0.019	(0.077)	0.004	0.015
252	21.00	0.07	0.019	(0.077)	0.004	0.015
253	21.08	0.10	0.029	(0.076)	0.006	0.022
254	21.17	0.10	0.029	(0.076)	0.006	0.022
255	21.25	0.10	0.029	(0.076)	0.006	0.022
256	21.33	0.07	0.019	(0.075)	0.004	0.015
257	21.42	0.07	0.019	(0.075)	0.004	0.015
258	21.50	0.07	0.019	(0.075)	0.004	0.015
259	21.58	0.10	0.029	(0.075)	0.006	0.022
260	21.67	0.10	0.029	(0.074)	0.006	0.022
261	21.75	0.10	0.029	(0.074)	0.006	0.022
262	21.83	0.07	0.019	(0.074)	0.004	0.015
263	21.92	0.07	0.019	(0.074)	0.004	0.015
264	22.00	0.07	0.019	(0.073)	0.004	0.015
265	22.08	0.10	0.029	(0.073)	0.006	0.022
266	22.17	0.10	0.029	(0.073)	0.006	0.022
267	22.25	0.10	0.029	(0.073)	0.006	0.022
268	22.33	0.07	0.019	(0.072)	0.004	0.015
269	22.42	0.07	0.019	(0.072)	0.004	0.015
270	22.50	0.07	0.019	(0.072)	0.004	0.015
271	22.58	0.07	0.019	(0.072)	0.004	0.015

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272  22.67     0.07      0.019       (  0.071)       0.004        0.015
273  22.75     0.07      0.019       (  0.071)       0.004        0.015
274  22.83     0.07      0.019       (  0.071)       0.004        0.015
275  22.92     0.07      0.019       (  0.071)       0.004        0.015
276  23.00     0.07      0.019       (  0.071)       0.004        0.015
277  23.08     0.07      0.019       (  0.071)       0.004        0.015
278  23.17     0.07      0.019       (  0.070)       0.004        0.015
279  23.25     0.07      0.019       (  0.070)       0.004        0.015
280  23.33     0.07      0.019       (  0.070)       0.004        0.015
281  23.42     0.07      0.019       (  0.070)       0.004        0.015
282  23.50     0.07      0.019       (  0.070)       0.004        0.015
283  23.58     0.07      0.019       (  0.070)       0.004        0.015
284  23.67     0.07      0.019       (  0.070)       0.004        0.015
285  23.75     0.07      0.019       (  0.070)       0.004        0.015
286  23.83     0.07      0.019       (  0.069)       0.004        0.015
287  23.92     0.07      0.019       (  0.069)       0.004        0.015
288  24.00     0.07      0.019       (  0.069)       0.004        0.015
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    22.5
      Flood volume = Effective rainfall      1.87(In)
       times area      11.2(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
      Total soil loss =      0.53(In)
      Total soil loss =     0.493(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       76106.4 Cubic Feet
      Total soil loss =       21465.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.875(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0004      0.06  Q         |         |         |         |
   0+10       0.0015      0.15  Q         |         |         |         |
   0+15       0.0026      0.17  Q         |         |         |         |
   0+20       0.0040      0.20  Q         |         |         |         |
   0+25       0.0057      0.24  Q         |         |         |         |
   0+30       0.0074      0.25  VQ        |         |         |         |
   0+35       0.0092      0.25  VQ        |         |         |         |
   0+40       0.0109      0.25  VQ        |         |         |         |
   0+45       0.0127      0.25  VQ        |         |         |         |
   0+50       0.0146      0.28  VQ        |         |         |         |
   0+55       0.0169      0.33  VQ        |         |         |         |
   1+ 0       0.0192      0.34  VQ        |         |         |         |
   1+ 5       0.0213      0.31  VQ        |         |         |         |
   1+10       0.0231      0.26  VQ        |         |         |         |
   1+15       0.0249      0.26  VQ        |         |         |         |
   1+20       0.0266      0.25  VQ        |         |         |         |
   1+25       0.0284      0.25  VQ        |         |         |         |
   1+30       0.0301      0.25  VQ        |         |         |         |
   1+35       0.0319      0.25  VQ        |         |         |         |
   1+40       0.0336      0.25  VQ        |         |         |         |
   1+45       0.0354      0.25  VQ        |         |         |         |
   1+50       0.0373      0.28  VQ        |         |         |         |
   1+55       0.0396      0.33  VQ        |         |         |         |
   2+ 0       0.0419      0.34  VQ        |         |         |         |
   2+ 5       0.0442      0.34  |Q        |         |         |         |
   2+10       0.0466      0.34  |Q        |         |         |         |
   2+15       0.0489      0.34  |Q        |         |         |         |
   2+20       0.0512      0.34  |Q        |         |         |         |
   2+25       0.0536      0.34  |Q        |         |         |         |
   2+30       0.0559      0.34  |Q        |         |         |         |
   2+35       0.0584      0.37  |Q        |         |         |         |
   2+40       0.0613      0.41  |Q        |         |         |         |
   2+45       0.0642      0.42  |Q        |         |         |         |
   2+50       0.0671      0.42  |Q        |         |         |         |
   2+55       0.0700      0.42  |Q        |         |         |         |
   3+ 0       0.0729      0.42  |Q        |         |         |         |
   3+ 5       0.0758      0.42  |Q        |         |         |         |
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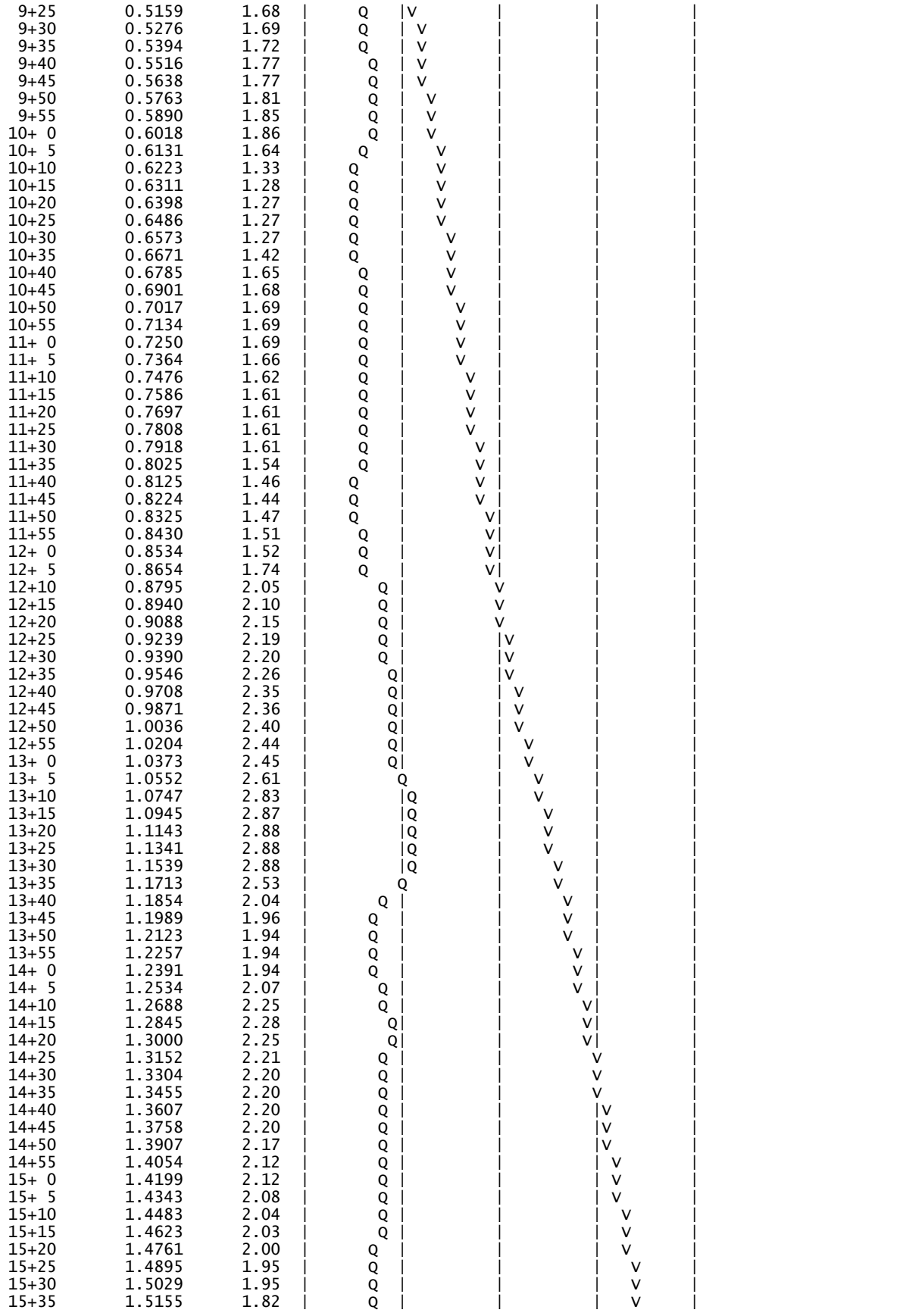
3+10	0.0788	0.42	Q			
3+15	0.0817	0.42	Q			
3+20	0.0846	0.42	Q			
3+25	0.0875	0.42	QV			
3+30	0.0904	0.42	QV			
3+35	0.0933	0.42	QV			
3+40	0.0962	0.42	QV			
3+45	0.0991	0.42	QV			
3+50	0.1023	0.45	QV			
3+55	0.1057	0.50	QV			
4+ 0	0.1092	0.51	Q			
4+ 5	0.1127	0.51	Q			
4+10	0.1162	0.51	Q			
4+15	0.1197	0.51	Q			
4+20	0.1234	0.54	Q			
4+25	0.1274	0.58	Q			
4+30	0.1315	0.59	QV			
4+35	0.1355	0.59	QV			
4+40	0.1396	0.59	QV			
4+45	0.1437	0.59	QV			
4+50	0.1480	0.62	QV			
4+55	0.1526	0.67	QV			
5+ 0	0.1572	0.67	QV			
5+ 5	0.1614	0.61	QV			
5+10	0.1651	0.53	QV			
5+15	0.1686	0.51	QV			
5+20	0.1723	0.54	QV			
5+25	0.1763	0.58	Q V			
5+30	0.1804	0.59	Q V			
5+35	0.1847	0.62	Q V			
5+40	0.1893	0.67	Q V			
5+45	0.1939	0.67	Q V			
5+50	0.1986	0.68	Q V			
5+55	0.2032	0.68	Q V			
6+ 0	0.2079	0.68	Q V			
6+ 5	0.2128	0.71	Q V			
6+10	0.2179	0.75	QV			
6+15	0.2232	0.76	Q V			
6+20	0.2284	0.76	Q V			
6+25	0.2337	0.76	Q V			
6+30	0.2389	0.76	Q V			
6+35	0.2444	0.79	Q V			
6+40	0.2501	0.84	Q V			
6+45	0.2559	0.84	Q V			
6+50	0.2617	0.85	Q V			
6+55	0.2676	0.85	Q V			
7+ 0	0.2734	0.85	Q V			
7+ 5	0.2792	0.85	Q V			
7+10	0.2850	0.85	Q V			
7+15	0.2909	0.85	Q V			
7+20	0.2969	0.88	Q V			
7+25	0.3033	0.92	Q V			
7+30	0.3096	0.93	Q V			
7+35	0.3163	0.96	Q V			
7+40	0.3232	1.01	Q V			
7+45	0.3302	1.01	Q V			
7+50	0.3374	1.05	Q V			
7+55	0.3449	1.09	Q V			
8+ 0	0.3524	1.10	Q V			
8+ 5	0.3604	1.16	Q V			
8+10	0.3691	1.25	Q V			
8+15	0.3778	1.27	Q V			
8+20	0.3865	1.27	Q V			
8+25	0.3952	1.27	Q V			
8+30	0.4040	1.27	Q V			
8+35	0.4129	1.30	Q V			
8+40	0.4222	1.34	Q V			
8+45	0.4315	1.35	Q V			
8+50	0.4410	1.38	Q V			
8+55	0.4509	1.43	Q V			
9+ 0	0.4608	1.44	Q V			
9+ 5	0.4711	1.50	Q V			
9+10	0.4820	1.59	Q V			
9+15	0.4931	1.60	Q V			
9+20	0.5044	1.64	Q V			



15+40	1.5268	1.64	| Q	|	|	| V	|
15+45	1.5379	1.61	| Q	|	|	| V	|
15+50	1.5489	1.61	| Q	|	|	| V	|
15+55	1.5600	1.61	| Q	|	|	| V	|
16+ 0	1.5711	1.61	| Q	|	|	| V	|
16+ 5	1.5789	1.14	| Q	|	|	| V	|
16+10	1.5822	0.47	|Q	|	|	| V	|
16+15	1.5847	0.36	|Q	|	|	| V	|
16+20	1.5870	0.34	|Q	|	|	| V	|
16+25	1.5893	0.34	|Q	|	|	| V	|
16+30	1.5917	0.34	|Q	|	|	| V	|
16+35	1.5938	0.31	|Q	|	|	| V	|
16+40	1.5956	0.26	|Q	|	|	| V	|
16+45	1.5973	0.26	|Q	|	|	| V	|
16+50	1.5991	0.25	|Q	|	|	| V	|
16+55	1.6008	0.25	|Q	|	|	| V	|
17+ 0	1.6026	0.25	|Q	|	|	| V	|
17+ 5	1.6048	0.32	|Q	|	|	| V	|
17+10	1.6075	0.40	|Q	|	|	| V	|
17+15	1.6104	0.42	|Q	|	|	| V	|
17+20	1.6133	0.42	|Q	|	|	| V	|
17+25	1.6163	0.42	|Q	|	|	| V	|
17+30	1.6192	0.42	|Q	|	|	| V	|
17+35	1.6221	0.42	|Q	|	|	| V	|
17+40	1.6250	0.42	|Q	|	|	| V	|
17+45	1.6279	0.42	|Q	|	|	| V	|
17+50	1.6306	0.39	|Q	|	|	| V	|
17+55	1.6330	0.35	|Q	|	|	| V	|
18+ 0	1.6353	0.34	|Q	|	|	| V	|
18+ 5	1.6377	0.34	|Q	|	|	| V	|
18+10	1.6400	0.34	|Q	|	|	| V	|
18+15	1.6423	0.34	|Q	|	|	| V	|
18+20	1.6446	0.34	|Q	|	|	| V	|
18+25	1.6470	0.34	|Q	|	|	| V	|
18+30	1.6493	0.34	|Q	|	|	| V	|
18+35	1.6514	0.31	|Q	|	|	| V	|
18+40	1.6532	0.26	|Q	|	|	| V	|
18+45	1.6550	0.26	|Q	|	|	| V	|
18+50	1.6565	0.22	Q	|	|	| V	|
18+55	1.6577	0.18	Q	|	|	| V	|
19+ 0	1.6589	0.17	Q	|	|	| V	|
19+ 5	1.6603	0.20	Q	|	|	| V	|
19+10	1.6620	0.24	Q	|	|	| V	|
19+15	1.6637	0.25	|Q	|	|	| V	|
19+20	1.6657	0.28	|Q	|	|	| V	|
19+25	1.6680	0.33	|Q	|	|	| V	|
19+30	1.6703	0.34	|Q	|	|	| V	|
19+35	1.6724	0.31	|Q	|	|	| V	|
19+40	1.6742	0.26	|Q	|	|	| V	|
19+45	1.6760	0.26	|Q	|	|	| V	|
19+50	1.6775	0.22	Q	|	|	| V	|
19+55	1.6787	0.18	Q	|	|	| V	|
20+ 0	1.6799	0.17	Q	|	|	| V	|
20+ 5	1.6813	0.20	Q	|	|	| V	|
20+10	1.6830	0.24	Q	|	|	| V	|
20+15	1.6847	0.25	|Q	|	|	| V	|
20+20	1.6864	0.25	|Q	|	|	| V	|
20+25	1.6882	0.25	|Q	|	|	| V	|
20+30	1.6899	0.25	|Q	|	|	| V	|
20+35	1.6917	0.25	|Q	|	|	| V	|
20+40	1.6934	0.25	|Q	|	|	| V	|
20+45	1.6952	0.25	|Q	|	|	| V	|
20+50	1.6967	0.22	Q	|	|	| V	|
20+55	1.6979	0.18	Q	|	|	| V	|
21+ 0	1.6991	0.17	Q	|	|	| V	|
21+ 5	1.7005	0.20	Q	|	|	| V	|
21+10	1.7022	0.24	Q	|	|	| V	|
21+15	1.7039	0.25	|Q	|	|	| V	|
21+20	1.7054	0.22	Q	|	|	| V	|
21+25	1.7067	0.18	Q	|	|	| V	|
21+30	1.7078	0.17	Q	|	|	| V	|
21+35	1.7092	0.20	Q	|	|	| V	|
21+40	1.7109	0.24	Q	|	|	| V	|
21+45	1.7126	0.25	|Q	|	|	| V	|
21+50	1.7142	0.22	Q	|	|	| V	|

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   21+55       1.7154      0.18  Q          |          |          |         v|
   22+ 0       1.7166      0.17  Q          |          |          |         v|
   22+ 5       1.7180      0.20  Q          |          |          |         v|
   22+10       1.7196      0.24  Q          |          |          |         v|
   22+15       1.7214      0.25  |Q         |          |          |         v|
   22+20       1.7229      0.22  Q          |          |          |         v|
   22+25       1.7241      0.18  Q          |          |          |         v|
   22+30       1.7253      0.17  Q          |          |          |         v|
   22+35       1.7265      0.17  Q          |          |          |         v|
   22+40       1.7276      0.17  Q          |          |          |         v|
   22+45       1.7288      0.17  Q          |          |          |         v|
   22+50       1.7300      0.17  Q          |          |          |         v|
   22+55       1.7311      0.17  Q          |          |          |         v|
   23+ 0       1.7323      0.17  Q          |          |          |         v|
   23+ 5       1.7335      0.17  Q          |          |          |         v|
   23+10       1.7346      0.17  Q          |          |          |         v|
   23+15       1.7358      0.17  Q          |          |          |         v|
   23+20       1.7370      0.17  Q          |          |          |         v|
   23+25       1.7381      0.17  Q          |          |          |         v|
   23+30       1.7393      0.17  Q          |          |          |         v|
   23+35       1.7405      0.17  Q          |          |          |         v|
   23+40       1.7416      0.17  Q          |          |          |         v|
   23+45       1.7428      0.17  Q          |          |          |         v|
   23+50       1.7440      0.17  Q          |          |          |         v|
   23+55       1.7451      0.17  Q          |          |          |         v|
   24+ 0       1.7463      0.17  Q          |          |          |         v|
   24+ 5       1.7470      0.11  Q          |          |          |         v|
   24+10       1.7471      0.02  Q          |          |          |         v|
   24+15       1.7472      0.00  Q          |          |          |         v|
-------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/08/21 File: PROP2YRC2242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA C2 PROPOSED CONDITION
2 YR STORM EVENT
21-0034
2021-11-08 EP

Drainage Area = 12.10(Ac.) = 0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 12.10(Ac.) = 0.019 Sq. Mi.
Length along longest watercourse = 1395.00(Ft.)
Length along longest watercourse measured to centroid = 552.00(Ft.)
Length along longest watercourse = 0.264 Mi.
Length along longest watercourse measured to centroid = 0.105 Mi.
Difference in elevation = 18.00(Ft.)
Slope along watercourse = 68.1290 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.48 Min.
25% of lag time = 0.62 Min.
40% of lag time = 0.99 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.10	2.40	29.04

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
12.10	6.20	75.02

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
12.100	59.80	0.770

Total Area Entered = 12.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

59.8	39.8	0.672	0.770	0.206	1.000	0.206
					Sum (F) =	0.206

Area averaged mean soil loss (F) (In/Hr) = 0.206
Minimum soil loss rate ((In/Hr)) = 0.103
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.280

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	201.918	42.661	5.202
2	0.167	403.837	49.832	6.077
3	0.250	605.755	6.448	0.786
4	0.333	807.674	1.058	0.129
			Sum = 100.000 Sum=	12.195

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.366)	0.005	0.014
2	0.17	0.07	0.019	(0.364)	0.005	0.014
3	0.25	0.07	0.019	(0.363)	0.005	0.014
4	0.33	0.10	0.029	(0.361)	0.008	0.021
5	0.42	0.10	0.029	(0.360)	0.008	0.021
6	0.50	0.10	0.029	(0.359)	0.008	0.021
7	0.58	0.10	0.029	(0.357)	0.008	0.021
8	0.67	0.10	0.029	(0.356)	0.008	0.021
9	0.75	0.10	0.029	(0.354)	0.008	0.021
10	0.83	0.13	0.038	(0.353)	0.011	0.028
11	0.92	0.13	0.038	(0.352)	0.011	0.028
12	1.00	0.13	0.038	(0.350)	0.011	0.028
13	1.08	0.10	0.029	(0.349)	0.008	0.021
14	1.17	0.10	0.029	(0.347)	0.008	0.021
15	1.25	0.10	0.029	(0.346)	0.008	0.021
16	1.33	0.10	0.029	(0.345)	0.008	0.021
17	1.42	0.10	0.029	(0.343)	0.008	0.021
18	1.50	0.10	0.029	(0.342)	0.008	0.021
19	1.58	0.10	0.029	(0.341)	0.008	0.021
20	1.67	0.10	0.029	(0.339)	0.008	0.021
21	1.75	0.10	0.029	(0.338)	0.008	0.021
22	1.83	0.13	0.038	(0.336)	0.011	0.028
23	1.92	0.13	0.038	(0.335)	0.011	0.028
24	2.00	0.13	0.038	(0.334)	0.011	0.028
25	2.08	0.13	0.038	(0.332)	0.011	0.028
26	2.17	0.13	0.038	(0.331)	0.011	0.028
27	2.25	0.13	0.038	(0.330)	0.011	0.028
28	2.33	0.13	0.038	(0.328)	0.011	0.028
29	2.42	0.13	0.038	(0.327)	0.011	0.028
30	2.50	0.13	0.038	(0.326)	0.011	0.028
31	2.58	0.17	0.048	(0.324)	0.013	0.035
32	2.67	0.17	0.048	(0.323)	0.013	0.035
33	2.75	0.17	0.048	(0.322)	0.013	0.035
34	2.83	0.17	0.048	(0.320)	0.013	0.035
35	2.92	0.17	0.048	(0.319)	0.013	0.035
36	3.00	0.17	0.048	(0.318)	0.013	0.035
37	3.08	0.17	0.048	(0.316)	0.013	0.035
38	3.17	0.17	0.048	(0.315)	0.013	0.035
39	3.25	0.17	0.048	(0.314)	0.013	0.035
40	3.33	0.17	0.048	(0.313)	0.013	0.035
41	3.42	0.17	0.048	(0.311)	0.013	0.035
42	3.50	0.17	0.048	(0.310)	0.013	0.035
43	3.58	0.17	0.048	(0.309)	0.013	0.035
44	3.67	0.17	0.048	(0.307)	0.013	0.035
45	3.75	0.17	0.048	(0.306)	0.013	0.035
46	3.83	0.20	0.058	(0.305)	0.016	0.041

47	3.92	0.20	0.058	(0.303)	0.016	0.041
48	4.00	0.20	0.058	(0.302)	0.016	0.041
49	4.08	0.20	0.058	(0.301)	0.016	0.041
50	4.17	0.20	0.058	(0.300)	0.016	0.041
51	4.25	0.20	0.058	(0.298)	0.016	0.041
52	4.33	0.23	0.067	(0.297)	0.019	0.048
53	4.42	0.23	0.067	(0.296)	0.019	0.048
54	4.50	0.23	0.067	(0.295)	0.019	0.048
55	4.58	0.23	0.067	(0.293)	0.019	0.048
56	4.67	0.23	0.067	(0.292)	0.019	0.048
57	4.75	0.23	0.067	(0.291)	0.019	0.048
58	4.83	0.27	0.077	(0.289)	0.022	0.055
59	4.92	0.27	0.077	(0.288)	0.022	0.055
60	5.00	0.27	0.077	(0.287)	0.022	0.055
61	5.08	0.20	0.058	(0.286)	0.016	0.041
62	5.17	0.20	0.058	(0.284)	0.016	0.041
63	5.25	0.20	0.058	(0.283)	0.016	0.041
64	5.33	0.23	0.067	(0.282)	0.019	0.048
65	5.42	0.23	0.067	(0.281)	0.019	0.048
66	5.50	0.23	0.067	(0.280)	0.019	0.048
67	5.58	0.27	0.077	(0.278)	0.022	0.055
68	5.67	0.27	0.077	(0.277)	0.022	0.055
69	5.75	0.27	0.077	(0.276)	0.022	0.055
70	5.83	0.27	0.077	(0.275)	0.022	0.055
71	5.92	0.27	0.077	(0.273)	0.022	0.055
72	6.00	0.27	0.077	(0.272)	0.022	0.055
73	6.08	0.30	0.086	(0.271)	0.024	0.062
74	6.17	0.30	0.086	(0.270)	0.024	0.062
75	6.25	0.30	0.086	(0.269)	0.024	0.062
76	6.33	0.30	0.086	(0.267)	0.024	0.062
77	6.42	0.30	0.086	(0.266)	0.024	0.062
78	6.50	0.30	0.086	(0.265)	0.024	0.062
79	6.58	0.33	0.096	(0.264)	0.027	0.069
80	6.67	0.33	0.096	(0.263)	0.027	0.069
81	6.75	0.33	0.096	(0.261)	0.027	0.069
82	6.83	0.33	0.096	(0.260)	0.027	0.069
83	6.92	0.33	0.096	(0.259)	0.027	0.069
84	7.00	0.33	0.096	(0.258)	0.027	0.069
85	7.08	0.33	0.096	(0.257)	0.027	0.069
86	7.17	0.33	0.096	(0.256)	0.027	0.069
87	7.25	0.33	0.096	(0.254)	0.027	0.069
88	7.33	0.37	0.106	(0.253)	0.030	0.076
89	7.42	0.37	0.106	(0.252)	0.030	0.076
90	7.50	0.37	0.106	(0.251)	0.030	0.076
91	7.58	0.40	0.115	(0.250)	0.032	0.083
92	7.67	0.40	0.115	(0.249)	0.032	0.083
93	7.75	0.40	0.115	(0.247)	0.032	0.083
94	7.83	0.43	0.125	(0.246)	0.035	0.090
95	7.92	0.43	0.125	(0.245)	0.035	0.090
96	8.00	0.43	0.125	(0.244)	0.035	0.090
97	8.08	0.50	0.144	(0.243)	0.040	0.104
98	8.17	0.50	0.144	(0.242)	0.040	0.104
99	8.25	0.50	0.144	(0.241)	0.040	0.104
100	8.33	0.50	0.144	(0.240)	0.040	0.104
101	8.42	0.50	0.144	(0.238)	0.040	0.104
102	8.50	0.50	0.144	(0.237)	0.040	0.104
103	8.58	0.53	0.154	(0.236)	0.043	0.111
104	8.67	0.53	0.154	(0.235)	0.043	0.111
105	8.75	0.53	0.154	(0.234)	0.043	0.111
106	8.83	0.57	0.163	(0.233)	0.046	0.118
107	8.92	0.57	0.163	(0.232)	0.046	0.118
108	9.00	0.57	0.163	(0.231)	0.046	0.118
109	9.08	0.63	0.182	(0.230)	0.051	0.131
110	9.17	0.63	0.182	(0.229)	0.051	0.131
111	9.25	0.63	0.182	(0.227)	0.051	0.131
112	9.33	0.67	0.192	(0.226)	0.054	0.138
113	9.42	0.67	0.192	(0.225)	0.054	0.138
114	9.50	0.67	0.192	(0.224)	0.054	0.138
115	9.58	0.70	0.202	(0.223)	0.056	0.145
116	9.67	0.70	0.202	(0.222)	0.056	0.145
117	9.75	0.70	0.202	(0.221)	0.056	0.145
118	9.83	0.73	0.211	(0.220)	0.059	0.152
119	9.92	0.73	0.211	(0.219)	0.059	0.152
120	10.00	0.73	0.211	(0.218)	0.059	0.152
121	10.08	0.50	0.144	(0.217)	0.040	0.104

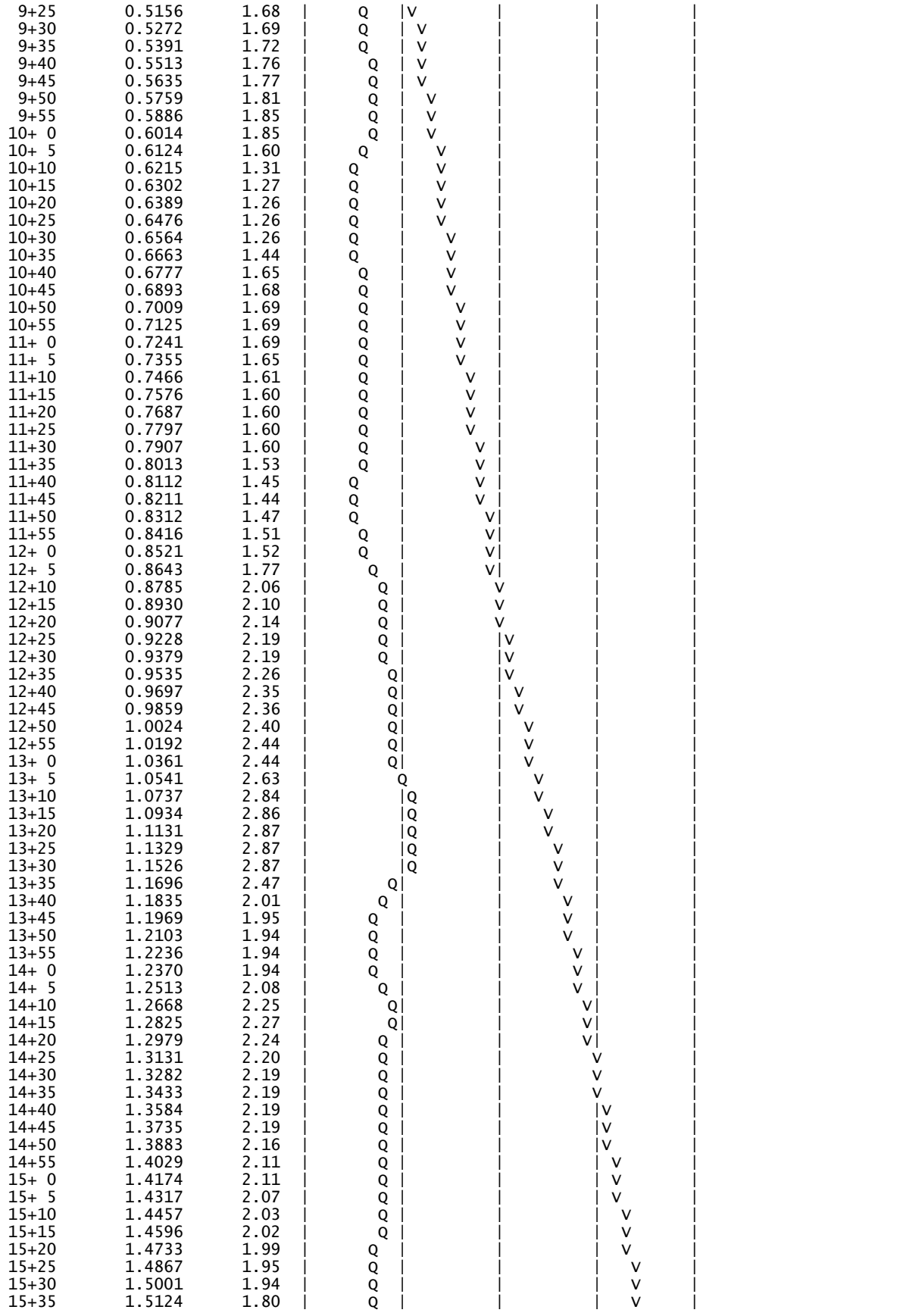
122	10.17	0.50	0.144	(0.216)	0.040	0.104
123	10.25	0.50	0.144	(0.215)	0.040	0.104
124	10.33	0.50	0.144	(0.214)	0.040	0.104
125	10.42	0.50	0.144	(0.213)	0.040	0.104
126	10.50	0.50	0.144	(0.212)	0.040	0.104
127	10.58	0.67	0.192	(0.210)	0.054	0.138
128	10.67	0.67	0.192	(0.209)	0.054	0.138
129	10.75	0.67	0.192	(0.208)	0.054	0.138
130	10.83	0.67	0.192	(0.207)	0.054	0.138
131	10.92	0.67	0.192	(0.206)	0.054	0.138
132	11.00	0.67	0.192	(0.205)	0.054	0.138
133	11.08	0.63	0.182	(0.204)	0.051	0.131
134	11.17	0.63	0.182	(0.203)	0.051	0.131
135	11.25	0.63	0.182	(0.202)	0.051	0.131
136	11.33	0.63	0.182	(0.201)	0.051	0.131
137	11.42	0.63	0.182	(0.200)	0.051	0.131
138	11.50	0.63	0.182	(0.199)	0.051	0.131
139	11.58	0.57	0.163	(0.198)	0.046	0.118
140	11.67	0.57	0.163	(0.197)	0.046	0.118
141	11.75	0.57	0.163	(0.196)	0.046	0.118
142	11.83	0.60	0.173	(0.195)	0.048	0.124
143	11.92	0.60	0.173	(0.194)	0.048	0.124
144	12.00	0.60	0.173	(0.193)	0.048	0.124
145	12.08	0.83	0.240	(0.193)	0.067	0.173
146	12.17	0.83	0.240	(0.192)	0.067	0.173
147	12.25	0.83	0.240	(0.191)	0.067	0.173
148	12.33	0.87	0.250	(0.190)	0.070	0.180
149	12.42	0.87	0.250	(0.189)	0.070	0.180
150	12.50	0.87	0.250	(0.188)	0.070	0.180
151	12.58	0.93	0.269	(0.187)	0.075	0.194
152	12.67	0.93	0.269	(0.186)	0.075	0.194
153	12.75	0.93	0.269	(0.185)	0.075	0.194
154	12.83	0.97	0.278	(0.184)	0.078	0.200
155	12.92	0.97	0.278	(0.183)	0.078	0.200
156	13.00	0.97	0.278	(0.182)	0.078	0.200
157	13.08	1.13	0.326	(0.181)	0.091	0.235
158	13.17	1.13	0.326	(0.180)	0.091	0.235
159	13.25	1.13	0.326	(0.179)	0.091	0.235
160	13.33	1.13	0.326	(0.178)	0.091	0.235
161	13.42	1.13	0.326	(0.178)	0.091	0.235
162	13.50	1.13	0.326	(0.177)	0.091	0.235
163	13.58	0.77	0.221	(0.176)	0.062	0.159
164	13.67	0.77	0.221	(0.175)	0.062	0.159
165	13.75	0.77	0.221	(0.174)	0.062	0.159
166	13.83	0.77	0.221	(0.173)	0.062	0.159
167	13.92	0.77	0.221	(0.172)	0.062	0.159
168	14.00	0.77	0.221	(0.171)	0.062	0.159
169	14.08	0.90	0.259	(0.170)	0.073	0.187
170	14.17	0.90	0.259	(0.170)	0.073	0.187
171	14.25	0.90	0.259	(0.169)	0.073	0.187
172	14.33	0.87	0.250	(0.168)	0.070	0.180
173	14.42	0.87	0.250	(0.167)	0.070	0.180
174	14.50	0.87	0.250	(0.166)	0.070	0.180
175	14.58	0.87	0.250	(0.165)	0.070	0.180
176	14.67	0.87	0.250	(0.164)	0.070	0.180
177	14.75	0.87	0.250	(0.164)	0.070	0.180
178	14.83	0.83	0.240	(0.163)	0.067	0.173
179	14.92	0.83	0.240	(0.162)	0.067	0.173
180	15.00	0.83	0.240	(0.161)	0.067	0.173
181	15.08	0.80	0.230	(0.160)	0.065	0.166
182	15.17	0.80	0.230	(0.159)	0.065	0.166
183	15.25	0.80	0.230	(0.159)	0.065	0.166
184	15.33	0.77	0.221	(0.158)	0.062	0.159
185	15.42	0.77	0.221	(0.157)	0.062	0.159
186	15.50	0.77	0.221	(0.156)	0.062	0.159
187	15.58	0.63	0.182	(0.155)	0.051	0.131
188	15.67	0.63	0.182	(0.155)	0.051	0.131
189	15.75	0.63	0.182	(0.154)	0.051	0.131
190	15.83	0.63	0.182	(0.153)	0.051	0.131
191	15.92	0.63	0.182	(0.152)	0.051	0.131
192	16.00	0.63	0.182	(0.151)	0.051	0.131
193	16.08	0.13	0.038	(0.151)	0.011	0.028
194	16.17	0.13	0.038	(0.150)	0.011	0.028
195	16.25	0.13	0.038	(0.149)	0.011	0.028
196	16.33	0.13	0.038	(0.148)	0.011	0.028

197	16.42	0.13	0.038	(0.148)	0.011	0.028
198	16.50	0.13	0.038	(0.147)	0.011	0.028
199	16.58	0.10	0.029	(0.146)	0.008	0.021
200	16.67	0.10	0.029	(0.145)	0.008	0.021
201	16.75	0.10	0.029	(0.145)	0.008	0.021
202	16.83	0.10	0.029	(0.144)	0.008	0.021
203	16.92	0.10	0.029	(0.143)	0.008	0.021
204	17.00	0.10	0.029	(0.142)	0.008	0.021
205	17.08	0.17	0.048	(0.142)	0.013	0.035
206	17.17	0.17	0.048	(0.141)	0.013	0.035
207	17.25	0.17	0.048	(0.140)	0.013	0.035
208	17.33	0.17	0.048	(0.140)	0.013	0.035
209	17.42	0.17	0.048	(0.139)	0.013	0.035
210	17.50	0.17	0.048	(0.138)	0.013	0.035
211	17.58	0.17	0.048	(0.138)	0.013	0.035
212	17.67	0.17	0.048	(0.137)	0.013	0.035
213	17.75	0.17	0.048	(0.136)	0.013	0.035
214	17.83	0.13	0.038	(0.135)	0.011	0.028
215	17.92	0.13	0.038	(0.135)	0.011	0.028
216	18.00	0.13	0.038	(0.134)	0.011	0.028
217	18.08	0.13	0.038	(0.133)	0.011	0.028
218	18.17	0.13	0.038	(0.133)	0.011	0.028
219	18.25	0.13	0.038	(0.132)	0.011	0.028
220	18.33	0.13	0.038	(0.132)	0.011	0.028
221	18.42	0.13	0.038	(0.131)	0.011	0.028
222	18.50	0.13	0.038	(0.130)	0.011	0.028
223	18.58	0.10	0.029	(0.130)	0.008	0.021
224	18.67	0.10	0.029	(0.129)	0.008	0.021
225	18.75	0.10	0.029	(0.128)	0.008	0.021
226	18.83	0.07	0.019	(0.128)	0.005	0.014
227	18.92	0.07	0.019	(0.127)	0.005	0.014
228	19.00	0.07	0.019	(0.127)	0.005	0.014
229	19.08	0.10	0.029	(0.126)	0.008	0.021
230	19.17	0.10	0.029	(0.125)	0.008	0.021
231	19.25	0.10	0.029	(0.125)	0.008	0.021
232	19.33	0.13	0.038	(0.124)	0.011	0.028
233	19.42	0.13	0.038	(0.124)	0.011	0.028
234	19.50	0.13	0.038	(0.123)	0.011	0.028
235	19.58	0.10	0.029	(0.122)	0.008	0.021
236	19.67	0.10	0.029	(0.122)	0.008	0.021
237	19.75	0.10	0.029	(0.121)	0.008	0.021
238	19.83	0.07	0.019	(0.121)	0.005	0.014
239	19.92	0.07	0.019	(0.120)	0.005	0.014
240	20.00	0.07	0.019	(0.120)	0.005	0.014
241	20.08	0.10	0.029	(0.119)	0.008	0.021
242	20.17	0.10	0.029	(0.119)	0.008	0.021
243	20.25	0.10	0.029	(0.118)	0.008	0.021
244	20.33	0.10	0.029	(0.118)	0.008	0.021
245	20.42	0.10	0.029	(0.117)	0.008	0.021
246	20.50	0.10	0.029	(0.117)	0.008	0.021
247	20.58	0.10	0.029	(0.116)	0.008	0.021
248	20.67	0.10	0.029	(0.116)	0.008	0.021
249	20.75	0.10	0.029	(0.115)	0.008	0.021
250	20.83	0.07	0.019	(0.115)	0.005	0.014
251	20.92	0.07	0.019	(0.114)	0.005	0.014
252	21.00	0.07	0.019	(0.114)	0.005	0.014
253	21.08	0.10	0.029	(0.113)	0.008	0.021
254	21.17	0.10	0.029	(0.113)	0.008	0.021
255	21.25	0.10	0.029	(0.112)	0.008	0.021
256	21.33	0.07	0.019	(0.112)	0.005	0.014
257	21.42	0.07	0.019	(0.112)	0.005	0.014
258	21.50	0.07	0.019	(0.111)	0.005	0.014
259	21.58	0.10	0.029	(0.111)	0.008	0.021
260	21.67	0.10	0.029	(0.110)	0.008	0.021
261	21.75	0.10	0.029	(0.110)	0.008	0.021
262	21.83	0.07	0.019	(0.110)	0.005	0.014
263	21.92	0.07	0.019	(0.109)	0.005	0.014
264	22.00	0.07	0.019	(0.109)	0.005	0.014
265	22.08	0.10	0.029	(0.109)	0.008	0.021
266	22.17	0.10	0.029	(0.108)	0.008	0.021
267	22.25	0.10	0.029	(0.108)	0.008	0.021
268	22.33	0.07	0.019	(0.108)	0.005	0.014
269	22.42	0.07	0.019	(0.107)	0.005	0.014
270	22.50	0.07	0.019	(0.107)	0.005	0.014
271	22.58	0.07	0.019	(0.107)	0.005	0.014

```
272  22.67     0.07      0.019       (  0.106)       0.005        0.014
273  22.75     0.07      0.019       (  0.106)       0.005        0.014
274  22.83     0.07      0.019       (  0.106)       0.005        0.014
275  22.92     0.07      0.019       (  0.105)       0.005        0.014
276  23.00     0.07      0.019       (  0.105)       0.005        0.014
277  23.08     0.07      0.019       (  0.105)       0.005        0.014
278  23.17     0.07      0.019       (  0.105)       0.005        0.014
279  23.25     0.07      0.019       (  0.104)       0.005        0.014
280  23.33     0.07      0.019       (  0.104)       0.005        0.014
281  23.42     0.07      0.019       (  0.104)       0.005        0.014
282  23.50     0.07      0.019       (  0.104)       0.005        0.014
283  23.58     0.07      0.019       (  0.104)       0.005        0.014
284  23.67     0.07      0.019       (  0.104)       0.005        0.014
285  23.75     0.07      0.019       (  0.103)       0.005        0.014
286  23.83     0.07      0.019       (  0.103)       0.005        0.014
287  23.92     0.07      0.019       (  0.103)       0.005        0.014
288  24.00     0.07      0.019       (  0.103)       0.005        0.014
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    20.7
      Flood volume = Effective rainfall      1.73(In)
       times area      12.1(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
      Total soil loss =      0.67(In)
      Total soil loss =     0.678(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       75897.2 Cubic Feet
      Total soil loss =       29515.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      2.867(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0005      0.07  Q         |         |         |         |
   0+10       0.0016      0.16  Q         |         |         |         |
   0+15       0.0027      0.17  Q         |         |         |         |
   0+20       0.0041      0.20  Q         |         |         |         |
   0+25       0.0058      0.25  Q         |         |         |         |
   0+30       0.0076      0.25  VQ        |         |         |         |
   0+35       0.0093      0.25  VQ        |         |         |         |
   0+40       0.0110      0.25  VQ        |         |         |         |
   0+45       0.0128      0.25  VQ        |         |         |         |
   0+50       0.0148      0.29  VQ        |         |         |         |
   0+55       0.0171      0.33  VQ        |         |         |         |
   1+ 0       0.0194      0.34  VQ        |         |         |         |
   1+ 5       0.0215      0.30  VQ        |         |         |         |
   1+10       0.0232      0.26  VQ        |         |         |         |
   1+15       0.0250      0.25  VQ        |         |         |         |
   1+20       0.0267      0.25  VQ        |         |         |         |
   1+25       0.0285      0.25  VQ        |         |         |         |
   1+30       0.0302      0.25  VQ        |         |         |         |
   1+35       0.0320      0.25  VQ        |         |         |         |
   1+40       0.0337      0.25  VQ        |         |         |         |
   1+45       0.0354      0.25  VQ        |         |         |         |
   1+50       0.0374      0.29  VQ        |         |         |         |
   1+55       0.0397      0.33  VQ        |         |         |         |
   2+ 0       0.0420      0.34  VQ        |         |         |         |
   2+ 5       0.0444      0.34  |Q        |         |         |         |
   2+10       0.0467      0.34  |Q        |         |         |         |
   2+15       0.0490      0.34  |Q        |         |         |         |
   2+20       0.0513      0.34  |Q        |         |         |         |
   2+25       0.0536      0.34  |Q        |         |         |         |
   2+30       0.0560      0.34  |Q        |         |         |         |
   2+35       0.0585      0.37  |Q        |         |         |         |
   2+40       0.0614      0.42  |Q        |         |         |         |
   2+45       0.0643      0.42  |Q        |         |         |         |
   2+50       0.0672      0.42  |Q        |         |         |         |
   2+55       0.0701      0.42  |Q        |         |         |         |
   3+ 0       0.0730      0.42  |Q        |         |         |         |
   3+ 5       0.0759      0.42  |Q        |         |         |         |
```

3+10	0.0788	0.42	Q			
3+15	0.0817	0.42	Q			
3+20	0.0846	0.42	Q			
3+25	0.0875	0.42	QV			
3+30	0.0904	0.42	QV			
3+35	0.0933	0.42	QV			
3+40	0.0962	0.42	QV			
3+45	0.0991	0.42	QV			
3+50	0.1023	0.46	QV			
3+55	0.1057	0.50	QV			
4+ 0	0.1092	0.51	Q			
4+ 5	0.1127	0.51	Q			
4+10	0.1162	0.51	Q			
4+15	0.1197	0.51	Q			
4+20	0.1234	0.54	Q			
4+25	0.1274	0.58	Q			
4+30	0.1315	0.59	QV			
4+35	0.1355	0.59	QV			
4+40	0.1396	0.59	QV			
4+45	0.1437	0.59	QV			
4+50	0.1480	0.63	QV			
4+55	0.1526	0.67	QV			
5+ 0	0.1572	0.67	QV			
5+ 5	0.1614	0.60	QV			
5+10	0.1650	0.52	QV			
5+15	0.1685	0.51	QV			
5+20	0.1722	0.54	QV			
5+25	0.1762	0.58	Q V			
5+30	0.1803	0.59	Q V			
5+35	0.1846	0.63	Q V			
5+40	0.1892	0.67	Q V			
5+45	0.1938	0.67	Q V			
5+50	0.1985	0.67	Q V			
5+55	0.2031	0.67	Q V			
6+ 0	0.2078	0.67	Q V			
6+ 5	0.2127	0.71	Q V			
6+10	0.2178	0.75	Q V			
6+15	0.2231	0.76	Q V			
6+20	0.2283	0.76	Q V			
6+25	0.2335	0.76	Q V			
6+30	0.2387	0.76	Q V			
6+35	0.2442	0.79	Q V			
6+40	0.2500	0.84	Q V			
6+45	0.2558	0.84	Q V			
6+50	0.2616	0.84	Q V			
6+55	0.2674	0.84	Q V			
7+ 0	0.2732	0.84	Q V			
7+ 5	0.2790	0.84	Q V			
7+10	0.2848	0.84	Q V			
7+15	0.2906	0.84	Q V			
7+20	0.2967	0.88	Q V			
7+25	0.3030	0.92	Q V			
7+30	0.3094	0.93	Q V			
7+35	0.3161	0.96	Q V			
7+40	0.3230	1.01	Q V			
7+45	0.3299	1.01	Q V			
7+50	0.3372	1.05	Q V			
7+55	0.3447	1.09	Q V			
8+ 0	0.3522	1.10	Q V			
8+ 5	0.3603	1.17	Q V			
8+10	0.3689	1.25	Q V			
8+15	0.3776	1.26	Q V			
8+20	0.3863	1.26	Q V			
8+25	0.3950	1.26	Q V			
8+30	0.4037	1.26	Q V			
8+35	0.4127	1.30	Q V			
8+40	0.4219	1.34	Q V			
8+45	0.4312	1.35	Q V			
8+50	0.4407	1.39	Q V			
8+55	0.4506	1.43	Q V			
9+ 0	0.4604	1.43	Q V			
9+ 5	0.4708	1.51	Q V			
9+10	0.4818	1.59	Q V			
9+15	0.4928	1.60	Q V			
9+20	0.5041	1.64	Q V			



15+40	1.5237	1.63	| Q	|	|	| V	|
15+45	1.5347	1.61	| Q	|	|	| V	|
15+50	1.5458	1.60	| Q	|	|	| V	|
15+55	1.5568	1.60	| Q	|	|	| V	|
16+ 0	1.5678	1.60	| Q	|	|	| V	|
16+ 5	1.5751	1.06	| Q	|	|	| V	|
16+10	1.5781	0.43	|Q	|	|	| V	|
16+15	1.5805	0.35	|Q	|	|	| V	|
16+20	1.5829	0.34	|Q	|	|	| V	|
16+25	1.5852	0.34	|Q	|	|	| V	|
16+30	1.5875	0.34	|Q	|	|	| V	|
16+35	1.5896	0.30	|Q	|	|	| V	|
16+40	1.5914	0.26	|Q	|	|	| V	|
16+45	1.5931	0.25	|Q	|	|	| V	|
16+50	1.5949	0.25	|Q	|	|	| V	|
16+55	1.5966	0.25	|Q	|	|	| V	|
17+ 0	1.5983	0.25	|Q	|	|	| V	|
17+ 5	1.6006	0.32	|Q	|	|	| V	|
17+10	1.6034	0.41	|Q	|	|	| V	|
17+15	1.6063	0.42	|Q	|	|	| V	|
17+20	1.6092	0.42	|Q	|	|	| V	|
17+25	1.6121	0.42	|Q	|	|	| V	|
17+30	1.6150	0.42	|Q	|	|	| V	|
17+35	1.6179	0.42	|Q	|	|	| V	|
17+40	1.6208	0.42	|Q	|	|	| V	|
17+45	1.6237	0.42	|Q	|	|	| V	|
17+50	1.6264	0.39	|Q	|	|	| V	|
17+55	1.6287	0.34	|Q	|	|	| V	|
18+ 0	1.6311	0.34	|Q	|	|	| V	|
18+ 5	1.6334	0.34	|Q	|	|	| V	|
18+10	1.6357	0.34	|Q	|	|	| V	|
18+15	1.6380	0.34	|Q	|	|	| V	|
18+20	1.6404	0.34	|Q	|	|	| V	|
18+25	1.6427	0.34	|Q	|	|	| V	|
18+30	1.6450	0.34	|Q	|	|	| V	|
18+35	1.6471	0.30	|Q	|	|	| V	|
18+40	1.6489	0.26	|Q	|	|	| V	|
18+45	1.6506	0.25	|Q	|	|	| V	|
18+50	1.6521	0.22	Q	|	|	| V	|
18+55	1.6533	0.17	Q	|	|	| V	|
19+ 0	1.6545	0.17	Q	|	|	| V	|
19+ 5	1.6559	0.20	Q	|	|	| V	|
19+10	1.6576	0.25	Q	|	|	| V	|
19+15	1.6593	0.25	|Q	|	|	| V	|
19+20	1.6613	0.29	|Q	|	|	| V	|
19+25	1.6636	0.33	|Q	|	|	| V	|
19+30	1.6659	0.34	|Q	|	|	| V	|
19+35	1.6680	0.30	|Q	|	|	| V	|
19+40	1.6698	0.26	|Q	|	|	| V	|
19+45	1.6715	0.25	|Q	|	|	| V	|
19+50	1.6730	0.22	Q	|	|	| V	|
19+55	1.6742	0.17	Q	|	|	| V	|
20+ 0	1.6754	0.17	Q	|	|	| V	|
20+ 5	1.6768	0.20	Q	|	|	| V	|
20+10	1.6785	0.25	Q	|	|	| V	|
20+15	1.6802	0.25	|Q	|	|	| V	|
20+20	1.6820	0.25	|Q	|	|	| V	|
20+25	1.6837	0.25	|Q	|	|	| V	|
20+30	1.6855	0.25	|Q	|	|	| V	|
20+35	1.6872	0.25	|Q	|	|	| V	|
20+40	1.6889	0.25	|Q	|	|	| V	|
20+45	1.6907	0.25	|Q	|	|	| V	|
20+50	1.6922	0.22	Q	|	|	| V	|
20+55	1.6934	0.17	Q	|	|	| V	|
21+ 0	1.6945	0.17	Q	|	|	| V	|
21+ 5	1.6960	0.20	Q	|	|	| V	|
21+10	1.6977	0.25	Q	|	|	| V	|
21+15	1.6994	0.25	|Q	|	|	| V	|
21+20	1.7009	0.22	Q	|	|	| V	|
21+25	1.7021	0.17	Q	|	|	| V	|
21+30	1.7033	0.17	Q	|	|	| V	|
21+35	1.7047	0.20	Q	|	|	| V	|
21+40	1.7064	0.25	Q	|	|	| V	|
21+45	1.7081	0.25	|Q	|	|	| V	|
21+50	1.7096	0.22	Q	|	|	| V	|

```
   21+55       1.7108      0.17  Q          |          |          |         v|
   22+ 0       1.7120      0.17  Q          |          |          |         v|
   22+ 5       1.7134      0.20  Q          |          |          |         v|
   22+10       1.7151      0.25  Q          |          |          |         v|
   22+15       1.7168      0.25  |Q         |          |          |         v|
   22+20       1.7183      0.22  Q          |          |          |         v|
   22+25       1.7195      0.17  Q          |          |          |         v|
   22+30       1.7207      0.17  Q          |          |          |         v|
   22+35       1.7218      0.17  Q          |          |          |         v|
   22+40       1.7230      0.17  Q          |          |          |         v|
   22+45       1.7242      0.17  Q          |          |          |         v|
   22+50       1.7253      0.17  Q          |          |          |         v|
   22+55       1.7265      0.17  Q          |          |          |         v|
   23+ 0       1.7277      0.17  Q          |          |          |         v|
   23+ 5       1.7288      0.17  Q          |          |          |         v|
   23+10       1.7300      0.17  Q          |          |          |         v|
   23+15       1.7311      0.17  Q          |          |          |         v|
   23+20       1.7323      0.17  Q          |          |          |         v|
   23+25       1.7335      0.17  Q          |          |          |         v|
   23+30       1.7346      0.17  Q          |          |          |         v|
   23+35       1.7358      0.17  Q          |          |          |         v|
   23+40       1.7369      0.17  Q          |          |          |         v|
   23+45       1.7381      0.17  Q          |          |          |         v|
   23+50       1.7393      0.17  Q          |          |          |         v|
   23+55       1.7404      0.17  Q          |          |          |         v|
   24+ 0       1.7416      0.17  Q          |          |          |         v|
   24+ 5       1.7423      0.10  Q          |          |          |         v|
   24+10       1.7423      0.01  Q          |          |          |         v|
   24+15       1.7424      0.00  Q          |          |          |         v|
-------------------------------------------------------------------------
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STAGE-STORAGE/OUTFLOW TABLES

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CONTECH CMP DETENTION SYSTEMS

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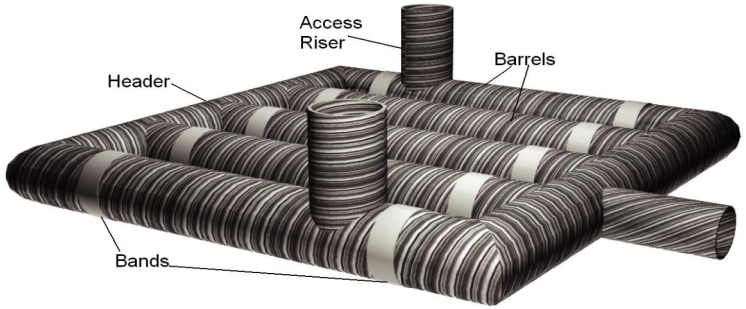


Project Summary

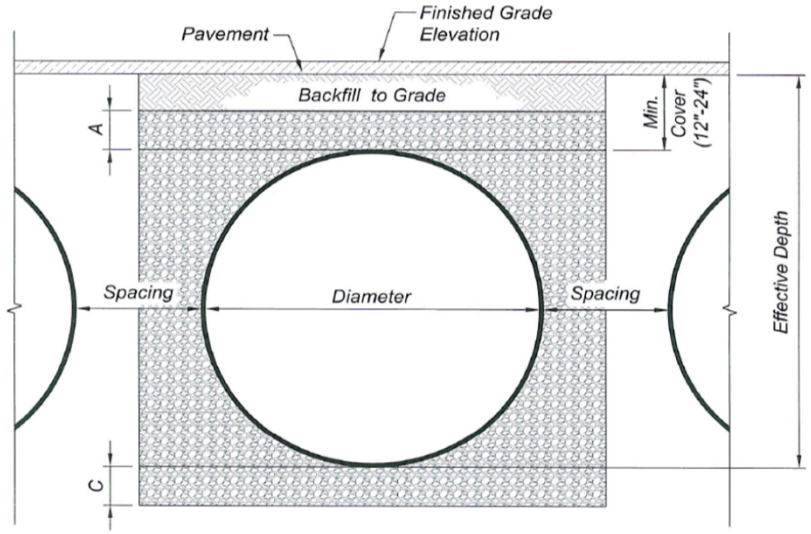
Date:	12/1/2021
Project Name:	BCCOV BLDG C AREA 8
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	65,000
Limiting Width (ft):	50.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	65,044	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	65,044	cf	100.1% Of Required Storage
Number of Barrels:	4	barrels	
Length per Barrel:	303.0	ft	
Length Per Header:	41.0	ft	
Rectangular Footprint (W x L):	44. ft x 322. ft		

CONTECH Materials

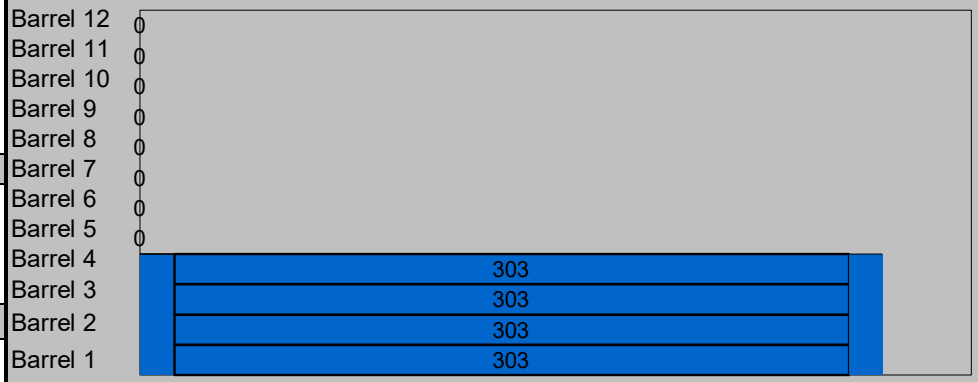
Total CMP Footage:	1,294	ft
Approximate Total Pieces:	56	pcs
Approximate Coupling Bands:	58	bands
Approximate Truckloads:	28	trucks

Construction Quantities**

Total Excavation:	5248	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	2839	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

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DYODS™
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CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings,
and pricing send completed worksheet to:
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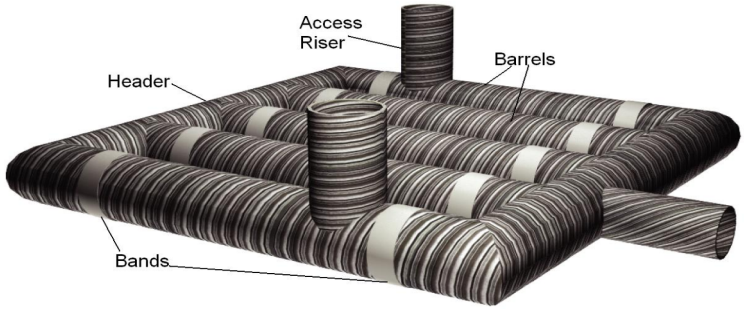


Project Summary

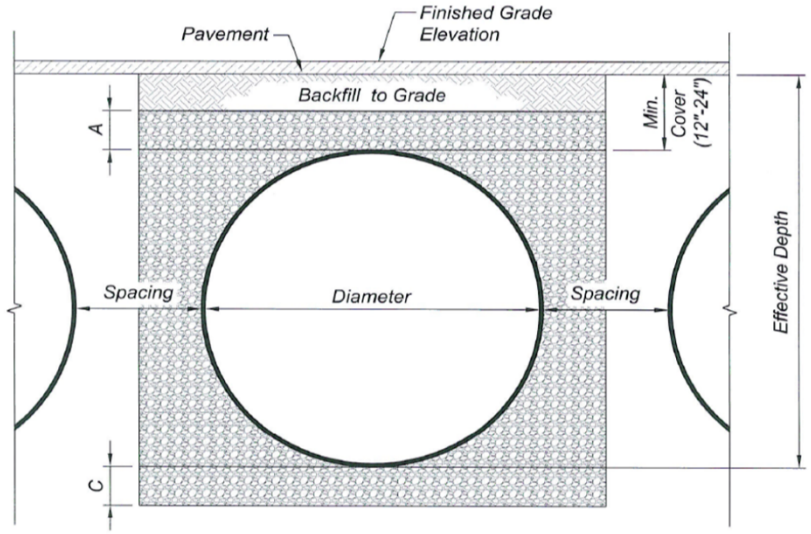
Date:	12/1/2021
Project Name:	BCCOV BLDG C AREA 9
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	70,000
Limiting Width (ft):	100.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	70,271	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	70,271	cf	100.4% Of Required Storage
Number of Barrels:	9	barrels	
Length per Barrel:	134.0	ft	
Length Per Header:	96.0	ft	
Rectangular Footprint (W x L):	99. ft x 153. ft		

CONTECH Materials

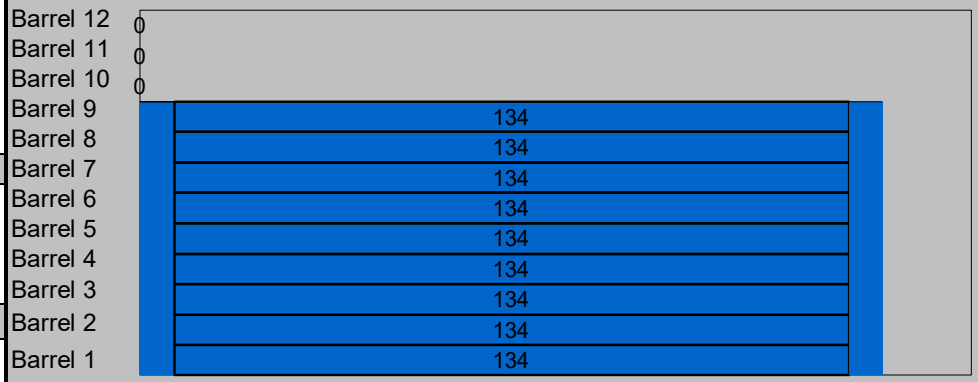
Total CMP Footage:	1,398	ft
Approximate Total Pieces:	62	pcs
Approximate Coupling Bands:	69	bands
Approximate Truckloads:	31	trucks

Construction Quantities**

Total Excavation:	5610	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	3007	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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BLDG C CMP CHAMBERS C1- Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	1.09
Opening (in)	4.5
# of Orifices	1
Area (sf)	0.1104
Opening (ft)	0.3750
Total Area (sf)	0.1104
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= $Cd*Area*(2*G*H)^{0.5}$

Q_{WEIR}= $C*L*H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.188	**0.1875**	**634.73**	**0.015**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1692.61**	**0.039**	**0.3125**	0.33	0.33	
4	2209	1	**4692.68**	**0.108**	**0.8125**	0.53	0.53	
5	**2209.5**	1.5	**8442.56**	**0.194**	**1.3125**	0.67	0.67	
6	2210	2	**12716.08**	**0.292**	**1.8125**	0.79	0.79	
7	**2210.5**	2.5	**17365.80**	**0.399**	**2.3125**	0.89	0.89	
8	2211	3	**22278.63**	**0.511**	**2.8125**	0.98	0.98	
9	**2211.5**	**3.5**	**27359.28**	**0.628**	**3.3125**	**1.06**	1.06	
10	2212	4	**32521.77**	**0.747**	**3.8125**	1.14	1.14	
11	**2212.5**	4.5	**37684.26**	**0.865**	**4.3125**	1.21	1.21	
12	2213	5	**42764.90**	**0.982**	**4.8125**	1.28	1.28	
13	**2213.5**	5.5	**47677.74**	**1.095**	**5.3125**	1.35	1.35	
14	2214	6	**52327.45**	**1.201**	**5.8125**	1.41	1.41	
15	**2214.5**	6.5	**56600.97**	**1.299**	**6.3125**	1.47	1.47	
16	2215	7	**60350.85**	**1.385**	**6.8125**	1.53	1.53	
17	**2215.5**	7.50	**63350.92**	**1.454**	**7.3125**	1.58	1.58	
18	2216	8	**65043.53**	**1.493**	**7.8125**	1.64	1.64	Top of chambers

BLDG C CMP CHAMBERS C2- Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	0.6
Opening (in)	3
# of Orifices	1
Area (sf)	0.0491
Opening (ft)	0.2500
Total Area (sf)	0.0491
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= Cd*Area*$(2*G*H)^{0.5}$

Q_{WEIR}= C*L*$H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.125	**0.125**	**457.16**	**0.010**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1828.65**	**0.042**	**0.375**	0.16	0.16	
4	2209	1	**5069.84**	**0.116**	**0.875**	0.24	0.24	
5	**2209.5**	1.5	**9121.10**	**0.209**	**1.375**	0.30	0.30	
6	2210	2	**13738.09**	**0.315**	**1.875**	0.36	0.36	
7	**2210.5**	2.5	**18761.50**	**0.431**	**2.375**	0.40	0.40	
8	2211	3	**24069.19**	**0.553**	**2.875**	0.44	0.44	
9	**2211.5**	**3.5**	**29558.17**	**0.679**	**3.375**	**0.48**	0.48	
10	2212	4	**35135.57**	**0.807**	**3.875**	0.51	0.51	
11	**2212.5**	4.5	**40712.98**	**0.935**	**4.375**	0.54	0.54	
12	2213	5	**46201.95**	**1.061**	**4.875**	0.57	0.57	
13	**2213.5**	5.5	**51509.64**	**1.182**	**5.375**	0.60	0.60	
14	2214	6	**56533.06**	**1.298**	**5.875**	0.63	0.63	
15	**2214.5**	6.5	**61150.05**	**1.404**	**6.375**	0.66	0.66	
16	2215	7	**65201.31**	**1.497**	**6.875**	0.68	0.68	
17	**2215.5**	7.50	**68442.49**	**1.571**	**7.375**	0.71	0.71	
18	2216	8	**70271.14**	**1.613**	**7.875**	0.73	0.73	Top of chambers

BASIN ROUTING (2-YEAR, 24-HOUR STORM EVENT)

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/25/21

BCCOV BLDG C AREA 9
2-YR 24 HR STORM
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YRC1242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 291
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.875 (CFS)
Total volume = 1.747 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++++++++++

Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 291
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

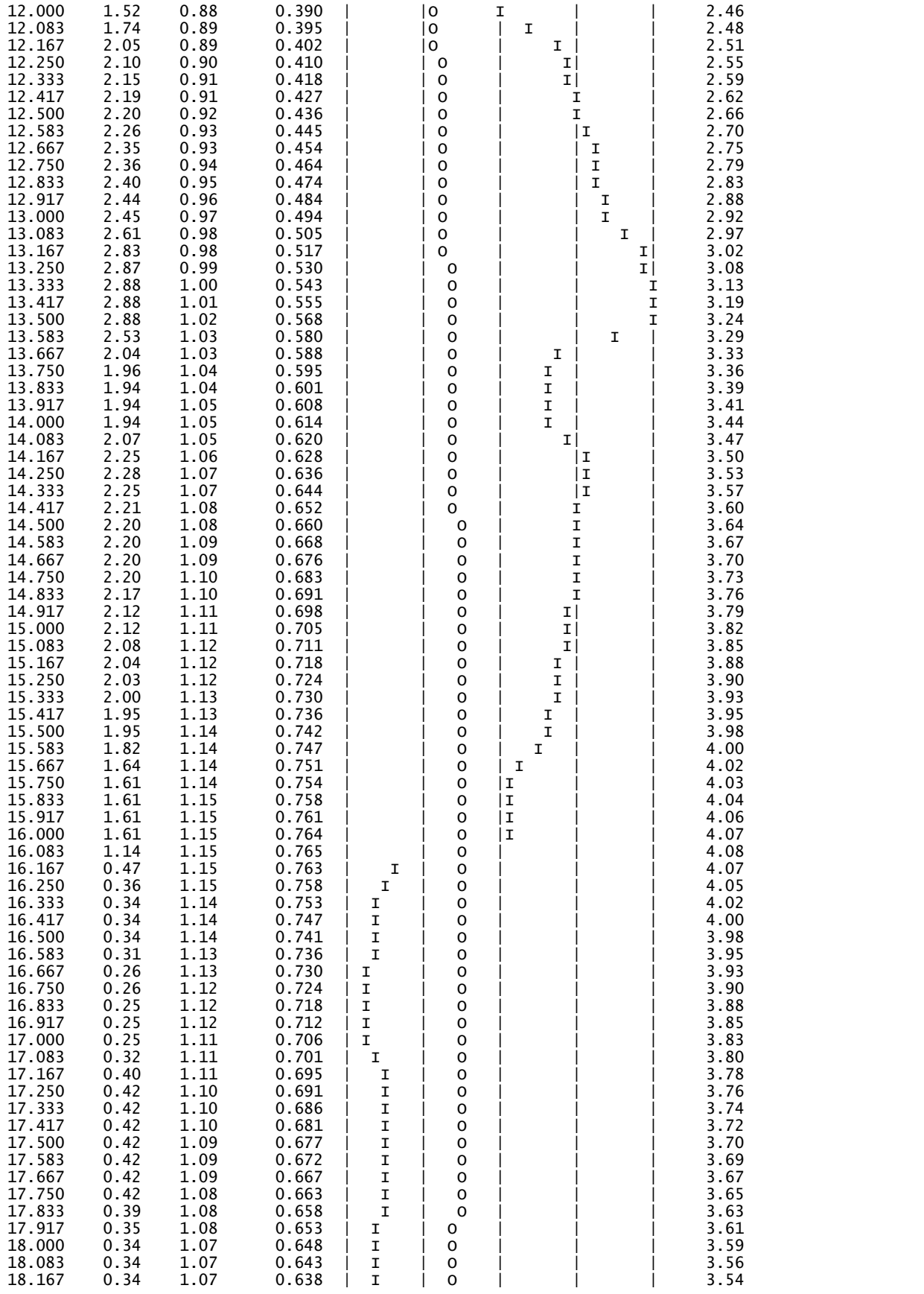
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.188	0.015	0.001	0.015	0.015
0.500	0.039	0.330	0.038	0.040
1.000	0.108	0.530	0.106	0.110
1.500	0.194	0.670	0.192	0.196
2.000	0.292	0.790	0.289	0.295
2.500	0.399	0.890	0.396	0.402
3.000	0.511	0.980	0.508	0.514
3.500	0.628	1.060	0.624	0.632
4.000	0.747	1.140	0.743	0.751
4.500	0.865	1.210	0.861	0.869
5.000	0.982	1.280	0.978	0.986
5.500	1.095	1.350	1.090	1.100
6.000	1.201	1.410	1.196	1.206
6.500	1.299	1.470	1.294	1.304
7.000	1.385	1.530	1.380	1.390
7.500	1.454	1.580	1.449	1.459
8.000	1.493	1.640	1.487	1.499

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.7	1.44	2.16	2.88	Depth (Ft.)
0.083	0.06	0.00	0.000	O					0.00
0.167	0.15	0.00	0.001	OI					0.01
0.250	0.17	0.00	0.002	OI					0.03
0.333	0.20	0.00	0.003	O I					0.04
0.417	0.24	0.00	0.005	O I					0.06
0.500	0.25	0.00	0.007	O I					0.08
0.583	0.25	0.00	0.008	O I					0.10
0.667	0.25	0.00	0.010	O I					0.13
0.750	0.25	0.00	0.012	O I					0.15
0.833	0.28	0.00	0.014	O I					0.17
0.917	0.33	0.01	0.016	O I					0.20
1.000	0.34	0.04	0.018	O I					0.22
1.083	0.31	0.06	0.020	O I					0.25
1.167	0.26	0.08	0.021	O I					0.27
1.250	0.26	0.10	0.022	OI					0.28
1.333	0.25	0.11	0.023	OI					0.30
1.417	0.25	0.13	0.024	OI					0.31
1.500	0.25	0.14	0.025	OI					0.32
1.583	0.25	0.15	0.026	OI					0.33
1.667	0.25	0.16	0.026	OI					0.34
1.750	0.25	0.17	0.027	OI					0.35
1.833	0.28	0.18	0.028	O I					0.35
1.917	0.33	0.19	0.029	OI					0.37
2.000	0.34	0.20	0.030	OI					0.38
2.083	0.34	0.21	0.030	OI					0.39
2.167	0.34	0.22	0.031	OI					0.40
2.250	0.34	0.23	0.032	OI					0.41
2.333	0.34	0.24	0.033	OI					0.42
2.417	0.34	0.25	0.033	OI					0.43
2.500	0.34	0.26	0.034	OI					0.43
2.583	0.37	0.27	0.035	O I					0.44
2.667	0.41	0.28	0.035	OI					0.45
2.750	0.42	0.29	0.036	OI					0.46
2.833	0.42	0.30	0.037	OI					0.48
2.917	0.42	0.31	0.038	OI					0.49
3.000	0.42	0.32	0.039	OI					0.49
3.083	0.42	0.33	0.039	OI					0.50
3.167	0.42	0.33	0.040	OI					0.51
3.250	0.42	0.33	0.040	OI					0.51
3.333	0.42	0.34	0.041	OI					0.52
3.417	0.42	0.34	0.042	OI					0.52
3.500	0.42	0.34	0.042	OI					0.52
3.583	0.42	0.34	0.043	OI					0.53
3.667	0.42	0.34	0.043	OI					0.53
3.750	0.42	0.34	0.044	OI					0.54
3.833	0.45	0.35	0.045	O I					0.54
3.917	0.50	0.35	0.045	O I					0.55
4.000	0.51	0.35	0.047	O I					0.55
4.083	0.51	0.35	0.048	O I					0.56
4.167	0.51	0.36	0.049	O I					0.57
4.250	0.51	0.36	0.050	OI					0.58
4.333	0.54	0.36	0.051	OI					0.59
4.417	0.58	0.37	0.052	O I					0.59
4.500	0.59	0.37	0.054	O I					0.61
4.583	0.59	0.38	0.055	O I					0.62
4.667	0.59	0.38	0.057	O I					0.63
4.750	0.59	0.38	0.058	O I					0.64
4.833	0.62	0.39	0.059	O I					0.65
4.917	0.67	0.39	0.061	O I					0.66
5.000	0.67	0.40	0.063	O I					0.67
5.083	0.61	0.40	0.065	O I					0.69
5.167	0.53	0.41	0.066	OI					0.70
5.250	0.51	0.41	0.067	OI					0.70
5.333	0.54	0.41	0.067	OI					0.71
5.417	0.58	0.42	0.068	O I					0.71
5.500	0.59	0.42	0.070	O I					0.72
5.583	0.62	0.42	0.071	O I					0.73
5.667	0.67	0.43	0.072	O I					0.74

5.750	0.67	0.43	0.074	o I				0.75
5.833	0.68	0.44	0.076	o I				0.77
5.917	0.68	0.44	0.077	o I				0.78
6.000	0.68	0.45	0.079	o I				0.79
6.083	0.71	0.45	0.081	o I				0.80
6.167	0.75	0.46	0.083	o I				0.82
6.250	0.76	0.46	0.085	o I				0.83
6.333	0.76	0.47	0.087	o I				0.85
6.417	0.76	0.47	0.089	o I				0.86
6.500	0.76	0.48	0.091	o I				0.87
6.583	0.79	0.49	0.093	o I				0.89
6.667	0.84	0.49	0.095	o I				0.90
6.750	0.84	0.50	0.097	o I				0.92
6.833	0.85	0.51	0.100	o I				0.94
6.917	0.85	0.51	0.102	o I				0.96
7.000	0.85	0.52	0.104	o I				0.97
7.083	0.85	0.53	0.106	o I				0.99
7.167	0.85	0.53	0.109	o I				1.00
7.250	0.85	0.53	0.111	o I				1.02
7.333	0.88	0.54	0.113	o I				1.03
7.417	0.92	0.54	0.115	o I				1.04
7.500	0.93	0.55	0.118	o I				1.06
7.583	0.96	0.55	0.121	o I				1.07
7.667	1.01	0.56	0.124	o I				1.09
7.750	1.01	0.56	0.127	o I				1.11
7.833	1.05	0.57	0.130	o I				1.13
7.917	1.09	0.57	0.134	o I				1.15
8.000	1.10	0.58	0.137	o I				1.17
8.083	1.16	0.58	0.141	o I				1.19
8.167	1.25	0.59	0.145	o I				1.22
8.250	1.27	0.60	0.150	o I				1.24
8.333	1.27	0.61	0.154	o I				1.27
8.417	1.27	0.61	0.159	o I				1.30
8.500	1.27	0.62	0.163	o I				1.32
8.583	1.30	0.63	0.168	o I				1.35
8.667	1.34	0.64	0.173	o I				1.38
8.750	1.35	0.64	0.178	o I				1.40
8.833	1.38	0.65	0.183	o I				1.43
8.917	1.43	0.66	0.188	o I				1.46
9.000	1.44	0.67	0.193	o I				1.49
9.083	1.50	0.68	0.198	o I				1.52
9.167	1.59	0.68	0.204	o I				1.55
9.250	1.60	0.69	0.211	o I				1.59
9.333	1.64	0.70	0.217	o I				1.62
9.417	1.68	0.71	0.224	o I				1.65
9.500	1.69	0.71	0.230	o I				1.69
9.583	1.72	0.72	0.237	o I				1.72
9.667	1.77	0.73	0.244	o I				1.76
9.750	1.77	0.74	0.251	o I				1.79
9.833	1.81	0.75	0.259	o I				1.83
9.917	1.85	0.76	0.266	o I				1.87
10.000	1.86	0.77	0.273	o I				1.91
10.083	1.64	0.78	0.280	o I				1.94
10.167	1.33	0.78	0.285	o I				1.96
10.250	1.28	0.79	0.289	o I				1.98
10.333	1.27	0.79	0.292	o I				2.00
10.417	1.27	0.79	0.295	o I				2.02
10.500	1.27	0.80	0.299	o I				2.03
10.583	1.42	0.80	0.302	o I				2.05
10.667	1.65	0.80	0.307	o I				2.07
10.750	1.68	0.81	0.313	o I				2.10
10.833	1.69	0.82	0.319	o I				2.13
10.917	1.69	0.82	0.325	o I				2.16
11.000	1.69	0.83	0.331	o I				2.18
11.083	1.66	0.83	0.337	o I				2.21
11.167	1.62	0.84	0.343	o I				2.24
11.250	1.61	0.84	0.348	o I				2.26
11.333	1.61	0.85	0.353	o I				2.29
11.417	1.61	0.85	0.358	o I				2.31
11.500	1.61	0.86	0.364	o I				2.33
11.583	1.54	0.86	0.369	o I				2.36
11.667	1.46	0.87	0.373	o I				2.38
11.750	1.44	0.87	0.377	o I				2.40
11.833	1.47	0.87	0.381	o I				2.42
11.917	1.51	0.88	0.385	o I				2.44



18.250	0.34	1.06	0.633	I	O			3.52
18.333	0.34	1.06	0.628	I	O			3.50
18.417	0.34	1.06	0.623	I	O			3.48
18.500	0.34	1.05	0.618	I	O			3.46
18.583	0.31	1.05	0.613	I	O			3.44
18.667	0.26	1.05	0.608	I	O			3.42
18.750	0.26	1.04	0.603	I	O			3.39
18.833	0.22	1.04	0.597	I	O			3.37
18.917	0.18	1.03	0.591	I	O			3.34
19.000	0.17	1.03	0.586	I	O			3.32
19.083	0.20	1.03	0.580	I	O			3.29
19.167	0.24	1.02	0.574	I	O			3.27
19.250	0.25	1.02	0.569	I	O			3.25
19.333	0.28	1.02	0.564	I	O			3.23
19.417	0.33	1.01	0.559	I	O			3.20
19.500	0.34	1.01	0.554	I	O			3.18
19.583	0.31	1.01	0.549	I	O			3.16
19.667	0.26	1.00	0.544	I	O			3.14
19.750	0.26	1.00	0.539	I	O			3.12
19.833	0.22	1.00	0.534	I	O			3.10
19.917	0.18	0.99	0.529	I	O			3.08
20.000	0.17	0.99	0.523	I	O			3.05
20.083	0.20	0.98	0.518	I	O			3.03
20.167	0.24	0.98	0.512	I	O			3.01
20.250	0.25	0.98	0.507	I	O			2.98
20.333	0.25	0.97	0.502	I	O			2.96
20.417	0.25	0.97	0.497	I	O			2.94
20.500	0.25	0.97	0.492	I	O			2.92
20.583	0.25	0.96	0.488	I	O			2.90
20.667	0.25	0.96	0.483	I	O			2.87
20.750	0.25	0.95	0.478	I	O			2.85
20.833	0.22	0.95	0.473	I	O			2.83
20.917	0.18	0.95	0.468	I	O			2.81
21.000	0.17	0.94	0.463	I	O			2.78
21.083	0.20	0.94	0.457	I	O			2.76
21.167	0.24	0.93	0.452	I	O			2.74
21.250	0.25	0.93	0.448	I	O			2.72
21.333	0.22	0.93	0.443	I	O			2.70
21.417	0.18	0.92	0.438	I	O			2.67
21.500	0.17	0.92	0.433	I	O			2.65
21.583	0.20	0.91	0.428	I	O			2.63
21.667	0.24	0.91	0.423	I	O			2.61
21.750	0.25	0.91	0.419	I	O			2.59
21.833	0.22	0.90	0.414	I	O			2.57
21.917	0.18	0.90	0.409	I	O			2.55
22.000	0.17	0.89	0.404	I	O			2.52
22.083	0.20	0.89	0.399	I	O			2.50
22.167	0.24	0.89	0.395	I	O			2.48
22.250	0.25	0.88	0.390	I	O			2.46
22.333	0.22	0.88	0.386	I	O			2.44
22.417	0.18	0.87	0.381	I	O			2.42
22.500	0.17	0.87	0.376	I	O			2.39
22.583	0.17	0.86	0.372	I	O			2.37
22.667	0.17	0.86	0.367	I	O			2.35
22.750	0.17	0.86	0.362	I	O			2.33
22.833	0.17	0.85	0.357	I	O			2.31
22.917	0.17	0.85	0.353	I	O			2.28
23.000	0.17	0.84	0.348	I	O			2.26
23.083	0.17	0.84	0.343	I	O			2.24
23.167	0.17	0.83	0.339	I	O			2.22
23.250	0.17	0.83	0.334	I	O			2.20
23.333	0.17	0.83	0.330	I	O			2.18
23.417	0.17	0.82	0.325	I	O			2.16
23.500	0.17	0.82	0.321	I	O			2.13
23.583	0.17	0.81	0.316	I	O			2.11
23.667	0.17	0.81	0.312	I	O			2.09
23.750	0.17	0.80	0.308	I	O			2.07
23.833	0.17	0.80	0.303	I	O			2.05
23.917	0.17	0.80	0.299	I	O			2.03
24.000	0.17	0.79	0.295	I	O			2.01
24.083	0.11	0.79	0.290	I	O			1.99
24.167	0.02	0.78	0.285	I	O			1.96
24.250	0.00	0.78	0.280	I	O			1.94
24.333	0.00	0.77	0.274	I	O			1.91
24.417	0.00	0.76	0.269	I	O			1.88

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24.500    0.00    0.76      0.264  I       o       |       |       |     1.86
24.583    0.00    0.75      0.259  I       o       |       |       |     1.83
24.667    0.00    0.74      0.254  I       o       |       |       |     1.80
24.750    0.00    0.74      0.249  I       o       |       |       |     1.78
24.833    0.00    0.73      0.244  I       o       |       |       |     1.75
24.917    0.00    0.72      0.239  I       o       |       |       |     1.73
25.000    0.00    0.72      0.234  I      o|       |       |       |     1.70
25.083    0.00    0.71      0.229  I      o|       |       |       |     1.68
25.167    0.00    0.71      0.224  I      o|       |       |       |     1.65
25.250    0.00    0.70      0.219  I      o|       |       |       |     1.63
25.333    0.00    0.69      0.214  I      o|       |       |       |     1.60
25.417    0.00    0.69      0.209  I      o|       |       |       |     1.58
25.500    0.00    0.68      0.205  I      o|       |       |       |     1.55
25.583    0.00    0.68      0.200  I      o|       |       |       |     1.53
25.667    0.00    0.67      0.195  I      o|       |       |       |     1.51
25.750    0.00    0.66      0.191  I      o|       |       |       |     1.48
25.833    0.00    0.66      0.186  I      o|       |       |       |     1.45
25.917    0.00    0.65      0.182  I      o|       |       |       |     1.43
26.000    0.00    0.64      0.177  I      o|       |       |       |     1.40
26.083    0.00    0.64      0.173  I      o|       |       |       |     1.38
26.167    0.00    0.63      0.168  I     o |       |       |       |     1.35
26.250    0.00    0.62      0.164  I     o |       |       |       |     1.33
26.333    0.00    0.61      0.160  I     o |       |       |       |     1.30
26.417    0.00    0.61      0.156  I     o |       |       |       |     1.28
26.500    0.00    0.60      0.151  I     o |       |       |       |     1.25
26.583    0.00    0.59      0.147  I     o |       |       |       |     1.23
26.667    0.00    0.59      0.143  I     o |       |       |       |     1.21
26.750    0.00    0.58      0.139  I     o |       |       |       |     1.18
26.833    0.00    0.57      0.135  I     o |       |       |       |     1.16
26.917    0.00    0.57      0.131  I     o |       |       |       |     1.14
27.000    0.00    0.56      0.127  I     o |       |       |       |     1.11
27.083    0.00    0.56      0.124  I     o |       |       |       |     1.09
27.167    0.00    0.55      0.120  I     o |       |       |       |     1.07
27.250    0.00    0.54      0.116  I     o |       |       |       |     1.05
27.333    0.00    0.54      0.112  I    o  |       |       |       |     1.03
27.417    0.00    0.53      0.109  I    o  |       |       |       |     1.00
27.500    0.00    0.52      0.105  I    o  |       |       |       |     0.98
27.583    0.00    0.51      0.101  I    o  |       |       |       |     0.95
27.667    0.00    0.50      0.098  I    o  |       |       |       |     0.93
27.750    0.00    0.49      0.095  I    o  |       |       |       |     0.90
27.833    0.00    0.48      0.091  I    o  |       |       |       |     0.88
27.917    0.00    0.47      0.088  I    o  |       |       |       |     0.85
28.000    0.00    0.46      0.085  I    o  |       |       |       |     0.83
28.083    0.00    0.45      0.082  I    o  |       |       |       |     0.81
28.167    0.00    0.44      0.078  I   o   |       |       |       |     0.79
28.250    0.00    0.44      0.075  I   o   |       |       |       |     0.76
28.333    0.00    0.43      0.072  I   o   |       |       |       |     0.74
28.417    0.00    0.42      0.070  I   o   |       |       |       |     0.72
28.500    0.00    0.41      0.067  I   o   |       |       |       |     0.70
28.583    0.00    0.40      0.064  I   o   |       |       |       |     0.68
28.667    0.00    0.39      0.061  I   o   |       |       |       |     0.66
28.750    0.00    0.39      0.058  I   o   |       |       |       |     0.64
28.833    0.00    0.38      0.056  I   o   |       |       |       |     0.62
28.917    0.00    0.37      0.053  I   o   |       |       |       |     0.60
29.000    0.00    0.36      0.051  I   o   |       |       |       |     0.59
29.083    0.00    0.36      0.048  I  o    |       |       |       |     0.57
29.167    0.00    0.35      0.046  I  o    |       |       |       |     0.55
29.250    0.00    0.34      0.043  I  o    |       |       |       |     0.53
29.333    0.00    0.34      0.041  I  o    |       |       |       |     0.52
29.417    0.00    0.33      0.039  I  o    |       |       |       |     0.50
29.500    0.00    0.30      0.037  I  o    |       |       |       |     0.47
29.583    0.00    0.27      0.035  I  o    |       |       |       |     0.44
29.667    0.00    0.25      0.033  I o     |       |       |       |     0.42
29.750    0.00    0.22      0.031  I o     |       |       |       |     0.40
29.833    0.00    0.20      0.030  I o     |       |       |       |     0.38
29.917    0.00    0.19      0.028  I o     |       |       |       |     0.36
30.000    0.00    0.17      0.027  IO      |       |       |       |     0.35
30.083    0.00    0.15      0.026  IO      |       |       |       |     0.33
30.167    0.00    0.14      0.025  IO      |       |       |       |     0.32
30.250    0.00    0.13      0.024  IO      |       |       |       |     0.31
30.333    0.00    0.12      0.023  IO      |       |       |       |     0.30
30.417    0.00    0.11      0.023  IO      |       |       |       |     0.29
30.500    0.00    0.10      0.022  IO      |       |       |       |     0.28
30.583    0.00    0.09      0.021  O       |       |       |       |     0.27
30.667    0.00    0.08      0.021  o       |       |       |       |     0.26
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30.750	0.00	0.07	0.020	o	|	|	|	|	0.26
30.833	0.00	0.07	0.020	o	|	|	|	|	0.25
30.917	0.00	0.06	0.019	o	|	|	|	|	0.24
31.000	0.00	0.05	0.019	o	|	|	|	|	0.24
31.083	0.00	0.05	0.019	o	|	|	|	|	0.23
31.167	0.00	0.05	0.018	o	|	|	|	|	0.23
31.250	0.00	0.04	0.018	o	|	|	|	|	0.23
31.333	0.00	0.04	0.018	o	|	|	|	|	0.22
31.417	0.00	0.03	0.017	o	|	|	|	|	0.22
31.500	0.00	0.03	0.017	o	|	|	|	|	0.22
31.583	0.00	0.03	0.017	o	|	|	|	|	0.21
31.667	0.00	0.03	0.017	o	|	|	|	|	0.21
31.750	0.00	0.02	0.017	o	|	|	|	|	0.21
31.833	0.00	0.02	0.016	o	|	|	|	|	0.21
31.917	0.00	0.02	0.016	o	|	|	|	|	0.21
32.000	0.00	0.02	0.016	o	|	|	|	|	0.20
32.083	0.00	0.02	0.016	o	|	|	|	|	0.20
32.167	0.00	0.01	0.016	o	|	|	|	|	0.20
32.250	0.00	0.01	0.016	o	|	|	|	|	0.20
32.333	0.00	0.01	0.016	o	|	|	|	|	0.20
32.417	0.00	0.01	0.016	o	|	|	|	|	0.20
32.500	0.00	0.01	0.016	o	|	|	|	|	0.20
32.583	0.00	0.01	0.016	o	|	|	|	|	0.20
32.667	0.00	0.01	0.016	o	|	|	|	|	0.19
32.750	0.00	0.01	0.015	o	|	|	|	|	0.19
32.833	0.00	0.01	0.015	o	|	|	|	|	0.19
32.917	0.00	0.01	0.015	o	|	|	|	|	0.19
33.000	0.00	0.01	0.015	o	|	|	|	|	0.19
33.083	0.00	0.01	0.015	o	|	|	|	|	0.19
33.167	0.00	0.00	0.015	o	|	|	|	|	0.19
33.250	0.00	0.00	0.015	o	|	|	|	|	0.19
33.333	0.00	0.00	0.015	o	|	|	|	|	0.19
33.417	0.00	0.00	0.015	o	|	|	|	|	0.19
33.500	0.00	0.00	0.015	o	|	|	|	|	0.19
33.583	0.00	0.00	0.015	o	|	|	|	|	0.19
33.667	0.00	0.00	0.015	o	|	|	|	|	0.19
33.750	0.00	0.00	0.015	o	|	|	|	|	0.19
33.833	0.00	0.00	0.015	o	|	|	|	|	0.19
33.917	0.00	0.00	0.015	o	|	|	|	|	0.19
34.000	0.00	0.00	0.015	o	|	|	|	|	0.19
34.083	0.00	0.00	0.015	o	|	|	|	|	0.19
34.167	0.00	0.00	0.015	o	|	|	|	|	0.19
34.250	0.00	0.00	0.015	o	|	|	|	|	0.19
34.333	0.00	0.00	0.015	o	|	|	|	|	0.19
34.417	0.00	0.00	0.015	o	|	|	|	|	0.19
34.500	0.00	0.00	0.015	o	|	|	|	|	0.19
34.583	0.00	0.00	0.015	o	|	|	|	|	0.19

Remaining water in basin = 0.01 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 415
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.151 (CFS)
Total volume = 1.732 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/25/21

BCCOV BLDG C AREA 9
2 YR 24 HR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YRC2242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 291
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 2.867 (CFS)
Total volume = 1.742 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 291
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.125	0.010	0.001	0.010	0.010
0.500	0.042	0.160	0.041	0.043
1.000	0.116	0.240	0.115	0.117
1.500	0.209	0.300	0.208	0.210
2.000	0.315	0.360	0.314	0.316
2.500	0.431	0.400	0.430	0.432
3.000	0.553	0.440	0.551	0.555
3.500	0.679	0.480	0.677	0.681
4.000	0.807	0.510	0.805	0.809
4.500	0.935	0.540	0.933	0.937
5.000	1.061	0.570	1.059	1.063
5.500	1.182	0.600	1.180	1.184
6.000	1.298	0.630	1.296	1.300
6.500	1.404	0.660	1.402	1.406
7.000	1.497	0.680	1.495	1.499
7.500	1.571	0.710	1.569	1.573
8.000	1.613	0.730	1.610	1.616

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.7	1.43	2.15	2.87	Depth (Ft.)
0.083	0.07	0.00	0.000	O					0.00
0.167	0.16	0.00	0.001	OI					0.01
0.250	0.17	0.00	0.002	OI					0.03
0.333	0.20	0.00	0.003	O I					0.04
0.417	0.25	0.00	0.005	O I					0.06
0.500	0.25	0.00	0.007	O I					0.08
0.583	0.25	0.00	0.008	O I					0.11
0.667	0.25	0.00	0.010	O I					0.13
0.750	0.25	0.01	0.012	O I					0.15
0.833	0.29	0.02	0.014	O I					0.17
0.917	0.33	0.03	0.016	O I					0.19
1.000	0.34	0.04	0.018	O I					0.21
1.083	0.30	0.05	0.020	O I					0.24
1.167	0.26	0.06	0.021	O I					0.26
1.250	0.25	0.06	0.022	O I					0.27
1.333	0.25	0.07	0.024	O I					0.29
1.417	0.25	0.08	0.025	O I					0.30
1.500	0.25	0.08	0.026	O I					0.31
1.583	0.25	0.09	0.027	O I					0.33
1.667	0.25	0.09	0.028	OI					0.34
1.750	0.25	0.10	0.030	OI					0.35
1.833	0.29	0.10	0.031	O I					0.37
1.917	0.33	0.11	0.032	O I					0.38
2.000	0.34	0.12	0.034	O I					0.40
2.083	0.34	0.13	0.035	O I					0.42
2.167	0.34	0.13	0.037	O I					0.44
2.250	0.34	0.14	0.038	O I					0.45
2.333	0.34	0.15	0.039	O I					0.47
2.417	0.34	0.15	0.041	O I					0.48
2.500	0.34	0.16	0.042	O I					0.50
2.583	0.37	0.16	0.043	O I					0.51
2.667	0.42	0.16	0.045	O I					0.52
2.750	0.42	0.16	0.047	O I					0.53
2.833	0.42	0.17	0.048	O I					0.54
2.917	0.42	0.17	0.050	O I					0.55
3.000	0.42	0.17	0.052	O I					0.57
3.083	0.42	0.17	0.053	O I					0.58
3.167	0.42	0.17	0.055	O I					0.59
3.250	0.42	0.18	0.057	O I					0.60
3.333	0.42	0.18	0.059	O I					0.61
3.417	0.42	0.18	0.060	O I					0.62
3.500	0.42	0.18	0.062	O I					0.63
3.583	0.42	0.18	0.064	O I					0.65
3.667	0.42	0.19	0.065	O I					0.66
3.750	0.42	0.19	0.067	O I					0.67
3.833	0.46	0.19	0.069	O I					0.68
3.917	0.50	0.19	0.071	O I					0.69
4.000	0.51	0.19	0.073	O I					0.71
4.083	0.51	0.20	0.075	O I					0.72
4.167	0.51	0.20	0.077	O I					0.74
4.250	0.51	0.20	0.079	O I					0.75
4.333	0.54	0.20	0.081	O I					0.77
4.417	0.58	0.21	0.084	O I					0.78
4.500	0.59	0.21	0.086	O I					0.80
4.583	0.59	0.21	0.089	O I					0.82
4.667	0.59	0.21	0.092	O I					0.84
4.750	0.59	0.22	0.094	O I					0.85
4.833	0.63	0.22	0.097	O I					0.87
4.917	0.67	0.22	0.100	O I					0.89
5.000	0.67	0.23	0.103	O I					0.91
5.083	0.60	0.23	0.106	O I					0.93
5.167	0.52	0.23	0.108	O I					0.95
5.250	0.51	0.23	0.110	O I					0.96
5.333	0.54	0.24	0.112	O I					0.97
5.417	0.58	0.24	0.114	O I					0.99
5.500	0.59	0.24	0.117	O I					1.00
5.583	0.63	0.24	0.119	O I					1.02
5.667	0.67	0.24	0.122	O I					1.03

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 5.750    0.67    0.25      0.125   | o    I|       |       |       |     1.05
 5.833    0.67    0.25      0.128   | o    I|       |       |       |     1.06
 5.917    0.67    0.25      0.131   | o    I|       |       |       |     1.08
 6.000    0.67    0.25      0.134   | o    I|       |       |       |     1.09
 6.083    0.71    0.25      0.137   | o    I|       |       |       |     1.11
 6.167    0.75    0.26      0.140   | o     I       |       |       |     1.13
 6.250    0.76    0.26      0.143   | o     I       |       |       |     1.15
 6.333    0.76    0.26      0.147   | o     I       |       |       |     1.17
 6.417    0.76    0.26      0.150   | o     I       |       |       |     1.18
 6.500    0.76    0.26      0.154   | o     I       |       |       |     1.20
 6.583    0.79    0.27      0.157   | o     I       |       |       |     1.22
 6.667    0.84    0.27      0.161   |  o    |I      |       |       |     1.24
 6.750    0.84    0.27      0.165   |  o    |I      |       |       |     1.26
 6.833    0.84    0.27      0.169   |  o    |I      |       |       |     1.28
 6.917    0.84    0.28      0.173   |  o    |I      |       |       |     1.30
 7.000    0.84    0.28      0.177   |  o    |I      |       |       |     1.33
 7.083    0.84    0.28      0.180   |  o    |I      |       |       |     1.35
 7.167    0.84    0.28      0.184   |  o    |I      |       |       |     1.37
 7.250    0.84    0.29      0.188   |  o    |I      |       |       |     1.39
 7.333    0.88    0.29      0.192   |  o    |I      |       |       |     1.41
 7.417    0.92    0.29      0.196   |  o    | I     |       |       |     1.43
 7.500    0.93    0.29      0.201   |  o    | I     |       |       |     1.46
 7.583    0.96    0.30      0.205   |  o    | I     |       |       |     1.48
 7.667    1.01    0.30      0.210   |  o    |  I    |       |       |     1.50
 7.750    1.01    0.30      0.215   |  o    |  I    |       |       |     1.53
 7.833    1.05    0.31      0.220   |  o    |  I    |       |       |     1.55
 7.917    1.09    0.31      0.225   |  o    |   I   |       |       |     1.58
 8.000    1.10    0.31      0.230   |  o    |   I   |       |       |     1.60
 8.083    1.17    0.32      0.236   |  o    |    I  |       |       |     1.63
 8.167    1.25    0.32      0.242   |  o    |    I  |       |       |     1.66
 8.250    1.26    0.32      0.249   |  o    |     I |       |       |     1.69
 8.333    1.26    0.33      0.255   |  o    |     I |       |       |     1.72
 8.417    1.26    0.33      0.262   |  o    |     I |       |       |     1.75
 8.500    1.26    0.33      0.268   |  o    |     I |       |       |     1.78
 8.583    1.30    0.34      0.274   |  o    |     I |       |       |     1.81
 8.667    1.34    0.34      0.281   |  o    |     I |       |       |     1.84
 8.750    1.35    0.34      0.288   |  o    |      I|       |       |     1.87
 8.833    1.39    0.35      0.295   |  o    |      I|       |       |     1.91
 8.917    1.43    0.35      0.302   |  o    |      I|       |       |     1.94
 9.000    1.43    0.36      0.310   |  o    |      I|       |       |     1.98
 9.083    1.51    0.36      0.318   |   o   |       I       |       |     2.01
 9.167    1.59    0.36      0.326   |   o   |       |I      |       |     2.05
 9.250    1.60    0.37      0.334   |   o   |       |I      |       |     2.08
 9.333    1.64    0.37      0.343   |   o   |       | I     |       |     2.12
 9.417    1.68    0.37      0.352   |   o   |       | I     |       |     2.16
 9.500    1.69    0.38      0.361   |   o   |       | I     |       |     2.20
 9.583    1.72    0.38      0.370   |   o   |       |  I    |       |     2.24
 9.667    1.76    0.38      0.379   |   o   |       |  I    |       |     2.28
 9.750    1.77    0.39      0.389   |   o   |       |  I    |       |     2.32
 9.833    1.81    0.39      0.398   |   o   |       |   I   |       |     2.36
 9.917    1.85    0.39      0.408   |   o   |       |   I   |       |     2.40
10.000    1.85    0.40      0.418   |   o   |       |   I   |       |     2.45
10.083    1.60    0.40      0.427   |   o   |       |I      |       |     2.48
10.167    1.31    0.40      0.435   |   o   |     I |       |       |     2.52
10.250    1.27    0.40      0.441   |   o   |     I |       |       |     2.54
10.333    1.26    0.41      0.447   |   o   |     I |       |       |     2.56
10.417    1.26    0.41      0.453   |   o   |     I |       |       |     2.59
10.500    1.26    0.41      0.459   |   o   |     I |       |       |     2.61
10.583    1.44    0.41      0.465   |   o   |       I       |       |     2.64
10.667    1.65    0.41      0.473   |   o   |       | I     |       |     2.67
10.750    1.68    0.42      0.482   |   o   |       | I     |       |     2.71
10.833    1.69    0.42      0.490   |   o   |       | I     |       |     2.74
10.917    1.69    0.42      0.499   |   o   |       | I     |       |     2.78
11.000    1.69    0.43      0.508   |   o   |       | I     |       |     2.81
11.083    1.65    0.43      0.516   |   o   |       | I     |       |     2.85
11.167    1.61    0.43      0.525   |   o   |       |I      |       |     2.88
11.250    1.60    0.43      0.533   |   o   |       |I      |       |     2.92
11.333    1.60    0.44      0.541   |   o   |       |I      |       |     2.95
11.417    1.60    0.44      0.549   |   o   |       |I      |       |     2.98
11.500    1.60    0.44      0.557   |   o   |       |I      |       |     3.01
11.583    1.53    0.44      0.564   |   o   |       |I      |       |     3.05
11.667    1.45    0.45      0.572   |   o   |       I       |       |     3.07
11.750    1.44    0.45      0.578   |    o  |       I       |       |     3.10
11.833    1.47    0.45      0.585   |    o  |       I       |       |     3.13
11.917    1.51    0.45      0.593   |    o  |       I       |       |     3.16
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12.000	1.52	0.45	0.600	| o |	| I |	| |	| |	3.19
12.083	1.77	0.46	0.608	| o |	| I |	| |	| |	3.22
12.167	2.06	0.46	0.618	| o |	| I|	| |	| |	3.26
12.250	2.10	0.46	0.629	| o |	| I|	| |	| |	3.30
12.333	2.14	0.47	0.641	| o |	| I|	| |	| |	3.35
12.417	2.19	0.47	0.652	| o |	| I |	| |	| |	3.39
12.500	2.19	0.48	0.664	| o |	| I |	| |	| |	3.44
12.583	2.26	0.48	0.676	| o |	| |I |	| |	| |	3.49
12.667	2.35	0.48	0.689	| o |	| | I |	| |	| |	3.54
12.750	2.36	0.49	0.702	| o |	| | I |	| |	| |	3.59
12.833	2.40	0.49	0.715	| o |	| | I |	| |	| |	3.64
12.917	2.44	0.49	0.728	| o |	| | | I |	| |	| |	3.69
13.000	2.44	0.49	0.741	| o |	| | | I |	| |	| |	3.74
13.083	2.63	0.50	0.755	| o |	| | | | I |	| |	| |	3.80
13.167	2.84	0.50	0.771	| o |	| | | | | I|	| |	| |	3.86
13.250	2.86	0.51	0.787	| o |	| | | | | I|	| |	| |	3.92
13.333	2.87	0.51	0.803	| o |	| | | | | | I	| |	| |	3.99
13.417	2.87	0.51	0.819	| o |	| | | | | | I	| |	| |	4.05
13.500	2.87	0.52	0.836	| o |	| | | | | | I	| |	| |	4.11
13.583	2.47	0.52	0.850	| o |	| | | | | I |	| |	| |	4.17
13.667	2.01	0.52	0.862	| o |	| | | | I |	| |	| |	4.22
13.750	1.95	0.53	0.872	| o |	| | | I |	| |	| |	4.25
13.833	1.94	0.53	0.882	| o |	| | | I |	| |	| |	4.29
13.917	1.94	0.53	0.892	| o |	| | | I |	| |	| |	4.33
14.000	1.94	0.53	0.901	| o |	| | | I |	| |	| |	4.37
14.083	2.08	0.53	0.912	| o |	| | | | I|	| |	| |	4.41
14.167	2.25	0.54	0.923	| o |	| | | | |I |	| |	| |	4.45
14.250	2.27	0.54	0.935	| | o |	| | | | |I |	| |	| |	4.50
14.333	2.24	0.54	0.947	| | o |	| | | | |I |	| |	| |	4.55
14.417	2.20	0.55	0.958	| | o |	| | | | I |	| |	| |	4.59
14.500	2.19	0.55	0.969	| | o |	| | | | I |	| |	| |	4.64
14.583	2.19	0.55	0.981	| | o |	| | | | I |	| |	| |	4.68
14.667	2.19	0.55	0.992	| | o |	| | | | I |	| |	| |	4.73
14.750	2.19	0.56	1.003	| | o |	| | | | I |	| |	| |	4.77
14.833	2.16	0.56	1.014	| | o |	| | | | I |	| |	| |	4.82
14.917	2.11	0.56	1.025	| | o |	| | | I|	| |	| |	4.86
15.000	2.11	0.56	1.036	| | o |	| | | I|	| |	| |	4.90
15.083	2.07	0.57	1.047	| | o |	| | | I|	| |	| |	4.94
15.167	2.03	0.57	1.057	| | o |	| | | I |	| |	| |	4.98
15.250	2.02	0.57	1.067	| | o |	| | | I |	| |	| |	5.02
15.333	1.99	0.57	1.077	| | o |	| | | I |	| |	| |	5.06
15.417	1.95	0.58	1.086	| | o |	| | | I |	| |	| |	5.10
15.500	1.94	0.58	1.096	| | o |	| | | I |	| |	| |	5.14
15.583	1.80	0.58	1.105	| | o |	| | I |	| |	| |	5.18
15.667	1.63	0.58	1.112	| | o |	| I |	| |	| |	5.21
15.750	1.61	0.58	1.119	| | o |	|I |	| |	| |	5.24
15.833	1.60	0.59	1.126	| | o |	|I |	| |	| |	5.27
15.917	1.60	0.59	1.133	| | o |	|I |	| |	| |	5.30
16.000	1.60	0.59	1.140	| | o |	|I |	| |	| |	5.33
16.083	1.06	0.59	1.146	| | o | I |	| |	| |	| |	5.35
16.167	0.43	0.59	1.147	| I o |	| |	| |	| |	5.35
16.250	0.35	0.59	1.145	| I o |	| |	| |	| |	5.35
16.333	0.34	0.59	1.144	| I o |	| |	| |	| |	5.34
16.417	0.34	0.59	1.142	| I o |	| |	| |	| |	5.33
16.500	0.34	0.59	1.140	| I o |	| |	| |	| |	5.33
16.583	0.30	0.59	1.138	| I o |	| |	| |	| |	5.32
16.667	0.26	0.59	1.136	| I o |	| |	| |	| |	5.31
16.750	0.25	0.59	1.134	| I o |	| |	| |	| |	5.30
16.833	0.25	0.59	1.131	| I o |	| |	| |	| |	5.29
16.917	0.25	0.59	1.129	| I o |	| |	| |	| |	5.28
17.000	0.25	0.59	1.127	| I o |	| |	| |	| |	5.27
17.083	0.32	0.59	1.125	| I o |	| |	| |	| |	5.26
17.167	0.41	0.59	1.123	| I o |	| |	| |	| |	5.26
17.250	0.42	0.59	1.122	| I o |	| |	| |	| |	5.25
17.333	0.42	0.58	1.121	| I o |	| |	| |	| |	5.25
17.417	0.42	0.58	1.120	| I o |	| |	| |	| |	5.24
17.500	0.42	0.58	1.119	| I o |	| |	| |	| |	5.24
17.583	0.42	0.58	1.118	| I o |	| |	| |	| |	5.23
17.667	0.42	0.58	1.117	| I o |	| |	| |	| |	5.23
17.750	0.42	0.58	1.115	| I o |	| |	| |	| |	5.22
17.833	0.39	0.58	1.114	| I o |	| |	| |	| |	5.22
17.917	0.34	0.58	1.113	| I o |	| |	| |	| |	5.21
18.000	0.34	0.58	1.111	| I o |	| |	| |	| |	5.21
18.083	0.34	0.58	1.109	| I o |	| |	| |	| |	5.20
18.167	0.34	0.58	1.108	| I o |	| |	| |	| |	5.19

18.250	0.34	0.58	1.106	| I o |	|	|	|	5.19
18.333	0.34	0.58	1.104	| I o |	|	|	|	5.18
18.417	0.34	0.58	1.103	| I o |	|	|	|	5.17
18.500	0.34	0.58	1.101	| I o |	|	|	|	5.16
18.583	0.30	0.58	1.099	| I o |	|	|	|	5.16
18.667	0.26	0.58	1.097	| I o |	|	|	|	5.15
18.750	0.25	0.58	1.095	| I o |	|	|	|	5.14
18.833	0.22	0.58	1.092	| I o |	|	|	|	5.13
18.917	0.17	0.58	1.090	|I o |	|	|	|	5.12
19.000	0.17	0.58	1.087	|I o |	|	|	|	5.11
19.083	0.20	0.58	1.084	| I o |	|	|	|	5.10
19.167	0.25	0.58	1.082	| I o |	|	|	|	5.09
19.250	0.25	0.57	1.080	| I o |	|	|	|	5.08
19.333	0.29	0.57	1.078	| I o |	|	|	|	5.07
19.417	0.33	0.57	1.076	| I o |	|	|	|	5.06
19.500	0.34	0.57	1.074	| I o |	|	|	|	5.05
19.583	0.30	0.57	1.072	| I o |	|	|	|	5.05
19.667	0.26	0.57	1.070	| I o |	|	|	|	5.04
19.750	0.25	0.57	1.068	| I o |	|	|	|	5.03
19.833	0.22	0.57	1.066	| I o |	|	|	|	5.02
19.917	0.17	0.57	1.063	|I o |	|	|	|	5.01
20.000	0.17	0.57	1.061	|I o |	|	|	|	5.00
20.083	0.20	0.57	1.058	| I o |	|	|	|	4.99
20.167	0.25	0.57	1.056	| I o |	|	|	|	4.98
20.250	0.25	0.57	1.053	| I o |	|	|	|	4.97
20.333	0.25	0.57	1.051	| I o |	|	|	|	4.96
20.417	0.25	0.57	1.049	| I o |	|	|	|	4.95
20.500	0.25	0.57	1.047	| I o |	|	|	|	4.94
20.583	0.25	0.57	1.045	| I o |	|	|	|	4.94
20.667	0.25	0.57	1.043	| I o |	|	|	|	4.93
20.750	0.25	0.57	1.040	| I o |	|	|	|	4.92
20.833	0.22	0.56	1.038	| I o |	|	|	|	4.91
20.917	0.17	0.56	1.036	|I o |	|	|	|	4.90
21.000	0.17	0.56	1.033	|I o |	|	|	|	4.89
21.083	0.20	0.56	1.030	| I o |	|	|	|	4.88
21.167	0.25	0.56	1.028	| I o |	|	|	|	4.87
21.250	0.25	0.56	1.026	| I o |	|	|	|	4.86
21.333	0.22	0.56	1.024	| I o |	|	|	|	4.85
21.417	0.17	0.56	1.021	|I o |	|	|	|	4.84
21.500	0.17	0.56	1.018	|I o |	|	|	|	4.83
21.583	0.20	0.56	1.016	| I o |	|	|	|	4.82
21.667	0.25	0.56	1.014	| I o |	|	|	|	4.81
21.750	0.25	0.56	1.011	| I o |	|	|	|	4.80
21.833	0.22	0.56	1.009	| I o |	|	|	|	4.79
21.917	0.17	0.56	1.007	|I o |	|	|	|	4.78
22.000	0.17	0.56	1.004	|I o |	|	|	|	4.77
22.083	0.20	0.56	1.002	| I o |	|	|	|	4.76
22.167	0.25	0.56	0.999	| I o |	|	|	|	4.76
22.250	0.25	0.55	0.997	| I o |	|	|	|	4.75
22.333	0.22	0.55	0.995	| I o |	|	|	|	4.74
22.417	0.17	0.55	0.993	|I o |	|	|	|	4.73
22.500	0.17	0.55	0.990	|I o |	|	|	|	4.72
22.583	0.17	0.55	0.987	|I o |	|	|	|	4.71
22.667	0.17	0.55	0.985	|I o |	|	|	|	4.70
22.750	0.17	0.55	0.982	|I o |	|	|	|	4.69
22.833	0.17	0.55	0.979	|I o |	|	|	|	4.68
22.917	0.17	0.55	0.977	|I o |	|	|	|	4.67
23.000	0.17	0.55	0.974	|I o |	|	|	|	4.66
23.083	0.17	0.55	0.971	|I o |	|	|	|	4.64
23.167	0.17	0.55	0.969	|I o |	|	|	|	4.63
23.250	0.17	0.55	0.966	|I o |	|	|	|	4.62
23.333	0.17	0.55	0.964	|I o |	|	|	|	4.61
23.417	0.17	0.55	0.961	|I o |	|	|	|	4.60
23.500	0.17	0.55	0.958	|I o |	|	|	|	4.59
23.583	0.17	0.54	0.956	|I o |	|	|	|	4.58
23.667	0.17	0.54	0.953	|I o |	|	|	|	4.57
23.750	0.17	0.54	0.951	|I o |	|	|	|	4.56
23.833	0.17	0.54	0.948	|I o |	|	|	|	4.55
23.917	0.17	0.54	0.946	|I o |	|	|	|	4.54
24.000	0.17	0.54	0.943	|I o |	|	|	|	4.53
24.083	0.10	0.54	0.940	|I o |	|	|	|	4.52
24.167	0.01	0.54	0.937	I o |	|	|	|	4.51
24.250	0.00	0.54	0.933	I o |	|	|	|	4.49
24.333	0.00	0.54	0.929	I o |	|	|	|	4.48
24.417	0.00	0.54	0.926	I o |	|	|	|	4.46

24.500	0.00	0.54	0.922	I	O	|	|	|	|	4.45
24.583	0.00	0.54	0.918	I	O	|	|	|	|	4.43
24.667	0.00	0.54	0.915	I	O	|	|	|	|	4.42
24.750	0.00	0.53	0.911	I	O	|	|	|	|	4.41
24.833	0.00	0.53	0.907	I	O	|	|	|	|	4.39
24.917	0.00	0.53	0.904	I	O	|	|	|	|	4.38
25.000	0.00	0.53	0.900	I	O	|	|	|	|	4.36
25.083	0.00	0.53	0.896	I	O	|	|	|	|	4.35
25.167	0.00	0.53	0.893	I	O	|	|	|	|	4.33
25.250	0.00	0.53	0.889	I	O	|	|	|	|	4.32
25.333	0.00	0.53	0.885	I	O	|	|	|	|	4.31
25.417	0.00	0.53	0.882	I	O	|	|	|	|	4.29
25.500	0.00	0.53	0.878	I	O	|	|	|	|	4.28
25.583	0.00	0.53	0.874	I	O	|	|	|	|	4.26
25.667	0.00	0.52	0.871	I	O	|	|	|	|	4.25
25.750	0.00	0.52	0.867	I	O	|	|	|	|	4.24
25.833	0.00	0.52	0.864	I	O	|	|	|	|	4.22
25.917	0.00	0.52	0.860	I	O	|	|	|	|	4.21
26.000	0.00	0.52	0.856	I	O	|	|	|	|	4.19
26.083	0.00	0.52	0.853	I	O	|	|	|	|	4.18
26.167	0.00	0.52	0.849	I	O	|	|	|	|	4.16
26.250	0.00	0.52	0.846	I	O	|	|	|	|	4.15
26.333	0.00	0.52	0.842	I	O	|	|	|	|	4.14
26.417	0.00	0.52	0.838	I	O	|	|	|	|	4.12
26.500	0.00	0.52	0.835	I	O	|	|	|	|	4.11
26.583	0.00	0.52	0.831	I	O	|	|	|	|	4.10
26.667	0.00	0.51	0.828	I	O	|	|	|	|	4.08
26.750	0.00	0.51	0.824	I	O	|	|	|	|	4.07
26.833	0.00	0.51	0.821	I	O	|	|	|	|	4.05
26.917	0.00	0.51	0.817	I	O	|	|	|	|	4.04
27.000	0.00	0.51	0.814	I	O	|	|	|	|	4.03
27.083	0.00	0.51	0.810	I	O	|	|	|	|	4.01
27.167	0.00	0.51	0.807	I	O	|	|	|	|	4.00
27.250	0.00	0.51	0.803	I	O	|	|	|	|	3.98
27.333	0.00	0.51	0.800	I	O	|	|	|	|	3.97
27.417	0.00	0.51	0.796	I	O	|	|	|	|	3.96
27.500	0.00	0.51	0.793	I	O	|	|	|	|	3.94
27.583	0.00	0.51	0.789	I	O	|	|	|	|	3.93
27.667	0.00	0.51	0.786	I	O	|	|	|	|	3.92
27.750	0.00	0.50	0.782	I	O	|	|	|	|	3.90
27.833	0.00	0.50	0.779	I	O	|	|	|	|	3.89
27.917	0.00	0.50	0.775	I	O	|	|	|	|	3.88
28.000	0.00	0.50	0.772	I	O	|	|	|	|	3.86
28.083	0.00	0.50	0.768	I	O	|	|	|	|	3.85
28.167	0.00	0.50	0.765	I	O	|	|	|	|	3.84
28.250	0.00	0.50	0.761	I	O	|	|	|	|	3.82
28.333	0.00	0.50	0.758	I	O	|	|	|	|	3.81
28.417	0.00	0.50	0.755	I	O	|	|	|	|	3.80
28.500	0.00	0.50	0.751	I	O	|	|	|	|	3.78
28.583	0.00	0.50	0.748	I	O	|	|	|	|	3.77
28.667	0.00	0.50	0.744	I	O	|	|	|	|	3.76
28.750	0.00	0.49	0.741	I	O	|	|	|	|	3.74
28.833	0.00	0.49	0.738	I	O	|	|	|	|	3.73
28.917	0.00	0.49	0.734	I	O	|	|	|	|	3.72
29.000	0.00	0.49	0.731	I	O	|	|	|	|	3.70
29.083	0.00	0.49	0.727	I	O	|	|	|	|	3.69
29.167	0.00	0.49	0.724	I	O	|	|	|	|	3.68
29.250	0.00	0.49	0.721	I	O	|	|	|	|	3.66
29.333	0.00	0.49	0.717	I	O	|	|	|	|	3.65
29.417	0.00	0.49	0.714	I	O	|	|	|	|	3.64
29.500	0.00	0.49	0.711	I	O	|	|	|	|	3.62
29.583	0.00	0.49	0.707	I	O	|	|	|	|	3.61
29.667	0.00	0.49	0.704	I	O	|	|	|	|	3.60
29.750	0.00	0.49	0.700	I	O	|	|	|	|	3.58
29.833	0.00	0.48	0.697	I	O	|	|	|	|	3.57
29.917	0.00	0.48	0.694	I	O	|	|	|	|	3.56
30.000	0.00	0.48	0.690	I	O	|	|	|	|	3.54
30.083	0.00	0.48	0.687	I	O	|	|	|	|	3.53
30.167	0.00	0.48	0.684	I	O	|	|	|	|	3.52
30.250	0.00	0.48	0.681	I	O	|	|	|	|	3.51
30.333	0.00	0.48	0.677	I	O	|	|	|	|	3.49
30.417	0.00	0.48	0.674	I	O	|	|	|	|	3.48
30.500	0.00	0.48	0.671	I	O	|	|	|	|	3.47
30.583	0.00	0.48	0.667	I	O	|	|	|	|	3.45
30.667	0.00	0.48	0.664	I	O	|	|	|	|	3.44

30.750	0.00	0.47	0.661	I	o	|	|	|	|	3.43
30.833	0.00	0.47	0.658	I	o	|	|	|	|	3.41
30.917	0.00	0.47	0.654	I	o	|	|	|	|	3.40
31.000	0.00	0.47	0.651	I	o	|	|	|	|	3.39
31.083	0.00	0.47	0.648	I	o	|	|	|	|	3.38
31.167	0.00	0.47	0.645	I	o	|	|	|	|	3.36
31.250	0.00	0.47	0.641	I	o	|	|	|	|	3.35
31.333	0.00	0.47	0.638	I	o	|	|	|	|	3.34
31.417	0.00	0.47	0.635	I	o	|	|	|	|	3.32
31.500	0.00	0.46	0.632	I	o	|	|	|	|	3.31
31.583	0.00	0.46	0.628	I	o	|	|	|	|	3.30
31.667	0.00	0.46	0.625	I	o	|	|	|	|	3.29
31.750	0.00	0.46	0.622	I	o	|	|	|	|	3.27
31.833	0.00	0.46	0.619	I	o	|	|	|	|	3.26
31.917	0.00	0.46	0.616	I	o	|	|	|	|	3.25
32.000	0.00	0.46	0.613	I	o	|	|	|	|	3.24
32.083	0.00	0.46	0.609	I	o	|	|	|	|	3.22
32.167	0.00	0.46	0.606	I	o	|	|	|	|	3.21
32.250	0.00	0.46	0.603	I	o	|	|	|	|	3.20
32.333	0.00	0.45	0.600	I	o	|	|	|	|	3.19
32.417	0.00	0.45	0.597	I	o	|	|	|	|	3.17
32.500	0.00	0.45	0.594	I	o	|	|	|	|	3.16
32.583	0.00	0.45	0.591	I	o	|	|	|	|	3.15
32.667	0.00	0.45	0.588	I	o	|	|	|	|	3.14
32.750	0.00	0.45	0.584	I	o	|	|	|	|	3.12
32.833	0.00	0.45	0.581	I	o	|	|	|	|	3.11
32.917	0.00	0.45	0.578	I	o	|	|	|	|	3.10
33.000	0.00	0.45	0.575	I	o	|	|	|	|	3.09
33.083	0.00	0.45	0.572	I	o	|	|	|	|	3.08
33.167	0.00	0.45	0.569	I	o	|	|	|	|	3.06
33.250	0.00	0.44	0.566	I	o	|	|	|	|	3.05
33.333	0.00	0.44	0.563	I	o	|	|	|	|	3.04
33.417	0.00	0.44	0.560	I	o	|	|	|	|	3.03
33.500	0.00	0.44	0.557	I	o	|	|	|	|	3.02
33.583	0.00	0.44	0.554	I	o	|	|	|	|	3.00
33.667	0.00	0.44	0.551	I	o	|	|	|	|	2.99
33.750	0.00	0.44	0.548	I	o	|	|	|	|	2.98
33.833	0.00	0.44	0.545	I	o	|	|	|	|	2.97
33.917	0.00	0.44	0.542	I	o	|	|	|	|	2.95
34.000	0.00	0.44	0.539	I	o	|	|	|	|	2.94
34.083	0.00	0.43	0.536	I	o	|	|	|	|	2.93
34.167	0.00	0.43	0.533	I	o	|	|	|	|	2.92
34.250	0.00	0.43	0.530	I	o	|	|	|	|	2.90
34.333	0.00	0.43	0.527	I	o	|	|	|	|	2.89
34.417	0.00	0.43	0.524	I	o	|	|	|	|	2.88
34.500	0.00	0.43	0.521	I	o	|	|	|	|	2.87
34.583	0.00	0.43	0.518	I	o	|	|	|	|	2.86
34.667	0.00	0.43	0.515	I	o	|	|	|	|	2.84
34.750	0.00	0.43	0.512	I	o	|	|	|	|	2.83
34.833	0.00	0.43	0.509	I	o	|	|	|	|	2.82
34.917	0.00	0.42	0.506	I	o	|	|	|	|	2.81
35.000	0.00	0.42	0.503	I	o	|	|	|	|	2.80
35.083	0.00	0.42	0.500	I	o	|	|	|	|	2.78
35.167	0.00	0.42	0.497	I	o	|	|	|	|	2.77
35.250	0.00	0.42	0.494	I	o	|	|	|	|	2.76
35.333	0.00	0.42	0.492	I	o	|	|	|	|	2.75
35.417	0.00	0.42	0.489	I	o	|	|	|	|	2.74
35.500	0.00	0.42	0.486	I	o	|	|	|	|	2.72
35.583	0.00	0.42	0.483	I	o	|	|	|	|	2.71
35.667	0.00	0.42	0.480	I	o	|	|	|	|	2.70
35.750	0.00	0.42	0.477	I	o	|	|	|	|	2.69
35.833	0.00	0.41	0.474	I	o	|	|	|	|	2.68
35.917	0.00	0.41	0.472	I	o	|	|	|	|	2.67
36.000	0.00	0.41	0.469	I	o	|	|	|	|	2.65
36.083	0.00	0.41	0.466	I	o	|	|	|	|	2.64
36.167	0.00	0.41	0.463	I	o	|	|	|	|	2.63
36.250	0.00	0.41	0.460	I	o	|	|	|	|	2.62
36.333	0.00	0.41	0.457	I	o	|	|	|	|	2.61
36.417	0.00	0.41	0.455	I	o	|	|	|	|	2.60
36.500	0.00	0.41	0.452	I	o	|	|	|	|	2.59
36.583	0.00	0.41	0.449	I	o	|	|	|	|	2.57
36.667	0.00	0.40	0.446	I	o	|	|	|	|	2.56
36.750	0.00	0.40	0.443	I	o	|	|	|	|	2.55
36.833	0.00	0.40	0.441	I	o	|	|	|	|	2.54
36.917	0.00	0.40	0.438	I	o	|	|	|	|	2.53

37.000	0.00	0.40	0.435	I	o	|	|	|	|	2.52
37.083	0.00	0.40	0.432	I	o	|	|	|	|	2.51
37.167	0.00	0.40	0.430	I	o	|	|	|	|	2.49
37.250	0.00	0.40	0.427	I	o	|	|	|	|	2.48
37.333	0.00	0.40	0.424	I	o	|	|	|	|	2.47
37.417	0.00	0.40	0.421	I	o	|	|	|	|	2.46
37.500	0.00	0.40	0.419	I	o	|	|	|	|	2.45
37.583	0.00	0.39	0.416	I	o	|	|	|	|	2.43
37.667	0.00	0.39	0.413	I	o	|	|	|	|	2.42
37.750	0.00	0.39	0.410	I	o	|	|	|	|	2.41
37.833	0.00	0.39	0.408	I	o	|	|	|	|	2.40
37.917	0.00	0.39	0.405	I	o	|	|	|	|	2.39
38.000	0.00	0.39	0.402	I	o	|	|	|	|	2.38
38.083	0.00	0.39	0.400	I	o	|	|	|	|	2.36
38.167	0.00	0.39	0.397	I	o	|	|	|	|	2.35
38.250	0.00	0.39	0.394	I	o	|	|	|	|	2.34
38.333	0.00	0.39	0.392	I	o	|	|	|	|	2.33
38.417	0.00	0.39	0.389	I	o	|	|	|	|	2.32
38.500	0.00	0.38	0.386	I	o	|	|	|	|	2.31
38.583	0.00	0.38	0.384	I	o	|	|	|	|	2.30
38.667	0.00	0.38	0.381	I	o	|	|	|	|	2.28
38.750	0.00	0.38	0.378	I	o	|	|	|	|	2.27
38.833	0.00	0.38	0.376	I	o	|	|	|	|	2.26
38.917	0.00	0.38	0.373	I	o	|	|	|	|	2.25
39.000	0.00	0.38	0.371	I	o	|	|	|	|	2.24
39.083	0.00	0.38	0.368	I	o	|	|	|	|	2.23
39.167	0.00	0.38	0.365	I	o	|	|	|	|	2.22
39.250	0.00	0.38	0.363	I	o	|	|	|	|	2.21
39.333	0.00	0.38	0.360	I	o	|	|	|	|	2.19
39.417	0.00	0.37	0.358	I	o	|	|	|	|	2.18
39.500	0.00	0.37	0.355	I	o	|	|	|	|	2.17
39.583	0.00	0.37	0.352	I	o	|	|	|	|	2.16
39.667	0.00	0.37	0.350	I	o	|	|	|	|	2.15
39.750	0.00	0.37	0.347	I	o	|	|	|	|	2.14
39.833	0.00	0.37	0.345	I	o	|	|	|	|	2.13
39.917	0.00	0.37	0.342	I	o	|	|	|	|	2.12
40.000	0.00	0.37	0.340	I	o	|	|	|	|	2.11
40.083	0.00	0.37	0.337	I	o	|	|	|	|	2.10
40.167	0.00	0.37	0.335	I	o	|	|	|	|	2.08
40.250	0.00	0.37	0.332	I	o	|	|	|	|	2.07
40.333	0.00	0.37	0.330	I	o	|	|	|	|	2.06
40.417	0.00	0.36	0.327	I	o	|	|	|	|	2.05
40.500	0.00	0.36	0.325	I	o	|	|	|	|	2.04
40.583	0.00	0.36	0.322	I	o	|	|	|	|	2.03
40.667	0.00	0.36	0.320	I	o	|	|	|	|	2.02
40.750	0.00	0.36	0.317	I	o	|	|	|	|	2.01
40.833	0.00	0.36	0.315	I	o	|	|	|	|	2.00
40.917	0.00	0.36	0.312	I	o	|	|	|	|	1.99
41.000	0.00	0.36	0.310	I	o	|	|	|	|	1.97
41.083	0.00	0.36	0.307	I	o	|	|	|	|	1.96
41.167	0.00	0.35	0.305	I	o	|	|	|	|	1.95
41.250	0.00	0.35	0.302	I	o	|	|	|	|	1.94
41.333	0.00	0.35	0.300	I	o	|	|	|	|	1.93
41.417	0.00	0.35	0.297	I	o	|	|	|	|	1.92
41.500	0.00	0.35	0.295	I	o	|	|	|	|	1.91
41.583	0.00	0.35	0.293	I	o	|	|	|	|	1.89
41.667	0.00	0.35	0.290	I	o	|	|	|	|	1.88
41.750	0.00	0.34	0.288	I	o	|	|	|	|	1.87
41.833	0.00	0.34	0.286	I	o	|	|	|	|	1.86
41.917	0.00	0.34	0.283	I	o	|	|	|	|	1.85
42.000	0.00	0.34	0.281	I	o	|	|	|	|	1.84
42.083	0.00	0.34	0.278	I	o	|	|	|	|	1.83
42.167	0.00	0.34	0.276	I	o	|	|	|	|	1.82
42.250	0.00	0.34	0.274	I	o	|	|	|	|	1.81
42.333	0.00	0.34	0.272	I	o	|	|	|	|	1.79
42.417	0.00	0.33	0.269	I	o	|	|	|	|	1.78
42.500	0.00	0.33	0.267	I	o	|	|	|	|	1.77
42.583	0.00	0.33	0.265	I	o	|	|	|	|	1.76
42.667	0.00	0.33	0.262	I	o	|	|	|	|	1.75
42.750	0.00	0.33	0.260	I	o	|	|	|	|	1.74
42.833	0.00	0.33	0.258	I	o	|	|	|	|	1.73
42.917	0.00	0.33	0.256	I	o	|	|	|	|	1.72
43.000	0.00	0.33	0.253	I	o	|	|	|	|	1.71
43.083	0.00	0.32	0.251	I	o	|	|	|	|	1.70
43.167	0.00	0.32	0.249	I	o	|	|	|	|	1.69

43.250	0.00	0.32	0.247	I	o	|	|	|	1.68
43.333	0.00	0.32	0.244	I	o	|	|	|	1.67
43.417	0.00	0.32	0.242	I	o	|	|	|	1.66
43.500	0.00	0.32	0.240	I	o	|	|	|	1.65
43.583	0.00	0.32	0.238	I	o	|	|	|	1.64
43.667	0.00	0.32	0.236	I	o	|	|	|	1.63
43.750	0.00	0.31	0.234	I	o	|	|	|	1.62
43.833	0.00	0.31	0.231	I	o	|	|	|	1.61
43.917	0.00	0.31	0.229	I	o	|	|	|	1.60
44.000	0.00	0.31	0.227	I	o	|	|	|	1.59
44.083	0.00	0.31	0.225	I	o	|	|	|	1.58
44.167	0.00	0.31	0.223	I	o	|	|	|	1.57
44.250	0.00	0.31	0.221	I	o	|	|	|	1.56
44.333	0.00	0.31	0.219	I	o	|	|	|	1.55
44.417	0.00	0.30	0.216	I	o	|	|	|	1.54
44.500	0.00	0.30	0.214	I	o	|	|	|	1.53
44.583	0.00	0.30	0.212	I	o	|	|	|	1.52
44.667	0.00	0.30	0.210	I	o	|	|	|	1.51
44.750	0.00	0.30	0.208	I	o	|	|	|	1.50
44.833	0.00	0.30	0.206	I	o	|	|	|	1.48
44.917	0.00	0.30	0.204	I	o	|	|	|	1.47
45.000	0.00	0.30	0.202	I	o	|	|	|	1.46
45.083	0.00	0.29	0.200	I	o	|	|	|	1.45
45.167	0.00	0.29	0.198	I	o	|	|	|	1.44
45.250	0.00	0.29	0.196	I	o	|	|	|	1.43
45.333	0.00	0.29	0.194	I	o	|	|	|	1.42
45.417	0.00	0.29	0.192	I	o	|	|	|	1.41
45.500	0.00	0.29	0.190	I	o	|	|	|	1.40
45.583	0.00	0.29	0.188	I	o	|	|	|	1.39
45.667	0.00	0.29	0.186	I	o	|	|	|	1.38
45.750	0.00	0.28	0.184	I	o	|	|	|	1.37
45.833	0.00	0.28	0.182	I	o	|	|	|	1.36
45.917	0.00	0.28	0.180	I	o	|	|	|	1.35
46.000	0.00	0.28	0.178	I	o	|	|	|	1.33
46.083	0.00	0.28	0.176	I	o	|	|	|	1.32
46.167	0.00	0.28	0.174	I	o	|	|	|	1.31
46.250	0.00	0.28	0.172	I	o	|	|	|	1.30
46.333	0.00	0.28	0.171	I	o	|	|	|	1.29
46.417	0.00	0.27	0.169	I	o	|	|	|	1.28
46.500	0.00	0.27	0.167	I	o	|	|	|	1.27
46.583	0.00	0.27	0.165	I	o	|	|	|	1.26
46.667	0.00	0.27	0.163	I	o	|	|	|	1.25
46.750	0.00	0.27	0.161	I	o	|	|	|	1.24
46.833	0.00	0.27	0.159	I	o	|	|	|	1.23
46.917	0.00	0.27	0.158	I	o	|	|	|	1.22
47.000	0.00	0.27	0.156	I	o	|	|	|	1.21
47.083	0.00	0.26	0.154	I	o	|	|	|	1.20
47.167	0.00	0.26	0.152	I	o	|	|	|	1.19
47.250	0.00	0.26	0.150	I	o	|	|	|	1.18
47.333	0.00	0.26	0.148	I	o	|	|	|	1.17
47.417	0.00	0.26	0.147	I	o	|	|	|	1.16
47.500	0.00	0.26	0.145	I	o	|	|	|	1.16
47.583	0.00	0.26	0.143	I	o	|	|	|	1.15
47.667	0.00	0.26	0.141	I	o	|	|	|	1.14
47.750	0.00	0.26	0.140	I	o	|	|	|	1.13
47.833	0.00	0.25	0.138	I	o	|	|	|	1.12
47.917	0.00	0.25	0.136	I	o	|	|	|	1.11
48.000	0.00	0.25	0.134	I	o	|	|	|	1.10
48.083	0.00	0.25	0.133	I	o	|	|	|	1.09
48.167	0.00	0.25	0.131	I	o	|	|	|	1.08
48.250	0.00	0.25	0.129	I	o	|	|	|	1.07
48.333	0.00	0.25	0.127	I	o	|	|	|	1.06
48.417	0.00	0.25	0.126	I	o	|	|	|	1.05
48.500	0.00	0.25	0.124	I	o	|	|	|	1.04
48.583	0.00	0.24	0.122	I	o	|	|	|	1.03
48.667	0.00	0.24	0.121	I	o	|	|	|	1.03
48.750	0.00	0.24	0.119	I	o	|	|	|	1.02
48.833	0.00	0.24	0.117	I	o	|	|	|	1.01
48.917	0.00	0.24	0.116	I	o	|	|	|	1.00
49.000	0.00	0.24	0.114	I	o	|	|	|	0.99
49.083	0.00	0.24	0.112	I	o	|	|	|	0.98
49.167	0.00	0.23	0.111	I	o	|	|	|	0.96
49.250	0.00	0.23	0.109	I	o	|	|	|	0.95
49.333	0.00	0.23	0.108	I	o	|	|	|	0.94
49.417	0.00	0.23	0.106	I	o	|	|	|	0.93

49.500	0.00	0.23	0.104	I O	|	|	|	0.92
49.583	0.00	0.23	0.103	I O	|	|	|	0.91
49.667	0.00	0.22	0.101	I O	|	|	|	0.90
49.750	0.00	0.22	0.100	I O	|	|	|	0.89
49.833	0.00	0.22	0.098	I O	|	|	|	0.88
49.917	0.00	0.22	0.097	I O	|	|	|	0.87
50.000	0.00	0.22	0.095	I O	|	|	|	0.86
50.083	0.00	0.22	0.094	I O	|	|	|	0.85
50.167	0.00	0.21	0.092	I O	|	|	|	0.84
50.250	0.00	0.21	0.091	I O	|	|	|	0.83
50.333	0.00	0.21	0.089	I O	|	|	|	0.82
50.417	0.00	0.21	0.088	I O	|	|	|	0.81
50.500	0.00	0.21	0.086	I O	|	|	|	0.80
50.583	0.00	0.21	0.085	I O	|	|	|	0.79
50.667	0.00	0.20	0.084	I O	|	|	|	0.78
50.750	0.00	0.20	0.082	I O	|	|	|	0.77
50.833	0.00	0.20	0.081	I O	|	|	|	0.76
50.917	0.00	0.20	0.079	I O	|	|	|	0.75
51.000	0.00	0.20	0.078	I O	|	|	|	0.74
51.083	0.00	0.20	0.077	I O	|	|	|	0.73
51.167	0.00	0.20	0.075	I O	|	|	|	0.73
51.250	0.00	0.19	0.074	I O	|	|	|	0.72
51.333	0.00	0.19	0.073	I O	|	|	|	0.71
51.417	0.00	0.19	0.071	I O	|	|	|	0.70
51.500	0.00	0.19	0.070	I O	|	|	|	0.69
51.583	0.00	0.19	0.069	I O	|	|	|	0.68
51.667	0.00	0.19	0.067	I O	|	|	|	0.67
51.750	0.00	0.19	0.066	I O	|	|	|	0.66
51.833	0.00	0.18	0.065	I O	|	|	|	0.65
51.917	0.00	0.18	0.064	I O	|	|	|	0.65
52.000	0.00	0.18	0.062	I O	|	|	|	0.64
52.083	0.00	0.18	0.061	I O	|	|	|	0.63
52.167	0.00	0.18	0.060	I O	|	|	|	0.62
52.250	0.00	0.18	0.059	IO	|	|	|	0.61
52.333	0.00	0.18	0.057	IO	|	|	|	0.60
52.417	0.00	0.18	0.056	IO	|	|	|	0.60
52.500	0.00	0.17	0.055	IO	|	|	|	0.59
52.583	0.00	0.17	0.054	IO	|	|	|	0.58
52.667	0.00	0.17	0.053	IO	|	|	|	0.57
52.750	0.00	0.17	0.051	IO	|	|	|	0.56
52.833	0.00	0.17	0.050	IO	|	|	|	0.56
52.917	0.00	0.17	0.049	IO	|	|	|	0.55
53.000	0.00	0.17	0.048	IO	|	|	|	0.54
53.083	0.00	0.17	0.047	IO	|	|	|	0.53
53.167	0.00	0.16	0.046	IO	|	|	|	0.52
53.250	0.00	0.16	0.045	IO	|	|	|	0.52
53.333	0.00	0.16	0.043	IO	|	|	|	0.51
53.417	0.00	0.16	0.042	IO	|	|	|	0.50
53.500	0.00	0.16	0.041	IO	|	|	|	0.49
53.583	0.00	0.15	0.040	IO	|	|	|	0.48
53.667	0.00	0.15	0.039	IO	|	|	|	0.47
53.750	0.00	0.14	0.038	IO	|	|	|	0.45
53.833	0.00	0.14	0.037	IO	|	|	|	0.44
53.917	0.00	0.13	0.036	IO	|	|	|	0.43
54.000	0.00	0.13	0.035	IO	|	|	|	0.42
54.083	0.00	0.12	0.035	IO	|	|	|	0.41
54.167	0.00	0.12	0.034	IO	|	|	|	0.40
54.250	0.00	0.11	0.033	IO	|	|	|	0.39
54.333	0.00	0.11	0.032	IO	|	|	|	0.38
54.417	0.00	0.11	0.031	IO	|	|	|	0.38
54.500	0.00	0.10	0.031	IO	|	|	|	0.37
54.583	0.00	0.10	0.030	IO	|	|	|	0.36
54.667	0.00	0.10	0.029	IO	|	|	|	0.35
54.750	0.00	0.09	0.029	IO	|	|	|	0.34
54.833	0.00	0.09	0.028	IO	|	|	|	0.34
54.917	0.00	0.09	0.027	O	|	|	|	0.33
55.000	0.00	0.08	0.027	O	|	|	|	0.32
55.083	0.00	0.08	0.026	O	|	|	|	0.31
55.167	0.00	0.08	0.026	O	|	|	|	0.31
55.250	0.00	0.08	0.025	O	|	|	|	0.30
55.333	0.00	0.07	0.025	O	|	|	|	0.30
55.417	0.00	0.07	0.024	O	|	|	|	0.29
55.500	0.00	0.07	0.024	O	|	|	|	0.28
55.583	0.00	0.07	0.023	O	|	|	|	0.28
55.667	0.00	0.06	0.023	O	|	|	|	0.27

55.750	0.00	0.06	0.022	o	|	|	|	|	0.27
55.833	0.00	0.06	0.022	o	|	|	|	|	0.26
55.917	0.00	0.06	0.021	o	|	|	|	|	0.26
56.000	0.00	0.06	0.021	o	|	|	|	|	0.25
56.083	0.00	0.05	0.021	o	|	|	|	|	0.25
56.167	0.00	0.05	0.020	o	|	|	|	|	0.25
56.250	0.00	0.05	0.020	o	|	|	|	|	0.24
56.333	0.00	0.05	0.020	o	|	|	|	|	0.24
56.417	0.00	0.05	0.019	o	|	|	|	|	0.23
56.500	0.00	0.05	0.019	o	|	|	|	|	0.23
56.583	0.00	0.04	0.019	o	|	|	|	|	0.23
56.667	0.00	0.04	0.018	o	|	|	|	|	0.22
56.750	0.00	0.04	0.018	o	|	|	|	|	0.22
56.833	0.00	0.04	0.018	o	|	|	|	|	0.22
56.917	0.00	0.04	0.018	o	|	|	|	|	0.21
57.000	0.00	0.04	0.017	o	|	|	|	|	0.21
57.083	0.00	0.04	0.017	o	|	|	|	|	0.21
57.167	0.00	0.03	0.017	o	|	|	|	|	0.20
57.250	0.00	0.03	0.017	o	|	|	|	|	0.20
57.333	0.00	0.03	0.016	o	|	|	|	|	0.20
57.417	0.00	0.03	0.016	o	|	|	|	|	0.20
57.500	0.00	0.03	0.016	o	|	|	|	|	0.19
57.583	0.00	0.03	0.016	o	|	|	|	|	0.19
57.667	0.00	0.03	0.015	o	|	|	|	|	0.19
57.750	0.00	0.03	0.015	o	|	|	|	|	0.19
57.833	0.00	0.03	0.015	o	|	|	|	|	0.18
57.917	0.00	0.03	0.015	o	|	|	|	|	0.18
58.000	0.00	0.02	0.015	o	|	|	|	|	0.18
58.083	0.00	0.02	0.015	o	|	|	|	|	0.18
58.167	0.00	0.02	0.014	o	|	|	|	|	0.18
58.250	0.00	0.02	0.014	o	|	|	|	|	0.17
58.333	0.00	0.02	0.014	o	|	|	|	|	0.17
58.417	0.00	0.02	0.014	o	|	|	|	|	0.17
58.500	0.00	0.02	0.014	o	|	|	|	|	0.17
58.583	0.00	0.02	0.014	o	|	|	|	|	0.17
58.667	0.00	0.02	0.014	o	|	|	|	|	0.17
58.750	0.00	0.02	0.013	o	|	|	|	|	0.17
58.833	0.00	0.02	0.013	o	|	|	|	|	0.16
58.917	0.00	0.02	0.013	o	|	|	|	|	0.16
59.000	0.00	0.02	0.013	o	|	|	|	|	0.16
59.083	0.00	0.02	0.013	o	|	|	|	|	0.16
59.167	0.00	0.02	0.013	o	|	|	|	|	0.16
59.250	0.00	0.01	0.013	o	|	|	|	|	0.16
59.333	0.00	0.01	0.013	o	|	|	|	|	0.16
59.417	0.00	0.01	0.013	o	|	|	|	|	0.16
59.500	0.00	0.01	0.012	o	|	|	|	|	0.15
59.583	0.00	0.01	0.012	o	|	|	|	|	0.15
59.667	0.00	0.01	0.012	o	|	|	|	|	0.15
59.750	0.00	0.01	0.012	o	|	|	|	|	0.15
59.833	0.00	0.01	0.012	o	|	|	|	|	0.15
59.917	0.00	0.01	0.012	o	|	|	|	|	0.15
60.000	0.00	0.01	0.012	o	|	|	|	|	0.15
60.083	0.00	0.01	0.012	o	|	|	|	|	0.15
60.167	0.00	0.01	0.012	o	|	|	|	|	0.15
60.250	0.00	0.01	0.012	o	|	|	|	|	0.15
60.333	0.00	0.01	0.012	o	|	|	|	|	0.14
60.417	0.00	0.01	0.012	o	|	|	|	|	0.14
60.500	0.00	0.01	0.012	o	|	|	|	|	0.14
60.583	0.00	0.01	0.012	o	|	|	|	|	0.14
60.667	0.00	0.01	0.011	o	|	|	|	|	0.14
60.750	0.00	0.01	0.011	o	|	|	|	|	0.14
60.833	0.00	0.01	0.011	o	|	|	|	|	0.14
60.917	0.00	0.01	0.011	o	|	|	|	|	0.14
61.000	0.00	0.01	0.011	o	|	|	|	|	0.14
61.083	0.00	0.01	0.011	o	|	|	|	|	0.14
61.167	0.00	0.01	0.011	o	|	|	|	|	0.14
61.250	0.00	0.01	0.011	o	|	|	|	|	0.14
61.333	0.00	0.01	0.011	o	|	|	|	|	0.14
61.417	0.00	0.01	0.011	o	|	|	|	|	0.14
61.500	0.00	0.01	0.011	o	|	|	|	|	0.14
61.583	0.00	0.01	0.011	o	|	|	|	|	0.14
61.667	0.00	0.01	0.011	o	|	|	|	|	0.14
61.750	0.00	0.01	0.011	o	|	|	|	|	0.14
61.833	0.00	0.01	0.011	o	|	|	|	|	0.13
61.917	0.00	0.00	0.011	o	|	|	|	|	0.13

62.000	0.00	0.00	0.011	o	|	|	|	|	0.13
62.083	0.00	0.00	0.011	o	|	|	|	|	0.13
62.167	0.00	0.00	0.011	o	|	|	|	|	0.13
62.250	0.00	0.00	0.011	o	|	|	|	|	0.13
62.333	0.00	0.00	0.011	o	|	|	|	|	0.13
62.417	0.00	0.00	0.011	o	|	|	|	|	0.13
62.500	0.00	0.00	0.011	o	|	|	|	|	0.13
62.583	0.00	0.00	0.011	o	|	|	|	|	0.13
62.667	0.00	0.00	0.011	o	|	|	|	|	0.13
62.750	0.00	0.00	0.011	o	|	|	|	|	0.13
62.833	0.00	0.00	0.010	o	|	|	|	|	0.13
62.917	0.00	0.00	0.010	o	|	|	|	|	0.13
63.000	0.00	0.00	0.010	o	|	|	|	|	0.13
63.083	0.00	0.00	0.010	o	|	|	|	|	0.13
63.167	0.00	0.00	0.010	o	|	|	|	|	0.13
63.250	0.00	0.00	0.010	o	|	|	|	|	0.13
63.333	0.00	0.00	0.010	o	|	|	|	|	0.13
63.417	0.00	0.00	0.010	o	|	|	|	|	0.13
63.500	0.00	0.00	0.010	o	|	|	|	|	0.13
63.583	0.00	0.00	0.010	o	|	|	|	|	0.13
63.667	0.00	0.00	0.010	o	|	|	|	|	0.13
63.750	0.00	0.00	0.010	o	|	|	|	|	0.13
63.833	0.00	0.00	0.010	o	|	|	|	|	0.13
63.917	0.00	0.00	0.010	o	|	|	|	|	0.13
64.000	0.00	0.00	0.010	o	|	|	|	|	0.13
64.083	0.00	0.00	0.010	o	|	|	|	|	0.13
64.167	0.00	0.00	0.010	o	|	|	|	|	0.13
64.250	0.00	0.00	0.010	o	|	|	|	|	0.13
64.333	0.00	0.00	0.010	o	|	|	|	|	0.13
64.417	0.00	0.00	0.010	o	|	|	|	|	0.13
64.500	0.00	0.00	0.010	o	|	|	|	|	0.13
64.583	0.00	0.00	0.010	o	|	|	|	|	0.13
64.667	0.00	0.00	0.010	o	|	|	|	|	0.13
64.750	0.00	0.00	0.010	o	|	|	|	|	0.13
64.833	0.00	0.00	0.010	o	|	|	|	|	0.13
64.917	0.00	0.00	0.010	o	|	|	|	|	0.13
65.000	0.00	0.00	0.010	o	|	|	|	|	0.13
65.083	0.00	0.00	0.010	o	|	|	|	|	0.13
65.167	0.00	0.00	0.010	o	|	|	|	|	0.13
65.250	0.00	0.00	0.010	o	|	|	|	|	0.13
65.333	0.00	0.00	0.010	o	|	|	|	|	0.13
65.417	0.00	0.00	0.010	o	|	|	|	|	0.13
65.500	0.00	0.00	0.010	o	|	|	|	|	0.13
65.583	0.00	0.00	0.010	o	|	|	|	|	0.13
65.667	0.00	0.00	0.010	o	|	|	|	|	0.13
65.750	0.00	0.00	0.010	o	|	|	|	|	0.13
65.833	0.00	0.00	0.010	o	|	|	|	|	0.12

Remaining water in basin = 0.01 (Ac.Ft)

**********HYDROGRAPH DATA**********

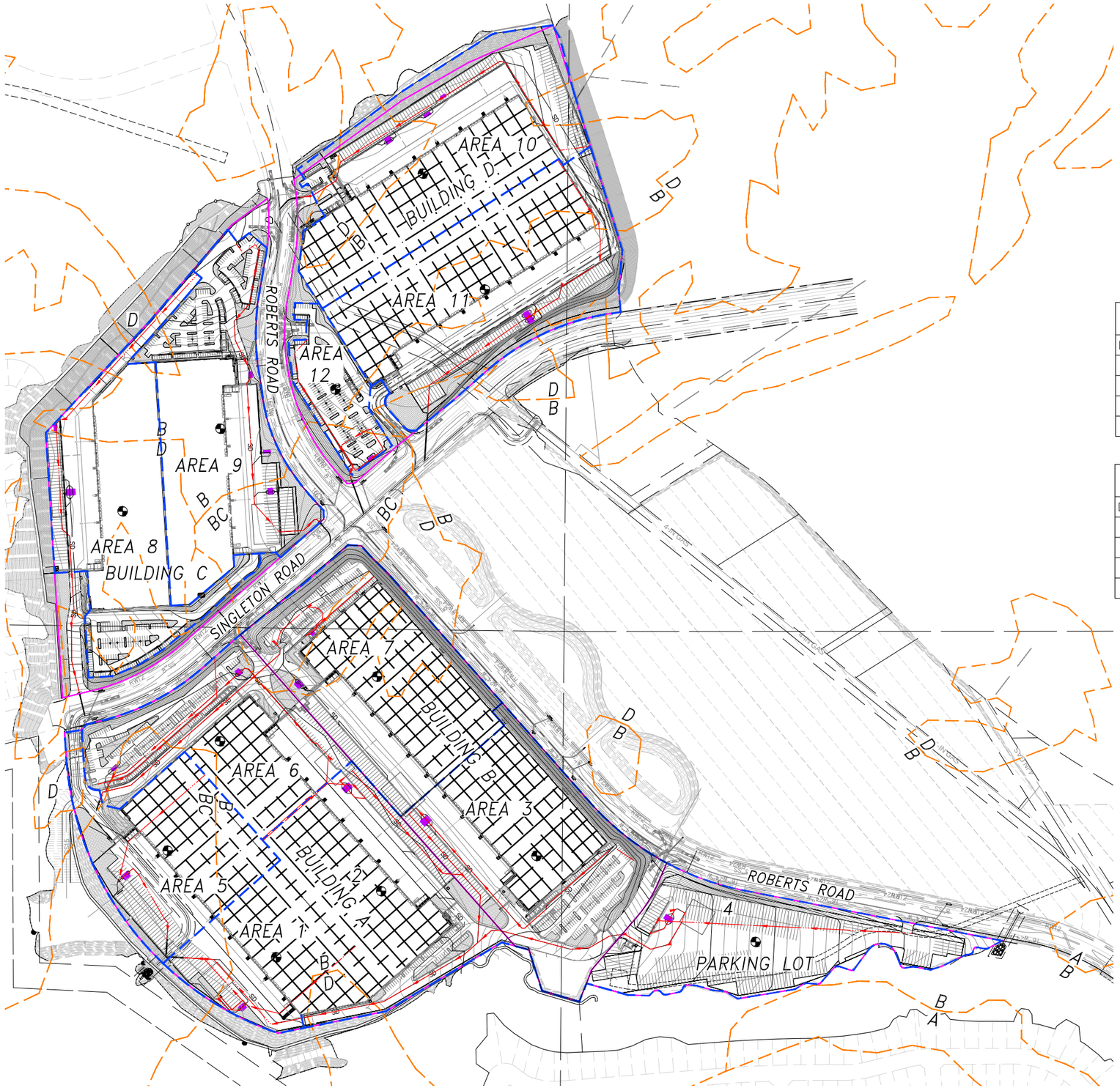
Number of intervals = 790
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.591 (CFS)
Total volume = 1.732 (Ac.Ft)

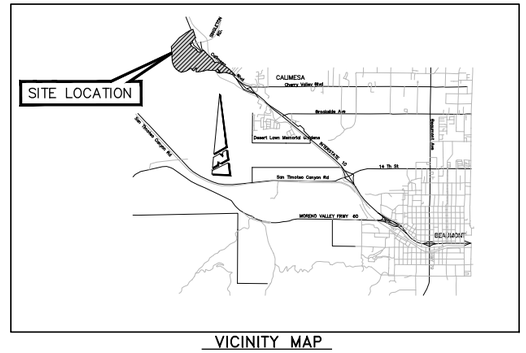
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

UNIT HYDROGRAPH HYDROLOGY MAP





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

PROPOSED AREAS						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA	6.8 AC	9.5 AC	12.3 AC	9.2 AC	8.1 AC	9.0 AC
L_T	1116 Ft	2462 Ft	2287 Ft	3348 Ft	899 Ft	1634 Ft
L_{CA}	860 Ft	2251 Ft	2251 Ft	2754 Ft	602 Ft	512 Ft
ΔH	6.5 Ft	6.50 Ft	9.30 Ft	37.50 Ft	6.50	3.70 Ft

PROPOSED AREAS						
DRAINAGE AREA	7	8	9	10	11	12
TOTAL AREA	12.5 AC	11.2 AC	12.1 AC	14.1 AC	14.1 AC	2.9 AC
L_T	1378 Ft	1821 Ft	1395 Ft	1473 Ft	1370 Ft	621 Ft
L_{CA}	1136 Ft	683 Ft	552 Ft	540 Ft	486 Ft	341 Ft
ΔH	3.3 Ft	29.30 Ft	18 Ft	7 Ft	2.80 Ft	9 Ft

LEGEND

NODE / ELEV – NODE NUMBER / ELEVATION (FT)

AC / FT – AREA (AC) / LENGTH (FT)

– DRAINAGE AREA BOUNDARY (PROPOSED)

– FLOWLINE (PROPOSED)

– PROJECT BOUNDARY

– NRCS SOIL BOUNDARY

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N W WEBB E S

1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
PRELIMINARY PROPOSED UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

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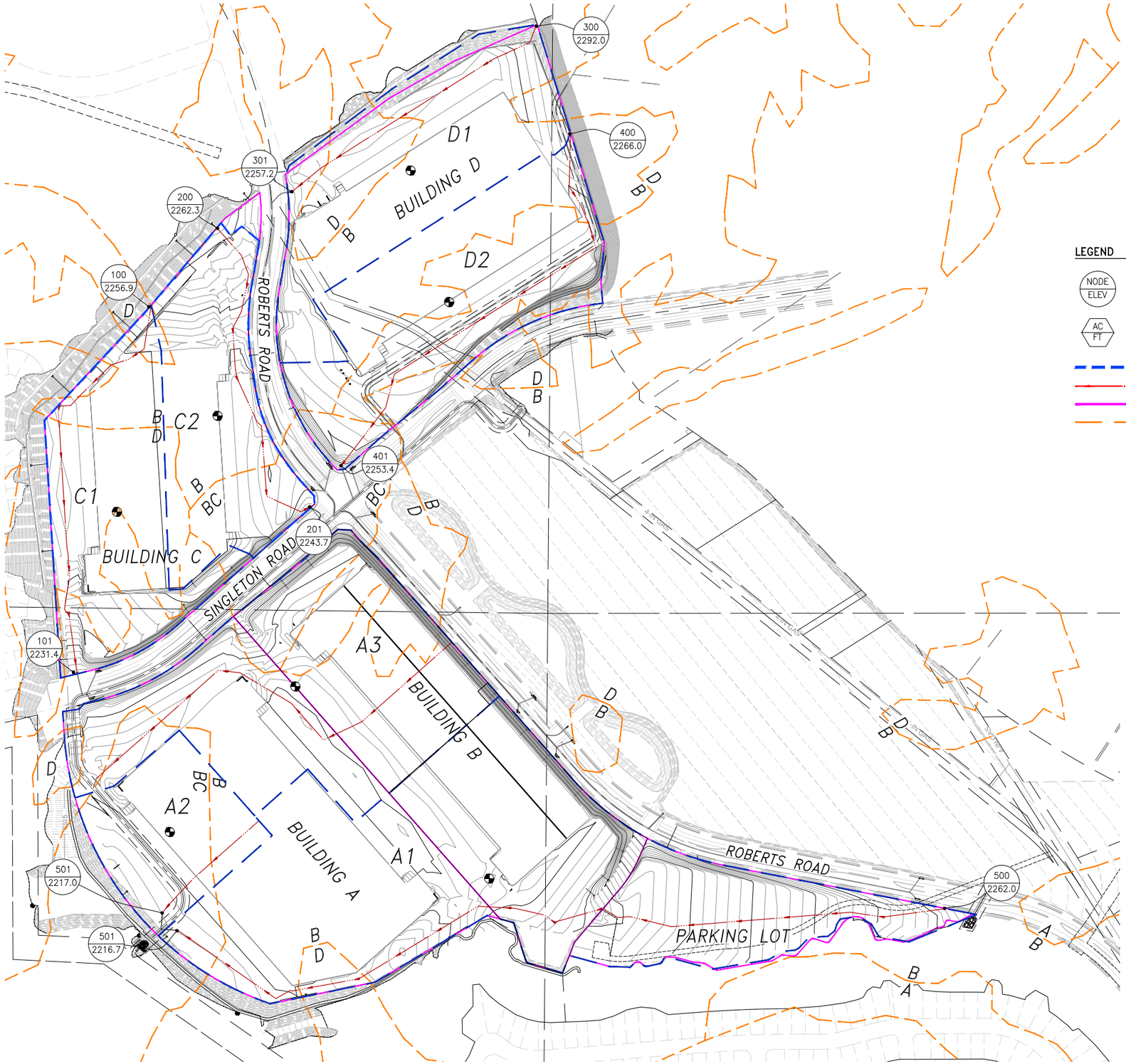

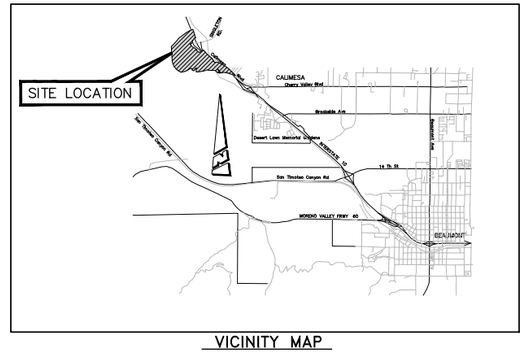

VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

LEGEND

NODE / ELEV	– NODE NUMBER – ELEVATION (FT)
AC / FT	– AREA (AC) – LENGTH (FT)
	– DRAINAGE AREA BOUNDARY
	– FLOWLINE (PROPOSED)
	– PROJECT BOUNDARY
	– NRCS SOIL BOUNDARY

EXISTING AREAS			
DRAINAGE AREA	A1	A2	A3
TOTAL AREA	37.7 AC	7.5 AC	21.7 AC
L_T	3231 Ft	526 Ft	1790 Ft
L_{CA}	1394 Ft	234 Ft	939 Ft
ΔH	45.0 Ft	7 Ft	23 Ft

EXISTING AREAS		
DRAINAGE AREA	C1	C2
TOTAL AREA	13.2 AC	11.8 AC
L_T	1645 Ft	1321 Ft
L_{CA}	629 Ft	574 Ft
ΔH	25.0 Ft	19 Ft

EXISTING AREAS		
DRAINAGE AREA	D1	D2
TOTAL AREA	15.8 AC	16.9 AC
L_T	1174 Ft	1828 Ft
L_{CA}	440 Ft	756 Ft
ΔH	35.0 Ft	13 Ft

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
W WEBB E
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1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
EXISTING UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	W.O.	21-0034
DATE:	12/14/2020	SHEET	1
DESIGNED:	EP	OF	1 SHEETS
CHECKED:	BJV	DWG. NO.	
PLN CK REF:			
F.B.			

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be provided during Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided during Final Engineering

FOR REVIEW ONLY

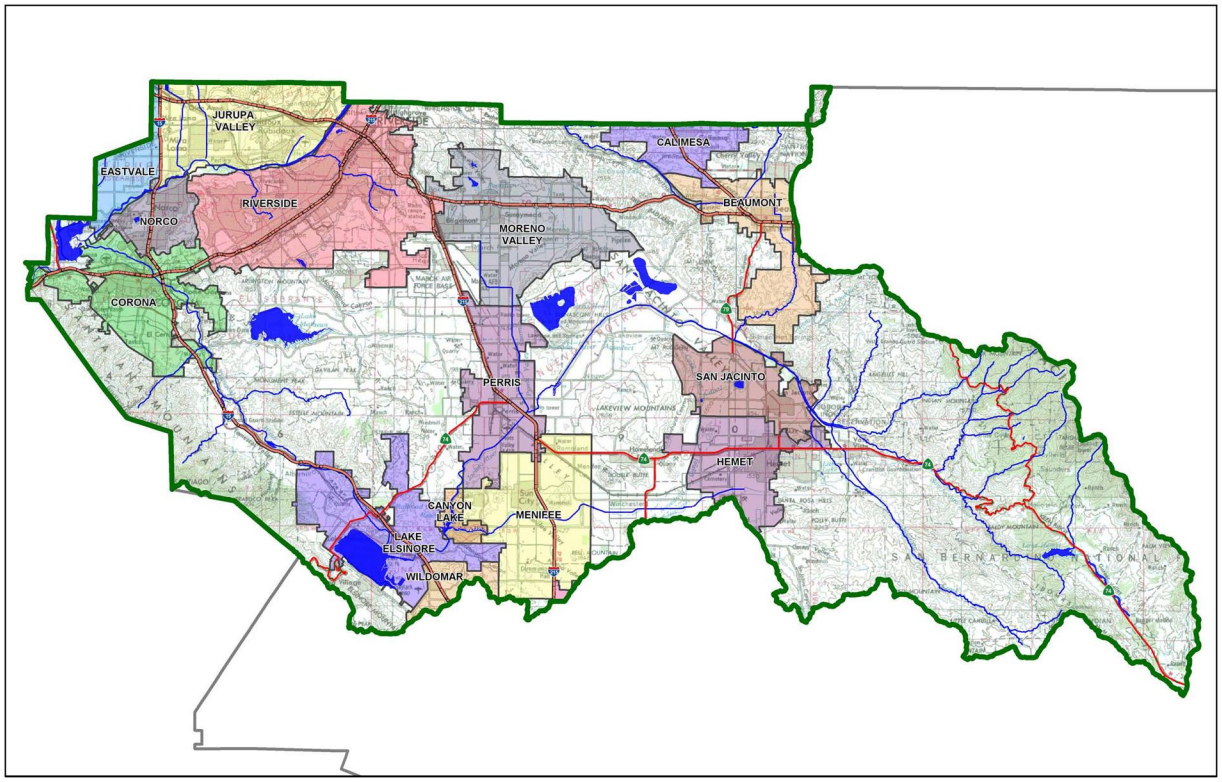
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Birtcher Commerce Center Oak Valley – Building D

Development No: DPR 21-06

Design Review/Case No:



Contact Information:

Prepared for: Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, CA 92660
(714) 728-9070

☒ **Preliminary**
☐ **Final**

Original Date Prepared: May 2021

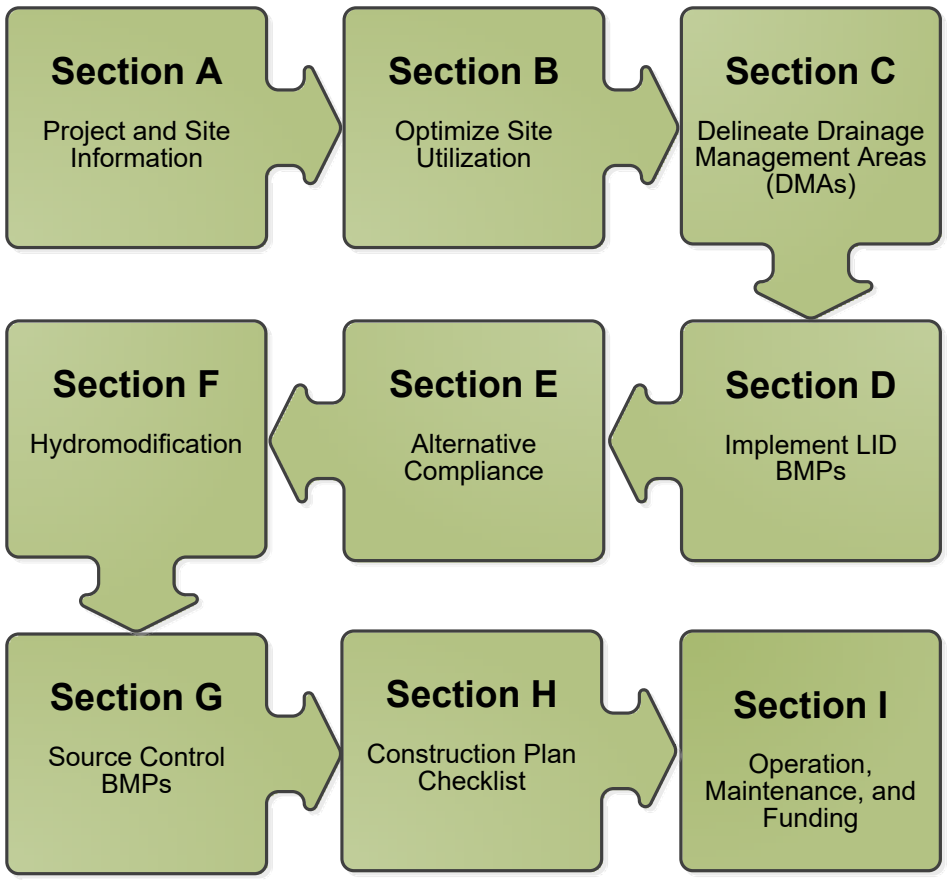
Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Prepared by:
Albert A. Webb Associates
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Birtcher Development by Albert A. Webb Associates for the Birtcher Commerce Center Oak Valley – Building D project.

This WQMP is intended to comply with the requirements of City of Calimesa, County of Riverside for County of Riverside Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (Municipal Code Section 13.12 – Stormwater Drainage System Protection Regulations).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 8
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 10

Section C: Delineate Drainage Management Areas (DMAs) 12

Section D: Implement LID BMPs 14

D.1 Infiltration Applicability 14
D.2 Harvest and Use Assessment 15
D.3 Bioretention and Biotreatment Assessment 17
D.4 Feasibility Assessment Summaries 18
D.5 LID BMP Sizing 19

Section E: Alternative Compliance (LID Waiver Program) 23

E.1 Identify Pollutants of Concern 24
E.2 Stormwater Credits 25
E.3 Sizing Criteria 25
E.4 Treatment Control BMP Selection 26

Section F: Hydromodification 27

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 27
F.2 HCOC Mitigation 28

Section G: Source Control BMPs 29

Section H: Construction Plan Checklist 33

Section I: Operation, Maintenance and Funding 34

List of Tables

Table A.1 Identification of Receiving Waters....8
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....12
Table C.2 Type 'A', Self-Treating Areas....12
Table C.3 Type 'B', Self-Retaining Areas....12
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....13
Table C.5 Type 'D', Areas Draining to BMPs....13
Table D.1 Infiltration Feasibility....14
Table D.2 LID Prioritization Summary Matrix....18
Table D.3 DCV Calculations for LID BMPs....19
Table E.1 Potential Pollutants by Land Use Type....24
Table E.2 Water Quality Credits....25
Table E.3 Treatment Control BMP Sizing....25
Table E.4 Treatment Control BMP Selection....26
Table F.1 Hydrologic Conditions of Concern Summary....27
Table G.1 Permanent and Operational Source Control Measures....29
Table H.1 Construction Plan Cross-reference....33

List of Appendices

Appendix 1: Maps and Site Plans....35
Appendix 2: Construction Plans....36
Appendix 3: Soils Information....37
Appendix 4: Historical Site Conditions....38
Appendix 5: LID Infeasibility....39
Appendix 6: BMP Design Details....40
Appendix 7: Hydromodification....41
Appendix 8: Source Control....42
Appendix 9: O&M....43
Appendix 10: Educational Materials....44

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial / Business Park
Planning Area:	Summerwind Ranch at Oak Valley Specific Plan
Community Name:	Birtcher Commerce Center Oak Valley
Development Name:	Birtcher Commerce Center Oak Valley – Building D
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°58'29.36"N / 117°03'08.64"W	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
APN(s): 413-190-025 & 413-290-047	
Map Book and Page No.: Thomas Bros Page: 689, Grid: H3, H4, J3, J4 ; Page: 690, Grid: A4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial, Business Park
Proposed or Potential SIC Code(s)	1541 – General Contractors-Industrial Buildings and Warehouses 1542 – General Contractors- Non-Residential Other than Industrial and Warehouses
Area of Impervious Project Footprint (SF)	1,255,381 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	1,255,381 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B, D
What is the Water Quality Design Storm Depth for the project?	0.78
Design rainfall intensity for QBMP calculations	0.2 inches/hr

Project Description

The Birtcher Commerce Center Oak Valley (BCCOV) - Building D project proposes an industrial development in the City of Calimesa on approximately 32.0 acres of vacant land located within the boundaries of the 220-acre PM 37862 (overall BCCOV project site). The overall BCCOV project site consists of approximately 220 acres of vacant land and is bounded by the Interstate-10 (I-10) highway along its northeast, the single-family residential tract TR 32702 (currently under construction) along its southeastern boundary, vacant land along its southern boundary, and a future residential development to its northwest. The San Timoteo Creek runs from north to south along the eastern boundary of the

overall BCCOV site and continues south of the site. The BCCOV - Building D project is bounded by Roberts Road to its west, vacant land to its northwest, the existing I-10 highway to its east, and Singleton Road to its south.

The overall BCCOV project site is currently vacant. Runoff from the onsite area and offsite areas north of the project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from north to south. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue through the southern boundary before ultimately discharging into the San Timoteo Creek.

Prior to any construction commencing for the BCCOV - Building D project, the overall BCCOV project site will be mass graded. The mass grading phase also includes the construction of retaining walls along the boundaries of the overall BCCOV project, graded pads, the construction of backbone street improvements for Singleton Road and Roberts Road, the installation of backbone storm drain facilities, and the installation of storm drain stub-outs for the individual BCCOV industrial developments to discharge into. The overall drainage pattern of the mass grade phase will perpetuate the drainage pattern of the existing, vacant project site. However, runoff in the mass graded phase will be captured in temporary inlets and conveyed towards the backbone storm drain facilities. The backbone storm drain facilities have been designed to convey the fully developed flows from the overall BCCOV project as well as the existing offsite flows generated north of the I-10 highway southerly towards the San Timoteo Creek. A separate drainage study titled "Hydrology and Hydraulics Study: Oak Valley Town Center Parcel Map No. 37862 Mass Grading Plan" was conducted for the mass grade phase of the project and encompasses the design and layout of the backbone storm drain facilities.

For the proposed condition, runoff is captured through a series of catch basins and grate inlets located throughout the site at localized low points. Captured flows are directed towards proposed treatment devices in order to treat for water quality requirements. Flows are then conveyed towards the existing stub-outs via proposed onsite storm drain that connect into the backbone storm drain facilities. Flows generated by the BCCOV - Building D project development ultimately discharge south of the overall BCCOV project site and into the San Timoteo Creek similar to the existing condition.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to highly variable infiltration rates of the existing soil as well as potentially collapsible soil being present throughout the site. Due to site constraints, most notably the significant offsite grading requirements of the overall BCCOV site, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary actually drains offsite and into the backbone streets. However, in this preliminary analysis all areas within the project boundary have been considered in the Qbmp calculations in order to provide a conservative treatment flow rate.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharging into the proposed CMP chamber detention systems. Mitigated flows outlet to the provided stub-outs. The proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm

events to bypass the vault and enter the onsite storm drain facilities. All captured onsite flows will be directed towards the provided lateral stub-outs constructed in the mass grade phase.

The project is required to address increased runoff mitigation for the 24-hour, 2-year storm event to meet HCOC requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	N/A	GWR, MUN, REC1, REC2, WARM, WILD	20± miles
San Timoteo Creek Reach 2	N/A	GWR, MUN, REC1, REC2, WARM, WILD	10± miles
San Timoteo Creek Reach 1B & 1A	N/A	AGR, MUN, REC1, REC2, WARM, WILD	5± miles
Santa Ana River Reach #5	N/A	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.
Santa Ana River Reach #4	Pathogens	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* *City of Calimesa Grading Permit*	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The currently vacant site generally drains from north to south towards the San Timoteo Creek. In this existing condition, flows are generally conveyed via smaller streambed areas that run from north to south through the overall BCCOV site. These smaller streambed areas discharge flows south, offsite into the San Timoteo Creek. In the mass grade phase, the project site generally sheet flows towards temporary inlets that discharge into the backbone storm drain facilities located along Singleton Road/Roberts Road. This backbone storm drain discharges flows towards the San Timoteo Creek south of the overall project site similar to the vacant site conditions.

In the developed condition, a network of catch basins and inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards existing stub-outs located at various points along the western and southern boundaries provided in the mass grade phase. From there, flows are conveyed into the backbone storm drain line located along Singleton Road/Roberts Road before ultimately discharging south, offsite towards the San Timoteo Creek similar to the existing condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing vegetation is very minimal. The existing project site is primarily barren, so no vegetation is proposed to be protected.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Due to poor infiltration capacities and potentially collapsible underlying soils throughout the site, an infiltration-based BMP is not feasible to treat for water quality requirements.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious areas will be minimized as much as possible while maintaining safe and usable facilities onsite. Landscaped areas have been provided throughout the projects site along concrete walkways, around the proposed building, adjacent to parking areas, and in other feasible locations throughout the site.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, however, based on the nature of the industrial development, not all runoff can feasibly be directed towards a pervious area before being captured. Pervious landscaped areas are proposed throughout the site where possible in order to maximize the chances of runoff dispersing into landscaped areas before being captured. All runoff that is captured onsite will be directed towards an MWS vault (or series of MWS vaults) to provide water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA D-1	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	142,709	D
DMA D-2	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	185,072	D
DMA D-3	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	312,165	D
DMA D-4	Mixed Use – Roofs, Concrete or Asphalt, Ornamental Landscaping	613,265	D
DMA D-6	Mixed Use – Concrete or Asphalt, Ornamental Landscaping	189,637	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product		Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA D-1	MWS Vault (8'x20')
DMA D-2	MWS Vault (8'x24')
DMA D-3	MWS Vaults (2 - 8'x20' vaults in series)
DMA D-4	MWS Vaults (4 - 8'x20' vaults in series)
DMA D-6	MWS Vault (8'x20')

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: All DMAs		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Soils underlying project site are potentially collapsible and not suitable for infiltration		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA D-1	☐	☐	☐	☒	☐
DMA D-2	☐	☐	☐	☒	☐
DMA D-3	☐	☐	☐	☒	☐
DMA D-4	☐	☐	☐	☒	☐
DMA D-5	☐	☐	☐	☒	☐
DMA D-6	☐	☐	☐	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the BCCOV - Building D project will utilize biotreatment (MWS vaults) throughout the site to treat for water quality requirements. Infiltration-based BMPs are not feasible due to poor infiltration capacities of underlying soils and potentially collapsible soils (see Appendix 3 for preliminary geotechnical investigation). Harvest and use BMPs are not feasible as reclaimed water will be used for non-potable water demands. Bioretention BMPs are not feasible due to site constraints including minimum parking density requirements and significant offsite grading conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA D-1*		
	[A]		[B]	[C]	[A] x [C]			
Building	*29000*	*Roofs*	*1*	*0.89*	*25868*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*97732*	*Concrete or Asphalt*	*1*	*0.89*	*87176.9*			
Landscape	*15977*	*Ornamental Landscaping*	*0.1*	*.11*	*1764.8*			
	$A_T = \Sigma[A]$ **142709**				Σ= [D] **114809.7**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.5**	[G] ***0.5***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA D-2*		
	[A]		[B]	[C]	[A] x [C]			
Building	*106720*	*Roofs*	*1*	*0.89*	*95194.2*			
Concrete / Asphalt	*68264*	*Concrete or Asphalt*	*1*	*0.89*	*60891.5*			
Landscape	*10088*	*Ornamental Landscaping*	*0.1*	*.11*	*1114.3*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **185072**				Σ= [D] **157200**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.7**	[G] ***0.7***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA D-3*		
	[A]		[B]	[C]	[A] x [C]			
Building	*197031*	*Roofs*	*1*	*0.89*	*175751.7*			
Concrete / Asphalt	*94938*	*Concrete or Asphalt*	*1*	*0.89*	*84684.7*			
Landscape	*20196*	*Ornamental Landscaping*	*0.1*	*.11*	*2230.8*			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Flow Rate (cfs)*
	$A_T = \Sigma[A]$ **312165**				Σ= [D] **262667.2**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **1.2**	[G] ***1.2***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA D-4*

	[A]		[B]	[C]	[A] x [C]			
Building	*316560*	*Roofs*	*1*	*0.89*	*282371.5*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Concrete / Asphalt	*215551*	*Concrete or Asphalt*	*1*	*0.89*	*192271.5*			
Landscape	*81154*	*Ornamental Landscaping*	*0.1*	*.11*	*8964.1*			
	$A_T = \Sigma[A]$ **613265**				Σ= [D] **483607.1**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **2.2**	[G] ***2.2***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***DMA D-6***		
	[A]		[B]	[C]	[A] x [C]			
Concrete / Asphalt	*129585*	*Concrete or Asphalt*	*1*	*0.89*	*115589.8*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Landscape	*60052*	*Ornamental Landscaping*	*0.1*	*.11*	*6633.2*			
	$A_T = \Sigma[A]$ **189637**				Σ= [D] **122223**	[E] **0.2**	$[F] = \frac{[D]x[E]}{12}$ **0.6**	[G] ***0.6***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
All DMAs	Bacteria/ Pathogens	Medium

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition C in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study. The 24-hour, 2-year unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. A routing analysis was performed to demonstrate that the proposed CMP chamber systems have substantial volume needed to mitigate flows to existing condition flow rates and determine the required orifice outlet sizing. See Appendix 7 for the unit hydrograph and routing analysis details. Further details can also be found in the "Preliminary Drainage Study – BCCOV Building D".

EXISTING CONDITION 2-YEAR, 24-HOUR STORM		
	VOL (AC-FT)	PEAK FLOW (CFS)
AREA D1	0.33	0.91
AREA D2	0.37	1.40
82.9% D2 (PROP AREA 11)	-	1.08
17.1% D2 (PROP AREA 12)	-	0.23

PROPOSED CONDITION 2-YEAR, 24-HOUR STORM			
	VOL (AC-FT)	PEAK FLOW (CFS)	ROUTING PEAK FLOW (CFS)
AREA 10	2.1	3.39	0.98
AREA 11	2.0	3.30	1.17
AREA 12	0.42	0.70	0.23
COMBINED (EXISTING D2)	2.42	4.0	1.40

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	*Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.*	*Maintain and periodically repaint or replace inlet markings.* *Provide stormwater pollution prevention information to new site owners, lessees, or operators.* *See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Interior floor drains and elevator shaft sump	*The interior floor drains and elevator shaft sump pumps will be plumbed to*	*Inspect and maintain drains to prevent blockages and overflow.*

	sanitary sewer	
Landscape/Outdoor Pesticide Use	*Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.* *Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.* *Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.* *Consider using pest-resistant plants, especially adjacent to hardscape.* *To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.*	*Maintain landscaping using minimum or no pesticides.* *See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/* *Provide IPM information to new owners, lessees and operators.* *Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Refuse Areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com*

Vehicle and Equipment Cleaning	*If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.*	*Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/*
Plazas, Sidewalks and parking lots.		*Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Loading Docks	*Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.* *Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.* *Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.*	*Move loaded and unloaded items indoors as soon as possible.* *See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fire Sprinkler Test Water	*Water discharged from the fire sprinkler systems shall not enter the storm drain system. Discharged water from fire sprinkler testing shall be collected and used for onsite landscape or disposed of at a local waste water treatment plant.*	*See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling*

		Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
All DMAs	MWS Vaults	Appendix 6

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section H will be completed and addressed during Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

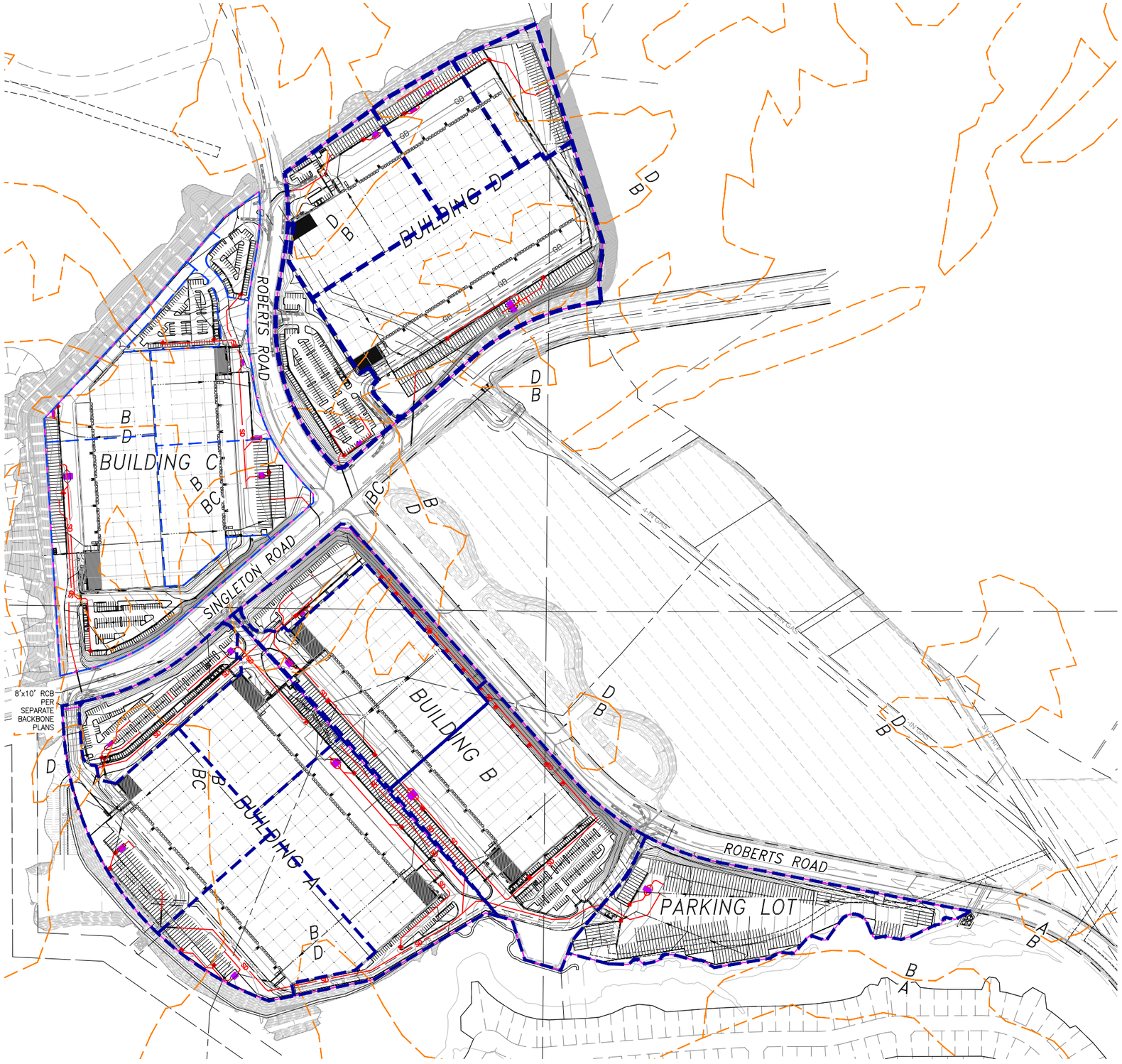
☒ Y ☐ N

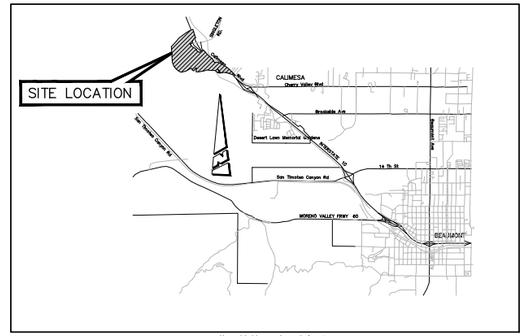
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section I will be completed and addressed during Final WQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

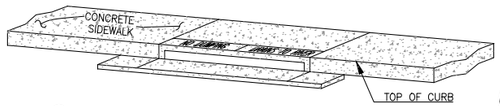


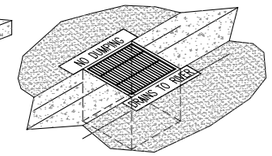


VICINITY MAP

N.T.S.

T2S, R2W, SECTION 23,24,25,26





1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING – DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NTS

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL BELOW (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).
3. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
4. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

SITE CONSTRAINTS:

1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE USE OF RECYCLED WATER FOR IRRIGATION PURPOSES.

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

N
W WEBB E
S

1" = 200'

200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

OVERALL BCCOV SITE PLAN
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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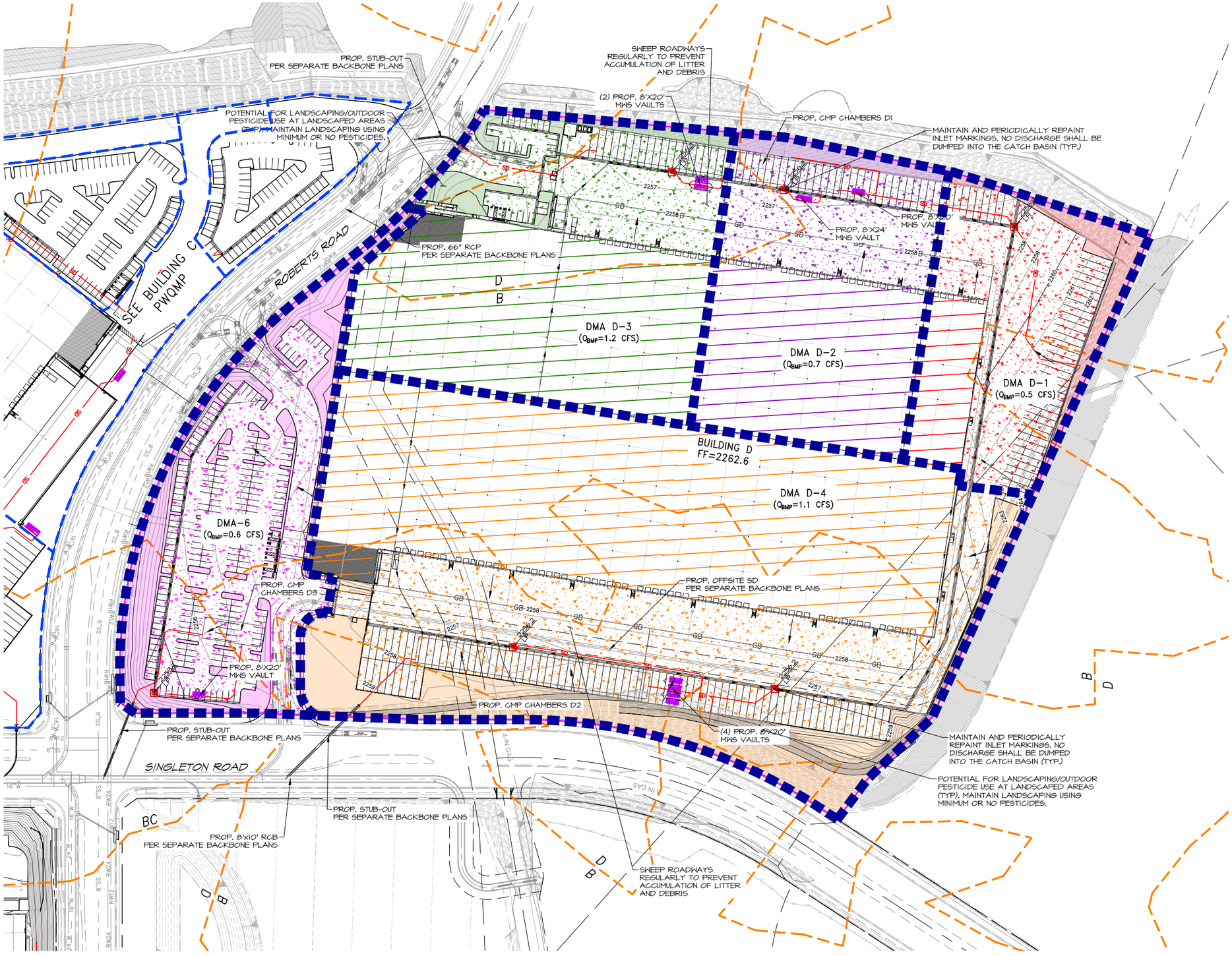

LEGEND

- – ROOF
- – CONCRETE/ASPHALT
- – LANDSCAPE
- – DMA BOUNDARY
- – PROJECT BOUNDARY
- – FLOWLINE
- – PROPOSED ONSITE STORM DRAIN
- – NRCS SOIL BOUNDARY
- – PROPOSED INLET
- – PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

DMA AREA TABLE					
	DMA D-1	DMA D-2	DMA D-3	DMA D-4	DMA D-6
ROOFS (SF)	29,000	106,720	197,031	316,560	–
CONCRETE (SF)	97,732	68,264	94,938	215,551	129,585
LANDSCAPE (SF)	15,977	10,088	20,196	81,154	60,052
QBMP (CFS)	0.5	0.7	1.2	2.2	0.6
QTREAT (CFS)	0.5	0.7	1.2	2.2	0.6

1" = 80'

80 0 80 160 240

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

BCCOV – BUILDING D
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=80'	W.O.	21-0034
DATE:	12/2/2021	SHEET	2
DESIGNED:	AYS	OF	2 SHEETS
CHECKED:	BJV		
PLN CK REF:		DWG. NO.	
F.B.			

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

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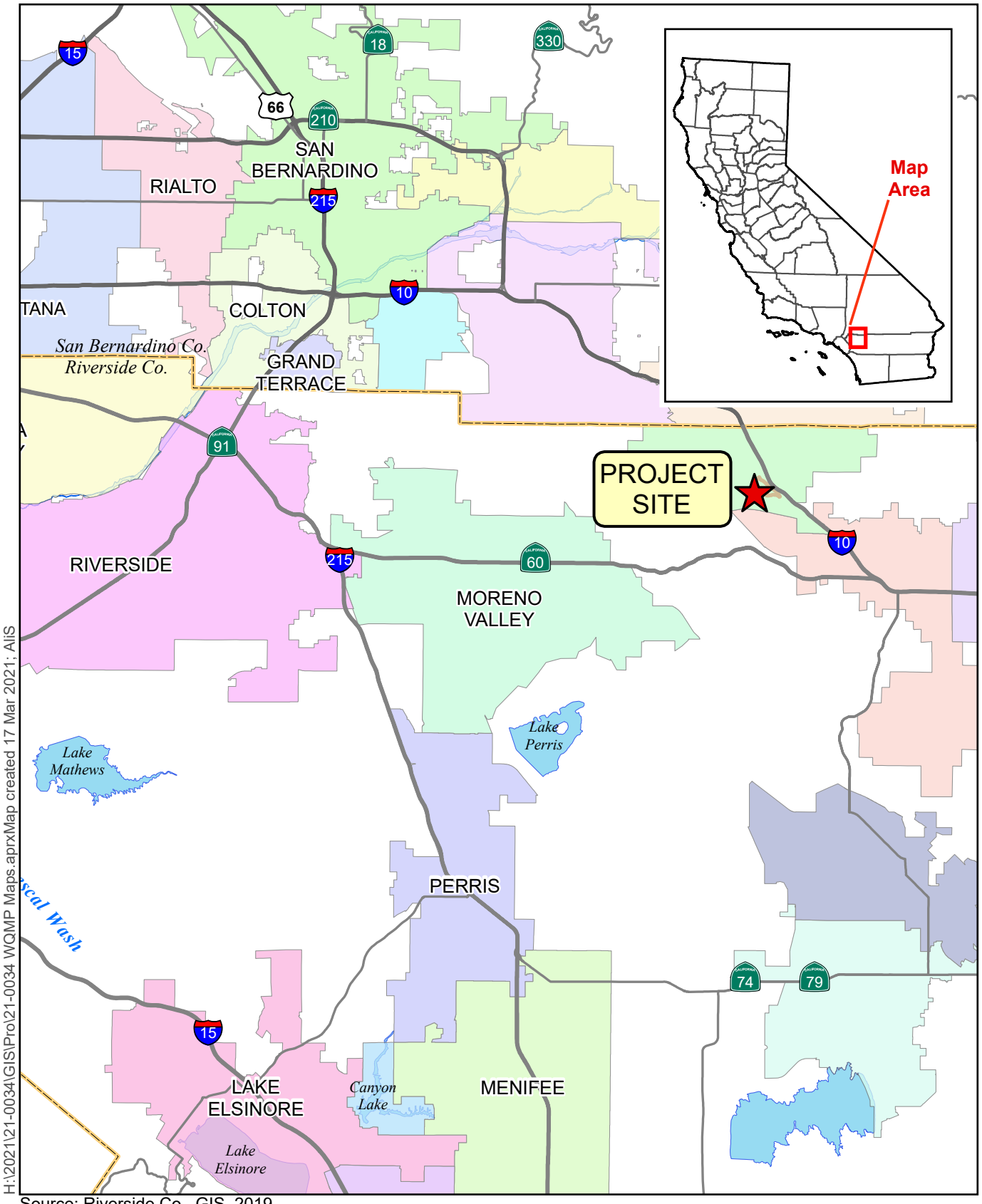


H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprxMap created 17 Mar 2021; AliS

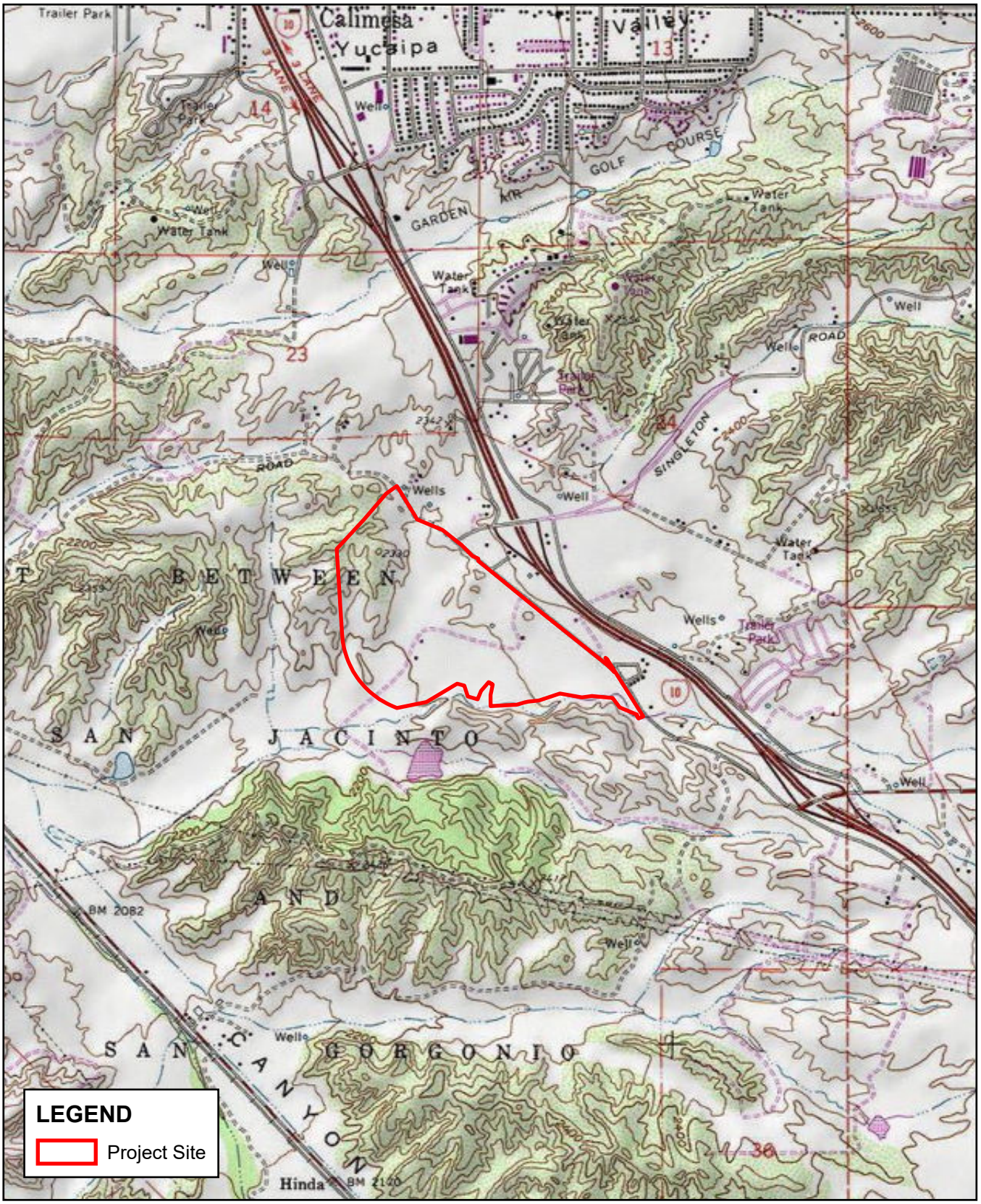
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: ESRI / USGS 7.5min Quad
DRGs: EL CASCO

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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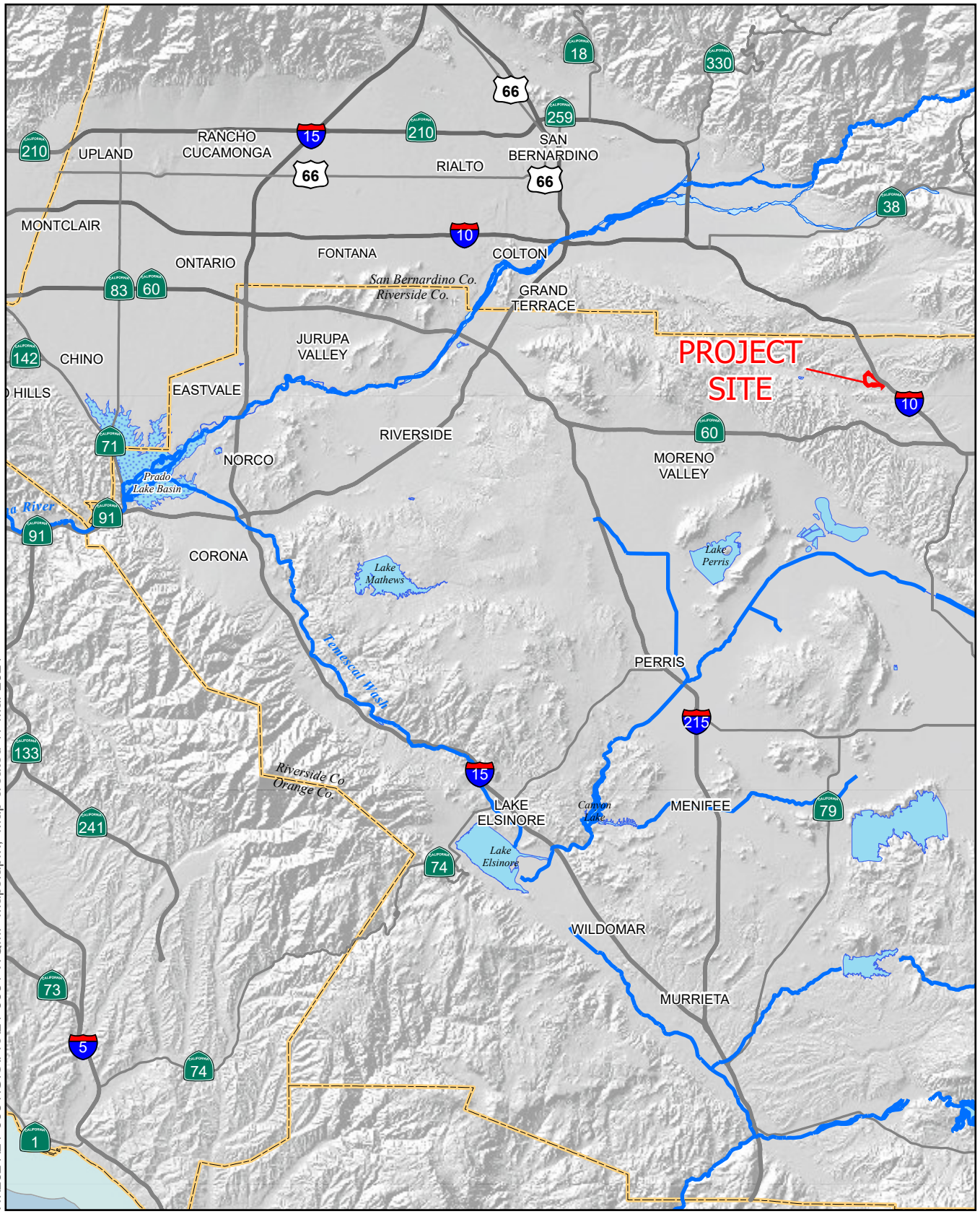
Source: Riverside Co. GIS, Jan. 2020.

0 600 1,200 1,800 Feet

Figure 3 - Aerial Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: USGS DLG; USGS 30m DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.88 PradoDam
0.50 LakeMathews
0.51 Woodcrest
0.68 PigeonPass
0.66 MorenoEast
0.68 PerrisReservoir
PROJECT SITE
0.85 Beaumont
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.90 HurkeyCreek
0.65 Anza
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.77 SantaRosaPlateau
0.52 SkinnerLake
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Appendix 2: Construction Plans

Grading and Drainage Plans

To be provided during Final Engineering

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

January 21, 2021

Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, California 92660

Attention: Mr. Randy Rankin
President of Construction

Project No.: **20G144-2**

Subject: **Geotechnical Review Letter**
Proposed Commercial/Industrial Development
Singleton Road at Roberts Road
Calimesa, California

Reference: Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, City of Calimesa, County of Riverside, California, prepared for Oak Valley Development Company by Advanced Geotechnical Solutions, Inc. (AGS), Report No. 2004-04-B-5, P/W 2004-01, dated December 23, 2020.

Dear Mr. Rankin:

In accordance with your request, we have reviewed the above-referenced geotechnical report for the proposed development. These reports were reviewed for conformance with generally accepted standards of practice for commercial/industrial development.

Document Review

Southern California Geotechnical, Inc. (SCG) was provided with copies of the above-referenced report previously prepared for the subject site. Comments generated during our review of the referenced documents are presented below:

This report consists of a geotechnical investigation performed in 2020 for a 266-acre site located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in Calimesa, California. The site is identified as being a part of Parcel Map 37862.

The overall site, which was the subject of this report, includes:

a) Four (4) new commercial/industrial buildings, ranging in size from 250,000± ft^2 to 500,000± ft^2, to be constructed in the western and southern areas of the subject site,
b) A new proposed commercial/retail center in the northeast portion of the site bounded by Singleton Road, and
c) A new sewer lift station to be constructed near the southwest corner of the tract.

Please note that only the four (4) proposed commercial/industrial buildings are included in the scope for our client, Birtcher Development. It is our understanding that the remaining proposed structures will be developed by a different developer, Oak Valley Development Company.

The stated scope of this report included providing geologic and geotechnical information and recommendations for the development of the Parcel Map 37862 relative to:

- Unsuitable soil removals,
- Cut, fill and natural slope stability,
- Buttress/stabilization fill requirements,
- Cut/fill pad overexcavation criteria,
- Remedial and design grading recommendations,
- Handling and disposal of oversize hard earth materials,
- Stabilization and removal of saturated removal bottoms, and
- Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

The report indicates that AGS conducted two phases of subsurface investigations. The first phase was performed on May 6, 2020 and May 7, 2020. The second investigation was performed between August 5, 2020 and August 14, 2020. These investigations included twenty-two (22) test pits ranging in depth from 9 to 14 feet and twenty-seven (27) borings drilled to a depth of up to 71½± feet.

The report identified five (5) main geologic units at the subject site. They are, from youngest to oldest:

- Artificial Fill – Undocumented (Map symbol Afu)
- Alluvium (Map symbol Qal)
- Older Alluvium (Map symbol Qoa) – The report states that the older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.
- Very Old Alluvial Fan Deposits (Map symbol Qvof), and
- Sedimentary Deposits of Live Oak Canyon (Map symbol Qlo)

The report indicates that groundwater was encountered throughout the site at highly variable elevations. This variability combined with the range in planned cuts and fills, will likely result in the presence of saturated soils at or near the planned removal depths. This condition will likely require mitigation that may include drying and/or mechanical stabilization of the saturated subgrade soils as well as possible dewatering.

This report states that the expansion potential of the on-site materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D-4829. AGS recommends that further testing and geologic mapping should be conducted during and upon completion of grading operations to provide design recommendations on a pad-by-pad basis.

This report states that on-site materials are significantly compressible, which includes undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. AGS recommends that these significantly compressible materials and the alluvial soils prone to hydro-consolidation be removed and replaced with compacted fill.

This report states that based on the chemical testing performed, the potential for sulfate attack on concrete in contact with the on-site soils is negligible and the on-site surface soils are not considered corrosive to buried ferrous metals.

Isolated layers of peat were encountered at the site and were recommended to be removed in their entirety due to their highly compressible nature.

Estimated depths of removal, ranging from ½ to 40+ feet, for both structural areas and landscape/parking areas for different geologic units were included in Table 7.1 on page 18 of this report.

This report included geotechnical mitigation recommendations related to overexcavation of building pads and streets related to cut/fill transition pads, steep cut and cut/fill transitions.

Comments

This report states that on-site materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. We would also include portions of the "very old alluvium."

Based on our review of the boring log data, it appears that some of the soils identified as older alluvium has similar and even lower blowcounts and relative densities than some of the soils identified as younger alluvium. **Based on our review of the blowcount and consolidation data, it is our opinion that some localized deeper removals of the Qoa and Qvof will be required.**

The report indicates Mirafi RS280i as a possible geotextile to be used to help mitigate an unstable excavation bottom. We would recommend consideration be given to include RS580i as an additional alternative for more unstable bottoms.

Page 23 of the report states that the on-site fill soils are subject to post-grading settlement and it is recommended that all fills overlying saturated soils be monitored prior to release for construction. The report recommends surface monuments. We concur with this recommendation and recommend that consideration should also be given to monitoring the settlement of the underlying bottoms using settlement plates similar to AGS's Plate 11 in the Appendix of their report.

Based on the presence of highly compressible soils at the subject site, we recommend that consideration should be given to requiring a 95 percent relative compaction standard for all new fill soils placed deeper than 20 feet below proposed site grades within the foundation influence zones of proposed buildings.

We concur with AGS's recommendation that additional investigations may be required at a later date to develop more detailed design-level recommendations after more details are provided about the proposed development including, but not limited to: final site elevations, proposed building configurations/locations, and structural requirements/settlement tolerances.

It is our opinion that the report has been prepared in general accordance with accepted geotechnical standards of practice.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, GE 2655
Principal Engineer



Daryl A. Kas, CEG 2467
Senior Geologist

Distribution: (1) Addressee

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CITY OF CALIMESA COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for:
Oak Valley Development Company
10410 Roberts Road
Calimesa, CA 92320

Prepared by:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

December 23, 2020
Report No. 2004-01-B-5
P/W 2004-01

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

Oak Valley Development Company
10410 Roberts Road
Calimesa, California 92320

December 23, 2020
P/W 2004-01
Report No. 2004-01-B-5

Attention: Mr. John Ohanian

Subject: ***Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, Calimesa, County of Riverside, California***

References: See Appendix

Gentlemen:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Geotechnical Investigation and Review of Mass Grading Plans for the Oak Valley Town Center Project, Parcel Map 37862, located in the City of Calimesa, California. In this report, AGS compiled previous investigative data, new data, and analyzed how it affects the proposed design as shown on the Mass Grading Plan prepared by Proactive Engineering Consultants West.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Prepared by:

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1. Scope of Work 1
1.2. Geotechnical Study Limitations 2
2.0 SITE LOCATION AND DESCRIPTION 2
2.1. Site Location 2
2.2. Site Description 2
3.0 PROPOSED DEVELOPMENT 2
4.0 FIELD AND LABORATORY INVESTIGATION 3
4.1. Previous Investigations 3
4.2. Current Investigation 3
5.0 ENGINEERING GEOLOGY 4
5.1. Geologic Analysis 4
5.1.1. Literature Review 4
5.1.2. Aerial Photograph Review 4
5.1.3. Field Mapping 4
5.2. Geologic and Geomorphic Setting 4
5.3. Stratigraphy 5
5.3.1. Artificial Fill – Undocumented (Map Symbols afu) 5
5.3.2. Alluvium (Map Symbol Qal) 5
5.3.3. Older Alluvium (Map Symbol Qoa) 5
5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof) 6
5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo) 6
5.4. Groundwater 6
5.5. Non-seismic Geologic Hazards 7
5.5.1. Mass Wasting and Debris Flows 7
5.5.2. Flooding 7
5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring 7
5.6. Seismic Hazards 8
5.6.1. Surface Fault Rupture 8
5.6.2. Liquefaction/Dynamic Settlement 8
5.6.3. Lateral Spreading 10
5.6.4. Seismically Induced Landsliding 10
5.6.5. Earthquake Induced Flooding 10
5.7. Seismic Design Parameters 10
5.8. Site Specific Ground Motion Hazard Analysis 11
5.8.1. Probabilistic Seismic Hazard Analysis 11
5.8.2. Deterministic Seismic Hazard Analysis 12
5.8.3. Site-Specific Design Response Spectrum 12
6.0 GEOTECHNICAL ENGINEERING 14
6.1. Material Properties 14
6.1.1. Excavation Characteristics 14
6.1.2. Compressibility 14
6.1.3. Collapse Potential/Hydro-Consolidation 14
6.1.4. Expansion Potential 14
6.1.5. Shear Strength 14

6.1.6. Chemical and Resistivity Test Results 15
6.1.7. Earthwork Adjustments 15
6.1.8. Pavement Support Characteristics 16
6.2. Analytical Methods 16
6.2.1. Slope Stability Analysis 16
6.2.2. Pavement Design 16
6.2.3. Bearing Capacity and Lateral Pressure 16
7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS 16
7.1. Site Preparation and Removals/Overexcavation 17
7.1.1. Overexcavation of Building Pads and Streets 18
7.1.1.1. Cut/Fill Transition Pads 18
7.1.1.2. Steep Cut and Cut/Fill Transitions 18
7.1.1.3. Street Overexcavation 19
7.1.2. Removals Along Grading Limits and Property Lines 19
7.2. Subgrade Stabilization 19
7.3. Slope Stability and Remediation 20
7.3.1. Cut Slopes 20
7.3.2. Fill Slopes 20
7.3.3. Skin Cut and Skin Fill Slopes 21
7.3.4. Fill Over Cut Slopes 21
7.3.5. Offsite Drainage Channel Slopes 21
7.3.6. Surficial Stability 21
7.3.7. Excavation and Temporary Cut Slopes 22
7.3.8. Geologic Observation During Grading 22
7.4. Survey Control During Grading 22
7.5. Settlement Monitoring 23
7.6. Subsurface Drainage 23
7.6.1. Canyon Drains 23
7.6.2. Heel Drains 23
7.6.3. Cut Slope Toe Drains and Subdrains 23
7.7. Seepage 23
7.8. Construction Dewatering 23
7.9. Earthwork Considerations 24
7.9.1. Compaction Standards 24
7.9.2. Fill Materials/ Import Soils 24
7.9.3. Benching 24
7.9.4. Mixing and Moisture Control 24
7.9.5. Haul Roads 25
7.9.6. Oversize Rock 25
7.9.6.1. Rock Blankets 25
7.9.6.2. Rock Windrows 25
7.9.6.3. Individual Rock Burial 26
7.9.6.4. Rock Disposal Logistics 26
7.9.7. Fill Slope Construction 26
7.9.7.1. Overbuilding Fill Slopes 26
7.9.7.2. Compacting the Slope Face 26

7.9.8. Utility Trench Excavation and Backfill 27
7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation 27
8.0 DESIGN RECOMMENDATIONS 27
8.1. Structural Design Recommendations 27
8.1.1. Foundation Design 28
8.1.2. Settlement 28
8.1.3. Isolated Footings 29
8.1.4. Deepened Footings and Setbacks 29
8.1.5. Footing Excavations 29
8.1.6. Moisture and Vapor Barrier 30
8.1.7. Concrete Design 30
8.2. Retaining Wall Design 30
8.2.1. Retaining Walls (backfilled with Native Materials) 30
8.2.2. Retaining Wall Drainage 31
8.3. Civil Design Recommendations 32
8.3.1. Site Drainage 32
8.3.2. Exterior Flatwork 33
8.3.3. Pavement Design 33
8.3.3.1. Asphalt Concrete Pavement 33
8.3.3.2. Portland Cement Concrete Pavement 34
8.4. Corrosion 35
9.0 SLOPE AND LOT MAINTENANCE 35
9.1. Slope Planting 35
9.2. Pad Drainage 35
9.3. Slope Irrigation 35
9.4. Burrowing Animals 36
10.0 FUTURE STUDY NEEDS 36
10.1. Future Studies and Reviews 36
10.2. Grading Observation 36
11.0 CLOSURE 36
11.1. Geotechnical Review 36
11.2. Limitations 37

ATTACHMENTS

Figure 1 - Site Location Map
Figure 2 - Regional Geologic Map
Figure 3 - Fault Map
Figure 4 - Seismic Response Spectra

Appendix A - References
Appendix B - Subsurface Logs
Appendix C - Laboratory Test Results
Appendix D - Engineering Analyses
Appendix E - Earthwork Specifications and Grading Details
Appendix F - Homeowners Maintenance Guidelines

ENCLOSURES

Plates 1 through 9 - Geotechnical Maps (Mass Grading Plans)
Plates 10 through 12 - Geologic Cross-Sections A-A' through N-N'

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CALIMESA, COUNTY OF RIVERSIDE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of this AGS's geotechnical investigation and review of the 60-scale Mass Grading Plans for Parcel Map 37862, in the City of Calimesa, County of Riverside, California prepared by Proactive Engineering Consultants provided to AGS on December 10, 2020.

The purpose of our review and report is to present geologic and geotechnical information obtained during previous geotechnical studies by Pacific Soils Engineering (PSE) with supplemental geologic and geotechnical data obtained by AGS during the current investigation. AGS has provided remedial grading recommendations for the ultimate mass grading configuration whereas an interim grading configuration is currently depicted on the 60-Scale Mass Grading Plan, shown on the attached plates. The interim grading condition avoids drainage areas. Proposed remedial grading conditions shown on Plates 1 through 9 are based on the ultimate mass grading condition. This study is aimed at providing geologic and geotechnical information and recommendations for the development of Parcel Map 37862 relative to: 1) Unsuitable soil removals; 2) Cut, fill and natural slope stability; 3) Buttress/stabilization fill requirements; 4) Cut/fill pad overexcavation criteria; 5) Remedial and design grading recommendations; 6) Handling and disposal of oversize hard earth materials; 7) Stabilization of saturated removal bottoms; and 8) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.1. Scope of Work

This study is aimed at providing geotechnical/geologic conclusions and recommendations for development of the Parcel Map 37862 commercial/retail development. The scope of this study included the following tasks:

- Review of readily available maps, geotechnical and geologic literature and aerial photographs (Appendix A).
- Compiling available data from previous published and unpublished studies by PSE.
- Preparation of Geotechnical Maps using the 60-scale plan with a base design provided by Proactive Engineering Consultants West, Inc. (Plates 1 through 9).
- Preparation of geologic cross-sections A-A' through N-N' (Plates 10 through 12).
- Perform data analyses in relation to the site-specific proposed improvements.
- Provide analysis and discussion of the excavation characteristics (i.e. rippability) of onsite formational materials.
- Formulation of grading, remedial grading and earthwork recommendations.
- Slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Determination of engineering parameters including earthwork adjustments, bearing and friction values, active, passive, and at-rest pressures for retaining walls.

- Perform a limited seismic hazard analysis.
- Preparing and publishing this report which presents geotechnical recommendations pertinent to the accompanying 60-scale grading plans.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on data developed during previous investigations performed by PSE and the current investigation performed by AGS. The conclusions presented herein are based upon the current design as reflected on the accompanying plans. Changes to the plans would necessitate further review.

The materials immediately adjacent to or beneath those observed and sampled may have different characteristics than those observed and sampled. No representations are made as to the quality or extent of materials not observed nor subjected to laboratory testing. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE LOCATION AND DESCRIPTION

2.1. Site Location

The subject site is an irregular shaped, 266-acre parcel located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in the City of Calimesa, Riverside County, California (Figure 1).

2.2. Site Description

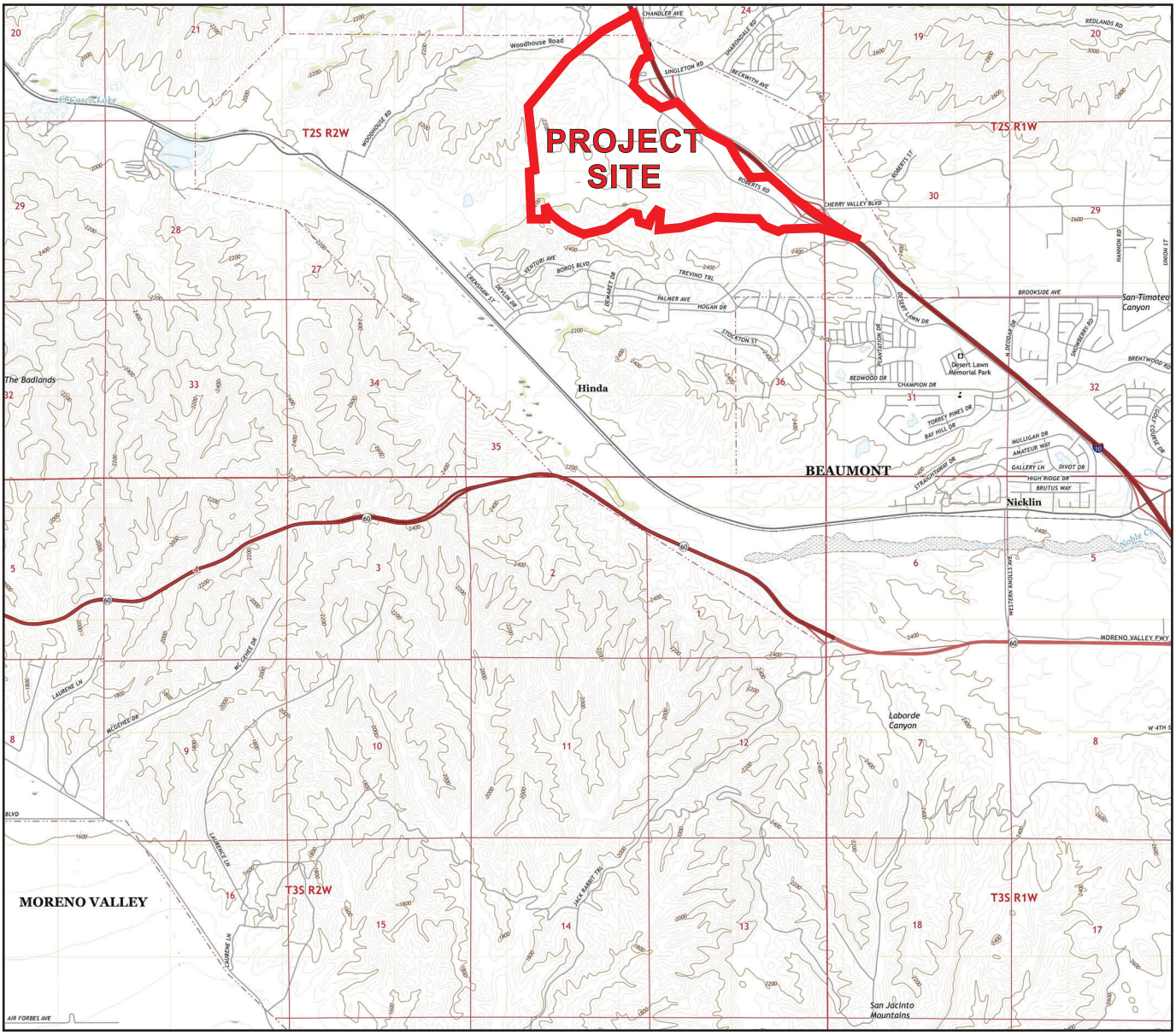
The site currently supports agricultural use (dry farming) on the southern and western portions of the site with several residential structures and outbuildings located within the northeastern, central, and southern portions of the site. Existing Roberts Road runs through the project site from southeast through the northeast. A failed concrete pipe culvert and associated headwall was observed beneath the northern portion of Roberts Road which has been undermined. The road was barricaded and closed to travel in this area.

Remnants of a prior low height dam are located across the main drainage that traverses the site, and its location is reflected by a line of artificial fill (afu) shown on Plate 1. A reservoir upstream of this dam is shown on older topographic maps of the area. Based on a review of historic aerial photographs, the active channel eroded a portion of this dam over 40 years ago.

The northwestern portion of the site consists of rolling hills underlain by formational materials consisting of the Live Oak Canyon and San Timoteo Formations. Several drainages exist onsite with two larger drainages transecting the site from northeast to southwest and one touching on the southwestern project boundary flowing from east to west.

3.0 PROPOSED DEVELOPMENT

It is our understanding that the proposed development as currently envisioned will consist of the following separate components:



SITE LOCATION MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

P/W 2004-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA (2018)

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- A commercial/retail center in the northeast portion of the site bounded by Singleton Road which will include extensive parking areas and possibly a new City Hall. These structures will likely be concrete "tilt-up" or conventional wood frame structures varying from 1 to 3 stories in height and would likely be supported by shallow slab-on-grade foundation systems. In addition to the commercial structures, a "man-made" lake would occupy the southwestern portion of the commercial/retail center.
- Large shipping and manufacturing buildings to be constructed on the western and southern areas of the property ranging in size from 250,000 to 500,000 square feet. The limits of these proposed structures are shown in blue on the attached Geotechnical Maps. It is anticipated that these structures will consist of concrete–tilt-up structures supported by shallow slab-on-grade foundation systems. Surrounding both the commercial and retail components will be interior roadways with primary access provided from Roberts Road and Singleton Road.
- A sewer lift station will be constructed near the southwest corner of the tract.

The mass grading plan shown on Plates 1 through 9 depicts an interim grading condition that avoid drainage areas. It is our understanding that the ultimate grades will be located within these areas.

4.0 FIELD AND LABORATORY INVESTIGATION

4.1. Previous Investigations

Several studies by PSE were previously completed onsite and near-by offsite. A description of the relevant data used within this current investigation is presented below.

- PSE conducted a subsurface investigation in 2004. AGS has utilized five (5) subsurface borings from this investigation (B-037, B-043, B-081, B-095, and B-096). These borings were excavated with a truck mounted drill rig equipped with 18-inch and 30-inch diameter bucket augers to depths ranging from 16 to 65 feet below ground surface (bgs). The locations of the exploratory excavations are shown on the Plates 1 through 9. Boring logs are presented in Appendix B.
- Laboratory testing was performed as a part of the PSE 2004 investigation and included chemical and resistivity testing, sieve analysis, maximum dry density and optimum moisture content, direct shear strength, and consolidation characteristics. Pertinent laboratory test results can be found in Appendix C.

4.2. Current Investigation

AGS conducted two phases of subsurface investigations, one on May 6 and 7, 2020, and the subsequent between August 5, 2020, and August 14, 2020, to evaluate the subsurface conditions as they relate to the proposed mass grading. Twenty two (22) test-pit excavations (T-1 through T-22) were excavated and logged to depths ranging from 9 to 14 feet bgs utilizing a JCB 3CX rubber-tired backhoe. Representative bulk samples were obtained and transported to our laboratory for testing to determine in-situ moisture content, maximum density and optimum moisture content, "remolded" shear strength, grain size distribution, and corrosivity. Test pit logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Twenty seven (27) borings were excavated, logged, and sampled with a truck mounted 8-inch hollow stem auger to depths of up to 71.5 feet. These borings were logged independently by both AGS and Southern California Geotechnical, Inc. (SCG). Representative bulk and relatively undisturbed samples were obtained and transported to AGS's laboratory for testing from eighteen of these borings (AGS-1 through AGS-18, except AGS-7 which was not used). Representative bulk and relatively undisturbed samples were obtained and transported to SCG's laboratory for testing from ten of these borings (SCG-1 through SCG-10). Test pit and boring logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Plates 1 through 9 show the locations of these exploratory excavations.

5.0 ENGINEERING GEOLOGY

5.1. Geologic Analysis

5.1.1. Literature Review

As part of this study, AGS has reviewed the geologic documents referenced in Appendix A. Where deemed appropriate, relevant geologic information has been included in this report.

5.1.2. Aerial Photograph Review

AGS has reviewed current and historical aerial photographs available through sources on the internet.

5.1.3. Field Mapping

Geologic field mapping was performed during our subsurface explorations.

5.2. Geologic and Geomorphic Setting

The Oak Valley Town Center lies on the Beaumont Plains at the north edge of the San Jacinto Mountains – one of the several northwest-trending mountain ranges that comprise the Peninsular Ranges Province of Southern California. Displacements along a series of northwest-trending active faults that extends from the Mojave Desert in the east, to the California Channel Islands in the west have and are elevating the mountain ranges above intervening lowlands. The faults include nearby San Andres fault zone, and the related San Gorgonio Pass Fault, and San Jacinto faults. These faults are, respectively, about 7-miles northeast, 3-miles east, and 5-miles southwest of the site.

According to Matti (2016), the sedimentary section below the Beaumont Plains near the study site includes in decreasing age: Pliocene to Pleistocene alluvial fan and flood plain deposits (5 Mya to ~1.3 Mya), perhaps up to several thousand feet thick, assigned to the San Timoteo Formation which were sourced from San Gabriel Mountains northwest of the area; Pleistocene alluvial and flood plain deposits, assigned sediments of the Live Oak Canyon, that were deposited after the San Timoteo Anticline disrupted the previous depositional pattern around 1.3 Mya; Holocene alluvium and colluvium within active stream channels and swales; topsoil; and local prisms of artificial fill.

West-flowing San Timoteo Creek drains the Beaumont Plains. That high-order drainage has kept pace with uplift in the plains and the west-adjacent San Timoteo Badlands, resulting in ongoing

incision and headward erosion of its channel. Many low-order drainages have consequently formed as tributaries to San Timoteo Creek. These drainages dissect the Beaumont Plains and form distinctive badlands topography common to the area. The canyons and swales on the study site are part of this system.

5.3. Stratigraphy

Mapping and nomenclature following Matti, Morton and Langenheim (2015) are being used for this report (Figure 2, Regional Geologic Map). The site has been mapped as being underlain by Pleistocene and Pliocene age sedimentary deposits of Live Oak Canyon (formerly described as the upper member of the San Timoteo Formation) within the northern rolling hills portion of the site. The majority of the site is mapped as Pleistocene age very old alluvial fan deposits overlain by Holocene age young alluvial axial-valley and fan deposits. The existing channels onsite are mapped as modern age very young wash deposits. Undocumented fill exists in areas where the land surface has been modified in order to support access roads and berms, especially in the vicinity of the existing structures and Roberts Road. For the purpose of this report, the three younger (Holocene) alluvial deposits described below have been labeled as one unit (Qal) on Plates 1 through 9. Approximate surface geologic contacts are shown on Plates 1 through 9. Brief descriptions of the geologic units encountered at the site are presented below, from youngest to oldest.

5.3.1. Artificial Fill – Undocumented (Map Symbols afu)

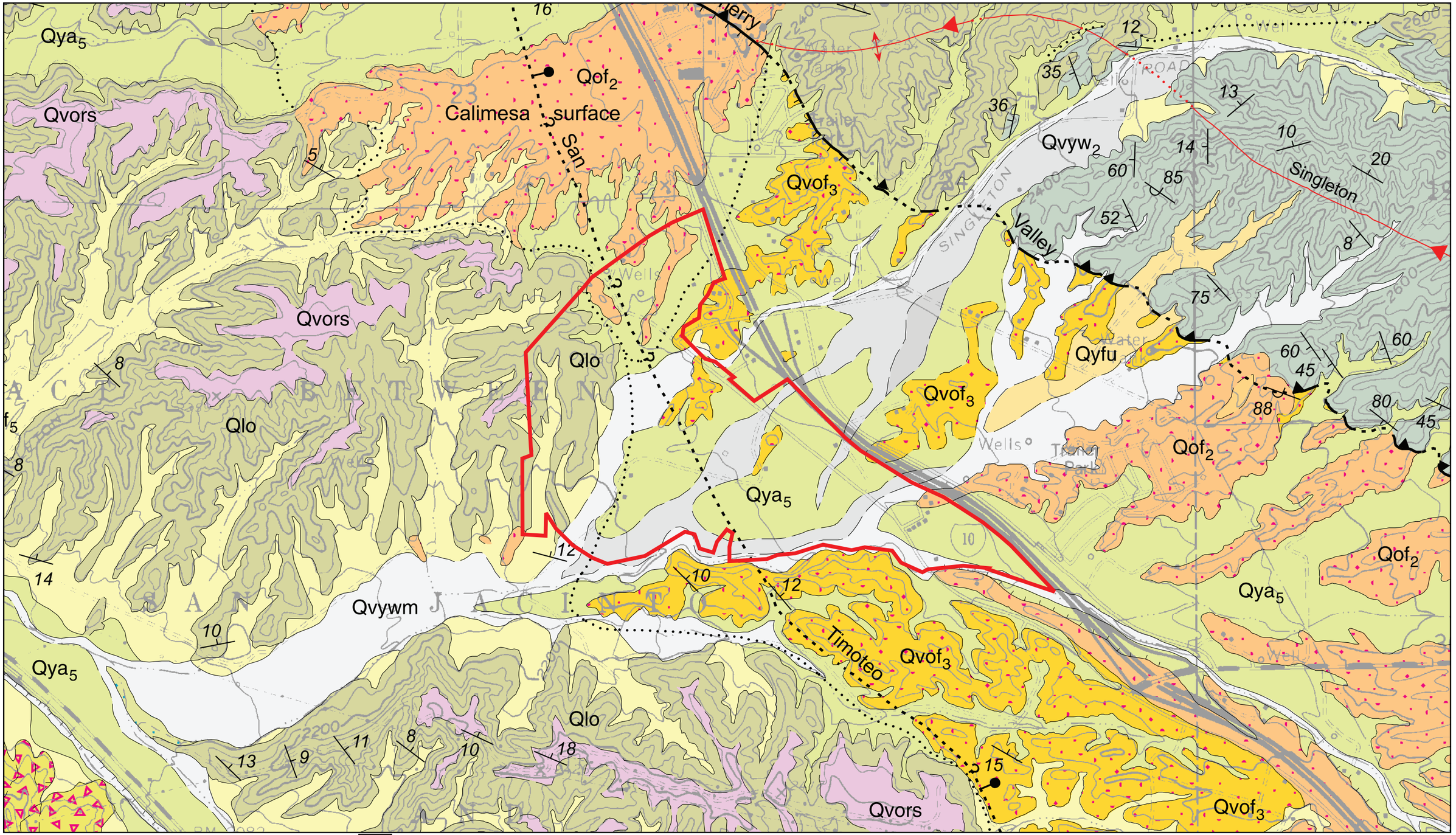
Artificial fill soils were observed throughout the site specifically along margins of adjacent residential developments, underlying existing structures and at roadway improvements including Roberts Road and other disturbed access roads onsite. Artificial fill was not encountered within our subsurface excavations however it is anticipated to be locally derived.

5.3.2. Alluvium (Map Symbol Qal)

Holocene age alluvium are located surrounding the major drainages onsite and cover most of the southerly portion of the site. The alluvium includes very young wash deposits, located within the active drainage channels, young axial valley deposits, and young alluvial fan deposits. These deposits have not been differentiated on the plans or boring logs. These deposits consisted of poorly consolidated sediments within the active drainage channels to more consolidated sediments elsewhere. The alluvium ranges from dry to wet with consistencies that generally range from soft/loose to medium dense/stiff. Up to 60 feet of alluvium was encountered in boring AGS-3. Abundant peat was encountered within boring AGS-4 at depths of up to 35 feet. Additional layers may be present between the roughly 5-foot sampling intervals. Cone penetration tests may be useful in identifying thin layers of peat deposits that may be present as well as the lateral extents.

5.3.3. Older Alluvium (Map Symbol Qoa)

An intermediate age alluvial deposit was observed in several borings and test pits underlying the young alluvial deposits. The older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.



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SOURCE MAP - GEOLOGIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE CALIFORNIA. HIRSCHBERG, MATTI AND COSSETTE (2015)

SCALE: 1 in. = 1000 ft.

Qvywm	Very young wash deposits (modern)
Qya_5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf_5	Young alluvial-fan deposits, unit 5 (middle Holocene)
$Qvof_3$	Very old alluvial-fan deposits, unit 3 (middle Pleistocene)
Qlo	Live Oak Canyon Formation (Pleistocene)

REGIONAL GEOLOGIC MAP

FIGURE 2

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The older alluvium has consistencies that range from medium dense/stiff to very dense/hard. This unit is considered to be late Pleistocene in age.

5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof)

Middle to Lower Pleistocene age very old alluvial fan deposits were encountered within the majority of test pit excavations underlying younger alluvial deposits. This unit was observed to be composed mainly of silty sand in a medium dense to dense condition. The very old alluvium is distinguished from the overlying younger alluvial deposits by its higher relative density, weakly cemented nature, and iron oxide development. Generally minor porosity within the upper five feet existed within this unit.

5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo)

Sedimentary deposits of Live Oak Canyon is a new unit name designated by Morton & Matti (2015) that applies to a sequence of sandy and conglomeratic rock that crops out in low hills and mesas north of San Timoteo Canyon. These materials were previously assigned to the upper member of the San Timoteo Formation and range in age from late Pliocene to early Pleistocene. The sedimentary deposits of Live Oak Canyon have been mapped within the rolling hills located in the northwestern portion of the project site. As encountered onsite, this unit is mostly composed of thickly bedded fine to medium-grained silty sandstone and conglomerate that is yellowish brown to light gray brown and moderately hard. In PSE's B-43 boring, some light grey moderately hard sandy siltstone was encountered. Iron oxide staining was observed in this unit. Although not encountered in exploratory excavations onsite, occasional clay beds may be present within this unit. Regionally, bedding within this unit has been mapped to dip at shallow inclinations (~10 degrees) to the northeast. One bedding attitude taken from B-43 indicates that the bedding dips at 10 degrees to the north-northeast.

5.4. Groundwater

Groundwater was encountered within several exploratory borings and Test Pit T-2 at various depths and elevations in the main drainage course that crosses the site. Standing water was present at the time of our current investigation within the drainage channel running under existing Roberts Road south of the Singleton and Roberts Road intersection. However, groundwater was not encountered in AGS-13, which was excavated just to the north of this drainage course to a depth of 50 feet (elevation 2195). The depth/elevation of the observed groundwater varied across the site and may be difficult to accurately predict. The presence of the concealed San Timoteo Canyon fault may have an impact on groundwater conditions. Matti, et al (2006) has shown groundwater to generally flow to the west in the area, and describes the presence of a groundwater barrier, which has been inferred to be a splay of the San Timoteo Canyon fault. There are four known active wells on the site. The depths of two are known (288 and 319 feet) whereas the other two are not known. The type of well construction, including limits of the screened zones, are unknown. Recent measurements maintained by the USGS California Water Science Center (July and December 2020) indicate that groundwater depths are around 100 to 170 feet (elevations 2105 to 2140). In Spring of 2000, groundwater elevations in the area upstream of the fault have been generalized at

an elevation of around 2175 feet (Matti 2006, Figure 28), which appear to be based on the nearby well readings (depths ranged from 59 to 102 feet in April 2020, which corresponded to an elevation of around 2175). Matti (2006) mentions the location of the fault coincides where springs have been documented historically in this area. However, Matti does not describe the precise locations of these springs. The well readings may be measuring a lower groundwater surface than those encountered in the recent borings.

Shallow groundwater conditions were encountered near the intersection of proposed Roberts and Singleton Roads and the northwest side of Lot 3. In this area, groundwater was encountered at depths of 15 feet (elevation 2216) in PSE-96, 11 feet (elevation 2217) in AGS-3, 10 feet in test pit T-10 (elevation 2216), 15 feet (elevation 2208) in AGS-16, and 40 feet (elevation 2210) in PSE-95. Just upstream of this area, groundwater was not encountered in AGS-13, which was excavated to a maximum depth of around 50 feet (elevation 2195). Groundwater was not encountered in SCG-10 located to the southeast, which was excavated to a maximum depth of around 50 feet (elevation 2180) nor in AGS-4, located downstream and drilled to a maximum depth of around 45 feet (elevation 2150).

Groundwater depths across the site will vary in relation to the time of year, rainfall, and discharge from upstream bodies of water. It should be anticipated that groundwater will be encountered during construction and will require mitigation, especially near the northwest corner of Lot 3. This mitigation may include dewatering areas where the remedial excavation extends below the groundwater level and stabilization of removal bottoms that are near the groundwater level. Subdrains are proposed in this area to mitigate the potential for groundwater rising and impacting surface improvements.

5.5. Non-seismic Geologic Hazards

5.5.1. Mass Wasting and Debris Flows

The site is gently sloping with some steeper topography within the northwestern portion of the project site. Due to the gently sloping existing terrain and proposed mass grading, mass wasting and debris flows are not considered a site hazard.

5.5.2. Flooding

The project site has been mapped as FEMA flood zone “X” which is characterized as an “Area of Minimal Flood Hazard”.

5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring

Some layers of peat were identified in the recent alluvial deposits. Settlement of peat deposits can occur when the moisture content is reduced and oxidation/decomposition is allowed to occur. Subsidence is also related to groundwater withdrawal and changes in stresses. Hazards associated with subsidence can be mitigated with proper design and construction practices. It is proposed to remove peat within building pad areas to mitigate the potential for settlement. Other improvements located outside the areas of deep removals

may be subject to possible settlement/subsidence due to groundwater withdrawal and changes in stresses.

Evidence of ground fissuring has not been identified on the site, and AGS is unaware of ground fissuring in the surrounding areas

5.6. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding.

The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

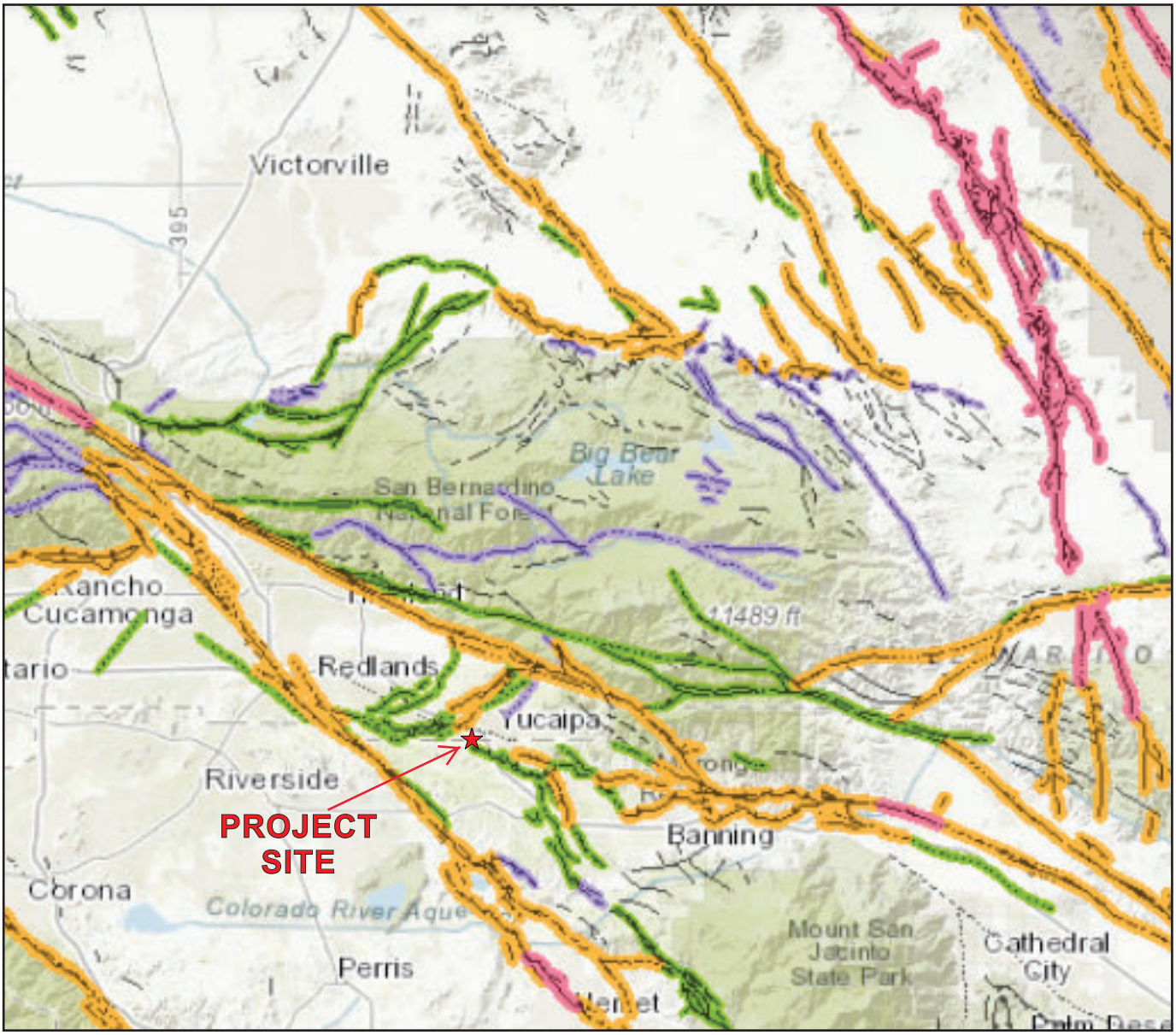
5.6.1. Surface Fault Rupture

There are no known active faults that transect or project into the site. The nearest known active fault is the San Gorgonio Pass Fault located approximately 1.5 miles northeast of the project site (See Figure 3, Regional Fault Map). The San Timoteo Canyon Fault is mapped transecting the site from the southeast to the northwest. The San Timoteo Canyon Fault is an inferred and concealed structure that is tagged with question marks to indicate that its existence is questionable and the evidence for the fault's existence is indirect. The San Timoteo Canyon Fault in the area is entirely concealed by younger Quaternary-age alluvial deposits. The fault is considered to be older than late Quaternary in age but its lower age limit is unknown. Accordingly, the potential for fault surface rupture within the project is considered low.

5.6.2. Liquefaction/Dynamic Settlement

Liquefaction is the phenomenon in which the buildup of excess pore pressures, in saturated granular soils due to seismic agitation, results in a temporary "quick" or "liquefied" condition. Loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. Once the excess pore water pressure dissipates, the liquefied zones/lenses will likely consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways, and may include ground deformation, loss of bearing strength, lateral spreading, flow failure, and dynamic settlement.

The very young wash deposits, young axial-valley deposits, and young alluvial fan deposits are potentially liquefiable in their present condition. Saturated younger alluvial deposits were encountered near the northeast corner of Lot 3. The potential for liquefaction of the saturated deposits was evaluated. The analyses were performed using LiqSVS software (Version 2.0.1.7 by GeoLogismiki, 2019). The deterministic methods presented in NCEER



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FAULT MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

SOURCE MAP - CALIFORNIA DEPARTMENT OF CONSERVATION FAULT ACTIVITY MAP OF CALIFORNIA (2010)

P/W 2004-01

FIGURE 3

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
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(1997) were used, and a corresponding dynamic settlement was estimated by the program using the curves proposed by Ishihara and Yoshimine (1992) as described in Zhang et al. (2002) and a groundwater level of 11 feet. Borings AGS-3 and AGS-16 form the basis of our analysis. The peak ground acceleration was determined in accordance with ASCE 7-16 and was determined to be 0.87g. Based on the deaggregation analysis results from the USGS Unified Hazard Tool website, a mean earthquake magnitude of 7.5 for the 2% in 50 year risk was used for the analysis using 100 percent of the PGA_M.

The upper 10 feet of soils were excluded from the analysis since these soils should be removed during remedial grading efforts. Based on test results, certain layers were assumed to behave more "clay-like" and were considered non-liquefiable. Laboratory test results were used to substantiate which soil layers are considered potentially liquefiable or subject to cyclic softening. The moisture contents of the samples (most of which are considered saturated and below the ground water table) were determined and compared with the plasticity indices. The results indicate that fine-grained soils encountered are not considered sensitive and subject to cyclic softening. The liquidity index (LI) indicates that the clayey soils are generally low. Based on the test results, the finer-grained soils onsite are considered to behave clay-like and are not considered susceptible to liquefaction or cyclic softening.

Based on a calibration report for 2R Drilling, an Energy Transfer Ratio of 85.5 percent was used, which corresponds to a Hammer Efficiency Ratio (Ce) of 1.43. The blow counts obtained from the SPT were used in the analyses. Samples were also collected using the Modified California Sampler, and the blow counts were used after applying a reduction factor of 0.6.

The calculations, included in Appendix D, indicate that potentially liquefiable soil layers are located at depths of around 30 feet in AGS-3 and AGS-16. The significant 30-foot thick non-liquefiable crust is anticipated to mitigate the potential for surface manifestations, including settlement, reduced bearing capacity, ground deformation, and lateral spreading. Additionally, it is recommended that a geotextile such as Mirafi RS280i be placed on the saturated subgrade in order to stabilize the subgrade. The related total dynamic settlements summarized in Table 5.6.2, below, are based on methods described in Zhang et al. (2002), and are considered conservative estimates based on the significant thickness of a non-liquefiable soil crust and recommended placement of the geotextile fabric. According to SP-117A (CDMG 2008), up to two thirds of the total settlement should be considered as differential settlement unless more precise predictions of differential settlement can be made. Considering the thick non-liquefiable crust, and placement of 10 to 15 feet of newly compacted fill over a geotextile fabric, it is AGS's opinion that the differential settlement may be less than 2/3 of the total settlement. AGS has estimated that the differential settlement is one half of the total. The structural engineer should design the structures within the northwest corner of Lot 3 to accommodate this settlement without collapsing.

TABLE 5.6.2 ESTIMATED DYNAMIC SETTLEMENT		
Boring	**Full PGA**	
	Total Settlement (inches)	**Differential Settlement (inches)**
AGS-3	2.2	1.1
AGS-16	3.7	1.9

5.6.3. Lateral Spreading

Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in a shallow underlying deposit during an earthquake. With the remedial grading recommendations of removing and recompacting the young alluvial soils, and the thickness of the non-liquefiable crust, the potential for lateral spread and surface manifestations is considered to be low. However, if saturated alluvial soils are left-in-place these areas may be prone to lateral spread. In that case, further evaluation of ground improvement measures may be necessary.

5.6.4. Seismically Induced Landsliding

No landslides, including shallow surficial failures have been mapped onsite. This indicates the lack of any seismically activated land sliding during past historic and ancient seismic events. Seismicially-induced landsliding is not considered a significant concern in either the pre- or post-development site conditions.

5.6.5. Earthquake Induced Flooding

Earthquake induced flooding can be caused by tsunamis, dam failures, or seiches. Also, earthquakes can cause landslides that dam rivers and streams, causing flooding upstream above the dam and also downstream when these dams are breached. A seiche is a free or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. Due to the lack of a freestanding body of water nearby, the potential for a seiche impacting the site is considered to be non-existent.

5.7. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 259 m/s. Table 5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 33.980°N and Longitude 117.051°W. The seismic provisions of 2019 CBC are different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located in Site Class D soil conditions except for certain cases noted in ASCE 7-16 Section 11.4.8.

TABLE 5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Seismic Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	2.239g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.772g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	2.687g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	1.791g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	1.099g
Seismic Design Category	N/A[3]

Notes:
[1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8
ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$.

5.8. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra including the probabilistic and deterministic seismic hazard analyses are described below.

5.8.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

5.8.2. Deterministic Seismic Hazard Analysis

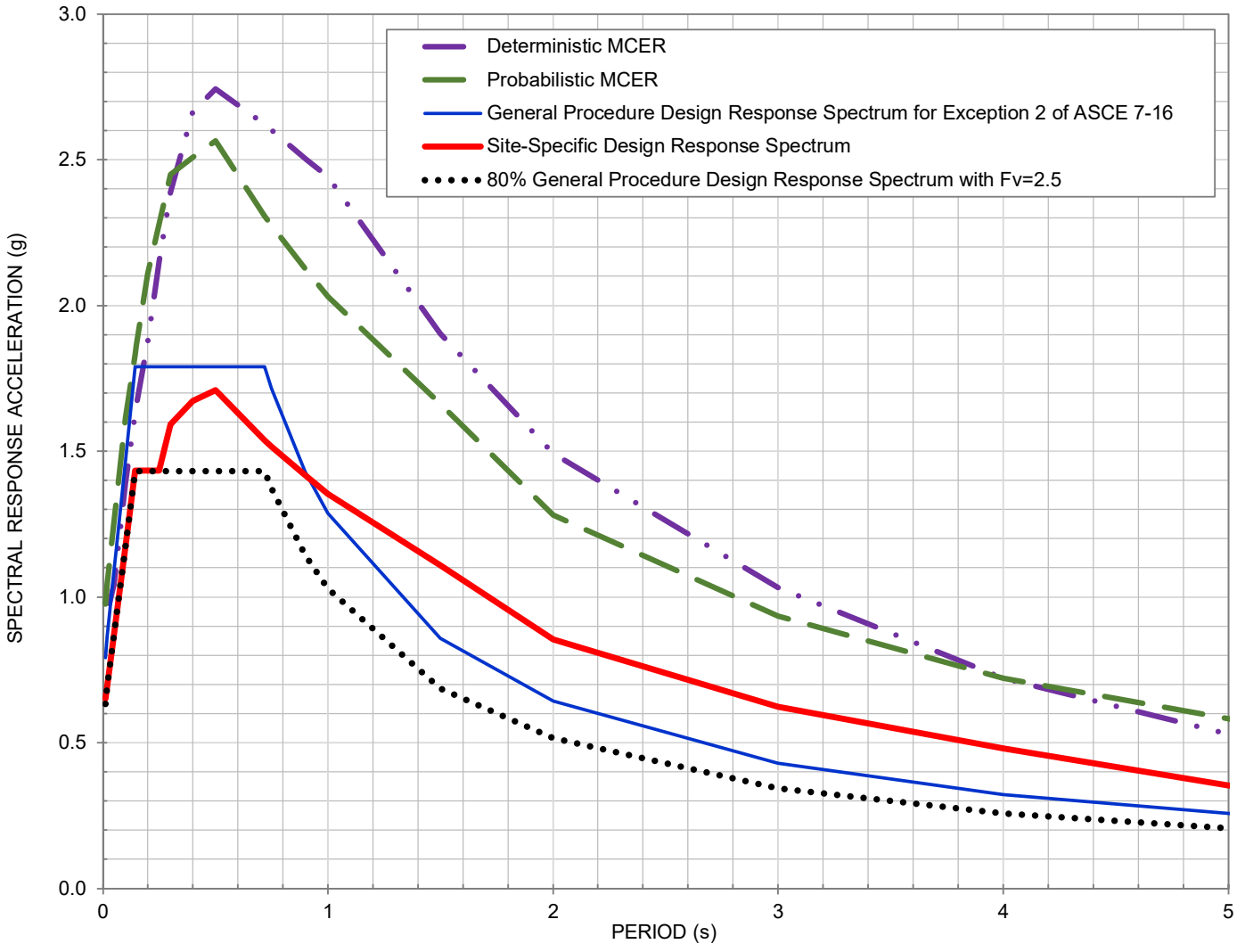
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation we selected three "controlling" sources and seismic events: the San Gorgonio Pass fault, the San Jacinto fault (San Jacinto Valley section) and the San Andreas fault (San Bernardino South section). Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

5.8.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 5.8.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.650
0.02	0.693
0.03	0.753
0.05	0.872
0.075	1.022
0.1	1.172
0.144	1.433
0.15	1.433
0.2	1.433
0.25	1.433
0.3	1.592

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	1.672
0.5	1.711
0.718	1.537
0.75	1.516
0.9	1.418
1.0	1.353
1.5	1.108
2.0	0.853
3.0	0.623
4.0	0.480
5.0	0.353



Note: See report for values of the various curves.

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SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

PARCEL MAP 37862
ROBERTS RD AND CHERRY VALLEY BLVD
CALIMESA, CALIFORNIA

PROJECT NO.	DATE	
2004-01	12/20	**FIGURE 4**

TABLE 5.8.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.791	0.915	1.065	0.975	0.979	0.645	0.979	0.975	0.633	0.650
0.02	0.866	0.915	1.143	1.046	0.983	0.690	0.983	0.983	0.693	0.693
0.03	0.941	0.915	1.220	1.117	0.978	0.735	0.978	0.978	0.753	0.753
0.05	1.091	0.915	1.375	1.259	1.045	0.825	1.045	1.045	0.872	0.872
0.075	1.278	0.915	1.569	1.436	1.214	0.938	1.214	1.214	1.022	1.022
0.1	1.465	0.915	1.763	1.614	1.390	1.050	1.390	1.390	1.172	1.172
0.144	1.791	0.915	2.000	1.830	1.630	1.246	1.630	1.630	1.433	1.433
0.15	1.791	0.915	2.034	1.862	1.658	1.275	1.658	1.658	1.433	1.433
0.2	1.791	0.915	2.305	2.110	1.874	1.500	1.874	1.874	1.433	1.433
0.25	1.791	0.913	2.494	2.278	2.149	1.500	2.149	2.149	1.433	1.433
0.3	1.791	0.912	2.687	2.450	2.388	1.500	2.388	2.388	1.433	1.592
0.4	1.791	0.909	2.760	2.508	2.665	1.500	2.665	2.508	1.433	1.672
0.5	1.791	0.905	2.834	2.566	2.743	1.500	2.743	2.566	1.433	1.711
0.718	1.791	0.898	2.567	2.305	2.622	1.500	2.622	2.305	1.433	1.537
0.75	1.716	0.897	2.535	2.274	2.601	1.500	2.601	2.274	1.372	1.516
0.9	1.430	0.892	2.384	2.127	2.505	1.500	2.505	2.127	1.144	1.418
1	1.287	0.889	2.284	2.030	2.441	1.500	2.441	2.030	1.029	1.353
1.5	0.858	0.889	1.870	1.663	1.903	1.000	1.903	1.663	0.686	1.108
2	0.643	0.889	1.440	1.280	1.493	0.750	1.493	1.280	0.515	0.853
3	0.429	0.889	1.052	0.935	1.032	0.500	1.032	0.935	0.343	0.623
4	0.322	0.889	0.811	0.721	0.722	0.375	0.722	0.721	0.257	0.480
5	0.257	0.889	0.656	0.583	0.530	0.300	0.530	0.530	0.206	0.353

Site-specific design response parameters are provided in Table 5.8.3B. These parameters were derived from the Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 5.8.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	2.882g
Spectral Response Acceleration 1-second period, S_{M1}	2.882g
Design Spectral Response Acceleration for short period, S_{DS}	1.922g
Design Spectral Response Acceleration for 1-second period, S_{D1}	1.922g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.890g

6.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

6.1. Material Properties

6.1.1. Excavation Characteristics

It is anticipated that excavations within the undocumented artificial fill, topsoil, young alluvium, older alluvium, very old alluvial fan deposits, and the highly weathered portions of the formational materials can be accomplished with conventional heavy equipment. It is possible that the deep excavations within the unweathered formational materials on the northwestern portion of the property area could require heavy ripping in deeper cuts.

6.1.2. Compressibility

Onsite materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the very old alluvial deposits and Live Oak Canyon deposits. These materials will require complete removal below structural areas prior to placement of fill, where exposed at design grade, and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 7.1 and earthwork adjustment estimates are presented in Section 6.1.7.

6.1.3. Collapse Potential/Hydro-Consolidation

Some of the upper alluvial soils are susceptible to hydro-consolidation. Beneath settlement sensitive improvements, it is recommended that the upper soils prone to hydro-consolidation be removed and replaced with compacted fill.

6.1.4. Expansion Potential

Based upon AGS's observations and preliminary testing and review of relevant laboratory testing by PSE, the expansion potential of the onsite materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D4829. However, it is anticipated that the majority of materials will fall into the "very low" to "low" range. Further testing and geologic mapping should be conducted during and upon completion of the grading operations to provide design recommendations on a pad by pad basis.

6.1.5. Shear Strength

Based on our laboratory testing, reviewed laboratory testing from PSE and previous experience on similar projects, the following shear strength values may be used for design.

TABLE 6.1.5 Shear Strength Parameters Used for Design (Ultimate)			
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Moist Density (pcf)**
Artificial Compacted Fill	150	31	125
Young and Older Alluvial Deposits (Qal & Qoa))	100	30	125
Very Old Alluvial Fan Deposits (Qvoa)	200	32	125
San Timoteo and Live Oak Canyon Formations	400	34	130

6.1.6. Chemical and Resistivity Test Results

The results of previous preliminary chemical/resistivity testing are presented in Appendix C. Corrosive soils are defined as soils that have minimum resistivity less than 1,000 ohm-centimeters, chloride concentration greater than 500 ppm, sulfate concentration greater than 2,000 ppm, or pH less than 5.5 (Caltrans, 2018).

Test results indicate that the potential for sulfate attack on concrete in contact with the on-site soils is negligible in accordance with ACI 318, Table 4.3.1. In addition, test results also indicated that the potential for chloride attack of reinforcing steel in concrete structures and pipes in contact with the on-site soil is negligible.

Resistivity test results indicate that the on-site near-surface soils are not considered corrosive to buried ferrous metals. However, a corrosion specialist may be consulted regarding suitable types of piping and appropriate protection for underground metal conduits, if needed.

Final determination of the corrosivity of the site should be based upon testing of soils from the site and import soils during grading operations.

6.1.7. Earthwork Adjustments

In consideration of the proposed mass grading to develop the project as currently proposed, the following average earthwork adjustment factors presented in Table 6.1.7 have been formulated for use in the earthwork design of the project.

TABLE 6.1.7 EARTHWORK ADJUSTMENTS	
Geologic Unit	**Approximate Range**
Artificial Fill, Topsoil, Young Alluvial Deposits	5% to 15% shrinkage (average ~12%)
Old and Very Old Alluvium Live Oak Canyon Formation	5% shrinkage to 10% bulk (average ~3% bulk)

6.1.8. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. If structural pavements are to be constructed (concrete or asphaltic concrete), an R-value of 30 can be utilized for the preliminary design of pavements. Final design should be based upon representative sampling of the as-graded soils.

6.2. Analytical Methods

6.2.1. Slope Stability Analysis

Stability analyses were performed for both static and seismic (pseudo-static) conditions using the GSTABL7 computer program. The Modified Bishop method was used to analyze circular type failures. The critical failure surface determined in the static analysis was used in the pseudo-static analysis. A horizontal destabilizing seismic coefficient (kh) of 0.15g was selected for the site and used in the pseudo-static analyses.

Surficial stability analyses were conducted using an infinite height slope method assuming seepage parallel to the slope surface.

6.2.2. Pavement Design

Asphalt concrete pavement sections have been designed using the recommendations and methods presented in the Caltrans Highway Design Manual.

6.2.3. Bearing Capacity and Lateral Pressure

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases.

7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

Some of the alluvial soils onsite are considered prone to hydro-consolidation. Layers of peat were also encountered at depths of up to around 35 feet in AGS-4. Peat is considered highly compressible and is subject to significant volume changes, even with minor changes in stresses and moisture content. It is recommended that these materials be removed below proposed structural areas. Lesser removals can be considered for areas where the potential for settlement may not warrant the cost of complete removal, such as in landscape and parking areas, where the cost associated with possible additional maintenance may be less than the cost remedial grading.

7.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of Riverside and AGS's Earthwork Specifications (Appendix E).

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing foundations elements, standpipes, irrigation lines, and utility conduits should be removed and wasted off-site. Concrete can be placed in the fill provided it is broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations presented in Section 7.9.6. Cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

Topsoil, undocumented fills, the upper young alluvial deposits, and highly weathered portions of older and very old alluvial fan deposits and Live Oak Canyon deposits should be removed in areas planned to receive compacted fill. Additionally, younger alluvial deposits, peat deposits, and porous older alluvium above the groundwater should be completely removed in areas intended to support settlement-sensitive structures. The removals for building areas should extend a minimum of 10 feet outside the building limits or at a 1:1 projection down and away from the building limits until a competent bottom is achieved, whichever is greater. It is anticipated that the upper 3 feet of alluvial soils should be removed in parking and landscape areas. Deeper alluvial removals should be conducted in street areas to support utilities and facilitate trenching. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals are presented in Table 7.1 and shown on Plates 1 through 12.

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. The removal bottoms should be observed and mapped by the engineering geologist prior to fill placement.

In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

TABLE 7.1

ESTIMATED DEPTH OF REMOVALS

Geologic Unit (map symbol)	Estimated Removal Depth	
	Structural Areas	Landscape Parking Areas
Topsoil	0.5-3 feet	
Undocumented Artificial Fill (afu)	1-10+ feet	
Young Alluvial Deposits (Qal)	1-40+ feet	1-3+ feet
Old Alluvial (Qoa) and Very Old Alluvial Fan Deposits (Qvof)	1-5 feet	1-3 feet
Highly Weathered Live Oak Canyon Formation (Qlo)	1-3 feet	

7.1.1. Overexcavation of Building Pads and Streets

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur exposed at the design elevation. Overexcavation recommendations are provided below. The overexcavation should expose competent bottoms, and the replacement fill should be compacted to project specifications as described in Section 7.9.1.

7.1.1.1. Cut/Fill Transition Pads

Where design grades and/or remedial grading activities create a cut/fill transition beneath building pads, the cut and shallow fill portions of the commercial building pad should be over-excavated a minimum depth of five (5) feet and replaced to design grade with compacted fill. In Lot 3 where deeper removals are planned, the cut portions of the building pad exposing Very Old Alluvial Deposits and Live Oak Canyon Formation should be overexcavated a minimum of 10 feet. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas. At this time specific locations of the buildings on the east side of Roberts Road are not known. Accordingly, it may be prudent to sheet grade the lots, and wait to conduct the undercuts once final foundation depths and building locations are determined.

7.1.1.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) of the deepest fill section within the pad but need not exceed 10 feet. The transition between the deep fill and cut (capped) portion of the lot should not exceed a 2:1 gradient.

7.1.1.3. Street Overexcavation

The overexcavation of street areas to facilitate utility installation is not anticipated to be required.

7.1.2. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

It is our understanding that development is planned on the adjacent parcels. Development of one parcel may impact remedial grading efforts needed to support the adjacent parcel development. Coordination with the adjacent property owner should be considered to avoid negatively impacting future development efforts on the adjacent parcel.

7.2. Subgrade Stabilization

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of 1½" angular rock wrapped in geotextile (such as Mirafi RS280i) over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water

truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

7.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. If field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

7.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 or flatter (horizontal to vertical). The highest proposed cut slope is 72 feet in height- 35 feet of 3:1 (H:V) above a 37 foot 2:1 (H:V). It is anticipated that slopes excavated in very old alluvium will be grossly and surficially stable to the proposed heights. If unconsolidated coarse-grained lenses of materials are encountered on the slope face, local stabilization may be necessary.

Although not encountered during the subsurface investigation, occasional weak beds are present in the Live Oak Canyon Formation. It is anticipated that slopes excavated in Live Oak Canyon Formation will be grossly and surficially stable to the proposed heights unless out-of-slope bedding conditions are encountered. Bedding generally dips to the northeast, so cut slopes facing this direction may need to be stabilized. Generally, the proposed cut slopes within the Live Oak Canyon Formation face to the east, southeast and south.

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcut. Terrace drains and benches should be constructed on cut slopes in accordance with the County of Riverside Grading Ordinance.

7.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 46 feet. Fill slopes, when properly constructed with onsite materials and maintained as described herein, are expected to be grossly and surficially stable as designed.

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will

improve surficial stability and should be considered. Areas subject to potential scour should be armored.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of ascending slope, whichever is greater. Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward, from the catch point of the design toe at a minimum 1:1 projection, to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County of Riverside Grading Ordinance.

7.3.3. Skin Cut and Skin Fill Slopes

A review of the mass grading plans did not indicate any significant design skin fill and skin cut conditions, however, skin cut or thin fill sections may be created during grading. If these conditions occur, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half the remaining slope height, and not less than 15 feet, is provided. Where the design cut is insufficient to remove all unsuitable materials, overexcavation and replacement with a stabilization fill will be required, as shown on Grading Detail 6 in Appendix E.

7.3.4. Fill Over Cut Slopes

Fill over cut slopes should be constructed such that the cut portion is excavated first for geologic mapping and stability determination. If deemed stable then a "tilt-back" keyway half the remaining slope height or minimally twenty (20) feet wide should be established. Drains will be required for this condition with the locations determined based upon exposed field conditions.

7.3.5. Offsite Drainage Channel Slopes

Along the southerly boundary, steep natural slopes are present along the active drainage channel and outside the grading limits (See Cross Sections K-K', L-L', M-M', N-N'). Continued migration of this channel, scour, and/or undercutting of these slopes may impact onsite improvement and/or lead to slopes having a factor of safety that is less than desired. It is our understanding that future plans may include stabilization of portions of this channel. AGS should evaluate the proposed channel improvements to determine if additional stabilization measures or setbacks are warranted on this boundary.

7.3.6. Surficial Stability

The surficial stability of 2:1 (or flatter) fill and cut slopes have been analyzed, and the analysis presented in Appendix D indicates a factor-of-safety in excess of code minimums. When fill and cut slopes are properly constructed and maintained, satisfactory performance can be anticipated although slopes will be subject to erosion, particularly before landscaping is fully established.

7.3.7. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials (Live Oak Canyon Formation) can be considered a Type "A" soil. Very Old Alluvial Fan Deposits and Engineered Fill can be considered Type "B" soils. Young and older alluvial soils can be considered Type "C". Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material, 1:1 in fill soils, and 1.5:1 in young alluvial soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations. Final determination should be made during construction by the project Geotechnical Engineer based upon field observation.

For vertical excavations less than approximately 15 feet in height, cantilevered shoring may be used. Where cantilevered shoring is used for deeper excavations, the total deflection at the top of the wall tends to exceed acceptable magnitudes. Shoring of excavations deeper than approximately 15 feet may need to be accomplished with the aid of tied back earth anchors.

The shoring design should be provided by a California Registered Civil Engineer experienced in the design and construction of shoring under similar conditions. Once the final excavation and shoring plans are complete, the plans and the design should be reviewed by AGS for conformance with the design intent and recommendations. Further, the shoring system should satisfy applicable requirements of Cal-OSHA.

Personnel from AGS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including Cal-OSHA requirements, should be met.

7.3.8. Geologic Observation During Grading

All temporary slope excavations, including front, side and backcuts, and all cut slopes should be mapped to verify the geologic conditions that were modeled prior to grading are consistent with the exposures during the grading. Slope stability analyses and designed keyways may have to be modified based on conditions exposed during grading.

7.4. Survey Control During Grading

Removal bottoms, keyways, sub drains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations. Survey support will also be required to monitor settlement as discussed in Section 7.5.

7.5. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated alluvial soils be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix E).

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

7.6. Subsurface Drainage

7.6.1. Canyon Drains

Six- (6), eight- (8), and ten- (10) inch diameter canyon subdrains are recommended along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. The diameter and approximate locations of proposed subdrains are shown on Plates 1 and 9. Final determination of drain locations will be made in the field, based on exposed conditions. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

7.6.2. Heel Drains

Heel drains will be required for all stabilization fill keyways. Tentative heel drain locations can be provided when more detailed grading plans become available. Heel drains should be constructed in accordance with the details shown on Detail 3 (Appendix E).

7.6.3. Cut Slope Toe Drains and Subdrains

Consideration should be given to placing a toe drain on all major cut slopes in order to provide drainage for possible future nuisance water on the cut slopes.

Subdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

7.7. Seepage

Seepage, when encountered during grading, should be evaluated by the Geotechnical Consultant. If seepage is excessive, remedial measures such as horizontal drains or under drains may need to be installed.

7.8. Construction Dewatering

Due to the presence of shallow groundwater encountered during our field exploration, dewatering measures may be necessary during the excavation operation. It should be noted that controlling and maintaining of groundwater during construction is the responsibility of the contractor. As part of

the groundwater control, the quality of collected water should also be checked in accordance with applicable permits and regulations for water discharge.

7.9. Earthwork Considerations

7.9.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction listed below as determined by ASTM Test Method: D 1557. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

- Minimum 90% relative compaction: general fills unless higher compaction standard applies.
- Minimum 93% relative compaction: below subdrains.
- Minimum 95% relative compaction: upper 12-inches below pavement areas and fills deeper than 40 feet.

7.9.2. Fill Materials/ Import Soils

Most of the soils encountered during our subsurface exploration should be suitable for use as engineered fill provided oversize rock is disposed of in accordance with the recommendations in Section 7.9.6.

Any imported fill material should consist of granular soil having a "very low" expansion potential (expansion index of 20 or less). Import should also have a low corrosion potential (chloride content less than 500 parts per million, soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Import soils should be tested and approved by the Geotechnical Consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

7.9.3. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

7.9.4. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

7.9.5. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

7.9.6. Oversize Rock

Allow large quantities of oversize materials are not expected, some oversized rock material [i.e., rock fragments greater than eight (8) inches] may be encountered during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within commercial pads and to two (2) foot below the deepest utility in street and building utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

7.9.6.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

7.9.6.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural

fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

7.9.6.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

7.9.6.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

7.9.7. Fill Slope Construction

Fill slopes may be constructed by preferably overbuilding and cutting back to the compacted core or by back-rolling and compacting the slope face. The following recommendations should be incorporated into construction of the proposed fill slopes.

Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal before compaction, shaping and grid rolling.

Seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

7.9.7.1. Overbuilding Fill Slopes

Fill slopes should be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the compaction of the slope face meets the minimum project requirements for compaction. Compaction of each lift should extend out to the temporary slope face.

7.9.7.2. Compacting the Slope Face

As an alternative to overbuilding the fill slopes, the slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Back-rolling at more frequent intervals may be required. Compaction of each fill should extend to the face of the slope. Upon completion, the slopes should be watered, shaped, and track-walked with a D-8 bulldozer or

similar equipment until the compaction of the slope face meets the minimum project requirements. Multiple passes may be required.

7.9.8. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation

The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc., should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content prior to concrete placement.

8.0 DESIGN RECOMMENDATIONS

From a geotechnical perspective, the proposed development is feasible provided the following recommendations are incorporated into the design and construction. Preliminary design recommendations are presented herein and are based on some of the general soils conditions encountered during the geotechnical investigations. As such, recommendations provided herein are considered preliminary and subject to change based on the results of additional subsurface exploratory investigation.. Final design recommendations should be provided in a final rough/precise grading report.

8.1. Structural Design Recommendations

Precise building products, loading conditions, and locations are not currently available. It is anticipated that the as-graded near-surface soils could vary from “very low” to “medium” in

expansion potential when tested in general accordance with ASTM D 4829, although a majority is expected to be "very low" to "low". AGS has provided recommendations below assuming a "very low" to "low" expansion potential, which should be verified during grading.

8.1.1. Foundation Design

At this time specific building types, heights and locations have not been determined. Accordingly, the following general design parameters can be used for preliminary design and budgeting. Once the proposed buildings type and locations are known, site specific foundation design parameters should be developed by the project Geotechnical Engineer. The following values may be used in preliminary foundation design.

The values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

TABLE 8.1.1
FOUNDATION DESIGN PARAMETERS (COMMERCIAL/RETAIL)

Allowable Bearing	2,000 psf, increasing by 300 psf for each additional foot of embedment and width beyond the minimum provided, up to 3,000 psf assuming a minimum embedment of 18 inches below lowest adjacent finish grade.
Lateral Bearing	250 psf per foot of depth to a maximum of 2,000 psf for level conditions. Reduced values may be appropriate for descending slope conditions.
Sliding Coefficient	0.35
Assumed Expansion Potential	"Very Low" to "Low"
Slab-on-Grade Thickness	Minimum 4 inches
Slab-on-Grade Reinforcement	No. 3 rebar 18-inches on center each way
Continuous Footing Width	Minimum 12 inches (one-story), 15 inches (two stories)
Continuous Footing Depth*	Minimum 12 inches
Min. Footing Reinforcement	No. 4 rebar - 2 on top, 2 on bottom or No. 5 rebar, 1 on top and bottom
*Notes on Footing Embedment: Depth of embedment should be measured below lowest adjacent finish grade. Footings Adjacent to Swales and Slopes: If exterior footings adjacent to drainage swales are to exist within 5 feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least 5 feet is provided horizontally from edge of the footing to the face of the slope.	

8.1.2. Settlement

Settlements are likely to be produced from structural loads and long term settlement of the fill and underlying alluvial soils. As verified by settlement monitoring, primary settlement of the compacted fill materials should be completed prior to the release of lots for construction. AGS has provided a preliminary estimate of settlement for a typical one to two story building with shallow foundations. However, AGS should re-evaluate the settlement based on as-graded soil conditions and actual structural loads.

For lots with less than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 3/4 inch total and 3/8-inch across 20 feet.

For lots with greater than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 1 inch total and 1/2-inch across 20 feet.

For lots with left-in-place saturated alluvial soils, estimated settlements are 1.5 inches total and 3/4-inch across 20 feet. Structures should also be designed to accommodate the potential seismic settlement described in Section 5.6.2.

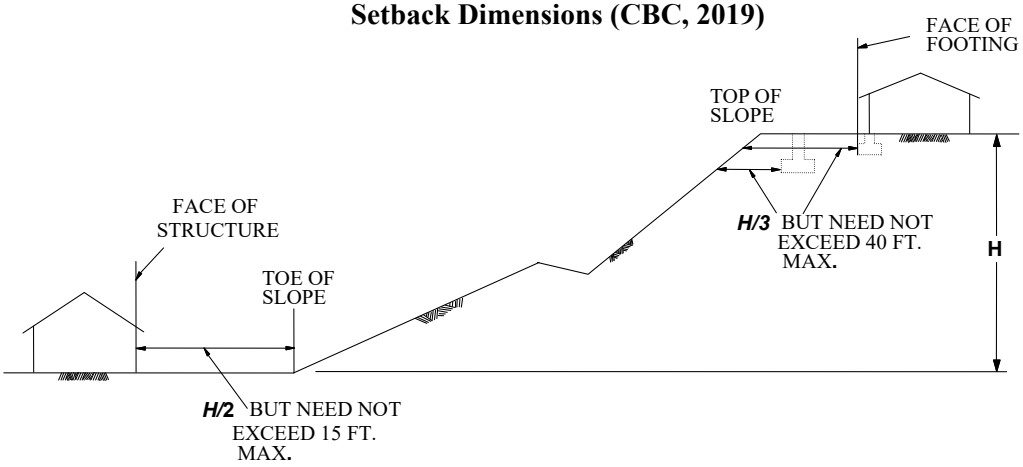
8.1.3. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

8.1.4. Deepened Footings and Setbacks

Improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code, require that structures be set back or footings deepened where subject to the influence of these natural processes. For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in the following figure.

FIGURE 8.1.4
Setback Dimensions (CBC, 2019)



8.1.5. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Spoils from the footing excavations should not be placed on slab-on-grade areas unless the soils are properly compacted. The footing excavations should not be allowed to dry back and should be kept moist until concrete is poured. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

8.1.6. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

8.1.7. Concrete Design

The test results from a sample collected during the current investigation indicated a sulfate concentration that corresponds to a S0 sulfate exposure class when classified in accordance with ACI 318.

Additional testing should be conducted after mass grading. It should be recognized that some fertilizers have been known to leach water-soluble sulfate compounds into soils containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. Accordingly, it is suggested that Portland cement type II/V be used for concrete in contact with soil.

8.2. Retaining Wall Design

8.2.1. Retaining Walls (backfilled with Native Materials)

The foundations for retaining walls should be founded on compacted fill, competent very old alluvial fan deposits, or Live Oak Canyon Formation and may be designed in accordance with the recommendations provided in Table 8.1.1. When calculating the lateral resistance, the upper 12 inches of soil cover should be ignored in areas that are not covered with hardscape. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance.

Retaining walls should be designed to resist earth pressures presented in the following table. These values assume that the retaining walls will be backfilled with native materials as shown in Detail RTW-A. Retaining walls should be designed to resist additional loads such as construction loads, temporary loads, traffic loads, and other surcharges as evaluated by the structural engineer.

The following Rankine earth pressure coefficients are recommended for the design of retaining walls onsite:

Static Case

"Native" backfill (C =150 psf, ϕ= 31°, density = 125 pcf)

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	390
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	63
Coefficient of Passive Pressure:	$K_p = 1.18$	148
Coefficient of At Rest Pressure:	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density (pcf)

k_h = seismic pseudostatic coefficient = $0.5 * PGA_M / g$

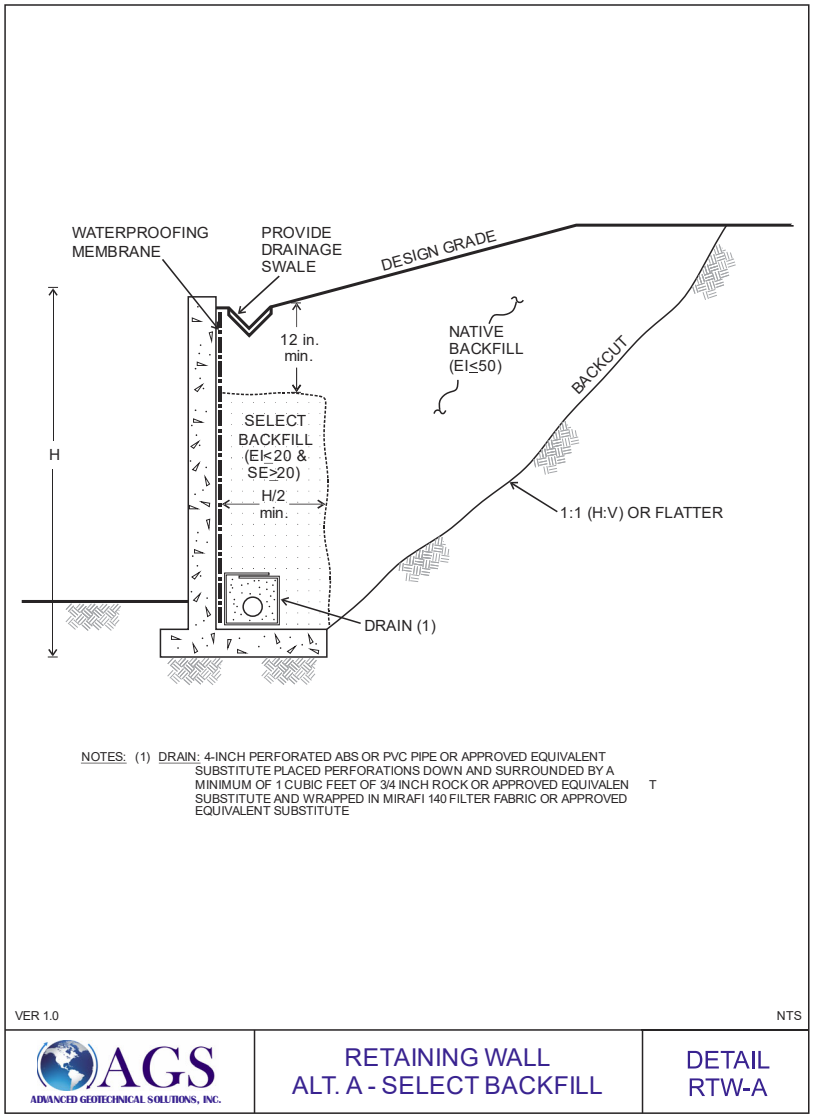
Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

8.2.2. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces as shown in Details RTW-A and RTW-B. Otherwise, the retaining walls should be designed to resist hydrostatic forces. Proper drainage devices should be installed along the top of the wall backfill and should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8 inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by

compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



8.3. Civil Design Recommendations

8.3.1. Site Drainage

Final site grading should assure positive drainage away from structures. Planter areas should be provided with area drains to transmit irrigation and rain water away from structures. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

8.3.2. Exterior Flatwork

- **Slab Thickness:** Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- **Control Joints:** Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.
- **Flatwork Reinforcement:** Consideration should be given to reinforcing any exterior flatwork.
- **Thickened Edge:** Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.3.3. Pavement Design

Preliminary pavement recommendations for streets and driveways are provided below. The performance of pavement is highly dependent on providing positive surface drainage away from the edge of pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed towards controlled drainage structures and not towards pavement areas. Landscaped areas adjacent to pavement areas are not recommended due the potential for surface or irrigation water infiltrating into the aggregate base and pavement subgrade. If landscaped areas are placed adjacent to pavement areas, consideration should be given to implementing measures that will reduce the potential for water to be introduced into the aggregate base. Such measures may include installing impermeable vertical barriers between the landscaped area and pavement areas including deepened curbs or 10 mil thick plastic liners extending a minimum of 6 inches below the bottom of the aggregate base.

8.3.3.1. Asphalt Concrete Pavement

Presented below are preliminary pavement sections for a range of traffic indices and an assumed Resistance-Value (R-Value) of 30 for the subgrade soils. R-Value testing of the subgrade soils should be performed during precise grading operations. The project Civil Engineer or Traffic Engineer should select traffic indices that are appropriate for the anticipated pavement usage and level of maintenance desired through the pavement life. Final pavement structural sections will be dependent on the R-value of the subgrade materials and the traffic index for the specific street or area being addressed. The pavement sections are subject to the review and approval by the County of Riverside.

TABLE 8.3.3.1. PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS*			
Traffic Index	**Assumed R-Value**	**Asphalt Concrete (inches)**	**Class II Aggregate Base (inches)**
4.5	30	3	5
5.0	30	3	6
5.5	30	3	7
6.0	30	3.5	8
6.5	30	4	8
7.0	30	4	10
7.5	30	4.5	10
8.0	30	5	11
*Note: See additional recommendations for subgrade preparation below.			

Pavement subgrade soils should be moisture conditioned to near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557 and should conform with the specifications listed in Section 26 of the *Standard Specifications for the State of California Department of Transportation* (Caltrans) or Section 200-2 of the *Standard Specifications for Public Works Construction* (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans *Standard Specifications* or Section 203-6 of the Green Book.

8.3.3.2. Portland Cement Concrete Pavement

Portland cement concrete may be used for the onsite driveways, trash enclosures, and truck loading docks. The following concrete pavement sections were determined using the recommendations provided in "Design of Concrete Pavement for City Streets" by the American Concrete Pavement Association. Testing of subgrade soils should be performed once driveway subgrades are achieved to determine the actual R-Value of the subgrade soils and/or corresponding modulus of subgrade reaction.

TABLE 8.3.3.2 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS				
Traffic Classification	**Maximum ADTT***	**Portland Cement Concrete Section (inches)**	**k* (pci)**	**MR* (psi)**
Collector	100	6.5	200	550
Industrial	300	8.0	200	550
*Notes: k = Modulus of subgrade reaction; ADDT = Average daily truck traffic; MR=Flexural strength of concrete (Modulus of Rupture) 550 corresponds to concrete having a minimum compressive strength of roughly 3,000 psi				

Joints should be provided at a minimum spacing of 8 feet. The joints should be caulked and sealed with a flexible compound to reduce the potential for moisture

infiltration. The civil engineer should determine the need for reinforcement and doweling.

The subgrade should be moisture conditioned and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Subgrade soils should be at or near the optimum moisture content to a depth of 12-inches immediately prior to placing concrete.

8.4. Corrosion

As discussed in Section 6.1.6, previous testing (pH, electrical resistivity, chloride content, and sulfate content) indicate that the soil conditions are not anticipated to be corrosive according to the Caltrans definition of a corrosive site. Final verification of site corrosivity will be based upon testing of import soil and soil from the site during grading operations. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of the construction materials.

9.0 SLOPE AND LOT MAINTENANCE

Maintenance of improvements is essential to the long-term performance of structures and slopes. Although the design and construction during mass grading created slopes that are considered both grossly and surficially stable, certain factors are beyond the control of the soil engineer and geologist. The property owners must implement certain maintenance procedures.

9.1. Slope Planting

Slope planting should consist of ground cover, shrubs and trees that possess deep, dense root structures and require a minimum of irrigation. The property owner should be advised of their responsibility to maintain such planting.

9.2. Pad Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure, or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water away from structures and slopes. Property owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, downdrains, and other devices that have been installed to promote structure and slope stability.

9.3. Slope Irrigation

The property owner should be advised of their responsibility to maintain irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful run-off and ground saturation should be avoided. If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

9.4. Burrowing Animals

Property owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

10.0 FUTURE STUDY NEEDS

10.1. Future Studies and Reviews

This report represents a geotechnical review of the current 60-scale mass grading plans for the project. From a geotechnical standpoint, it is AGS's opinion that additional subsurface investigation and analysis is required before construction of the proposed project begins.

As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Additional subsurface investigation and analysis
- Review of Rough Grading plans
- Review of Precise Grading plans
- Review of Foundation plans
- Review of Retaining Wall plans
- Review of road improvements, including potential impacts to existing improvements.

Project plans should be forwarded to the geotechnical engineer/geologist for evaluation and comment, as necessary

10.2. Grading Observation

Geologic exposures afforded during remedial and rough grading operations provide the best opportunity to evaluate the anticipated site geologic structure. Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional near-surface samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from the exploratory excavations at the locations indicated on the plans. The findings are based on the review of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

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APPENDIX B

SUBSURFACE LOGS

APPENDIX B-1

SUBSURFACE LOGS (AGS)

Date Excavated 5/6/2020, 5/7/2020 & 8/5/2020
Logged by SS
Equipment: JCB 3CX Backhoe

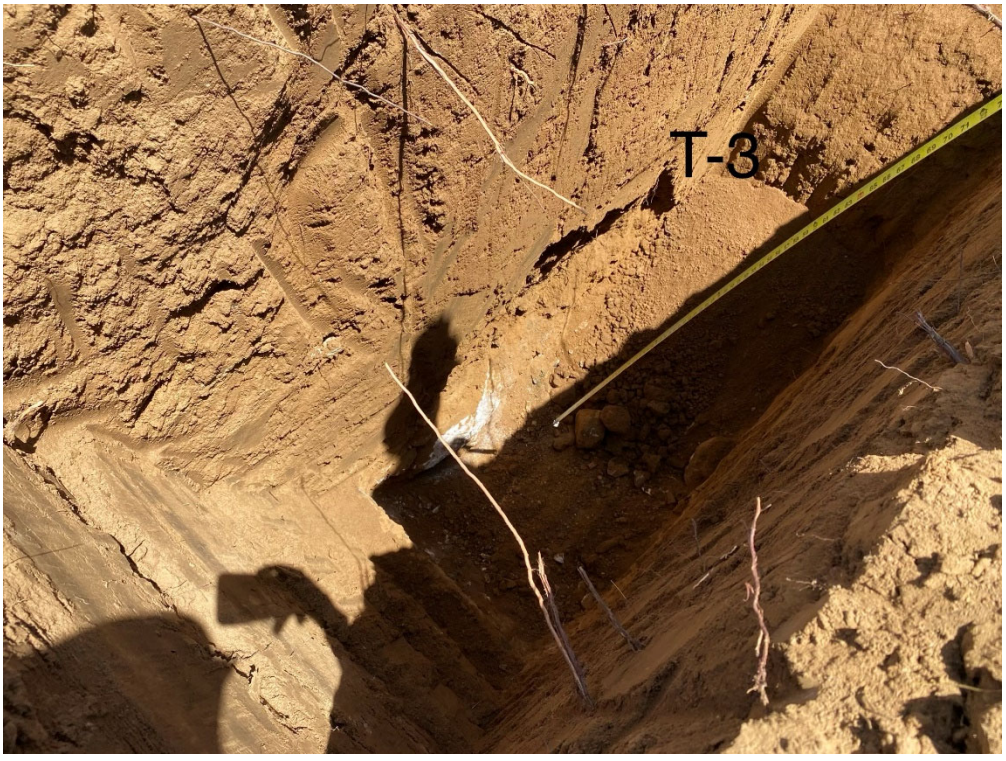
LOG OF TEST PITS

Excavation No.	Depth	USCS	Description
T-1	0.0 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @1.0 ft., moist; occasional gravel
	6.5 – 11.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @11.0 ft., increased density TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-2	0.0 – 4.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous
	4.5 – 11.5 ft.	SM/CL	@4.5 ft., Clayey SAND to Sandy CLAY, fine- to medium-grained, dark gray brown, very moist, loose to firm; micaceous @6.0 ft., wet @10.0 ft., Seepage, caving TOTAL DEPTH = 11.5 ft. SEEPAGE @ 10 ft., CAVING BELOW 10 ft.

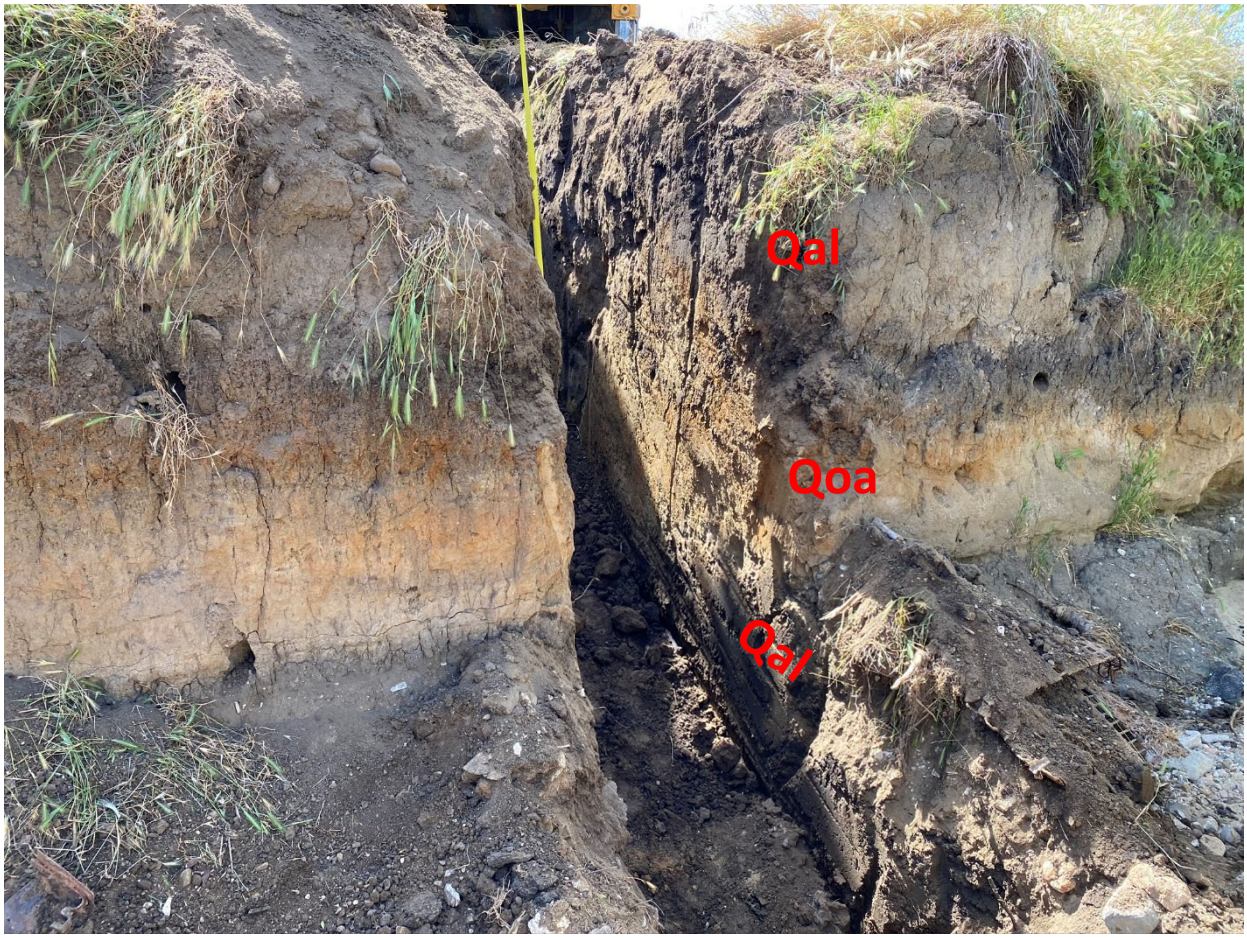


Excavation No.	Depth	USCS	Description
T-3	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to medium-grained SAND, brown, slightly moist, loose; roots
	1.0 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown, moist, medium dense; occasional gravel @6.0 ft., Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense; abundant sub-rounded to sub-angular gravel to cobble
	8.0 – 13.0 ft.	GM	@8.0 ft., Sandy sub-rounded GRAVEL layer, yellow brown to orange brown, slightly moist, medium dense; 2-3-foot boulder in sidewall
	13.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, slightly moist, medium dense to dense; micaceous, iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-4	0.0 – 4.0 ft.	SM	**Alluvium (Qal)** Clayey fine- to coarse-grained SAND, dark gray brown, moist, loose
	4.0 – 8.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense to dense; micaceous, iron oxide staining, weakly cemented @6.0 ft., Silty fine-grained SAND
	8.0 – 12.0 ft.	SM/SC	**Alluvium (Qal)** Silty SAND to Clayey SAND, fine- to coarse-grained, dark gray brown, moist, loose; rounded to sub-rounded gravel to cobble. (Channel deposits undermining the side wall of channel)

TOTAL DEPTH = 12.0 ft.
NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-5	0.0 – 2.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.5 – 11.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; minor porosity, weakly cemented @4.0 ft., Yellow brown to orange brown; occasional sub-rounded gravel @8.0 ft., no longer porous @10.0 ft., increased density; occasional sub-angular gravel to cobble TOTAL DEPTH = 11.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-6	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous, roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, yellow brown, slightly moist to moist, loose to medium dense
	6.5 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; weakly cemented, micaceous, minor porosity, trace coarse-grained sand to fine gravel @9.0 ft., Dense; no longer porous
	11.0 – 12.0 ft.	GM	Fine- to coarse-grained Sandy GRAVEL to COBBLE, yellow brown, slightly moist, dense
			TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-7	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 14.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine- to coarse grained SAND, dark yellow brown, slightly moist, medium dense to dense; occasional gravel @3.0 ft., moist; weakly cemented @8.0 ft., trace clay
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-8	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @2.0 ft., occasional gravel @4.5 ft., increased moisture; minor porosity
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse grained SAND, yellow brown to gray brown, moist, medium dense to dense; some gravel to cobble @9.0 ft., trace clay; weakly cemented, minor porosity, micaceous @10.0 ft., trace clay TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-9	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous @6.0 ft., yellow brown to gray brown, medium dense
	8.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented @11.0 ft., no longer porous TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-10	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 12.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @3.0 ft., occasional sub-rounded gravel @7.0 ft., yellow brown to gray brown, increased moisture, loose to medium dense; porous @11.0 ft., with clay, moist to very moist
	12.0 – 13.0 ft.	ML/CL	Sandy SILT to Sandy CLAY, wet; occasional sub-rounded gravel to cobble
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-11	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	3.0 – 7.5 ft.	ML/SM	Sandy SILT to Silty SAND, fine-grained, dark gray brown, moist, firm to medium dense; micaceous
	7.5 – 13.0 ft.	ML	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented
	8.0 – 13.0 ft.	SM	Silty fine-grained SAND, gray brown to yellow brown, moist, dense; trace clay, micaceous, manganese oxide nodules
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-12	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, slightly moist, loose; micaceous
	3.0 – 7.0 ft.	SW	Fine- to coarse-grained SAND with Silt with sub-rounded gravel
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; micaceous, weakly cemented
			TOTAL DEPTH = 14.0 ft. NO WATER, CAVING FROM 0 to 7 ft.

Excavation No.	Depth	USCS	Description
T-13	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @2.0 ft., moist; occasional gravel, micaceous
	7.5 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @10.0 ft., increased density TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-14	0.0 – 2.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.0 – 11.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous @5.0 ft., abundant sub-rounded gravel to cobble TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-15	0.0 – 4.0 ft.	SW	**Alluvium (Qal)** Fine- to coarse-grained SAND, yellow brown to gray brown, dry to slightly moist, loose; with sub-angular gravel
	4.0 – 9.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, moist, medium dense to dense; micaceous
			TOTAL DEPTH = 9.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-16	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense; trace clay
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, minor porosity
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, yellow brown to gray brown, moist, dense to moderately hard; trace clay, micaceous TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-17	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark gray brown, slightly moist, loose to medium dense; occasional sub-angular gravel to cobble
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, micaceous, manganese oxide
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, dense to moderately hard; trace clay and gravel @13.0 becomes fine- to coarse-grained TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-18	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 6.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, red brown, slightly moist, medium dense
	6.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor porosity @11.0 ft., decreasing moisture TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-19	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, medium dense; trace clay
	6.5 – 11.0 ft.	SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to medium-grained SAND, light yellow brown to light gray brown, very dense; iron oxide staining
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING





Excavation No.	Depth	USCS	Description
T-20	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 10.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, slightly moist, medium dense; trace gravel
	10.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-21	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist, loose; roots
	1.0 – 3.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, moist, medium dense; minor porosity
	3.5.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to gray brown, moist, dense; minor iron oxide staining, manganese oxide nodules
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-22	0.0 – 9.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	9.0 – 13.0 ft.	SM	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, stiff; occasional fine gravel, minor porosity, weakly cemented
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

BORING NUMBER AGS-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to orange brown, moist, medium dense; trace coarse sand, micaceous										
5				SPT	5-7-9 (16)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; iron oxide staining, micaceous										
10			@10.0 ft., very dense	MC	24-38-50/3"	112	2.9	16	Consol				
15			@15.0 ft., Silty fine-grained SAND, orange brown to red brown, moist, very dense; trace clay, iron oxide staining, micaceous	SPT	40-47-50/5"								
20				MC	47-50/3"	124	6.1	46					
25			@25.0 ft., Silty fine- to coarse-grained, orange brown, slightly moist, very dense; iron oxide staining, micaceous	SPT	37-50/5"								

Total depth = 25.9 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to brown, moist, medium dense; trace coarse sand, micaceous										
5				MC	4-4-5 (9)								
10		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND, yellow brown, slightly moist, dense; iron oxide staining, calcium carbonate development, micaceous	SPT	8-12-16 (28)								
15			@15.0 ft., occasional gray brown to blue gray siltstone fragments	MC	50								
20				SPT	25-50								
25		SM	@25.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown, moist, very dense; trace clay, occasional quartz fragments, iron oxide development, micaceous	MC	50	117	10.2	62	Shear				
			Total depth = 25.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2228 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 11.00 ft / Elev 2217.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5				MC	3-3-5 (8)	105	7.5	33					
10		ML	▽ @10.0 ft., Fine-grained Sandy SILT with Clay, dark gray brown, wet, soft; micaceous, mottled, minor iron oxide development	SPT	1-1-1 (2)								74
15			@15.0 ft., becomes gray brown	MC	3-4-6 (10)	106	16.9	77	Consol				
20			@20.0 ft., increased clay content; minor iron oxide development	SPT	3-3-3 (6)					46	29	17	71
25		CL	@25.0 ft., Silty CLAY with fine-grained Sand, brown to gray brown, wet, soft; minor iron oxide development	MC	5-7-9 (16)	95	25.6	89	Consol				
30		SC	@30.0 ft., Clayey SAND, blue gray to gray brown; occasional fine quartz fragments, trace root fibers	SPT	2-3-7 (10)					32	22	10	36
35													

(Continued Next Page)

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ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	@35.0 ft., Clayey SILT grades down to Silty fine-grained SAND, dark gray to dark olive brown, wet, stiff to medium dense	MC	6-9-12 (21)	89	17.0	51					
40		CL	@40.0 ft., Silty to Sandy CLAY, dark gray, wet, stiff	SPT	3-5-8 (13)								
45		SM	@45 ft., Silty fine-grained SAND with clay, blue gray to gray brown, wet, medium dense	MC	6-12-20 (32)	121	12.4	86					
50			@50.0 ft., Interbedded: from Silty fine- to coarse-grained SAND with fine quartz fragments to Clayey SILT with fine-grained Sand	SPT	4-4-7 (11)								59
55			@55.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown, wet, medium dense	SPT	6-5-11 (16)								
60		SC-SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to Clayey fine-grained SAND, dark yellow brown, wet, dense; iron oxide staining, micaceous	MC	11-22-35 (57)								
65			@65.0 ft., Sand becomes fine- to coarse-grained	SPT	8-10-10 (20)								
70		SP	@70.0 ft., Coarse-grained SAND with rock fragments	MC	30-20-26 (46)	115	13.3	78					
			@71.0 ft., Silty fine-grained SAND with Clay										
		SM	Total depth = 71.5 feet Groundwater encountered at 11 feet Backfilled with soil cuttings										

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2197 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND with Clay, dark gray brown, dry to slightly moist, loose										
5			@5.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown to olive, moist, medium dense to firm; micaceous	MC	10-12-14 (26)	103	19.4	83	Consol				
10		CL	@10.0 ft., Silty CLAY with fine-grained Sand, yellow brow to gray brown to black, moist, soft; abundant decomposing organic matter, minor iron oxide staining, micaceous	SPT	2-2-3 (5)								
15		CL-ML	@15.0 ft., Fine-grained Sandy SILT, yellow brown to gray brown with Silty CLAY, black, moist, medium dense to stiff; abundant decomposing organic matter, iron oxide staining, micaceous	MC	3-5-10 (15)	93	18.3	61	Consol				
20		OL	@20.0 ft., Organic SILT/PEAT, blue gray to black, moist, soft; abundant decomposing organic matter	SPT	1-2-4 (6)								
25			@25.0 ft., Silty CLAY to Clayey SILT with Peat layers, dark gray to blue gray to black, moist, soft; abundant decomposing organic matter	MC	4-5-6 (11)	60	37.8	57	Consol				
30		CL-ML	@30.0 ft., With fine-grained sand, very moist; trace fine root fibers	SPT	3-5-5 (10)								
35													

(Continued Next Page)

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	**Older Alluvium (Qoa)** Fine- to coarse-grained Sandy SILT with Clay, yellow brown to gray brown to olive, moist, very stiff; iron oxide staining, micaceous	MC	7-10-13 (23)	121	12.2	84					
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to orange brown, slightly moist, very dense; trace fine gravel, iron oxide staining, micaceous	SPT	17-21-21 (42)								
45				MC	50	110	4.8	24					

Total depth = 45.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
5		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, light yellow brown to light gray brown, slightly moist, dense; minor iron oxide staining, micaceous, weakly cemented	MC	25-34-35 (69)	103	5.1	21	Consol				
10		SM	@10.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, medium dense to very stiff; iron oxide staining, micaceous	SPT	5-7-9 (16)								
15			@15.0 ft., becomes dark yellow brown to orange brown, increased fines and moisture content	MC	9-13-16 (29)	119	9.5	62	Shear				
20		SM	@20.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to orange brown, moist, dense; trace gravel, iron oxide staining, micaceous	SPT	9-14-11 (25)								
25				MC	18-50	126	6.5	52					

Total depth = 26.0 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2190 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to olive brown, slightly moist, medium dense; micaceous										
5				MC	15-13-20 (33)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND with gravel, yellow brown to gray brown, slightly moist, dense; iron oxide staining, micaceous										
10				SPT	4-8-14 (22)								
15		ML	@15.0 ft., Clayey SILT with fine-grained Sand, gray brown to olive, moist, hard; iron oxide staining, manganese oxide nodules, micaceous	MC	9-15-26 (41)	120	11.7	24	Shear				
20		ML	@20.0 ft., Fine-grained Sandy SILT, blue green to gray, moist, very stiff; minor iron oxide staining, micaceous	SPT	5-5-8 (13)								
25				MC	17-22-30 (52)	122	8.6	61	Shear				
30		ML	@30.0 ft., with Clay, very moist; occasional quartz fragments	SPT	8-8-7 (15)								
35													

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Silty fine-grained SAND, blue gray, slightly moist to moist, dense; iron oxide staining, micaceous	MC	9-19-24 (43)	110	11.4	58					
40		CL-ML	@40.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, blue gray, moist to very moist, very stiff; micaceous, trace root fibers	SPT	3-5-9 (14)								
45		SM	@45.0 ft., Silty fine-grained SAND	MC	20-36-50 (86)	127	7.6	63					
50		CL-ML	@50.0 ft., Silty CLAY to Clayey SILT	SPT	4-4-5 (9)								

Total depth = 51.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2238 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND with Clay, dark gray brown to black, moist, medium dense; micaceous										
5				MC	5-7-14 (21)	120	7.1	47					
10		SM	**Older Alluvium (Qoa)** Silty fine- to medium-grained SAND, dark yellow brown to olive brown, slightly moist, dense; iron oxide staining, carbonate, micaceous	SPT	5-11-12 (23)								
15		SM	@15.0 ft., Silty fine-grained SAND to fine-grained SILT, olive, moist, dense to hard; trace clay, iron oxide staining, micaceous	MC	10-26-49 (75)	122	11.4	81	Shear, Consol				
20			@20.0 ft., becomes yellow brown to orange brown to olive, increased clay content	SPT	8-11-25 (36)								
25				MC	18-40-50/4"	115	11.6	68					
			Total depth = 26.3 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-9

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	1-1-0 (1)								
10			@10.0 ft., trace coarse sand, trace fine gravel, micaceous	MC	10-15-15 (30)								
15		ML	Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, loose to stiff; trace coarse sand, trace fine gravel, micaceous	SPT	3-3-4 (7)								
20		ML	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, dense to hard; trace coarse sand, trace fine gravel, iron oxide staining, micaceous	MC	12-19-26 (45)	128	8.5	71	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND, yellow brown to gray brown, slightly moist, medium dense; trace fine gravel, iron oxide staining, micaceous	SPT	9-7-8 (15)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	5-6-7 (13)								
10		SM	**Older Alluvium (Qoa)** Silty fine-gained SAND with gravel, yellow brown to gray brown, slightly moist, dense; trace fine sand, iron oxide staining, micaceous	MC	20-20-30 (50)	126	2.0	16	Consol				
15			@15.0 ft., becomes dark yellow brown to orange brown, moist, trace clay	SPT	7-11-11 (22)								
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, dense to hard; trace clay, trace fine gravel, iron oxide staining, micaceous	MC	21-25-29 (54)	120	7.2	48					
25		SW	@25.0 ft., Fine- to coarse-grained SAND with gravel, light yellow brown to light gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	SPT	11-16-17 (33)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-11

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2220 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		ML	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine-grained SAND to fine-grained Sandy SILT, yellow brown to orange brown, slightly moist, medium dense to very stiff; iron oxide staining, micaceous										
5				SPT	7-7-8 (15)								
10		SM	@10.0 ft., Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	22-50/5"	113	9.3	51					
15		ML	@15.0 ft., Clayey SILT with fine-grained SAND, dark yellow brown to gray brown to olive, moist, hard; iron oxide, micaceous	SPT	9-16-18 (34)								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with fine Gravel, yellow brown to gray, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	20-34-50/5"	115	3.1	18					
25				SPT	20-27-33 (60)								

Total depth = 26.5 feet
No groundwater encountered
backfilled with soil cuttings

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2320 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND with gravel to cobble, yellow brown, dry to slightly moist, dense										
5			@5.0 ft., Sand becomes fine-grained, minor iron oxide staining	SPT	16-22-26 (48)								
10				MC	50/4"	99	2.4	9					
15			@15.0 ft., quartz fragments	SPT	50/5"								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50	113	2.5	14					
25		SP	@25.0 ft., Fine-grained SAND with Silt, dark yellow brown to gray brown to olive, moist, dense; trace clay, iron oxide staining, micaceous	SPT	12-17-20 (37)								
30		SW	@30.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50/5"	111	1.7	9					
35													

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW		SPT	50/5"								
40		SM	@40.0 ft., Silty fine-grained SAND, yellow brown to orange brown to gray brown, moist very dense; trace clay, iron oxide staining, micaceous	MC	50	105	12.8	58					
45			@45.5 ft., occasional quartz fragments	SPT	11-26-36 (62)								
50			@50.0 ft., increased clay content, manganese oxide nodules	MC	50/5"	115	9.5	55					

Total depth = 50.4 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/7/20
GROUND ELEVATION 2235 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, slightly moist, loose; trace fine gravel, micaceous										
		SP	@5.0 ft., Coarse-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose; trace fine gravel	SPT	3-2-5 (7)								
10				MC	11-19-29 (48)	122	2.4	17	Consol				
15		SM	@15.0 ft., Silty fine- to coarse-grained SAND, dark gray brown, moist, loose; trace clay, trace fine gravel, micaceous	SPT	1-2-4 (6)								
20		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to olive, dense; trace fine gravel, iron oxide staining, micaceous	MC	11-21-31 (52)	129	9.0	79	Consol				
25				SPT	8-10-14 (24)								
30		SM	@30.0 ft., becomes dark yellow brown to orange brown, moist, very dense; iron oxide staining, micaceous, weakly cemented	MC	30-50/5"	131	6.2	59					
35													

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW	@35.0 ft., Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, slightly moist, dense; trace gravel	SPT	15-16-17 (33)								
40				MC	25-47-50/5"	120	4.3	28					
45				SPT	10-13-23 (36)								
50				MC	50	115	3.9	22					
			Total depth = 50.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-14

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2275 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; trace fine gravel, micaceous										
5			SPT	1-1-3 (4)								
10		@10.0 ft., medium dense	MC	9-11-13 (24)	102	3.5	14					
15	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-9-9 (18)								
20	ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	MC	8-11-12 (23)	128	5.1	43	Consol				
25		@25.0 ft., with gravel	SPT	7-8-12 (20)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-15

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2254 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, medium dense; micaceous										
5				MC	10-6-9 (15)	107	6.7	32					
10		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-10-8 (18)								
15				MC	13-21-23 (44)	108	5.7	28					
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	SPT	6-8-8 (16)								
25			@25.0 ft., with gravel	MC	11-17-20 (37)	126	9.8	79	Consol				

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 15.00 ft / Elev 2208.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 22.25 ft / Elev 2200.75 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SP	**Alluvium (Qal)** Coarse-grained SAND with fine gravel, light yellow brown to light gray brown, slightly moist, loose; trace fine gravel, micaceous @0.5 ft., becomes fine-grained, dark gray brown to dark yellow brown, moist										
5		ML	@5.0 ft., Silty fine-grained SAND to Sandy SILT with Clay, gray brown to olive to dark yellow brown, moist, loose to soft; micaceous	SPT	3-1-2 (3)								
10		CL-ML	@10.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, dark gray brown, moist, stiff; micaceous	MC	3-6-8 (14)	92	21.2	68	Consol				
15		CL	▽ @15.0 ft., Silty CLAY with fine-grained Sand, gray brown, wet, stiff	SPT	1-2-4 (6)								78
20			@20.0 ft., brown to dark gray brown, mottled	MC	4-5-6 (11)	93	25.3	84	Consol				
25			▼	SPT	3-3-5 (8)					43	23	20	54
30		SC	@30.0 ft., Clayey fine- to coarse-grained SAND, gray brown to dark olive, saturated, medium dense; minor iron oxide staining, micaceous, trace organics	MC	10-8-13 (21)	122	12.3	88	Consol				
35													

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	**Older Alluvium (Qoa)** Clayey fine- to coarse-grained SAND to fine- to coarse-grained Sandy CLAY	SPT	5-5-6 (11)								
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to gray brown, mottled, saturated, medium dense; trace fine gravel, iron oxide development	MC	6-8-12 (20)	118	14.9	95					
45		SC-SM	@45.0 ft., becomes Silty fine- to coarse-grained SAND to Clayey fine- to coarse-grained SAND; manganese oxide nodules	SPT	4-6-8 (14)								
50				MC	13-17-20 (37)	123	9.8	72					
55				SPT	9-11-13 (24)								

Total depth = 56.5 feet
Seepage @ 15 feet
groundwater measured at 22.25 feet
Backfilled with soil cuttings

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2252 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark red brown, slightly moist, loose										
5				MC	4-10-12 (22)	111	4.5	23					
10			@8.0 ft., becomes dark red brown to dark yellow brown, minor porosity	SPT	4-5-7 (12)								
15		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, dense; iron oxide staining	MC	21-27-41 (68)	127	4.5	37	Consol				
20			@20.0 ft., trace clay	SPT	7-9-10 (19)								
25				MC	18-50/5"	123	4.1	30					
30		SM	@30.0 ft., becomes yellow brown to orange brown, slightly moist, dense; iron oxide staining, minor carbonate development	SPT	13-17-18 (35)								
35													

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AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:07 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Sand becomes more fine-grained; weakly cemented, micaceous	MC	12-24-35 (59)	120	3.2	21					
40			@40.0 ft., becomes dark yellow brown to gray brown, dry to slightly moist, very dense; occasional gravel, micaceous	SPT	13-29-50/3"								
45				MC	50/5"	110	1.6	8					
50				SPT	50/1"								
			Total depth = 50.1 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2219 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, brown to gray brown, slightly moist, loose										
5		SW	@5.0 ft., Fine- to coarse-grained SAND with Gravel, light yellow brown, light gray brown, dry to slightly moist, medium dense	SPT	4-7-7 (14)								
10		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT with Clay, gray brown to olive, moist, medium dense to very stiff; occasional gravel, iron oxide staining, micaceous	MC	13-16-21 (37)	124	8.9	67					
15				SPT	6-12-21 (33)								
20		CL-ML	@20.0 ft., Silty CLAY to Clayey SILT with fine-grained SAND, blue green to blue gray, moist, very stiff; occasional fine quartz fragments, iron oxide staining, micaceous	MC	3-7-15 (22)	117	12.3	75	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND with Gravel, blue gray, moist, very dense; micaceous	SPT	32-40-15 (55)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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APPENDIX B-2

DRAFT SUBSURFACE LOGS (SCG)

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium Sand, trace fine root fibers, slightly porous, medium dense-damp							
5		15				106	6					
10		15			@ 8.5', little medium to coarse Sand, trace fine Gravel, medium dense-damp		4					
15		34			Light Red Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp	112	3			27		
20		81			Light Gray Brown Silty fine Sand, trace medium Sand, very dense-damp		5					
25		50/5"			Light Gray Brown fine to coarse Sand, trace fine Gravel, trace Silt, very dense-dry	105	2					
30		89			Light Gray Brown fine Sandy Silt, trace medium Sand, very dense-damp		7					
		50/5"			Light Red Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, very dense-damp	108	4					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, very dense-moist							
40		50/4"					12					
		50/3"				118	11					
45					Light Gray Silty fine to coarse Sand, trace fine Gravel, very dense-dry to damp							
		50/4"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-2

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Orange Brown fine Sandy Silt, trace Clay, very dense-moist							
5		54					14					
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, very dense-moist							
10		50/5"				126	12					
15		50/5"					10					
					Red Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, very dense-damp							
20		50/5"				124	10					
					Red Brown fine Sandy Silt, trace Clay, very dense-moist							
25		67					15					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					COLLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, slightly porous, trace fine root fibers, medium dense-damp							
5		16				81	4					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
10		10					5					
15		39			@ 13.5', trace Clay	108	4					
20		18					4			33		
					OLDER ALLUVIUM: Orange Brown Silty fine to medium Sand, trace coarse Sand, very dense-dry to damp							
25		50/6"				92	3					
					LIVE OAK CANYON FORMATION: Light Gray Silty fine-grained Sandstone to fine-grained Siltstone, highly weathered, friable, weakly cemented, very dense-damp							
30		67					6			51		
					Gray Brown Silty fine to coarse-grained Conglomeratic Sandstone, little fine to coarse Gravel, highly weathered, friable, weakly cemented, very dense-dry to damp							
		50/3"					2					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/6"					5					
					Light Gray Brown Silty fine-grained Sandstone, some Iron Oxide staining, highly weathered, friable, weakly cemented, very dense-damp							
45		50/6"				103	5					
		50/5"					3					
50					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-4

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		16			ALLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace to little fine Gravel, trace Clay, medium dense-damp	107	6					
10		17			Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		2					
15		39			Brown Silty fine Sand, trace medium to coarse Sand, trace Clay, medium dense-damp	117	4					
20		26			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense to very dense-dry to damp		4					
25		50/6"				116	3					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		17	3.5		POSSIBLE FILL: Black to Dark Brown Clayey Silt, trace fine to medium Sand, slightly organic, very stiff-damp to moist	111	9					
10		13	3.5		ALLUVIUM: Light Gray Clayey Silt to Silty Clay, trace fine Sand, stiff-damp		8					
15		50/6"			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace clay, very dense-damp	124	7					
20		14			Brown Silty fine Sand, little medium to coarse Sand, medium dense-moist		13			44		
25		50			Gray Brown Silty Clay, little fine to medium Sand, abundant Calcareous veining, hard-moist to very moist	116	17			72		
30		50/6"			Light Gray Brown Gravelly fine to coarse Sand, little Silt, very dense-damp		6					
		59			Gray Brown Clayey Silt, trace fine Sand, hard-moist	115	16					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium to coarse Sand, dense-damp							
		40					6			30		
40												
					Light Gray Brown Gravelly fine to coarse Sand, very dense-damp							
		50/4"				114	4					
45												
		56					5					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-6

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Light Gray Clayey Silt, trace fine Sand, stiff-moist		18					
10		17	4.5		Dark Brown Silty Clay, trace fine Sand, stiff-moist	107	15					
15		12	4.5		Gray Brown Clayey Silt, trace fine Sand, stiff-moist		16					
20		22			Light Brown Silty fine Sand, medium dense-damp to moist	94	11					
25		22			Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		8					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Dark Brown Clayey Silt, trace fine to coarse Sand, trace Iron Oxide staining, loose-moist	113	14					
10		7			Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, trace fine Gravel, loose-very moist		17					
15		13	4.5		Light Brown to Dark Brown Clayey Silt, trace fine Sand, trace fine root fibers, loose-moist	112	15			74		
20		10	1.0				19	29	17	66		
25		21	3.0			110	20	27	14	77		
30		16			Dark Gray fine Sandy Silt interbedded with 5" Dark Gray Silty Clay lenses, medium dense-moist		16			76		
		28				116	16			57		

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Light Brown to Brown fine Sandy Silt interbedded with Brown Silty fine to coarse Sand with trace fine Gravel and 3" lenses of Dark Gray Silty Clay, medium dense to very stiff-wet							
40		19					32			48		
					Gray Brown Silty fine to coarse Sand, trace Silt, trace fine Gravel, dense-dry to damp							
45		61				111	3			10		
					Dark Gray Silty Clay with lenses of Dark Gray Silty fine Sand, very stiff-very moist							
50		16	1.5				26	40	24	73		
					Dark Gray Clayey fine Sand, trace medium to coarse Sand, trace fine root fibers, very stiff-moist to very moist							
55		43	4.5			113	16					
					Boring Terminated at 55'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-8

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		9			ALLUVIUM: Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, loose to medium dense-damp		7					
10		36				118	13					
15		15			@ 13.5,' trace Iron Oxide staining		9					
20		24			Dark Brown Clayey fine Sand, trace medium to coarse Sand, little Silt, little Iron Oxide staining, medium dense-damp to moist	114	14					
25		18			Dark Gray fine Sandy Silt with 3" lenses of Dark Gray Silty fine Sand, trace to little fine to coarse Sand, trace to little fine Gravel, medium dense-damp to moist		13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-9

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine Sand, trace fine root fibers, trace Clay, trace Calcareous nodules and veining, medium dense-damp to moist							
5		21				115	9					
10		29					9					
15		38				122	8					
20		20					11					
25		56				122	13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		7			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-damp		6					
10		58			Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, dense-damp	126	10			40		
15		14			Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Clay, medium dense-damp to moist		14					
20		50/6"			OLDER ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous nodules, trace to little fine Gravel, dense to very dense-damp	130	8					
25		34					7					
30		41			@ 28.5', medium dense-very moist	114	17					
		28			Brown Silty fine Sand, trace medium Sand, medium dense-damp		5					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		24				105	10					
40												
					Dark Gray Silty fine Sand, trace to little medium to coarse Sand, trace Clay, trace fine Gravel, medium dense-very moist							
		25					24					
45												
		34				116	14					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10b

APPENDIX B-3

SUBSURFACE LOGS (PSE)

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-037
DATE STARTED	4/8/04	GROUND ELEV.	2268	LOGGED BY	DMP
DATE FINISHED	4/9/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ALLUVIUM** (Qal): SANDY SILT, fine grained, light brown, slightly moist, firm, trace coarse grains, visible porosity.				
	2265									
						@ 4.0 ft. color change to yellow brown.				
5		R	Push				5.4	100	22	
	2260					@ 8.0 ft. trace gravel.				
10		R	3		SM	@ 10.0 ft. SILTY SAND, fine grained, yellow brown, slightly moist to moist, medium dense, visible porosity, trace coarse grains, gravel.	4.4	115	27	
	2255	B								
						SAN TIMOTEO FORMATION (QTst): SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard to hard.				
15		R	9				8.6	131	85	CON, HY
						TOTAL DEPTH 16.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=49911b.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=38411b.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=24461b.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2275				CL	**TOPSOIL** (No Map Symbol): SANDY CLAY, sand is fine to coarse grained, dark red brown, moist, stiff, trace gravel, secondary clay development.				
						SAN TIMOTEO FORMATION (QTst): CONGLOMERATE, matrix supported, mostly granule sized clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard some secondary clay, calcium carbonate cementation.				
5	2270					@ 3.0 ft. SANDY SILTSTONE, fine grained, light yellow brown, dry, moderately hard, pinches out, interfingered contact with below.				
						@ 4.0 ft. PEBBLE CONGLOMERATE, matrix supported, 1/4-3" clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard, clasts are igneous and metamorphic, subrounded, occasional 4-5" clasts.				
						@ 6.0 ft. low cohesion, slight caving.				
10	2265					@ 8.0 ft. SILTY SAND matrix, greater cohesion, fewer clasts.				
						@ 11.0 ft. coarser grained, mostly medium to coarse grained SAND and granules, visible porosity, low cohesion.				
						@ 13.0 ft. occasional interfingered lenses of SANDY SILTSTONE, and SILTY SANDSTONE, fine grained, yellow brown, moist, moderately hard.				
15	2260									
						@ 17.0 ft. gradational change to SILTY SANDSTONE, fine to coarse grained, (coarse grained locally), yellow brown to reddish brown, moist, moderately hard, trace pebbles and granules.				
20	2255					@ 20.0 ft. 1.5' thick CONGLOMERATE bed, clast supported, up to 9" clasts.				
						@ 22.0 ft. N78W , 10NE-approximate attitude of bedding on coarse grained SANDSTONE bed, 6" thick.				
25	2250									
						@ 28.0 ft. SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard, trace granules and pebbles, locally SILTY SANDSTONE.				
30	2245	R B	6				11.3	123	87	
						@ 33.0 ft. 2' thick SANDSTONE bed, fine to coarse grained, light gray, moist, moderately hard, trace pebbles and granules.				
35	2240									
	2235					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2235					**SAN TIMOTEO FORMATION** (QTst): Continued. @ 38.0 ft. interfingered contact with below, gradational change, alternating SANDY SILTSTONE and PEBBLE CONGLOMERATE, 3"-1' thick.				
45	2230	R	19			@ 43.0 ft. PEBBLE CONGLOMERATE, matrix supported, mostly 1/2-2" in diameter clasts in a fine to coarse grained sand matrix, yellow brown to yellow gray, moist, hard.	3.9	132	41	
						@ 46.0 ft. faint biotite rich laminations in sandy lenses, cross bedded, discontinuous, overall decrease in clast size to mostly granules for 3'.				
50	2225	R	22				2.3	128	21	
55	2220	B				@ 56.0 ft. increased cohesion/cementation, hard.				
						@ 57.0 ft. greater abundance of clasts, mostly 1/2-1" in diameter, subangular to subrounded, igneous and metamorphic.				
60	2215									
65	2210					TOTAL DEPTH 65.0 FT NO GROUNDWATER ENCOUNTERED CAVING OBSERVED @ 6.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind		
DATE STARTED	7/22/04	GROUND ELEV.	2280	BORING DESIG.	B-081
DATE FINISHED	7/22/04	GW DEPTH (FT)		LOGGED BY	SJD
DRILLER	Al Roy Drilling	DRIVE WT.	SEE NOTE	NOTE	0-24'=2150 lb
TYPE OF DRILL RIG	18" Bucket Auger	DROP	12 in.		25-44'=1350 lb
					45-65=650lb/65+=1150lb

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2280				SM	ALLUVIUM (Qal): SILTY SAND, fine to coarse-grained, trace gravel, reddish brown, dry to slightly moist.				
5	2275	R	4			@ 5 ft. slightly moist, medium dense.	5.2	96	19	
10	2270	R	3				5.0	110	26	
15	2265	R	5				5.5	112	31	CON, HY
						@ 17 ft. slightly moist to moist, fine-grained.				
20	2260	R/B	3			@ 20 ft. moist.	6.1	110	32	
25	2255	R	30 for 11"		SM	OLDER ALLUVIUM (QTst): SILTY SAND, fine-grained, trace medium to coarse-grained, reddish brown to yellowish brown, moist, dense.	6.8	128	61	
30	2250	R	32 for 8"			@ 30 ft. coarse-grained, reddish brown.	5.6	119	38	
					ML	@ 32 ft. SANDY SILT, fine-grained SAND, yellowish brown to reddish brown, moist, stiff.				
35	2245	R	30 for 8"		SM	@ 35 ft. SILTY SAND, fine to coarse-grained, some GRAVEL, reddish brown, slightly moist, dense.	5.3	118	35	
						TOTAL DEPTH 36 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-47

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-095
DATE STARTED	9/15/04	GROUND ELEV.	2225	LOGGED BY	FE
DATE FINISHED	9/15/04	GW DEPTH (FT)	15	NOTE	0-22'=2400lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		23-42'=
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		1200lb.43-65'=850lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2225				SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SAND, light yellow brown, dry, loose.				
5	2220	R	1				3.0			
					SM	ALLUVIUM (Qal): SILTY SAND, medium gray brown, moist, moderately dense, fine to medium grained.				
10	2215	R B	1			@ 10.0 ft. moist to very moist.	13.2	113	75	CON, HY MAX. CHEM HY
15	2210	R	2		SM	INTERMEDIATE-AGE ALLUVIUM (Qia): SILTY SAND, fine grained, dense, very moist to wet, some clay, brown and olive gray, slightly mottled, water entering boring @ 15.0 ft and 24.0 ft.	14.6	121	95	
20	2205	R	Push		ML	@ 20.0 ft. SANDY SILT to CLAYEY SILT, brown, very moist, soft, some fine grained sand.	19.1	110	95	
25	2200	R B	1			@ 25.0 ft. interlensed SAND and CLAYEY SILT, light gray to brown, soft, very moist to wet, sand is fine to coarse grained.	21.0	105	92	
30	2195	R	1				22.4	104	94	
35	2190					@ 34.0 ft. dark blueish gray.				
40	2185					TOTAL DEPTH 40.0 FT GROUNDWATER ENCOUNTERED @ 15.0 & 20.0 FT CAVING @ 40.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-54

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-096
DATE STARTED	9/16/04	GROUND ELEV.	2232	LOGGED BY	FE
DATE FINISHED	9/16/04	GW DEPTH (FT)		NOTE	0-22'=2400lb, 23-42'=1200lb, 43-65'=850lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	2230				SM/SP	**ALLUVIUM** (Qal): interlensed SAND and SILTY SAND, light brown to light gray, fine to coarse grained, dry to slightly moist, abundant visible porosity, some clay, trace of gravel, loose, trace gravel.				
5		R	Push				3.9	103	17	CON, HY
	2225									
10						@ 10.0 ft. subrounded metamorphic clasts to 2" in diameter.				
		R	1			@ 11.0 ft. sharp contact, dark gray to black, moist, firm, some visible porosity.	14.4	112	79	CON, HY
	2220	B								DSR, MAX, HY, CHEM
					SM	**INTERMEDIATE-AGE ALLUVIUM** (Qia): SILTY SAND, light brown and olive gray, slightly mottled, moist, moderately dense, fine to medium gray, iron oxide, some clay, weathered.				
15		R	1				12.3	115	75	
						@ 16.0 ft. less weathered, dense.				
	2215									
20		R	4			@ 20.0 ft. brown and olive gray, mottled, moist, very dense, fine to coarse grained.	6.6	123	50	
	2210				SP	@ 22.0 ft. SAND, light yellow brown, fine to coarse grained, slightly moist, dense, some gravel to 1/8" in diameter.				
25		B								
					SM	@ 26.0 ft. SILTY SAND, light yellow brown, fine to coarse grained, slightly moist, dense.				
	2205					@ 26.0 ft. N35E, 20SE - erosional surface.				
30		R	3				12.5	118	82	
						SAN TIMOTEO FORMATION (QTst): fine SANDY SILTSTONE, light yellow brown, moist to very moist, moderately hard, massive, trace gravel.				
	2200					@ 31.0 ft. N30E, 15SE - contact.				
35						@ 33.0 ft. CLAYEY SILTSTONE, light olive gray, moist to very moist, very stiff, massive, some fine grained SAND.				
	2195	B								
40		R	10				12.5	118	82	
						TOTAL DEPTH 41.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-55

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C-1

LABORATORY TEST RESULTS (AGS)

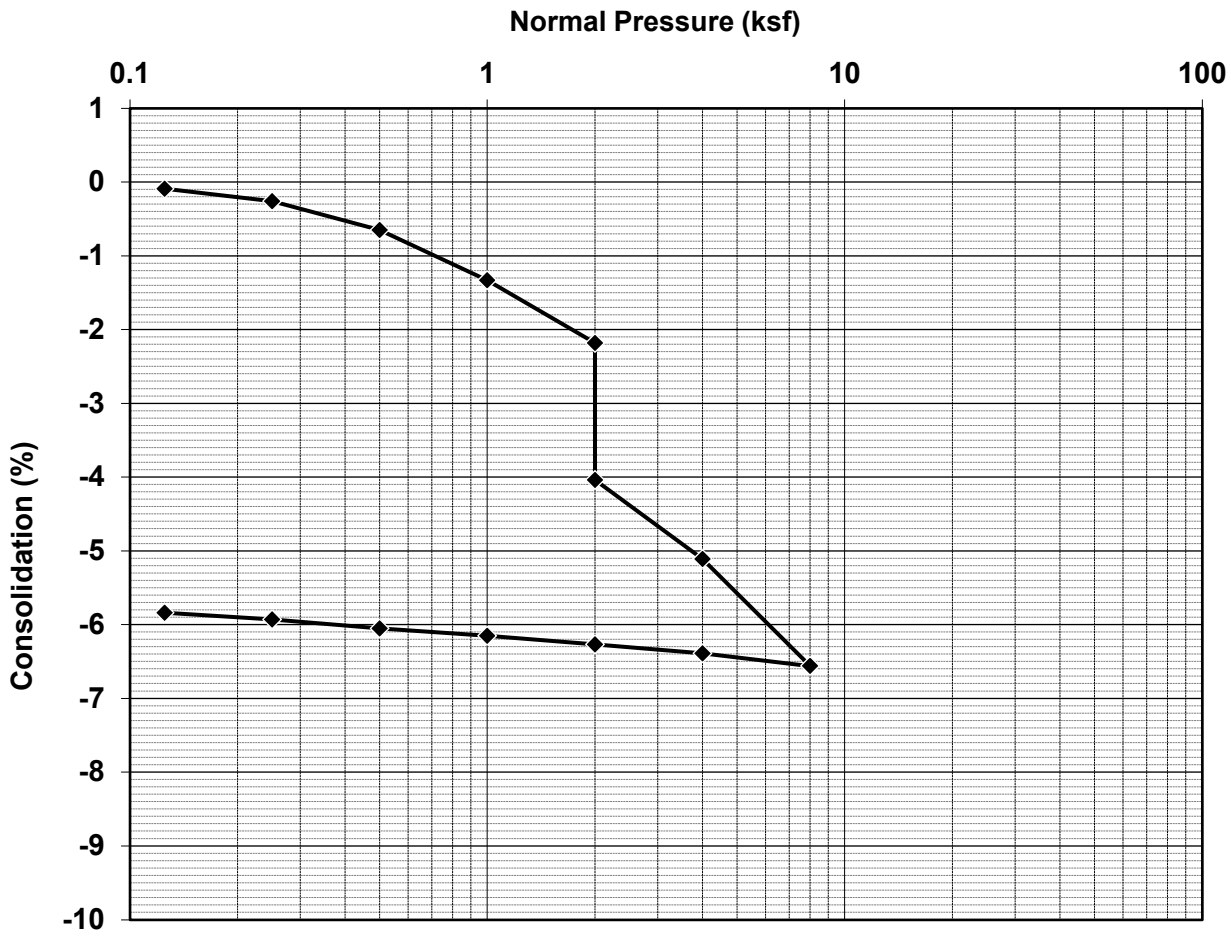
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-1
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.9%	15.3%
Void Ratio, e	0.57	0.48
Saturation, S	14%	86%
Dry Density (pcf)	107.4	114.1
Wet Density (pcf)	110.5	131.5

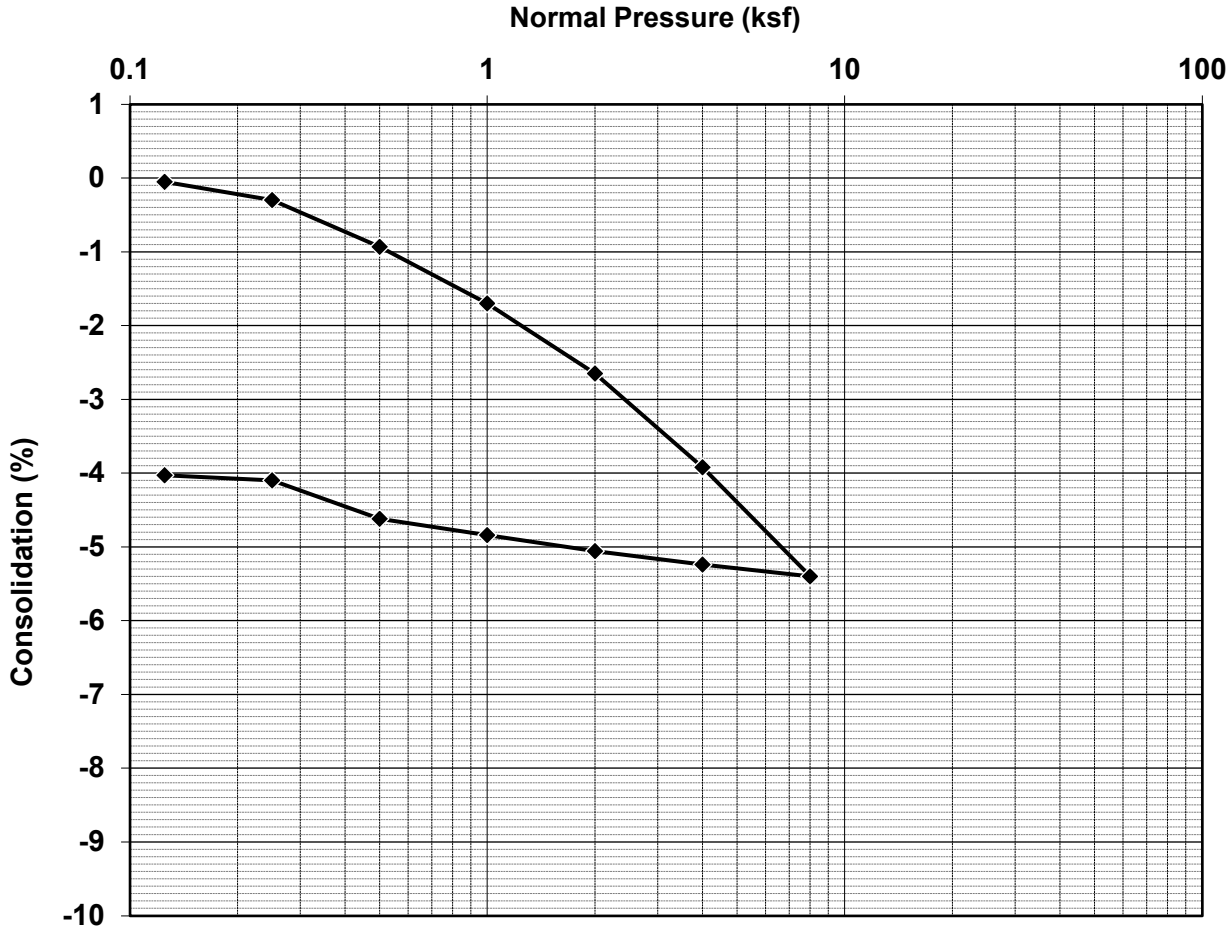
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	15 ft
Project No:	2001-04	Description:	Qal- Sandy Silt with Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	16.9%	22.2%
Void Ratio, e	0.64	0.57
Saturation, S	72%	105%
Dry Density (pcf)	102.8	107.1
Wet Density (pcf)	120.2	131.0

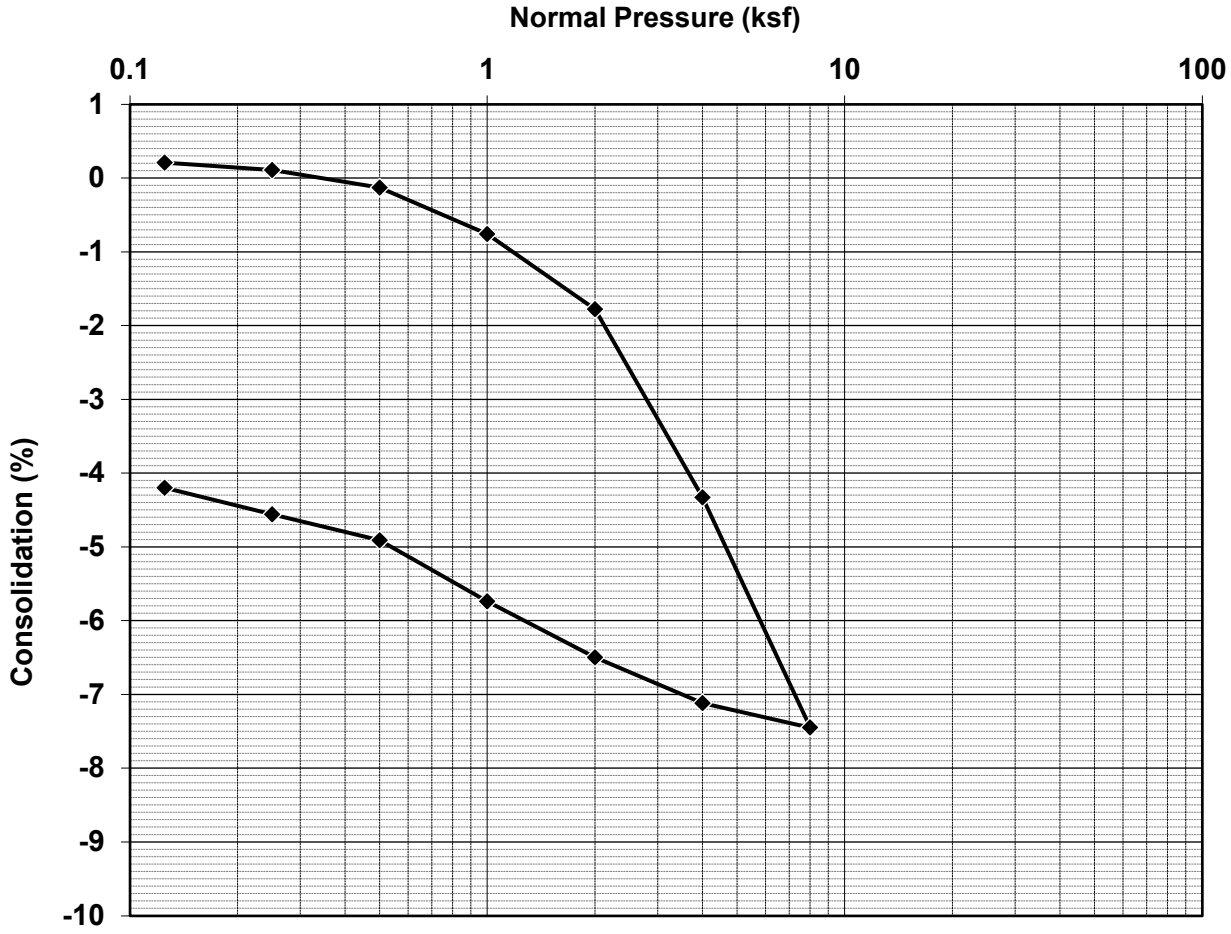
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	25 ft
Project No:	2001-04	Description:	Qal- Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.6%	27.4%
Void Ratio, e	0.82	0.74
Saturation, S	85%	100%
Dry Density (pcf)	92.7	96.8
Wet Density (pcf)	116.5	123.2

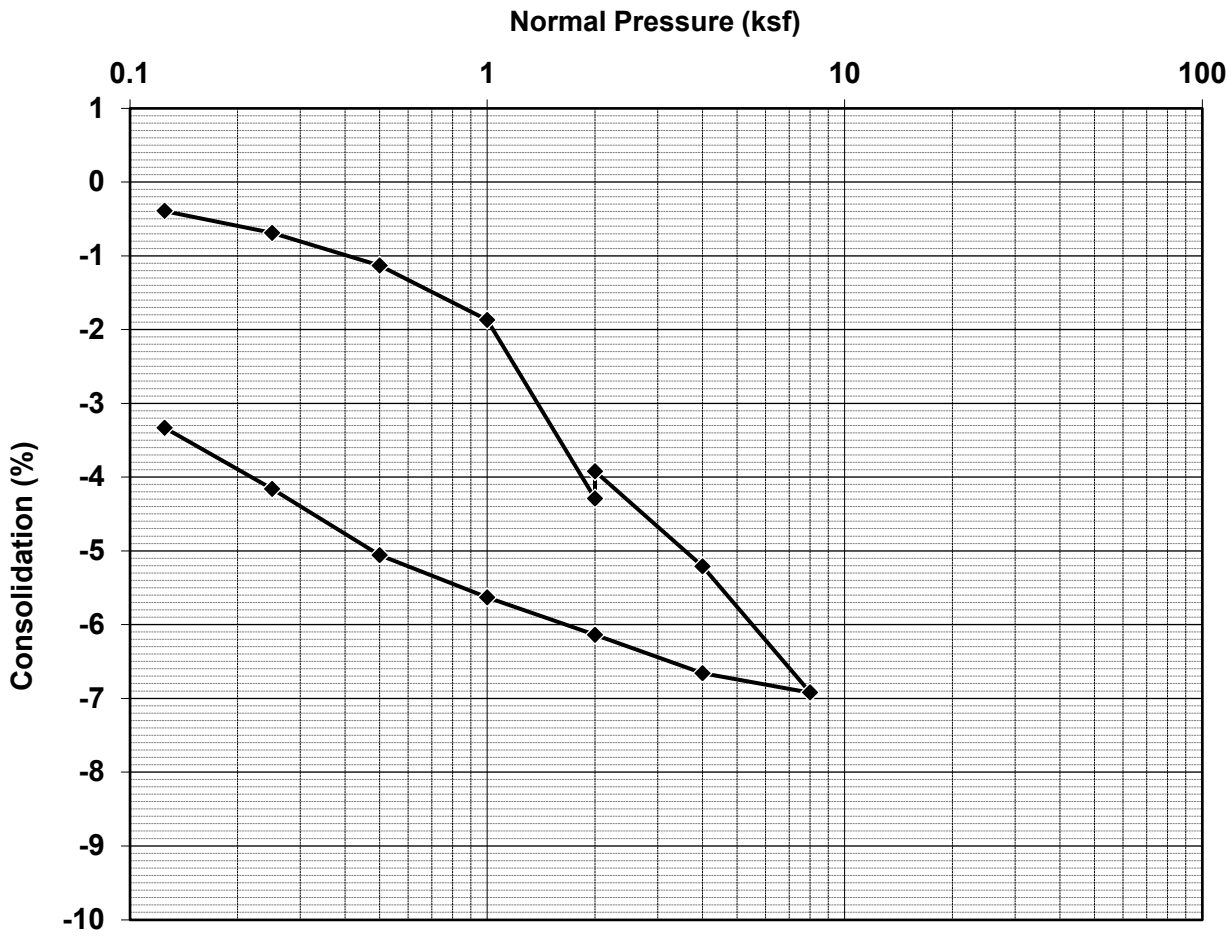
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qal- Sandy Silt
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	19.4%	34.5%
Void Ratio, e	0.91	0.84
Saturation, S	58%	111%
Dry Density (pcf)	88.4	91.5
Wet Density (pcf)	105.5	123.0

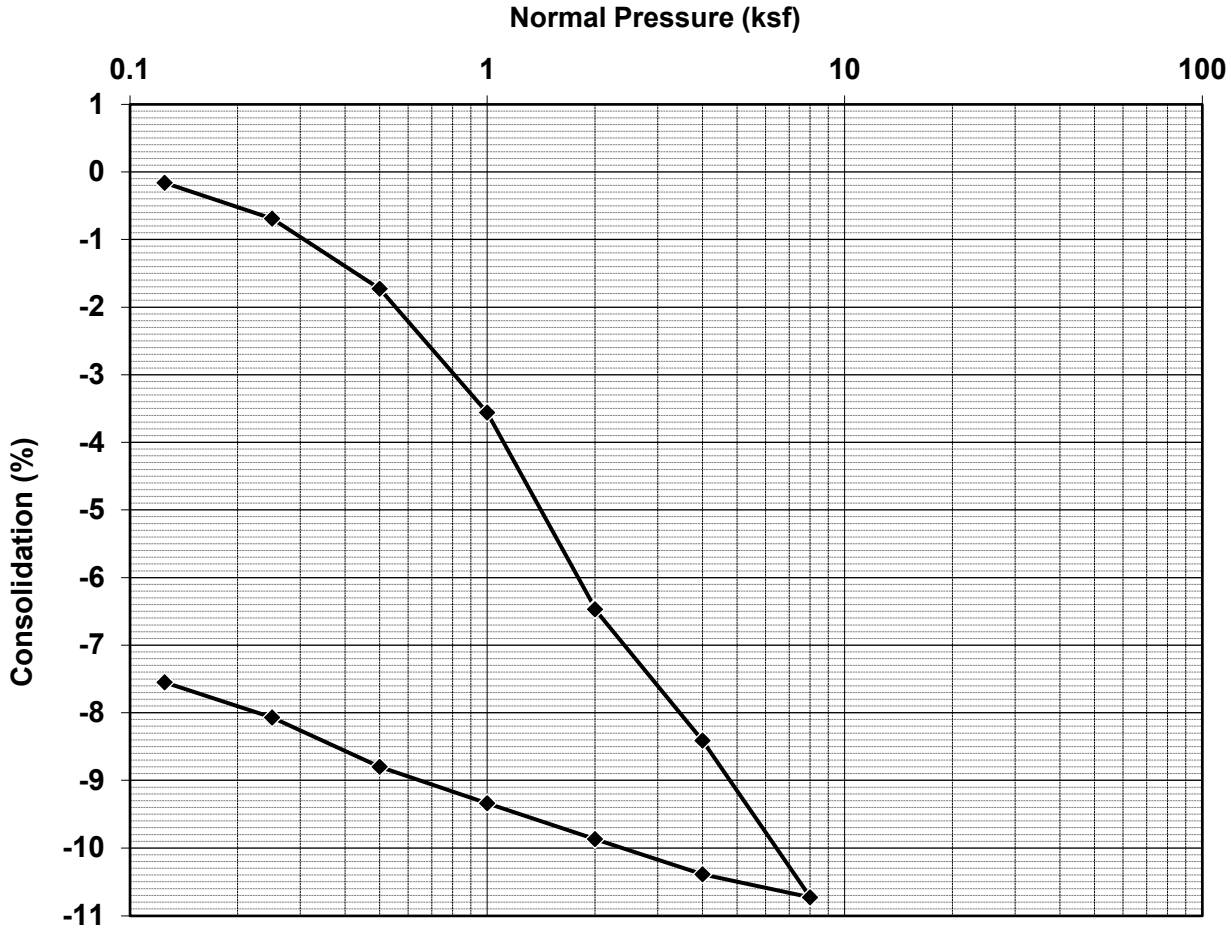
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qal- Sandy Silt with Peat
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	18.3%	34.0%
Void Ratio, e	0.81	0.67
Saturation, S	61%	137%
Dry Density (pcf)	93.3	100.9
Wet Density (pcf)	110.4	135.3

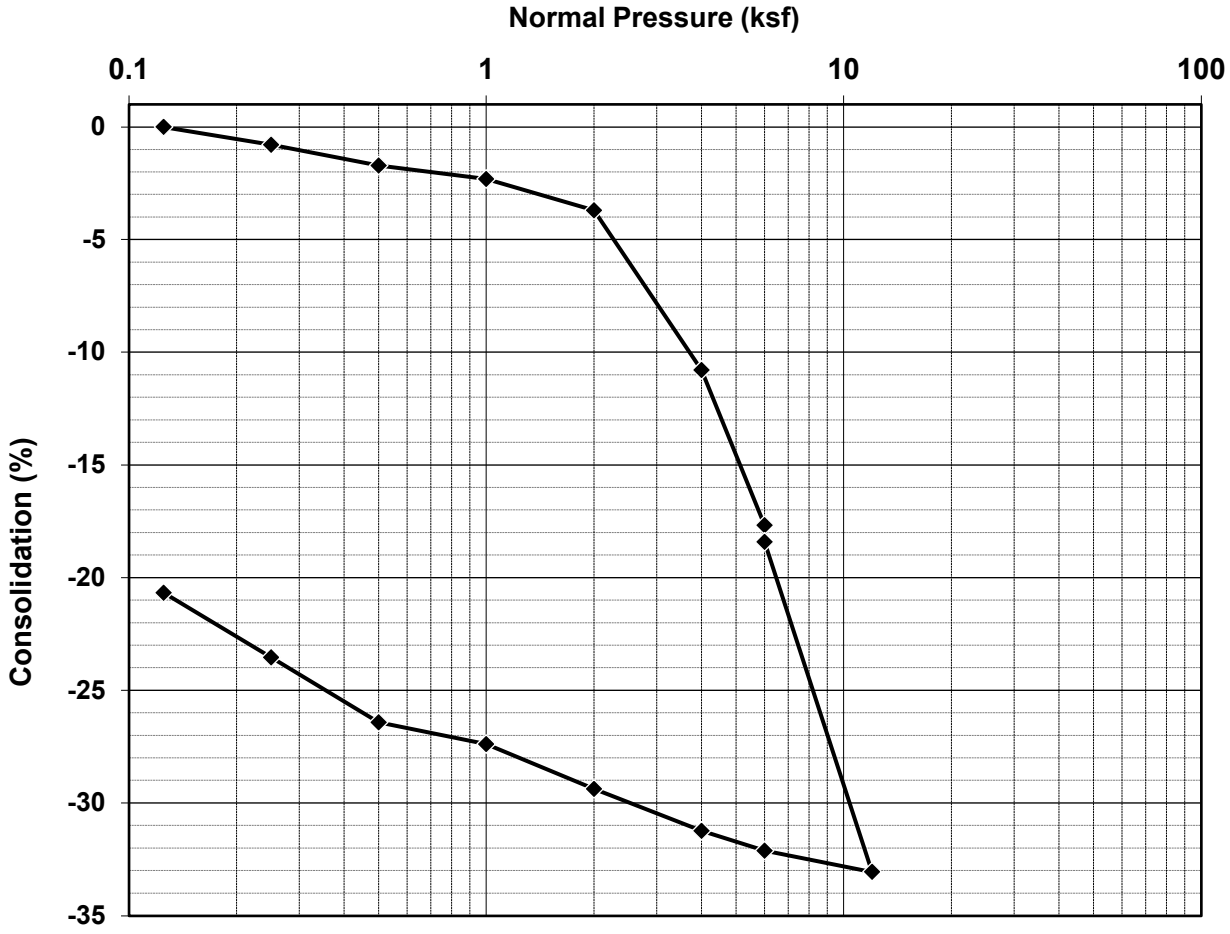
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Black Peat
Date:	9/10/2011	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w		143.9%
Void Ratio, e		
Saturation, S		
Dry Density (pcf)		33.1
Wet Density (pcf)	75.6	80.7

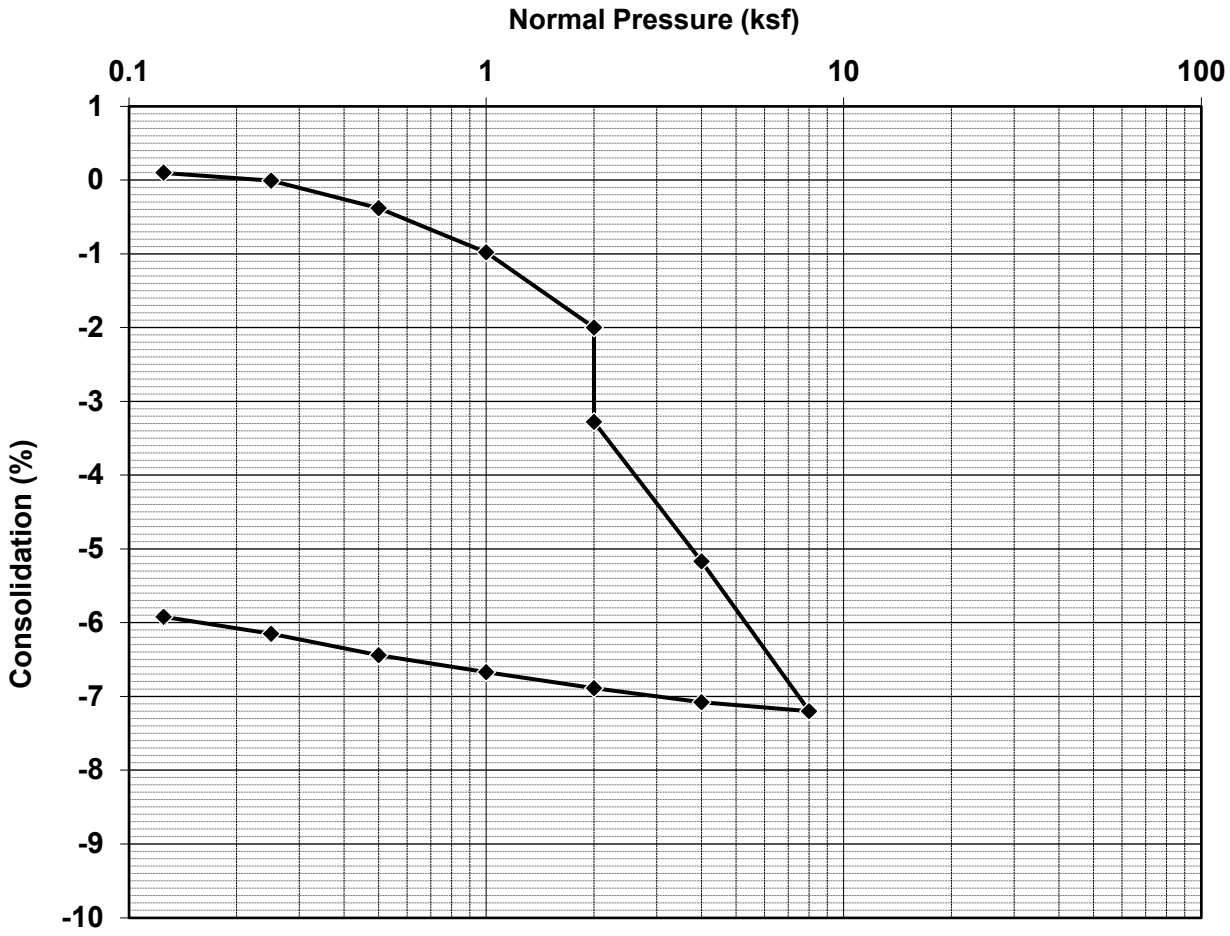
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	15.0%
Void Ratio, e	0.53	0.43
Saturation, S	26%	93%
Dry Density (pcf)	110.5	117.4
Wet Density (pcf)	116.1	135.0

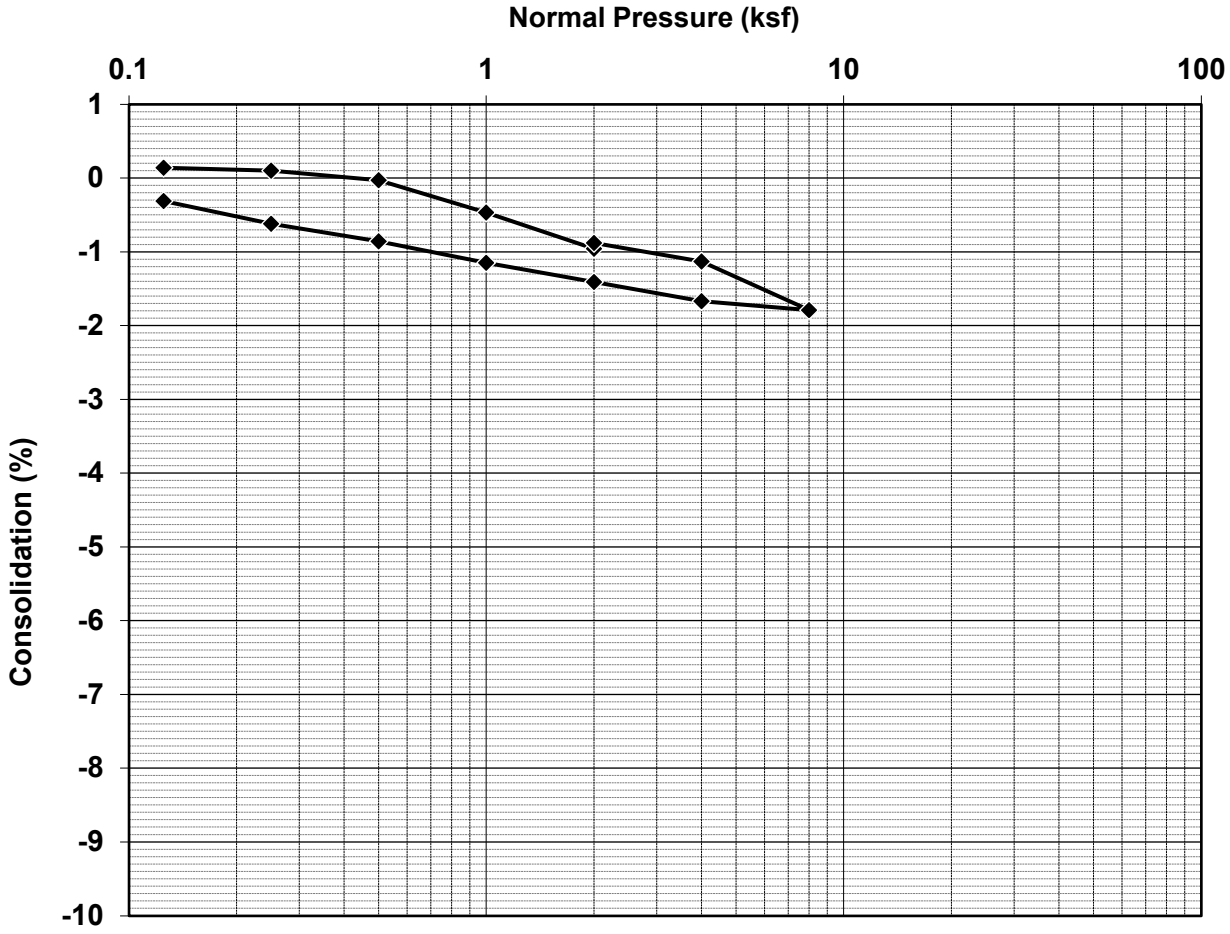
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/10/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	11.4%	17.0%
Void Ratio, e	0.46	0.46
Saturation, S	66%	100%
Dry Density (pcf)	115.1	115.5
Wet Density (pcf)	128.3	135.1

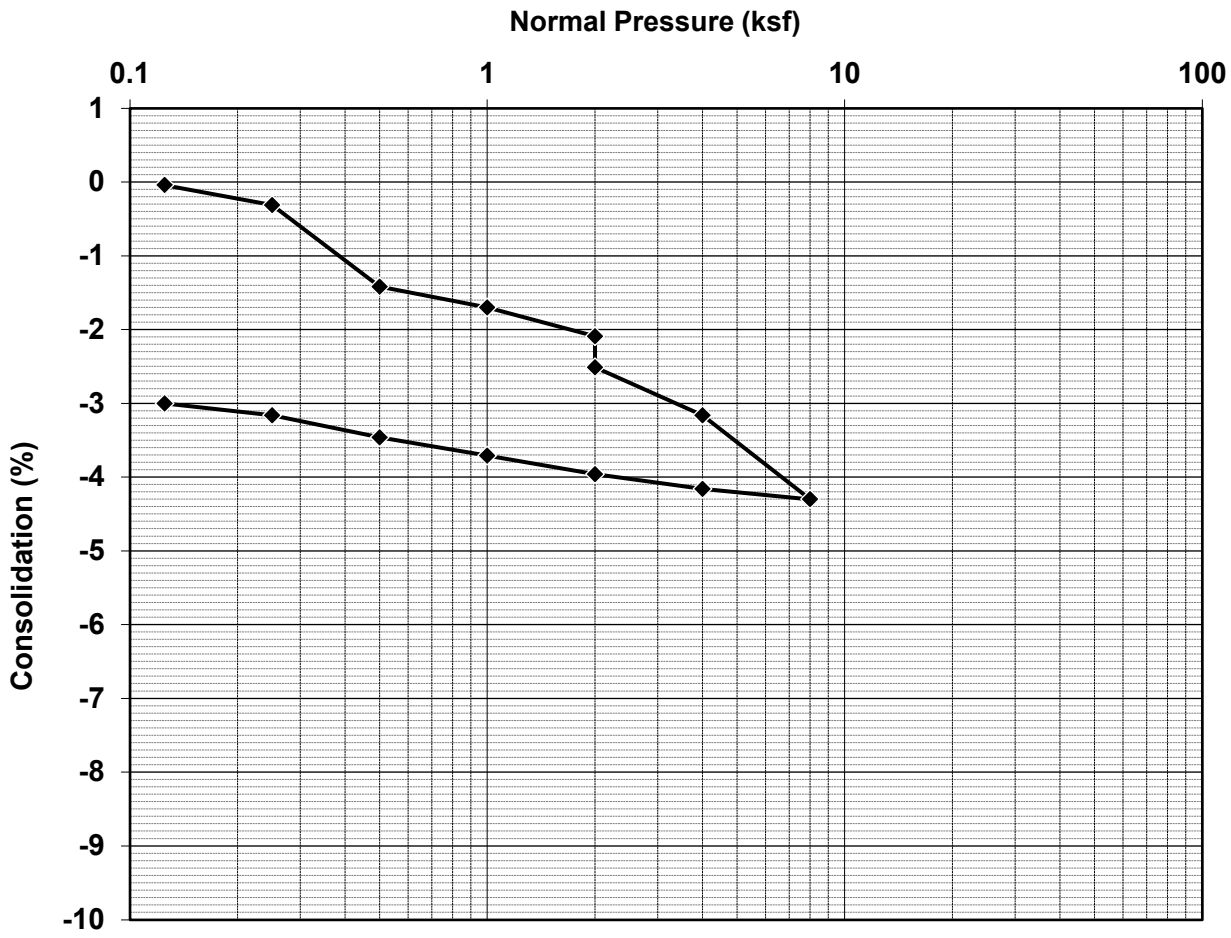
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-9
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand/Sandy Silt
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	8.5%	16.5%
Void Ratio, e	0.37	0.33
Saturation, S	62%	135%
Dry Density (pcf)	122.9	126.7
Wet Density (pcf)	133.4	147.6

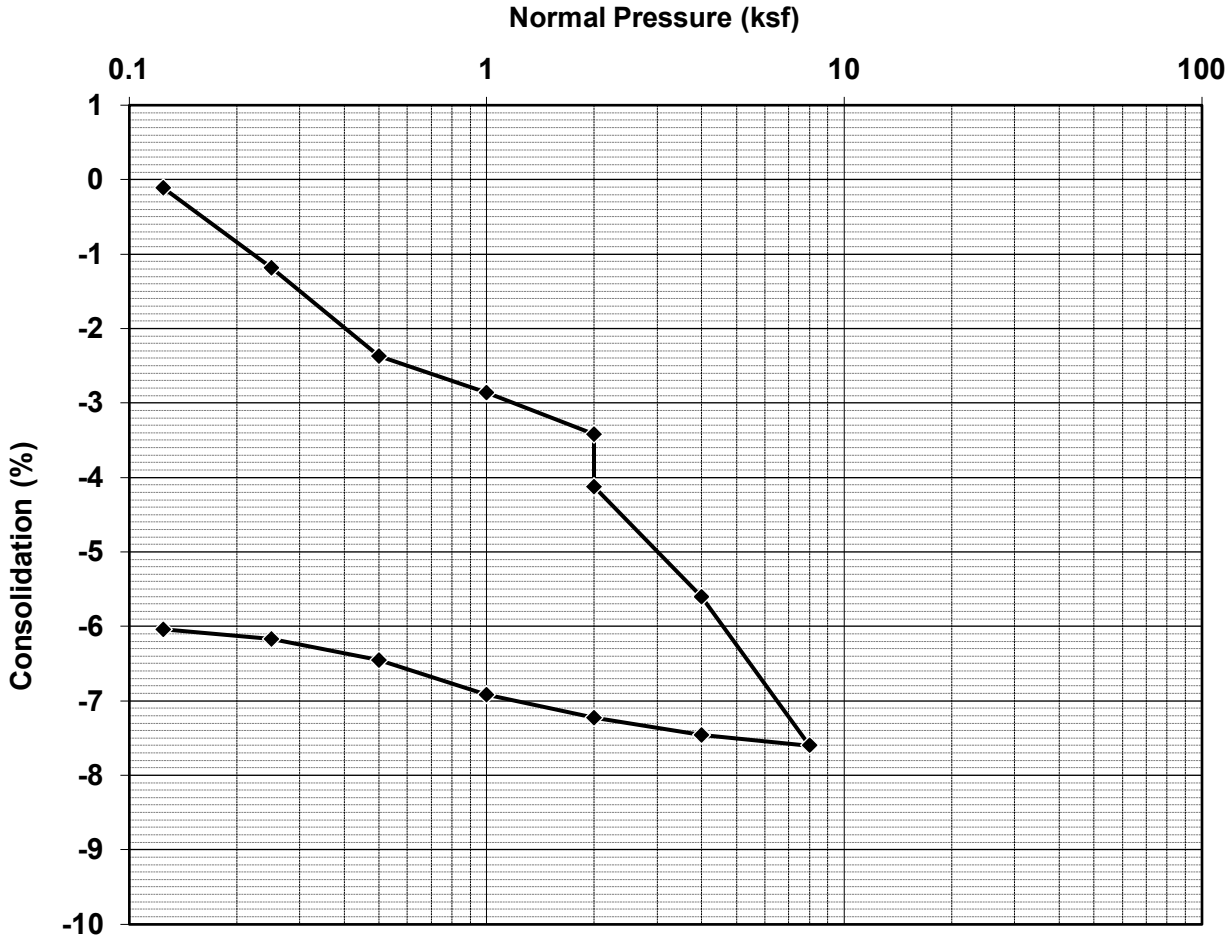
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-10
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.0%	15.9%
Void Ratio, e	0.40	0.31
Saturation, S	14%	138%
Dry Density (pcf)	120.7	128.5
Wet Density (pcf)	123.2	149.0

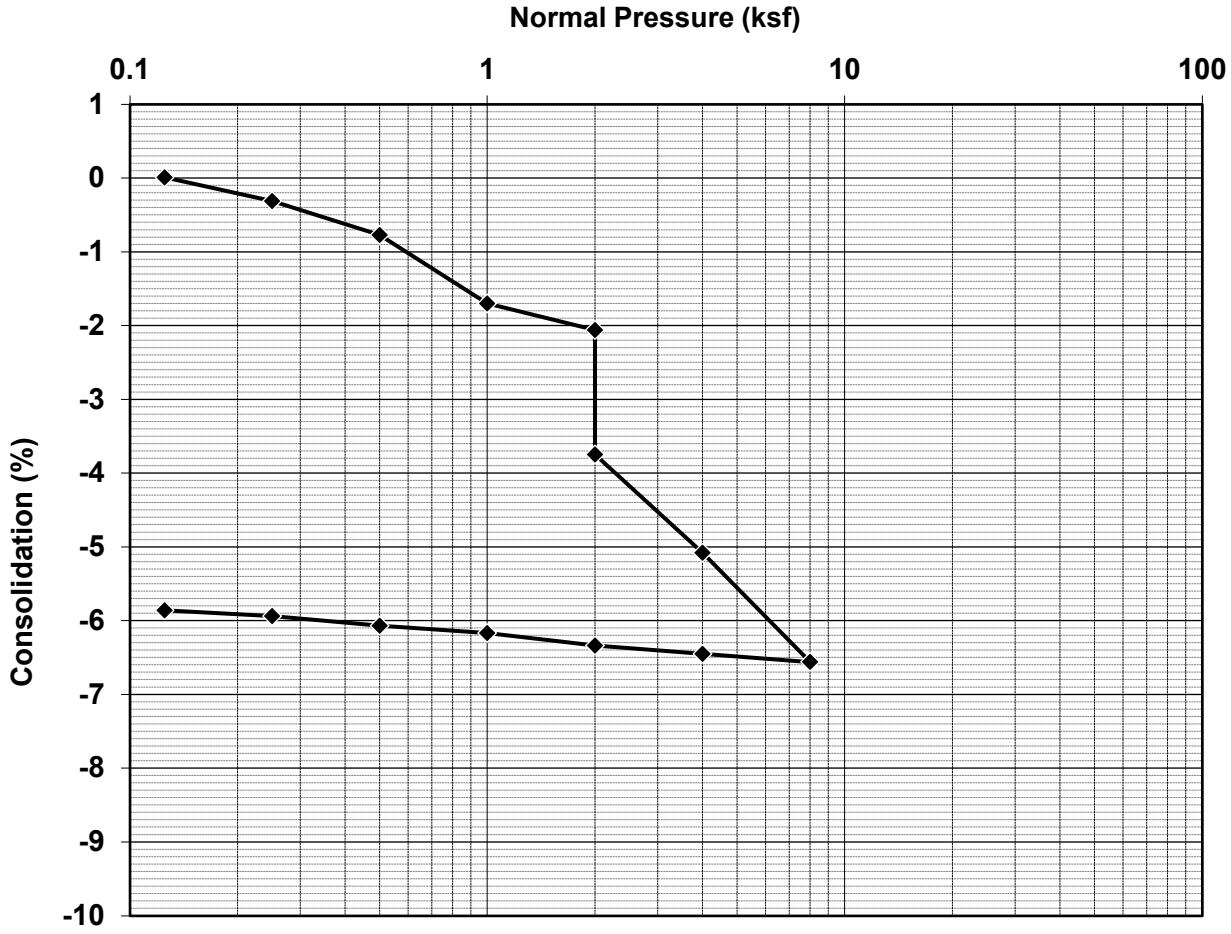
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qal- Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.4%	13.0%
Void Ratio, e	0.48	0.39
Saturation, S	13%	89%
Dry Density (pcf)	113.9	121.0
Wet Density (pcf)	116.6	136.7

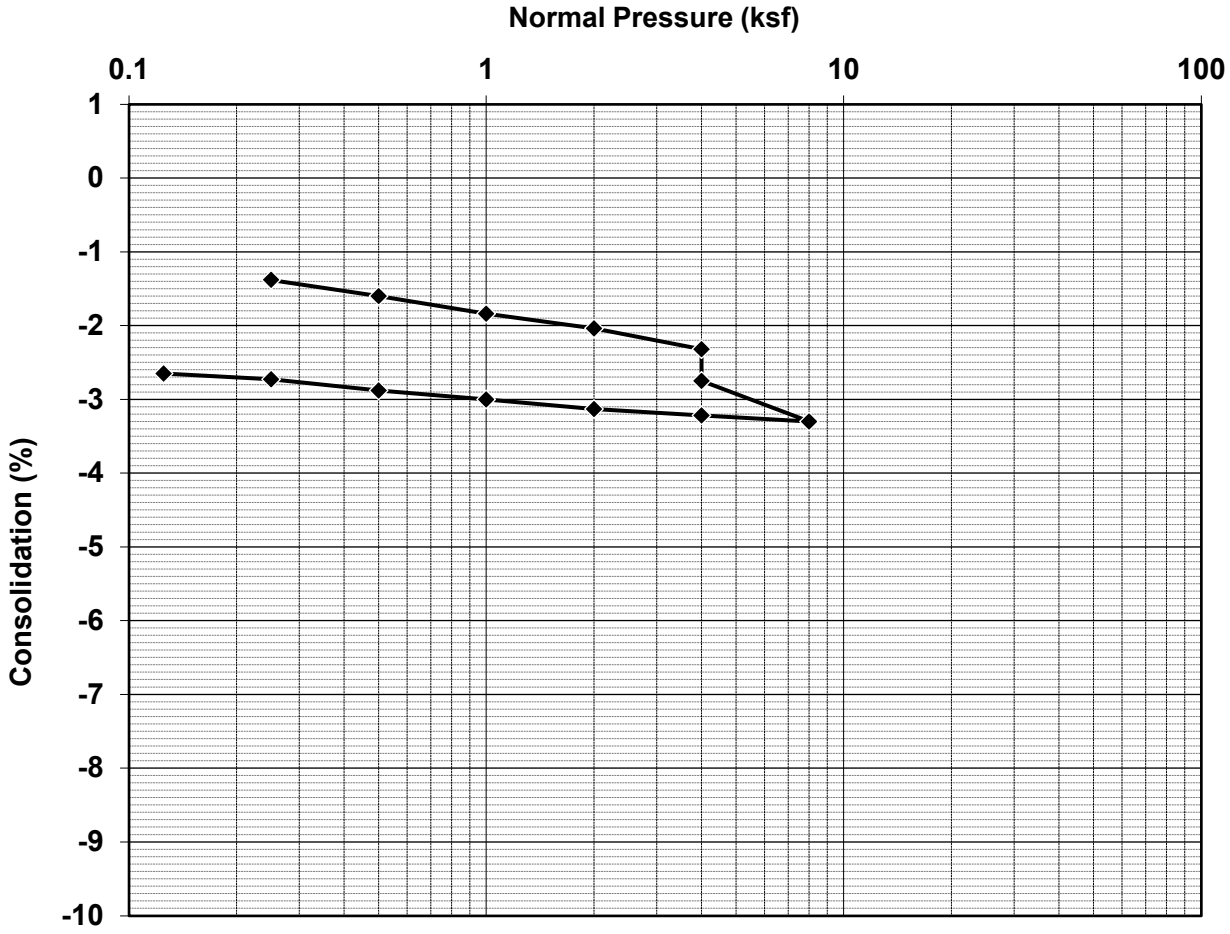
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.0%	12.0%
Void Ratio, e	0.34	0.31
Saturation, S	71%	106%
Dry Density (pcf)	125.6	129.0
Wet Density (pcf)	136.9	144.5

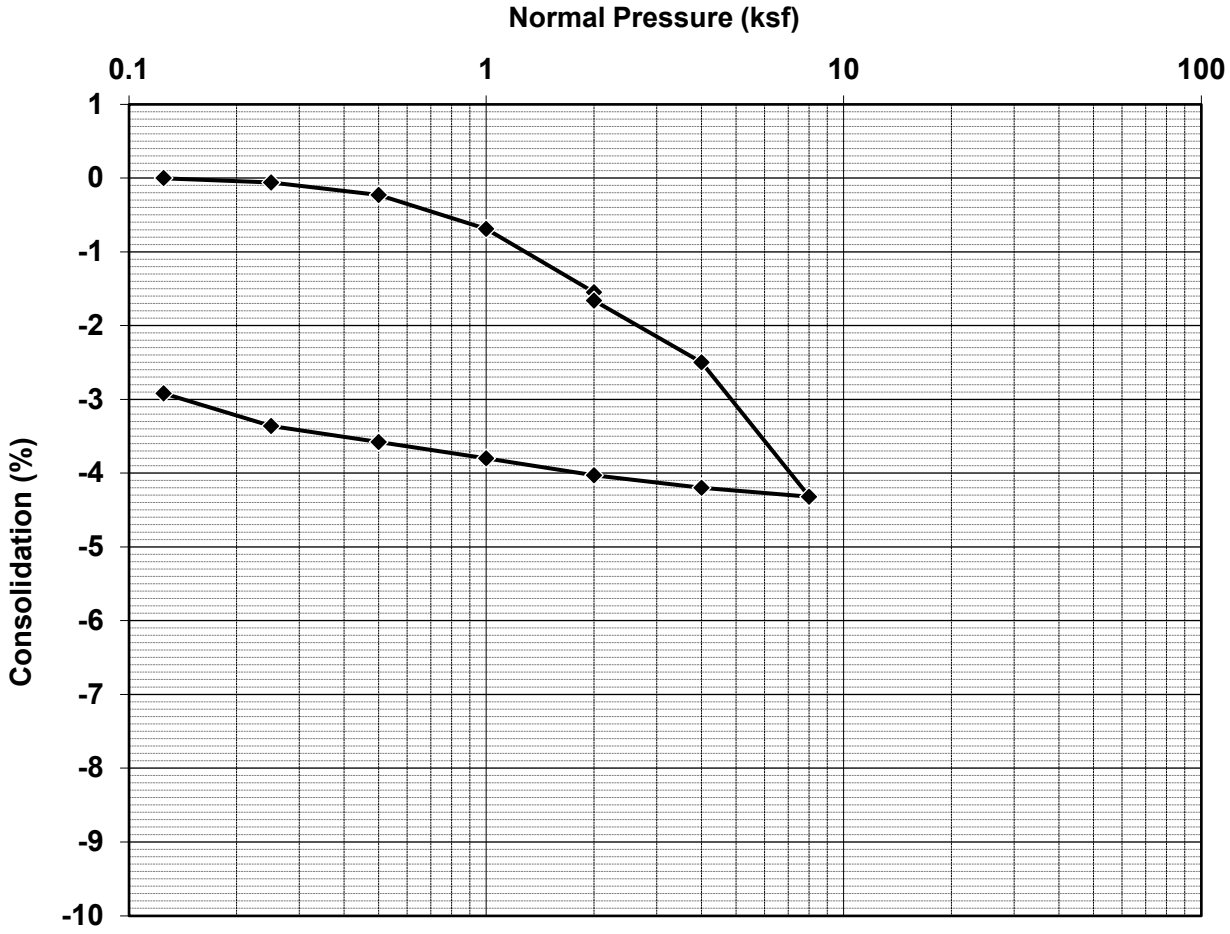
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS -14
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/22/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	14.9%
Void Ratio, e	0.40	0.36
Saturation, S	34%	111%
Dry Density (pcf)	120.0	123.6
Wet Density (pcf)	126.1	142.0

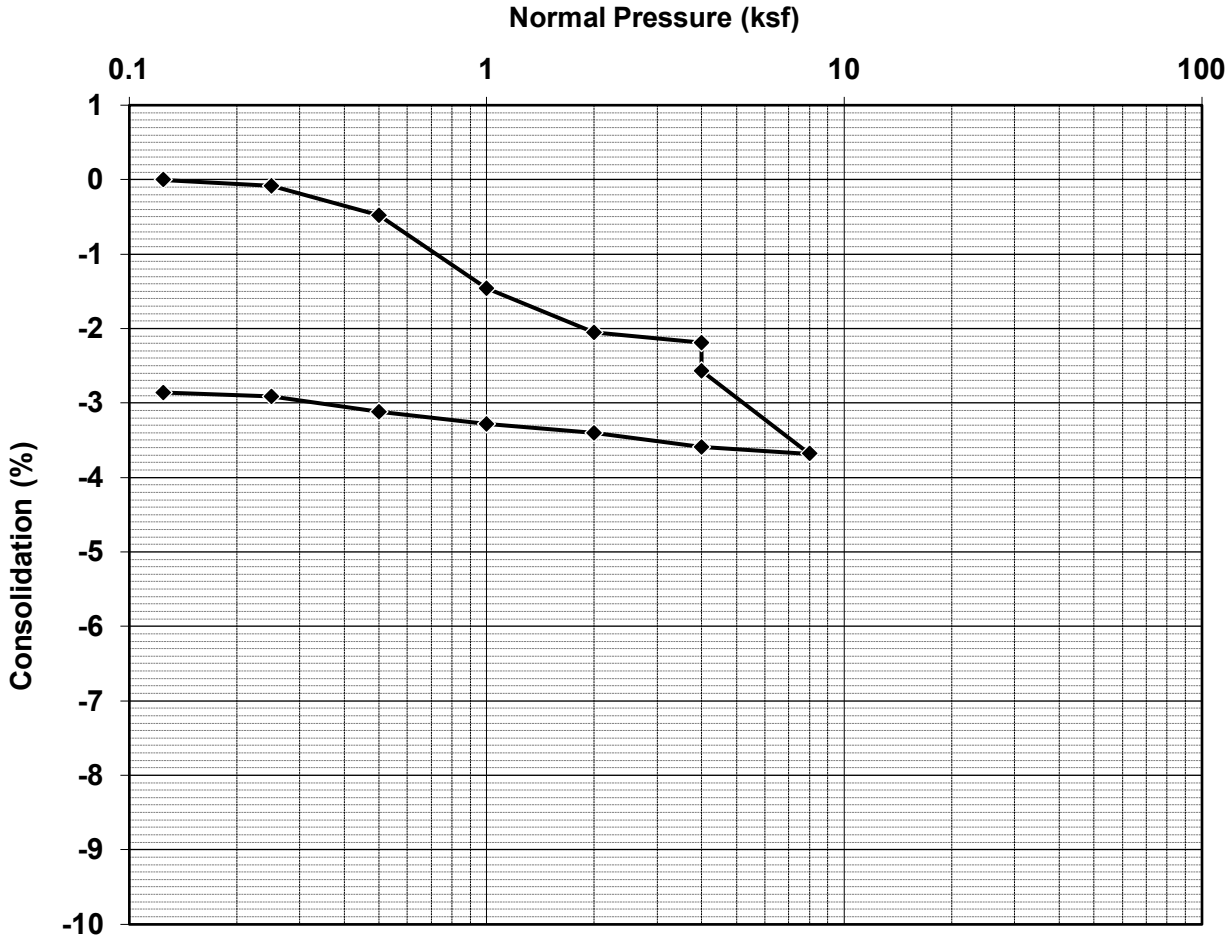
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-15
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Silty to Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.8%	12.5%
Void Ratio, e	0.36	0.32
Saturation, S	74%	106%
Dry Density (pcf)	124.1	127.8
Wet Density (pcf)	136.3	143.8

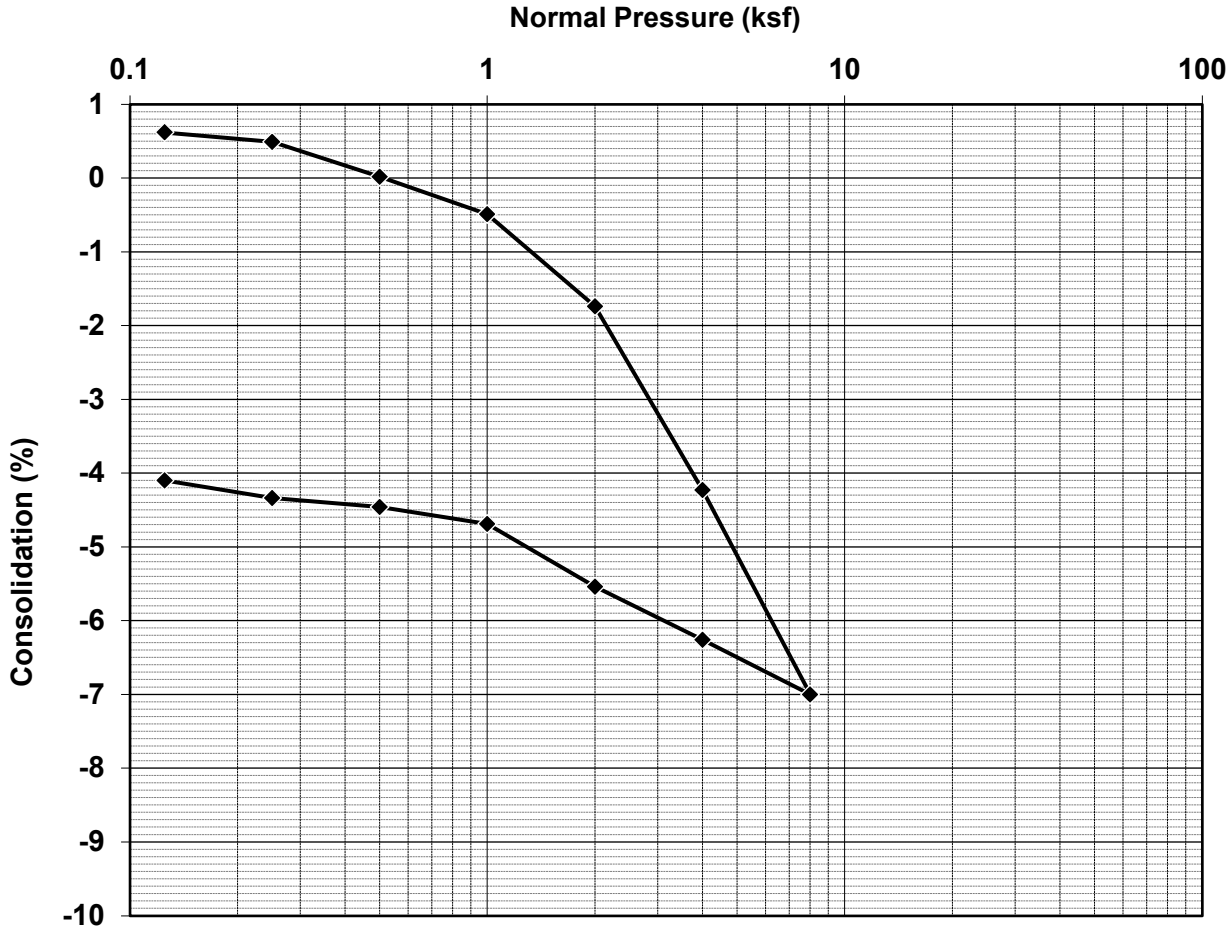
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	10 ft
Project No:	2001-04	Description:	Qal- Silty Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	21.2%	28.0%
Void Ratio, e	0.86	0.78
Saturation, S	67%	97%
Dry Density (pcf)	90.7	94.6
Wet Density (pcf)	109.9	121.1

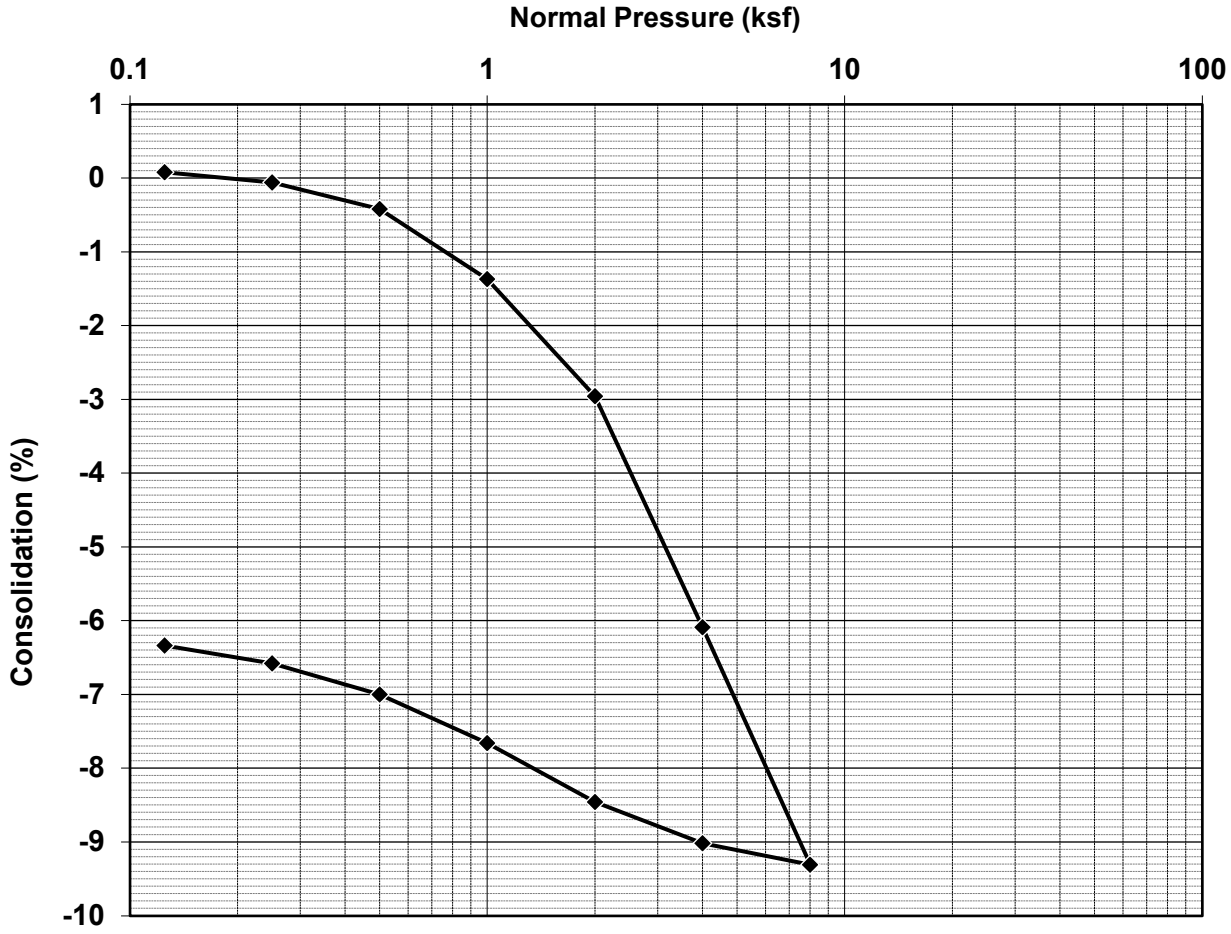
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	20 ft
Project No:	2001-04	Description:	Qal- Silty Clay with Sand
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.3%	25.5%
Void Ratio, e	0.99	0.86
Saturation, S	69%	80%
Dry Density (pcf)	84.8	90.5
Wet Density (pcf)	106.3	113.6

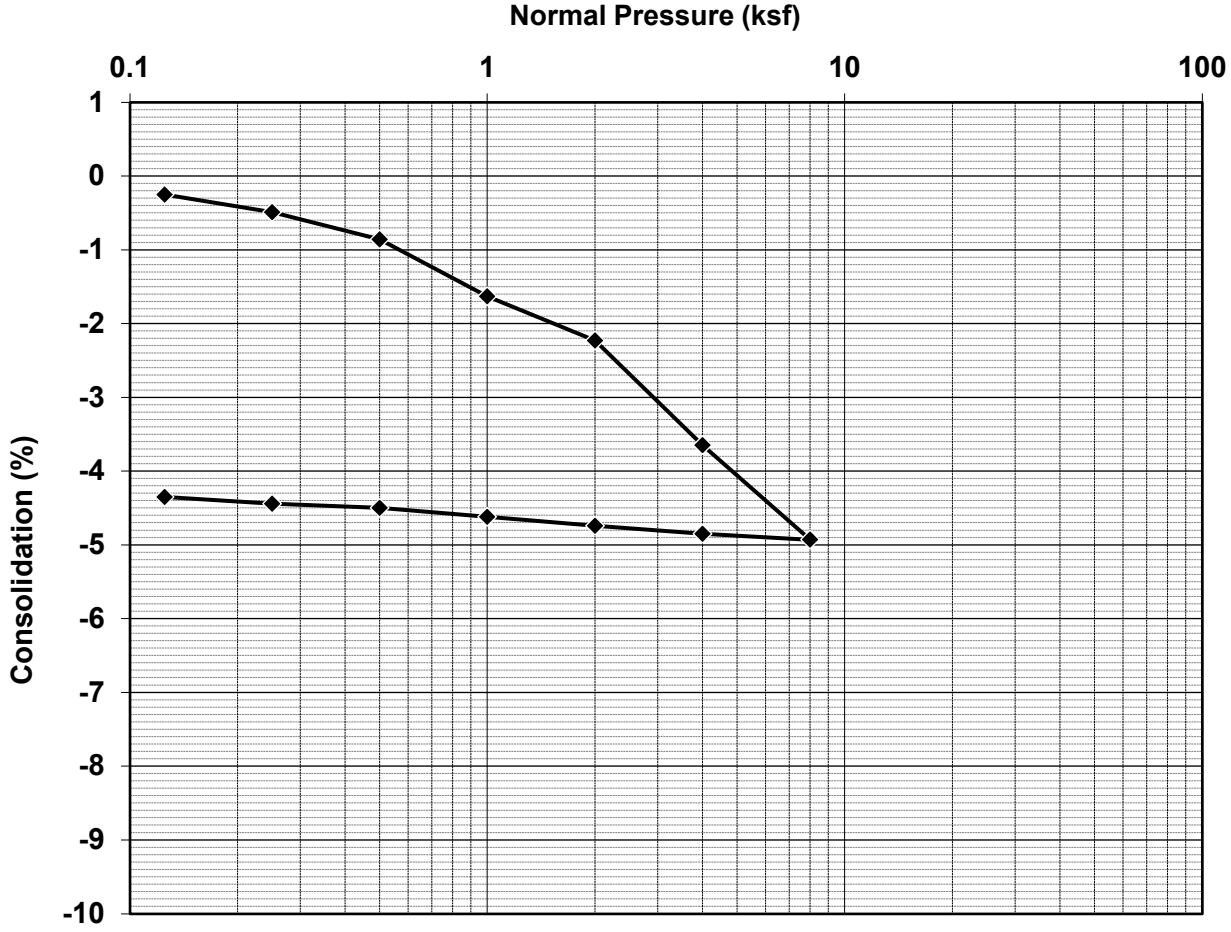
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No:	2004-01	Description:	Qoa- Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	13.9%
Void Ratio, e	0.40	0.34
Saturation, S	84%	112%
Dry Density (pcf)	120.6	126.1
Wet Density (pcf)	135.5	143.6

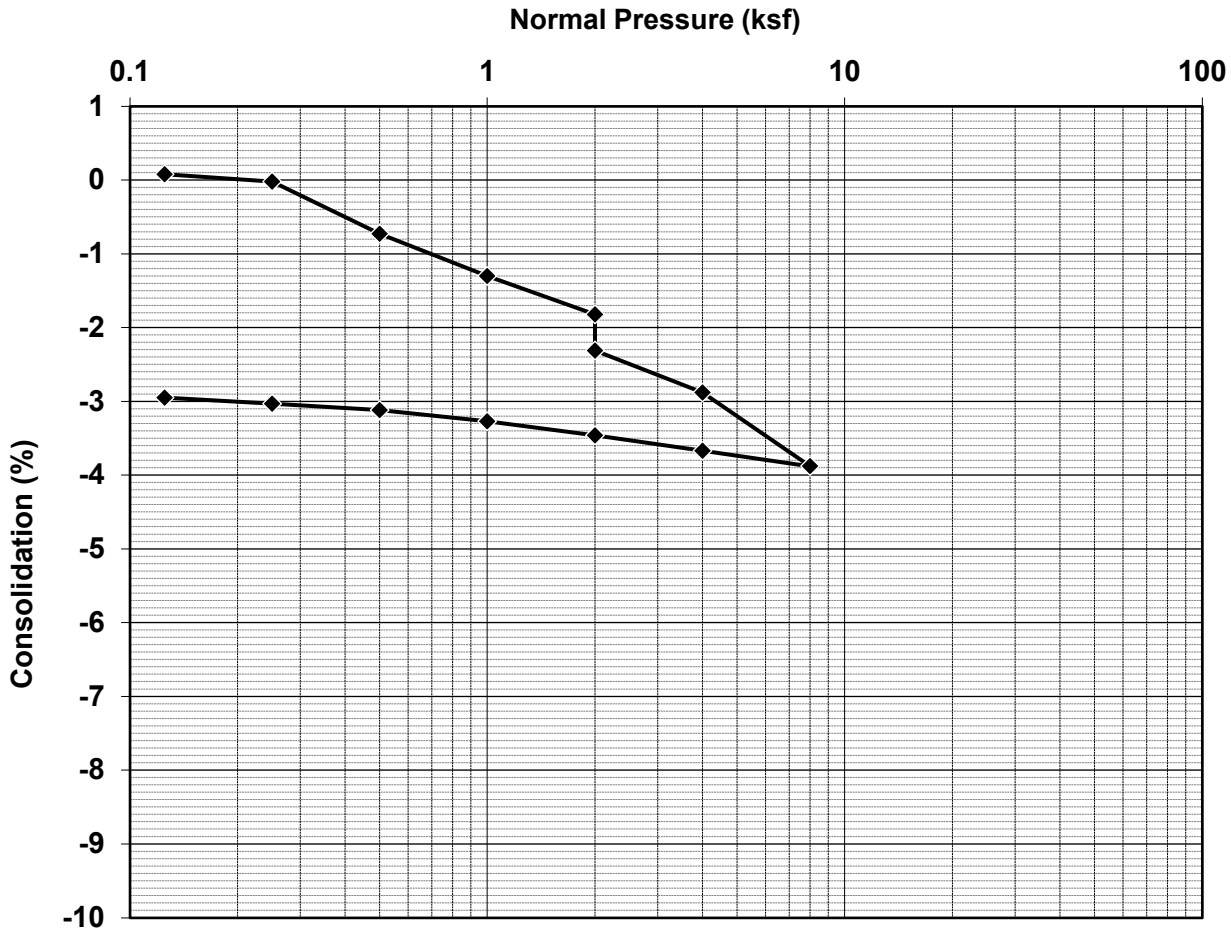
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-17
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	4.5%	14.1%
Void Ratio, e	0.41	0.37
Saturation, S	30%	104%
Dry Density (pcf)	119.6	123.3
Wet Density (pcf)	125.0	140.6

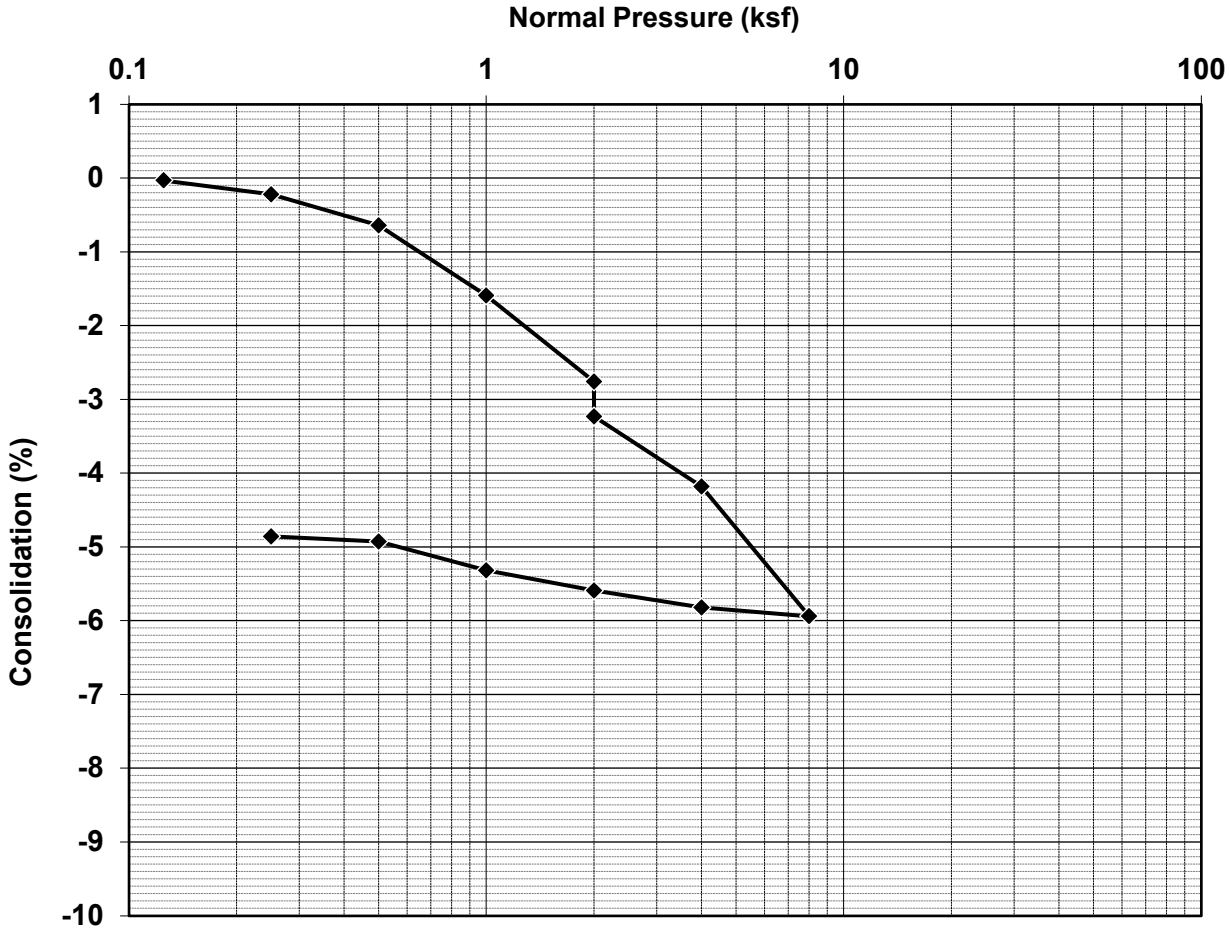
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-18
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qal- Silty Clay
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	19.0%
Void Ratio, e	0.57	0.50
Saturation, S	58%	103%
Dry Density (pcf)	107.1	112.6
Wet Density (pcf)	120.3	134.0

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

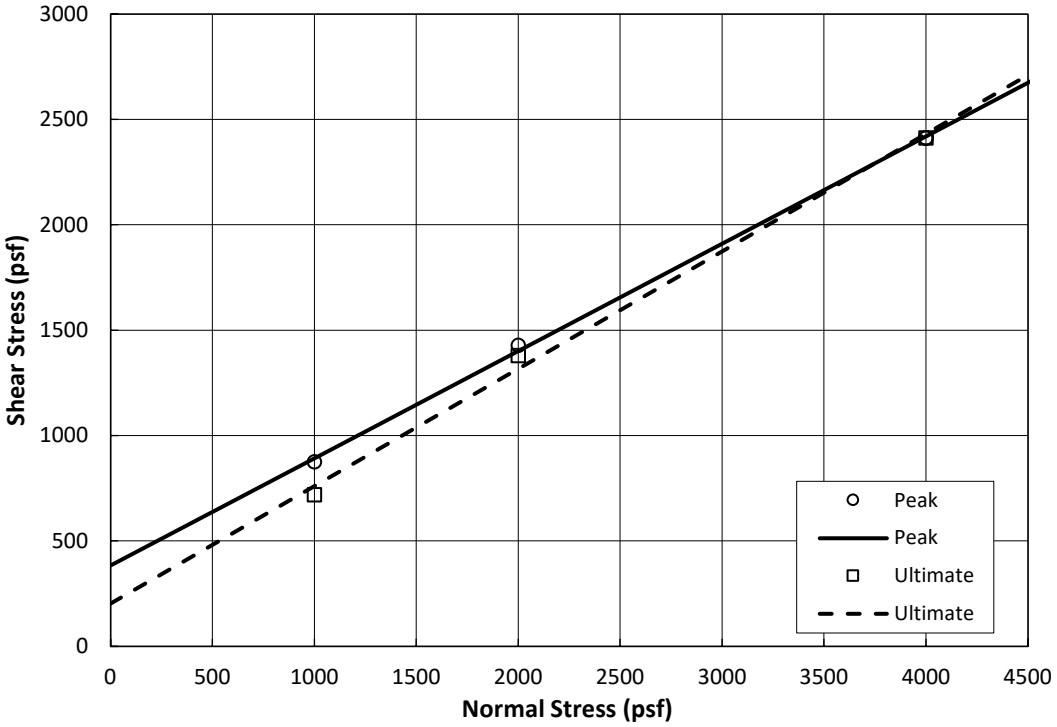
DIRECT SHEAR - ASTM D3080

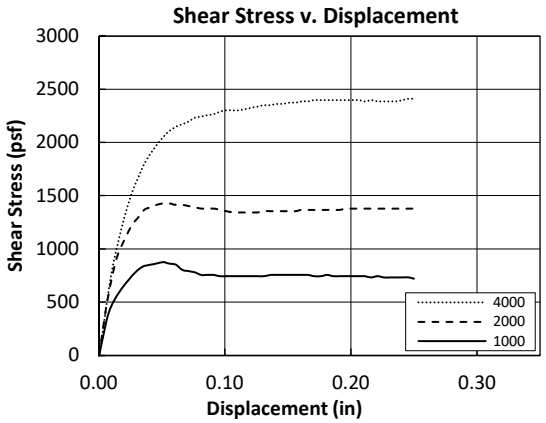
Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/19/2020	Reviewed by:	JC

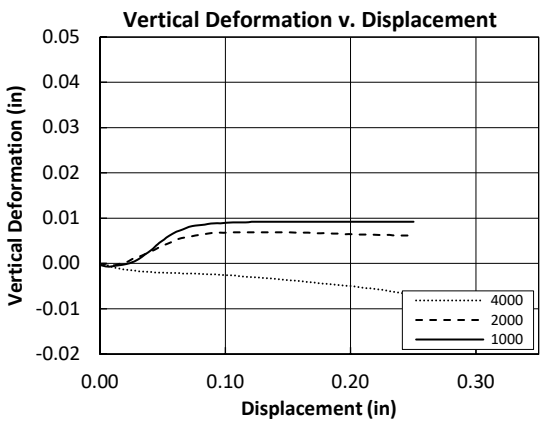
Samples Tested	1	2	3
Intial Moisture (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.5	111.5	111.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	876	1428	2412
Ult. Shear Stress (psf)	720	1380	2412

Soil Type:	Qya
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	27	29
Cohesion (psf)	384	204







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

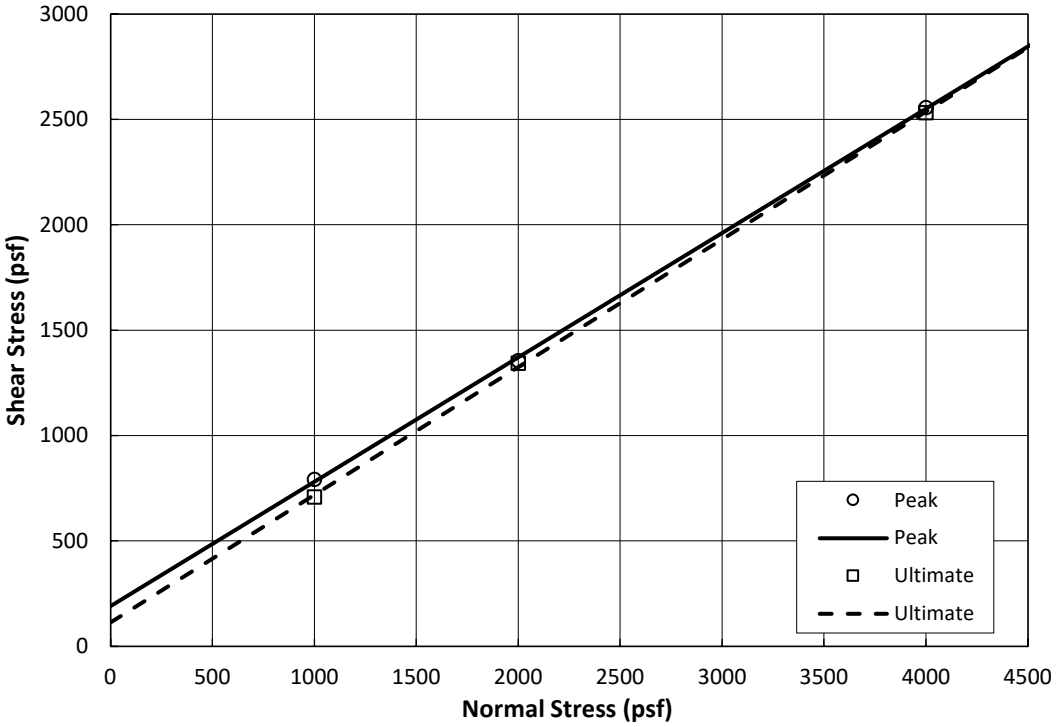
DIRECT SHEAR - ASTM D3080

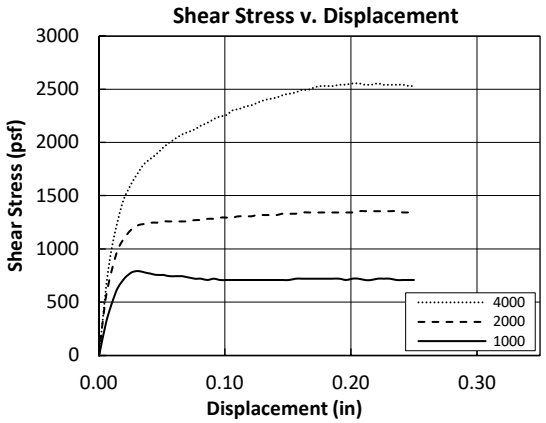
Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/20/2020	Reviewed by:	JC

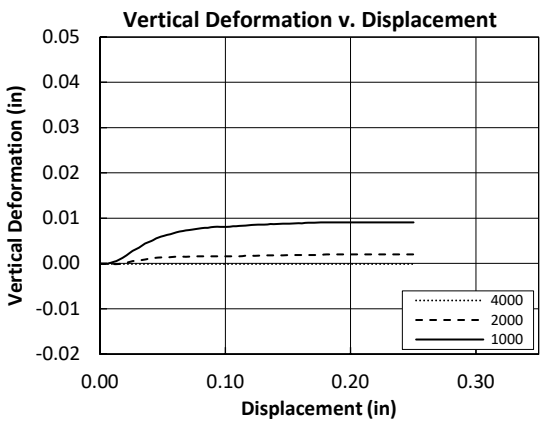
Samples Tested	1	2	3
Intial Moisture (%)	10.5	10.5	10.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	792	1356	2556
Ult. Shear Stress (psf)	708	1344	2532

Soil Type:	Qoa
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	31	31
Cohesion (psf)	192	114







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

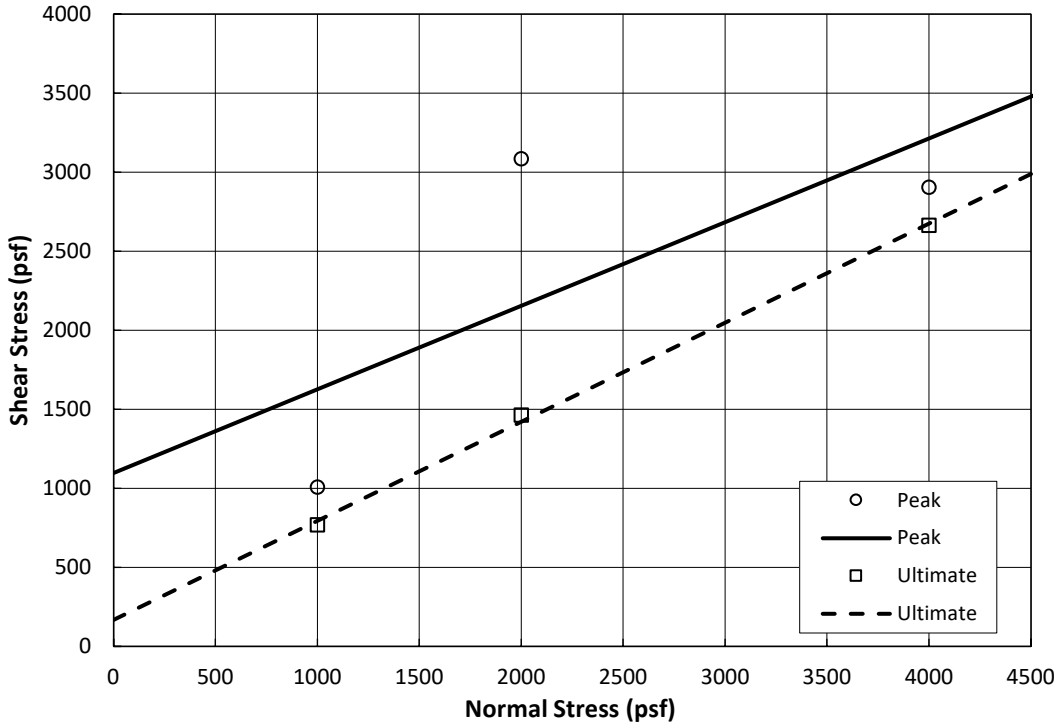
DIRECT SHEAR - ASTM D3080

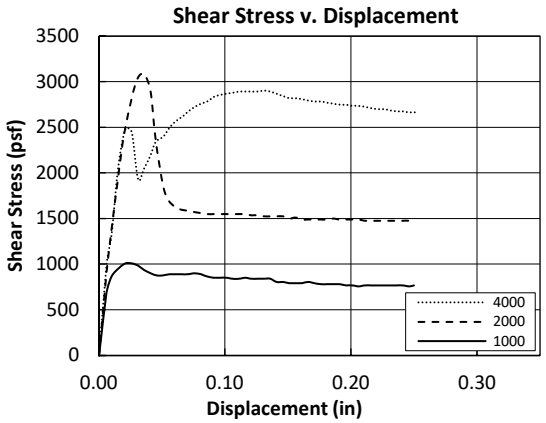
Project Name:	Oak Valley Town Center	Excavation:	AGS-2
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/3/2020	Reviewed by:	SS

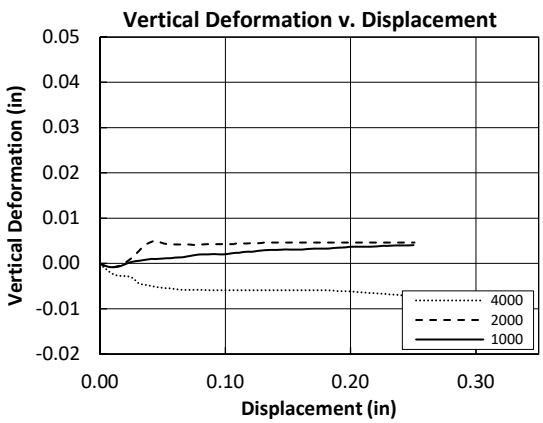
Samples Tested	1	2	3
Intial Moisture (%)	10.2	10.2	10.2
Initial Dry Density (pcf)	113.8	123.7	111.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	3084	2904
Ult. Shear Stress (psf)	768	1464	2664

Soil Type:	Yellowish SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	32
Cohesion (psf)	1098	168







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

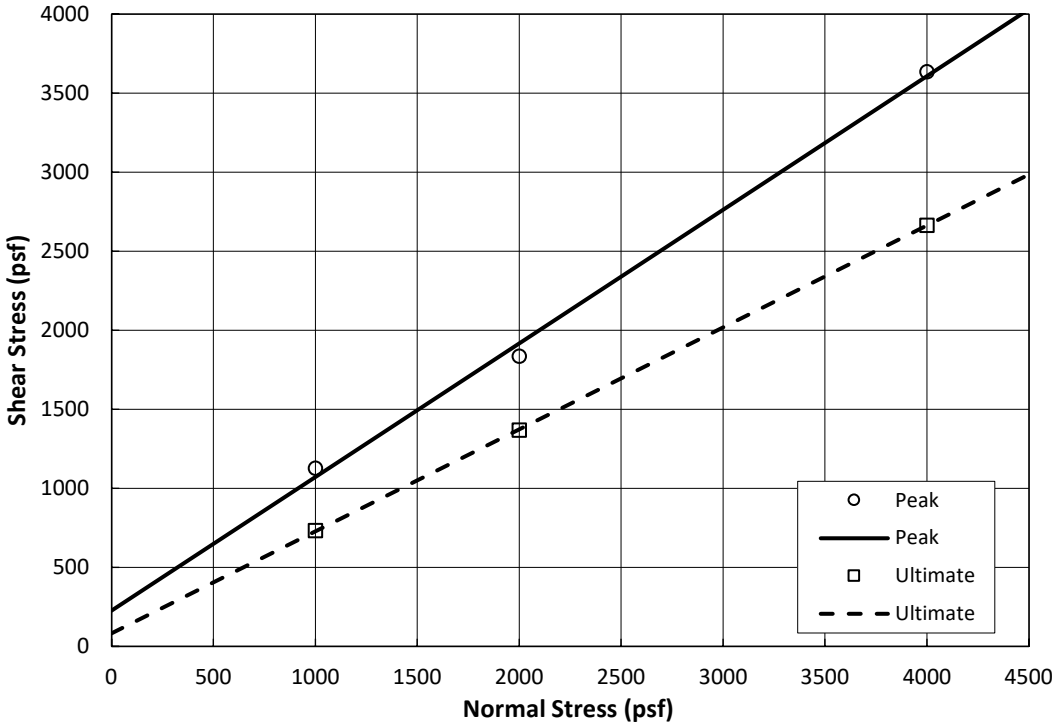
DIRECT SHEAR - ASTM D3080

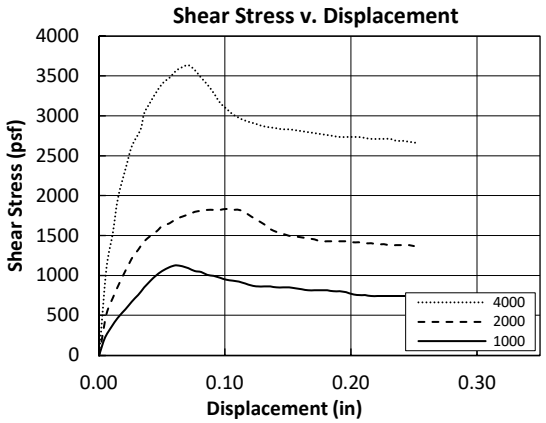
Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/31/2020	Reviewed by:	SS

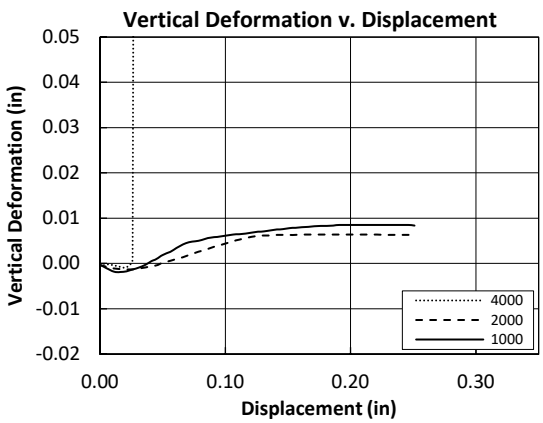
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	122.9	121.1	117.9
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1128	1836	3636
Ult. Shear Stress (psf)	732	1368	2664

Soil Type:	Light Brn SC-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	33
Cohesion (psf)	228	84







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

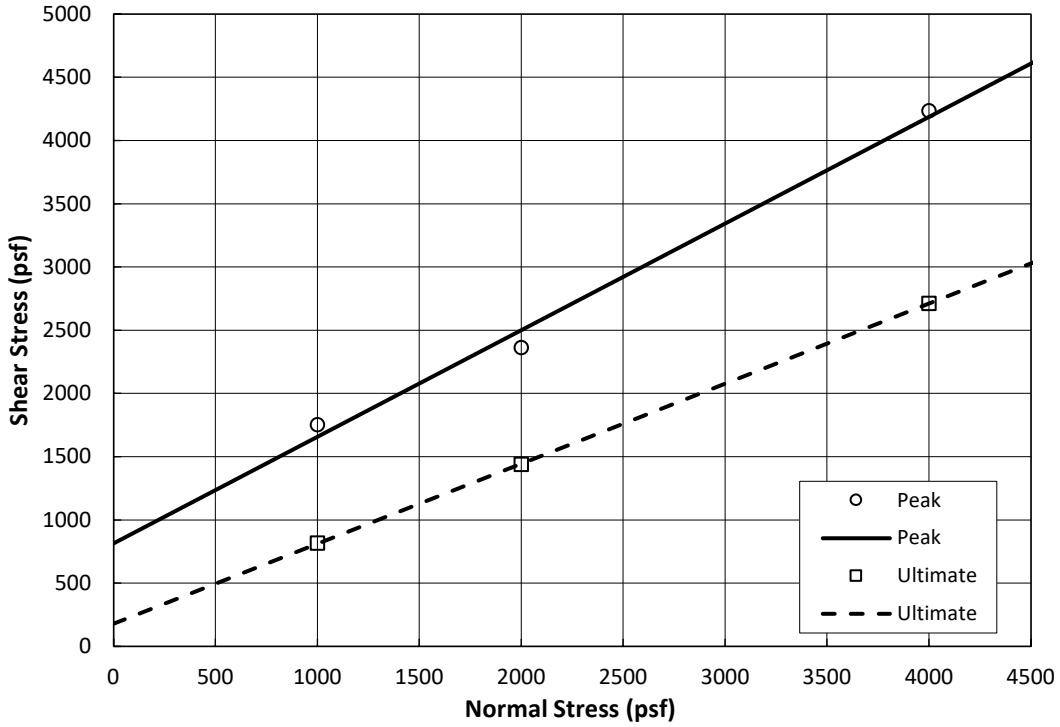
DIRECT SHEAR - ASTM D3080

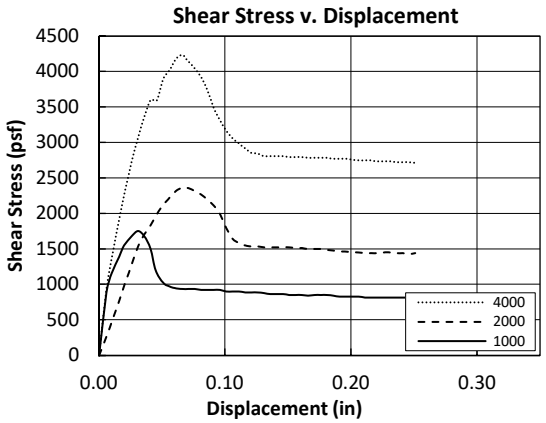
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/10/2020	Reviewed by:	SS

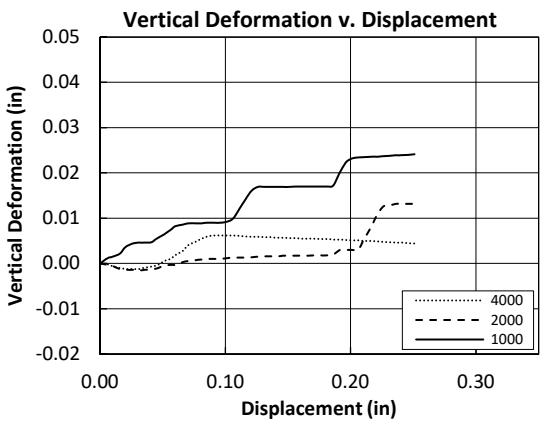
Samples Tested	1	2	3
Intial Moisture (%)	8.6	8.6	8.6
Initial Dry Density (pcf)	121.0	121.8	121.0
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1752	2364	4236
Ult. Shear Stress (psf)	816	1440	2712

Soil Type:	Blue SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	32
Cohesion (psf)	816	180







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

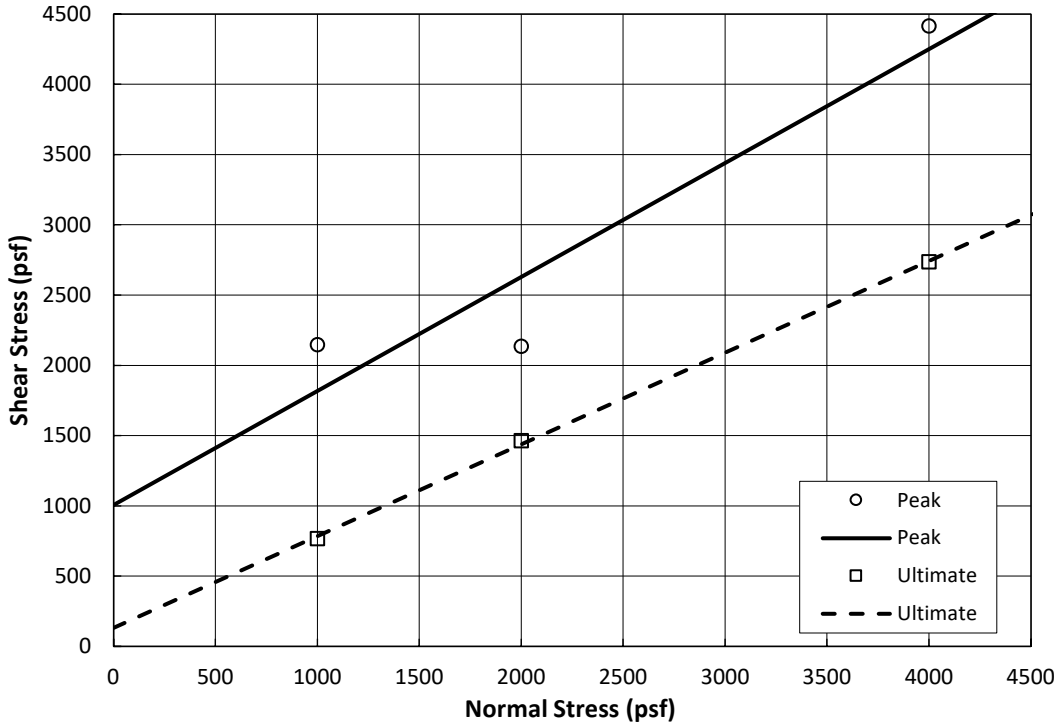
DIRECT SHEAR - ASTM D3080

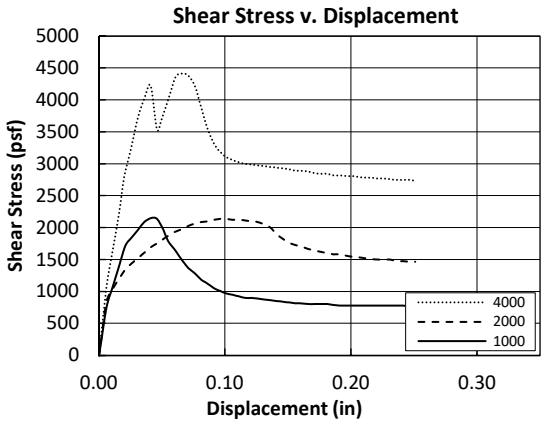
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/4/2020	Reviewed by:	SS

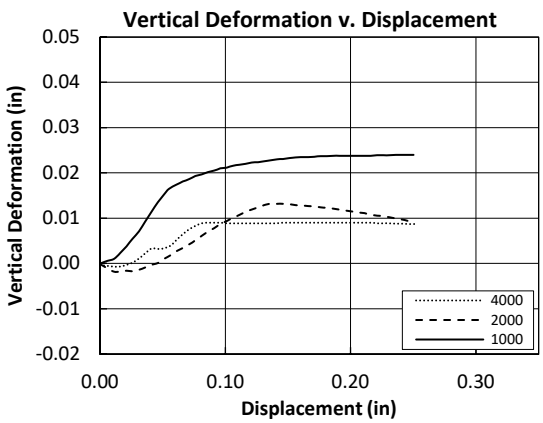
Samples Tested	1	2	3
Intial Moisture (%)	11.7	11.7	11.7
Initial Dry Density (pcf)	120.0	118.0	119.1
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	2148	2136	4416
Ult. Shear Stress (psf)	768	1464	2736

Soil Type:	Olive ML-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	39	33
Cohesion (psf)	1008	132







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

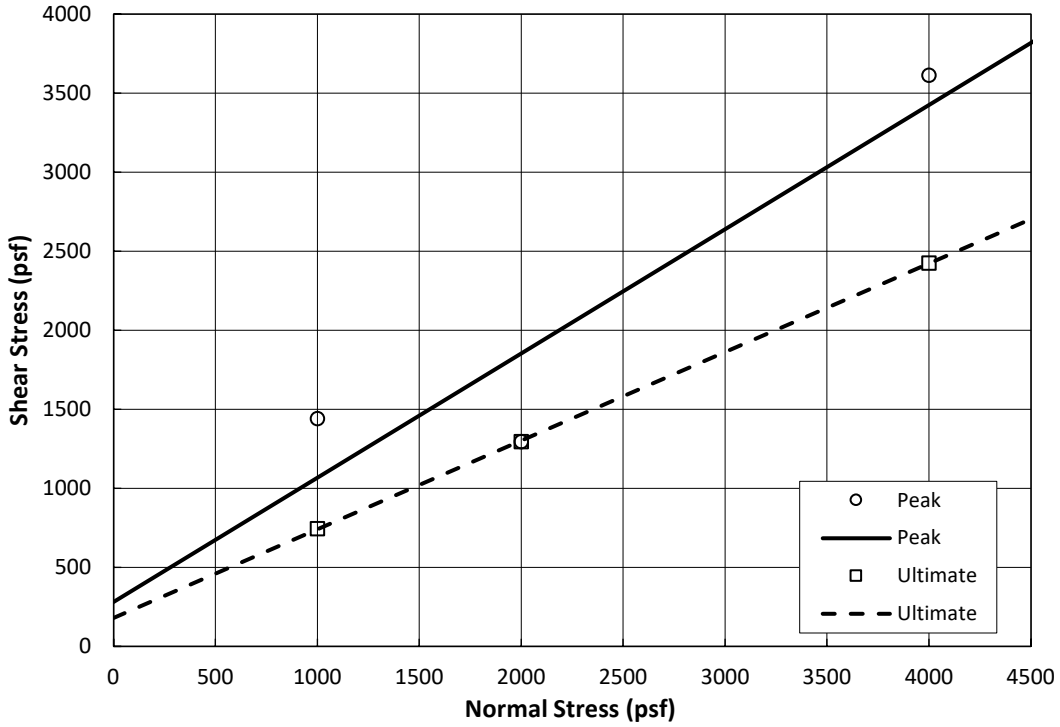
DIRECT SHEAR - ASTM D3080

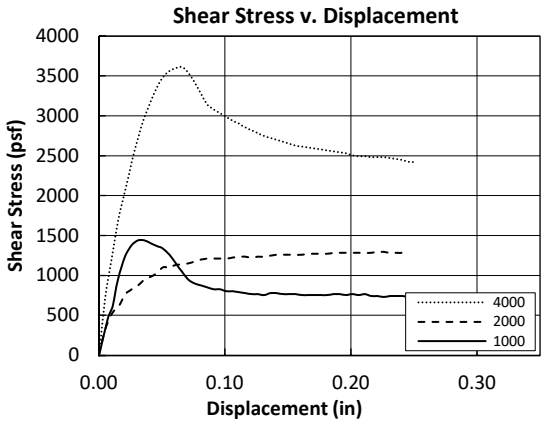
Project Name:	Oak Valeey Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/28/2020	Reviewed by:	SS

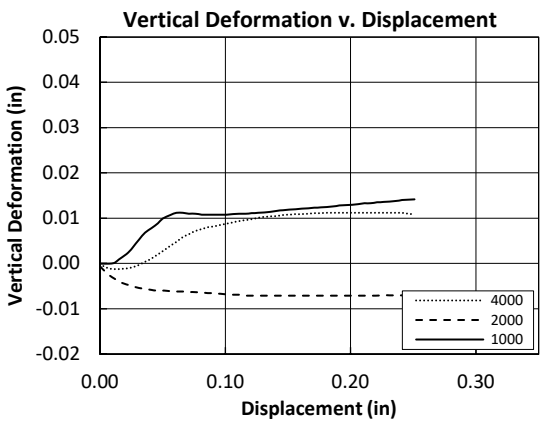
Samples Tested	1	2	3
Intial Moisture (%)	11.4	11.4	11.4
Initial Dry Density (pcf)	120.5	120.9	121.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1440	1296	3612
Ult. Shear Stress (psf)	744	1296	2424

Soil Type:	Olive SM-ML
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	38	29
Cohesion (psf)	282	180







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 05/20/2020

P.O. NO.: Chain of Custody

LAB NO.: C-3816

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 2004-01
Project: Oak Valley Town Center
Date sampled: 05/18/2020
Sample ID: T-2 @ 8'-9'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
7.5	7,600	292	111

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Oak Valley Town Center	Excavation/Tract:	T-2
Location:	Calimesa	Depth/Lot:	6-9 ft
P/W:	2004-01	Description:	Qya
Date:	5/21/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	108.3
Initial Moisture Content (%):	10.4
Initial Saturation (%):	50.6
Final Dry Density (pcf):	106.8
Final Moisture Content (%):	20.1
Final Saturation (%):	93.9
Expansion Index:	14
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

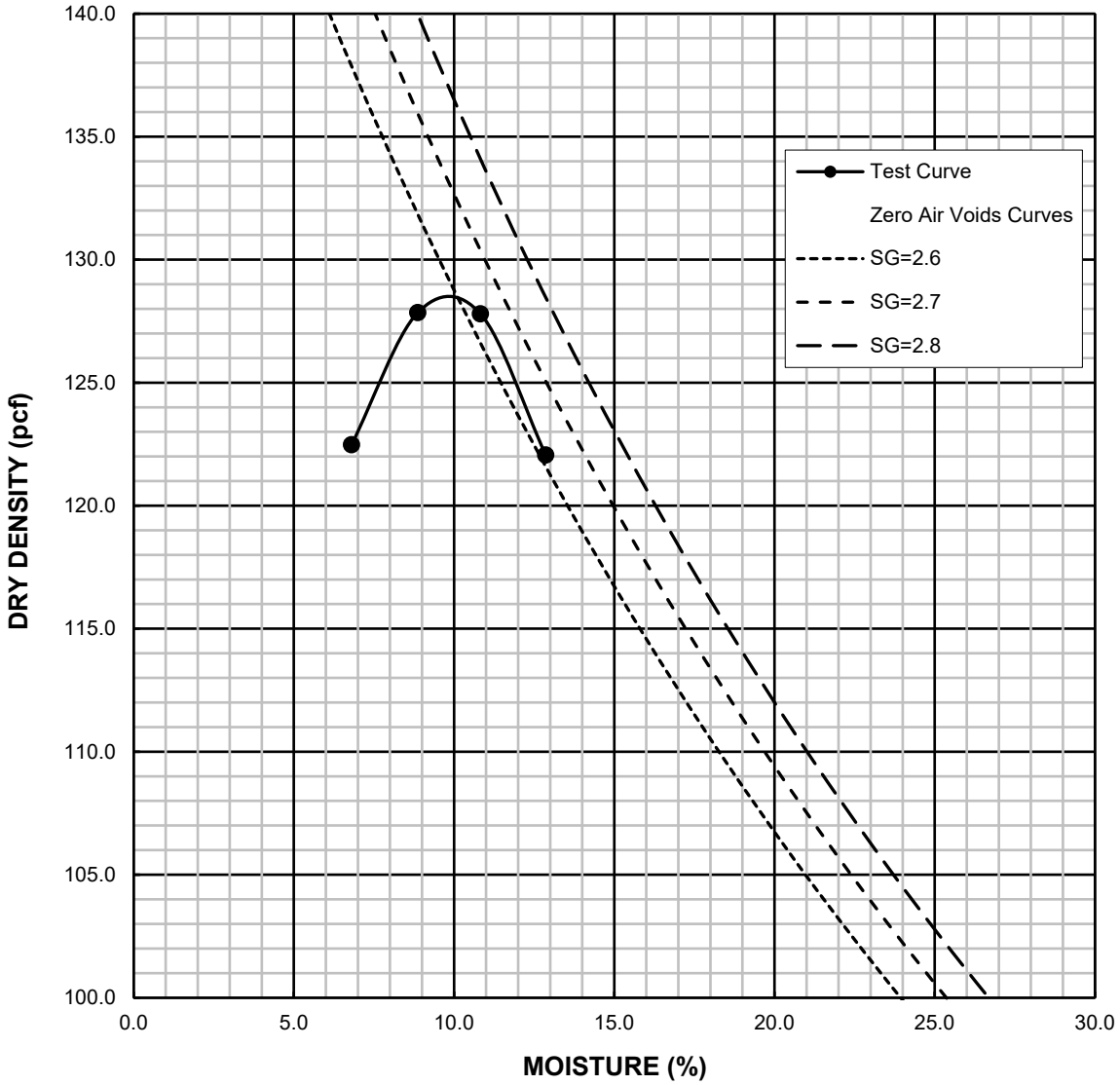
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-3
Location:	Calimesa	Depth:	8-10 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	FV
		Checked by:	SS

Method:	A	Oversize Retained: 25 %		
Point No.	1	2	3	4
Dry Density (pcf)	122.5	127.9	127.8	122.1
Moisture Content (%)	6.8	8.9	10.8	12.9

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**136.3 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**128.5 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

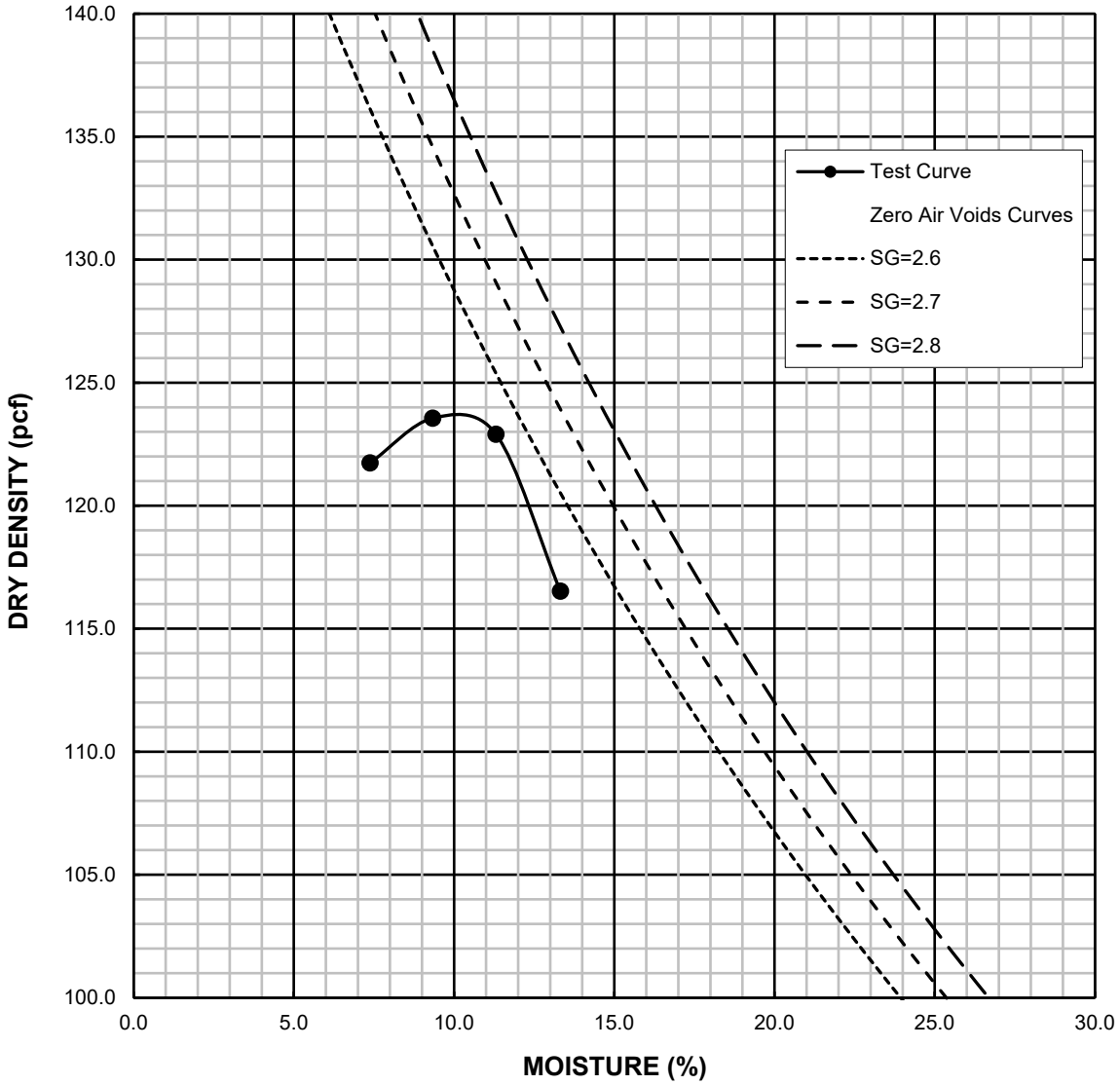
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 2.9 %		
Point No.	1	2	3	4
Dry Density (pcf)	121.7	123.6	122.9	116.5
Moisture Content (%)	7.4	9.3	11.3	13.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**124.8 pcf**	Corrected Moisture	**9.7** %
Max. Dry Density	**123.9 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

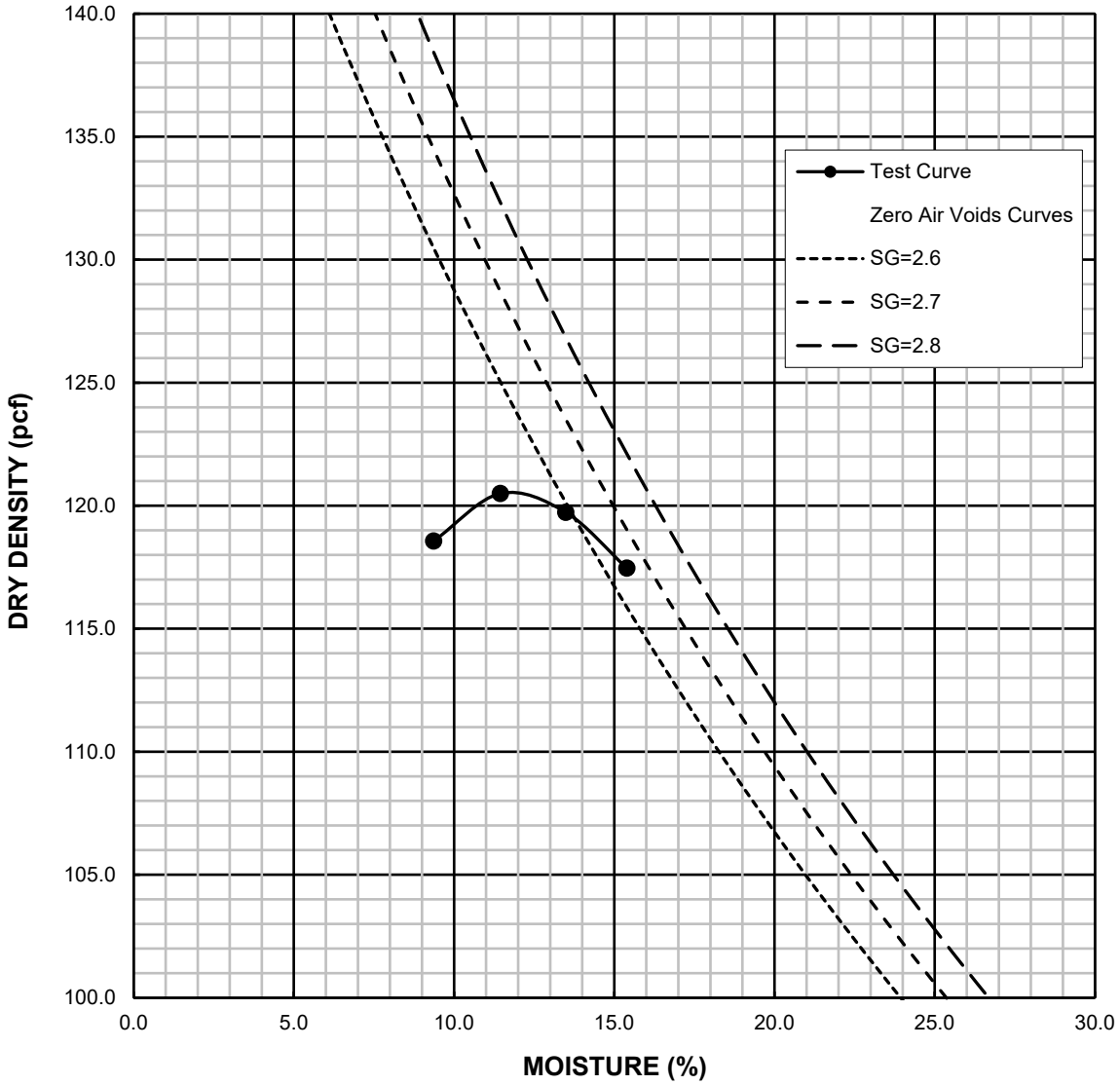
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-16
Location:	Calimesa	Depth:	7-9 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.6	120.5	119.7	117.5
Moisture Content (%)	9.4	11.4	13.5	15.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**123.9 pcf**	Corrected Moisture	**9.9** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

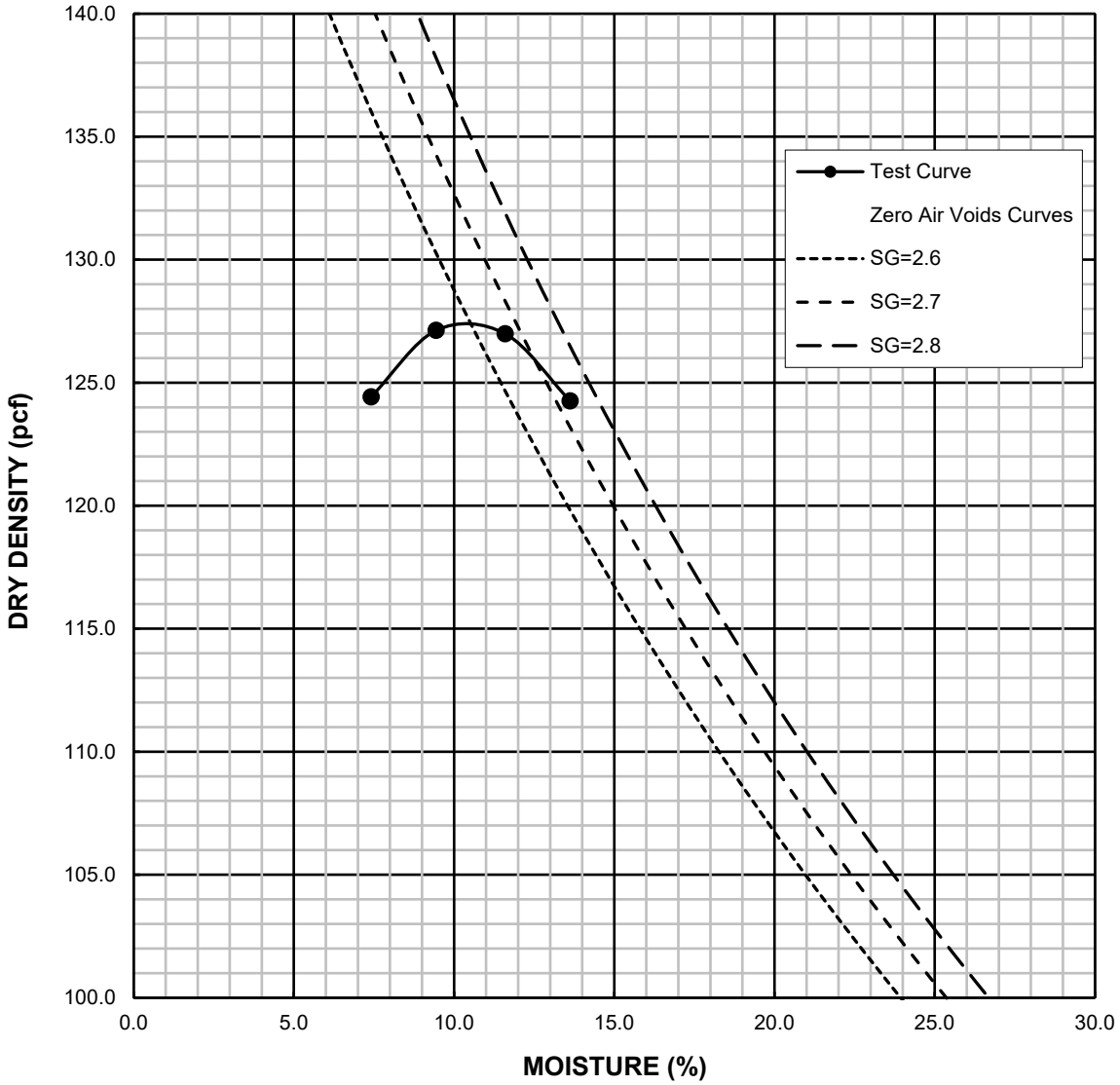
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	124.4	127.1	127.0	124.3
Moisture Content (%)	7.4	9.4	11.6	13.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**130.6 pcf**	Corrected Moisture	**9.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**10.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

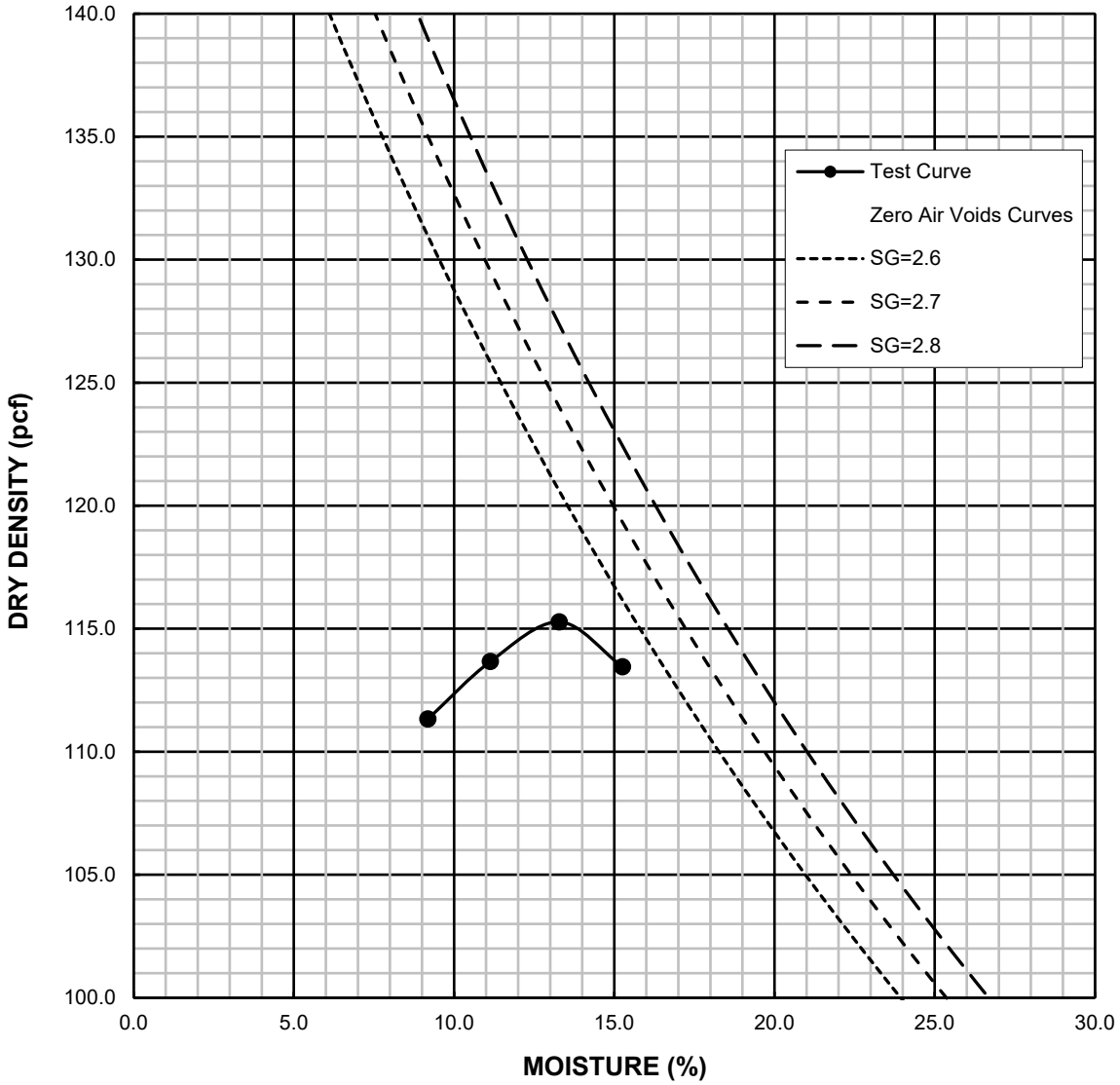
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-19
Location:	Calimesa	Depth:	6-9 ft
P/W No.:	2004-01	Soil Type:	Qlo
Date:	05-2019	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	111.3	113.7	115.3	113.5
Moisture Content (%)	9.2	11.1	13.3	15.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**118.7 pcf**	Corrected Moisture	**12.2** %
Max. Dry Density	**115 pcf**	Optimum Moisture	**13.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/24/2020

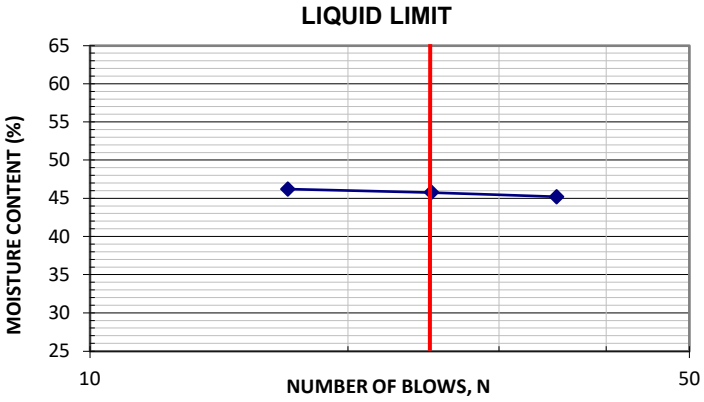
Excavation: AGS-3
Depth: 20 ft
Description: ML
By: FV

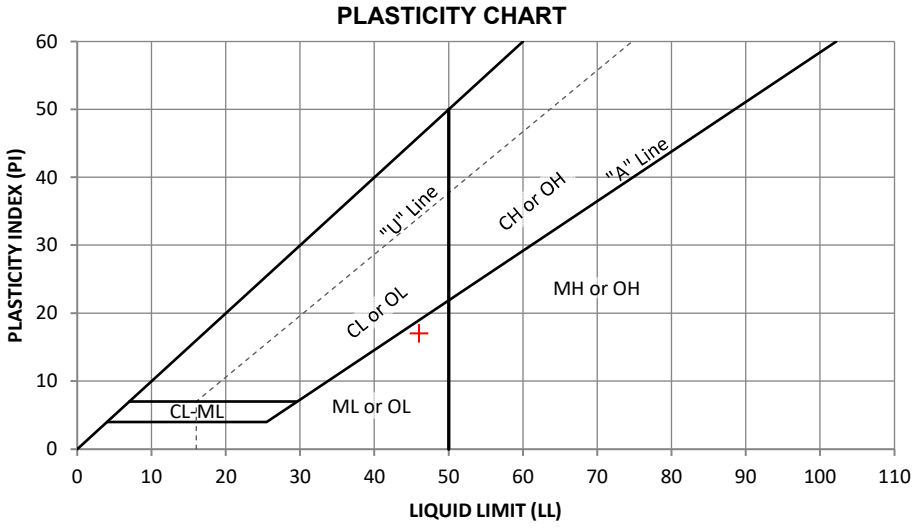
LIQUID LIMIT

Can No.	16	4	2
Wt. wet soil+can (g)	19.20	18.37	19.24
Wt. dry soil+can (g)	16.70	16.09	16.68
Wt. can (g)	11.17	11.11	11.14
Wt. mosture (g)	2.50	2.28	2.56
Wt. dry soil (g)	5.53	4.98	5.54
Water Content %	45.21	45.78	46.21
No. of Blows	35	25	17

PLASTIC LIMIT

101	105
58.85	57.22
57.12	55.77
51.09	50.74
1.73	1.45
6.03	5.03
28.69	28.83





Liquid Limit (LL) 46 Plastic Limit (PL) 29 Plasticity Index (PI) 17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

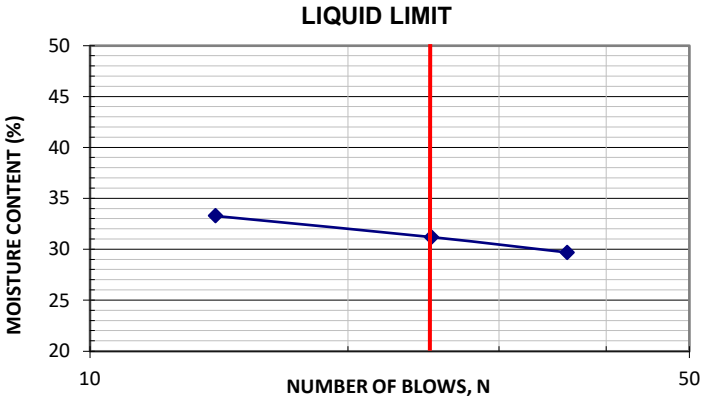
AGS Form E-2

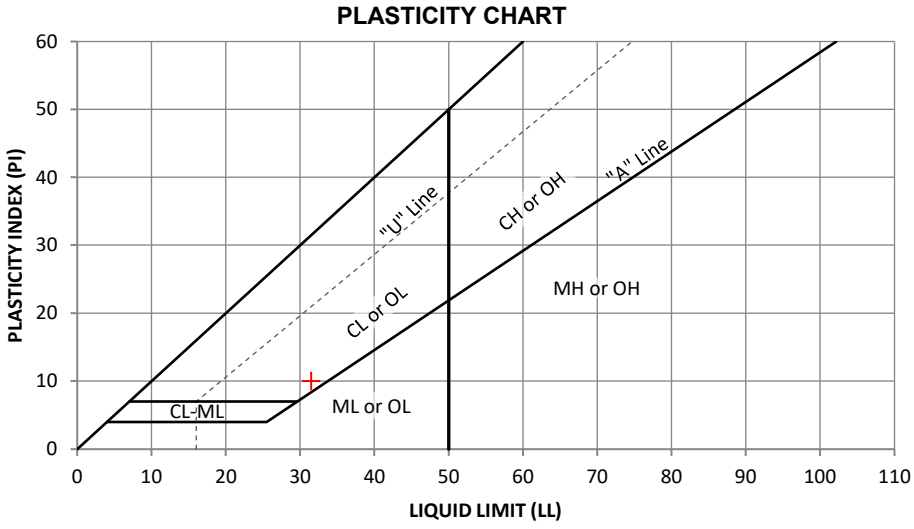
ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/21/2020

Excavation: AGS-3
Depth: 30 ft
Description: Grey Brn SC-SM
By: FV

	LIQUID LIMIT			PLASTIC LIMIT	
Can No.	3	11	1	108	102
Wt. wet soil+can (g)	21.32	23.11	23.84	60.31	62.31
Wt. dry soil+can (g)	18.80	20.29	20.96	58.63	60.41
Wt. can (g)	11.23	11.25	11.26	50.93	51.44
Wt. mosture (g)	2.52	2.82	2.88	1.68	1.90
Wt. dry soil (g)	7.57	9.04	9.70	7.70	8.97
Water Content %	33.29	31.19	29.69	21.82	21.18
No. of Blows	14	25	36		





Liquid Limit (LL) 31.5 Plastic Limit (PL) 21.5 Plasticity Index (PI) 10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

Excavation: AGS-3
Depth: 35 ft
Description: ML
By: FV

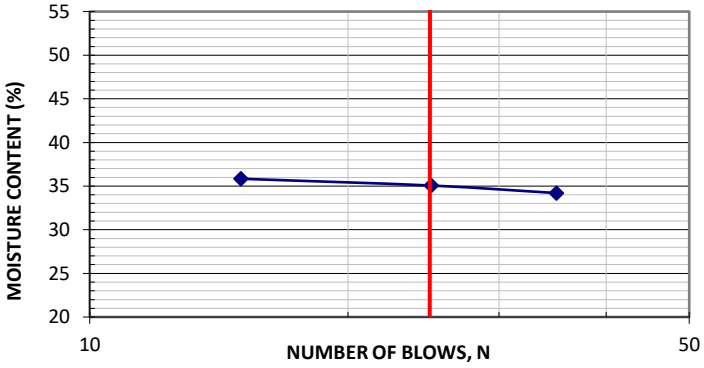
LIQUID LIMIT

Can No.	1	5	11
Wt. wet soil+can (g)	18.84	23.79	24.65
Wt. dry soil+can (g)	16.84	20.55	21.24
Wt. can (g)	11.26	11.31	11.27
Wt. mosture (g)	2.00	3.24	3.41
Wt. dry soil (g)	5.58	9.24	9.97
Water Content %	35.84	35.06	34.20
No. of Blows	15	25	35

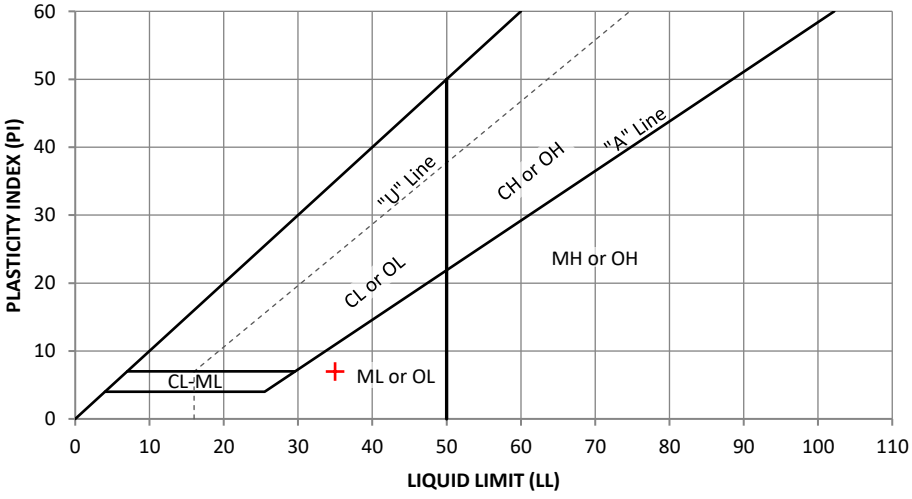
PLASTIC LIMIT

108	105
59.98	61.77
57.85	59.50
50.96	50.73
2.13	2.27
6.89	8.77
30.91	25.88

LIQUID LIMIT



PLASTICITY CHART



Liquid Limit (LL) 35 Plastic Limit (PL) 28 Plasticity Index (PI) 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

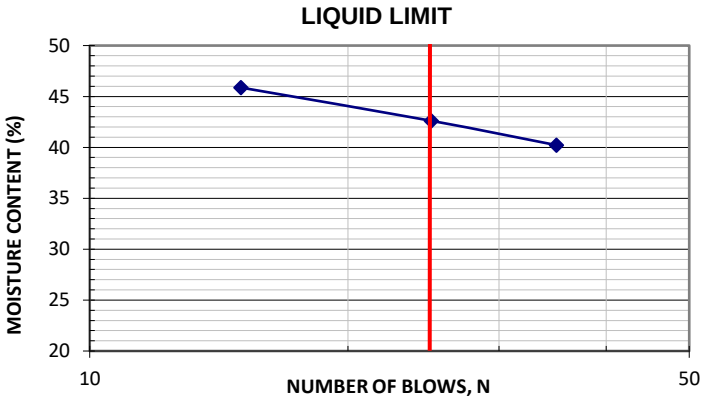
Excavation: AGS-3
Depth: 40 ft
Description: CL (Fine portion)
By: FV

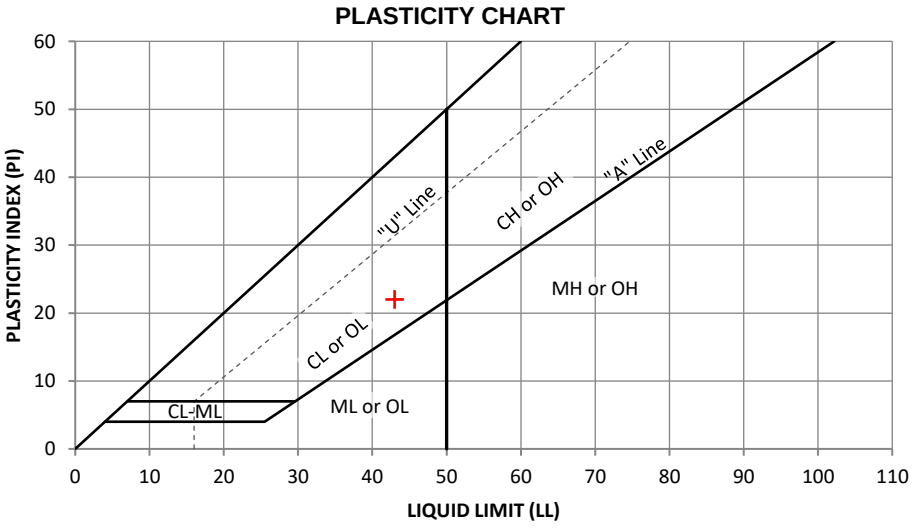
LIQUID LIMIT

Can No.	15	14	3
Wt. wet soil+can (g)	20.42	20.43	19.94
Wt. dry soil+can (g)	17.53	17.69	17.39
Wt. can (g)	11.23	11.26	11.05
Wt. mosture (g)	2.89	2.74	2.55
Wt. dry soil (g)	6.30	6.43	6.34
Water Content %	45.87	42.61	40.22
No. of Blows	15	25	35

PLASTIC LIMIT

104	102
59.27	57.85
57.87	56.74
51.04	51.47
1.40	1.11
6.83	5.27
20.50	21.06





Liquid Limit (LL) 43 Plastic Limit (PL) 21 Plasticity Index (PI) 22

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley town Center
Location: Calimesa
Project No: 2004-01
Date: 9/23/2020

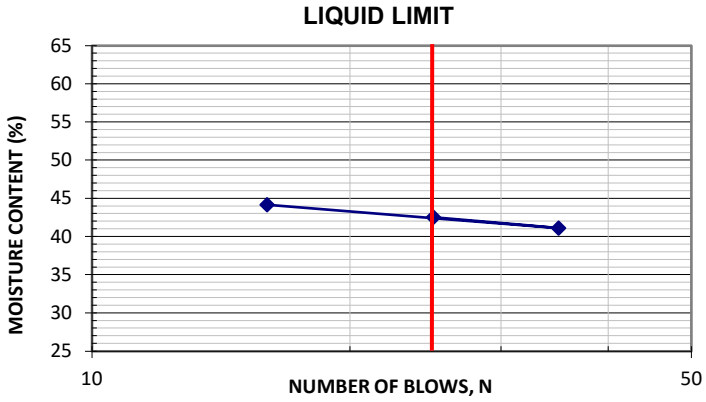
Excavation: AGS-16
Depth: 25 ft
Description: CL
By: FV

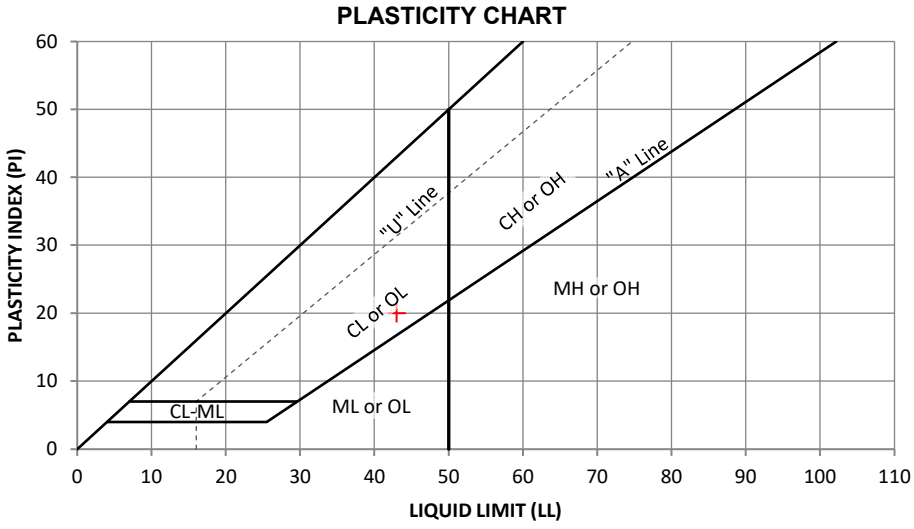
LIQUID LIMIT

Can No.	15	11	5
Wt. wet soil+can (g)	20.10	19.65	18.21
Wt. dry soil+can (g)	17.45	17.20	16.09
Wt. can (g)	11.22	11.24	11.29
Wt. mosture (g)	2.65	2.45	2.12
Wt. dry soil (g)	6.23	5.96	4.80
Water Content %	42.54	41.11	44.17
No. of Blows	25	35	16

PLASTIC LIMIT

109	106
56.91	58.04
55.89	56.78
51.56	51.34
1.02	1.26
4.33	5.44
23.56	23.16





Liquid Limit (LL) 43 Plastic Limit (PL) 23 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

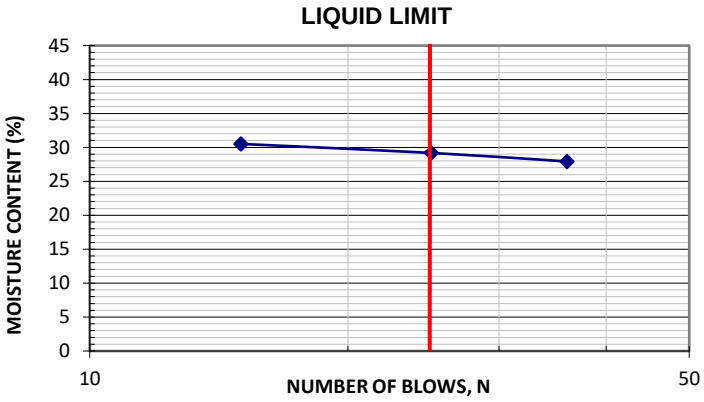
Excavation: AGS-16
Depth: 30 ft
Description: CL (Fine portion)
By: FV

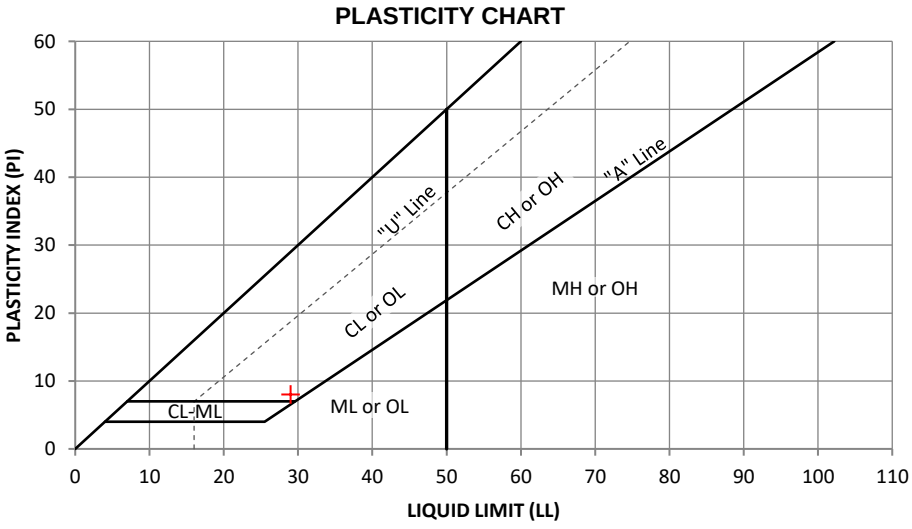
LIQUID LIMIT

Can No.	14	3	15
Wt. wet soil+can (g)	22.98	22.43	21.44
Wt. dry soil+can (g)	20.24	19.90	19.22
Wt. can (g)	11.26	11.23	11.27
Wt. mosture (g)	2.74	2.53	2.22
Wt. dry soil (g)	8.98	8.67	7.95
Water Content %	30.51	29.18	27.92
No. of Blows	15	25	36

PLASTIC LIMIT

101	109
58.25	58.32
56.94	57.20
51.08	51.55
1.31	1.12
5.86	5.65
22.35	19.82





Liquid Limit (LL) 29 Plastic Limit (PL) 21 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

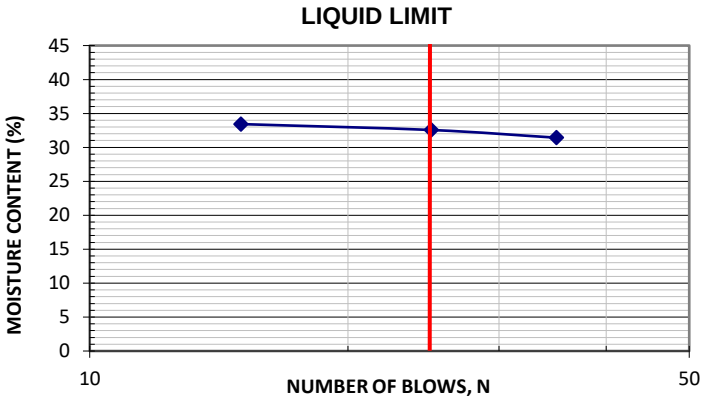
Excavation: AGS-16
Depth: 35 ft
Description: CL (Fine portion)
By: FV

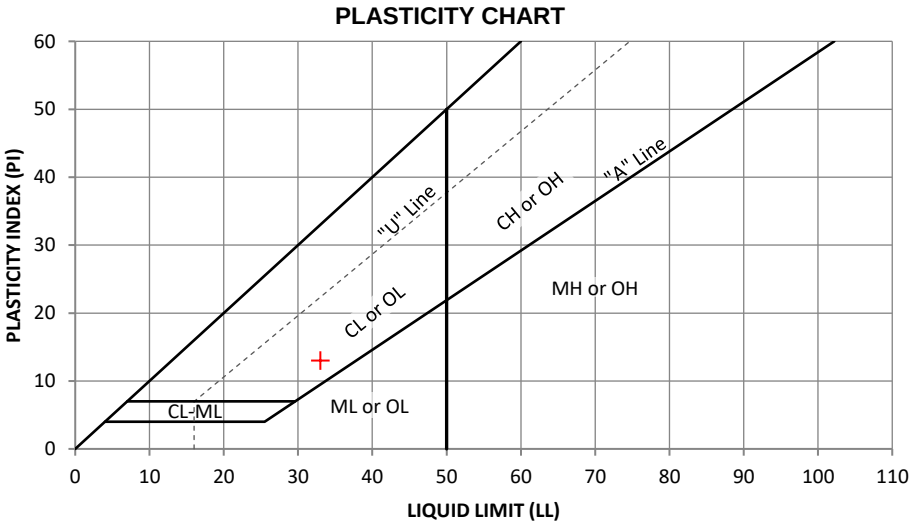
LIQUID LIMIT

Can No.	16	11	5
Wt. wet soil+can (g)	20.66	21.55	22.08
Wt. dry soil+can (g)	18.29	19.02	19.50
Wt. can (g)	11.20	11.25	11.29
Wt. mosture (g)	2.37	2.53	2.58
Wt. dry soil (g)	7.09	7.77	8.21
Water Content %	33.43	32.56	31.43
No. of Blows	15	25	35

PLASTIC LIMIT

106	111
57.80	57.64
56.66	56.63
51.34	51.42
1.14	1.01
5.32	5.21
21.43	19.39





Liquid Limit (LL) 33 Plastic Limit (PL) 20 Plasticity Index (PI) 13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

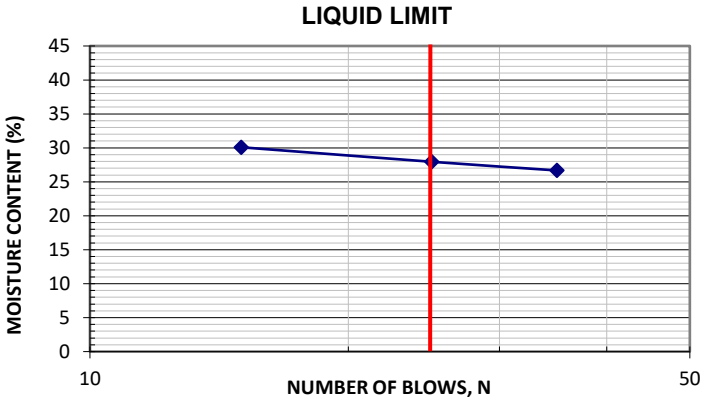
Excavation: AGS-16
Depth: 45 ft
Description: CL (Fine portion)
By: FV

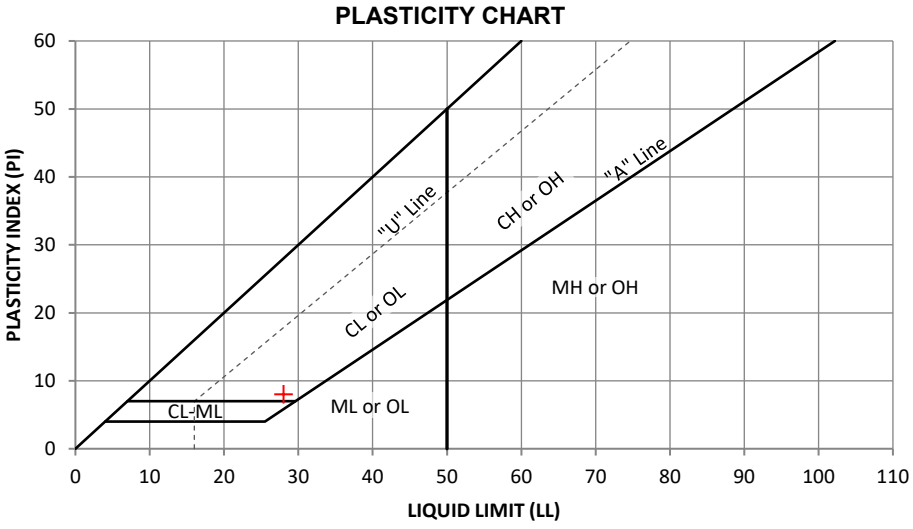
LIQUID LIMIT

Can No.	4	2	10
Wt. wet soil+can (g)	20.75	20.88	21.44
Wt. dry soil+can (g)	18.72	18.75	19.06
Wt. can (g)	11.11	11.13	11.15
Wt. mosture (g)	2.03	2.13	2.38
Wt. dry soil (g)	7.61	7.62	7.91
Water Content %	26.68	27.95	30.09
No. of Blows	35	25	15

PLASTIC LIMIT

100	103
58.69	58.58
57.45	57.40
51.53	51.47
1.24	1.18
5.92	5.93
20.95	19.90





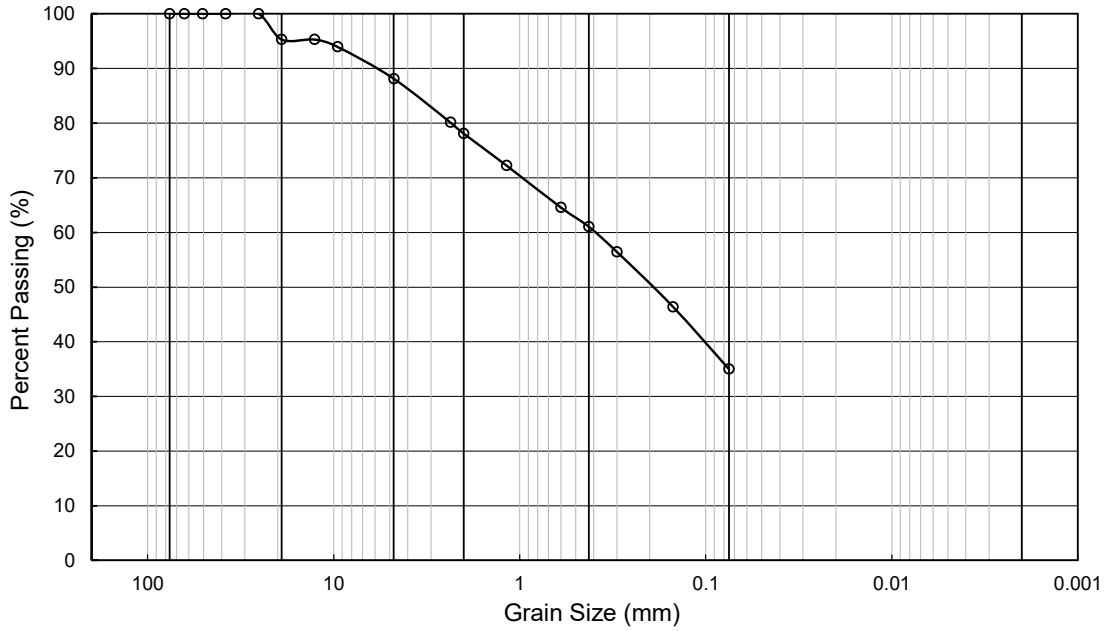
Liquid Limit (LL) 28 Plastic Limit (PL) 20 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-5
Location:	Calimesa	Depth:	4 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	95
1/2 "	12.70	95
3/8 "	9.53	94
# 4	4.75	88.1
# 8	2.36	80.1
#10	2.00	78.1
#16	1.18	72.3
# 30	0.60	64.5
# 40	0.425	61.0
# 50	0.30	56.4
# 100	0.15	46.4
# 200	0.075	35.0

Summary	
% Gravel =	11.9
% Sand =	53.1
% Fines =	35.0
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

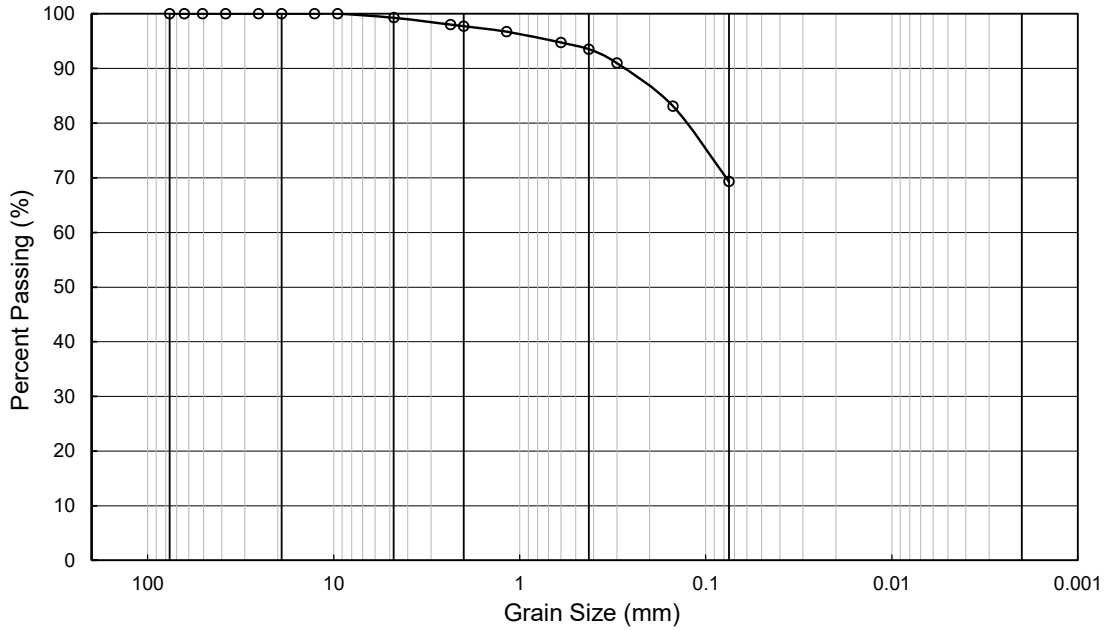
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-10
Location:	Calimesa	Depth:	12 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.3
# 8	2.36	98.0
#10	2.00	97.7
#16	1.18	96.7
# 30	0.60	94.7
# 40	0.425	93.5
# 50	0.30	91.0
# 100	0.15	83.1
# 200	0.075	69.3

Summary	
% Gravel =	0.7
% Sand =	30.0
% Fines =	69.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

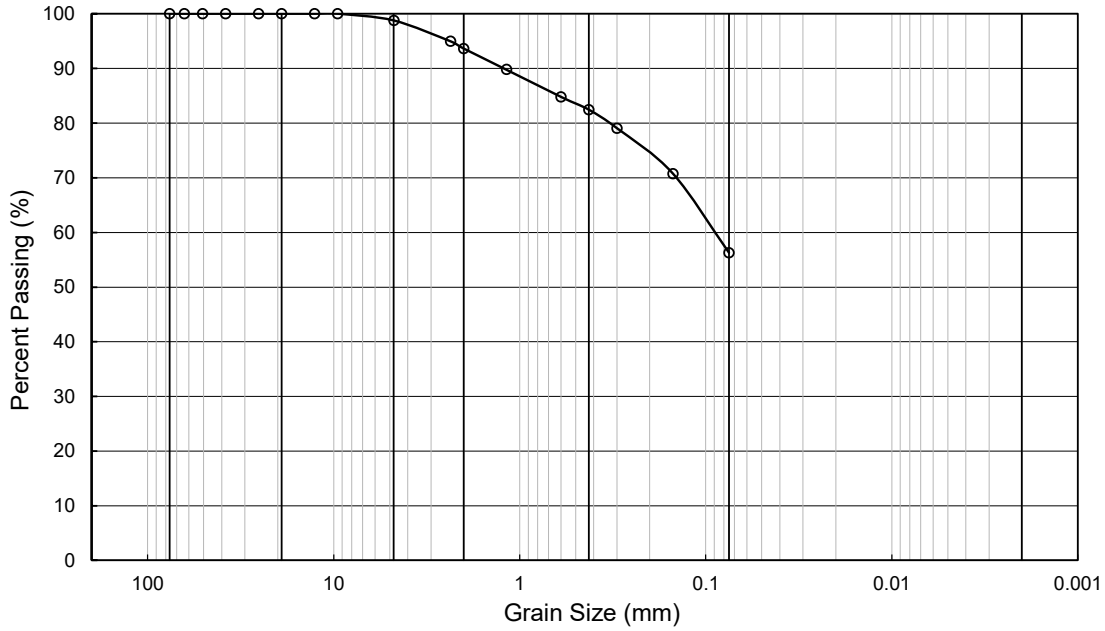
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-11
Location:	Calimesa	Depth:	7.5 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.8
# 8	2.36	95.0
#10	2.00	93.6
#16	1.18	89.8
# 30	0.60	84.8
# 40	0.425	82.4
# 50	0.30	79.1
# 100	0.15	70.7
# 200	0.075	56.3

Summary	
% Gravel =	1.2
% Sand =	42.5
% Fines =	56.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

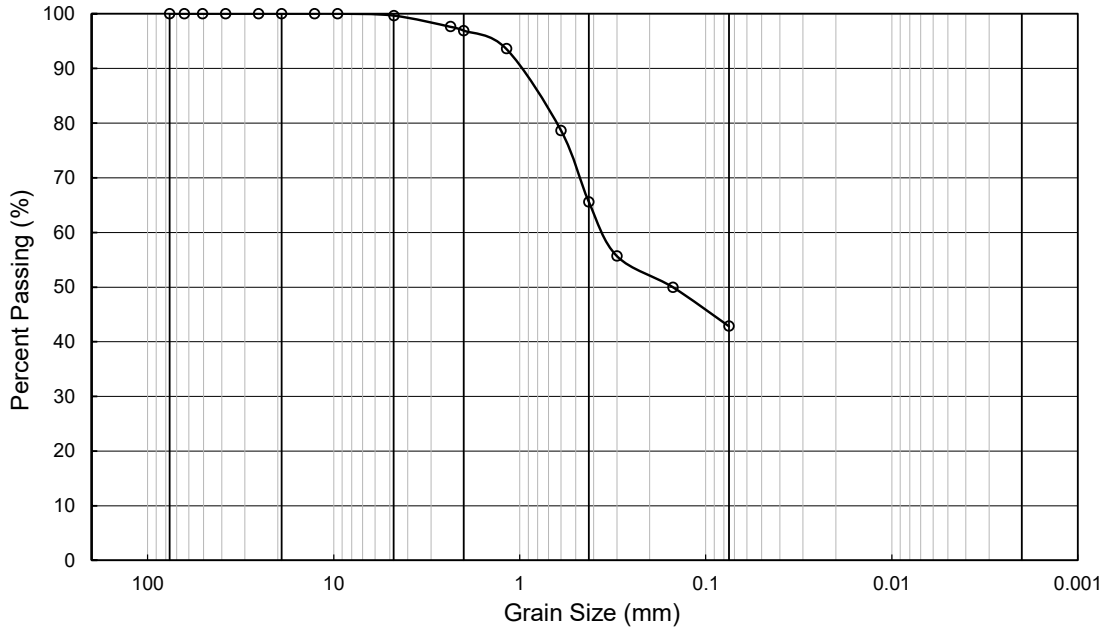
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-17
Location:	Calimesa	Depth:	13-14 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.6
# 8	2.36	97.6
#10	2.00	96.9
#16	1.18	93.6
# 30	0.60	78.6
# 40	0.425	65.6
# 50	0.30	55.7
# 100	0.15	50.0
# 200	0.075	42.8

Summary	
% Gravel =	0.4
% Sand =	56.8
% Fines =	42.8
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

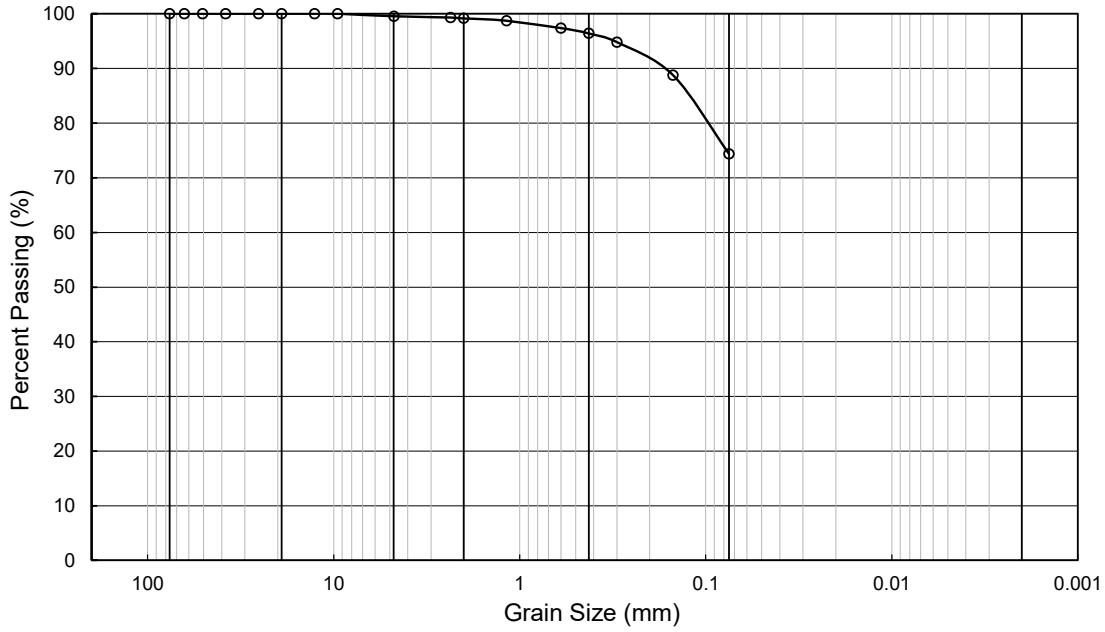
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	10 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.5
# 8	2.36	99.3
#10	2.00	99.2
#16	1.18	98.7
# 30	0.60	97.4
# 40	0.425	96.4
# 50	0.30	94.8
# 100	0.15	88.8
# 200	0.075	74.3

Summary	
% Gravel =	0.5
% Sand =	25.2
% Fines =	74.3
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

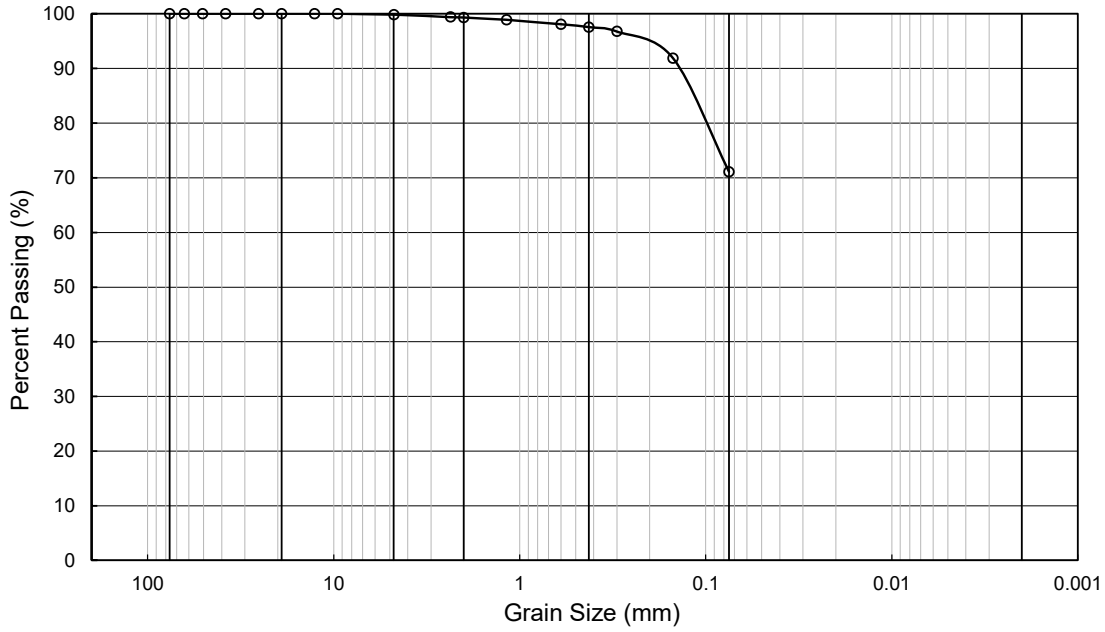
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	20 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.8
# 8	2.36	99.4
#10	2.00	99.3
#16	1.18	98.9
# 30	0.60	98.1
# 40	0.425	97.5
# 50	0.30	96.8
# 100	0.15	91.9
# 200	0.075	71.1

Summary	
% Gravel =	0.2
% Sand =	28.7
% Fines =	71.1
Sum =	100.0

LL=	46
PL=	29
PI =	17

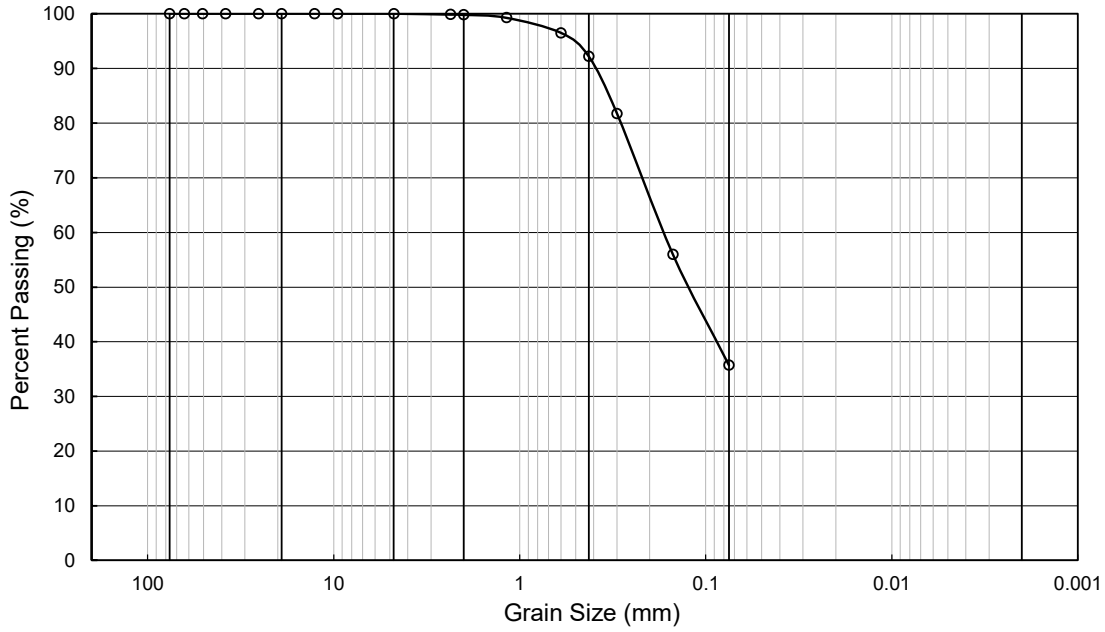
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.9
#10	2.00	99.8
#16	1.18	99.3
# 30	0.60	96.5
# 40	0.425	92.2
# 50	0.30	81.7
# 100	0.15	55.9
# 200	0.075	35.7

Summary	
% Gravel =	0.0
% Sand =	64.3
% Fines =	35.7
Sum =	100.0

LL=	31.5
PL=	21.5
PI =	10

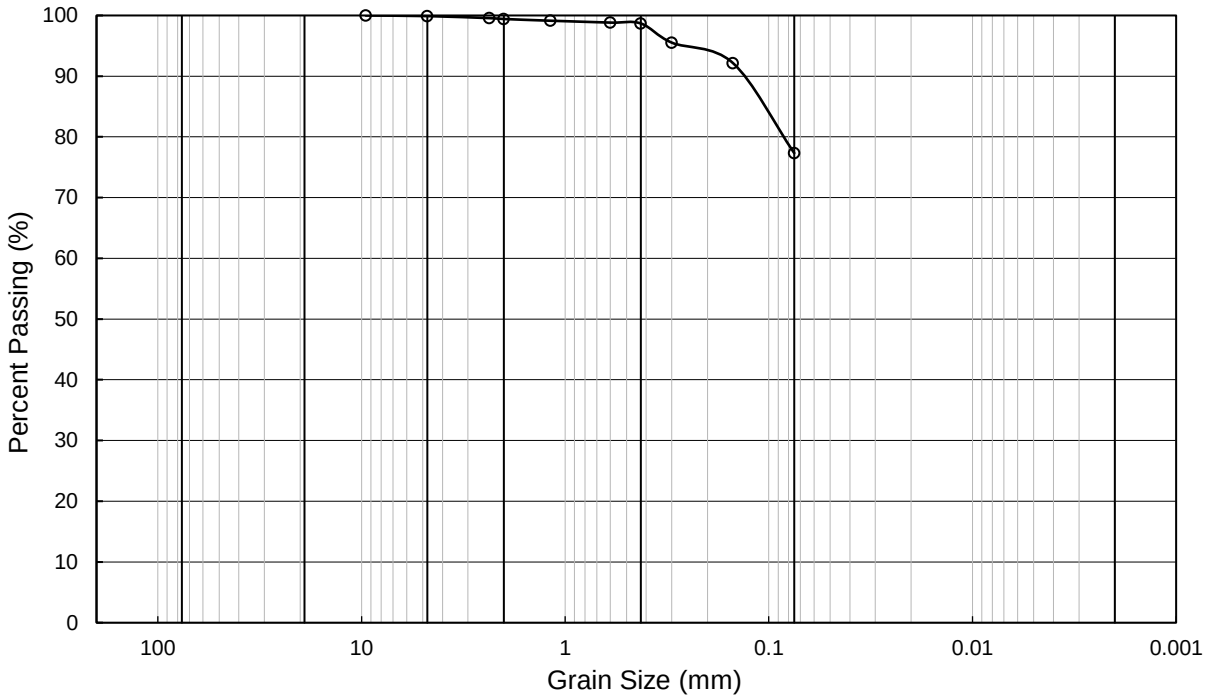
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	99.9
# 8	2.36	99.6
#10	2.00	99.4
#16	1.18	99.1
# 30	0.60	98.8
# 40	0.425	98.7
# 50	0.30	95.5
# 100	0.15	92.2
# 200	0.075	77.3

Summary	
% Gravel =	0.1
% Sand =	22.6
% Fines =	77.3
Sum =	100.0

LL=	35
PL=	28
PI =	7

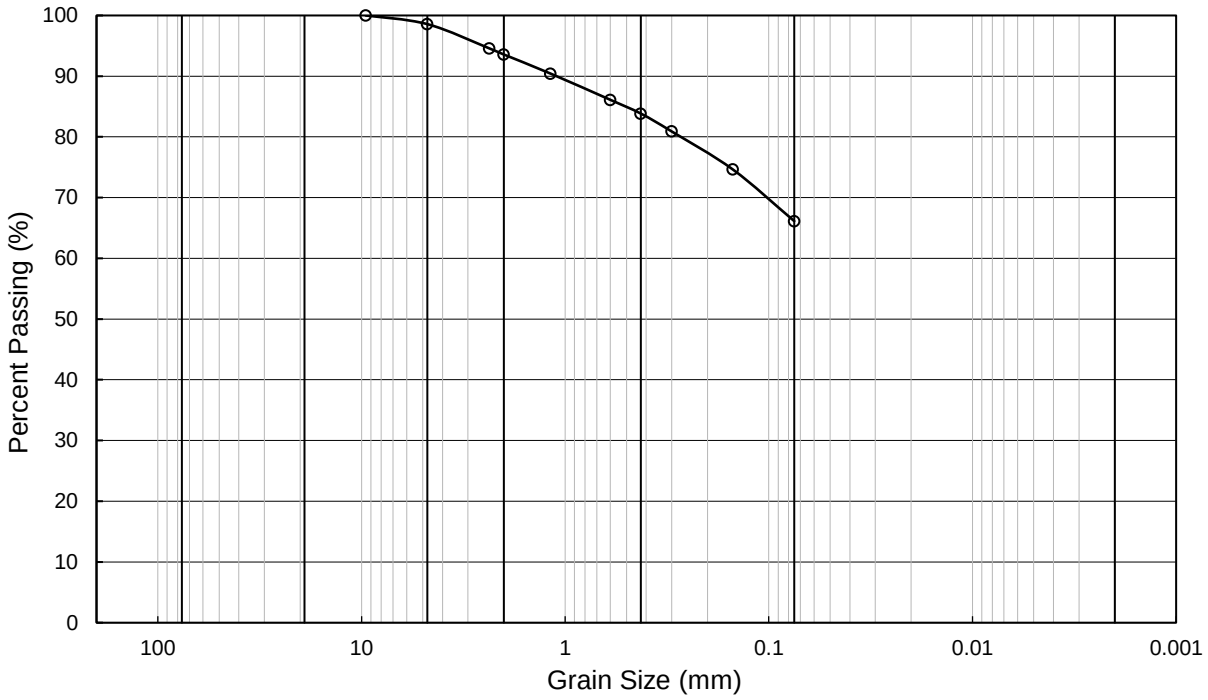
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	40 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	98.6
# 8	2.36	94.6
#10	2.00	93.6
#16	1.18	90.4
# 30	0.60	86.1
# 40	0.425	83.8
# 50	0.30	80.9
# 100	0.15	74.6
# 200	0.075	66.1

Summary	
% Gravel =	1.4
% Sand =	32.4
% Fines =	66.1
Sum =	100.0

LL=	43
PL=	21
PI =	22

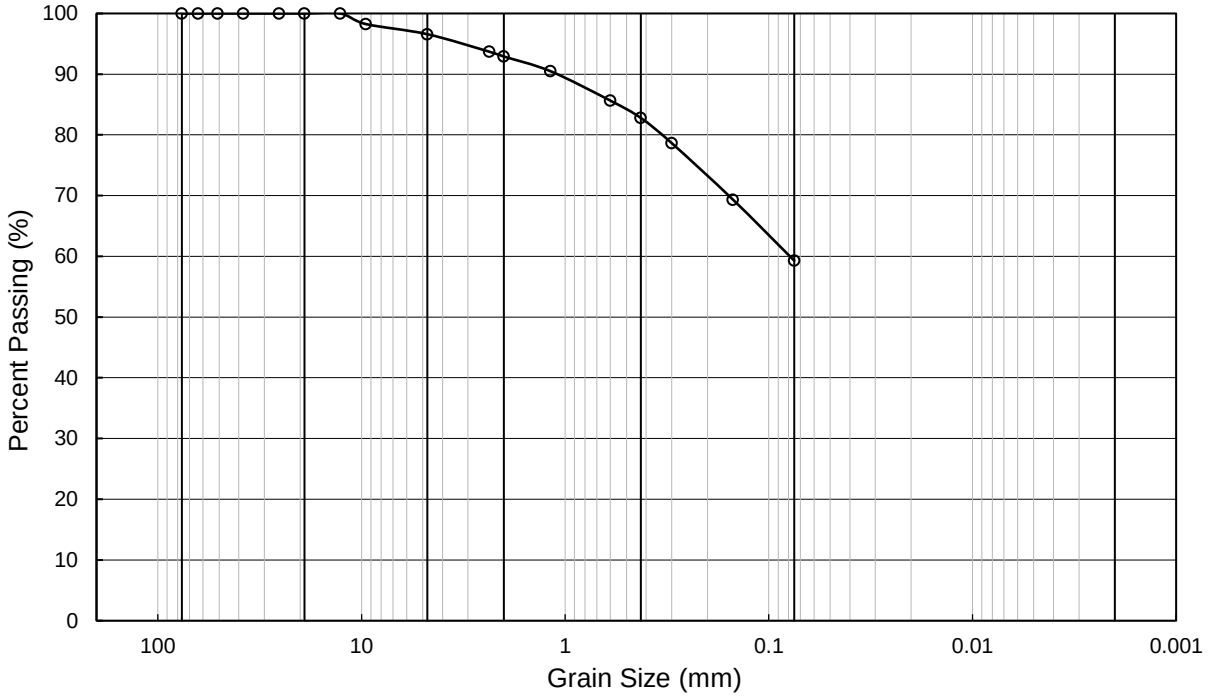
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	50 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	98
# 4	4.75	96.6
# 8	2.36	93.7
#10	2.00	92.9
#16	1.18	90.5
# 30	0.60	85.6
# 40	0.425	82.8
# 50	0.30	78.7
# 100	0.15	69.3
# 200	0.075	59.3

Summary	
% Gravel =	3.4
% Sand =	37.3
% Fines =	59.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

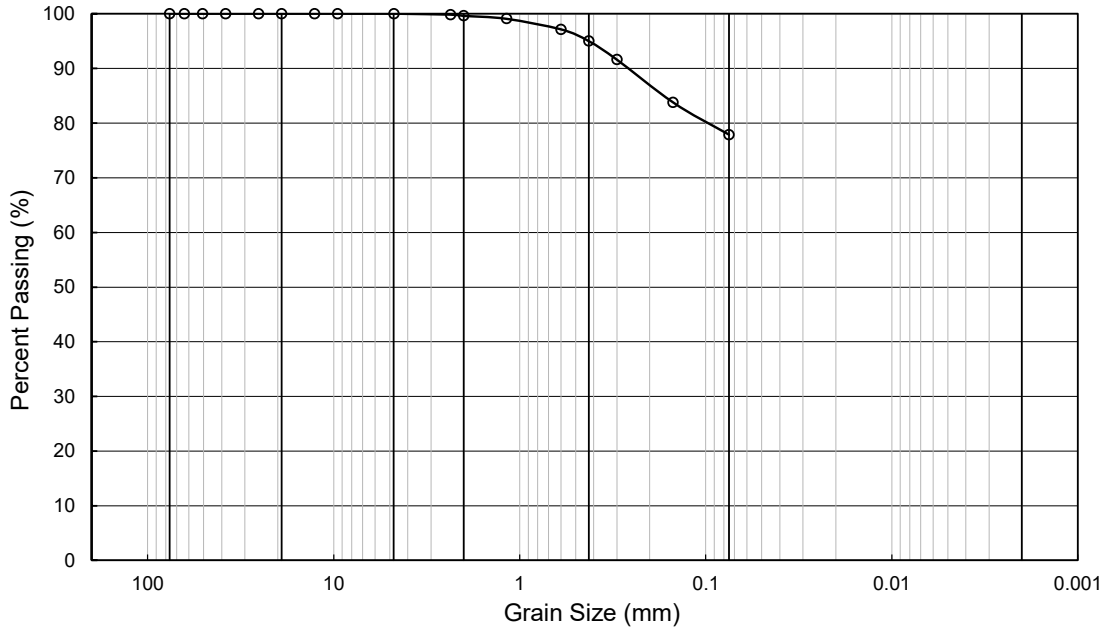
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.8
#10	2.00	99.6
#16	1.18	99.1
# 30	0.60	97.1
# 40	0.425	95.0
# 50	0.30	91.6
# 100	0.15	83.8
# 200	0.075	77.9

Summary	
% Gravel =	0.0
% Sand =	22.1
% Fines =	77.9
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

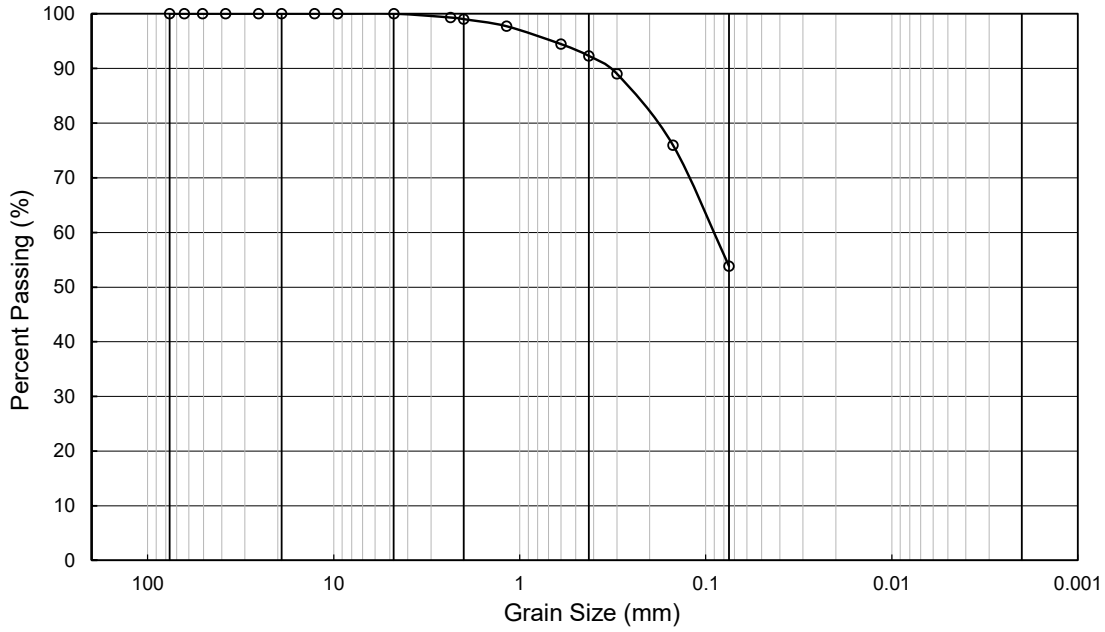
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.3
#10	2.00	99.0
#16	1.18	97.7
# 30	0.60	94.4
# 40	0.425	92.3
# 50	0.30	89.0
# 100	0.15	75.9
# 200	0.075	53.8

Summary	
% Gravel =	0.0
% Sand =	46.2
% Fines =	53.8
Sum =	100.0

LL=	43
PL=	23
PI =	20

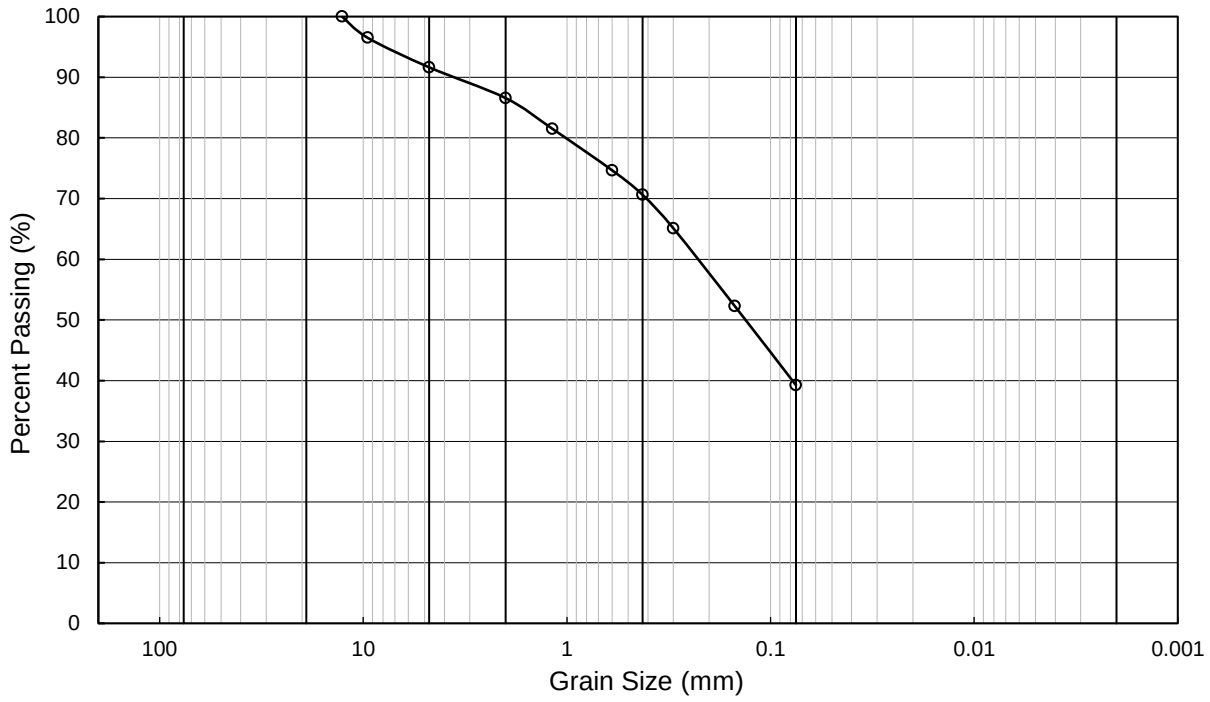
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	100
3/8 "	9.53	97
# 4	4.75	91.6
#10	2.00	86.6
#16	1.18	81.5
# 30	0.60	74.7
# 40	0.425	70.6
# 50	0.30	65.1
# 100	0.15	52.3
# 200	0.075	39.3

Summary	
% Gravel =	8.4
% Sand =	52.4
% Fines =	39.3
Sum =	100.0

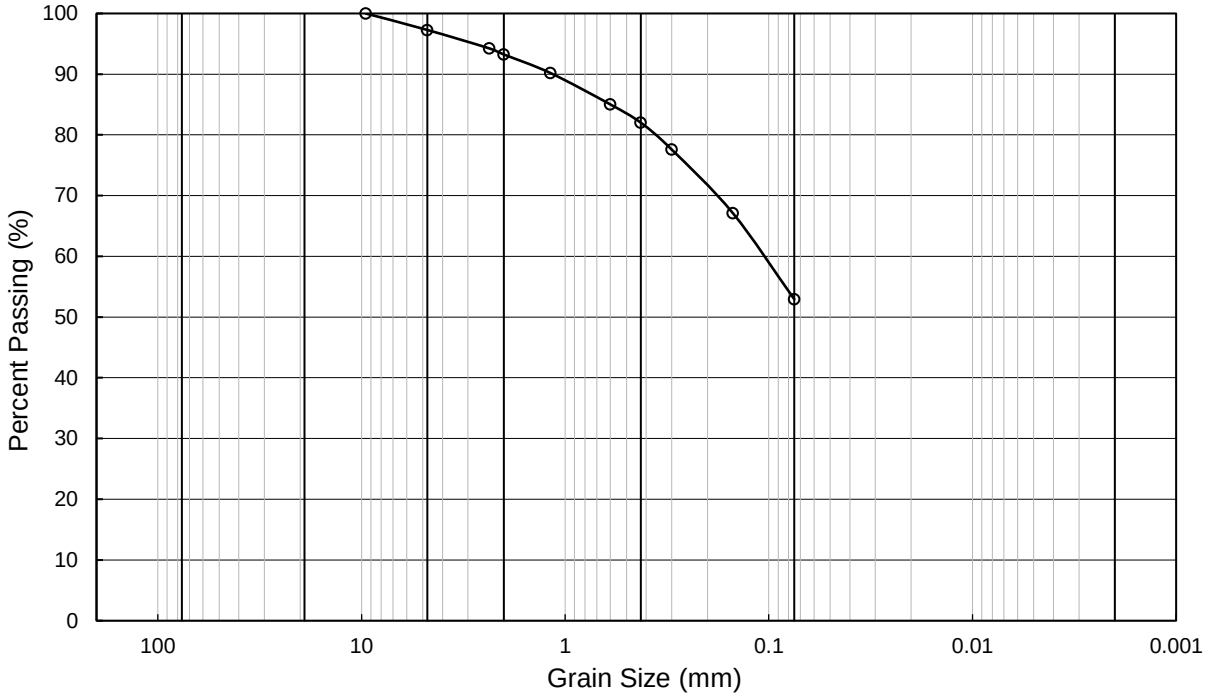
LL=	29
PL=	21
PI =	8
Soil Type:	SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.3
#10	2.00	93.2
#16	1.18	90.2
# 30	0.60	85.0
# 40	0.425	82.0
# 50	0.30	77.6
# 100	0.15	67.1
# 200	0.075	52.9

Summary	
% Gravel =	2.7
% Sand =	44.3
% Fines =	52.9
Sum =	100.0

LL=	33
PL=	20
PI =	13

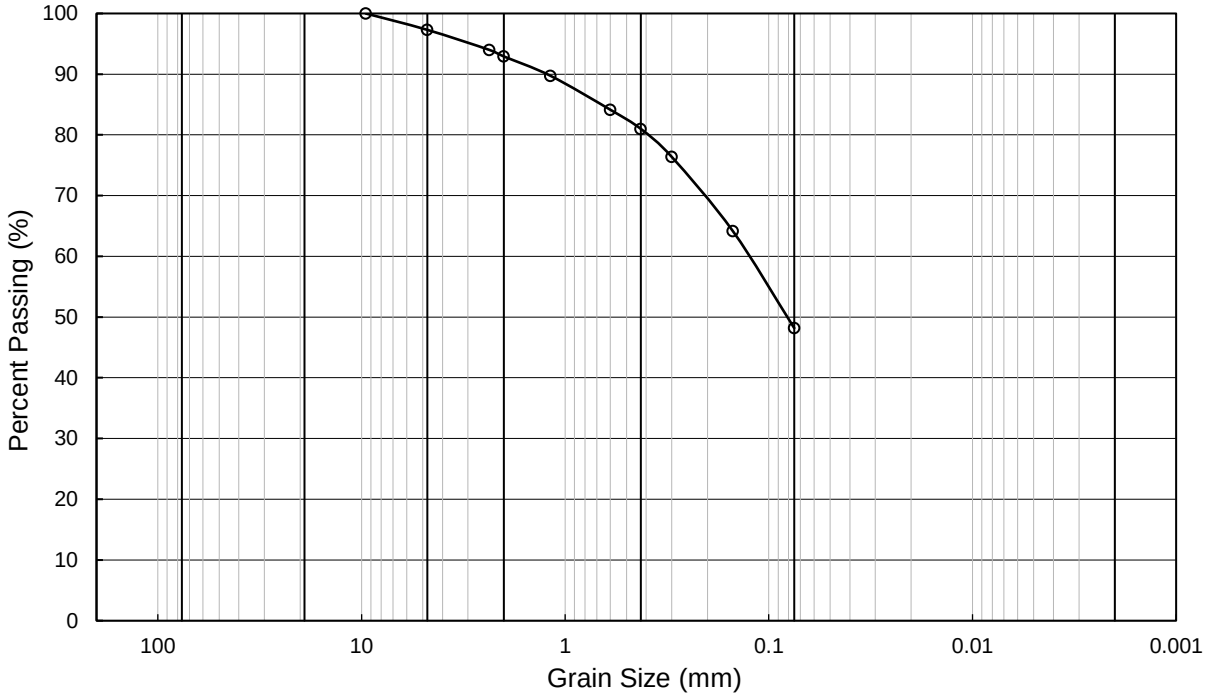
Soil Type: SC-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	45 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.0
#10	2.00	92.9
#16	1.18	89.7
# 30	0.60	84.1
# 40	0.425	81.0
# 50	0.30	76.4
# 100	0.15	64.1
# 200	0.075	48.2

Summary	
% Gravel =	2.7
% Sand =	49.1
% Fines =	48.2
Sum =	100.0

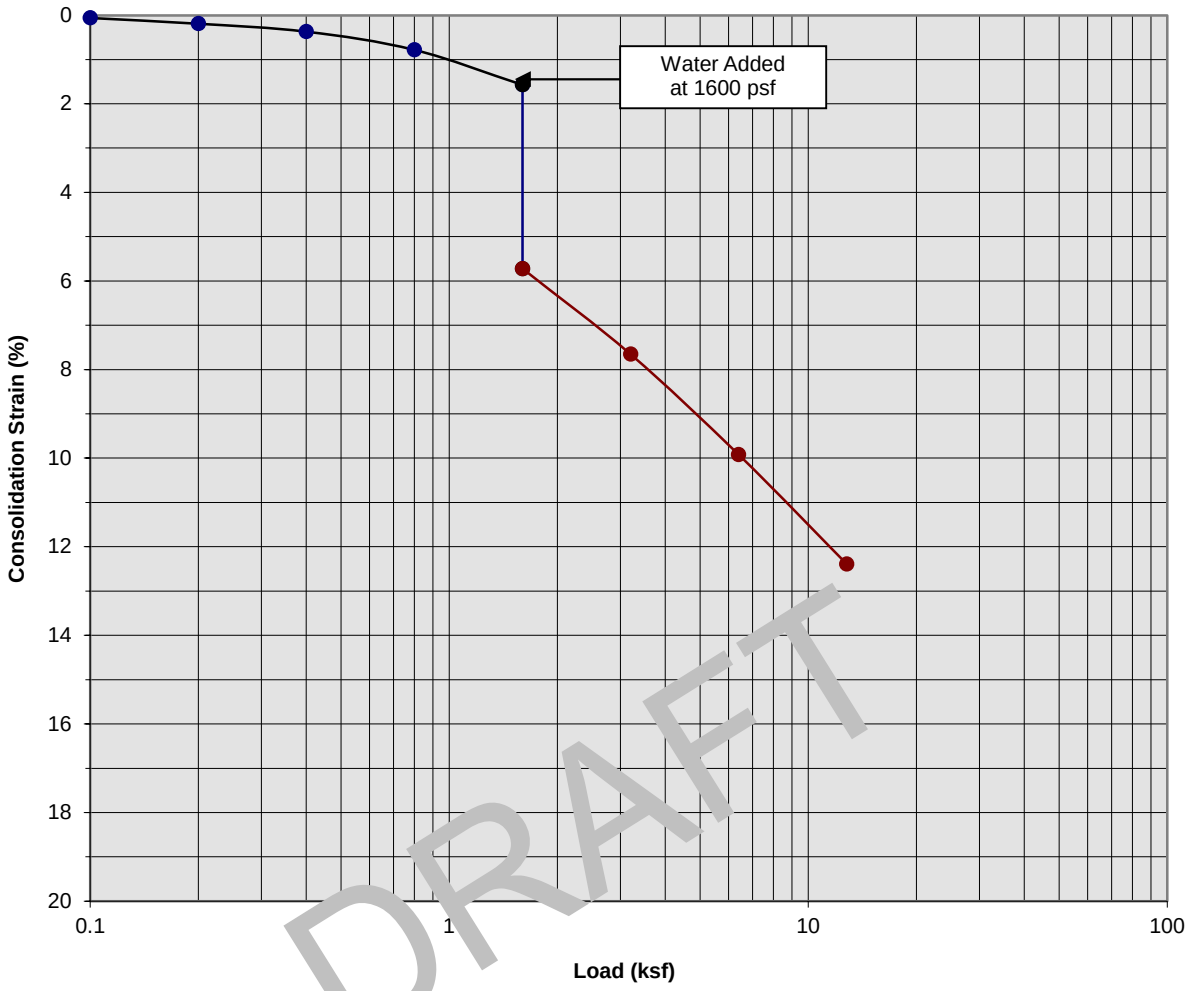
LL=	28
PL=	20
PI =	8

Soil Type: SC-CL

APPENDIX C-2

DRAFT LABORATORY TEST RESULTS (SCG)

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Light Red Brown Silty fine to coarse Sand

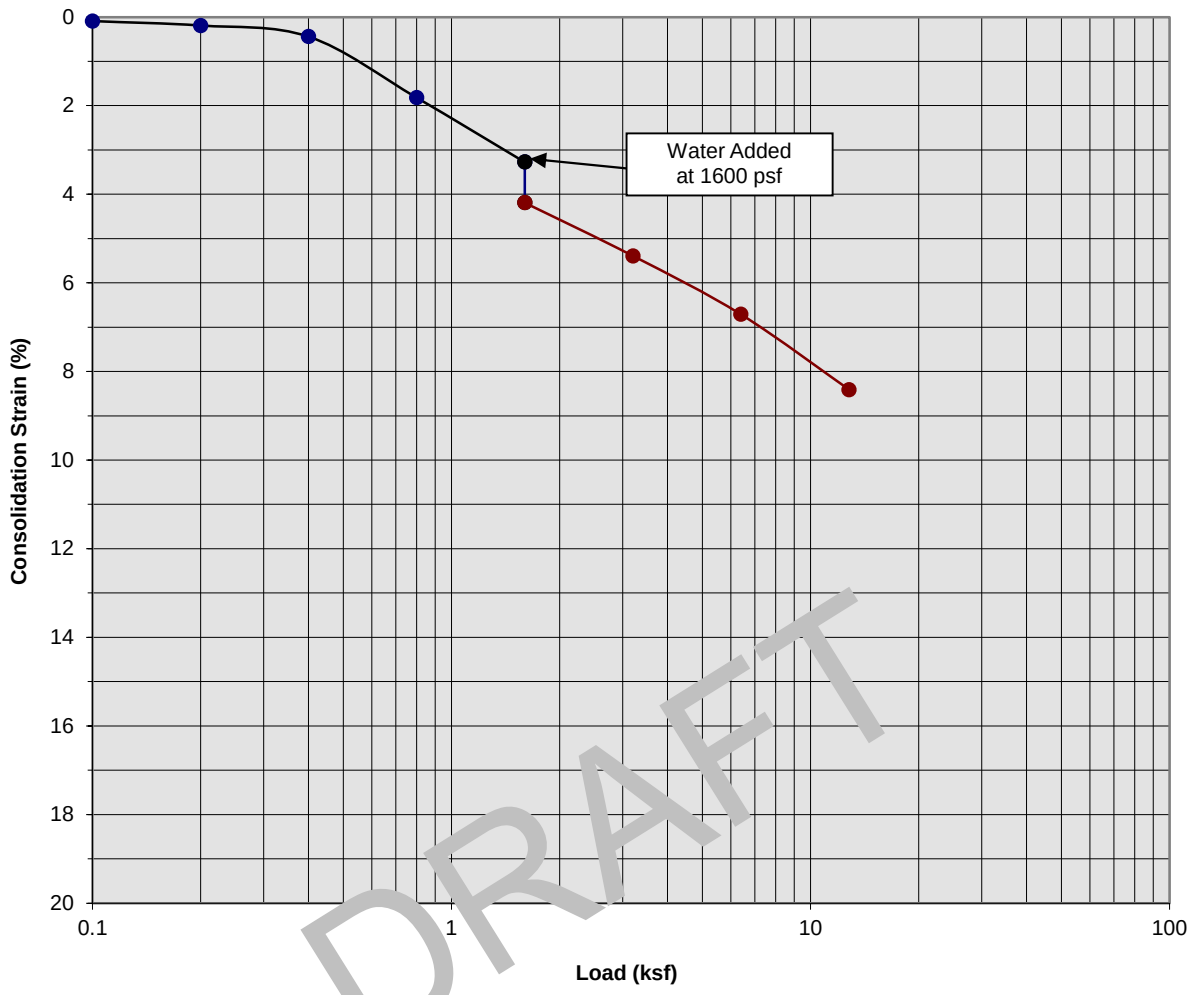
Boring Number:	SCG-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Red Brown Silty fine Sand, trace medium to coarse Sand

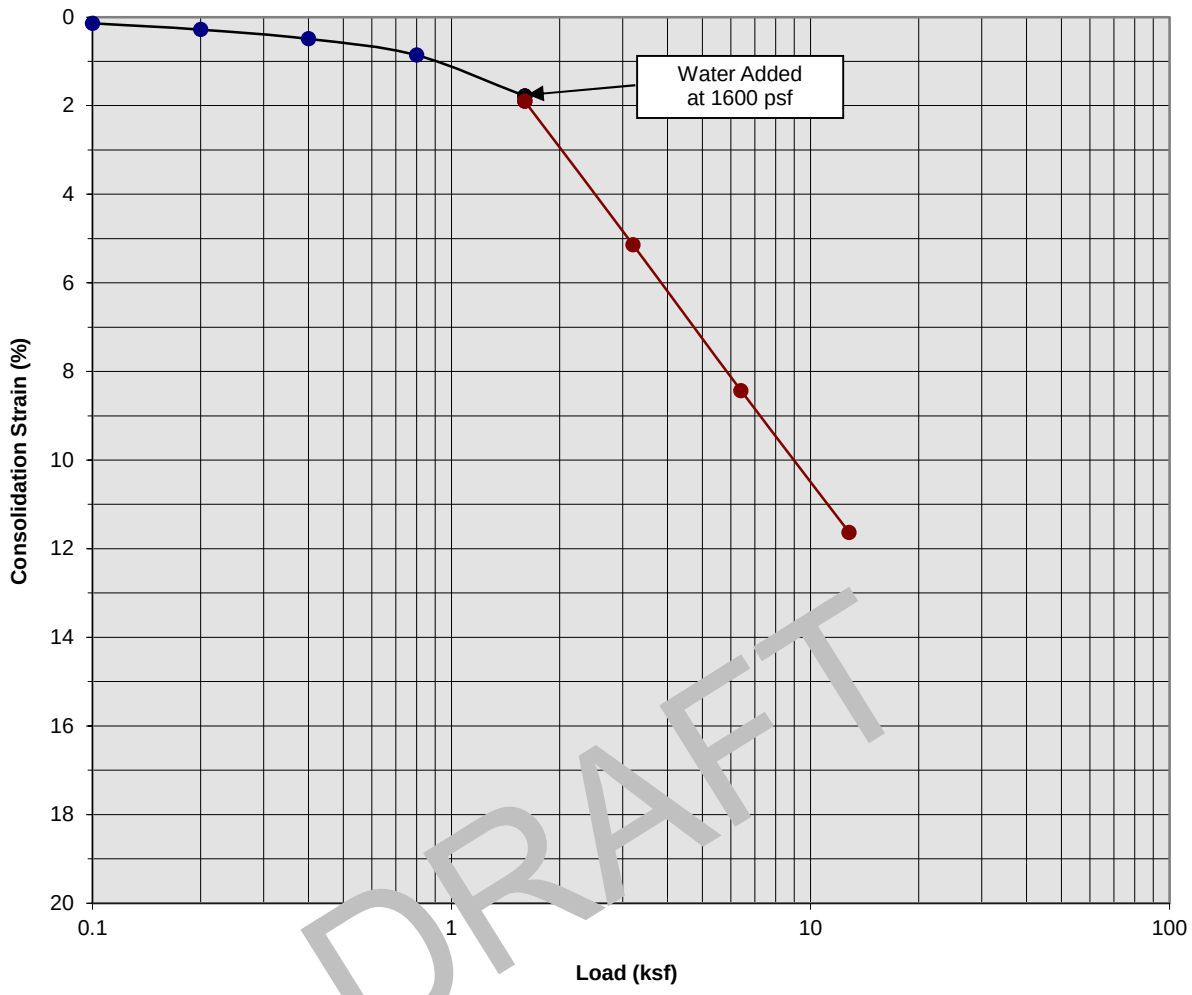
Boring Number:	SCG-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	121.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Colluvium: Dark Gray Brown Silty fine to medium Sand

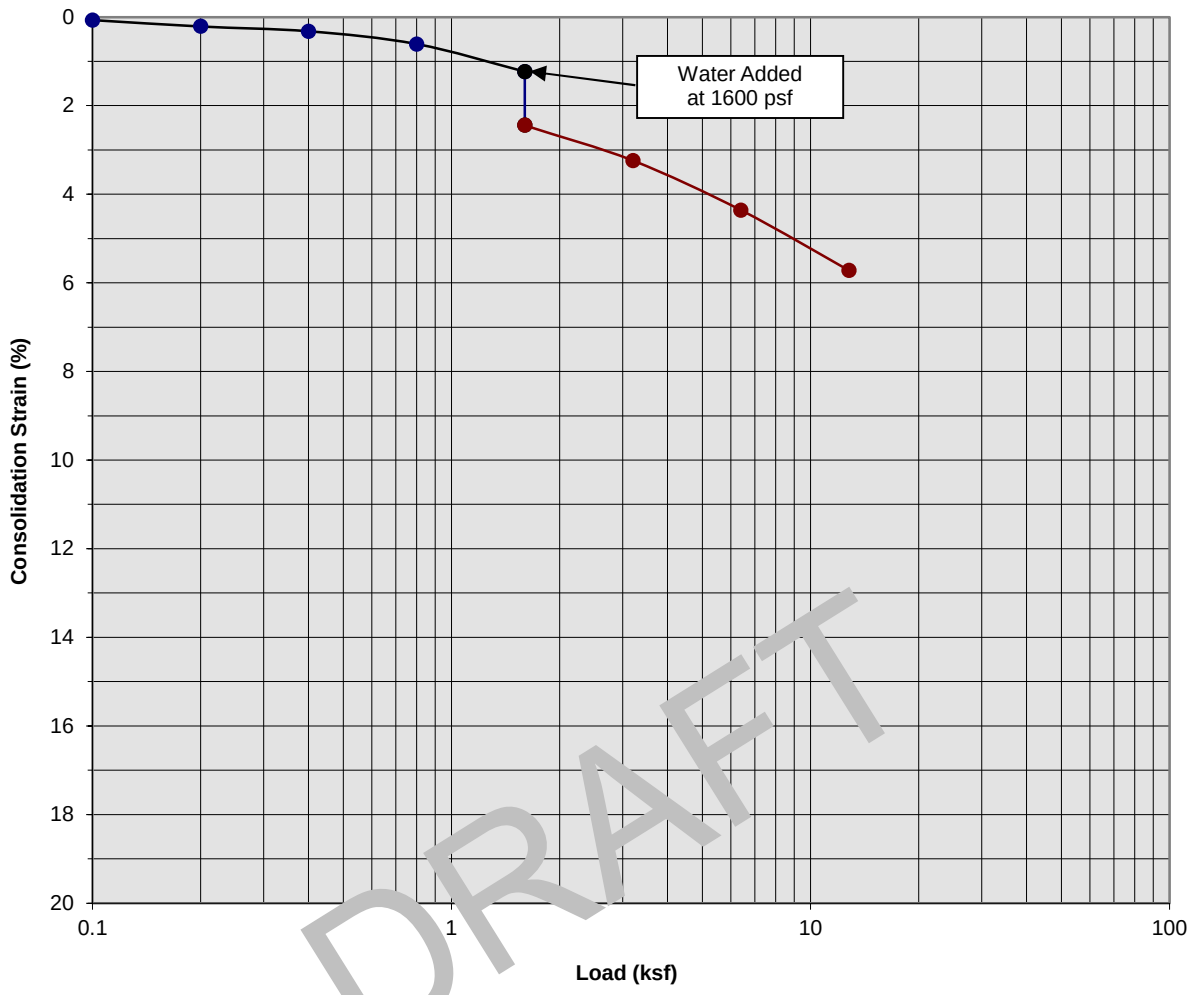
Boring Number:	SCG-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	99.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace medium to coarse Sand

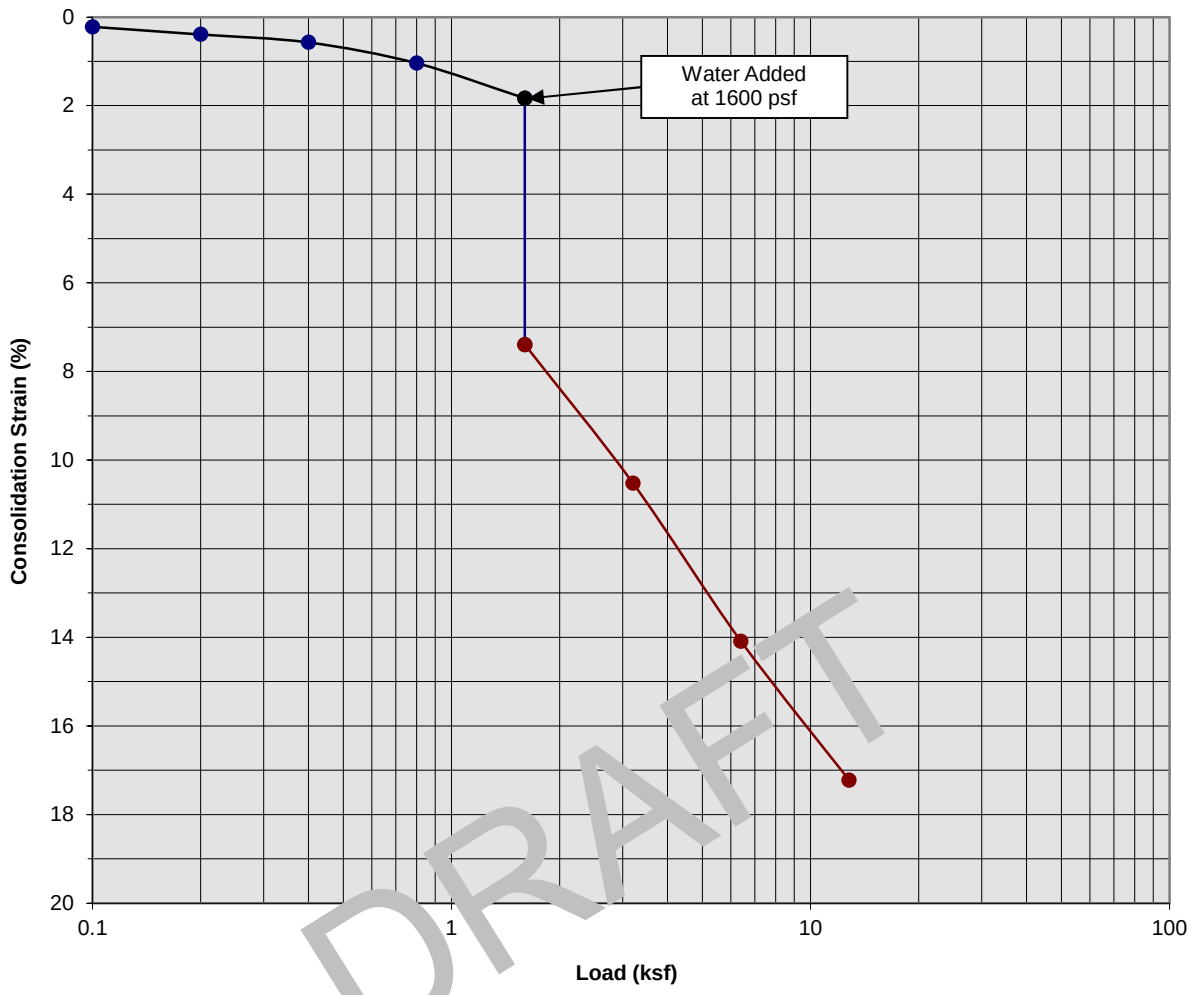
Boring Number:	SCG-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	125.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Gray Brown Silty fine to medium Sand

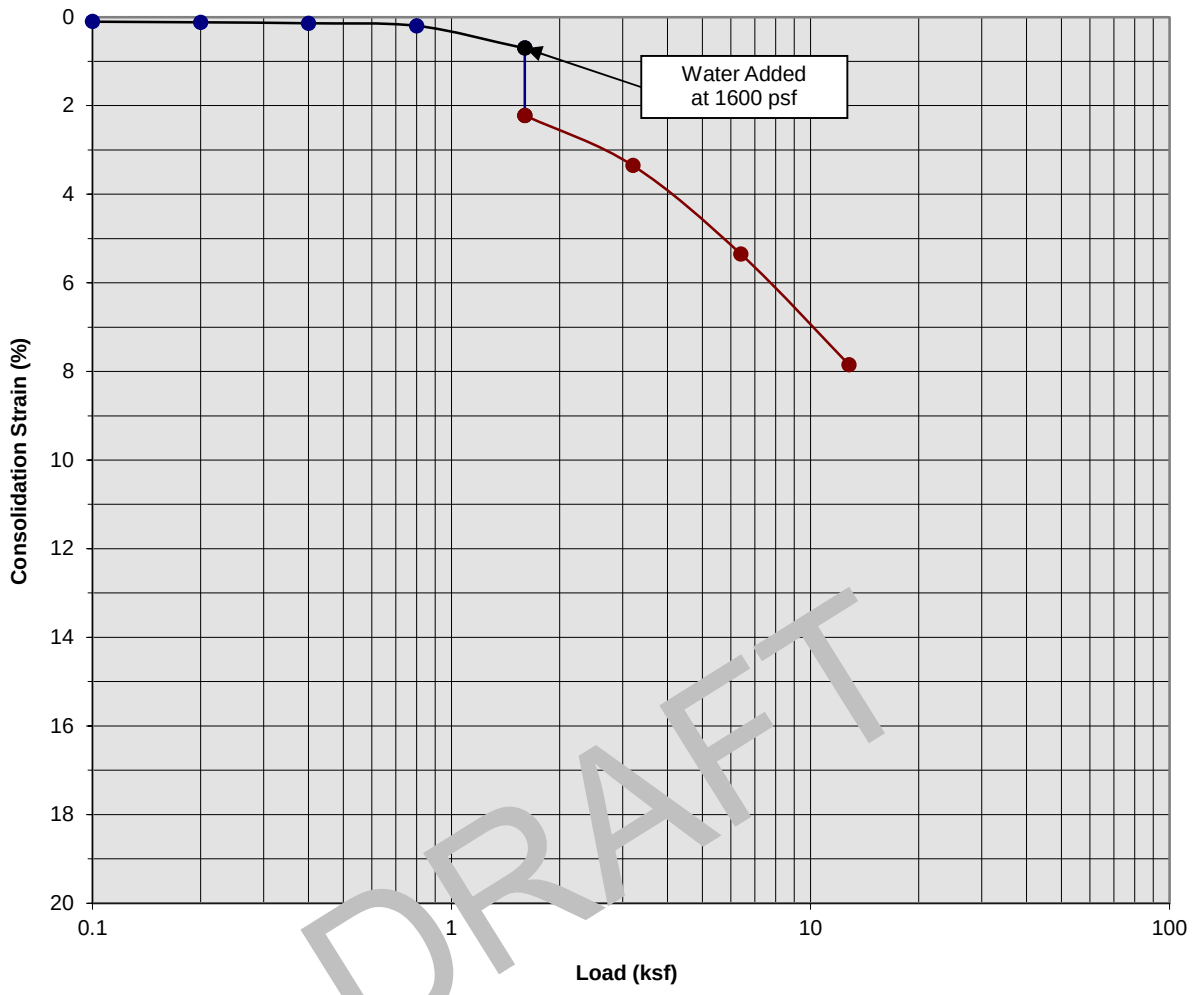
Boring Number:	SCG-4	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	102.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

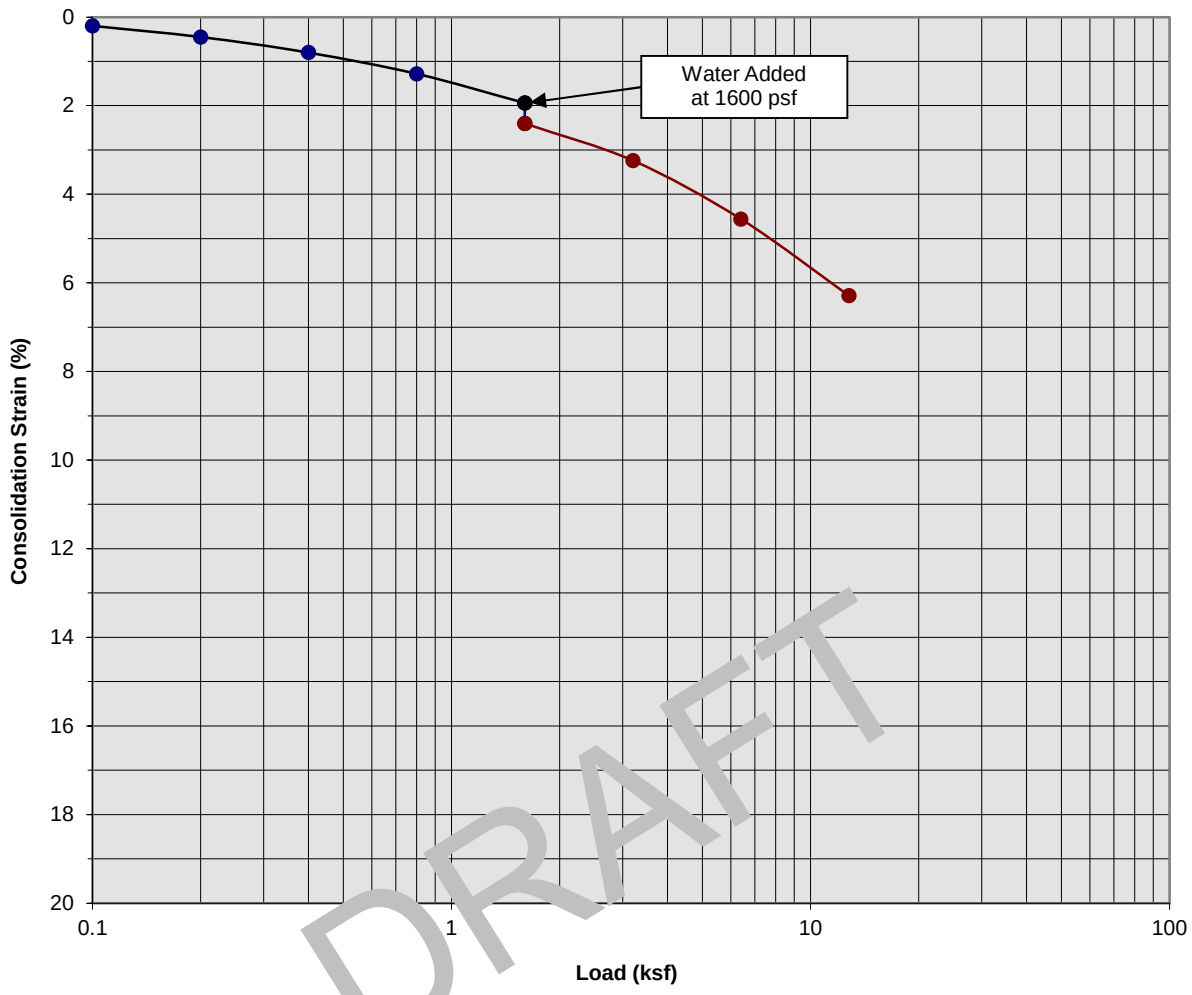
Boring Number:	SCG-4	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	126.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.52

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: FILL: Black to Dark Brown Clayey Silt

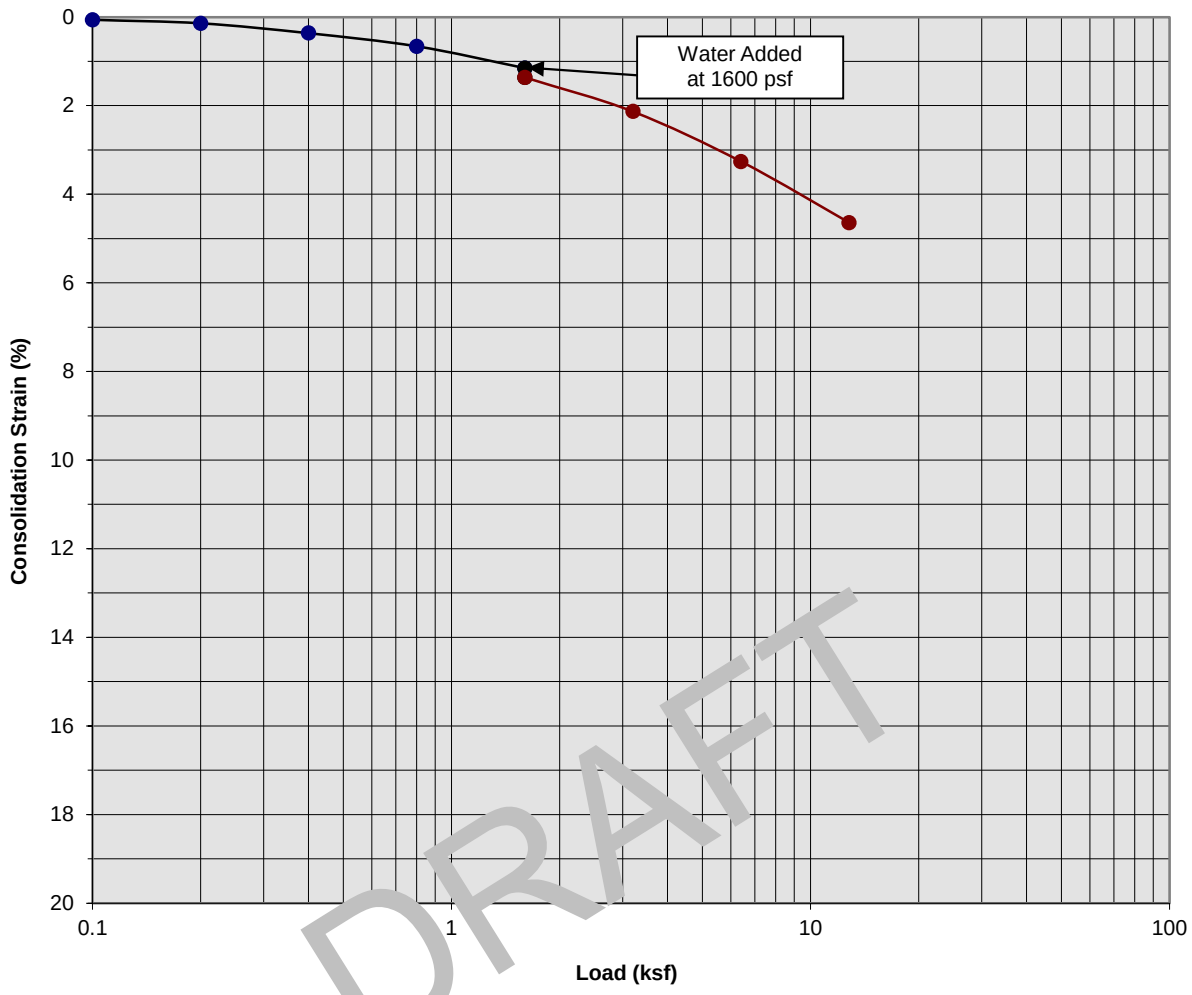
Boring Number:	SCG-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	115.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Bray Brown Silty Clay, little fine to medium Sand

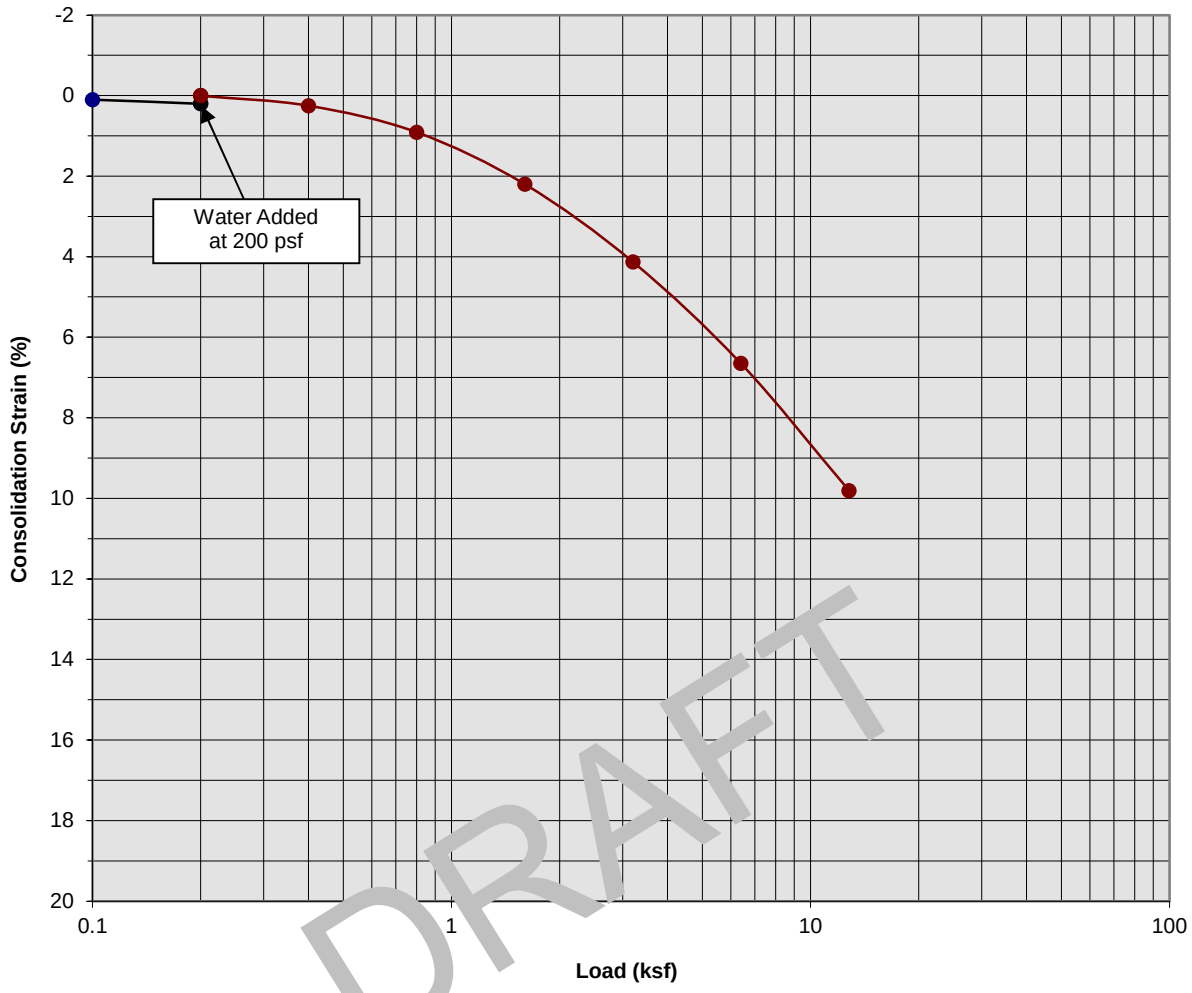
Boring Number:	SCG-5	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	131.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 8

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Silty Clay, trace fine Sand

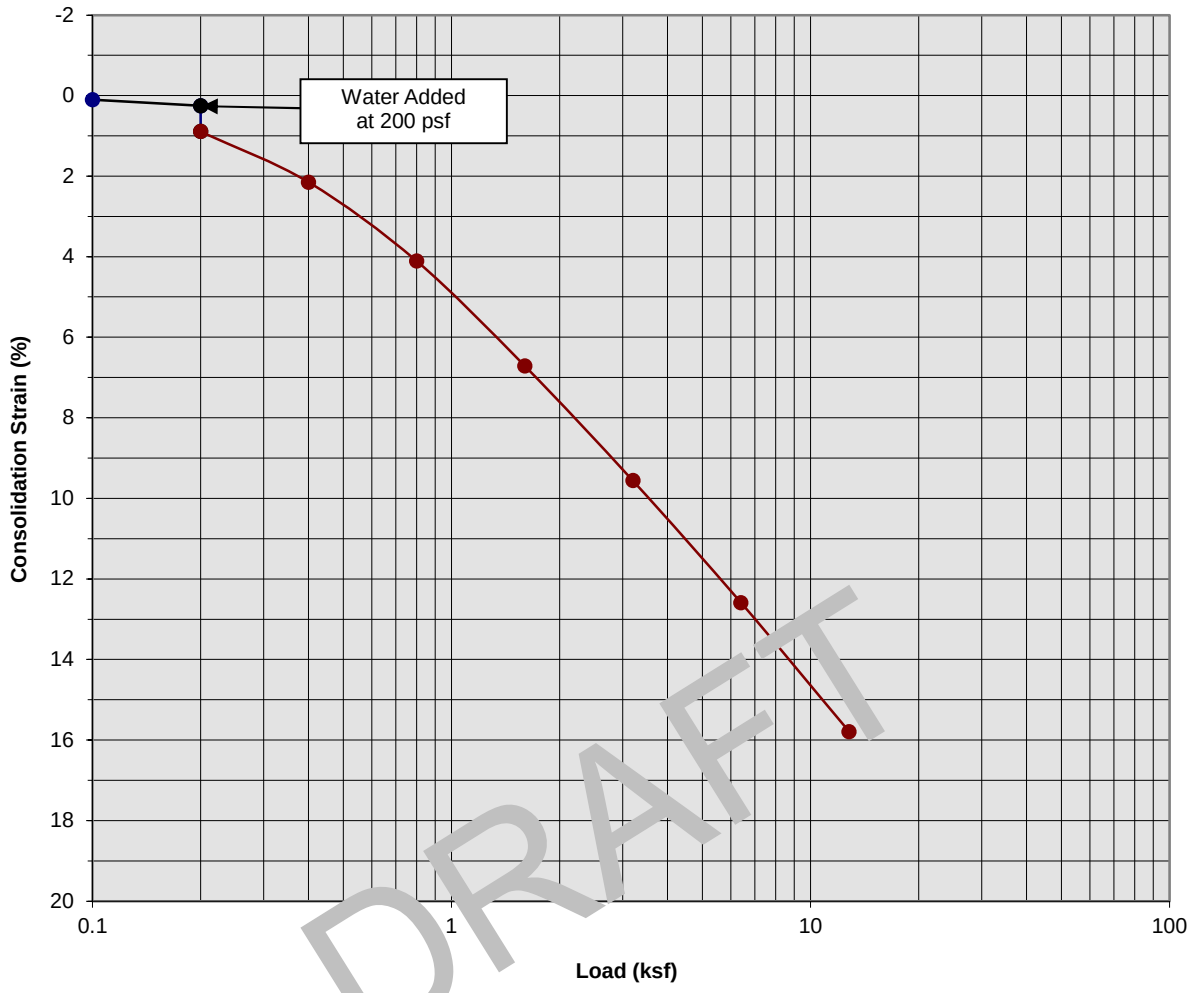
Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	102.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.20

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 9

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light Brown Silty fine Sand

Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	95.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.64

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 10

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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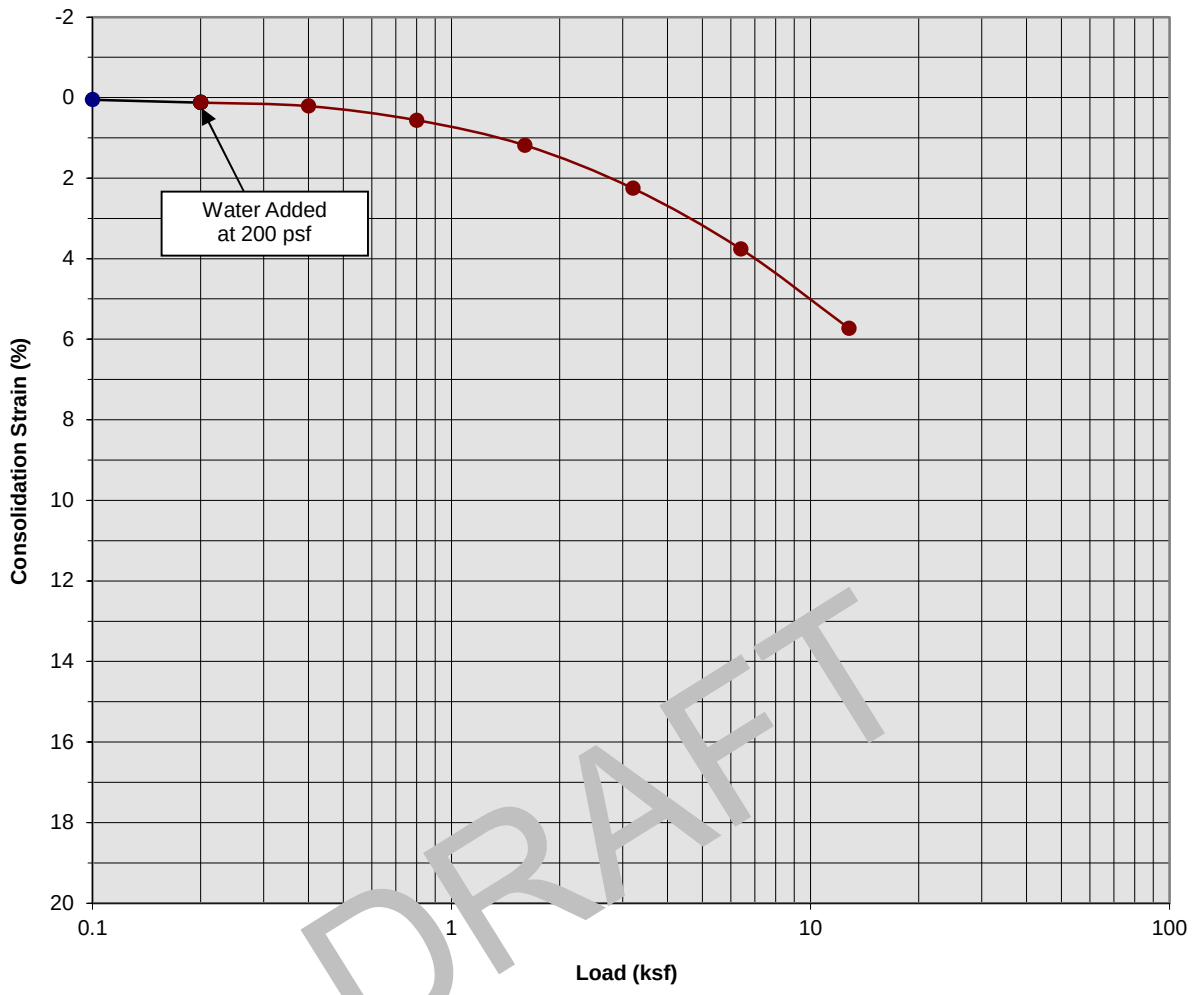
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Clayey Silt, trace fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 11

SoCalGeo
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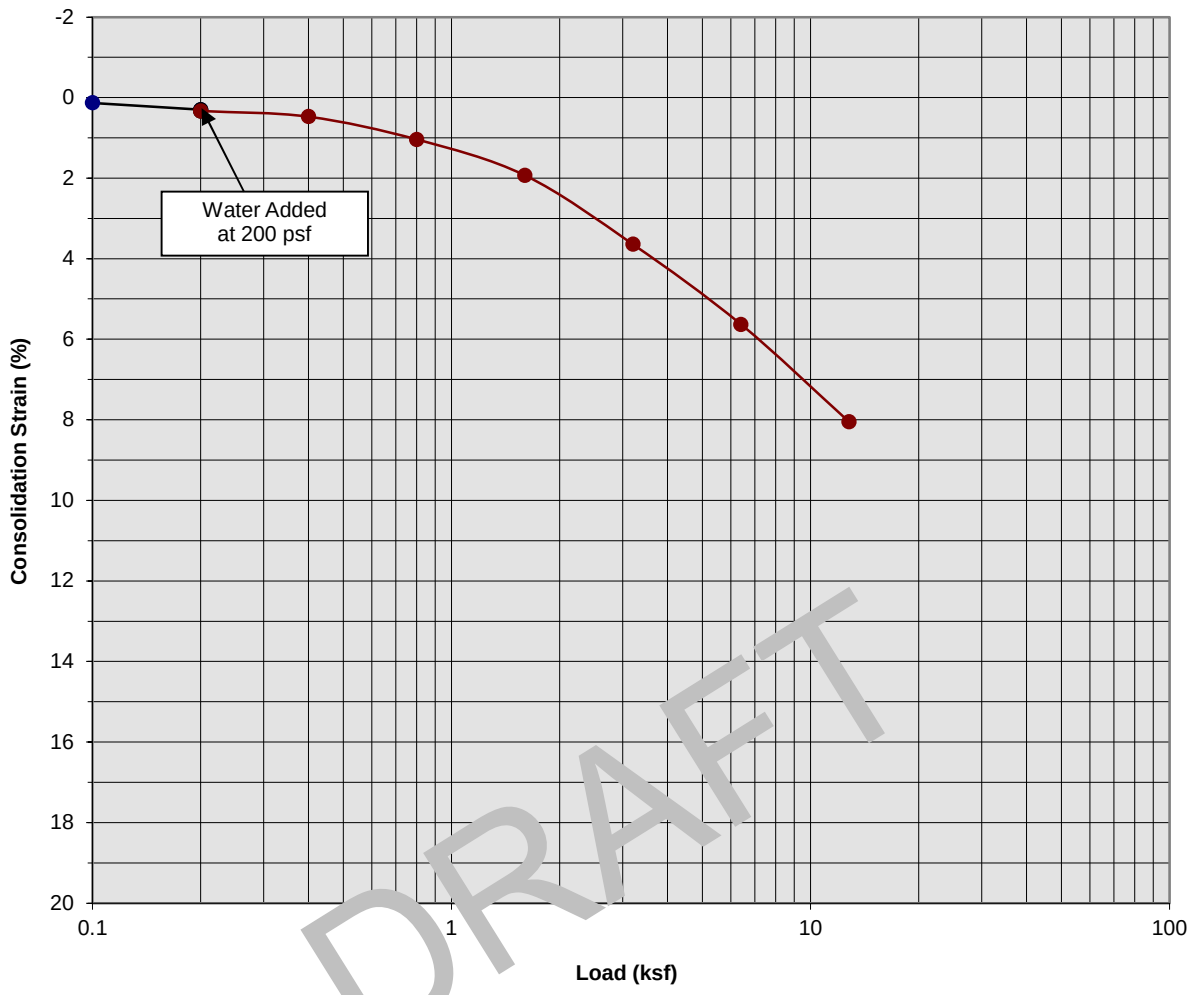
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 12

SoCalGeo
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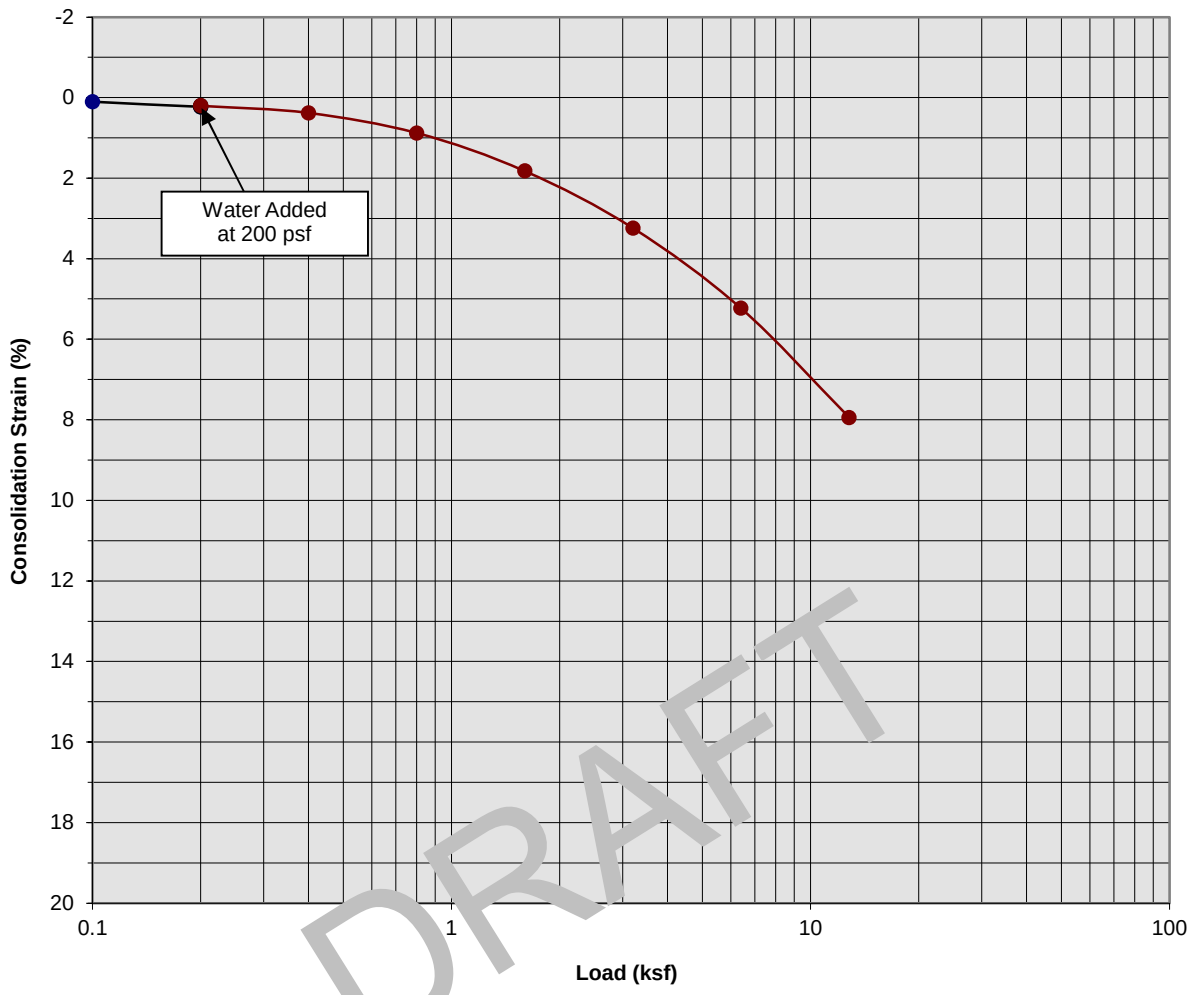
Consolidation/Collapse Test Results



DRAFT

Classification: Light to Dark Brown Clayey Silt, trace fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	109.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 13

SoCalGeo
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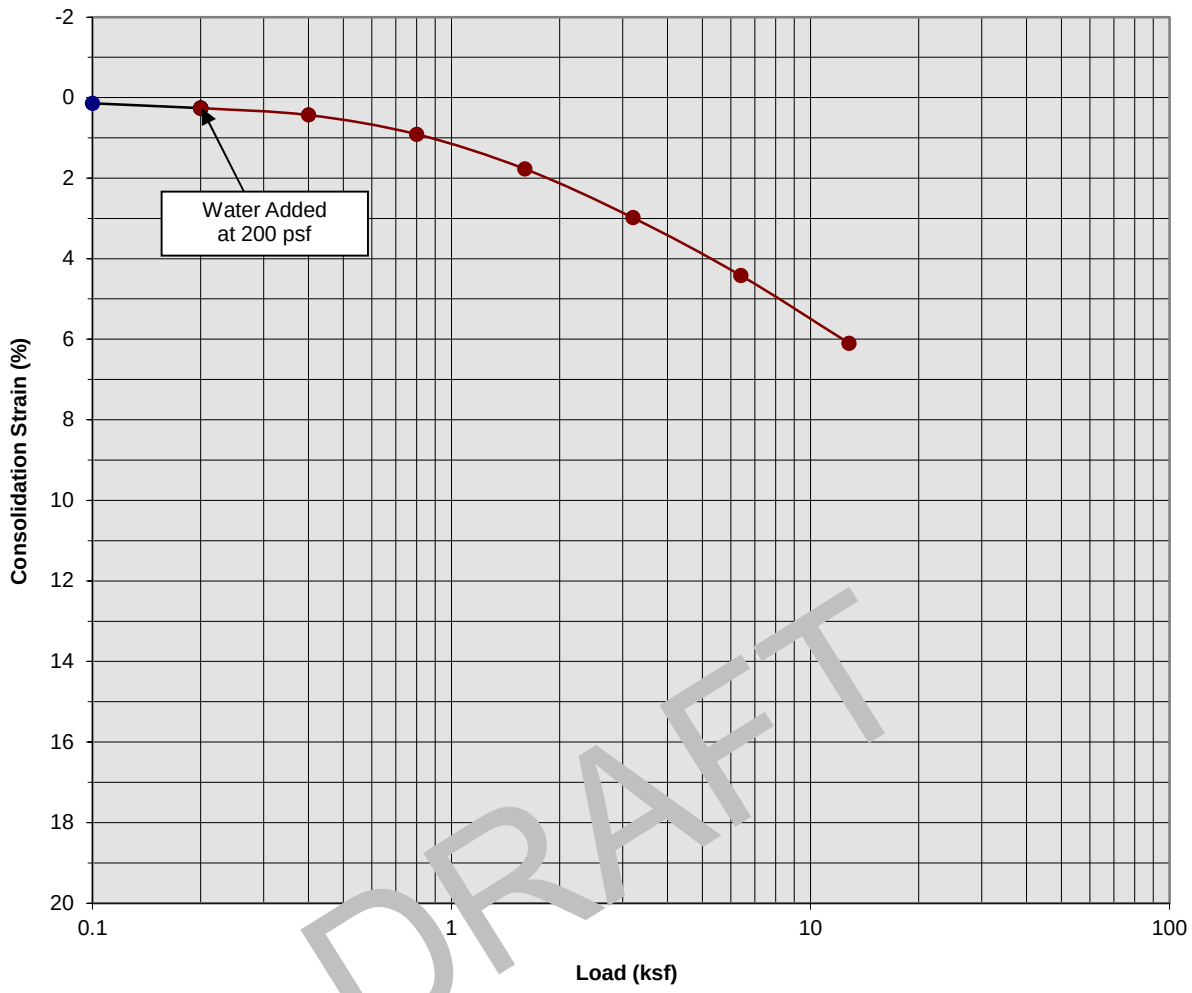
Consolidation/Collapse Test Results



DRAFT

Classification: Green Blue Silty fine Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	33.5 to 34.5	Initial Dry Density (pcf)	113.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 14

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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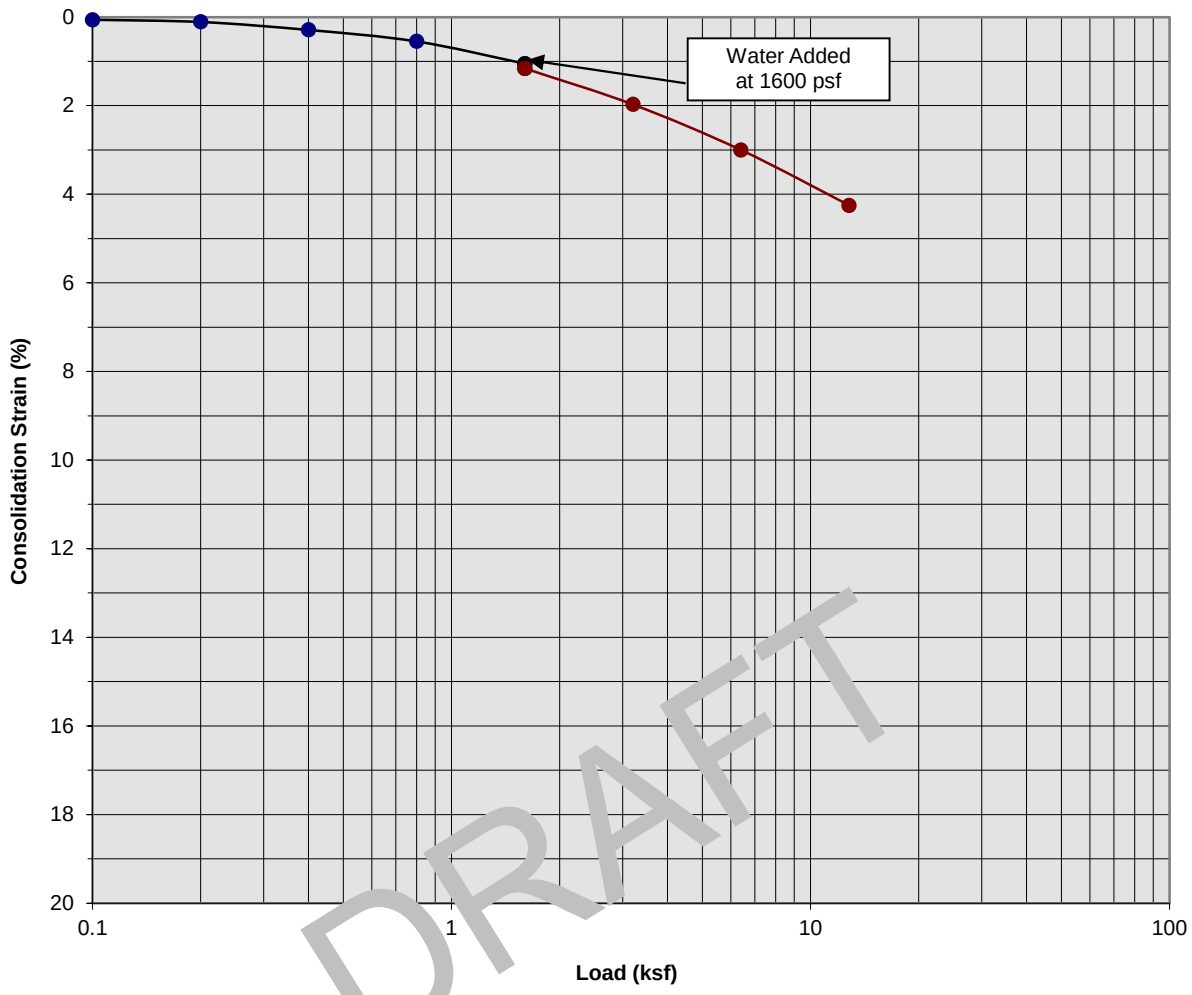
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Gray Brown Silty fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	43.5 to 44.5	Initial Dry Density (pcf)	114.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.11

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 15

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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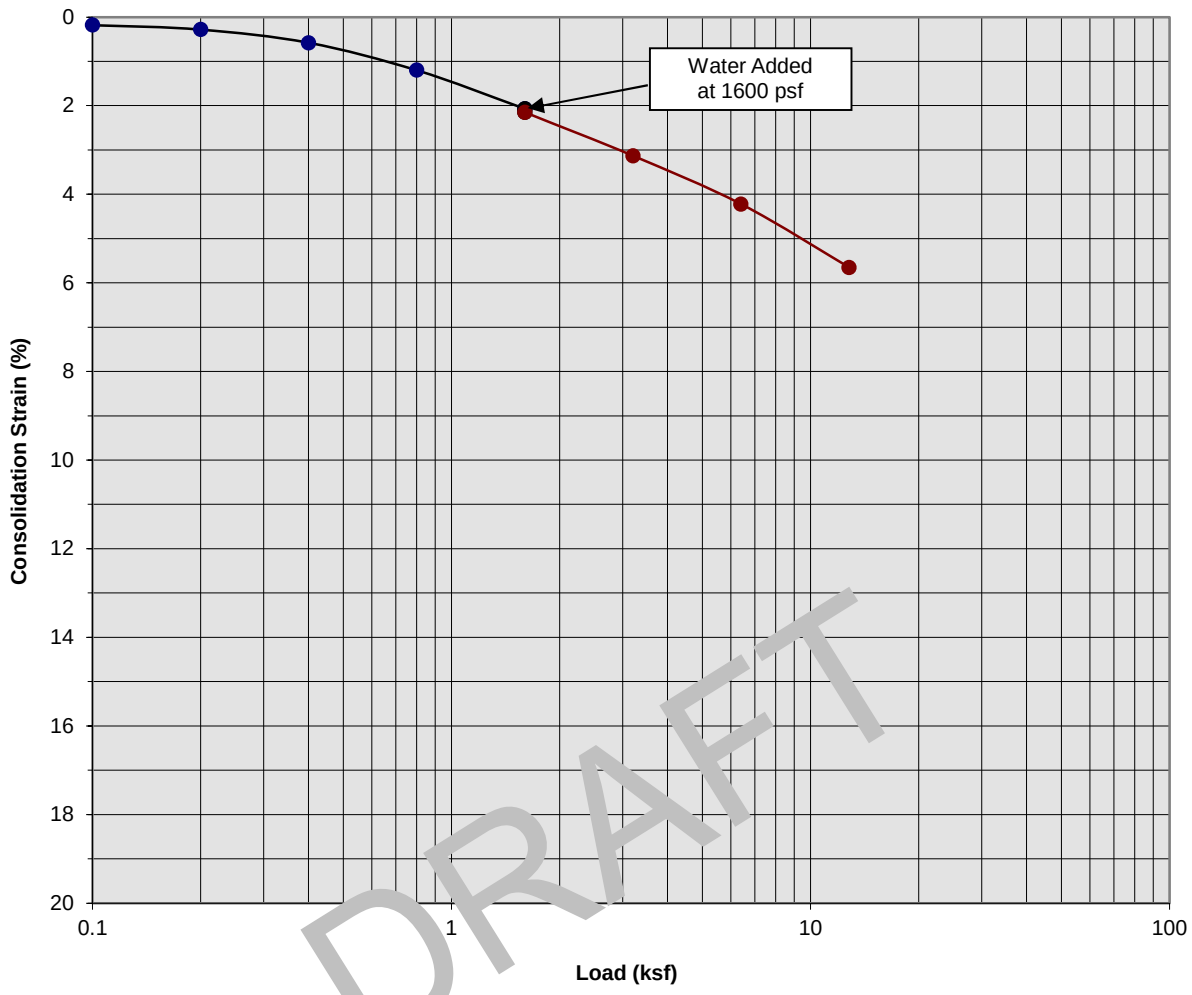
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Blue Green Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	53.5 to 54.5	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 16

SoCalGeo
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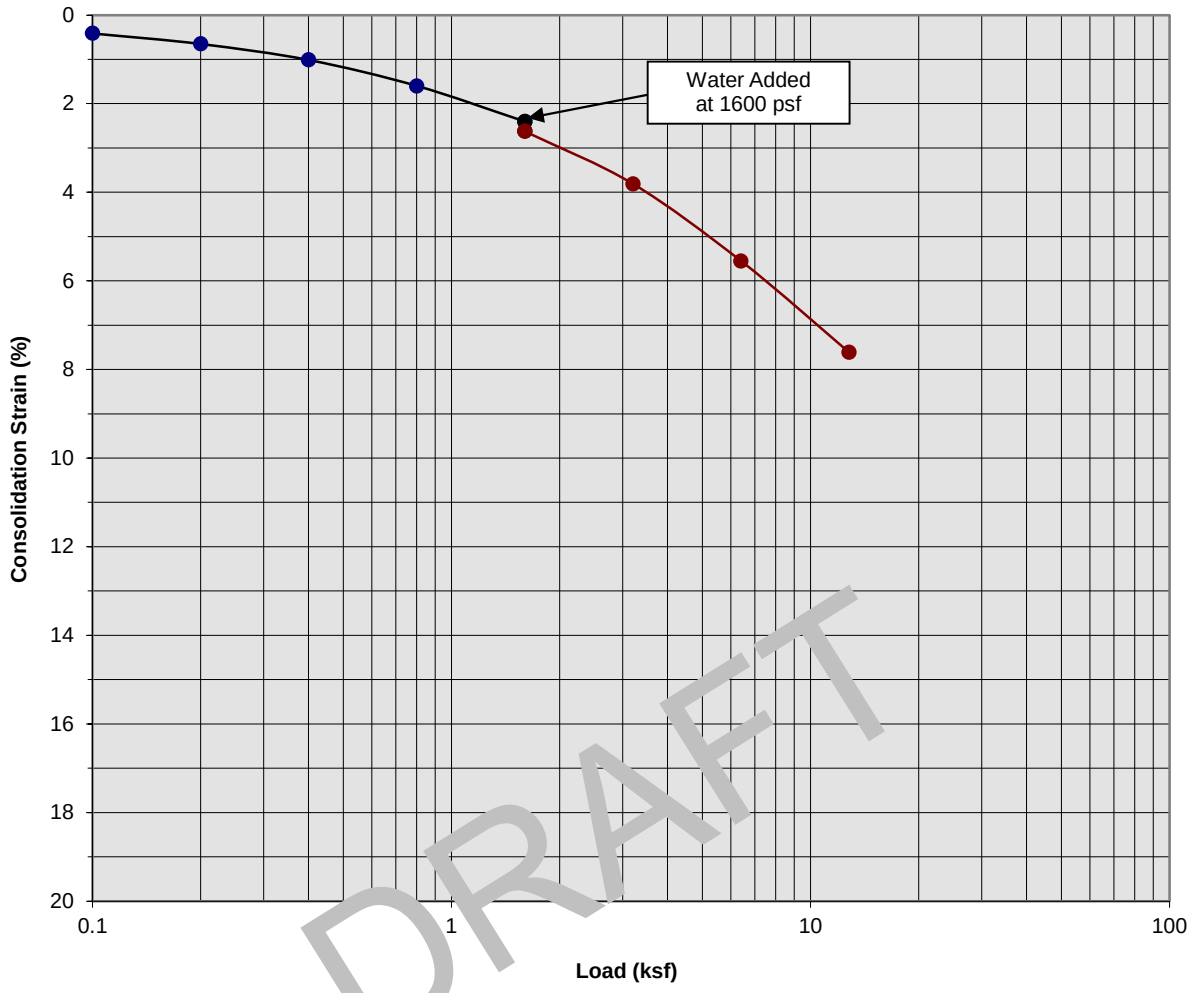
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.22

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 17

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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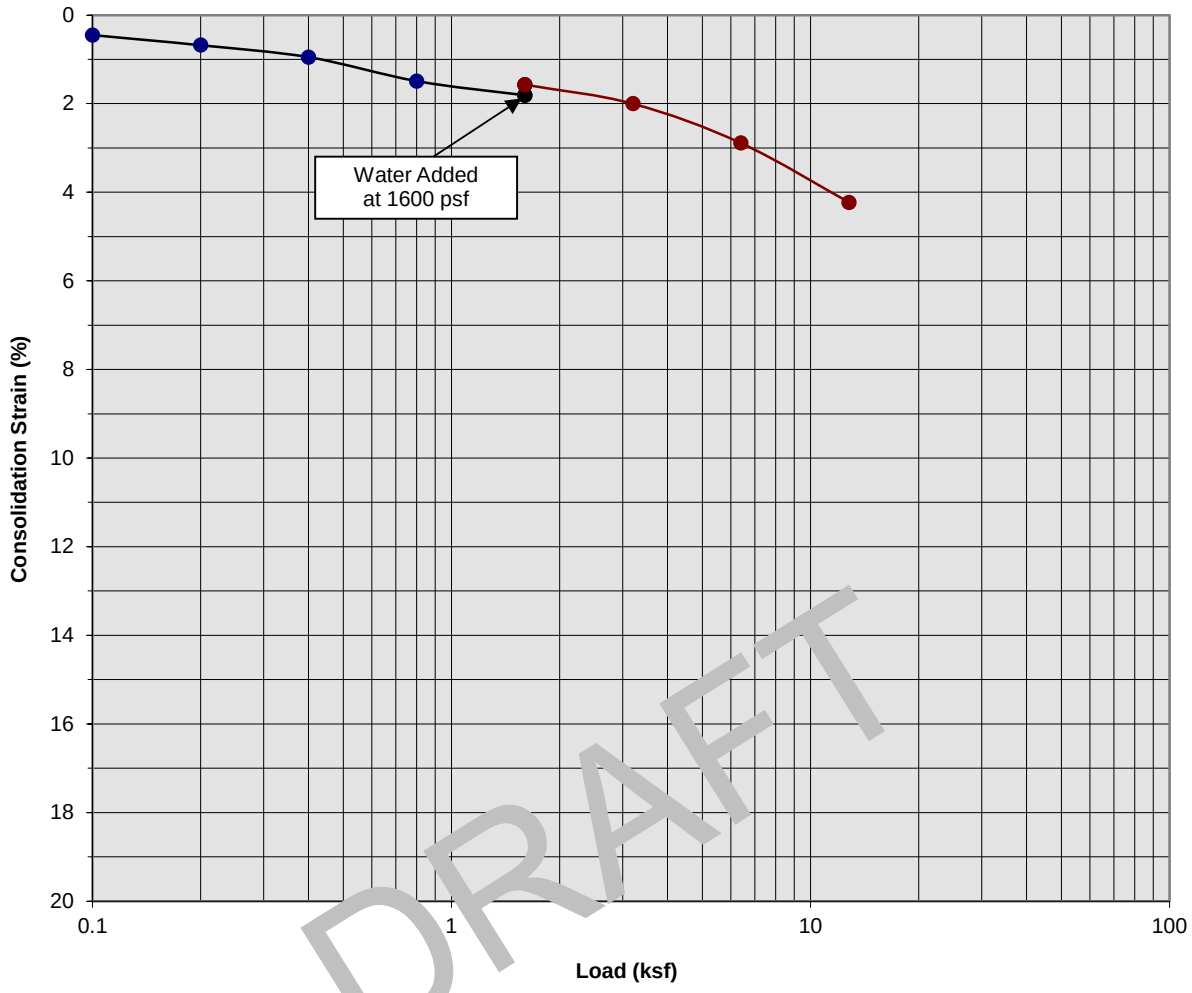
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	122.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.24

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 18

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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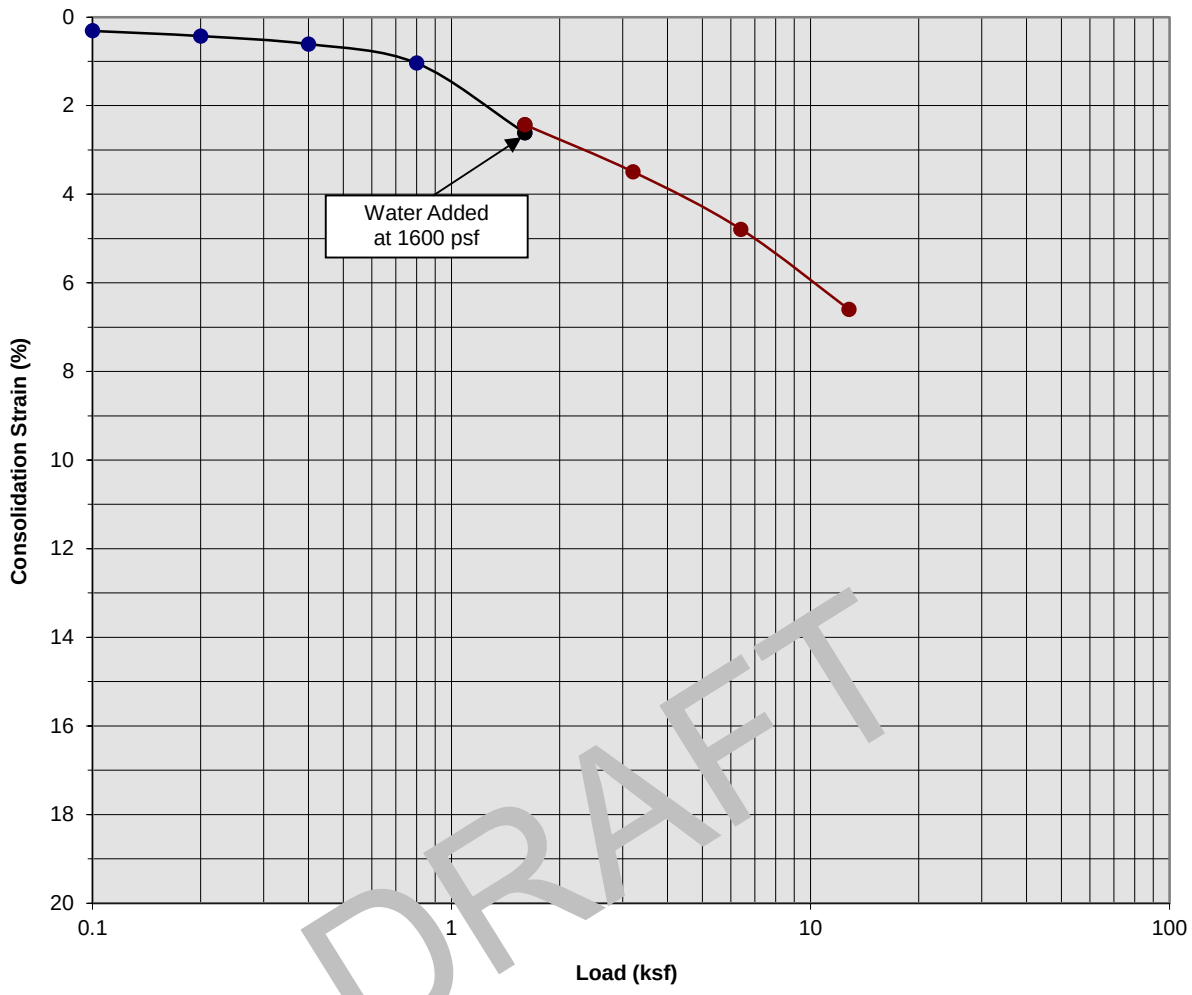
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.18

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 19

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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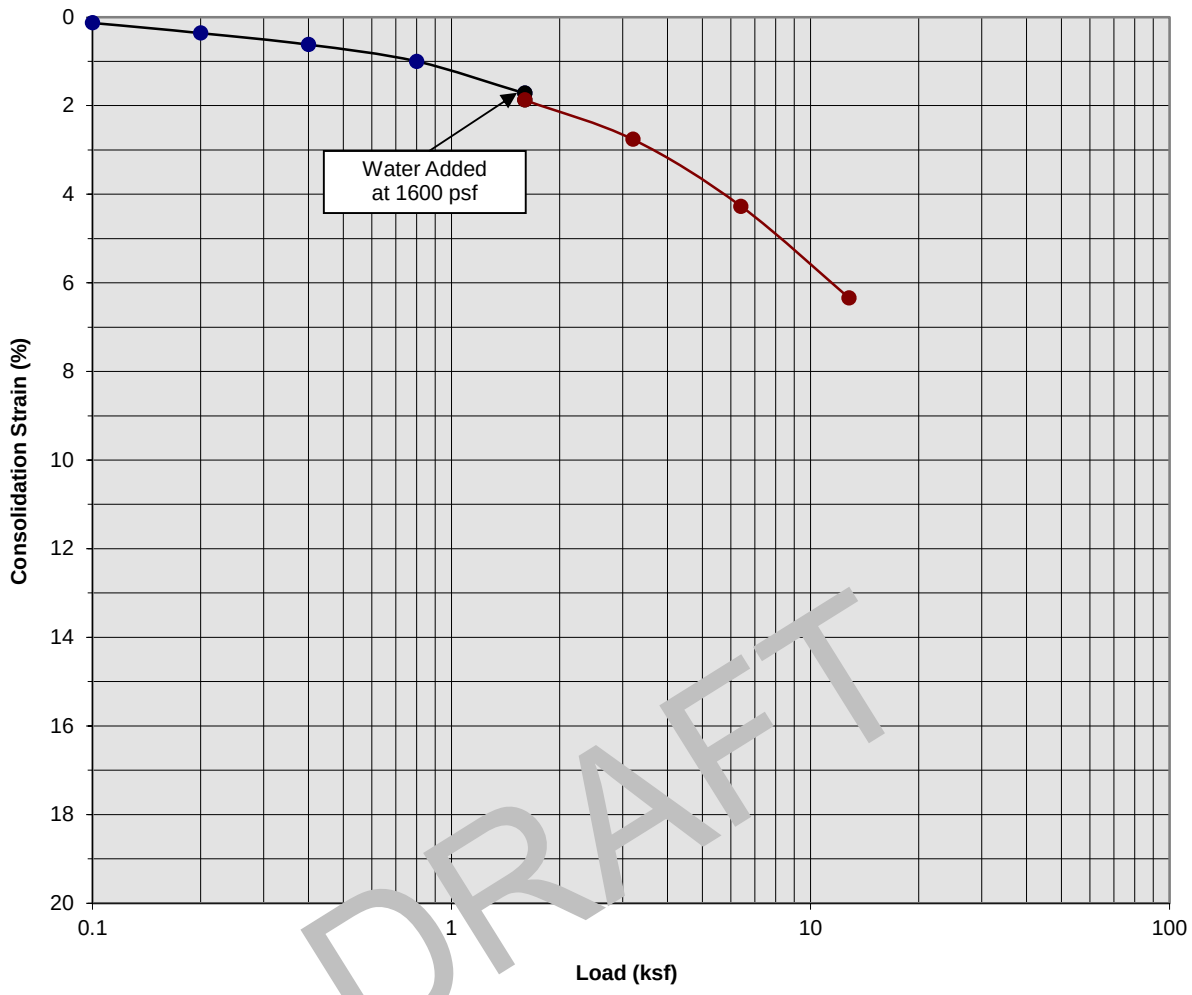
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	131.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 20

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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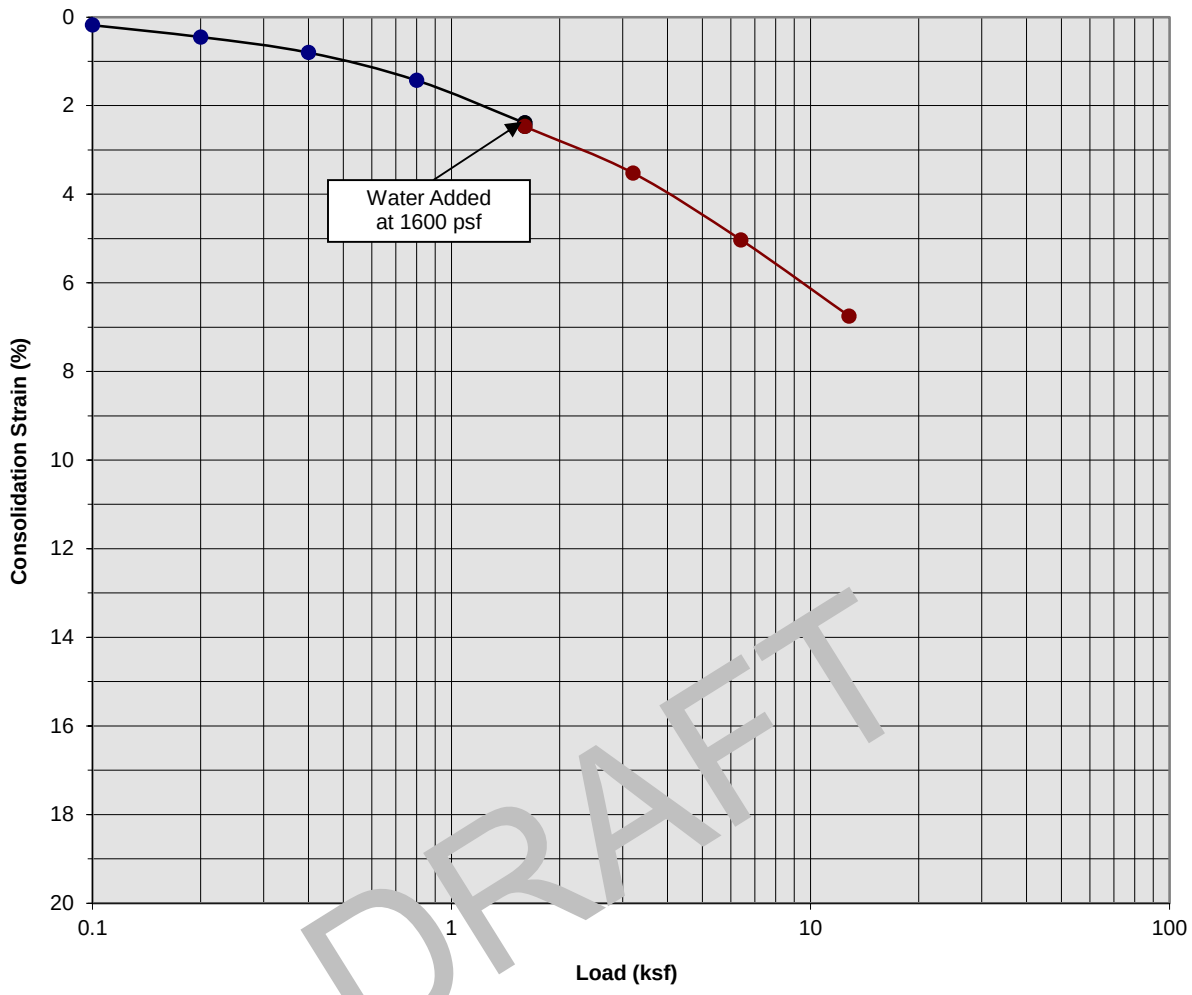
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	117.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 21

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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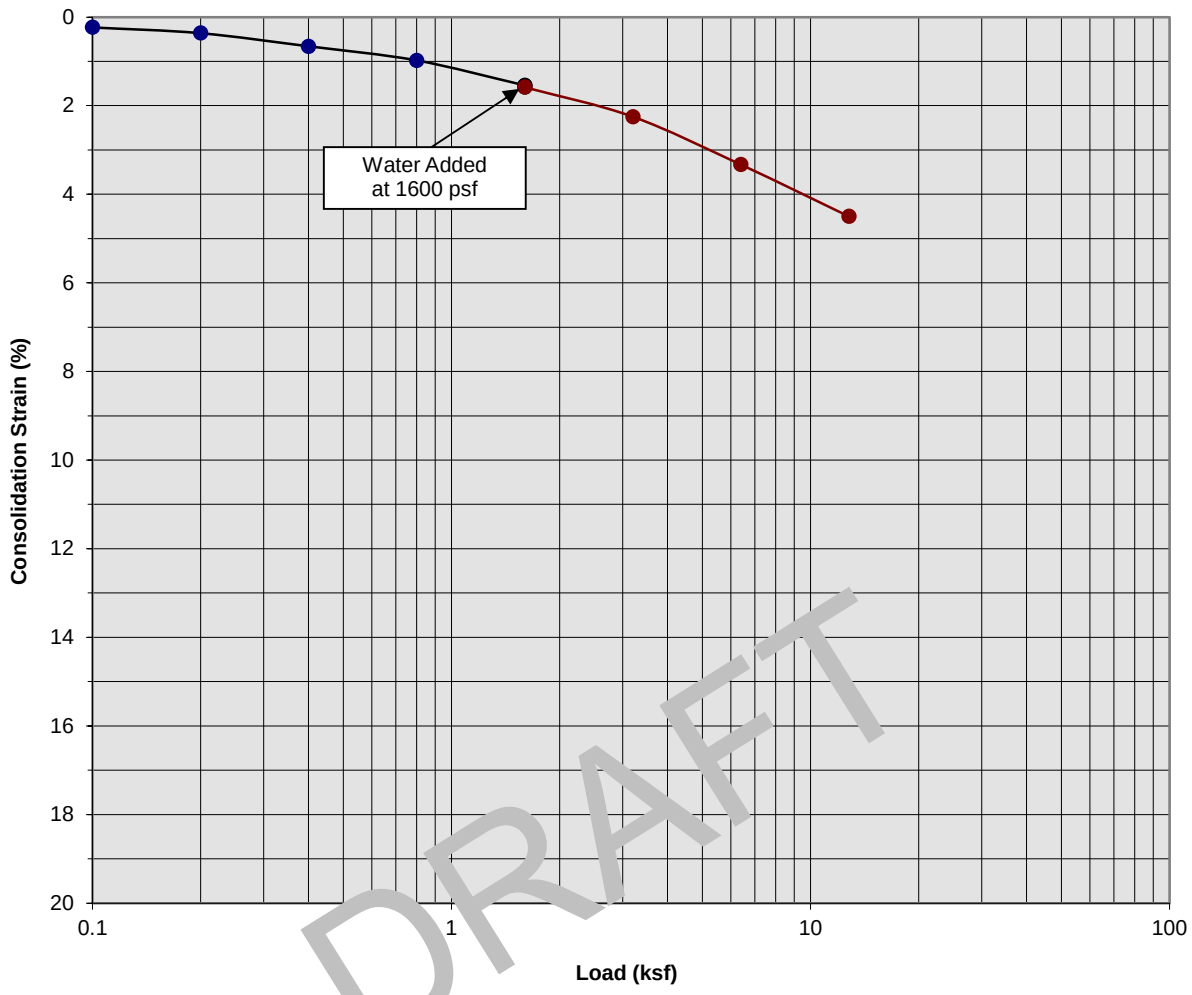
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	28.5 to 29.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.04

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 22

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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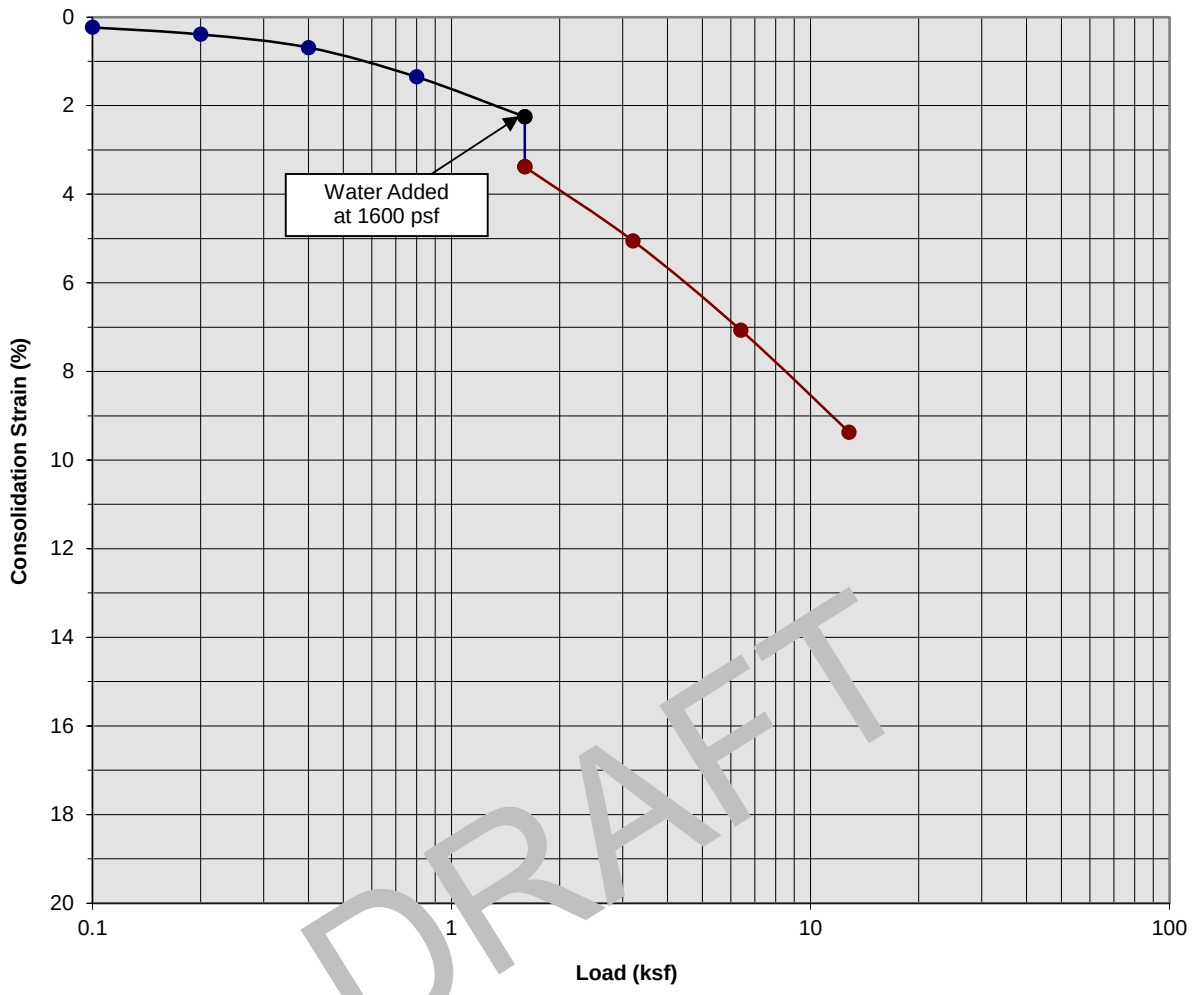
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand, trace medium Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	38.5 to 39.5	Initial Dry Density (pcf)	103.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 23

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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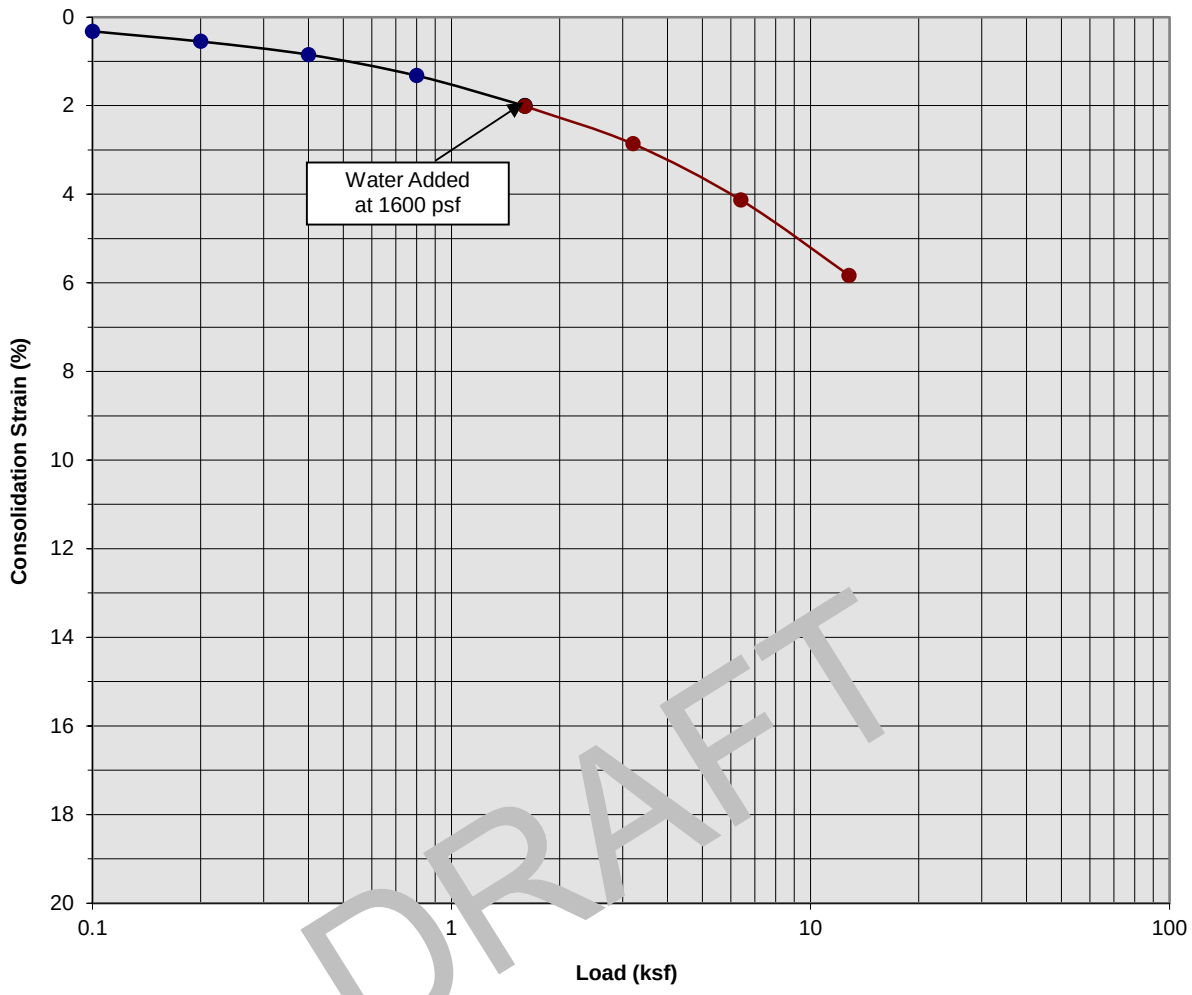
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Green Blue Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	48.5 to 49.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 24

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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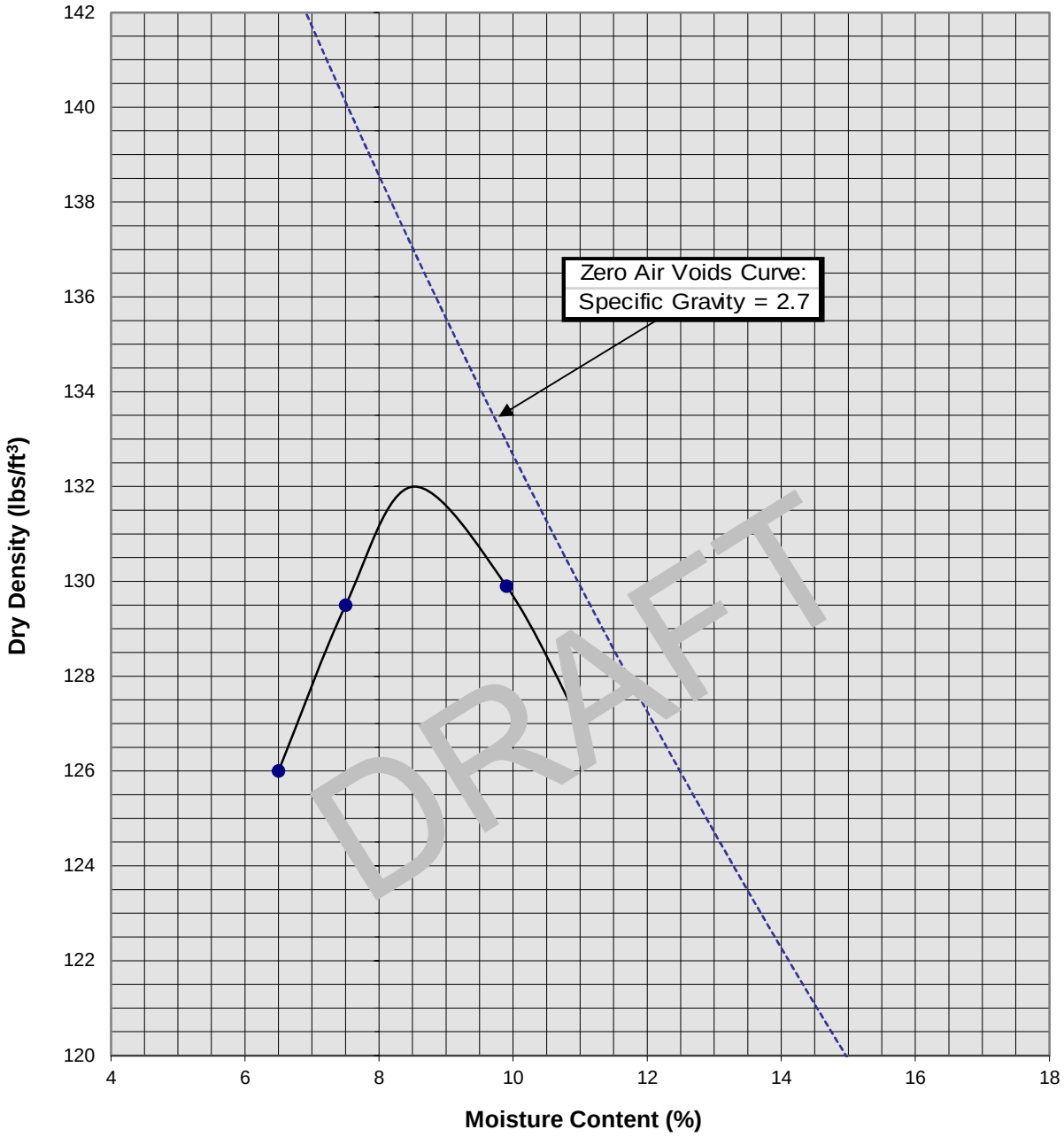
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-2 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	132
Soil Classification	Orange Brown fine Sandy Silt, trace Clay

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-25

SoCalGeo
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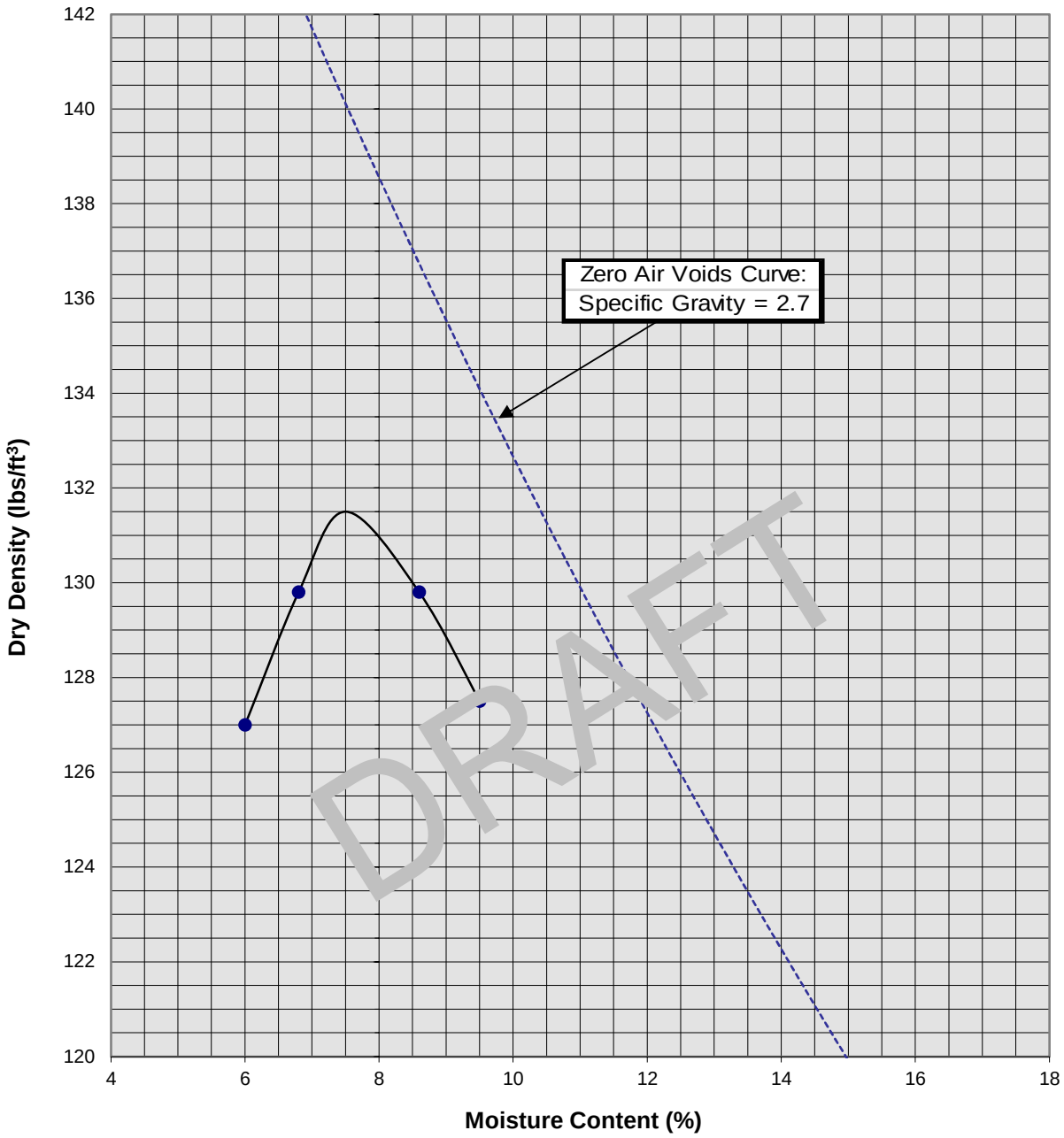
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-4 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	131.5
Soil Classification	Dark Gray Brown Silty fine to medium Sand, trace to little course Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-26

SoCalGeo
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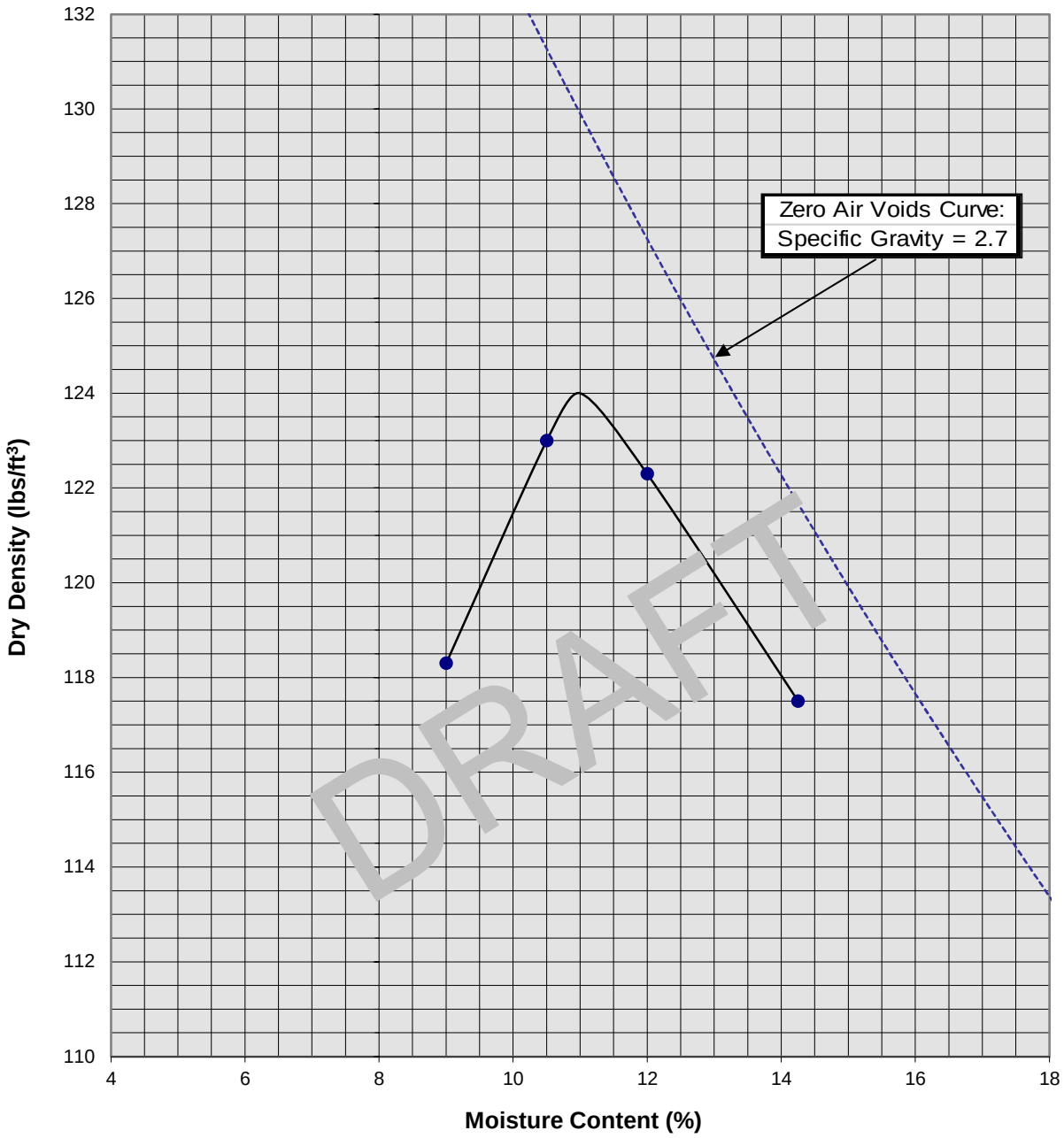
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-5 @ 0-5'
Optimum Moisture (%)	11
Maximum Dry Density (pcf)	124
Soil Classification	Dark Brown Clayey Silt, trace fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-27

SoCalGeo
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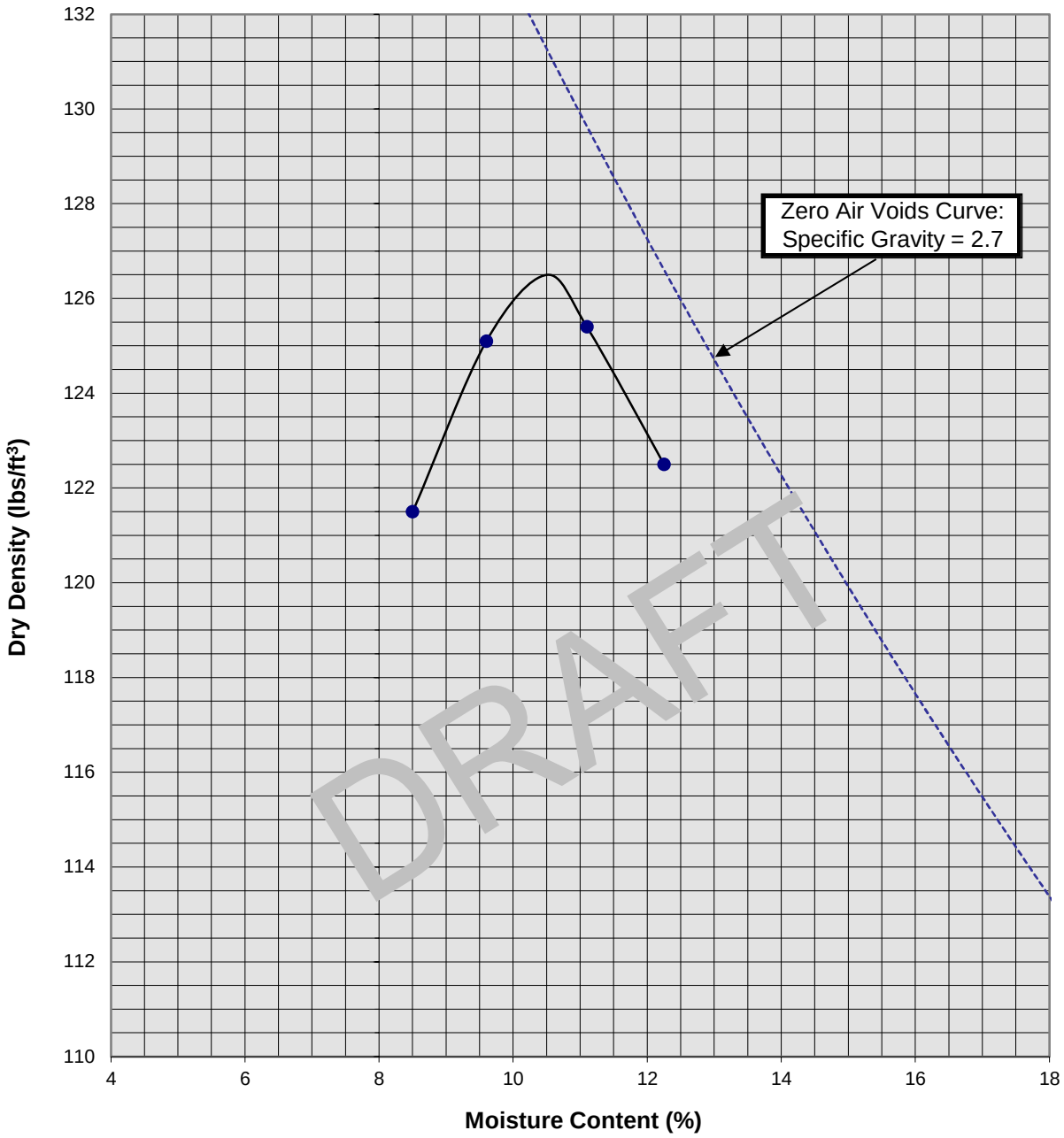
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-10 @ 0-5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-28

SoCalGeo
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APPENDIX C-3

LABORATORY TEST RESULTS (PSE)

Expansion Index Tests

Expansion Index tests were performed to evaluate the expansion potential of typical on-site soils. Testing was carried out according to UBC Method 18-2. The results are presented in Table C-1.

Corrosivity Testing

Corrosivity tests were performed to analyze the corrosion potential of the on-site soils on ferrous metals and concrete. Sulfate contents were determined and are shown on Plates 243 through 253.

The pH and electrical resistivity were also determined and are summarized in the following table.

Electrical Resistivity and pH			
Boring/Trench	**Depth**	**pH**	**Resistivity (ohms-cm)**
B-039	25	7.7	2360
B-039	55	7.0	3470
B-040	24	8.0	2090
B-054	20	7.8	3920
B-059	20	7.8	6130
B-067	5	6.6	3570
B-070	5	7.4	4200
B-073	10	7.3	4260
B-079	45	6.5	2180
B-093	6	6.8	6960
B-095	11	6.8	4090
B-096	12	6.8	3050
BB-01	16	8.2	4550
BB-03	11	8.3	4480
BB-05	11	8.3	4080
BB-08	4	8.4	3270
H-01	3	6.9	3950
H-04	3	6.9	3950
H-06	9	7.7	4100

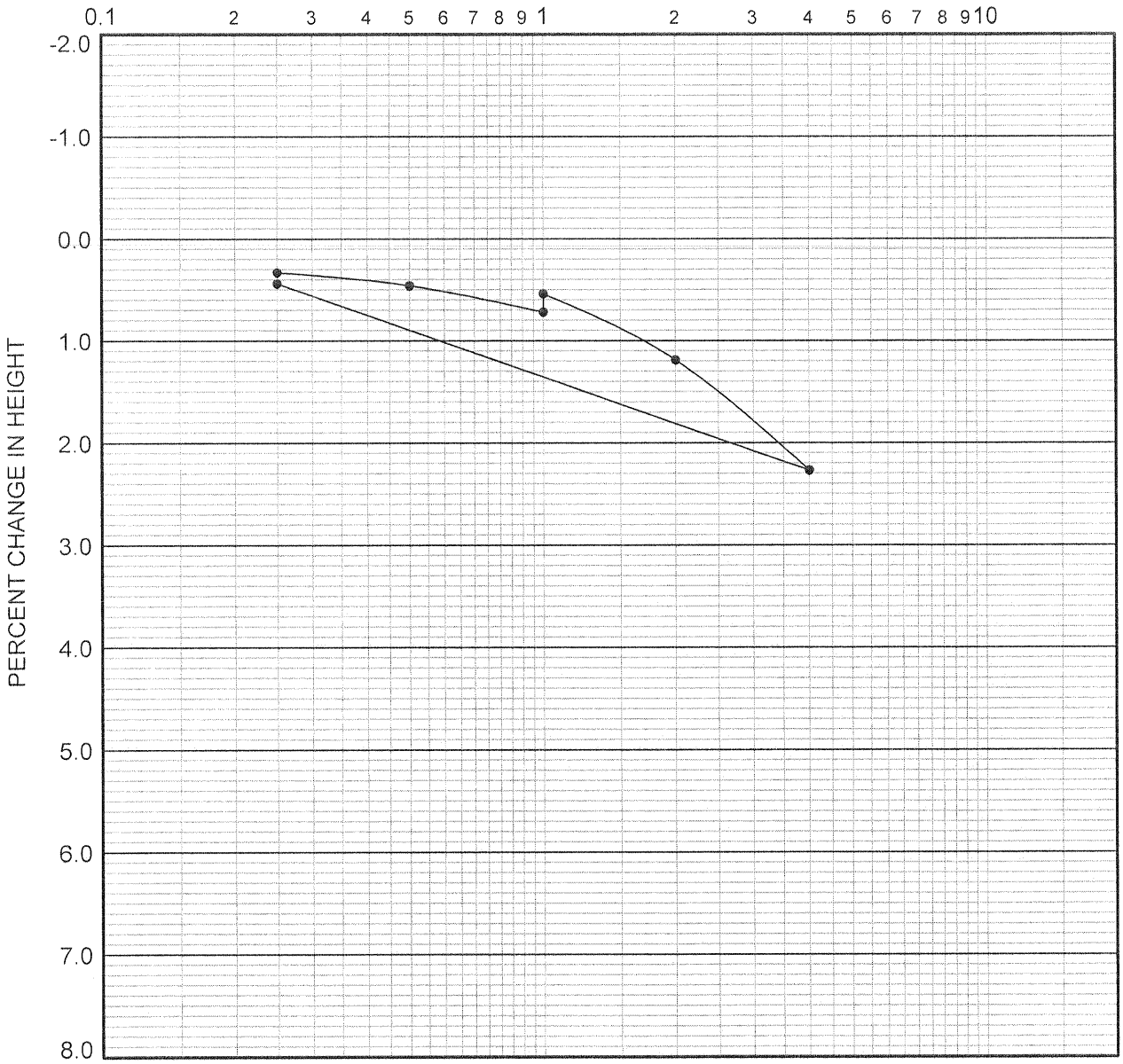
TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-035	20	Silty Sand (Qal)	SM				0	58	30	12		Consolidation-Plate C-1
B-035	27	Silty Sand (Qal)	SM	130.2	8.6		10	58	25	7		
B-035	30	Silty Sand (Qal)	SM				3	55	32	10		Consolidation-Plate C-2
B-036	21	Silty Sand (Qal)	SM	122.7	10.8		2	59	31	8		
B-037	15	Sandy Siltstone (QTst)					5	45	40	10		Consolidation-Plate C-3
B-038	20	Silty Sand (Qoa)	SM				0	76	17	7		Consolidation-Plate C-4
B-039	25	Sandy Siltstone (QTst)		120.4	12.5	SEE PLATE C-161	7	51	31	11	32	Chemical-Plate C-243 Resistivity = 2360, pH = 7.7
B-039	50	Sandy Siltstone (QTst)				SEE PLATE C-162	0	42	46	12		
B-039	55	Sandy Siltstone (QTst)		122.4	11.1	SEE PLATE C-163	5	52	33	10	11	Chemical-Plate C-243 Resistivity = 3470, pH = 7.0
B-040	24	Sandy Siltstone (QTst)		117.8	13.3	SEE PLATE C-164	5	55	29	11	42	Chemical-Plate C-243 Resistivity = 2090, pH = 8.0
B-041	30	Pebble Conglomerate (QTst)				SEE PLATE C-165	16	60	20	4		
B-041	51	Sandy Siltstone (QTst)				SEE PLATE C-166	2	51	34	13		
B-041	70	Silty Sandstone (QTst)					0	64	32	4		Consolidation - Plate C-5
B-041	71	Silty Sandstone (QTst)		125.0	9.0	SEE PLATE C-167	0	73	22	5	0	Chemical-Plate C-244
B-042	30	Sandy Siltstone (QTst)					0	63	28	9		Consolidation - Plate C-6
B-044	25	Silty Sand (Qal)	SM				14	66	16	4		Consolidation - Plate C-7
B-045	20	Gravelly Sand (Qal)	SP				17	72	8	3		Consolidation - Plate C-8
B-045	30	Silty Sand (Qal)	SM				16	52	25	7		Consolidation - Plate C-9
B-046	30	Silty Sand (Qal)	SM				9	62	21	8		Consolidation - Plate C-10
B-047	30	Silty Sand (Qal)	SM				0	53	32	15		Consolidation - Plate C-11
B-047	31	Silty Sand (Qal)	SM	128.8	9.5		2	58	30	10		
B-047	35	Silty Sand (Qal)	SM				2	53	30	15		Consolidation - Plate C-12

TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-079	70	Silty Sandstone (Qtst)		120.0	11.9	SEE PLATE C-186	0	33	44	23		
B-080	20	Silty Sand (Qoa)	SM	132.3	8.3		6	64	22	8		
B-081	15	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-58
B-082	10	Sand with Silt (Qal)	SP-SM				8	78	11	3		Consolidation-Plate C-59
B-082	20	Sandy Siltstone (Qtst)		126.2	9.1	SEE PLATE C-187	0	70	20	10		
B-082	35	Sandy Siltstone (Qtst)				SEE PLATE C-188	0	56	27	17		
B-082	45	Sandy Siltstone (Qtst)				SEE PLATE C-189	0	70	15	15		
B-083	20	Silty Sand (Qoa)	SM			SEE PLATE C-190	0	53	30	17		
B-084	20	Silty Sandstone (Qtst)				SEE PLATE C-191	0	60	30	10		
B-084	35	Sandy Siltstone (Qtst)				SEE PLATE C-192	0	45	42	13		
B-085	15	Silty Sand (Qoa)	SM	130.6	8.7		0	79	18	3		Consolidation-Plate C-60
B-090	26	Gravelly Sand (Qoa)	SP			SEE PLATE C-193						
B-093	6	Silty Sandstone (Qtst)		125.9	10.0	SEE PLATE C-194	0	71	20	9		Chemical-Plate C-249 Resistivity = 6960, pH = 6.8
B-093	13	Silty Sandstone (Qtst)				SEE PLATE C-195	0	58	22	10		
B-093	20	Sandy Siltstone (Qtst)					0	40	48	12		Consolidation-Plate C-61
B-095	10	Silty Sand (Qal)	SM				0	70	20	10		Consolidation-Plate C-62
B-095	11	Silty Sand (Qal)	SM	126.6	10.7							Chemical-Plate C-249 Resistivity = 4090, pH = 6.8
B-096	5	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-63
B-096	11	Silty Sand (Qal)	SM				0	60	20	20		Consolidation-Plate C-64
B-096	12	Silty Sand (Qal)	SM	125.1	11.9	SEE PLATE C-196	0	72	16	12		Chemical-Plate C-250 Resistivity = 3050, pH = 6.8
B-099	15	Silty Sand (Qal)	SM				10	69	12	9		Consolidation-Plate C-65
B-099	21	Gravelly Sand (Qal)	SP	130.2	7.9	SEE PLATE C-197	18	71	8	3	0	

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-037	15.0	131	8.6	85	49		Sandy Siltstone (QTst)

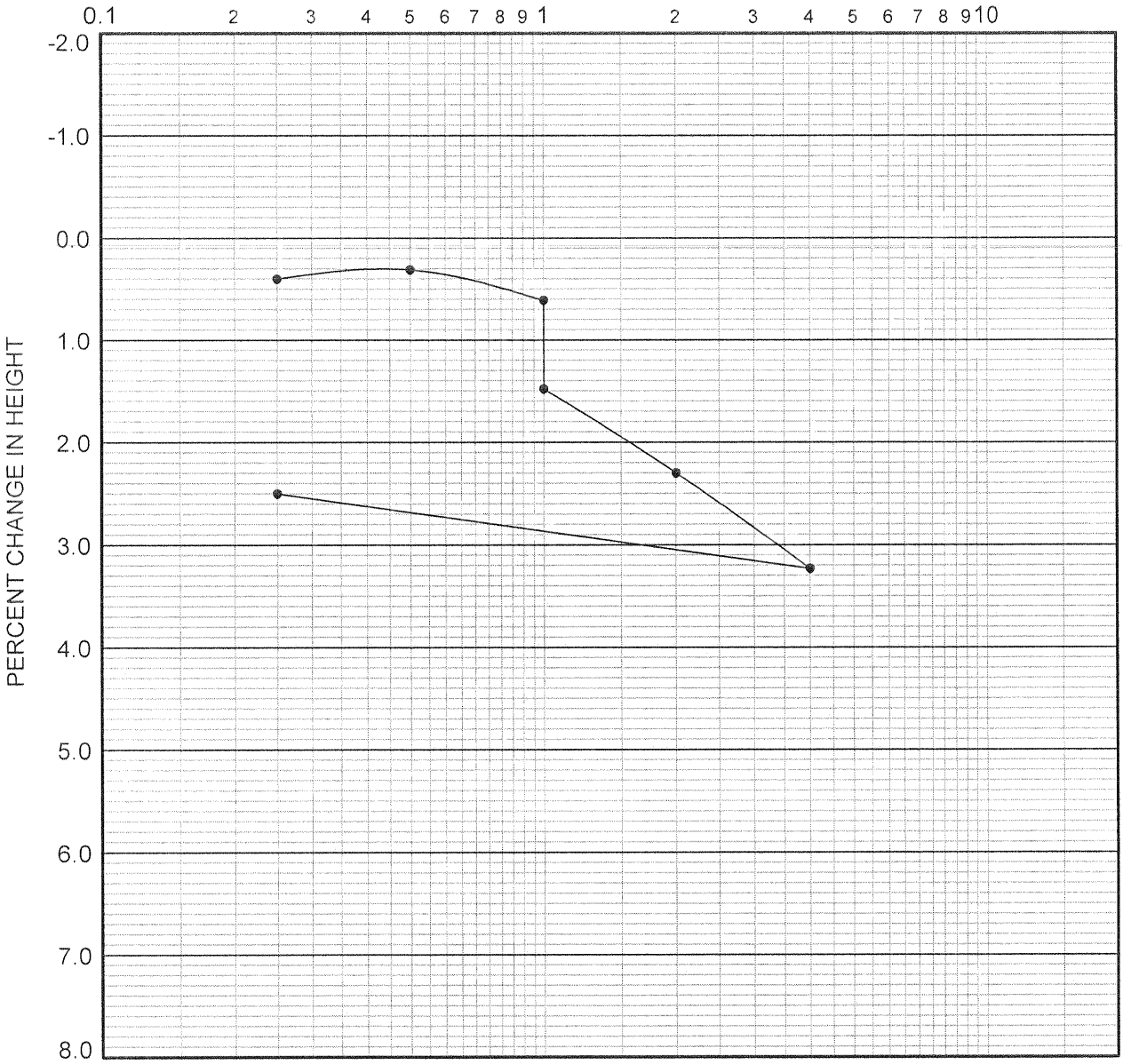
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-3

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-081	15.0	112	5.5	31	29	SM	Silty Sand (Qal)

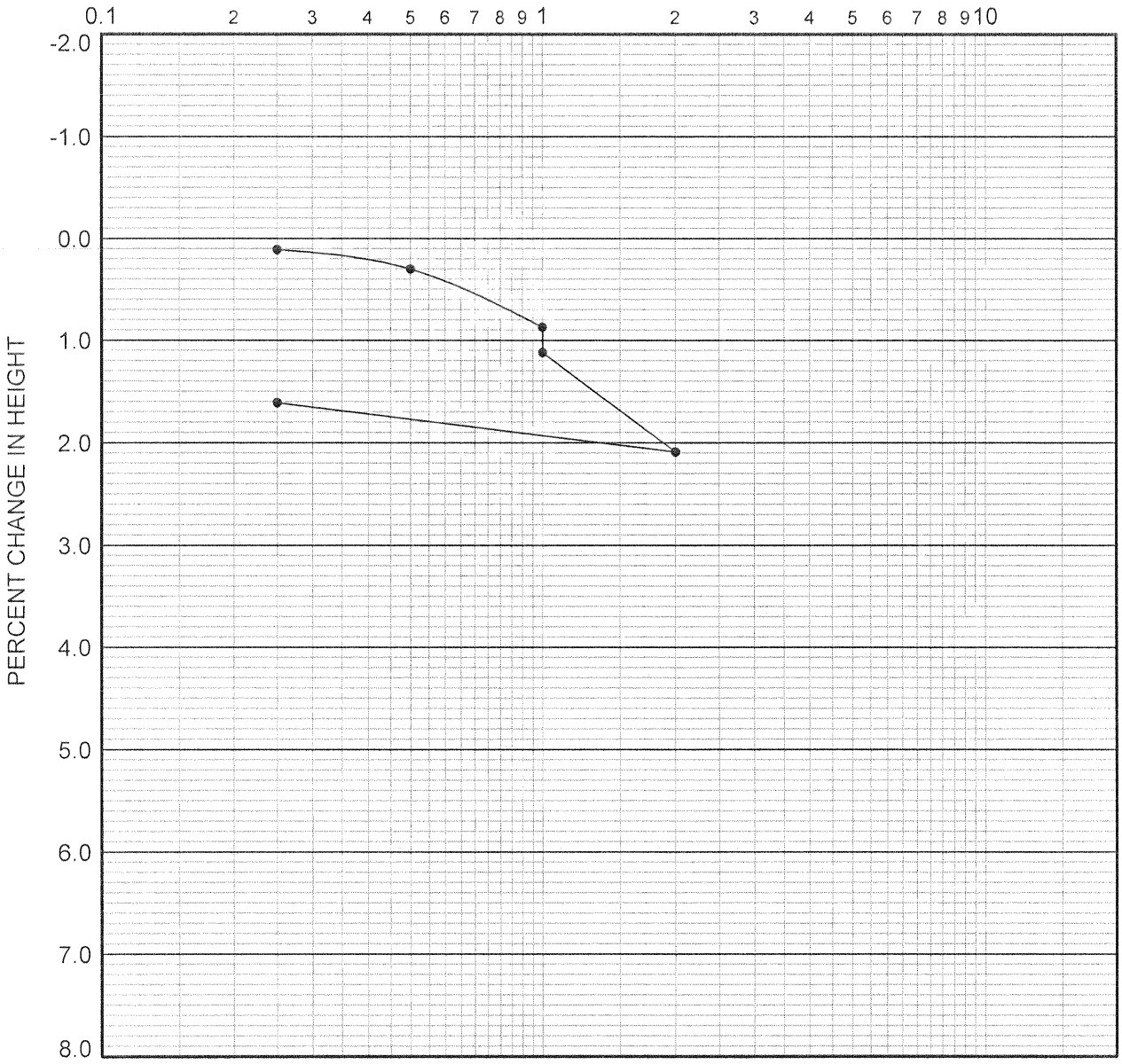
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-58

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-095	10.0	113	13.2	75	30	SM	Silty Sand (Qal)

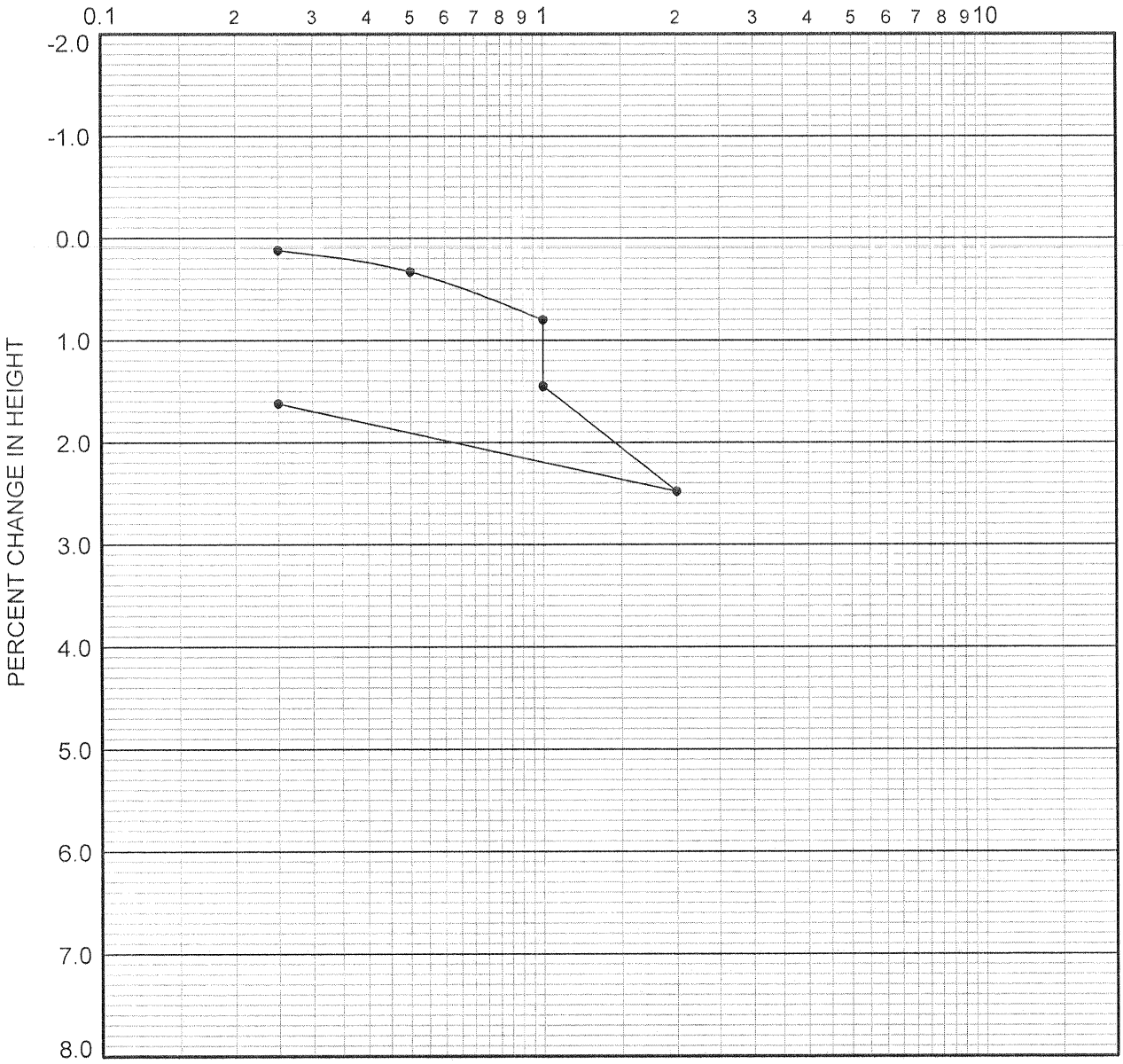
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-62

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	5.0	103	3.9	17	29	SM	Silty Sand (Qal)

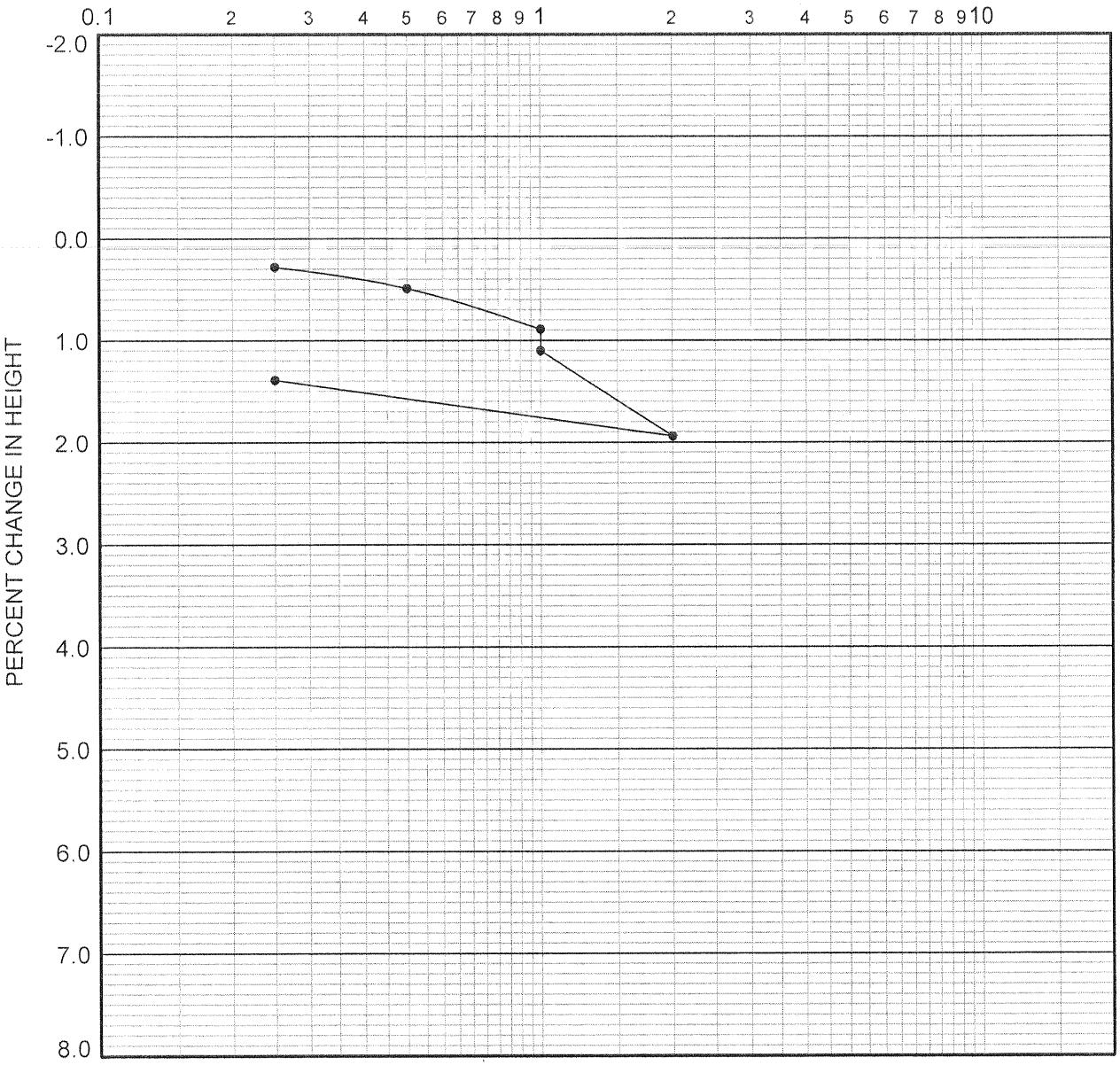
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-63

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	11.0	112	14.4	79	40	SM	Silty Sand (Qal)

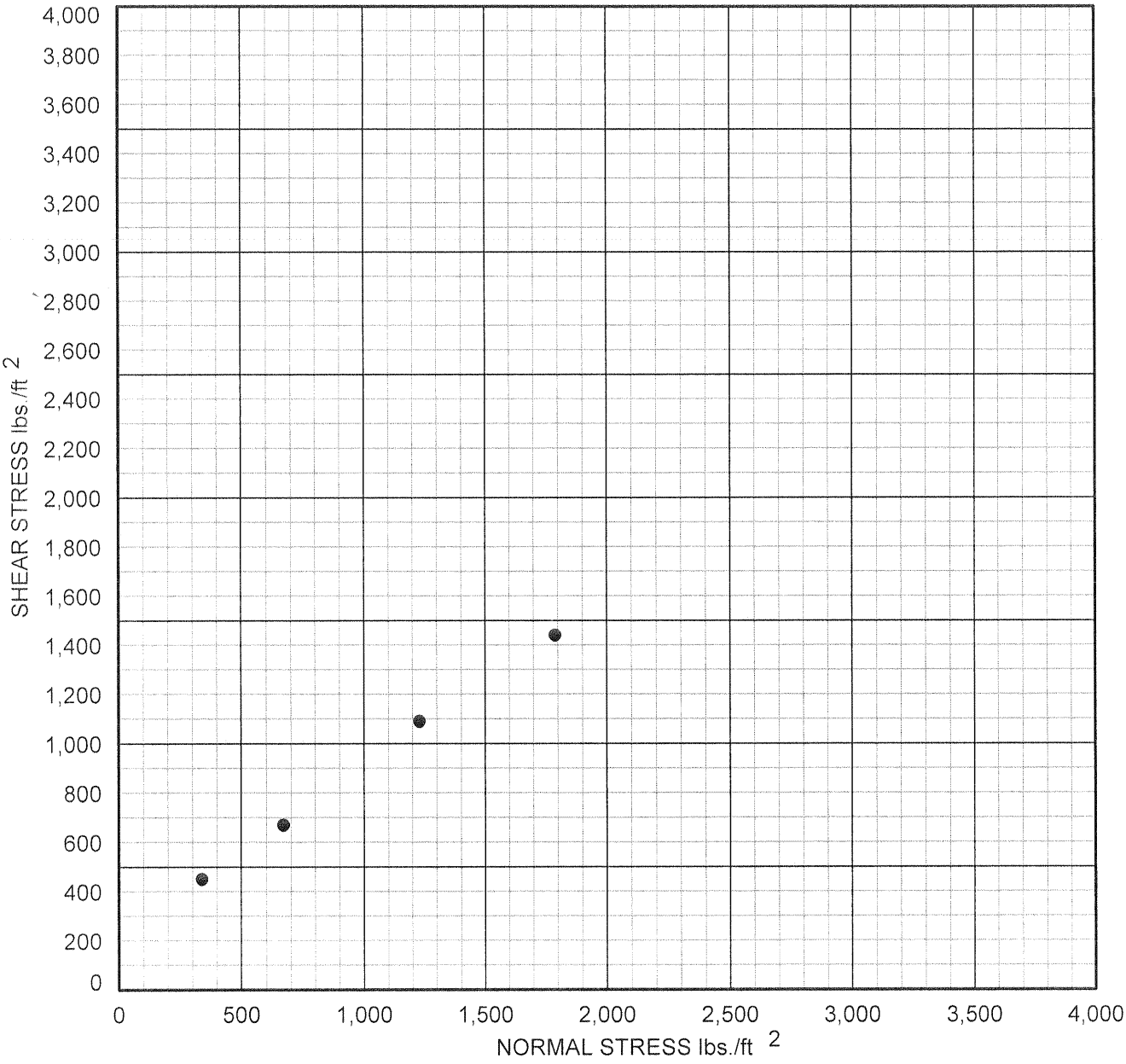
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-64

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
B-096	12.0			28	SM	Silty Sand (Qal)

COHESION	220	psf.
FRICTION ANGLE	35.0	degrees

DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-196

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 Tel: (714) 549-5824 Fax: (714) 549-8375

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246199R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.005~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.004~~	~~0.001~~
B-93 (6)	20979	11-1-2004	Chloride Content	CalTrans 422	0.002	0.001
B-93 (6)	20979	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-93 (6)	20979	11-1-2004	Alkalinity	EPA 310.1	0.002	0.001
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.001~~	~~0.001~~
B-95 (11)	20981	11-1-2004	Chloride Content	CalTrans 422	0.001	0.001
B-95 (11)	20981	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-95 (11)	20981	11-1-2004	Alkalinity	EPA 310.1	0.007	0.001

Authorized Signature

November 3, 2004
Report Date

PLATE C-249

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 *Tel: (714) 549-5824* *Fax: (714) 549-8375*

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246148R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.005~~	~~0.001~~
B-96 (12)	20856	10-5-2004	Chloride Content	CalTrans 422	0.001	0.001
B-96 (12)	20856	10-5-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-96 (12)	20856	10-5-2004	Alkalinity	EPA 310.1	0.006	0.001
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.002~~	~~0.001~~

Authorized Signature

October 11, 2004
Report Date

PLATE C-250

APPENDIX D

ENGINEERING ANALYSES

APPENDIX D-1

LIQEFACTION ANALYSIS

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

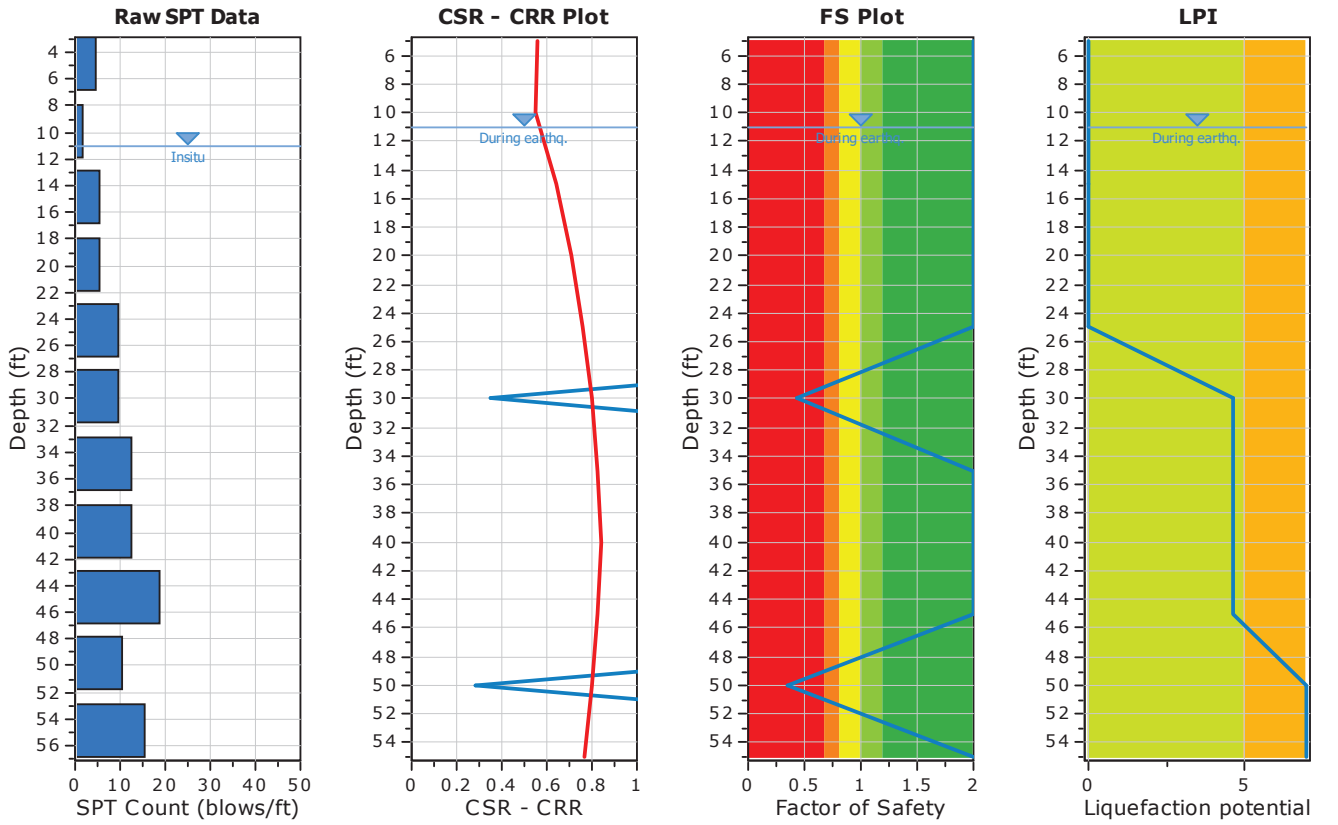
SPT BASED LIQUEFACTION ANALYSIS REPORT

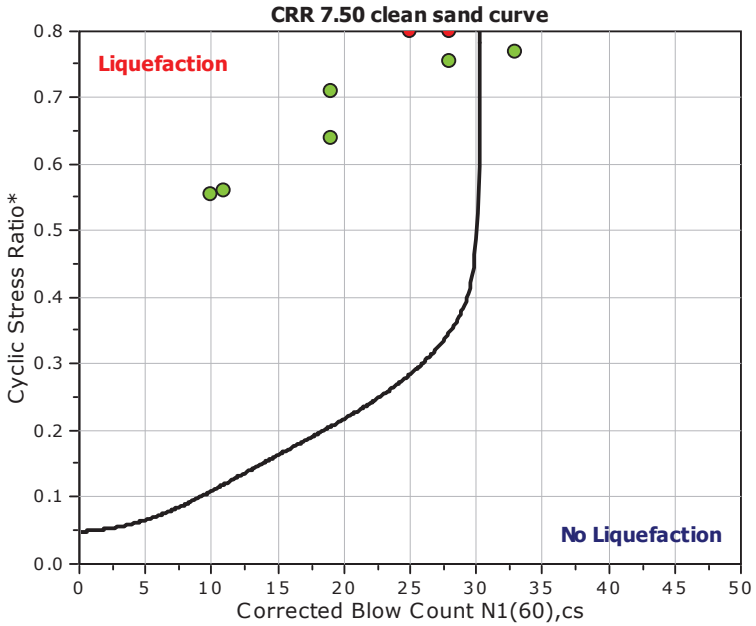
Project title : 2004-01 OVTC **SPT Name: AGS-3**

Location : Calimesa, CA

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	11.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	11.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	7.50
Borehole diameter:	200mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.42		

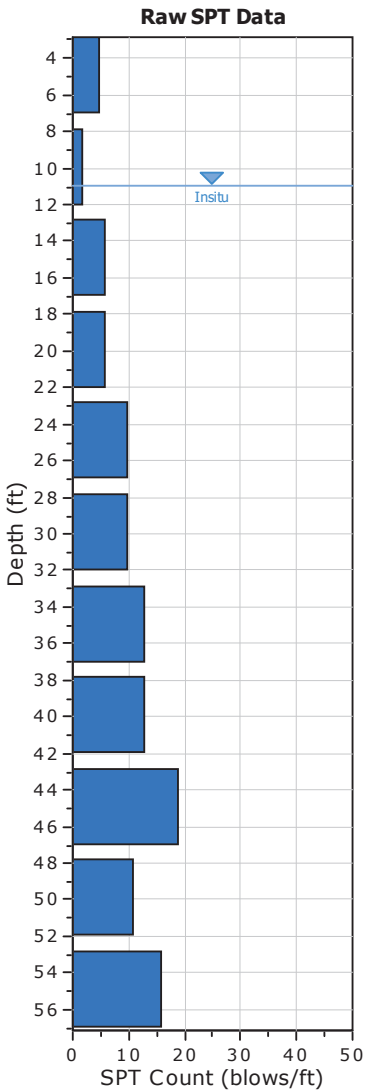


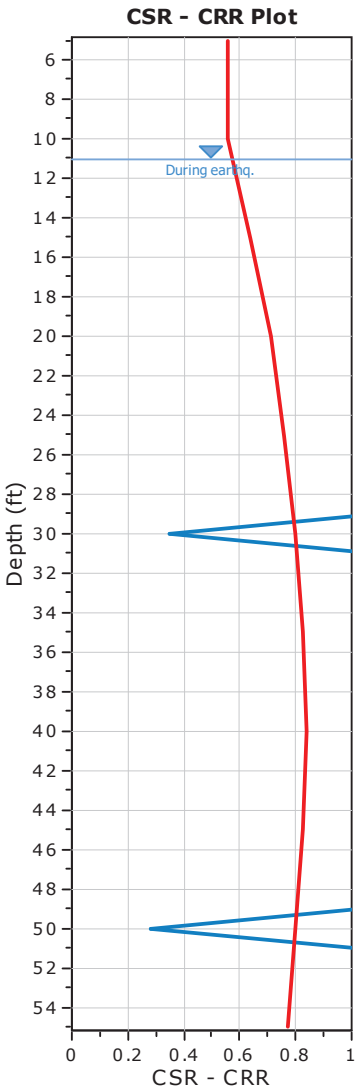


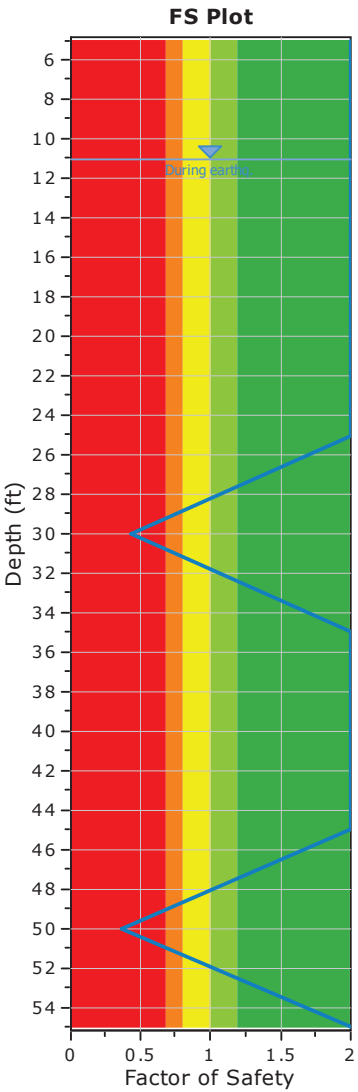
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

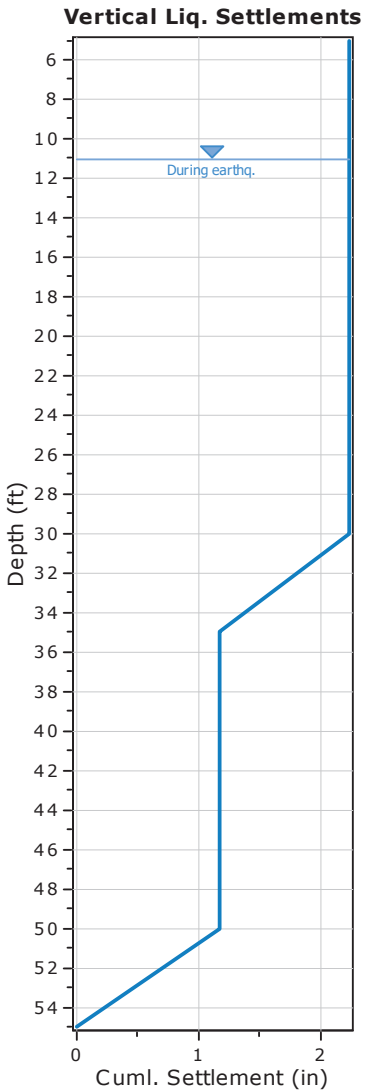
LPI color scheme
- Very high risk
- High risk
- Low risk

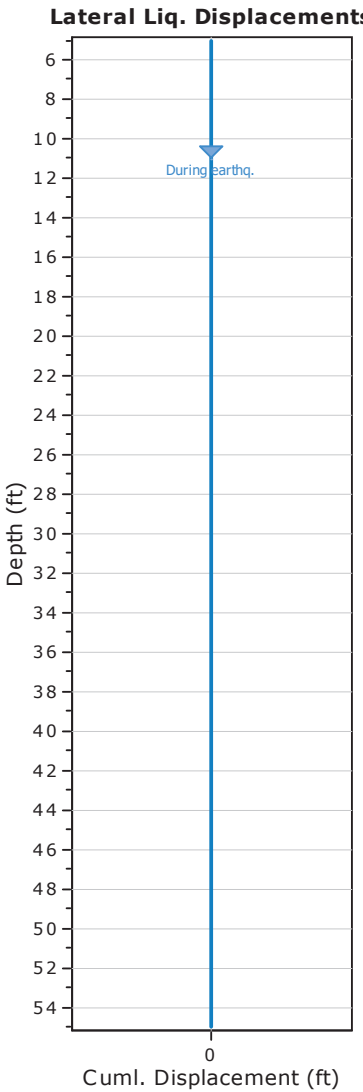
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	5	0.00	113.00	5.00	No
10.00	2	74.30	113.00	5.00	No
15.00	6	74.30	124.00	5.00	No
20.00	6	71.10	124.00	5.00	No
25.00	10	71.10	119.00	5.00	No
30.00	10	35.70	119.00	5.00	Yes
35.00	13	77.30	104.00	5.00	No
40.00	13	66.10	104.00	5.00	No
45.00	19	66.10	136.00	5.00	Yes
50.00	11	59.30	125.00	5.00	Yes
55.00	16	59.30	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	5	113.00	0.28	0.00	0.28	1.50	1.42	1.15	0.75	1.20	11	0.00	0.00	1.00	11	4.000
10.00	2	113.00	0.56	0.00	0.56	1.27	1.42	1.15	0.85	1.20	4	74.30	5.00	1.20	10	4.000
15.00	6	124.00	0.88	0.12	0.75	1.15	1.42	1.15	0.85	1.20	12	74.30	5.00	1.20	19	4.000
20.00	6	124.00	1.19	0.28	0.90	1.07	1.42	1.15	0.95	1.20	12	71.10	5.00	1.20	19	4.000
25.00	10	119.00	1.48	0.44	1.05	1.01	1.42	1.15	0.95	1.20	19	71.10	5.00	1.20	28	4.000
30.00	10	119.00	1.78	0.59	1.19	0.95	1.42	1.15	1.00	1.20	19	35.70	5.00	1.20	28	0.348
35.00	13	104.00	2.04	0.75	1.29	0.91	1.42	1.15	1.00	1.20	23	77.30	5.00	1.20	33	4.000
40.00	13	104.00	2.30	0.91	1.39	0.87	1.42	1.15	1.00	1.20	22	66.10	5.00	1.20	31	4.000
45.00	19	136.00	2.64	1.06	1.58	0.82	1.42	1.15	1.00	1.20	30	66.10	5.00	1.20	41	4.000
50.00	11	125.00	2.95	1.22	1.73	0.77	1.42	1.15	1.00	1.20	17	59.30	5.00	1.20	25	0.285
55.00	16	130.00	3.28	1.37	1.90	0.73	1.42	1.15	1.00	1.20	23	59.30	5.00	1.20	33	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	113.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	113.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	124.00	0.88	0.12	0.75	0.97	1.00	0.639	1.00	0.639	1.00	0.639	2.000	●
20.00	124.00	1.19	0.28	0.90	0.96	1.00	0.709	1.00	0.710	1.00	0.710	2.000	●
25.00	119.00	1.48	0.44	1.05	0.94	1.00	0.755	1.00	0.756	1.00	0.756	2.000	●
30.00	119.00	1.78	0.59	1.19	0.92	1.00	0.781	1.00	0.781	0.98	0.799	0.436	●
35.00	104.00	2.04	0.75	1.29	0.89	1.00	0.796	1.00	0.796	0.96	0.829	2.000	●
40.00	104.00	2.30	0.91	1.39	0.85	1.00	0.794	1.00	0.794	0.95	0.839	2.000	●
45.00	136.00	2.64	1.06	1.58	0.80	1.00	0.760	1.00	0.760	0.92	0.824	2.000	●
50.00	125.00	2.95	1.22	1.73	0.75	1.00	0.724	1.00	0.725	0.91	0.800	0.356	●
55.00	130.00	3.28	1.37	1.90	0.70	1.00	0.685	1.00	0.685	0.89	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.436	0.56	5.43	5.00	4.67
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	0.356	0.64	2.38	5.00	2.33
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 7.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
10.00	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.77	5.00	1.064
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	0.00	5.00	0.000
45.00	0.00	5.00	0.00	5.00	0.000
50.00	0.00	5.00	1.95	5.00	1.168
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 2.232

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	11	46.43	0.00	5.00	0.000	0.00
10.00	4	28.00	0.00	5.00	0.000	0.00
15.00	12	48.50	0.00	5.00	0.000	0.00
20.00	12	48.50	0.00	5.00	0.000	0.00
25.00	19	61.02	0.00	5.00	0.000	0.00
30.00	19	61.02	22.70	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	22	65.67	0.00	5.00	0.000	0.00
45.00	30	76.68	0.00	5.00	0.000	0.00
50.00	17	57.72	22.70	5.00	0.000	0.00
55.00	23	67.14	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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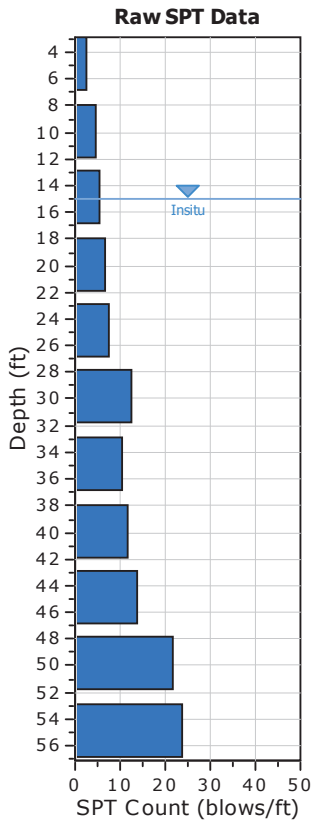
SPT BASED LIQUEFACTION ANALYSIS REPORT

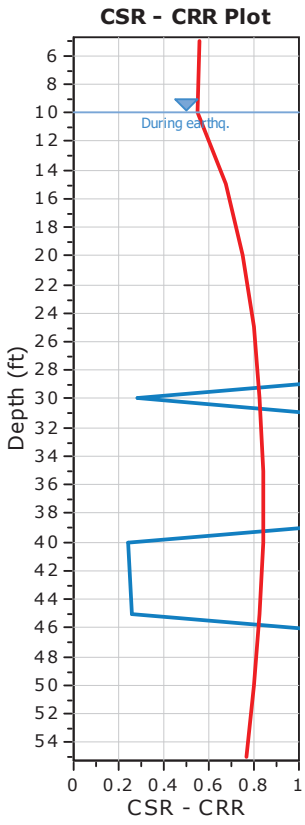
Project title : 2004-01 OVTC **SPT Name: AGS-16**

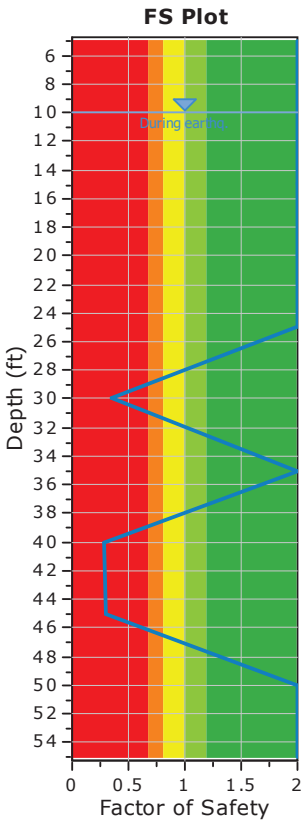
Location : Calimesa, CA

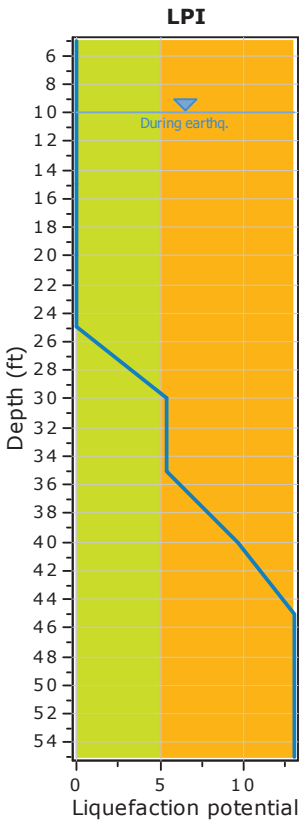
:: Input parameters and analysis properties ::

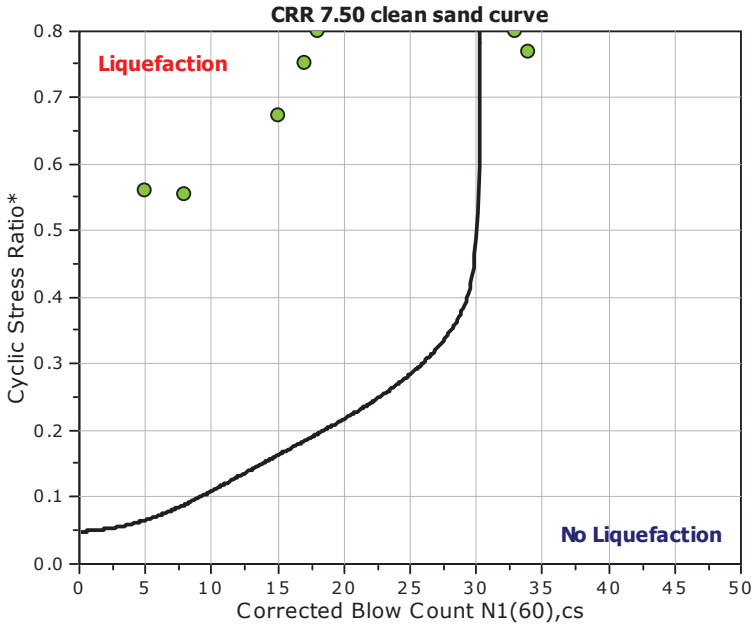
Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.50
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.45		







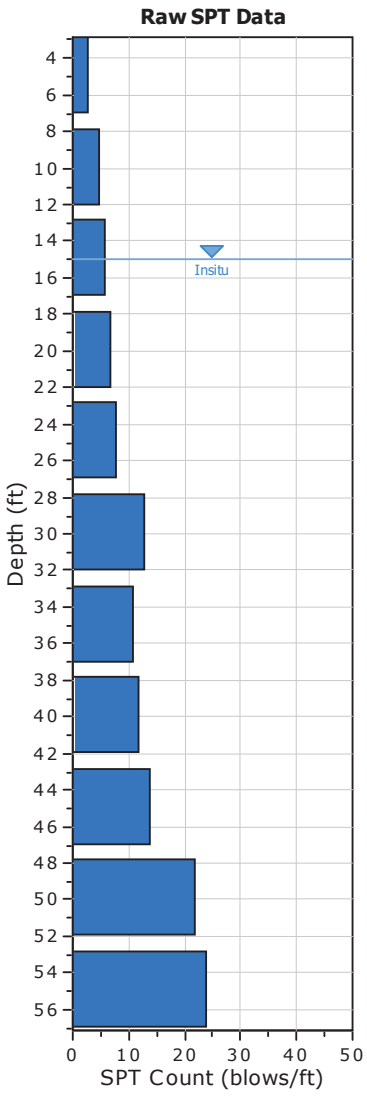


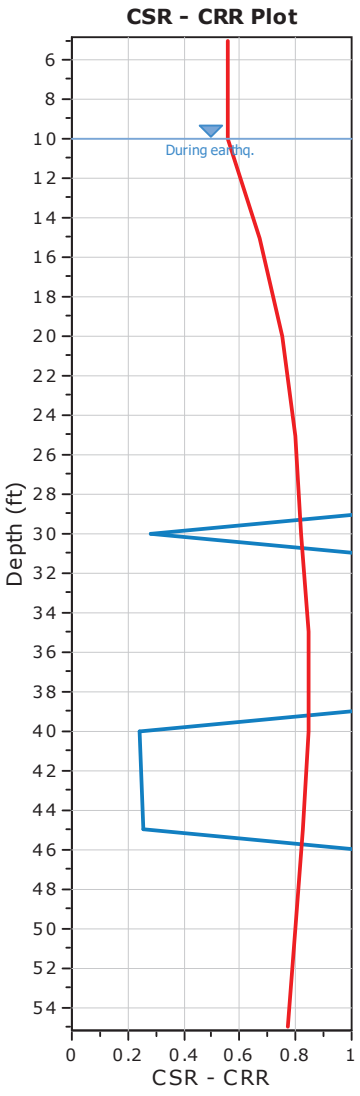


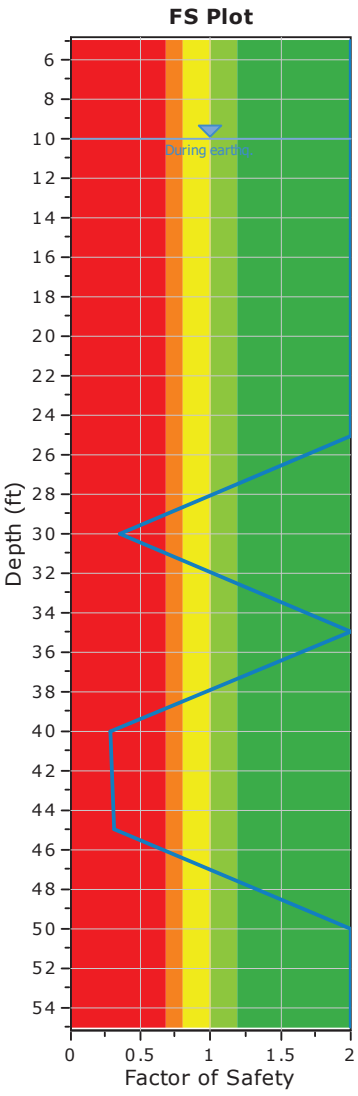
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

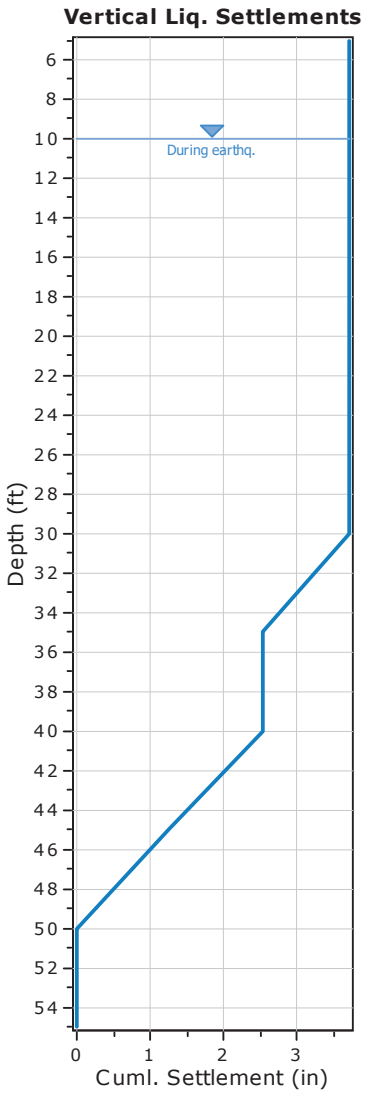
LPI color scheme
- Very high risk
- High risk
- Low risk

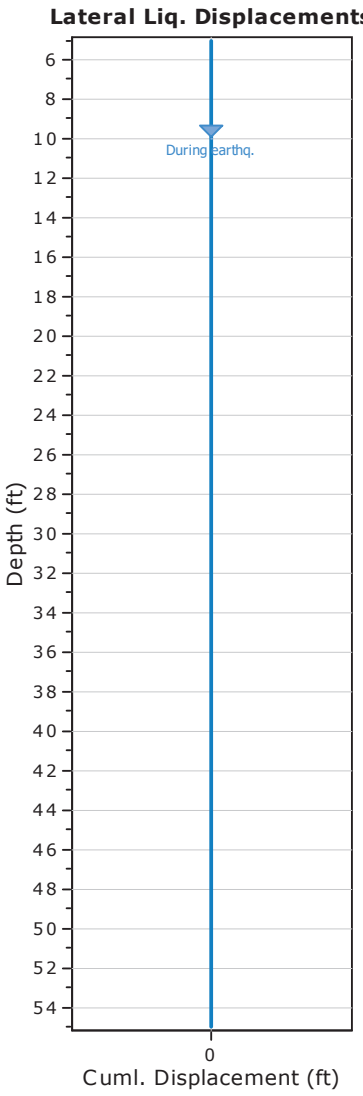
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	3	0.00	111.00	5.00	No
10.00	5	0.00	111.00	5.00	No
15.00	6	77.90	111.00	5.00	No
20.00	7	77.90	113.00	5.00	No
25.00	8	53.80	113.00	5.00	No
30.00	13	34.00	134.00	5.00	Yes
35.00	11	52.90	125.00	5.00	No
40.00	12	52.90	135.00	5.00	Yes
45.00	14	48.20	135.00	5.00	Yes
50.00	22	48.20	135.00	5.00	Yes
55.00	24	48.20	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	3	111.00	0.28	0.00	0.28	1.50	1.45	1.00	0.75	1.00	5	0.00	0.00	1.00	5	4.000
10.00	5	111.00	0.56	0.00	0.56	1.28	1.45	1.00	0.85	1.00	8	0.00	0.00	1.00	8	4.000
15.00	6	111.00	0.83	0.00	0.83	1.11	1.45	1.00	0.85	1.00	8	77.90	5.00	1.20	15	4.000
20.00	7	113.00	1.12	0.16	0.96	1.04	1.45	1.00	0.95	1.00	10	77.90	5.00	1.20	17	4.000
25.00	8	113.00	1.40	0.31	1.09	0.99	1.45	1.00	0.95	1.00	11	53.80	5.00	1.20	18	4.000
30.00	13	134.00	1.73	0.47	1.26	0.92	1.45	1.00	1.00	1.00	17	34.00	4.93	1.19	25	0.285
35.00	11	125.00	2.05	0.62	1.42	0.87	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	4.000
40.00	12	135.00	2.38	0.78	1.60	0.81	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	0.242
45.00	14	135.00	2.72	0.94	1.78	0.76	1.45	1.00	1.00	1.00	15	48.20	5.00	1.20	23	0.255
50.00	22	135.00	3.06	1.09	1.97	0.72	1.45	1.00	1.00	1.00	23	48.20	5.00	1.20	33	4.000
55.00	24	135.00	3.40	1.25	2.15	0.68	1.45	1.00	1.00	1.00	24	48.20	5.00	1.20	34	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	111.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	111.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	111.00	0.83	0.16	0.68	0.97	1.00	0.674	1.00	0.674	1.00	0.674	2.000	●
20.00	113.00	1.12	0.31	0.80	0.96	1.00	0.751	1.00	0.752	1.00	0.752	2.000	●
25.00	113.00	1.40	0.47	0.93	0.94	1.00	0.801	1.00	0.801	1.00	0.801	2.000	●
30.00	134.00	1.73	0.62	1.11	0.92	1.00	0.814	1.00	0.814	0.99	0.822	0.347	●
35.00	125.00	2.05	0.78	1.26	0.89	1.00	0.814	1.00	0.814	0.96	0.844	2.000	●
40.00	135.00	2.38	0.94	1.45	0.85	1.00	0.793	1.00	0.793	0.94	0.844	0.286	●
45.00	135.00	2.72	1.09	1.63	0.80	1.00	0.759	1.00	0.760	0.92	0.828	0.308	●
50.00	135.00	3.06	1.25	1.81	0.75	1.00	0.719	1.00	0.719	0.90	0.801	2.000	●
55.00	135.00	3.40	1.40	1.99	0.70	1.00	0.678	1.00	0.678	0.88	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.347	0.65	5.43	5.00	5.40
35.00	2.000	0.00	4.67	5.00	0.00
40.00	0.286	0.71	3.90	5.00	4.25
45.00	0.308	0.69	3.14	5.00	3.31
50.00	2.000	0.00	2.38	5.00	0.00
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 12.96

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
10.00	0.00	5.00	0.00	5.00	0.000
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.95	5.00	1.168
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	2.16	5.00	1.297
45.00	0.00	5.00	2.08	5.00	1.250
50.00	0.00	5.00	0.00	5.00	0.000
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 3.714

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	5	31.30	0.00	5.00	0.000	0.00
10.00	8	39.60	0.00	5.00	0.000	0.00
15.00	8	39.60	0.00	5.00	0.000	0.00
20.00	10	44.27	0.00	5.00	0.000	0.00
25.00	11	46.43	0.00	5.00	0.000	0.00
30.00	17	57.72	22.70	5.00	0.000	0.00
35.00	14	52.38	0.00	5.00	0.000	0.00
40.00	14	52.38	34.10	5.00	0.000	0.00
45.00	15	54.22	34.10	5.00	0.000	0.00
50.00	23	67.14	0.00	5.00	0.000	0.00
55.00	24	68.59	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX D-2

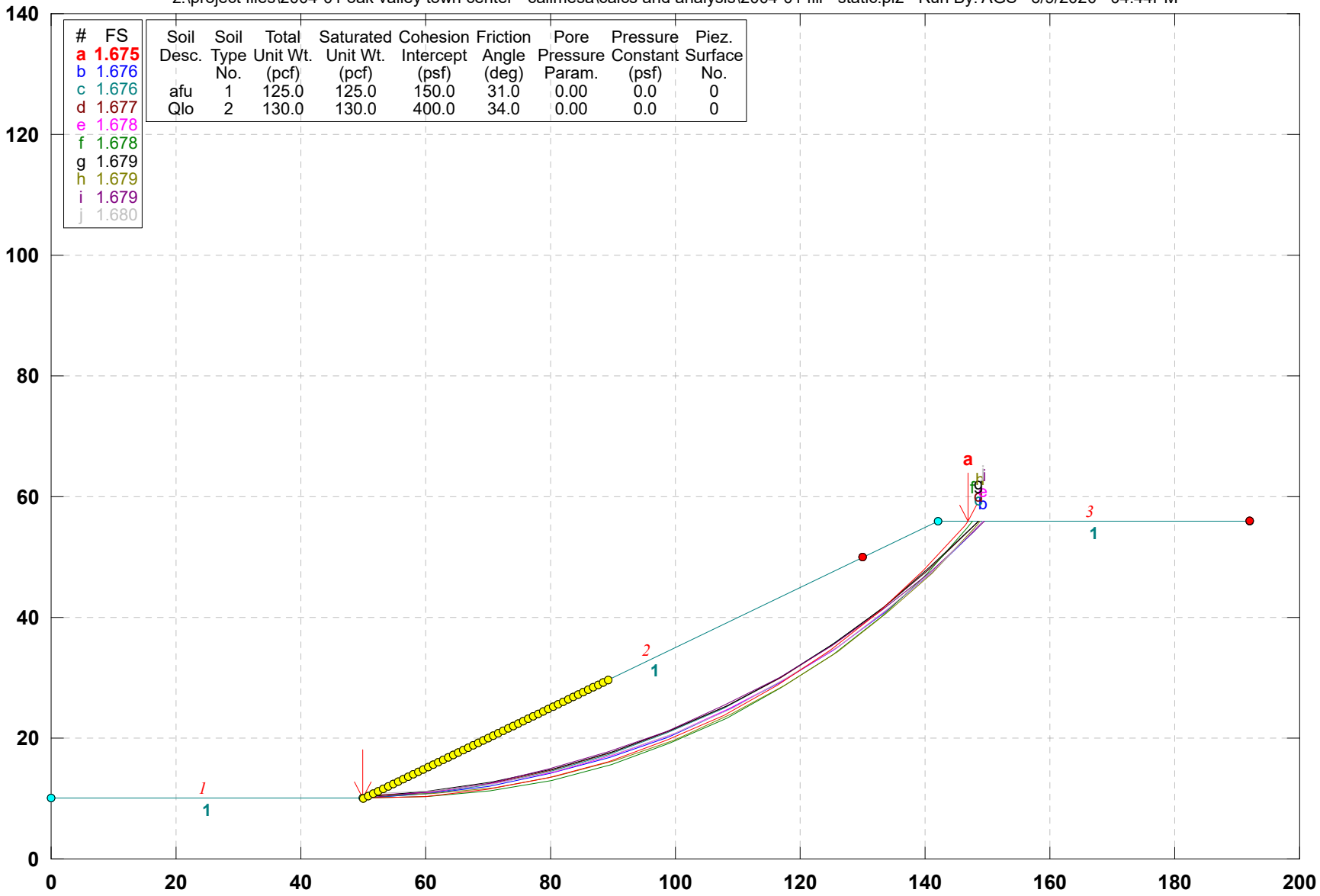
SLOPE STABILITY ANALYSIS

2004-01 OVTC 46 ft. Fill Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static.pl2 Run By: AGS 6/9/2020 04:44PM

#	FS
a	1.675
b	1.676
c	1.676
d	1.677
e	1.678
f	1.678
g	1.679
h	1.679
i	1.679
j	1.680

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.675

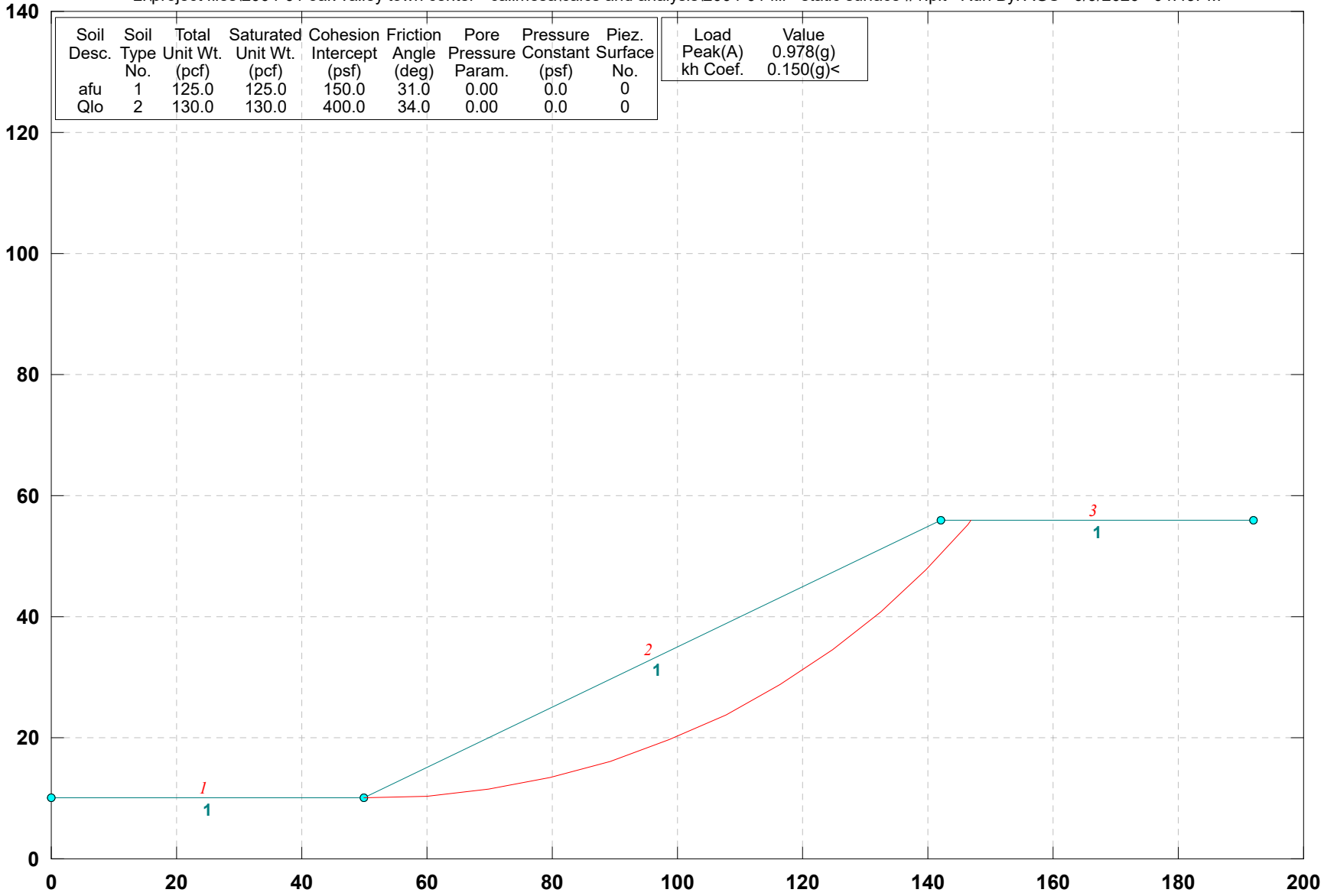
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 46 ft. Fill Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static surface #1.plt Run By: AGS 6/9/2020 04:49PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

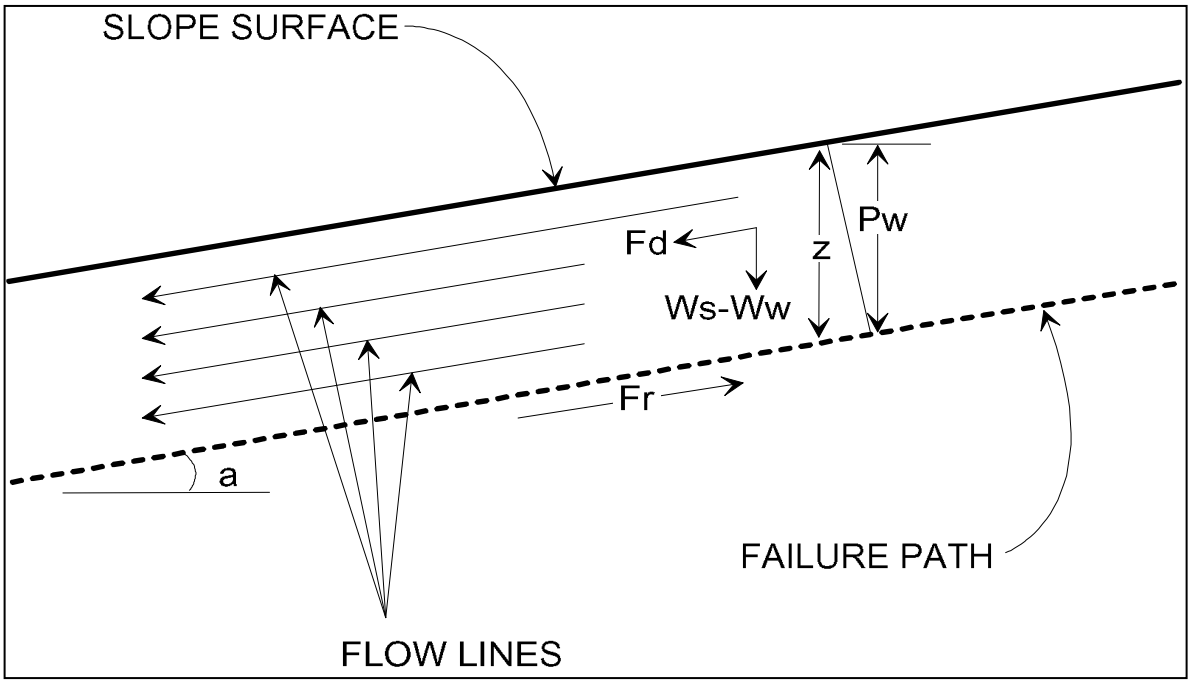
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.221

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

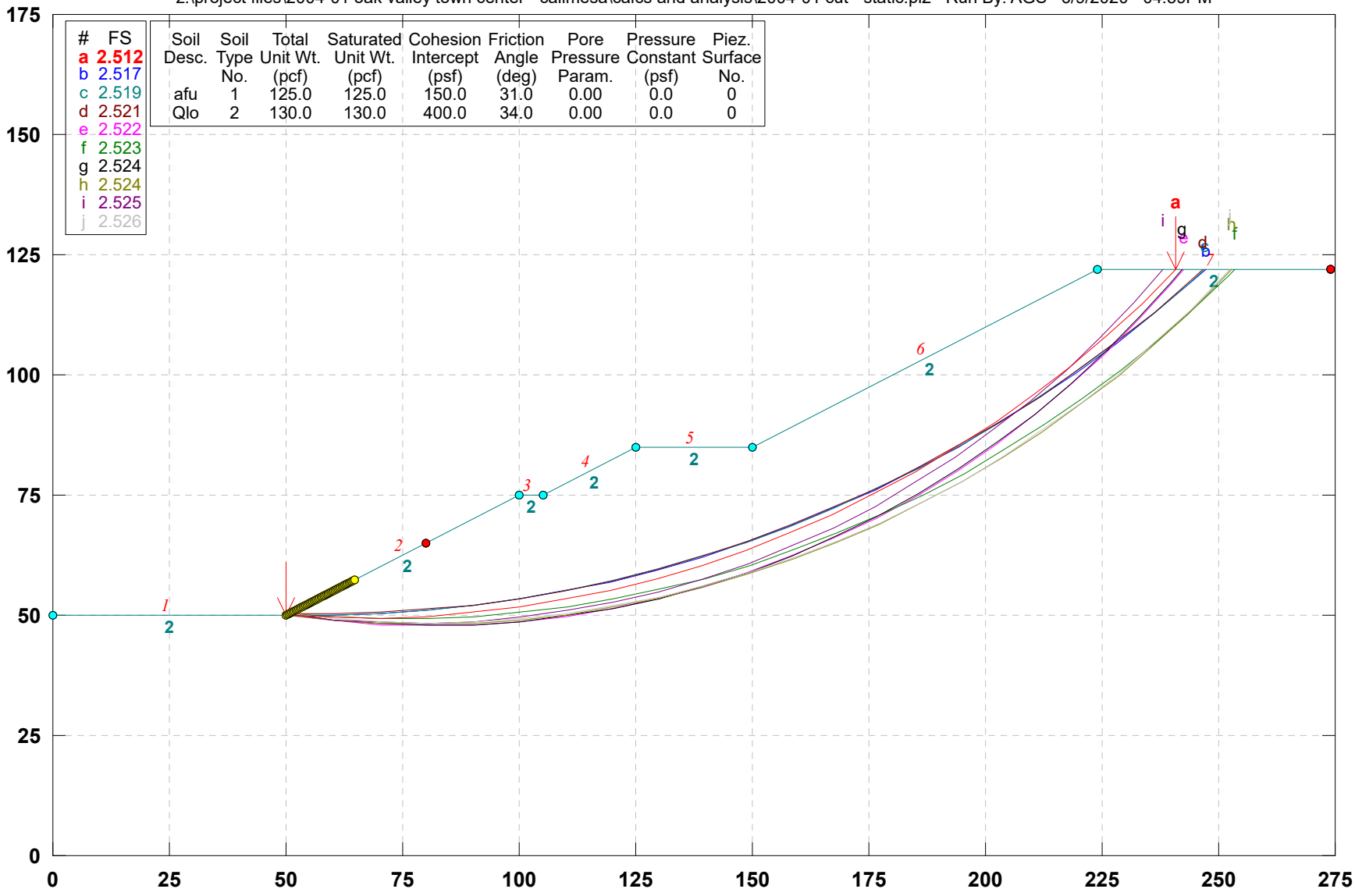
Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
125	3	26.56505	0.463648	31	0.541052	150

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	240.27	**1.60**

2004-01 OVTC 72 ft Cut Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static.pl2 Run By: AGS 6/9/2020 04:59PM



GSTABL7 v.2 FSmin=2.512

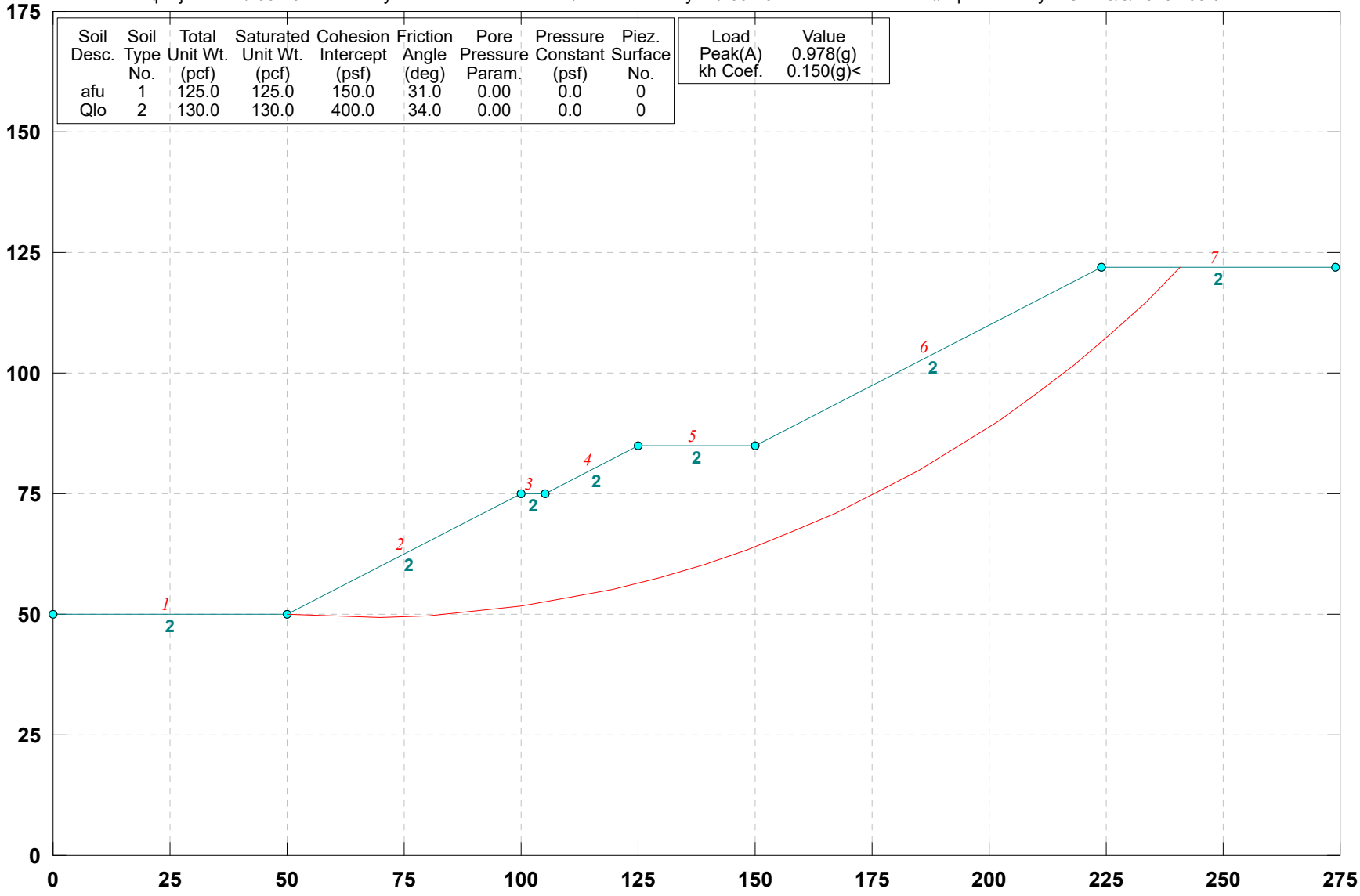
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 72 ft Cut Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static surface #1.plt Run By: AGS 6/9/2020 05:01PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

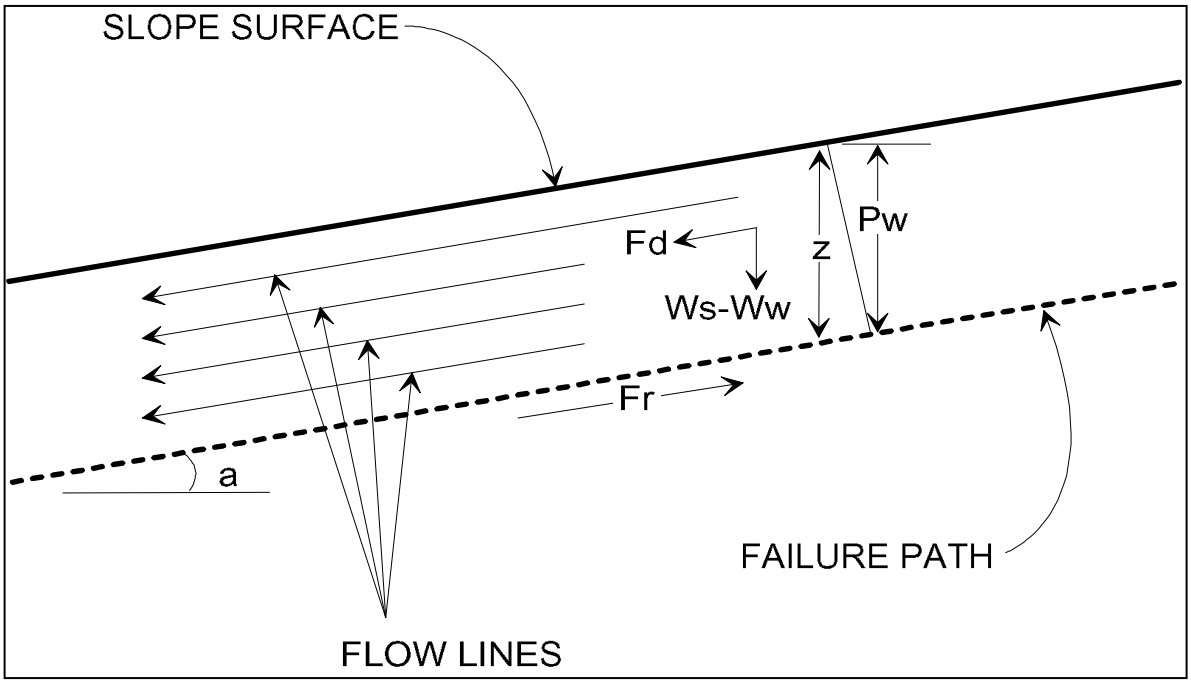
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.727

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
130	3	26.56505	0.463648	34	0.593412	400

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	156.00	509.43	**3.27**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All clearing and grubbing, remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be

properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspoles, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant. Environmental evaluation of existing conditions is not the responsibility of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be processed or scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 12 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant and do not inhibit the ability to properly compact fill materials.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to ½ the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall observe all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Civil Engineer.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation

by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials to achieve compaction is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill will be tested and evaluated by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content is not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

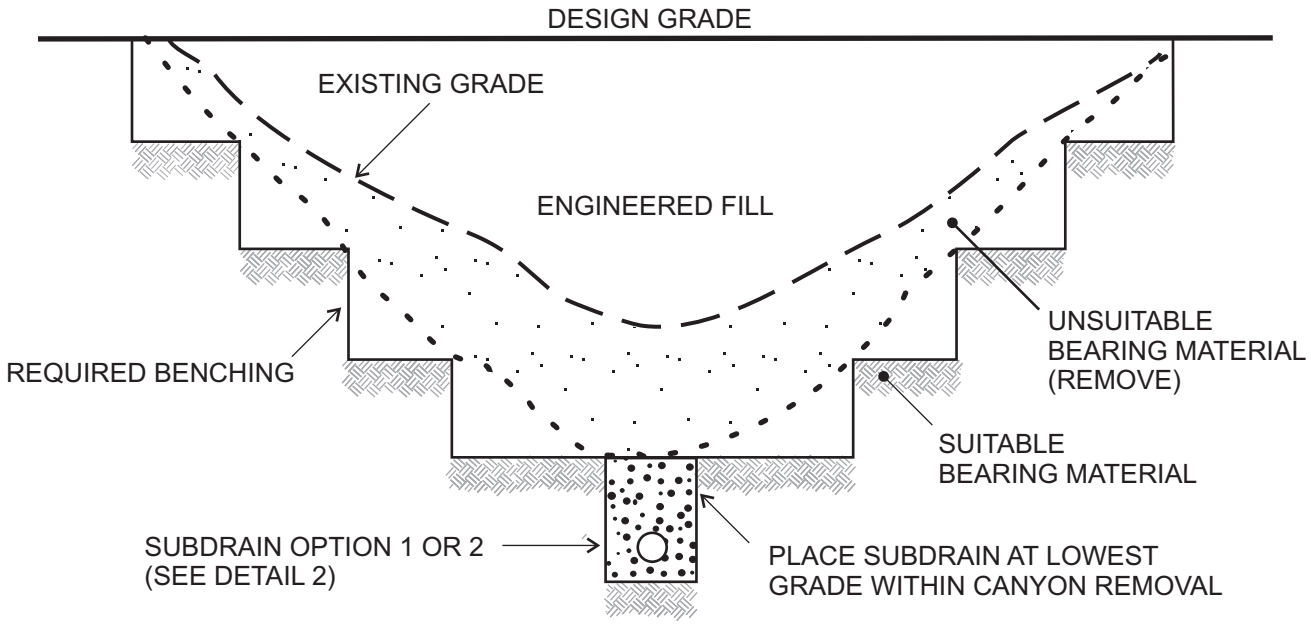
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals approximately two feet in fill height.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

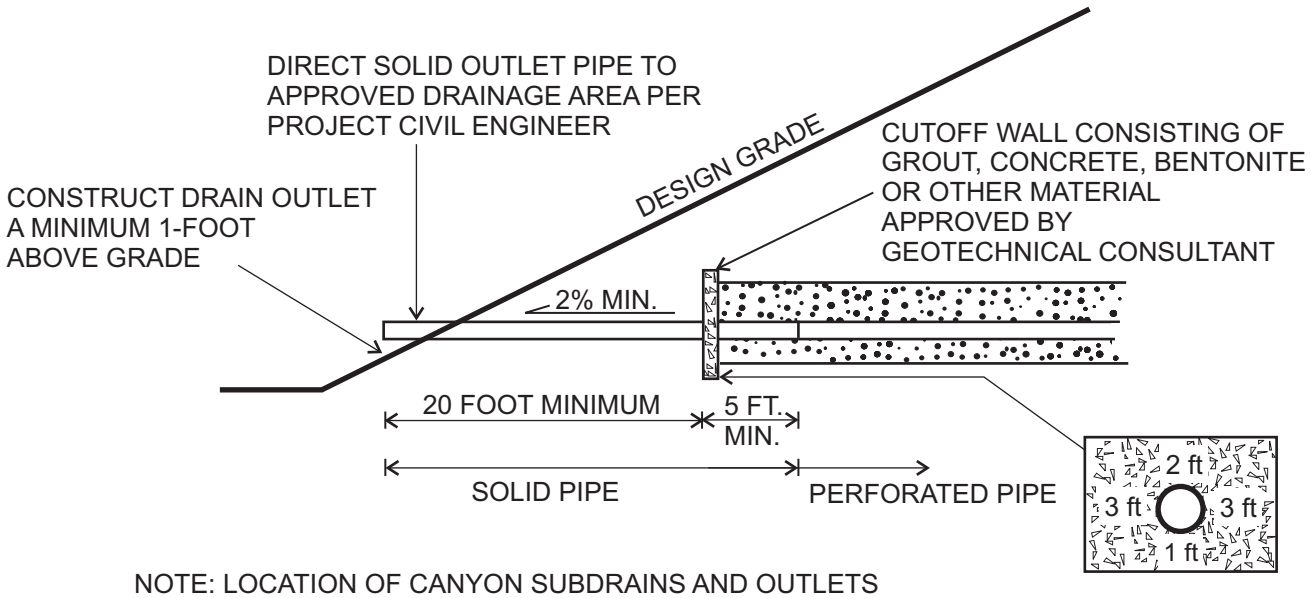
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results.



CANYON SUBDRAIN PROFILE



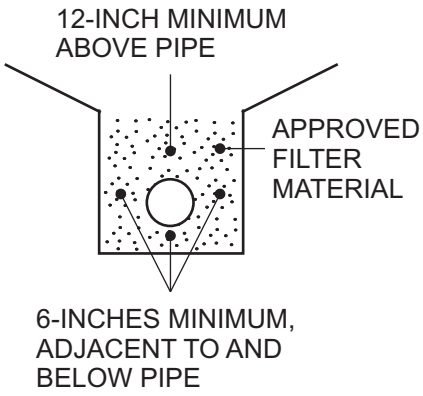
NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

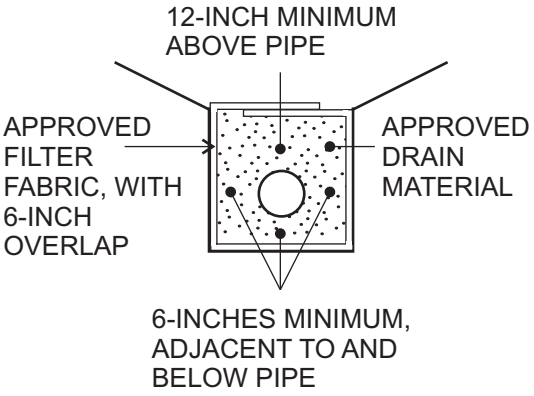
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

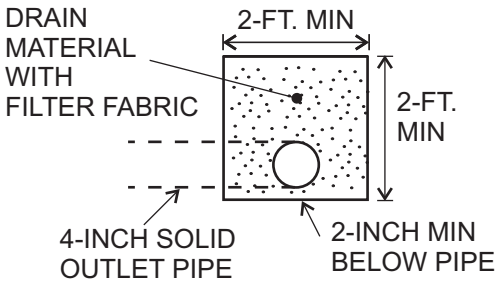
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

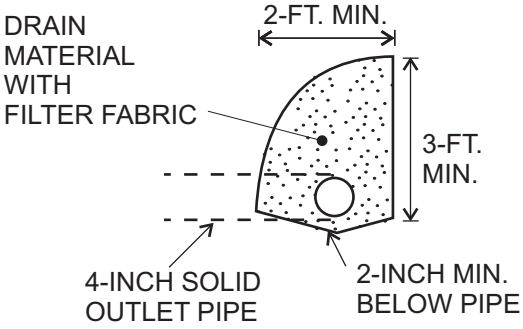
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

VER 1.0

NTS

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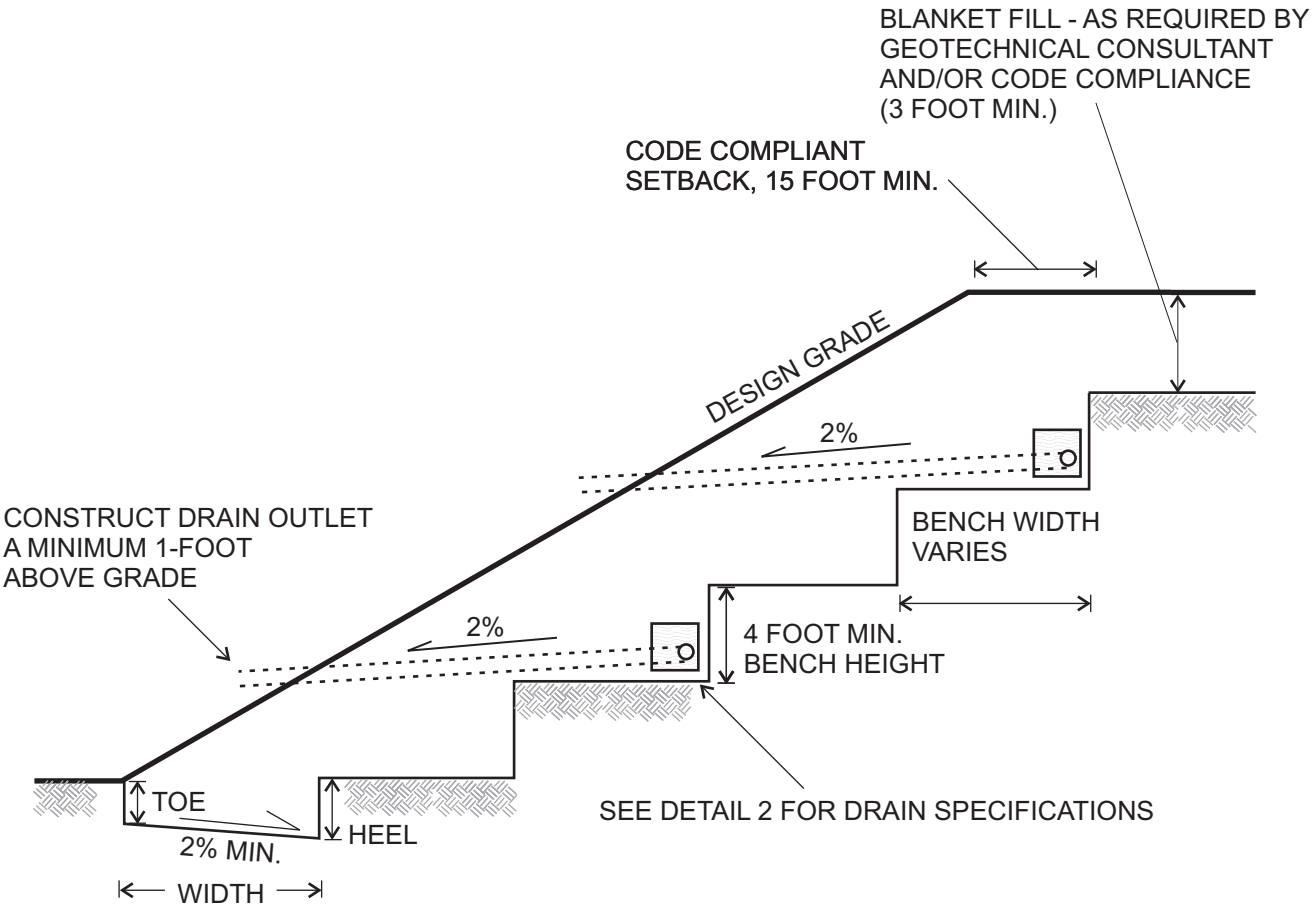
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

NTS

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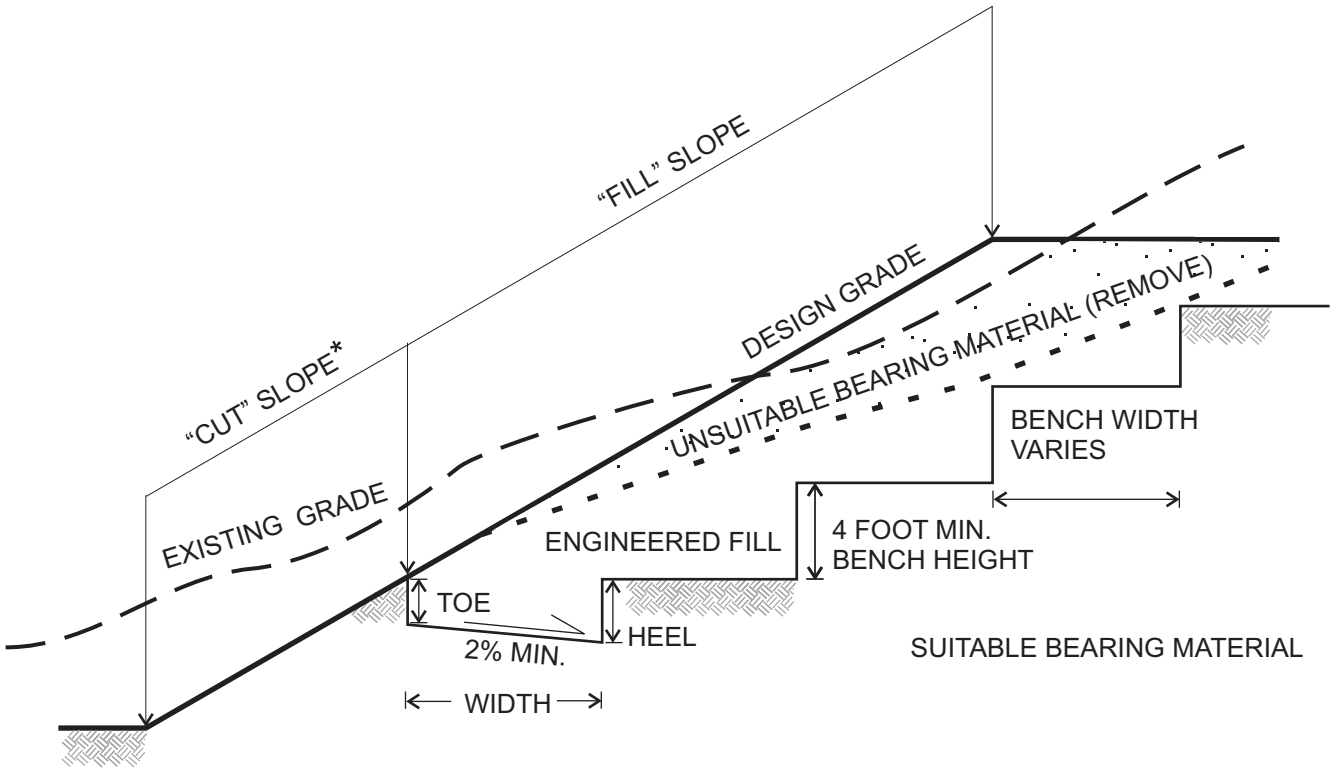
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0 NTS

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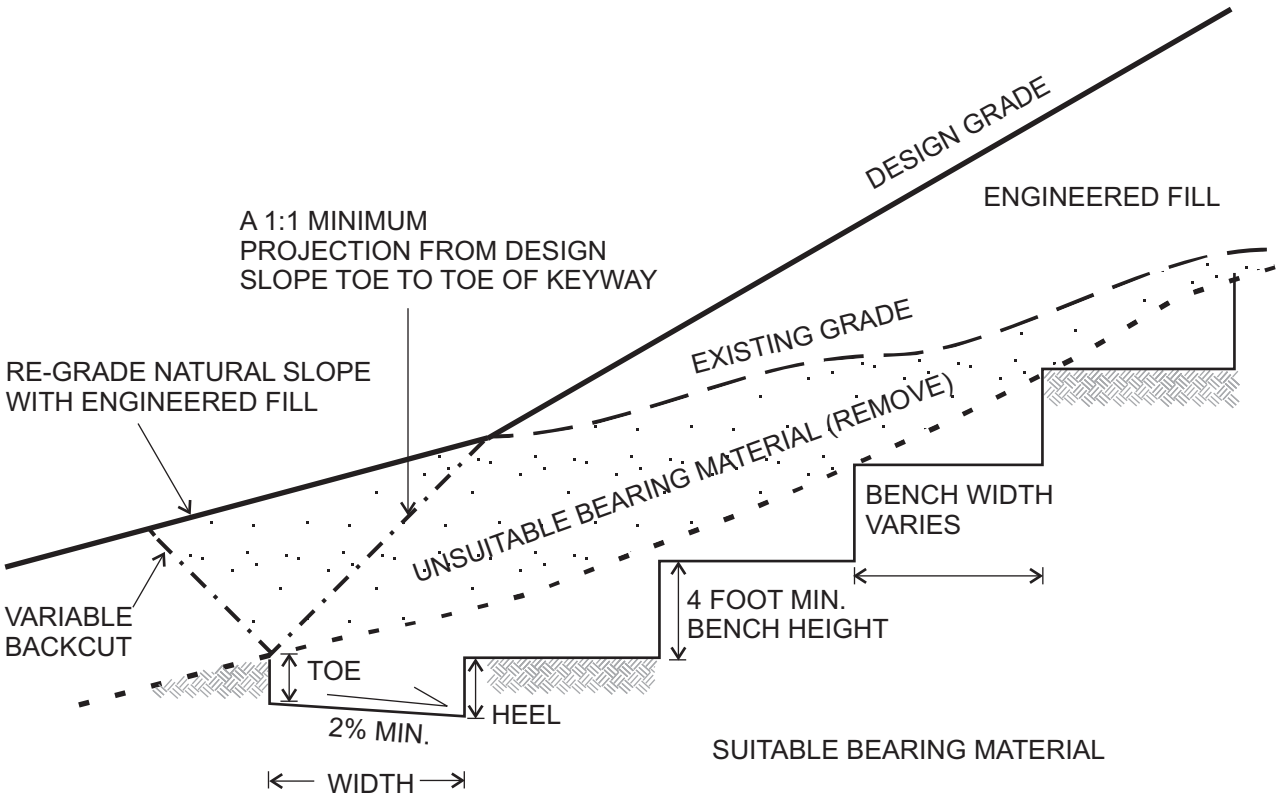
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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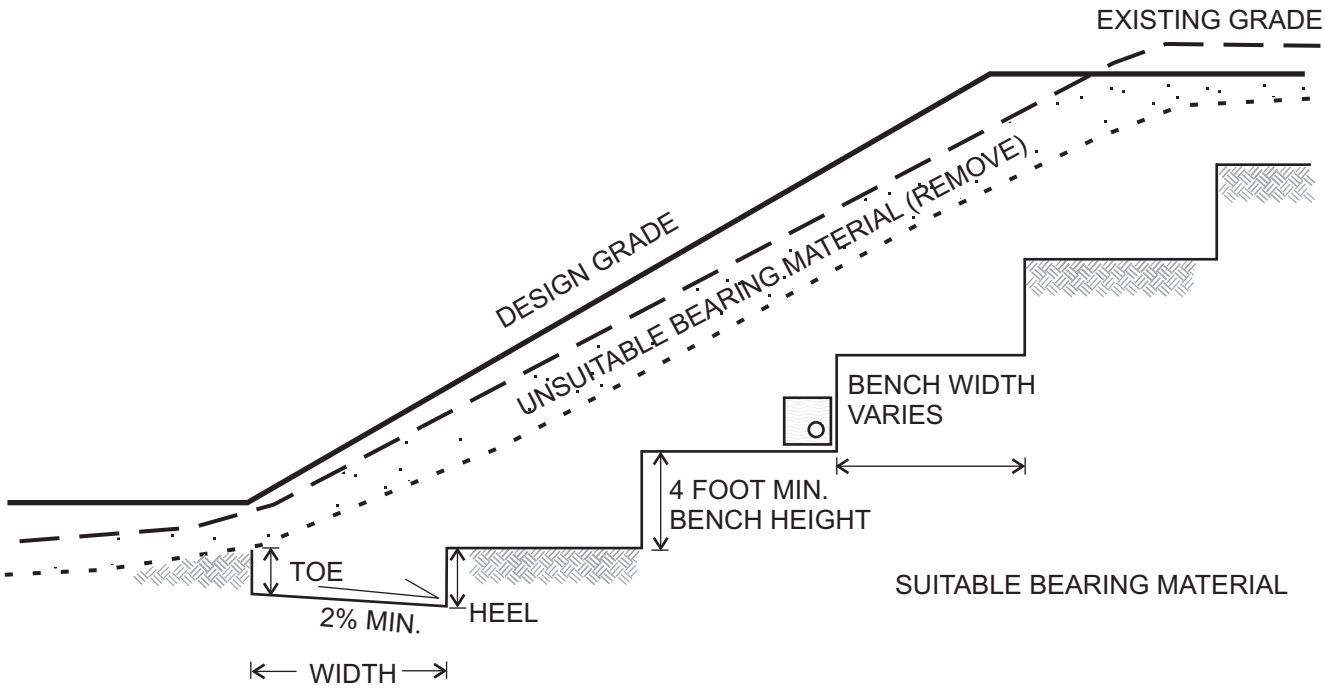
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0

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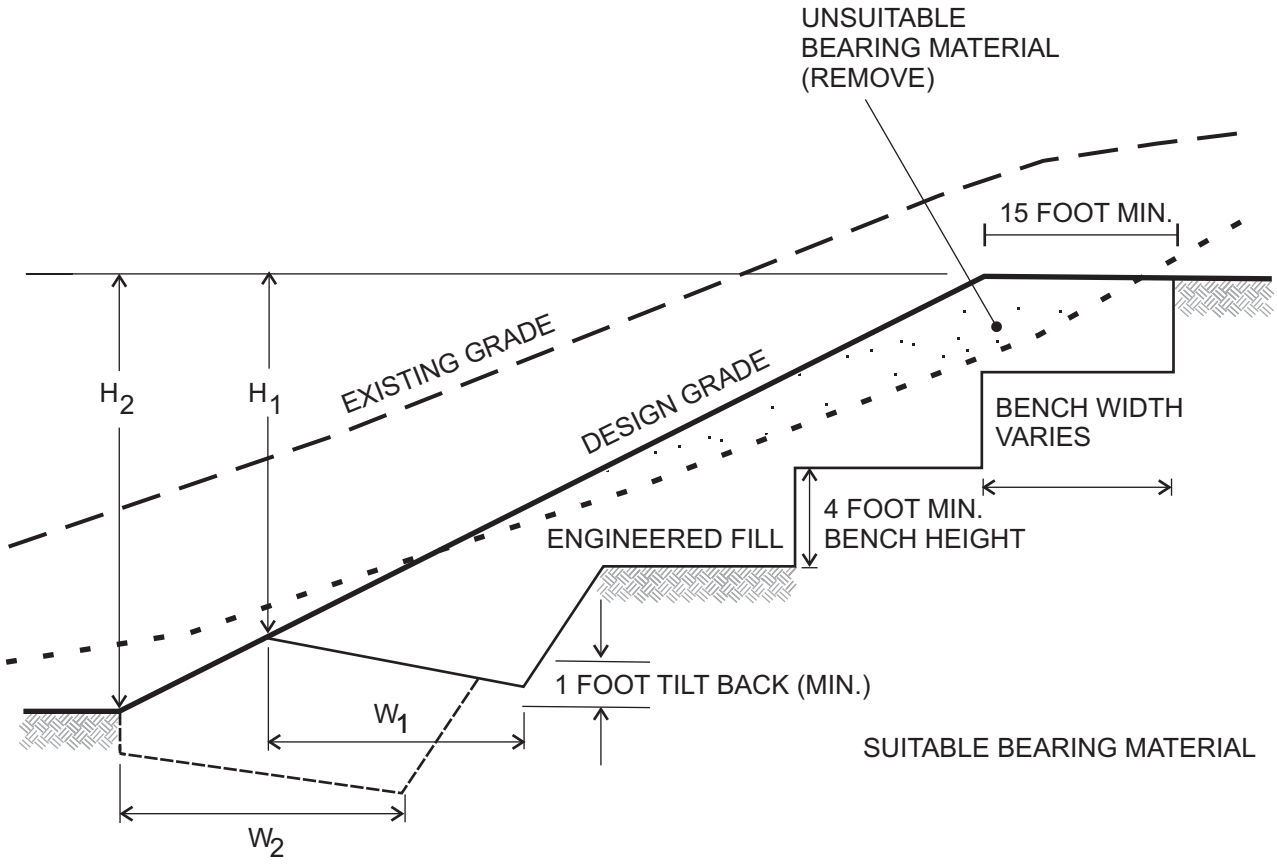
ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

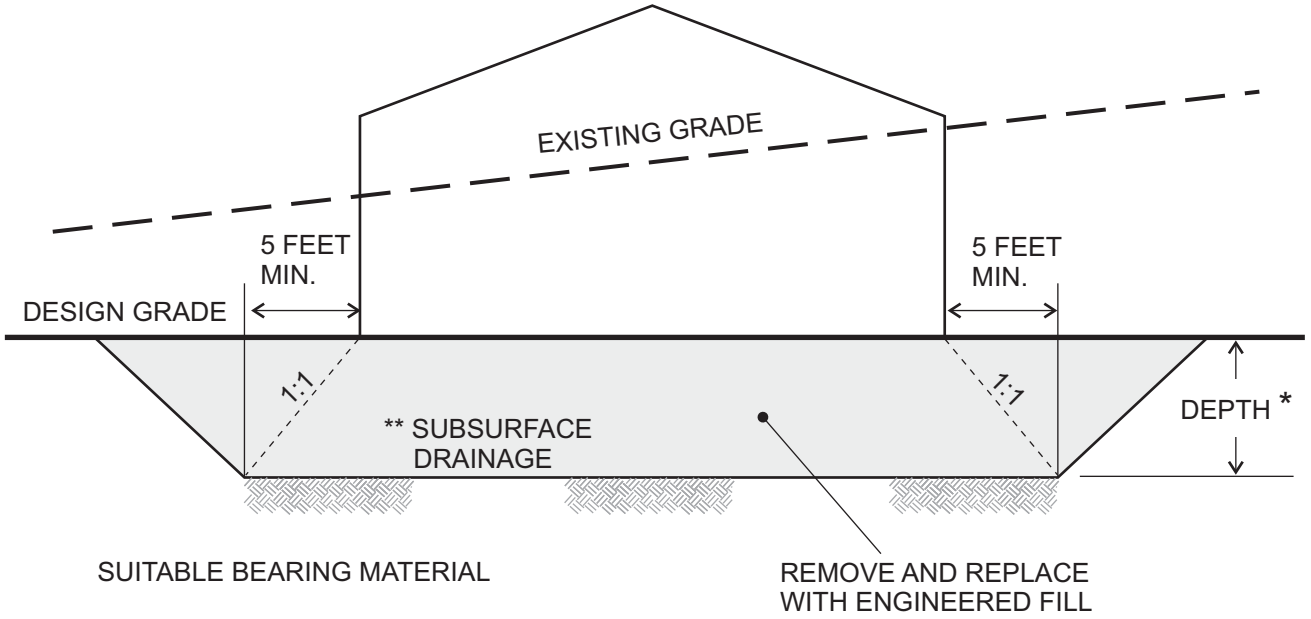
VER 1.0

NTS

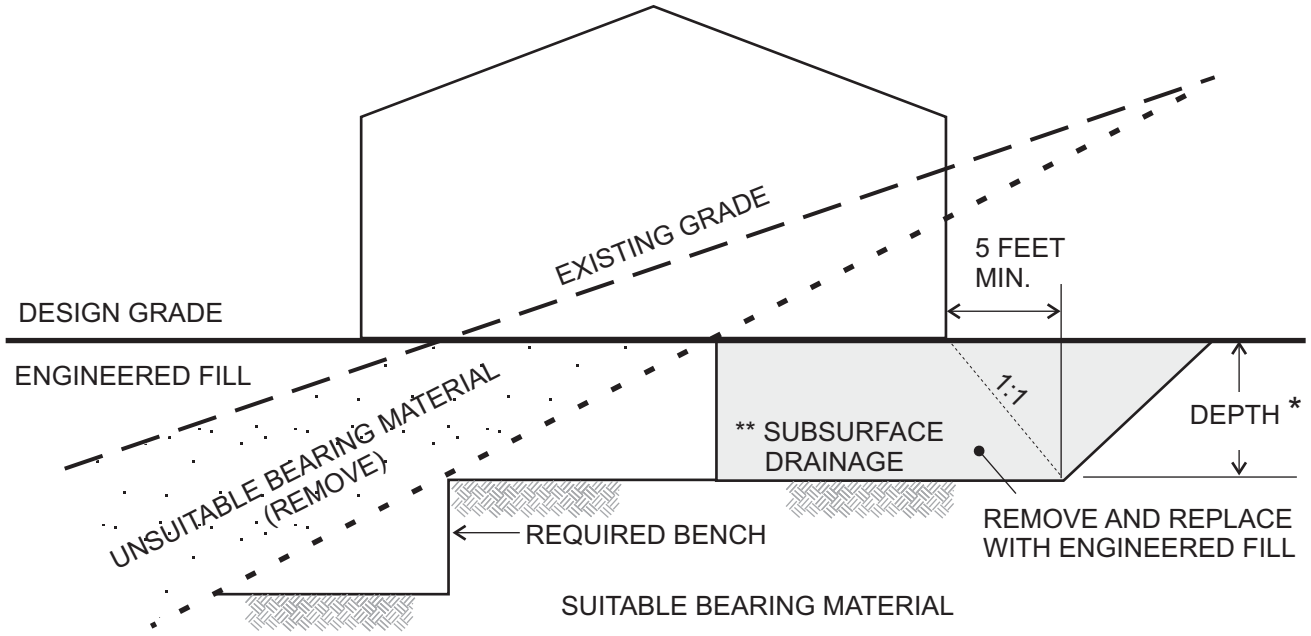
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

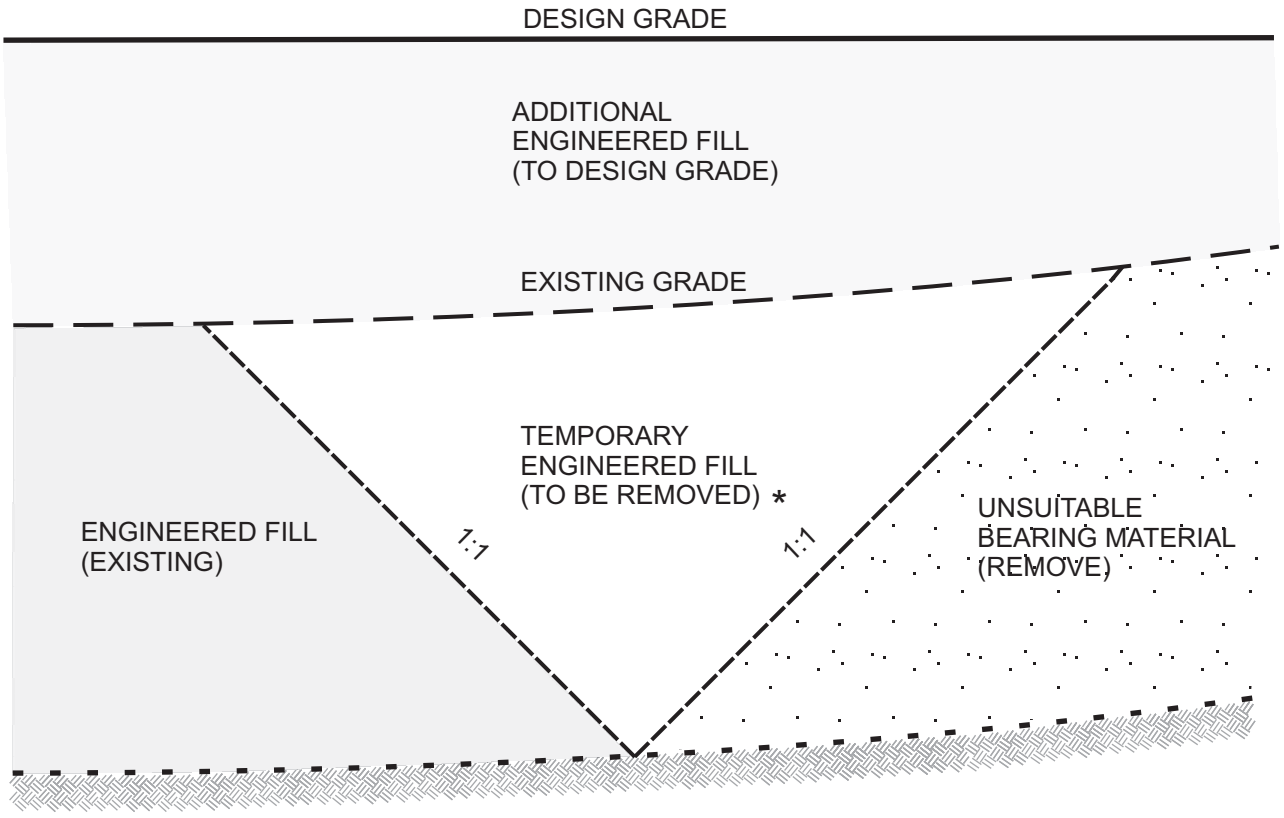
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0 NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

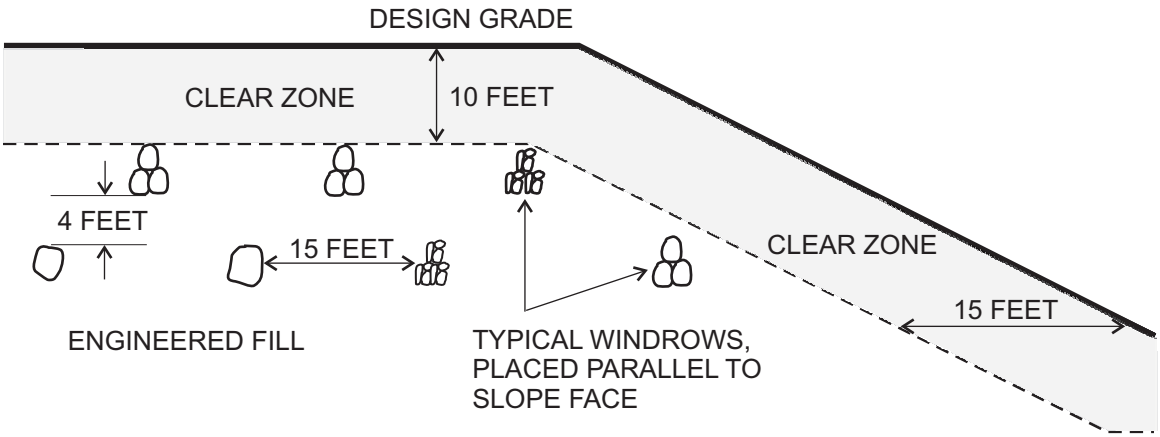
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

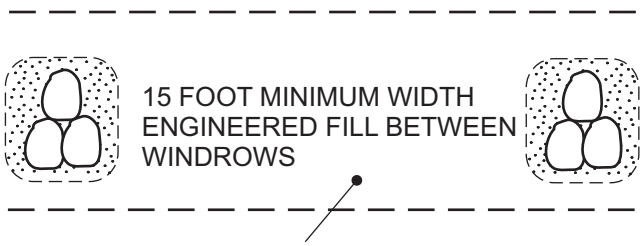
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

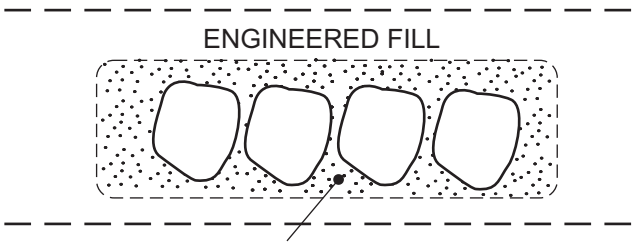
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

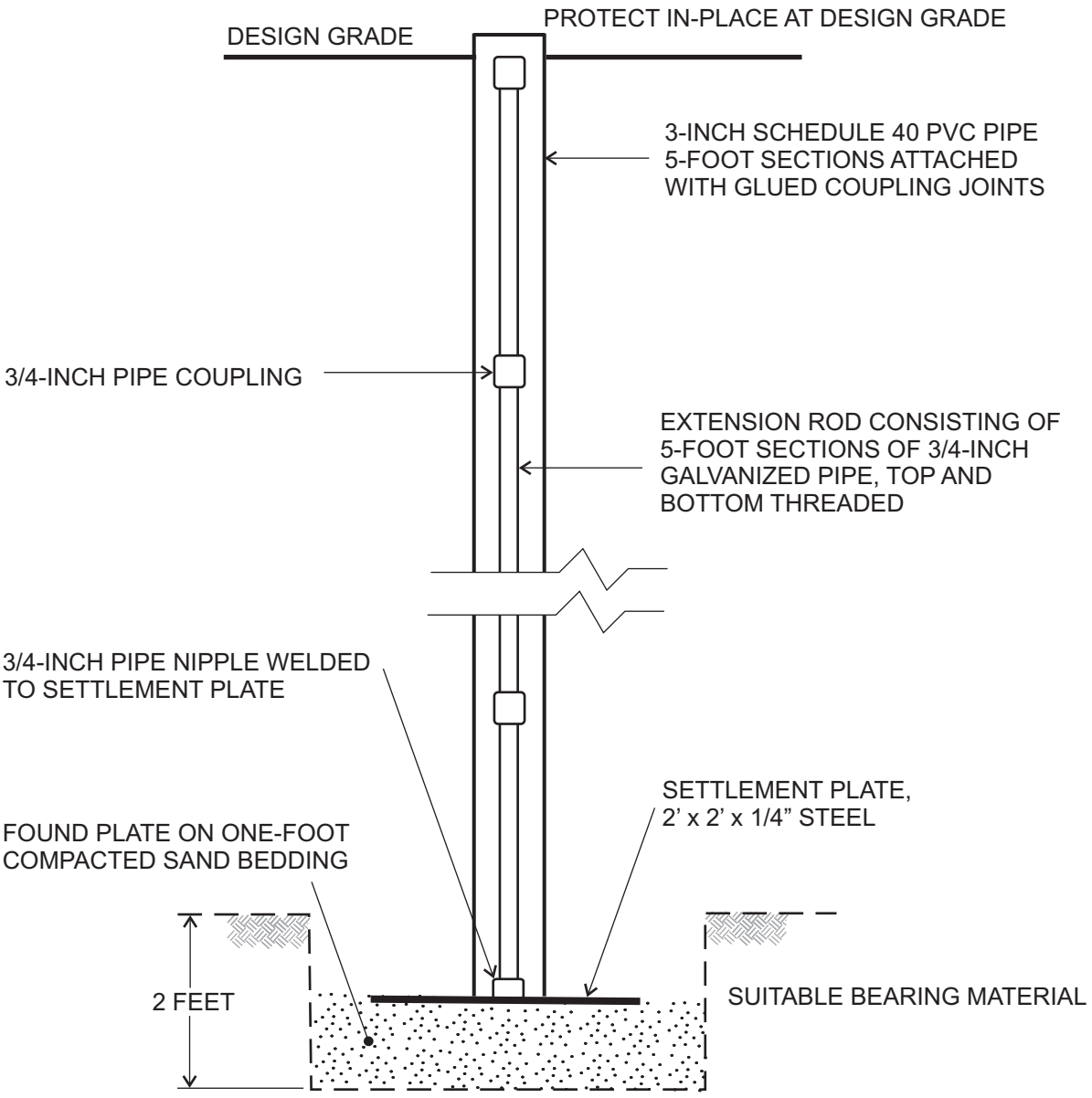
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

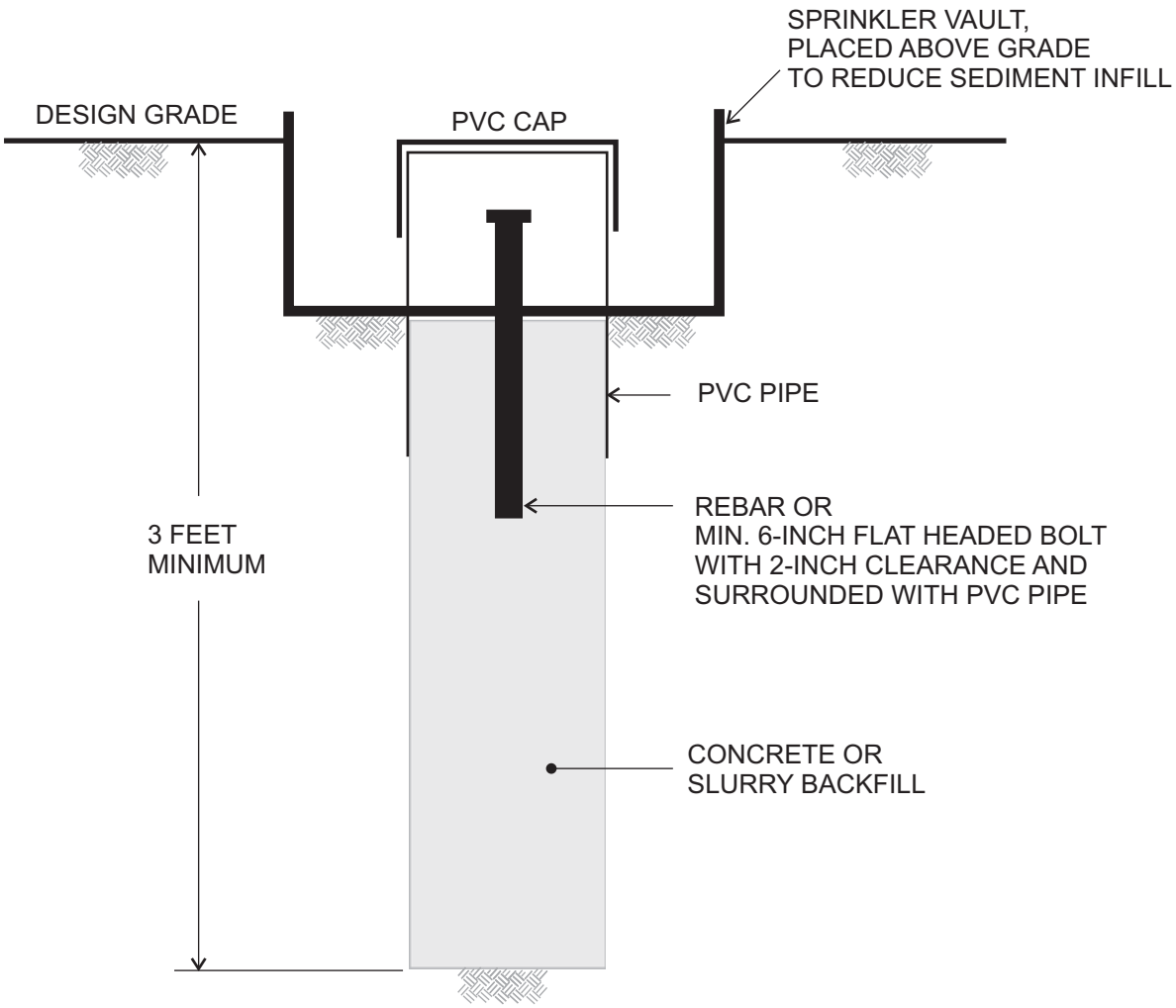
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT MONUMENT

DETAIL 12

LEGEND

afu	ARTIFICAL FILL - UNDOCUMENTED
Qya	YOUNG ALLUVIUM (DESIGNATION FOR ALL HOLOCENE, ALLUVIUMS ENCOUNTERED ONSITE)
Qoa	OLDER ALLUVIUM
$Qvof_3$	VERY OLD ALLUVIAL-FAN DEPOSITS
Qlo	SEDIMENTARY DEPOSITS OF LIVE OAK CANYON
T-22	APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (AGS, 2020)
B-37	APPROXIMATE LOCATION OF EXPLORATORY BORING (PSE)
AGS-18	APPROXIMATE LOCATION OF EXPLORATORY BORING (AGS, 2020)
SCG-10	APPROXIMATE LOCATION OF EXPLORATORY BORING (SCG, 2020)
	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
15	ESTIMATED REMOVAL DEPTH (IN FEET)
O.X. 5	PROPOSED BUILDING OVEREXCAVATION DEPTH (IN FEET)
	POSSIBLE INFILTRATION AREAS TO BE VERIFIED BY TESTING
	PROPOSED KEYWAY
8	PROPOSED SUBDRAIN WITH SIZE IN INCHES

PARCEL "A"
LLA. 05-002
INST. NO. 2005-0324926 O.R.

B-81 B

0-25.0' Qal
25.0-36.0' Qoa
T.D.=36.0'
No Water
No Caving

Install Stub for Future Development?

PROJECT BOUNDARY

15X2X3 Keyway

B'

$Qvof_3$

O.X. 5

T-15

0-8.0' Qal
8.0-25.0' Qoa
T.D.=26.0
No Water

GRADING AVOIDANCE AREA, TYP.

AGS-1

0-4.0' Qal
4.0-9.5' $Qvof_3$
T.D.=9.5'
No Water
No Caving

Qal

afu

Install Stub for Future Development?

$Qvof_3$

EXISTING STRUCTURES TO BE REMOVED, TYP.

0-15.0' Qal
15.0-50.1' Qoa
T.D.=50.1'
No Water

AGS-17

EXISTING MISC. ITEMS TO BE REMOVED & DISPOSED

0.0-25.0' $Qvof_3$
T.D.=25.0'
No Water

SCG-2

T-1

0-6.5' Qal
6.5-11.0' $Qvof_3$
T.D.=11.0'
No Water
No Caving

EXISTING WALLS TO BE REMOVED

EXISTING STRUCTURES REMOVED

SCG-1

0-13.5' Qal
13.5-49.3' Qoa
T.D.=49.3'
No Water
No Caving

Install Subdrain in Future

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

GRADING AND PROPOSED FUTURE FREEWAY OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

15X2X3 Keyway

EXISTING 30" RCP

EXISTING 36" RCP

EXISTING 48" RCP

GRADING LIMITS

CALTRANS R/W & PROJECT BOUNDARY

40' ±

WRITTEN GRADING PERMIT CLEARANCE OR PERMITS REQUIRED FROM CALTRANS PRIOR TO START OF GRADING

15X2X3 Keyway

A A'

GRADING AND OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

GRADING LIMITS

APN 413-190-006

40' WIDE ROAD & UTILITY EASEMENT (WOODHOUSE RD.)

ROBERTS ROAD

Qlo

Qal

afu

EXISTING DIRT ROAD

CAUTION: EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING POLES AND POWER LINES TO BE REMOVED, TYP.

0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

0-2.0 Topsoil

R/W

SEE SHEET 12

SEE SHEET 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
3. PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE

EXISTING EASEMENT NOTES:

24. EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
    - GRANTED TO: RIVERSIDE COUNTY
    - PURPOSE: PUBLIC HIGHWAY AND PUBLIC UTILITIES
    - RECORDED: NOVEMBER 20, 1945, IN BOOK 714 PAGE 216 O.R.
    - AFFECTS: AS SET FORTH IN SAID DOCUMENT

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
	ENGINEER		REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

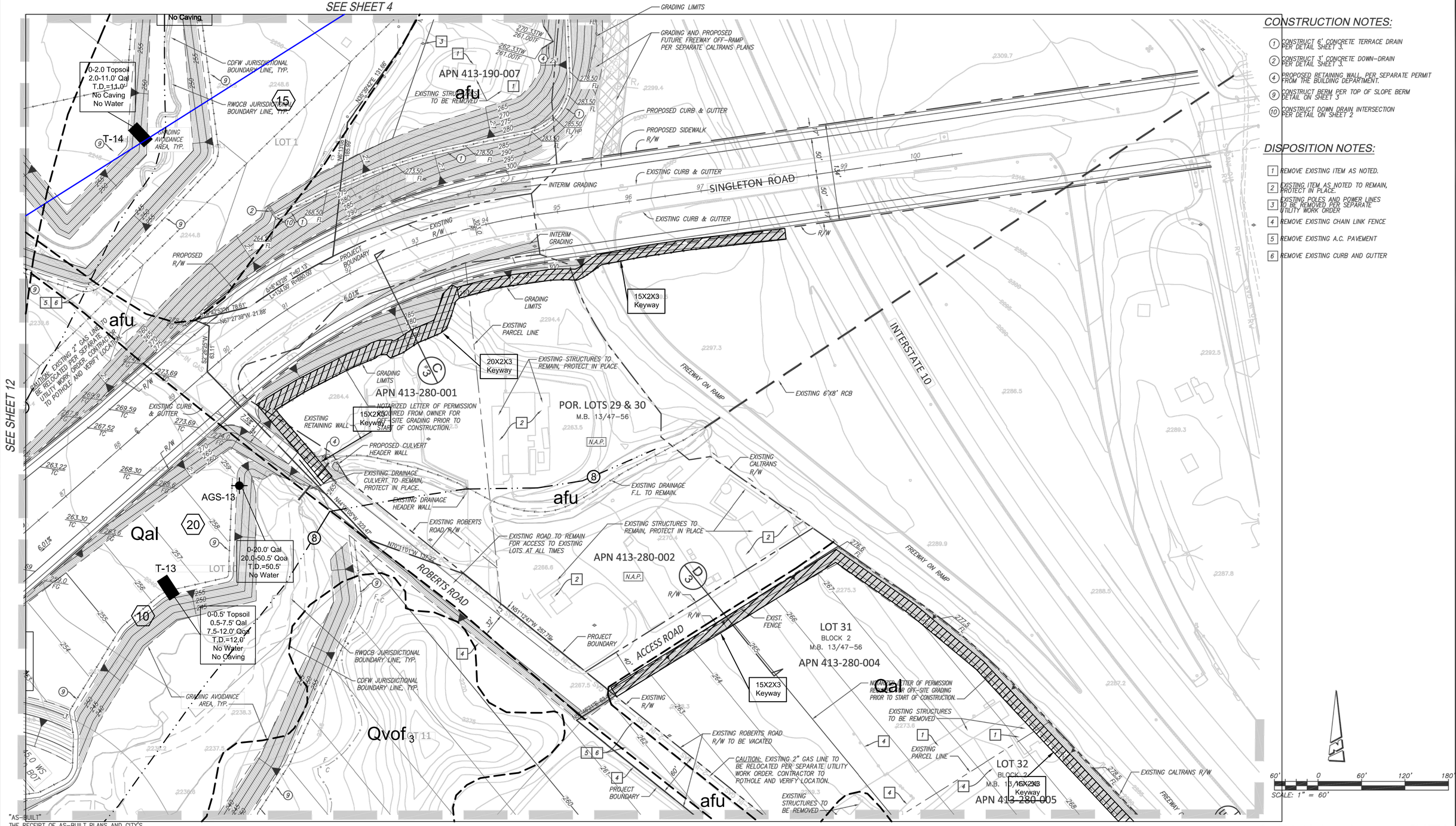
4 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg



CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
9. CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP: _____

See Plate 1 for Legend — PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM — ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

5 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberto
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 5

SEE SHEET 11

SEE SHEET 7

SEE SHEET 9

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING WEST
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 28.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

6 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

Plotted: Dec 10, 2020 - 10:42am By: gherta
DWG: N:\01_169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

LOT 32
BLOCK 2
M.B. 13/47–56

APN 413-280-005

APN 413-280-006

APN 413-280-007

APN 413-280-008

EXISTING PARCEL LINE

PROJECT BOUNDARY

INTERSTATE 10

EXISTING 30" RCP

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

A.P.N.413-280-009

A.P.N.413-280-010

EXISTING CALTRANS R/W

EXISTING DOUBLE 48" CMP

EXISTING BORING PIT PER CROSSING I-10 PLANS PERMIT NO. 08-05-6-UU-1116

EXISTING 48" CMP

N64°25'37"W 396.38'

N.A.P.

EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 4" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 2" GAS LINE TO BE RELOCATED PER / SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING COPPER DRIVE R/W TO BE VACATED

EXISTING ROBERTS ROAD R/W TO BE VACATED

EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING TELEPHONE LINE, PRIOR TO CONSTRUCTION CONTRACTOR TO VERIFY LOCATION.

EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

LOT 18
PARCEL MAP 19207
P.M. 127/10–11

A.P.N.413-280-034

A.P.N.413-280-035

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

CAUTION: EXISTING 24" DIP (CLASS 300) ZONE 11 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

CAUTION: EXISTING 16" DIP (CLASS 300) ZONE 12 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

EXISTING PARCEL LINE

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXIST. ROBERTS ROAD R/W TO BE VACATED

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXISTING PARCEL LINE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

LOT 14

LOT 15

LOT 16

LOT 17

ROBERTS ROAD

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY

RWQCB JURISDICTIONAL BOUNDARY

CUT/FILL LINE

EXISTING 90' SCE 20.00' SDGE FORCE MAIN EASEMENT

PROJECT BOUNDARY

PARCEL 9
P.M. NO. 33105
P.M. 243/99–111

TRACT BOUNDARY

TRACT 32702

N36°55'25"W 170.0

N84°30'34"W 299.43

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. NOTARIZED LETTER OF PERMISSION REQUIRED FROM SEWER AGENCY FOR GRADING OVER EXISTING SEWER PIPE PRIOR TO START OF CONSTRUCTION.

SEE SHEET 6

SEE SHEET 8

SEE SHEET 9

AGS-14

AGS-15

AGS-10

0-0.5' Topsoil
0.5-8.0' Qal
8.0-12.0' Qvof
T.D.=12.0'
No Water
No Caving

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-1.0' Topsoil
1.0-13.0' Qal
T.D.=13.0'
No Water
No Caving

0-0.5' Topsoil
0.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

60' 0 60' 120' 180'
SCALE: 1" = 60'

See Plate 1 for Legend PLATE 4

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

811 Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

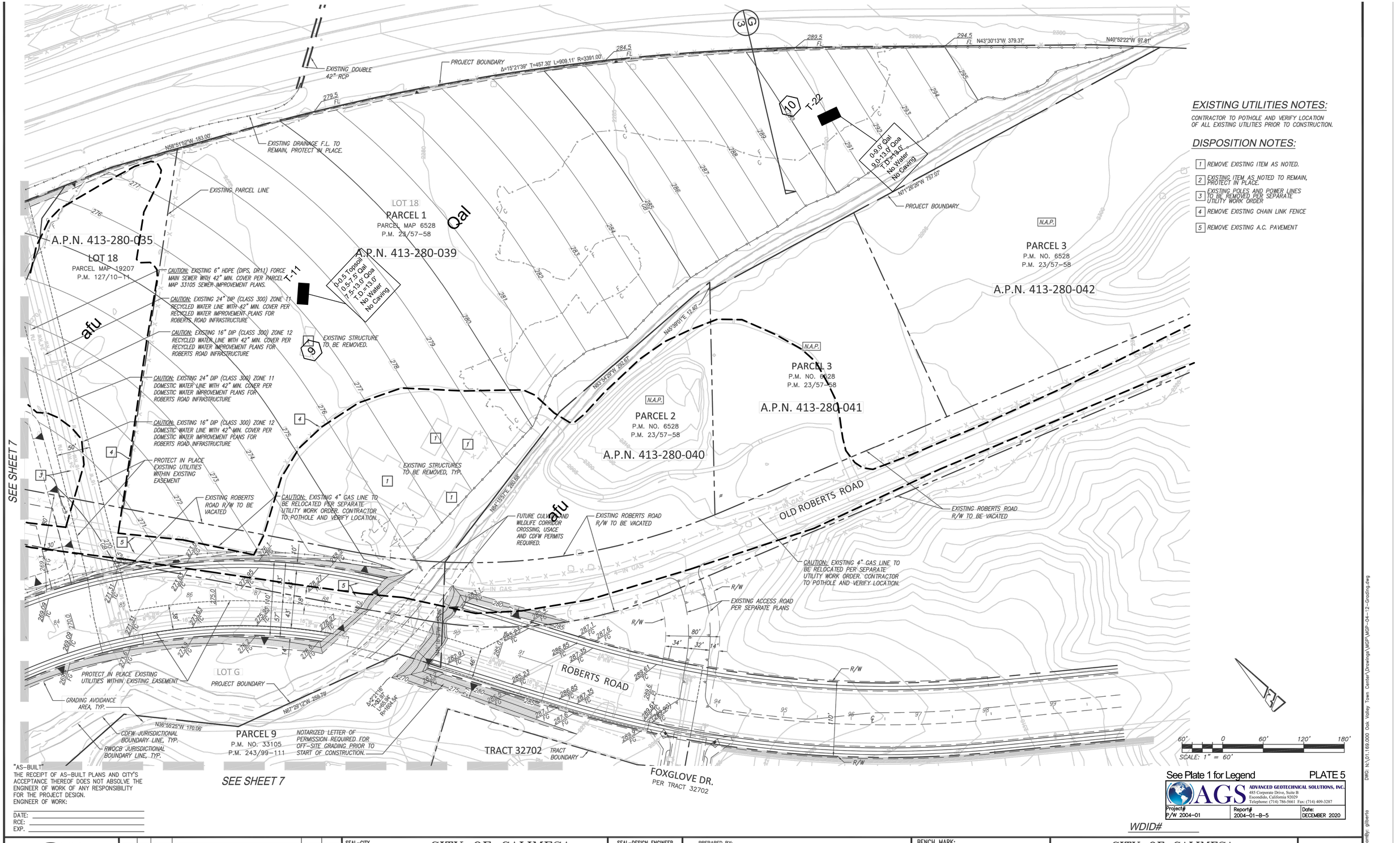
7 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 – 10:43am By: gilberta
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg



EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 5

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

8 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:43am By: gilberto DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 6

SEE SHEET 10

SEE SHEET 7

SCG-9
0-10.0' Qal
10.0-25.0' Qoa
T.D.=25.0'
No Water

T-17
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-5
0-4.0' Qya
4.0-26.0' Qoa
T.D.=26.0'
No Water

B-94
0-12' Qal
12-50.0' Qoa
T.D.=50.0'
No Water

T-8
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-15

AGS-10
0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

T-21
0-3.5' Qal
3.5-11.0' Qoa
T.D.=11.0'
No Water
No Caving

15X2X3 Keyway

15X2X3 Keyway

afu

EXISTING STRUCTURES TO BE REMOVED, TYP.

EXISTING STRUCTURES TO BE REMOVED, TYP.

45.0 WS
37.0 BOT

LOT 9
LOT C
LOT 3
LOT 15
LOT 16
LOT 5

Qal

Qal

Qal

ST4

ROBERTS ROAD

ROBERTS

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 9
P.M. NO. 33105
P.M. 243/99-111

TRACT 32702
TRACT BOUNDARY

TRACT 32702
TRACT BOUNDARY

GRADING AVOIDANCE AREA, TYP.

PROJECT BOUNDARY

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

EXISTING PARCEL LIINE

PROJECT BOUNDARY

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. CONTRACTOR TO POTHOLE AND VERIFY.

EXISTING 20.00' FORCE MAIN EASEMENT

M

M'

N

N'

L=140.57'
T=94.17'
R=350.00'
N40°35'10"E 164.17'
N12°03'25"E 150.84'
N1°43'09"E 133.04'
N0°10'01"E 161.34'

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1 REMOVE EXISTING ITEM AS NOTED.

4 REMOVE EXISTING CHAIN LINK FENCE

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

9 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01\169.000 Oak Valley Town Center\Drawings\MGP\04-12-Grading.dwg

SEE SHEET 11

Qlo
CUT/FILL LINE
Qal
Qlo
SCG-5
0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water
0-26.5' Qlo
T.D.=26.5'
No Water
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
Qal
AGS-4
0-35.0' Qal
35.0-45.5' Qoa
T.D.=45.5'
No Water
PAD=223.9
afu
EXISTING STRUCTURES TO BE REMOVED, TYP.
SCG-9
SCG-7
0-8.5' Qal
8.5-55.0' Qoa
T.D.=55.0'
No Water
ST5
ST7
ST6
T-16
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving
LOT 4
SCG-6
0-25.0' Qoa ?
T.D.=25.0'
No Water
0-4.0' Qal
4.0-8.0' Qoa
8.0-12.0' Qya
T.D.=12.0'
No Water
No Caving
Qlo
TEMP. SEWER LIFT STATION PAD
PAD=186.0
T-4
Qal
0-18.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water
AGS-18
GRADING AVOIDANCE AREA, TYP.
0-8.5' Qal
8.5-25.0' Qoa
T.D.=25.0'
No Water
SCG-8
15X2X3 Keyway
PROJECT BOUNDARY
EXISTING 100' WIDE DRAINAGE, GRADING & SLOPES EASEMENT
Δ=67°29'06" T=801.59'
L=1413.40' R=1200.00'
C.L. 4' WIDE
NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF-SITE GRADING PRIOR TO START OF CONSTRUCTION.
0-7.0' Qal
7.0-51.5' Qoa
T.D.=51.6'
No Water
AGS-6
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.

[4] REMOVE EXISTING CHAIN LINK FENCE

SEE SHEET 9

EXISTING EASEMENT NOTES:

(21) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: MARCH 9, 1971, INSTRUMENT NO. 23255 OF OFFICIAL RECORDS
AFFECTS: AS SET FORTH IN SAID DOCUMENT

(23) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: SUNCAL SUMMERWIND RANCH LLC
PURPOSE: DRAINAGE, GRADING & SLOPE EASEMENT
RECORDED: AUGUST 28, 2006, INSTRUMENT NO. 2006-0632646
AFFECTS: AS SET FORTH IN SAID DOCUMENT

S-BUILT"
E RECEIPT OF AS-BUILT PLANS AND CITY'S
CCEPTANCE THEREOF DOES NOT ABSOLVE THE
GINEER OF WORK OF ANY RESPONSIBILITY
R THE PROJECT DESIGN.
GINEER OF WORK:

TE: _____
E: _____
P. _____

See Plate 1 for Legend PLATE 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

60' 0 60' 120' 180'
SCALE: 1" = 60'

WDID#

811 now what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER MICHAEL THORNTON No. C44226 Exp. 6/30/21 CIVIL STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER GEORGE ALAN LENFESTEY No. 45920 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

10 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 12

SEE SHEET 6

SEE SHEET 10

CONSTRUCTION NOTES:

(2) CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
(3) PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
(4) PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
(5) CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
(8) CONSTRUCT 3' CONCRETE BROW DITCH PER DETAIL ON SHEET 3
(9) CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.
[4] REMOVE EXISTING CHAIN LINK FENCE

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

0-1.0' Topsoil
1.0-10.0' Qal
10.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

0-8.5' Qal
8.5-18.5' Qoa
18.5-24.0' Qlo
T.D.=24.0'
No Water

0-2.0' Topsoil
2.0-65.0' Qlo
T.D.=65.0'
No Water
Caving @ 5'

0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water

0-26.5' Qlo
T.D.=26.5'
No Water

0-30.0' Qal
30.0-56.5' Qoa
T.D.=56.5'
Seepage @
46.0-56.5'

0-11.5' Qal
T.D.=11.5'
Seepage @10'
Caving below 10

0-60.0' Qal
60.0-71.5' Qoa
T.D.=71.5'
Seepage
11.0-71.5'

0-6.5' afu
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Seepage @
15.0-42'
Caving @ 40'

Stabilize Saturated Removal Bottom

Install Subdrain for Future Development?

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 1
VACANT
RLC PHASE 1
INST. NO. 732045 O.R.

FUTURE SINGLETON ROAD EXTENSION

PROJECT BOUNDARY

EXISTING 100' WIDE DRAINAGE, ROADWAY & SLOPES EASEMENT

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE, SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020
12/10/20 DATE

BENCH MARK:
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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

11 OF 23 SHEETS

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 4

PARCEL 14
P.M. NO. 33105
P.M. 243/99–111

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

PROJECT BOUNDARY

CAUTION: EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

B-37
0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

15X2X3 Keyway

AGS-8
0-9.0' Qal
9.0-26.3' Qoa
T.D.=26.3'
No Water

AGS-12
0-50.4' Qlo
T.D.=54.4'
No Water

T-3
0-1.0' Topsoil
1.0-8.0' Qal
8.0-14.0' Qlo
T.D.=14.0'
No Water
No Caving

T-19
0-0.5' Topsoil
0.5-6.5' Qal
6.5-11.0' Qlo
T.D.=11.0'
No Water
No Caving

T-18
PAD=251.9

AGS-2
0-10' Qal
10-25.5' Qlo
T.D.=25.5'
No Water

0-1.0' Topsoil
1.0-6.0' Qal
6.0-12.0' Qoa
T.D.=12.0'
No Water
No Caving

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

B-96
0-6.5 Topsoil
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Water @ 15to42'
Caving @ 40'

Qal
Qlo
Qoa
afu
Qvof 3

ST10
ST11
ST12
ST13
ST9

LOT 2
LOT A
LOT 7

ROBARTS ROAD
SINGLETON ROAD

O.X. 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN–DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V–DITCH PER DETAIL ON SHEET 3
6. CONSTRUCT 12" DRAIN AND PIPE PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2
13. INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

SEE SHEET 5

SEE SHEET 11

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS–BUILT"
THE RECEIPT OF AS–BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 9

WDID# _____

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
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ENGINEER			REVISIONS	COUNTY	

SEAL–CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL–DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12–31–2020

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NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

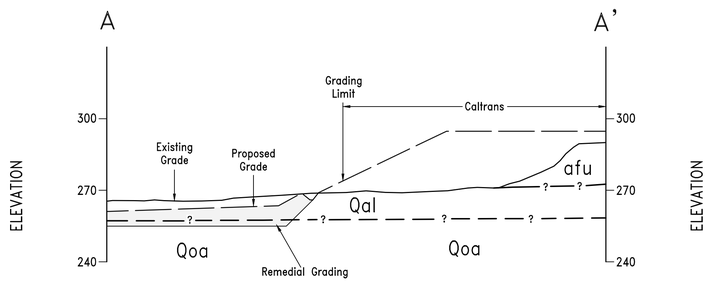
12 OF 23 SHEETS

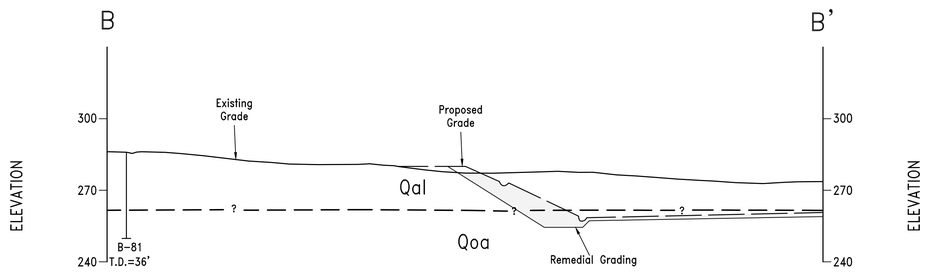
FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

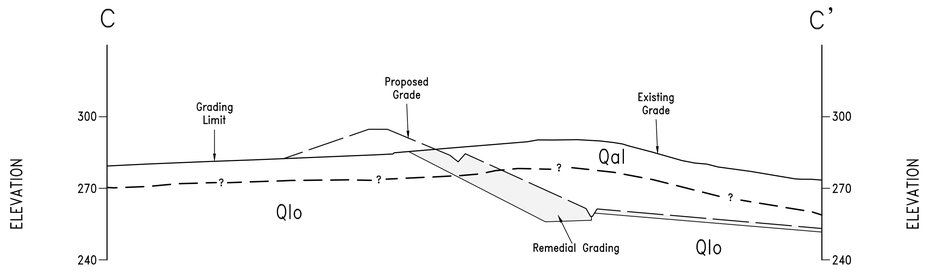
PLAN No. _____

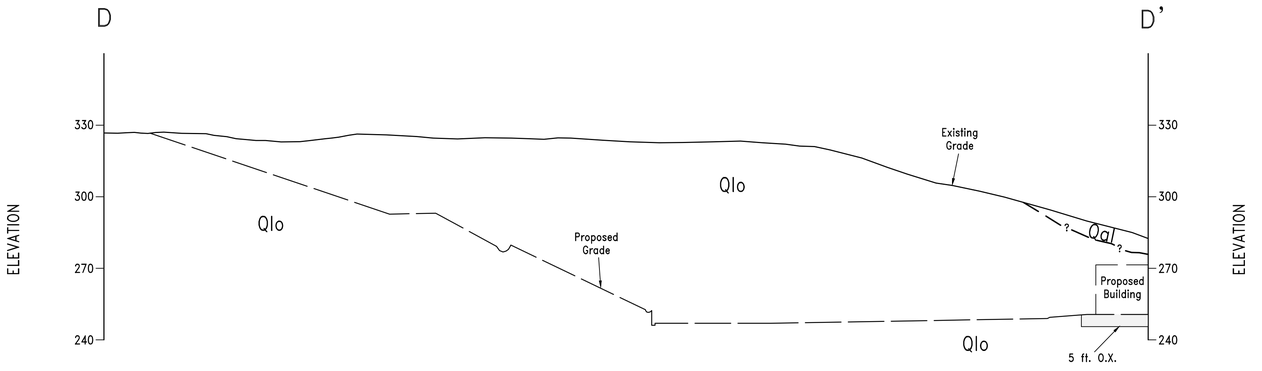
NOT FOR CONSTRUCTION

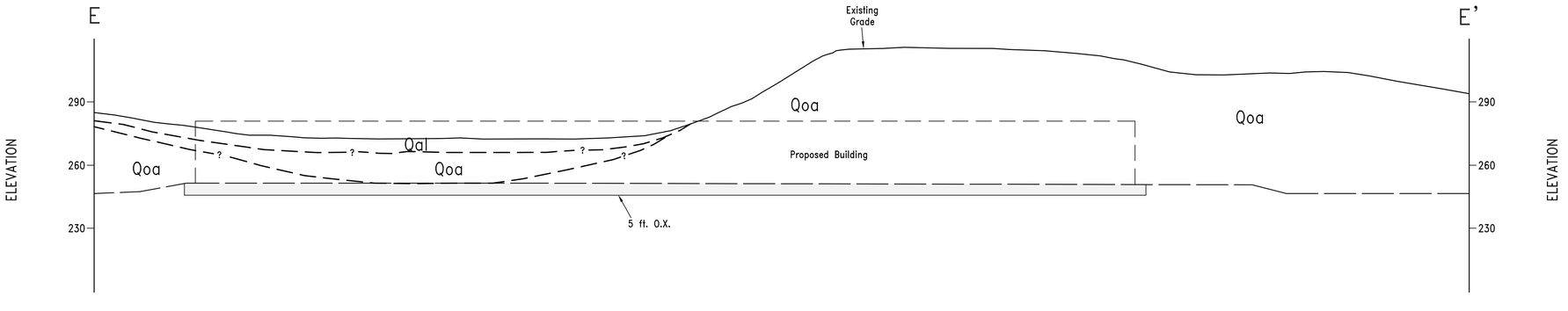
Plotted: Dec 10, 2020 – 10:45am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg











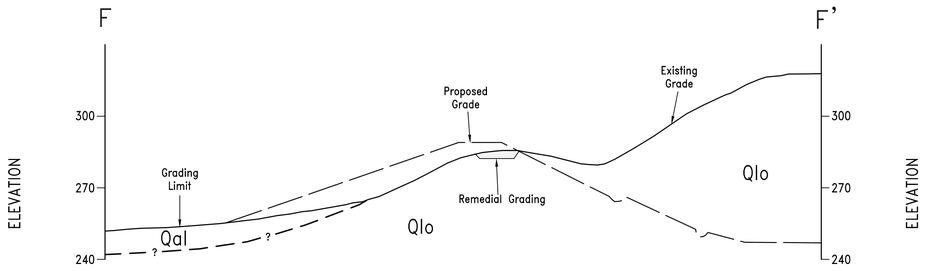
Scale: 1"=30'

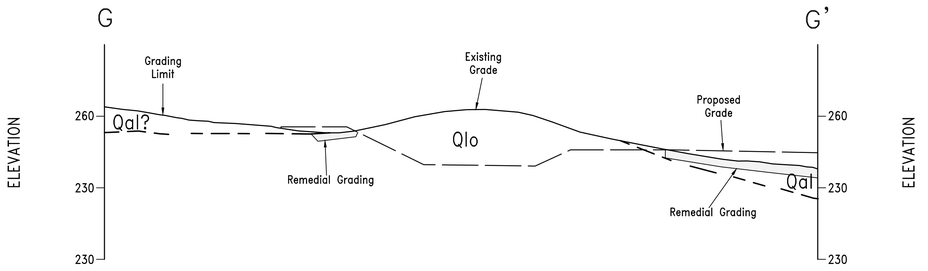
See Plate 1 for Legend

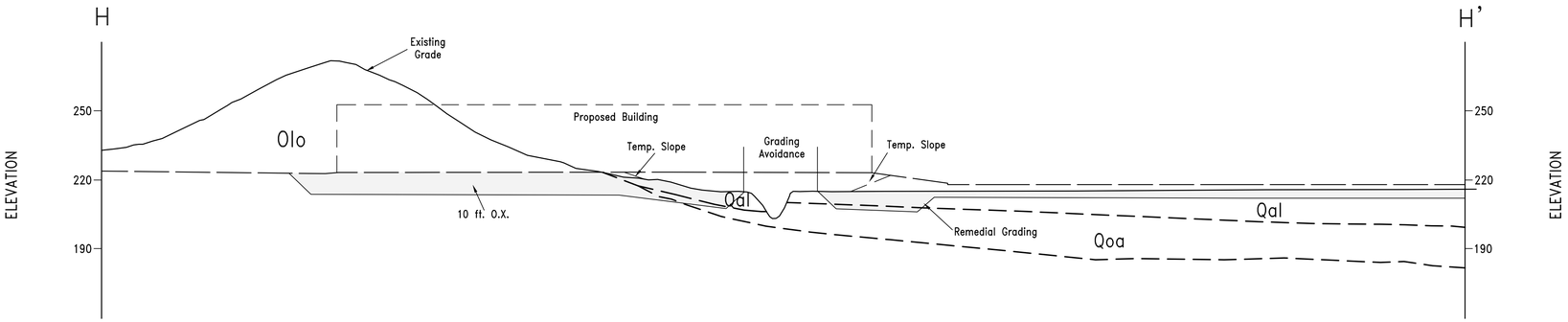
PLATE 10

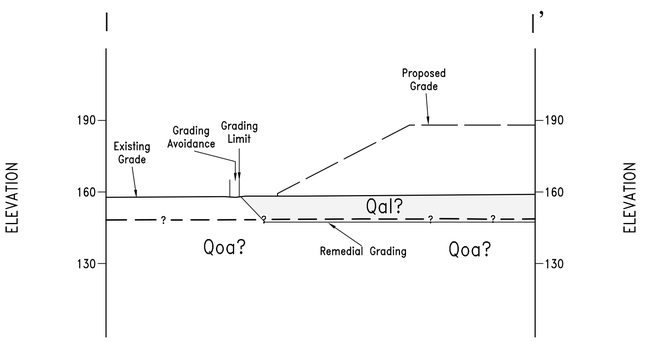
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

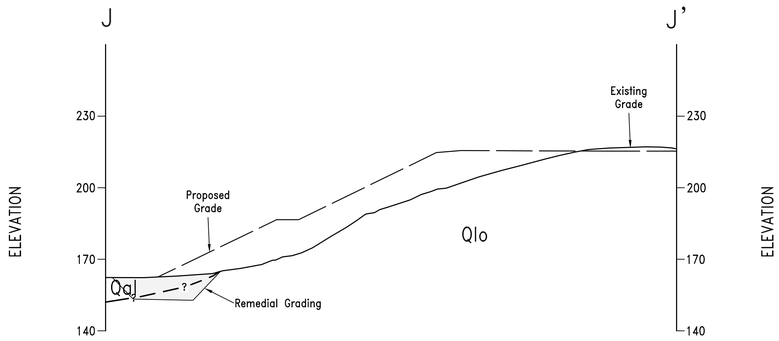
Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020











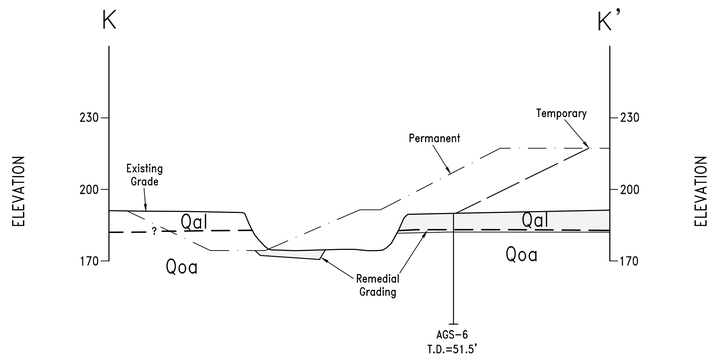
Scale: 1"=30'

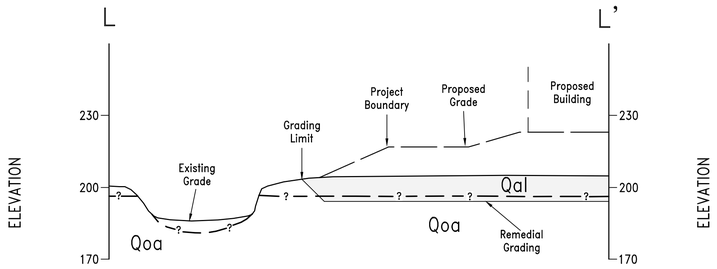
See Plate 1 for Legend

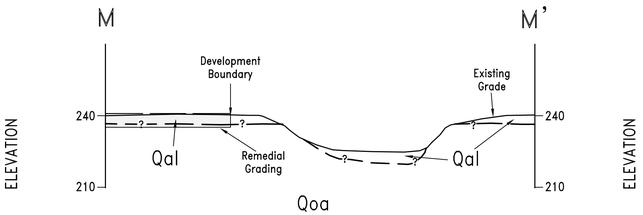
PLATE 11

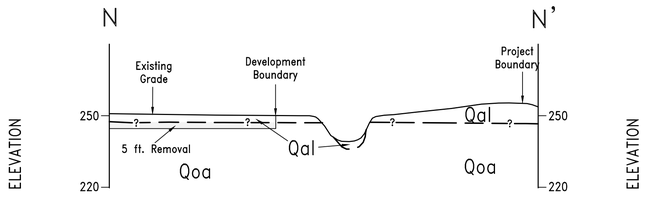
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020









Scale: 1"=30'

See Plate 1 for Legend PLATE 12

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building D

BMP Identification

BMP NAME / ID: DMA D-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*29000*	*Roofs*	*1*	*0.89*	*25868*			
CONC	*97732*	*Concrete or Asphalt*	*1*	*0.892*	*87176.9*			
L/S	*15977*	*Ornamental Landscaping*	*0.1*	*0.11046*	*1764.8*			
	142709		***Total***		**114809.7**	**0.20**	***0.5***	***0.5***

Notes: 8'x20' MWS Vault

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building D

BMP Identification

BMP NAME / ID: DMA D-2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*106720*	*Roofs*	*1*	*0.89*	*95194.2*			
CONC	*68264*	*Concrete or Asphalt*	*1*	*0.892*	*60891.5*			
L/S	*10088*	*Ornamental Landscaping*	*0.1*	*0.11046*	*1114.3*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building D

BMP Identification

BMP NAME / ID: DMA D-3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*197031*	*Roofs*	*1*	*0.89*	*175751.7*			
CONC	*94938*	*Concrete or Asphalt*	*1*	*0.892*	*84684.7*			
L/S	*20196*	*Ornamental Landscaping*	*0.1*	*0.11046*	*2230.8*			
	312165		***Total***		**262667.2**	**0.20**	***1.2***	***1.2***

Notes: 2 - 8'x20' MWS Vaults

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BLCOV - Building D

BMP Identification

BMP NAME / ID: DMA D-4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
BLDG	*316560*	*Roofs*	*1*	*0.89*	*282371.5*			
CONC	*215551*	*Concrete or Asphalt*	*1*	*0.892*	*192271.5*			
L/S	*81154*	*Ornamental Landscaping*	*0.1*	*0.11046*	*8964.1*			

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Albert A. Webb Associates	Date	12/2/2021
Designed by	EP	Case No	
Company Project Number/Name	BLCOV - Building D		

BMP Identification

BMP NAME / ID: DMA D-6

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

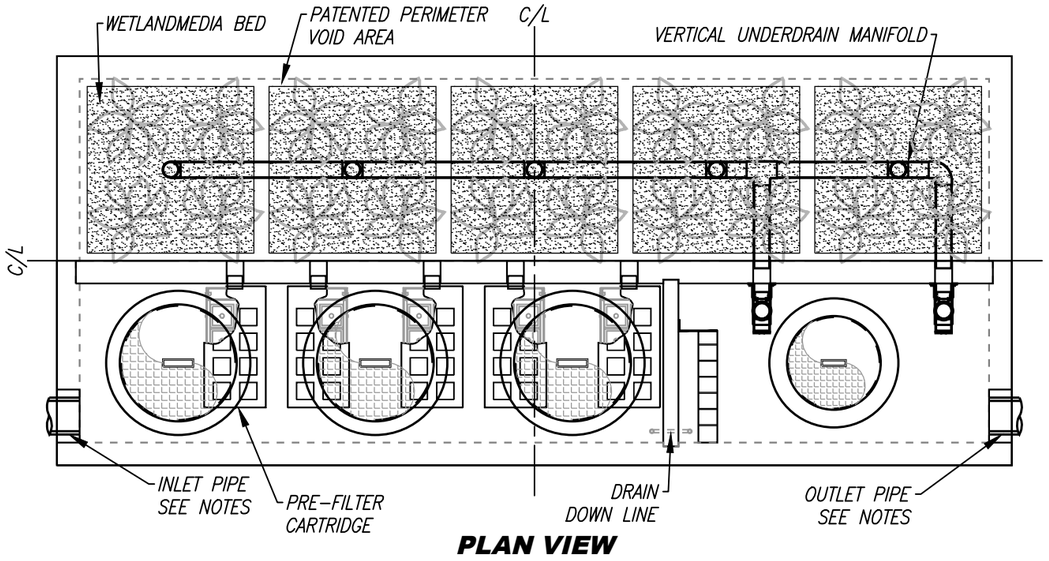
DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
CONC	*129585*	*Concrete or Asphalt*	*1*	*0.89*	*115589.8*			
L/S	*60052*	*Ornamental Landscaping*	*0.1*	*0.11046*	*6633.2*			
	189637	***Total***			**122223**	**0.20**	***0.6***	***0.6***

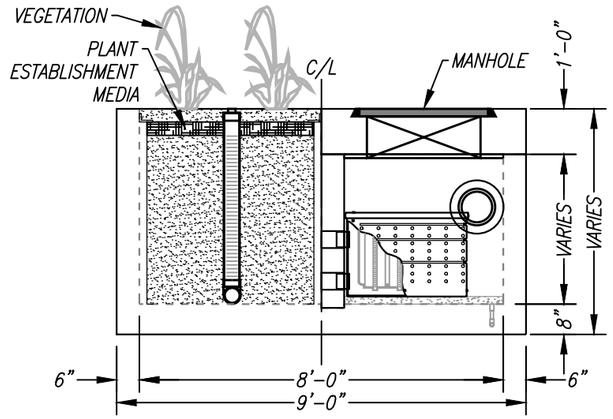
Notes: 8'x20' MWS Vault

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.5	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			11
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

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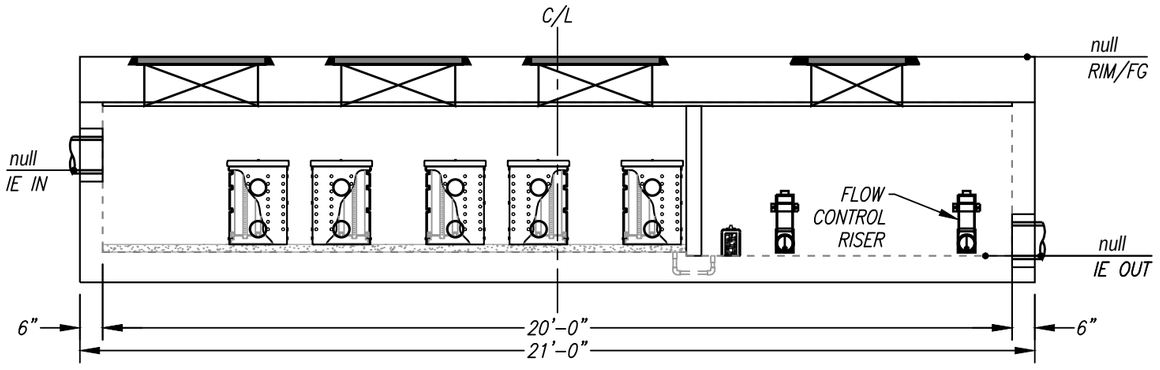
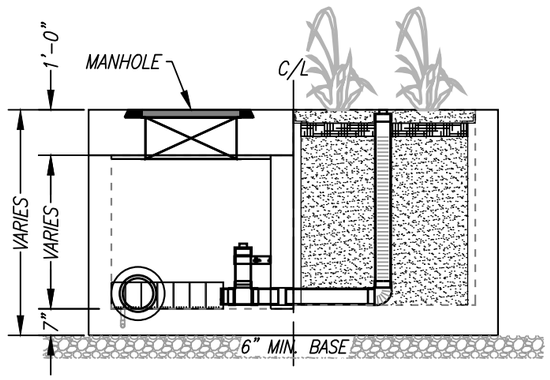


ELEVATION VIEW



RIGHT END VIEW

DMA D-1

TREATMENT FLOW (CFS)	0.5
OPERATING HEAD (FT)	2.9
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

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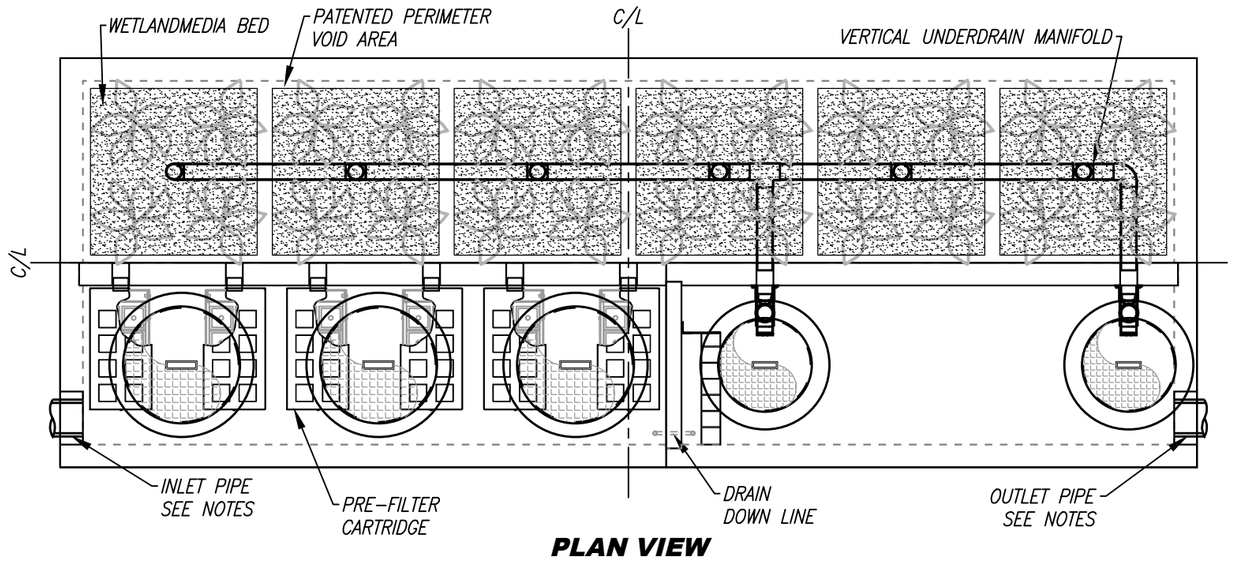
Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

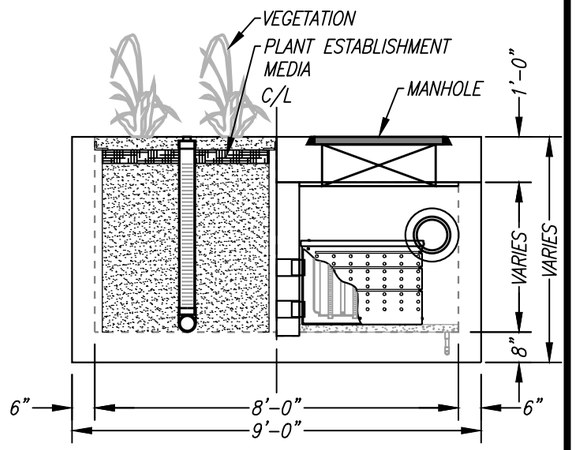
5/23/19 10:LEE

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.7	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			16
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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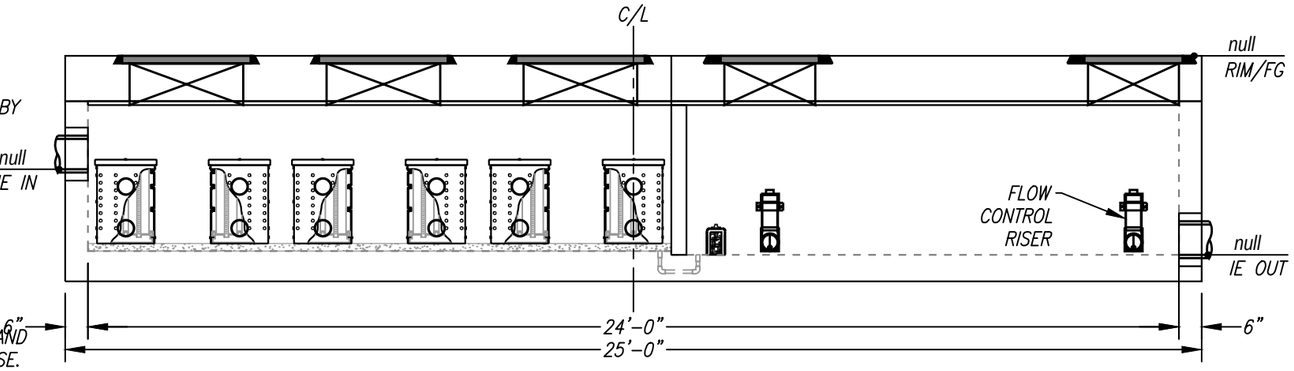
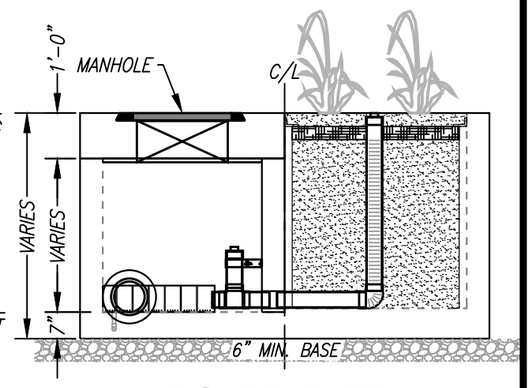


ELEVATION VIEW



RIGHT END VIEW

DMA D-2

TREATMENT FLOW (CFS)	0.7
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

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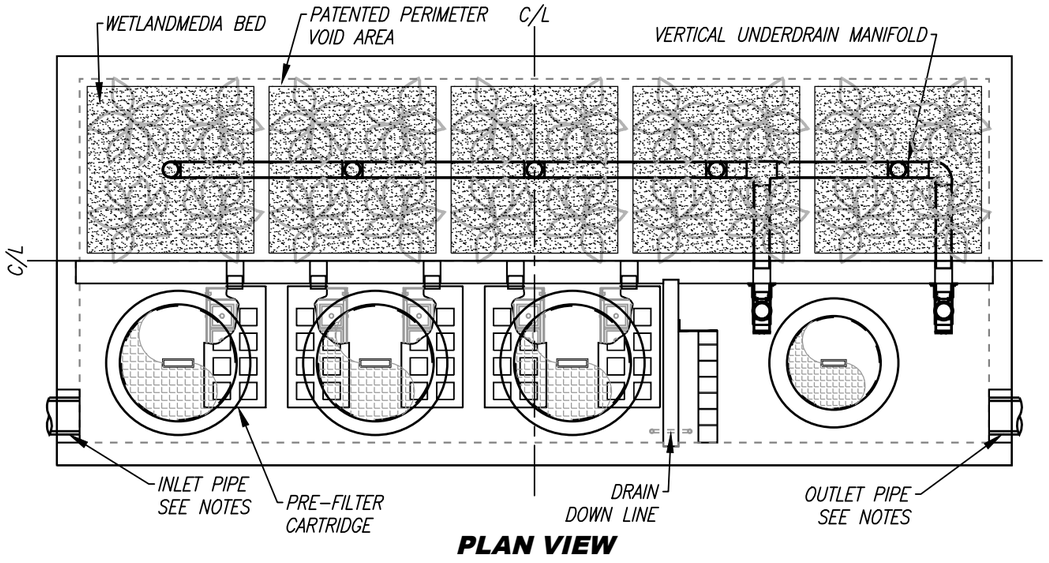
Bio Clean
A Forterra Company

MWS-L-8-24-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

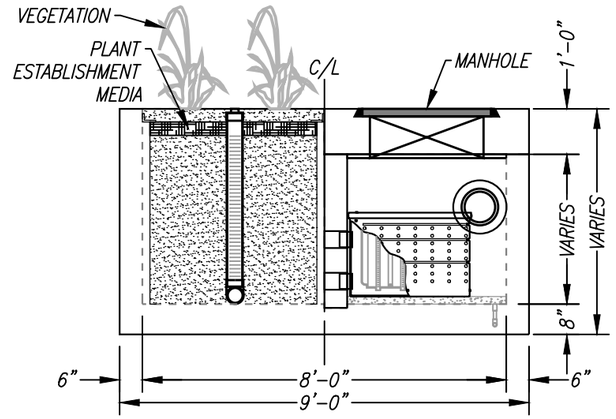
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			20
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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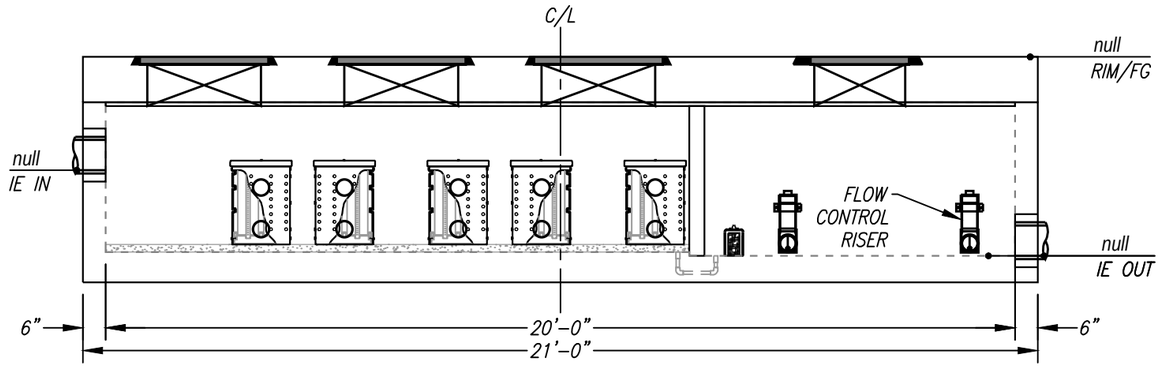
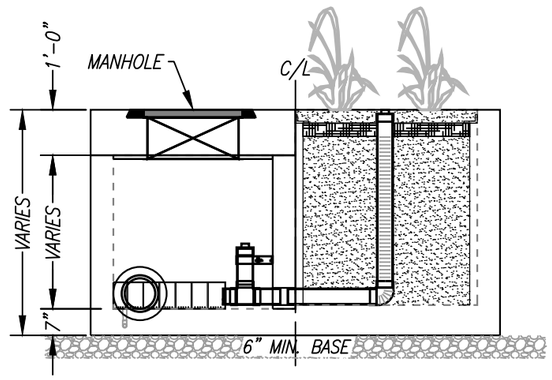


ELEVATION VIEW



RIGHT END VIEW

2 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.2 CFS

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

DMA D-3

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Bio Clean
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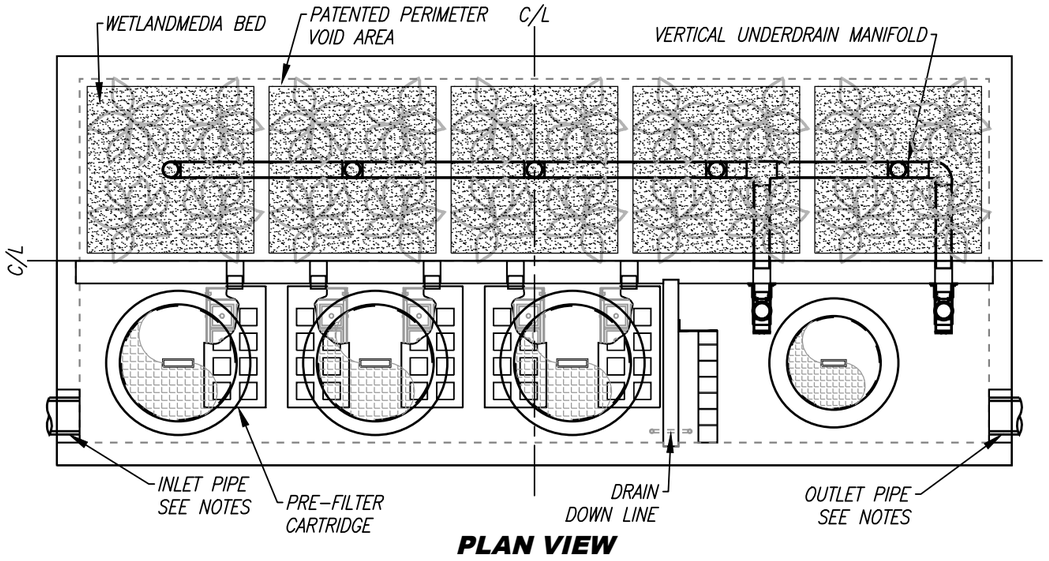
MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

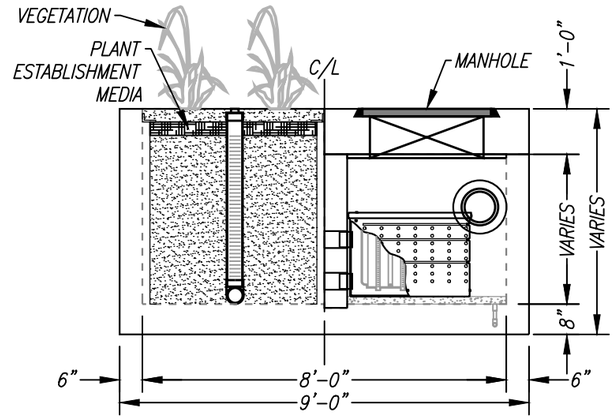
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			22
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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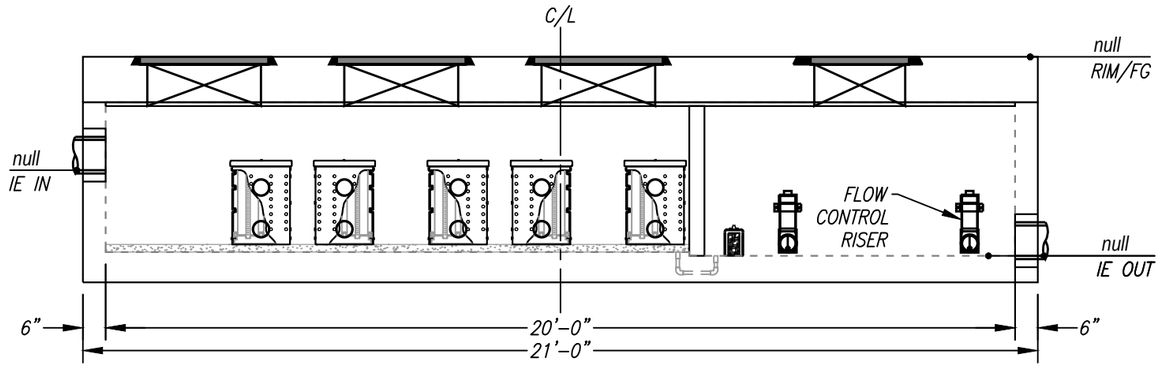
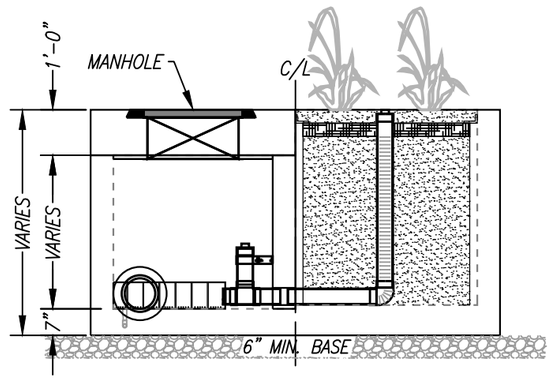


ELEVATION VIEW



RIGHT END VIEW

4 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 2.2 CFS

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

DMA D-4

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Bio Clean
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MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			10
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
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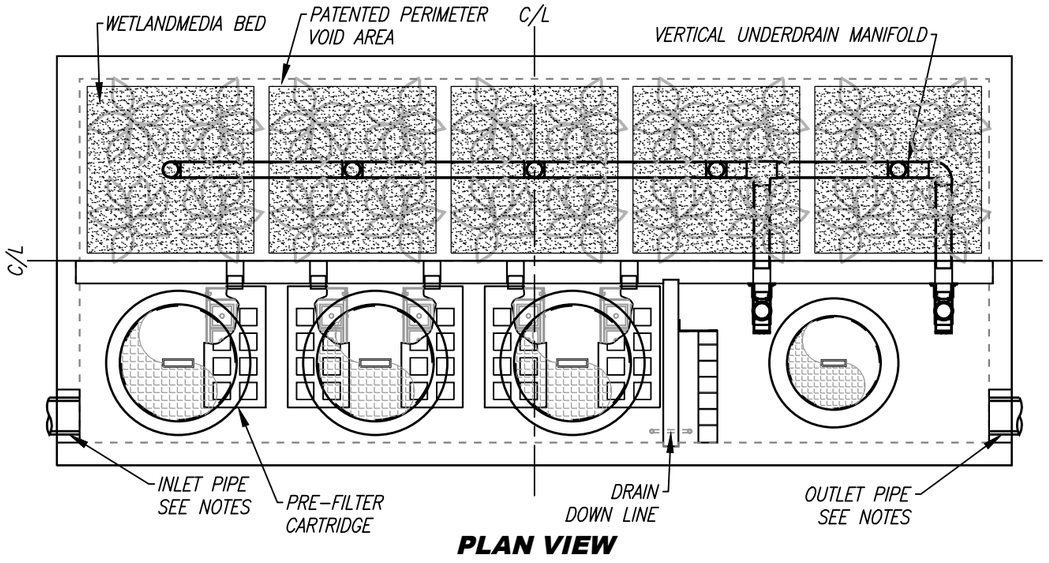
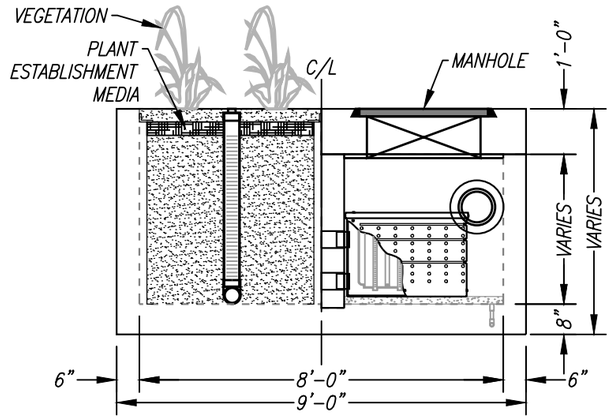


PLAN VIEW



LEFT END VIEW

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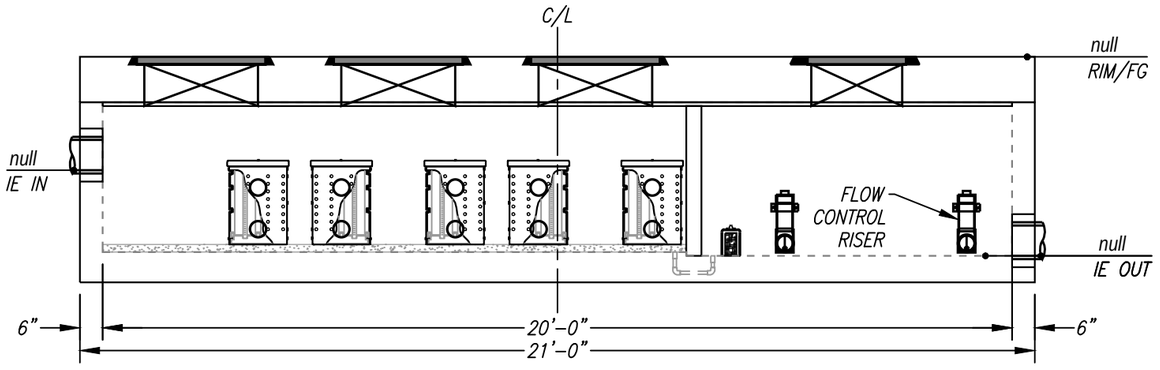
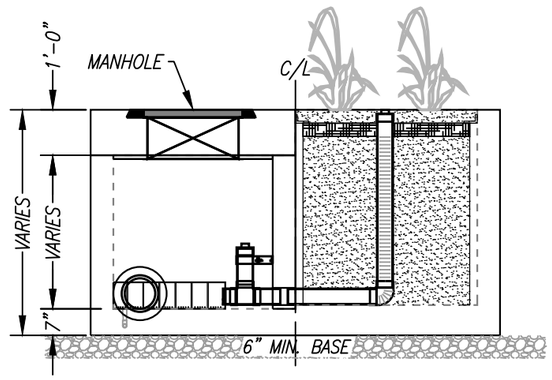


ELEVATION VIEW



RIGHT END VIEW

DMA D-6

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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Bio Clean
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MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEE

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution



OVERVIEW

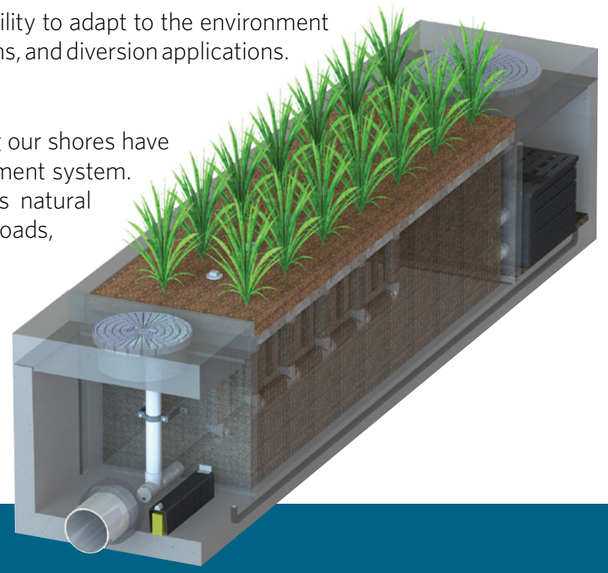
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

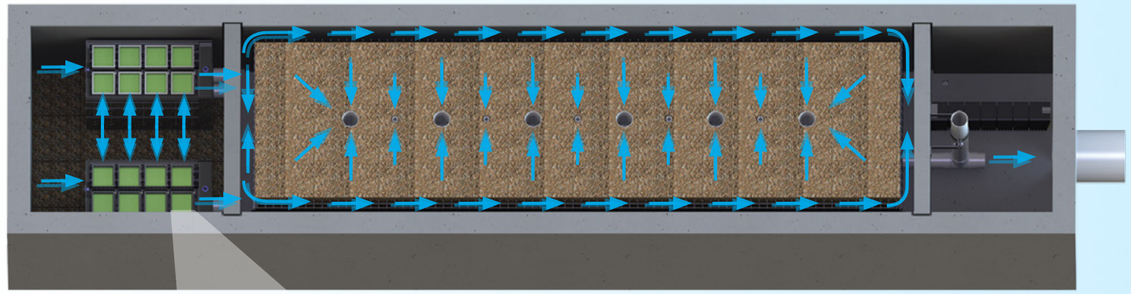


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



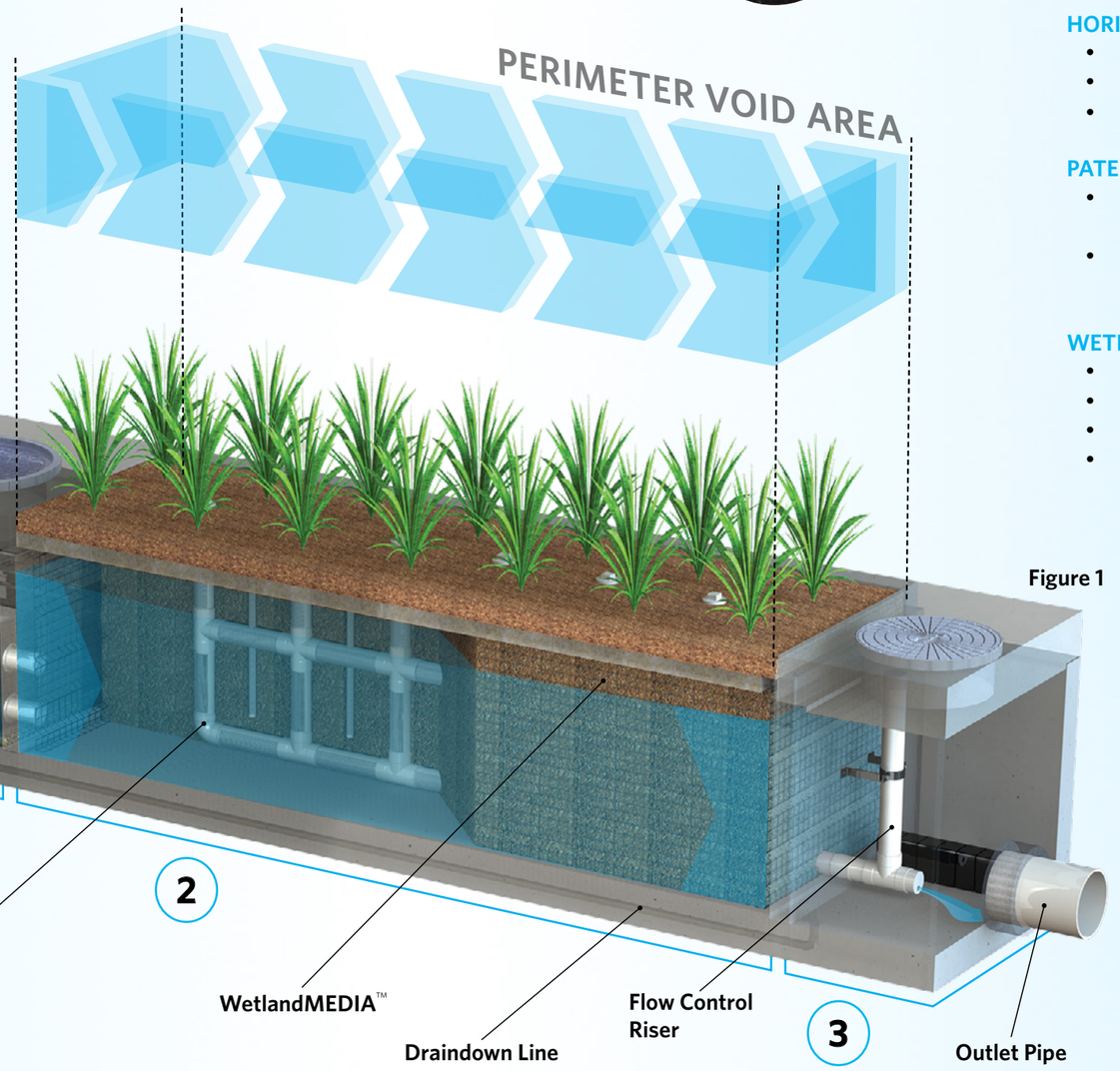


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

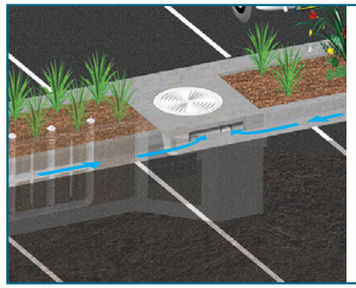
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





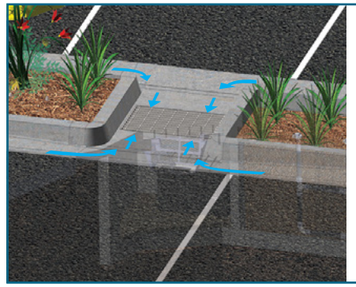
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



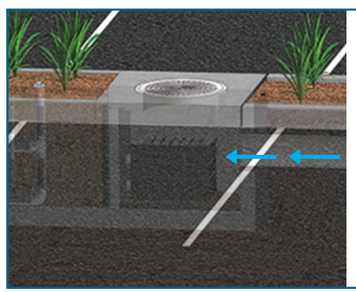
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

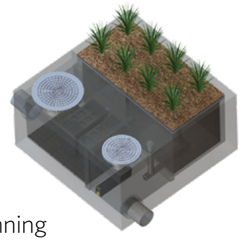


DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

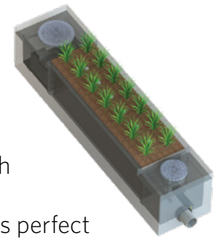
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

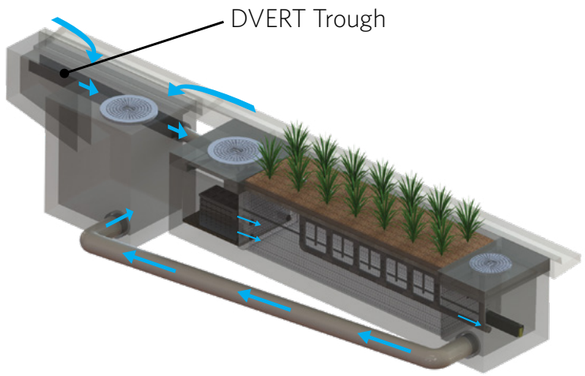
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



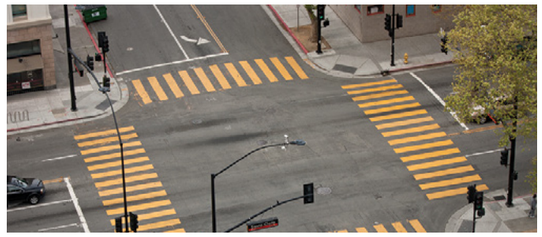
INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



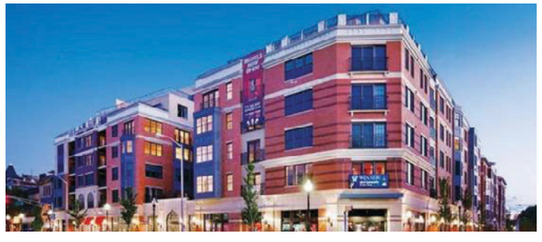
PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION



Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



Bio Clean
A Forterra Company

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/04/21 File: EX2YRD242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV - AREA D1 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
11-04-2021 EP

Drainage Area = 15.80(Ac.) = 0.025 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.80(Ac.) = 0.025 Sq. Mi.
Length along longest watercourse = 1174.00(Ft.)
Length along longest watercourse measured to centroid = 440.00(Ft.)
Length along longest watercourse = 0.222 Mi.
Length along longest watercourse measured to centroid = 0.083 Mi.
Difference in elevation = 34.80(Ft.)
Slope along watercourse = 156.5111 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.061 Hr.
Lag time = 3.63 Min.
25% of lag time = 0.91 Min.
40% of lag time = 1.45 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.80	2.40	37.92

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.80	6.20	97.96

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.800	87.60	0.000

Total Area Entered = 15.80(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

87.6	74.2	0.313	0.000	0.313	1.000	0.313
					Sum (F) =	0.313

Area averaged mean soil loss (F) (In/Hr) = 0.313
Minimum soil loss rate ((In/Hr)) = 0.156
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	137.615	26.988	4.297
2	0.167	275.230	55.201	8.790
3	0.250	412.845	13.359	2.127
4	0.333	550.460	3.222	0.513
5	0.417	688.075	0.961	0.153
6	0.500	825.690	0.269	0.043
			Sum = 100.000	Sum= 15.923

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.555)	0.017	0.002
2	0.17	0.07	0.019	(0.553)	0.017	0.002
3	0.25	0.07	0.019	(0.550)	0.017	0.002
4	0.33	0.10	0.029	(0.548)	0.026	0.003
5	0.42	0.10	0.029	(0.546)	0.026	0.003
6	0.50	0.10	0.029	(0.544)	0.026	0.003
7	0.58	0.10	0.029	(0.542)	0.026	0.003
8	0.67	0.10	0.029	(0.540)	0.026	0.003
9	0.75	0.10	0.029	(0.538)	0.026	0.003
10	0.83	0.13	0.038	(0.536)	0.035	0.004
11	0.92	0.13	0.038	(0.533)	0.035	0.004
12	1.00	0.13	0.038	(0.531)	0.035	0.004
13	1.08	0.10	0.029	(0.529)	0.026	0.003
14	1.17	0.10	0.029	(0.527)	0.026	0.003
15	1.25	0.10	0.029	(0.525)	0.026	0.003
16	1.33	0.10	0.029	(0.523)	0.026	0.003
17	1.42	0.10	0.029	(0.521)	0.026	0.003
18	1.50	0.10	0.029	(0.519)	0.026	0.003
19	1.58	0.10	0.029	(0.517)	0.026	0.003
20	1.67	0.10	0.029	(0.515)	0.026	0.003
21	1.75	0.10	0.029	(0.513)	0.026	0.003
22	1.83	0.13	0.038	(0.511)	0.035	0.004
23	1.92	0.13	0.038	(0.508)	0.035	0.004
24	2.00	0.13	0.038	(0.506)	0.035	0.004
25	2.08	0.13	0.038	(0.504)	0.035	0.004
26	2.17	0.13	0.038	(0.502)	0.035	0.004
27	2.25	0.13	0.038	(0.500)	0.035	0.004
28	2.33	0.13	0.038	(0.498)	0.035	0.004
29	2.42	0.13	0.038	(0.496)	0.035	0.004
30	2.50	0.13	0.038	(0.494)	0.035	0.004
31	2.58	0.17	0.048	(0.492)	0.043	0.005
32	2.67	0.17	0.048	(0.490)	0.043	0.005
33	2.75	0.17	0.048	(0.488)	0.043	0.005
34	2.83	0.17	0.048	(0.486)	0.043	0.005
35	2.92	0.17	0.048	(0.484)	0.043	0.005
36	3.00	0.17	0.048	(0.482)	0.043	0.005
37	3.08	0.17	0.048	(0.480)	0.043	0.005
38	3.17	0.17	0.048	(0.478)	0.043	0.005
39	3.25	0.17	0.048	(0.476)	0.043	0.005
40	3.33	0.17	0.048	(0.474)	0.043	0.005
41	3.42	0.17	0.048	(0.472)	0.043	0.005
42	3.50	0.17	0.048	(0.470)	0.043	0.005
43	3.58	0.17	0.048	(0.468)	0.043	0.005
44	3.67	0.17	0.048	(0.466)	0.043	0.005

45	3.75	0.17	0.048	(0.464)	0.043	0.005
46	3.83	0.20	0.058	(0.462)	0.052	0.006
47	3.92	0.20	0.058	(0.460)	0.052	0.006
48	4.00	0.20	0.058	(0.458)	0.052	0.006
49	4.08	0.20	0.058	(0.457)	0.052	0.006
50	4.17	0.20	0.058	(0.455)	0.052	0.006
51	4.25	0.20	0.058	(0.453)	0.052	0.006
52	4.33	0.23	0.067	(0.451)	0.060	0.007
53	4.42	0.23	0.067	(0.449)	0.060	0.007
54	4.50	0.23	0.067	(0.447)	0.060	0.007
55	4.58	0.23	0.067	(0.445)	0.060	0.007
56	4.67	0.23	0.067	(0.443)	0.060	0.007
57	4.75	0.23	0.067	(0.441)	0.060	0.007
58	4.83	0.27	0.077	(0.439)	0.069	0.008
59	4.92	0.27	0.077	(0.437)	0.069	0.008
60	5.00	0.27	0.077	(0.435)	0.069	0.008
61	5.08	0.20	0.058	(0.434)	0.052	0.006
62	5.17	0.20	0.058	(0.432)	0.052	0.006
63	5.25	0.20	0.058	(0.430)	0.052	0.006
64	5.33	0.23	0.067	(0.428)	0.060	0.007
65	5.42	0.23	0.067	(0.426)	0.060	0.007
66	5.50	0.23	0.067	(0.424)	0.060	0.007
67	5.58	0.27	0.077	(0.422)	0.069	0.008
68	5.67	0.27	0.077	(0.420)	0.069	0.008
69	5.75	0.27	0.077	(0.419)	0.069	0.008
70	5.83	0.27	0.077	(0.417)	0.069	0.008
71	5.92	0.27	0.077	(0.415)	0.069	0.008
72	6.00	0.27	0.077	(0.413)	0.069	0.008
73	6.08	0.30	0.086	(0.411)	0.078	0.009
74	6.17	0.30	0.086	(0.409)	0.078	0.009
75	6.25	0.30	0.086	(0.408)	0.078	0.009
76	6.33	0.30	0.086	(0.406)	0.078	0.009
77	6.42	0.30	0.086	(0.404)	0.078	0.009
78	6.50	0.30	0.086	(0.402)	0.078	0.009
79	6.58	0.33	0.096	(0.400)	0.086	0.010
80	6.67	0.33	0.096	(0.398)	0.086	0.010
81	6.75	0.33	0.096	(0.397)	0.086	0.010
82	6.83	0.33	0.096	(0.395)	0.086	0.010
83	6.92	0.33	0.096	(0.393)	0.086	0.010
84	7.00	0.33	0.096	(0.391)	0.086	0.010
85	7.08	0.33	0.096	(0.390)	0.086	0.010
86	7.17	0.33	0.096	(0.388)	0.086	0.010
87	7.25	0.33	0.096	(0.386)	0.086	0.010
88	7.33	0.37	0.106	(0.384)	0.095	0.011
89	7.42	0.37	0.106	(0.382)	0.095	0.011
90	7.50	0.37	0.106	(0.381)	0.095	0.011
91	7.58	0.40	0.115	(0.379)	0.104	0.012
92	7.67	0.40	0.115	(0.377)	0.104	0.012
93	7.75	0.40	0.115	(0.376)	0.104	0.012
94	7.83	0.43	0.125	(0.374)	0.112	0.012
95	7.92	0.43	0.125	(0.372)	0.112	0.012
96	8.00	0.43	0.125	(0.370)	0.112	0.012
97	8.08	0.50	0.144	(0.369)	0.130	0.014
98	8.17	0.50	0.144	(0.367)	0.130	0.014
99	8.25	0.50	0.144	(0.365)	0.130	0.014
100	8.33	0.50	0.144	(0.363)	0.130	0.014
101	8.42	0.50	0.144	(0.362)	0.130	0.014
102	8.50	0.50	0.144	(0.360)	0.130	0.014
103	8.58	0.53	0.154	(0.358)	0.138	0.015
104	8.67	0.53	0.154	(0.357)	0.138	0.015
105	8.75	0.53	0.154	(0.355)	0.138	0.015
106	8.83	0.57	0.163	(0.353)	0.147	0.016
107	8.92	0.57	0.163	(0.352)	0.147	0.016
108	9.00	0.57	0.163	(0.350)	0.147	0.016
109	9.08	0.63	0.182	(0.348)	0.164	0.018
110	9.17	0.63	0.182	(0.347)	0.164	0.018
111	9.25	0.63	0.182	(0.345)	0.164	0.018
112	9.33	0.67	0.192	(0.343)	0.173	0.019
113	9.42	0.67	0.192	(0.342)	0.173	0.019
114	9.50	0.67	0.192	(0.340)	0.173	0.019
115	9.58	0.70	0.202	(0.339)	0.181	0.020
116	9.67	0.70	0.202	(0.337)	0.181	0.020
117	9.75	0.70	0.202	(0.335)	0.181	0.020
118	9.83	0.73	0.211	(0.334)	0.190	0.021
119	9.92	0.73	0.211	(0.332)	0.190	0.021

120	10.00	0.73	0.211	(	0.330)	0.190	0.021
121	10.08	0.50	0.144	(	0.329)	0.130	0.014
122	10.17	0.50	0.144	(	0.327)	0.130	0.014
123	10.25	0.50	0.144	(	0.326)	0.130	0.014
124	10.33	0.50	0.144	(	0.324)	0.130	0.014
125	10.42	0.50	0.144	(	0.322)	0.130	0.014
126	10.50	0.50	0.144	(	0.321)	0.130	0.014
127	10.58	0.67	0.192	(	0.319)	0.173	0.019
128	10.67	0.67	0.192	(	0.318)	0.173	0.019
129	10.75	0.67	0.192	(	0.316)	0.173	0.019
130	10.83	0.67	0.192	(	0.315)	0.173	0.019
131	10.92	0.67	0.192	(	0.313)	0.173	0.019
132	11.00	0.67	0.192	(	0.312)	0.173	0.019
133	11.08	0.63	0.182	(	0.310)	0.164	0.018
134	11.17	0.63	0.182	(	0.309)	0.164	0.018
135	11.25	0.63	0.182	(	0.307)	0.164	0.018
136	11.33	0.63	0.182	(	0.306)	0.164	0.018
137	11.42	0.63	0.182	(	0.304)	0.164	0.018
138	11.50	0.63	0.182	(	0.302)	0.164	0.018
139	11.58	0.57	0.163	(	0.301)	0.147	0.016
140	11.67	0.57	0.163	(	0.299)	0.147	0.016
141	11.75	0.57	0.163	(	0.298)	0.147	0.016
142	11.83	0.60	0.173	(	0.297)	0.156	0.017
143	11.92	0.60	0.173	(	0.295)	0.156	0.017
144	12.00	0.60	0.173	(	0.294)	0.156	0.017
145	12.08	0.83	0.240	(	0.292)	0.216	0.024
146	12.17	0.83	0.240	(	0.291)	0.216	0.024
147	12.25	0.83	0.240	(	0.289)	0.216	0.024
148	12.33	0.87	0.250	(	0.288)	0.225	0.025
149	12.42	0.87	0.250	(	0.286)	0.225	0.025
150	12.50	0.87	0.250	(	0.285)	0.225	0.025
151	12.58	0.93	0.269	(	0.283)	0.242	0.027
152	12.67	0.93	0.269	(	0.282)	0.242	0.027
153	12.75	0.93	0.269	(	0.281)	0.242	0.027
154	12.83	0.97	0.278	(	0.279)	0.251	0.028
155	12.92	0.97	0.278	(	0.278)	0.251	0.028
156	13.00	0.97	0.278	(	0.276)	0.251	0.028
157	13.08	1.13	0.326		0.275	(0.294)	0.051
158	13.17	1.13	0.326		0.274	(0.294)	0.053
159	13.25	1.13	0.326		0.272	(0.294)	0.054
160	13.33	1.13	0.326		0.271	(0.294)	0.056
161	13.42	1.13	0.326		0.269	(0.294)	0.057
162	13.50	1.13	0.326		0.268	(0.294)	0.058
163	13.58	0.77	0.221	(	0.267)	0.199	0.022
164	13.67	0.77	0.221	(	0.265)	0.199	0.022
165	13.75	0.77	0.221	(	0.264)	0.199	0.022
166	13.83	0.77	0.221	(	0.263)	0.199	0.022
167	13.92	0.77	0.221	(	0.261)	0.199	0.022
168	14.00	0.77	0.221	(	0.260)	0.199	0.022
169	14.08	0.90	0.259	(	0.259)	0.233	0.026
170	14.17	0.90	0.259	(	0.257)	0.233	0.026
171	14.25	0.90	0.259	(	0.256)	0.233	0.026
172	14.33	0.87	0.250	(	0.255)	0.225	0.025
173	14.42	0.87	0.250	(	0.253)	0.225	0.025
174	14.50	0.87	0.250	(	0.252)	0.225	0.025
175	14.58	0.87	0.250	(	0.251)	0.225	0.025
176	14.67	0.87	0.250	(	0.249)	0.225	0.025
177	14.75	0.87	0.250	(	0.248)	0.225	0.025
178	14.83	0.83	0.240	(	0.247)	0.216	0.024
179	14.92	0.83	0.240	(	0.246)	0.216	0.024
180	15.00	0.83	0.240	(	0.244)	0.216	0.024
181	15.08	0.80	0.230	(	0.243)	0.207	0.023
182	15.17	0.80	0.230	(	0.242)	0.207	0.023
183	15.25	0.80	0.230	(	0.241)	0.207	0.023
184	15.33	0.77	0.221	(	0.239)	0.199	0.022
185	15.42	0.77	0.221	(	0.238)	0.199	0.022
186	15.50	0.77	0.221	(	0.237)	0.199	0.022
187	15.58	0.63	0.182	(	0.236)	0.164	0.018
188	15.67	0.63	0.182	(	0.235)	0.164	0.018
189	15.75	0.63	0.182	(	0.233)	0.164	0.018
190	15.83	0.63	0.182	(	0.232)	0.164	0.018
191	15.92	0.63	0.182	(	0.231)	0.164	0.018
192	16.00	0.63	0.182	(	0.230)	0.164	0.018
193	16.08	0.13	0.038	(	0.229)	0.035	0.004
194	16.17	0.13	0.038	(	0.227)	0.035	0.004

195	16.25	0.13	0.038	(0.226)	0.035	0.004
196	16.33	0.13	0.038	(0.225)	0.035	0.004
197	16.42	0.13	0.038	(0.224)	0.035	0.004
198	16.50	0.13	0.038	(0.223)	0.035	0.004
199	16.58	0.10	0.029	(0.222)	0.026	0.003
200	16.67	0.10	0.029	(0.221)	0.026	0.003
201	16.75	0.10	0.029	(0.219)	0.026	0.003
202	16.83	0.10	0.029	(0.218)	0.026	0.003
203	16.92	0.10	0.029	(0.217)	0.026	0.003
204	17.00	0.10	0.029	(0.216)	0.026	0.003
205	17.08	0.17	0.048	(0.215)	0.043	0.005
206	17.17	0.17	0.048	(0.214)	0.043	0.005
207	17.25	0.17	0.048	(0.213)	0.043	0.005
208	17.33	0.17	0.048	(0.212)	0.043	0.005
209	17.42	0.17	0.048	(0.211)	0.043	0.005
210	17.50	0.17	0.048	(0.210)	0.043	0.005
211	17.58	0.17	0.048	(0.209)	0.043	0.005
212	17.67	0.17	0.048	(0.208)	0.043	0.005
213	17.75	0.17	0.048	(0.207)	0.043	0.005
214	17.83	0.13	0.038	(0.206)	0.035	0.004
215	17.92	0.13	0.038	(0.205)	0.035	0.004
216	18.00	0.13	0.038	(0.204)	0.035	0.004
217	18.08	0.13	0.038	(0.203)	0.035	0.004
218	18.17	0.13	0.038	(0.202)	0.035	0.004
219	18.25	0.13	0.038	(0.201)	0.035	0.004
220	18.33	0.13	0.038	(0.200)	0.035	0.004
221	18.42	0.13	0.038	(0.199)	0.035	0.004
222	18.50	0.13	0.038	(0.198)	0.035	0.004
223	18.58	0.10	0.029	(0.197)	0.026	0.003
224	18.67	0.10	0.029	(0.196)	0.026	0.003
225	18.75	0.10	0.029	(0.195)	0.026	0.003
226	18.83	0.07	0.019	(0.194)	0.017	0.002
227	18.92	0.07	0.019	(0.193)	0.017	0.002
228	19.00	0.07	0.019	(0.192)	0.017	0.002
229	19.08	0.10	0.029	(0.191)	0.026	0.003
230	19.17	0.10	0.029	(0.190)	0.026	0.003
231	19.25	0.10	0.029	(0.189)	0.026	0.003
232	19.33	0.13	0.038	(0.188)	0.035	0.004
233	19.42	0.13	0.038	(0.188)	0.035	0.004
234	19.50	0.13	0.038	(0.187)	0.035	0.004
235	19.58	0.10	0.029	(0.186)	0.026	0.003
236	19.67	0.10	0.029	(0.185)	0.026	0.003
237	19.75	0.10	0.029	(0.184)	0.026	0.003
238	19.83	0.07	0.019	(0.183)	0.017	0.002
239	19.92	0.07	0.019	(0.183)	0.017	0.002
240	20.00	0.07	0.019	(0.182)	0.017	0.002
241	20.08	0.10	0.029	(0.181)	0.026	0.003
242	20.17	0.10	0.029	(0.180)	0.026	0.003
243	20.25	0.10	0.029	(0.179)	0.026	0.003
244	20.33	0.10	0.029	(0.179)	0.026	0.003
245	20.42	0.10	0.029	(0.178)	0.026	0.003
246	20.50	0.10	0.029	(0.177)	0.026	0.003
247	20.58	0.10	0.029	(0.176)	0.026	0.003
248	20.67	0.10	0.029	(0.176)	0.026	0.003
249	20.75	0.10	0.029	(0.175)	0.026	0.003
250	20.83	0.07	0.019	(0.174)	0.017	0.002
251	20.92	0.07	0.019	(0.173)	0.017	0.002
252	21.00	0.07	0.019	(0.173)	0.017	0.002
253	21.08	0.10	0.029	(0.172)	0.026	0.003
254	21.17	0.10	0.029	(0.171)	0.026	0.003
255	21.25	0.10	0.029	(0.171)	0.026	0.003
256	21.33	0.07	0.019	(0.170)	0.017	0.002
257	21.42	0.07	0.019	(0.169)	0.017	0.002
258	21.50	0.07	0.019	(0.169)	0.017	0.002
259	21.58	0.10	0.029	(0.168)	0.026	0.003
260	21.67	0.10	0.029	(0.168)	0.026	0.003
261	21.75	0.10	0.029	(0.167)	0.026	0.003
262	21.83	0.07	0.019	(0.166)	0.017	0.002
263	21.92	0.07	0.019	(0.166)	0.017	0.002
264	22.00	0.07	0.019	(0.165)	0.017	0.002
265	22.08	0.10	0.029	(0.165)	0.026	0.003
266	22.17	0.10	0.029	(0.164)	0.026	0.003
267	22.25	0.10	0.029	(0.164)	0.026	0.003
268	22.33	0.07	0.019	(0.163)	0.017	0.002
269	22.42	0.07	0.019	(0.163)	0.017	0.002

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270  22.50     0.07      0.019       (  0.162)       0.017        0.002
271  22.58     0.07      0.019       (  0.162)       0.017        0.002
272  22.67     0.07      0.019       (  0.161)       0.017        0.002
273  22.75     0.07      0.019       (  0.161)       0.017        0.002
274  22.83     0.07      0.019       (  0.160)       0.017        0.002
275  22.92     0.07      0.019       (  0.160)       0.017        0.002
276  23.00     0.07      0.019       (  0.160)       0.017        0.002
277  23.08     0.07      0.019       (  0.159)       0.017        0.002
278  23.17     0.07      0.019       (  0.159)       0.017        0.002
279  23.25     0.07      0.019       (  0.158)       0.017        0.002
280  23.33     0.07      0.019       (  0.158)       0.017        0.002
281  23.42     0.07      0.019       (  0.158)       0.017        0.002
282  23.50     0.07      0.019       (  0.158)       0.017        0.002
283  23.58     0.07      0.019       (  0.157)       0.017        0.002
284  23.67     0.07      0.019       (  0.157)       0.017        0.002
285  23.75     0.07      0.019       (  0.157)       0.017        0.002
286  23.83     0.07      0.019       (  0.157)       0.017        0.002
287  23.92     0.07      0.019       (  0.157)       0.017        0.002
288  24.00     0.07      0.019       (  0.156)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area      15.8(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      2.15(In)
      Total soil loss =     2.829(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       14403.8 Cubic Feet
      Total soil loss =      123241.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.909(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q          |         |         |         |
   0+10       0.0002      0.03  Q          |         |         |         |
   0+15       0.0004      0.03  Q          |         |         |         |
   0+20       0.0007      0.03  Q          |         |         |         |
   0+25       0.0010      0.04  Q          |         |         |         |
   0+30       0.0013      0.05  Q          |         |         |         |
   0+35       0.0016      0.05  Q          |         |         |         |
   0+40       0.0019      0.05  Q          |         |         |         |
   0+45       0.0022      0.05  Q          |         |         |         |
   0+50       0.0026      0.05  Q          |         |         |         |
   0+55       0.0030      0.06  Q          |         |         |         |
   1+ 0       0.0034      0.06  Q          |         |         |         |
   1+ 5       0.0038      0.06  Q          |         |         |         |
   1+10       0.0041      0.05  Q          |         |         |         |
   1+15       0.0044      0.05  Q          |         |         |         |
   1+20       0.0047      0.05  Q          |         |         |         |
   1+25       0.0051      0.05  Q          |         |         |         |
   1+30       0.0054      0.05  Q          |         |         |         |
   1+35       0.0057      0.05  Q          |         |         |         |
   1+40       0.0060      0.05  Q          |         |         |         |
   1+45       0.0063      0.05  Q          |         |         |         |
   1+50       0.0067      0.05  Q          |         |         |         |
   1+55       0.0071      0.06  Q          |         |         |         |
   2+ 0       0.0075      0.06  Q          |         |         |         |
   2+ 5       0.0079      0.06  Q          |         |         |         |
   2+10       0.0083      0.06  QV         |         |         |         |
   2+15       0.0088      0.06  QV         |         |         |         |
   2+20       0.0092      0.06  QV         |         |         |         |
   2+25       0.0096      0.06  QV         |         |         |         |
   2+30       0.0100      0.06  QV         |         |         |         |
   2+35       0.0105      0.07  QV         |         |         |         |
   2+40       0.0110      0.07  QV         |         |         |         |
   2+45       0.0115      0.08  QV         |         |         |         |
   2+50       0.0120      0.08  QV         |         |         |         |
   2+55       0.0126      0.08  QV         |         |         |         |
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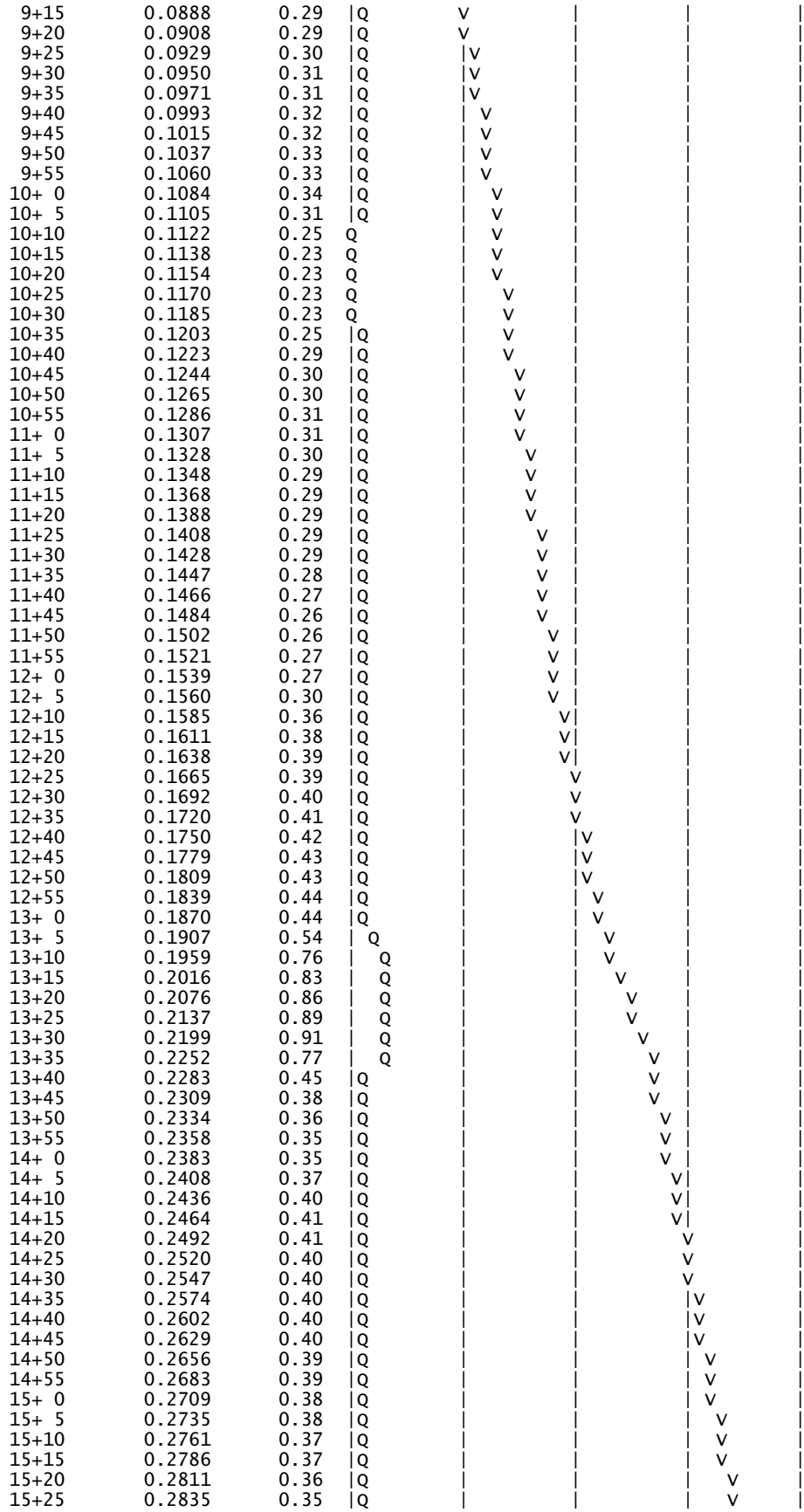
3+ 0       0.0131      0.08  QV        |         |         |         |
3+ 5       0.0136      0.08  QV        |         |         |         |
3+10       0.0141      0.08  QV        |         |         |         |
3+15       0.0147      0.08  QV        |         |         |         |
3+20       0.0152      0.08  QV        |         |         |         |
3+25       0.0157      0.08  QV        |         |         |         |
3+30       0.0162      0.08  QV        |         |         |         |
3+35       0.0168      0.08  Q V       |         |         |         |
3+40       0.0173      0.08  Q V       |         |         |         |
3+45       0.0178      0.08  Q V       |         |         |         |
3+50       0.0184      0.08  Q V       |         |         |         |
3+55       0.0190      0.09  Q V       |         |         |         |
4+ 0       0.0196      0.09  Q V       |         |         |         |
4+ 5       0.0202      0.09  Q V       |         |         |         |
4+10       0.0209      0.09  Q V       |         |         |         |
4+15       0.0215      0.09  Q V       |         |         |         |
4+20       0.0222      0.10  Q V       |         |         |         |
4+25       0.0229      0.10  Q V       |         |         |         |
4+30       0.0236      0.11  Q V       |         |         |         |
4+35       0.0244      0.11  Q V       |         |         |         |
4+40       0.0251      0.11  Q  V      |         |         |         |
4+45       0.0258      0.11  Q  V      |         |         |         |
4+50       0.0266      0.11  Q  V      |         |         |         |
4+55       0.0274      0.12  Q  V      |         |         |         |
5+ 0       0.0283      0.12  Q  V      |         |         |         |
5+ 5       0.0290      0.11  Q  V      |         |         |         |
5+10       0.0297      0.10  Q  V      |         |         |         |
5+15       0.0304      0.09  Q  V      |         |         |         |
5+20       0.0310      0.10  Q  V      |         |         |         |
5+25       0.0317      0.10  Q  V      |         |         |         |
5+30       0.0325      0.11  Q  V      |         |         |         |
5+35       0.0332      0.11  Q   V     |         |         |         |
5+40       0.0341      0.12  Q   V     |         |         |         |
5+45       0.0349      0.12  Q   V     |         |         |         |
5+50       0.0357      0.12  Q   V     |         |         |         |
5+55       0.0366      0.12  Q   V     |         |         |         |
6+ 0       0.0374      0.12  Q   V     |         |         |         |
6+ 5       0.0383      0.13  Q   V     |         |         |         |
6+10       0.0392      0.13  Q   V     |         |         |         |
6+15       0.0402      0.14  Q   V     |         |         |         |
6+20       0.0411      0.14  Q   V     |         |         |         |
6+25       0.0421      0.14  Q    V    |         |         |         |
6+30       0.0430      0.14  Q    V    |         |         |         |
6+35       0.0440      0.14  Q    V    |         |         |         |
6+40       0.0450      0.15  Q    V    |         |         |         |
6+45       0.0461      0.15  Q    V    |         |         |         |
6+50       0.0471      0.15  Q    V    |         |         |         |
6+55       0.0482      0.15  Q    V    |         |         |         |
7+ 0       0.0492      0.15  Q    V    |         |         |         |
7+ 5       0.0503      0.15  Q     V   |         |         |         |
7+10       0.0513      0.15  Q     V   |         |         |         |
7+15       0.0524      0.15  Q     V   |         |         |         |
7+20       0.0535      0.16  Q     V   |         |         |         |
7+25       0.0546      0.17  Q     V   |         |         |         |
7+30       0.0558      0.17  Q     V   |         |         |         |
7+35       0.0569      0.17  Q     V   |         |         |         |
7+40       0.0582      0.18  Q      V  |         |         |         |
7+45       0.0594      0.18  Q      V  |         |         |         |
7+50       0.0607      0.19  Q      V  |         |         |         |
7+55       0.0621      0.20  Q      V  |         |         |         |
8+ 0       0.0635      0.20  Q      V  |         |         |         |
8+ 5       0.0649      0.21  Q      V  |         |         |         |
8+10       0.0664      0.22  Q       V |         |         |         |
8+15       0.0680      0.23  Q       V |         |         |         |
8+20       0.0696      0.23  Q       V |         |         |         |
8+25       0.0711      0.23  Q       V |         |         |         |
8+30       0.0727      0.23  Q       V |         |         |         |
8+35       0.0743      0.23  Q       V |         |         |         |
8+40       0.0760      0.24  Q        V|         |         |         |
8+45       0.0777      0.24  Q        V|         |         |         |
8+50       0.0794      0.25  Q        V|         |         |         |
8+55       0.0812      0.26  |Q       V|         |         |         |
9+ 0       0.0830      0.26  |Q        V         |         |         |
9+ 5       0.0848      0.27  |Q        V         |         |         |
9+10       0.0868      0.29  |Q        V         |         |         |
```



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15+30       0.2860      0.35  |Q        |         |         |   V     |
15+35       0.2883      0.34  |Q        |         |         |   V     |
15+40       0.2904      0.30  |Q        |         |         |    V    |
15+45       0.2924      0.29  |Q        |         |         |    V    |
15+50       0.2944      0.29  |Q        |         |         |    V    |
15+55       0.2964      0.29  |Q        |         |         |    V    |
16+ 0       0.2984      0.29  |Q        |         |         |     V   |
16+ 5       0.3000      0.23  Q         |         |         |     V   |
16+10       0.3007      0.10  Q         |         |         |     V   |
16+15       0.3012      0.07  Q         |         |         |     V   |
16+20       0.3016      0.06  Q         |         |         |     V   |
16+25       0.3020      0.06  Q         |         |         |     V   |
16+30       0.3025      0.06  Q         |         |         |     V   |
16+35       0.3028      0.06  Q         |         |         |     V   |
16+40       0.3032      0.05  Q         |         |         |     V   |
16+45       0.3035      0.05  Q         |         |         |     V   |
16+50       0.3038      0.05  Q         |         |         |     V   |
16+55       0.3041      0.05  Q         |         |         |     V   |
17+ 0       0.3044      0.05  Q         |         |         |     V   |
17+ 5       0.3048      0.05  Q         |         |         |     V   |
17+10       0.3053      0.07  Q         |         |         |     V   |
17+15       0.3058      0.08  Q         |         |         |     V   |
17+20       0.3064      0.08  Q         |         |         |      V  |
17+25       0.3069      0.08  Q         |         |         |      V  |
17+30       0.3074      0.08  Q         |         |         |      V  |
17+35       0.3079      0.08  Q         |         |         |      V  |
17+40       0.3085      0.08  Q         |         |         |      V  |
17+45       0.3090      0.08  Q         |         |         |      V  |
17+50       0.3095      0.07  Q         |         |         |      V  |
17+55       0.3099      0.06  Q         |         |         |      V  |
18+ 0       0.3103      0.06  Q         |         |         |      V  |
18+ 5       0.3108      0.06  Q         |         |         |      V  |
18+10       0.3112      0.06  Q         |         |         |      V  |
18+15       0.3116      0.06  Q         |         |         |      V  |
18+20       0.3120      0.06  Q         |         |         |      V  |
18+25       0.3125      0.06  Q         |         |         |      V  |
18+30       0.3129      0.06  Q         |         |         |      V  |
18+35       0.3133      0.06  Q         |         |         |      V  |
18+40       0.3136      0.05  Q         |         |         |      V  |
18+45       0.3139      0.05  Q         |         |         |      V  |
18+50       0.3142      0.04  Q         |         |         |       V |
18+55       0.3144      0.03  Q         |         |         |       V |
19+ 0       0.3147      0.03  Q         |         |         |       V |
19+ 5       0.3149      0.03  Q         |         |         |       V |
19+10       0.3152      0.04  Q         |         |         |       V |
19+15       0.3155      0.05  Q         |         |         |       V |
19+20       0.3159      0.05  Q         |         |         |       V |
19+25       0.3163      0.06  Q         |         |         |       V |
19+30       0.3167      0.06  Q         |         |         |       V |
19+35       0.3171      0.06  Q         |         |         |       V |
19+40       0.3174      0.05  Q         |         |         |       V |
19+45       0.3177      0.05  Q         |         |         |       V |
19+50       0.3180      0.04  Q         |         |         |       V |
19+55       0.3182      0.03  Q         |         |         |       V |
20+ 0       0.3185      0.03  Q         |         |         |       V |
20+ 5       0.3187      0.03  Q         |         |         |       V |
20+10       0.3190      0.04  Q         |         |         |       V |
20+15       0.3193      0.05  Q         |         |         |       V |
20+20       0.3196      0.05  Q         |         |         |       V |
20+25       0.3199      0.05  Q         |         |         |       V |
20+30       0.3202      0.05  Q         |         |         |       V |
20+35       0.3206      0.05  Q         |         |         |       V |
20+40       0.3209      0.05  Q         |         |         |       V |
20+45       0.3212      0.05  Q         |         |         |       V |
20+50       0.3215      0.04  Q         |         |         |       V |
20+55       0.3217      0.03  Q         |         |         |       V |
21+ 0       0.3219      0.03  Q         |         |         |       V |
21+ 5       0.3222      0.03  Q         |         |         |       V |
21+10       0.3225      0.04  Q         |         |         |        V|
21+15       0.3228      0.05  Q         |         |         |        V|
21+20       0.3231      0.04  Q         |         |         |        V|
21+25       0.3233      0.03  Q         |         |         |        V|
21+30       0.3235      0.03  Q         |         |         |        V|
21+35       0.3237      0.03  Q         |         |         |        V|
21+40       0.3240      0.04  Q         |         |         |        V|
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21+45	0.3244	0.05	Q	|	|	|	V|
21+50	0.3246	0.04	Q	|	|	|	V|
21+55	0.3249	0.03	Q	|	|	|	V|
22+ 0	0.3251	0.03	Q	|	|	|	V|
22+ 5	0.3253	0.03	Q	|	|	|	V|
22+10	0.3256	0.04	Q	|	|	|	V|
22+15	0.3259	0.05	Q	|	|	|	V|
22+20	0.3262	0.04	Q	|	|	|	V|
22+25	0.3265	0.03	Q	|	|	|	V|
22+30	0.3267	0.03	Q	|	|	|	V|
22+35	0.3269	0.03	Q	|	|	|	V|
22+40	0.3271	0.03	Q	|	|	|	V|
22+45	0.3273	0.03	Q	|	|	|	V|
22+50	0.3275	0.03	Q	|	|	|	V|
22+55	0.3277	0.03	Q	|	|	|	V|
23+ 0	0.3279	0.03	Q	|	|	|	V|
23+ 5	0.3281	0.03	Q	|	|	|	V|
23+10	0.3284	0.03	Q	|	|	|	V|
23+15	0.3286	0.03	Q	|	|	|	V|
23+20	0.3288	0.03	Q	|	|	|	V|
23+25	0.3290	0.03	Q	|	|	|	V|
23+30	0.3292	0.03	Q	|	|	|	V|
23+35	0.3294	0.03	Q	|	|	|	V|
23+40	0.3296	0.03	Q	|	|	|	V|
23+45	0.3298	0.03	Q	|	|	|	V|
23+50	0.3300	0.03	Q	|	|	|	V|
23+55	0.3303	0.03	Q	|	|	|	V|
24+ 0	0.3305	0.03	Q	|	|	|	V|
24+ 5	0.3306	0.02	Q	|	|	|	V|
24+10	0.3307	0.01	Q	|	|	|	V|
24+15	0.3307	0.00	Q	|	|	|	V|
24+20	0.3307	0.00	Q	|	|	|	V|
24+25	0.3307	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/04/21 File: EX2YRD2242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV - AREA D2 EXISTING CONDITION
2-YEAR STORM EVENT
21-0034
11-04-2021 EP

Drainage Area = 16.90(Ac.) = 0.026 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 16.90(Ac.) = 0.026 Sq. Mi.
Length along longest watercourse = 1828.00(Ft.)
Length along longest watercourse measured to centroid = 757.00(Ft.)
Length along longest watercourse = 0.346 Mi.
Length along longest watercourse measured to centroid = 0.143 Mi.
Difference in elevation = 12.60(Ft.)
Slope along watercourse = 36.3939 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.116 Hr.
Lag time = 6.97 Min.
25% of lag time = 1.74 Min.
40% of lag time = 2.79 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.90	2.40	40.56

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.90	6.20	104.78

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
16.900	89.30	0.000

Total Area Entered = 16.90(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

89.3	76.9	0.281	0.000	0.281	1.000	0.281
					Sum (F) =	0.281

Area averaged mean soil loss (F) (In/Hr) = 0.281
Minimum soil loss rate ((In/Hr)) = 0.140
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	71.726	7.458	1.270
2	0.167	143.452	42.488	7.237
3	0.250	215.178	28.206	4.804
4	0.333	286.904	10.712	1.825
5	0.417	358.630	5.843	0.995
6	0.500	430.355	2.913	0.496
7	0.583	502.081	1.036	0.176
8	0.667	573.807	0.579	0.099
9	0.750	645.533	0.484	0.082
10	0.833	717.259	0.280	0.048
			Sum = 100.000	Sum= 17.032

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.498)	0.017	0.002
2	0.17	0.07	0.019	(0.496)	0.017	0.002
3	0.25	0.07	0.019	(0.494)	0.017	0.002
4	0.33	0.10	0.029	(0.492)	0.026	0.003
5	0.42	0.10	0.029	(0.490)	0.026	0.003
6	0.50	0.10	0.029	(0.488)	0.026	0.003
7	0.58	0.10	0.029	(0.486)	0.026	0.003
8	0.67	0.10	0.029	(0.484)	0.026	0.003
9	0.75	0.10	0.029	(0.483)	0.026	0.003
10	0.83	0.13	0.038	(0.481)	0.035	0.004
11	0.92	0.13	0.038	(0.479)	0.035	0.004
12	1.00	0.13	0.038	(0.477)	0.035	0.004
13	1.08	0.10	0.029	(0.475)	0.026	0.003
14	1.17	0.10	0.029	(0.473)	0.026	0.003
15	1.25	0.10	0.029	(0.471)	0.026	0.003
16	1.33	0.10	0.029	(0.469)	0.026	0.003
17	1.42	0.10	0.029	(0.467)	0.026	0.003
18	1.50	0.10	0.029	(0.466)	0.026	0.003
19	1.58	0.10	0.029	(0.464)	0.026	0.003
20	1.67	0.10	0.029	(0.462)	0.026	0.003
21	1.75	0.10	0.029	(0.460)	0.026	0.003
22	1.83	0.13	0.038	(0.458)	0.035	0.004
23	1.92	0.13	0.038	(0.456)	0.035	0.004
24	2.00	0.13	0.038	(0.454)	0.035	0.004
25	2.08	0.13	0.038	(0.453)	0.035	0.004
26	2.17	0.13	0.038	(0.451)	0.035	0.004
27	2.25	0.13	0.038	(0.449)	0.035	0.004
28	2.33	0.13	0.038	(0.447)	0.035	0.004
29	2.42	0.13	0.038	(0.445)	0.035	0.004
30	2.50	0.13	0.038	(0.444)	0.035	0.004
31	2.58	0.17	0.048	(0.442)	0.043	0.005
32	2.67	0.17	0.048	(0.440)	0.043	0.005
33	2.75	0.17	0.048	(0.438)	0.043	0.005
34	2.83	0.17	0.048	(0.436)	0.043	0.005
35	2.92	0.17	0.048	(0.434)	0.043	0.005
36	3.00	0.17	0.048	(0.433)	0.043	0.005
37	3.08	0.17	0.048	(0.431)	0.043	0.005
38	3.17	0.17	0.048	(0.429)	0.043	0.005
39	3.25	0.17	0.048	(0.427)	0.043	0.005
40	3.33	0.17	0.048	(0.426)	0.043	0.005

41	3.42	0.17	0.048	(0.424)	0.043	0.005
42	3.50	0.17	0.048	(0.422)	0.043	0.005
43	3.58	0.17	0.048	(0.420)	0.043	0.005
44	3.67	0.17	0.048	(0.418)	0.043	0.005
45	3.75	0.17	0.048	(0.417)	0.043	0.005
46	3.83	0.20	0.058	(0.415)	0.052	0.006
47	3.92	0.20	0.058	(0.413)	0.052	0.006
48	4.00	0.20	0.058	(0.411)	0.052	0.006
49	4.08	0.20	0.058	(0.410)	0.052	0.006
50	4.17	0.20	0.058	(0.408)	0.052	0.006
51	4.25	0.20	0.058	(0.406)	0.052	0.006
52	4.33	0.23	0.067	(0.404)	0.060	0.007
53	4.42	0.23	0.067	(0.403)	0.060	0.007
54	4.50	0.23	0.067	(0.401)	0.060	0.007
55	4.58	0.23	0.067	(0.399)	0.060	0.007
56	4.67	0.23	0.067	(0.398)	0.060	0.007
57	4.75	0.23	0.067	(0.396)	0.060	0.007
58	4.83	0.27	0.077	(0.394)	0.069	0.008
59	4.92	0.27	0.077	(0.392)	0.069	0.008
60	5.00	0.27	0.077	(0.391)	0.069	0.008
61	5.08	0.20	0.058	(0.389)	0.052	0.006
62	5.17	0.20	0.058	(0.387)	0.052	0.006
63	5.25	0.20	0.058	(0.386)	0.052	0.006
64	5.33	0.23	0.067	(0.384)	0.060	0.007
65	5.42	0.23	0.067	(0.382)	0.060	0.007
66	5.50	0.23	0.067	(0.381)	0.060	0.007
67	5.58	0.27	0.077	(0.379)	0.069	0.008
68	5.67	0.27	0.077	(0.377)	0.069	0.008
69	5.75	0.27	0.077	(0.376)	0.069	0.008
70	5.83	0.27	0.077	(0.374)	0.069	0.008
71	5.92	0.27	0.077	(0.372)	0.069	0.008
72	6.00	0.27	0.077	(0.371)	0.069	0.008
73	6.08	0.30	0.086	(0.369)	0.078	0.009
74	6.17	0.30	0.086	(0.367)	0.078	0.009
75	6.25	0.30	0.086	(0.366)	0.078	0.009
76	6.33	0.30	0.086	(0.364)	0.078	0.009
77	6.42	0.30	0.086	(0.362)	0.078	0.009
78	6.50	0.30	0.086	(0.361)	0.078	0.009
79	6.58	0.33	0.096	(0.359)	0.086	0.010
80	6.67	0.33	0.096	(0.358)	0.086	0.010
81	6.75	0.33	0.096	(0.356)	0.086	0.010
82	6.83	0.33	0.096	(0.354)	0.086	0.010
83	6.92	0.33	0.096	(0.353)	0.086	0.010
84	7.00	0.33	0.096	(0.351)	0.086	0.010
85	7.08	0.33	0.096	(0.350)	0.086	0.010
86	7.17	0.33	0.096	(0.348)	0.086	0.010
87	7.25	0.33	0.096	(0.346)	0.086	0.010
88	7.33	0.37	0.106	(0.345)	0.095	0.011
89	7.42	0.37	0.106	(0.343)	0.095	0.011
90	7.50	0.37	0.106	(0.342)	0.095	0.011
91	7.58	0.40	0.115	(0.340)	0.104	0.012
92	7.67	0.40	0.115	(0.339)	0.104	0.012
93	7.75	0.40	0.115	(0.337)	0.104	0.012
94	7.83	0.43	0.125	(0.335)	0.112	0.012
95	7.92	0.43	0.125	(0.334)	0.112	0.012
96	8.00	0.43	0.125	(0.332)	0.112	0.012
97	8.08	0.50	0.144	(0.331)	0.130	0.014
98	8.17	0.50	0.144	(0.329)	0.130	0.014
99	8.25	0.50	0.144	(0.328)	0.130	0.014
100	8.33	0.50	0.144	(0.326)	0.130	0.014
101	8.42	0.50	0.144	(0.325)	0.130	0.014
102	8.50	0.50	0.144	(0.323)	0.130	0.014
103	8.58	0.53	0.154	(0.322)	0.138	0.015
104	8.67	0.53	0.154	(0.320)	0.138	0.015
105	8.75	0.53	0.154	(0.319)	0.138	0.015
106	8.83	0.57	0.163	(0.317)	0.147	0.016
107	8.92	0.57	0.163	(0.316)	0.147	0.016
108	9.00	0.57	0.163	(0.314)	0.147	0.016
109	9.08	0.63	0.182	(0.313)	0.164	0.018
110	9.17	0.63	0.182	(0.311)	0.164	0.018
111	9.25	0.63	0.182	(0.310)	0.164	0.018
112	9.33	0.67	0.192	(0.308)	0.173	0.019
113	9.42	0.67	0.192	(0.307)	0.173	0.019
114	9.50	0.67	0.192	(0.305)	0.173	0.019
115	9.58	0.70	0.202	(0.304)	0.181	0.020

116	9.67	0.70	0.202	(	0.302)	0.181	0.020
117	9.75	0.70	0.202	(	0.301)	0.181	0.020
118	9.83	0.73	0.211	(	0.299)	0.190	0.021
119	9.92	0.73	0.211	(	0.298)	0.190	0.021
120	10.00	0.73	0.211	(	0.297)	0.190	0.021
121	10.08	0.50	0.144	(	0.295)	0.130	0.014
122	10.17	0.50	0.144	(	0.294)	0.130	0.014
123	10.25	0.50	0.144	(	0.292)	0.130	0.014
124	10.33	0.50	0.144	(	0.291)	0.130	0.014
125	10.42	0.50	0.144	(	0.289)	0.130	0.014
126	10.50	0.50	0.144	(	0.288)	0.130	0.014
127	10.58	0.67	0.192	(	0.287)	0.173	0.019
128	10.67	0.67	0.192	(	0.285)	0.173	0.019
129	10.75	0.67	0.192	(	0.284)	0.173	0.019
130	10.83	0.67	0.192	(	0.282)	0.173	0.019
131	10.92	0.67	0.192	(	0.281)	0.173	0.019
132	11.00	0.67	0.192	(	0.280)	0.173	0.019
133	11.08	0.63	0.182	(	0.278)	0.164	0.018
134	11.17	0.63	0.182	(	0.277)	0.164	0.018
135	11.25	0.63	0.182	(	0.276)	0.164	0.018
136	11.33	0.63	0.182	(	0.274)	0.164	0.018
137	11.42	0.63	0.182	(	0.273)	0.164	0.018
138	11.50	0.63	0.182	(	0.271)	0.164	0.018
139	11.58	0.57	0.163	(	0.270)	0.147	0.016
140	11.67	0.57	0.163	(	0.269)	0.147	0.016
141	11.75	0.57	0.163	(	0.267)	0.147	0.016
142	11.83	0.60	0.173	(	0.266)	0.156	0.017
143	11.92	0.60	0.173	(	0.265)	0.156	0.017
144	12.00	0.60	0.173	(	0.263)	0.156	0.017
145	12.08	0.83	0.240	(	0.262)	0.216	0.024
146	12.17	0.83	0.240	(	0.261)	0.216	0.024
147	12.25	0.83	0.240	(	0.260)	0.216	0.024
148	12.33	0.87	0.250	(	0.258)	0.225	0.025
149	12.42	0.87	0.250	(	0.257)	0.225	0.025
150	12.50	0.87	0.250	(	0.256)	0.225	0.025
151	12.58	0.93	0.269	(	0.254)	0.242	0.027
152	12.67	0.93	0.269	(	0.253)	0.242	0.027
153	12.75	0.93	0.269	(	0.252)	0.242	0.027
154	12.83	0.97	0.278		0.251	(0.251)	0.028
155	12.92	0.97	0.278		0.249	(0.251)	0.029
156	13.00	0.97	0.278		0.248	(0.251)	0.030
157	13.08	1.13	0.326		0.247	(0.294)	0.080
158	13.17	1.13	0.326		0.245	(0.294)	0.081
159	13.25	1.13	0.326		0.244	(0.294)	0.082
160	13.33	1.13	0.326		0.243	(0.294)	0.083
161	13.42	1.13	0.326		0.242	(0.294)	0.085
162	13.50	1.13	0.326		0.241	(0.294)	0.086
163	13.58	0.77	0.221	(	0.239)	0.199	0.022
164	13.67	0.77	0.221	(	0.238)	0.199	0.022
165	13.75	0.77	0.221	(	0.237)	0.199	0.022
166	13.83	0.77	0.221	(	0.236)	0.199	0.022
167	13.92	0.77	0.221	(	0.234)	0.199	0.022
168	14.00	0.77	0.221	(	0.233)	0.199	0.022
169	14.08	0.90	0.259		0.232	(0.233)	0.027
170	14.17	0.90	0.259		0.231	(0.233)	0.028
171	14.25	0.90	0.259		0.230	(0.233)	0.029
172	14.33	0.87	0.250	(	0.229)	0.225	0.025
173	14.42	0.87	0.250	(	0.227)	0.225	0.025
174	14.50	0.87	0.250	(	0.226)	0.225	0.025
175	14.58	0.87	0.250	(	0.225)	0.225	0.025
176	14.67	0.87	0.250		0.224	(0.225)	0.026
177	14.75	0.87	0.250		0.223	(0.225)	0.027
178	14.83	0.83	0.240	(	0.222)	0.216	0.024
179	14.92	0.83	0.240	(	0.220)	0.216	0.024
180	15.00	0.83	0.240	(	0.219)	0.216	0.024
181	15.08	0.80	0.230	(	0.218)	0.207	0.023
182	15.17	0.80	0.230	(	0.217)	0.207	0.023
183	15.25	0.80	0.230	(	0.216)	0.207	0.023
184	15.33	0.77	0.221	(	0.215)	0.199	0.022
185	15.42	0.77	0.221	(	0.214)	0.199	0.022
186	15.50	0.77	0.221	(	0.213)	0.199	0.022
187	15.58	0.63	0.182	(	0.212)	0.164	0.018
188	15.67	0.63	0.182	(	0.210)	0.164	0.018
189	15.75	0.63	0.182	(	0.209)	0.164	0.018
190	15.83	0.63	0.182	(	0.208)	0.164	0.018

191	15.92	0.63	0.182	(0.207)	0.164	0.018
192	16.00	0.63	0.182	(0.206)	0.164	0.018
193	16.08	0.13	0.038	(0.205)	0.035	0.004
194	16.17	0.13	0.038	(0.204)	0.035	0.004
195	16.25	0.13	0.038	(0.203)	0.035	0.004
196	16.33	0.13	0.038	(0.202)	0.035	0.004
197	16.42	0.13	0.038	(0.201)	0.035	0.004
198	16.50	0.13	0.038	(0.200)	0.035	0.004
199	16.58	0.10	0.029	(0.199)	0.026	0.003
200	16.67	0.10	0.029	(0.198)	0.026	0.003
201	16.75	0.10	0.029	(0.197)	0.026	0.003
202	16.83	0.10	0.029	(0.196)	0.026	0.003
203	16.92	0.10	0.029	(0.195)	0.026	0.003
204	17.00	0.10	0.029	(0.194)	0.026	0.003
205	17.08	0.17	0.048	(0.193)	0.043	0.005
206	17.17	0.17	0.048	(0.192)	0.043	0.005
207	17.25	0.17	0.048	(0.191)	0.043	0.005
208	17.33	0.17	0.048	(0.190)	0.043	0.005
209	17.42	0.17	0.048	(0.189)	0.043	0.005
210	17.50	0.17	0.048	(0.188)	0.043	0.005
211	17.58	0.17	0.048	(0.187)	0.043	0.005
212	17.67	0.17	0.048	(0.186)	0.043	0.005
213	17.75	0.17	0.048	(0.185)	0.043	0.005
214	17.83	0.13	0.038	(0.184)	0.035	0.004
215	17.92	0.13	0.038	(0.184)	0.035	0.004
216	18.00	0.13	0.038	(0.183)	0.035	0.004
217	18.08	0.13	0.038	(0.182)	0.035	0.004
218	18.17	0.13	0.038	(0.181)	0.035	0.004
219	18.25	0.13	0.038	(0.180)	0.035	0.004
220	18.33	0.13	0.038	(0.179)	0.035	0.004
221	18.42	0.13	0.038	(0.178)	0.035	0.004
222	18.50	0.13	0.038	(0.177)	0.035	0.004
223	18.58	0.10	0.029	(0.177)	0.026	0.003
224	18.67	0.10	0.029	(0.176)	0.026	0.003
225	18.75	0.10	0.029	(0.175)	0.026	0.003
226	18.83	0.07	0.019	(0.174)	0.017	0.002
227	18.92	0.07	0.019	(0.173)	0.017	0.002
228	19.00	0.07	0.019	(0.172)	0.017	0.002
229	19.08	0.10	0.029	(0.172)	0.026	0.003
230	19.17	0.10	0.029	(0.171)	0.026	0.003
231	19.25	0.10	0.029	(0.170)	0.026	0.003
232	19.33	0.13	0.038	(0.169)	0.035	0.004
233	19.42	0.13	0.038	(0.168)	0.035	0.004
234	19.50	0.13	0.038	(0.168)	0.035	0.004
235	19.58	0.10	0.029	(0.167)	0.026	0.003
236	19.67	0.10	0.029	(0.166)	0.026	0.003
237	19.75	0.10	0.029	(0.165)	0.026	0.003
238	19.83	0.07	0.019	(0.165)	0.017	0.002
239	19.92	0.07	0.019	(0.164)	0.017	0.002
240	20.00	0.07	0.019	(0.163)	0.017	0.002
241	20.08	0.10	0.029	(0.162)	0.026	0.003
242	20.17	0.10	0.029	(0.162)	0.026	0.003
243	20.25	0.10	0.029	(0.161)	0.026	0.003
244	20.33	0.10	0.029	(0.160)	0.026	0.003
245	20.42	0.10	0.029	(0.160)	0.026	0.003
246	20.50	0.10	0.029	(0.159)	0.026	0.003
247	20.58	0.10	0.029	(0.158)	0.026	0.003
248	20.67	0.10	0.029	(0.158)	0.026	0.003
249	20.75	0.10	0.029	(0.157)	0.026	0.003
250	20.83	0.07	0.019	(0.156)	0.017	0.002
251	20.92	0.07	0.019	(0.156)	0.017	0.002
252	21.00	0.07	0.019	(0.155)	0.017	0.002
253	21.08	0.10	0.029	(0.154)	0.026	0.003
254	21.17	0.10	0.029	(0.154)	0.026	0.003
255	21.25	0.10	0.029	(0.153)	0.026	0.003
256	21.33	0.07	0.019	(0.153)	0.017	0.002
257	21.42	0.07	0.019	(0.152)	0.017	0.002
258	21.50	0.07	0.019	(0.151)	0.017	0.002
259	21.58	0.10	0.029	(0.151)	0.026	0.003
260	21.67	0.10	0.029	(0.150)	0.026	0.003
261	21.75	0.10	0.029	(0.150)	0.026	0.003
262	21.83	0.07	0.019	(0.149)	0.017	0.002
263	21.92	0.07	0.019	(0.149)	0.017	0.002
264	22.00	0.07	0.019	(0.148)	0.017	0.002
265	22.08	0.10	0.029	(0.148)	0.026	0.003

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266  22.17     0.10      0.029       (  0.147)       0.026        0.003
267  22.25     0.10      0.029       (  0.147)       0.026        0.003
268  22.33     0.07      0.019       (  0.146)       0.017        0.002
269  22.42     0.07      0.019       (  0.146)       0.017        0.002
270  22.50     0.07      0.019       (  0.145)       0.017        0.002
271  22.58     0.07      0.019       (  0.145)       0.017        0.002
272  22.67     0.07      0.019       (  0.145)       0.017        0.002
273  22.75     0.07      0.019       (  0.144)       0.017        0.002
274  22.83     0.07      0.019       (  0.144)       0.017        0.002
275  22.92     0.07      0.019       (  0.144)       0.017        0.002
276  23.00     0.07      0.019       (  0.143)       0.017        0.002
277  23.08     0.07      0.019       (  0.143)       0.017        0.002
278  23.17     0.07      0.019       (  0.143)       0.017        0.002
279  23.25     0.07      0.019       (  0.142)       0.017        0.002
280  23.33     0.07      0.019       (  0.142)       0.017        0.002
281  23.42     0.07      0.019       (  0.142)       0.017        0.002
282  23.50     0.07      0.019       (  0.141)       0.017        0.002
283  23.58     0.07      0.019       (  0.141)       0.017        0.002
284  23.67     0.07      0.019       (  0.141)       0.017        0.002
285  23.75     0.07      0.019       (  0.141)       0.017        0.002
286  23.83     0.07      0.019       (  0.141)       0.017        0.002
287  23.92     0.07      0.019       (  0.141)       0.017        0.002
288  24.00     0.07      0.019       (  0.140)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     3.2
      Flood volume = Effective rainfall      0.27(In)
       times area      16.9(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
      Total soil loss =      2.13(In)
      Total soil loss =     3.005(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       16330.8 Cubic Feet
      Total soil loss =      130897.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.405(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q          |         |         |         |
  0+10       0.0001      0.02  Q          |         |         |         |
  0+15       0.0003      0.03  Q          |         |         |         |
  0+20       0.0005      0.03  Q          |         |         |         |
  0+25       0.0008      0.04  Q          |         |         |         |
  0+30       0.0011      0.04  Q          |         |         |         |
  0+35       0.0014      0.05  Q          |         |         |         |
  0+40       0.0017      0.05  Q          |         |         |         |
  0+45       0.0021      0.05  Q          |         |         |         |
  0+50       0.0024      0.05  Q          |         |         |         |
  0+55       0.0028      0.06  Q          |         |         |         |
  1+ 0       0.0032      0.06  Q          |         |         |         |
  1+ 5       0.0037      0.06  Q          |         |         |         |
  1+10       0.0041      0.06  Q          |         |         |         |
  1+15       0.0044      0.05  Q          |         |         |         |
  1+20       0.0048      0.05  Q          |         |         |         |
  1+25       0.0051      0.05  Q          |         |         |         |
  1+30       0.0055      0.05  Q          |         |         |         |
  1+35       0.0058      0.05  Q          |         |         |         |
  1+40       0.0061      0.05  Q          |         |         |         |
  1+45       0.0065      0.05  Q          |         |         |         |
  1+50       0.0068      0.05  Q          |         |         |         |
  1+55       0.0072      0.06  Q          |         |         |         |
  2+ 0       0.0076      0.06  Q          |         |         |         |
  2+ 5       0.0081      0.06  Q          |         |         |         |
  2+10       0.0085      0.06  Q          |         |         |         |
  2+15       0.0090      0.07  Q          |         |         |         |
  2+20       0.0094      0.07  QV         |         |         |         |
  2+25       0.0099      0.07  QV         |         |         |         |
  2+30       0.0103      0.07  QV         |         |         |         |
  2+35       0.0108      0.07  QV         |         |         |         |
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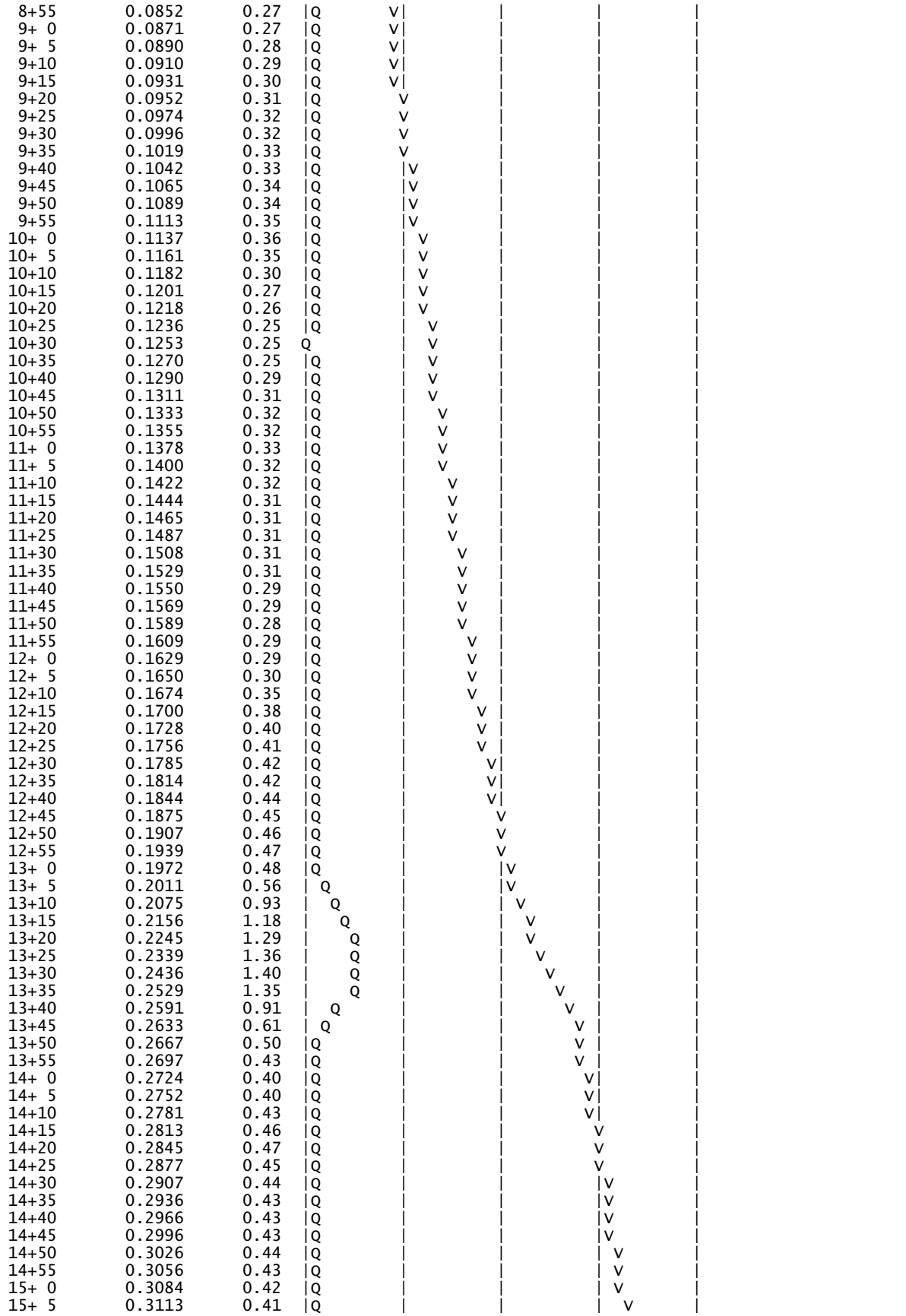
2+40       0.0113      0.07  QV        |         |         |         |
2+45       0.0118      0.08  QV        |         |         |         |
2+50       0.0124      0.08  QV        |         |         |         |
2+55       0.0129      0.08  QV        |         |         |         |
3+ 0       0.0135      0.08  QV        |         |         |         |
3+ 5       0.0141      0.08  QV        |         |         |         |
3+10       0.0146      0.08  QV        |         |         |         |
3+15       0.0152      0.08  QV        |         |         |         |
3+20       0.0157      0.08  QV        |         |         |         |
3+25       0.0163      0.08  QV        |         |         |         |
3+30       0.0169      0.08  QV        |         |         |         |
3+35       0.0174      0.08  QV        |         |         |         |
3+40       0.0180      0.08  QV        |         |         |         |
3+45       0.0186      0.08  QV        |         |         |         |
3+50       0.0191      0.08  Q V       |         |         |         |
3+55       0.0197      0.09  Q V       |         |         |         |
4+ 0       0.0204      0.09  Q V       |         |         |         |
4+ 5       0.0211      0.10  Q V       |         |         |         |
4+10       0.0217      0.10  Q V       |         |         |         |
4+15       0.0224      0.10  Q V       |         |         |         |
4+20       0.0231      0.10  Q V       |         |         |         |
4+25       0.0238      0.11  Q V       |         |         |         |
4+30       0.0246      0.11  Q V       |         |         |         |
4+35       0.0254      0.11  Q V       |         |         |         |
4+40       0.0261      0.11  Q V       |         |         |         |
4+45       0.0269      0.11  Q V       |         |         |         |
4+50       0.0277      0.12  Q V       |         |         |         |
4+55       0.0286      0.12  Q  V      |         |         |         |
5+ 0       0.0294      0.13  Q  V      |         |         |         |
5+ 5       0.0303      0.13  Q  V      |         |         |         |
5+10       0.0311      0.11  Q  V      |         |         |         |
5+15       0.0318      0.10  Q  V      |         |         |         |
5+20       0.0325      0.10  Q  V      |         |         |         |
5+25       0.0333      0.11  Q  V      |         |         |         |
5+30       0.0340      0.11  Q  V      |         |         |         |
5+35       0.0348      0.11  Q  V      |         |         |         |
5+40       0.0357      0.12  Q  V      |         |         |         |
5+45       0.0365      0.13  Q  V      |         |         |         |
5+50       0.0374      0.13  Q  V      |         |         |         |
5+55       0.0383      0.13  Q   V     |         |         |         |
6+ 0       0.0392      0.13  Q   V     |         |         |         |
6+ 5       0.0401      0.13  Q   V     |         |         |         |
6+10       0.0411      0.14  Q   V     |         |         |         |
6+15       0.0421      0.14  Q   V     |         |         |         |
6+20       0.0431      0.15  Q   V     |         |         |         |
6+25       0.0441      0.15  Q   V     |         |         |         |
6+30       0.0451      0.15  Q   V     |         |         |         |
6+35       0.0461      0.15  Q   V     |         |         |         |
6+40       0.0472      0.16  Q    V    |         |         |         |
6+45       0.0483      0.16  Q    V    |         |         |         |
6+50       0.0494      0.16  Q    V    |         |         |         |
6+55       0.0505      0.16  Q    V    |         |         |         |
7+ 0       0.0517      0.16  Q    V    |         |         |         |
7+ 5       0.0528      0.16  Q    V    |         |         |         |
7+10       0.0539      0.16  Q    V    |         |         |         |
7+15       0.0550      0.16  Q    V    |         |         |         |
7+20       0.0562      0.16  Q    V    |         |         |         |
7+25       0.0573      0.17  Q     V   |         |         |         |
7+30       0.0586      0.18  Q     V   |         |         |         |
7+35       0.0598      0.18  Q     V   |         |         |         |
7+40       0.0611      0.19  Q     V   |         |         |         |
7+45       0.0624      0.19  Q     V   |         |         |         |
7+50       0.0638      0.20  Q     V   |         |         |         |
7+55       0.0652      0.20  Q     V   |         |         |         |
8+ 0       0.0666      0.21  Q      V  |         |         |         |
8+ 5       0.0681      0.21  Q      V  |         |         |         |
8+10       0.0696      0.23  Q      V  |         |         |         |
8+15       0.0713      0.24  Q      V  |         |         |         |
8+20       0.0729      0.24  Q      V  |         |         |         |
8+25       0.0746      0.24  Q      V  |         |         |         |
8+30       0.0763      0.24  Q       V |         |         |         |
8+35       0.0780      0.25  Q       V |         |         |         |
8+40       0.0797      0.25  |Q      V |         |         |         |
8+45       0.0815      0.26  |Q      V |         |         |         |
8+50       0.0833      0.26  |Q      V |         |         |         |
```



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15+10       0.3141      0.40  |Q        |         |         |  V      |
15+15       0.3168      0.40  |Q        |         |         |  V      |
15+20       0.3195      0.39  |Q        |         |         |   V     |
15+25       0.3222      0.39  |Q        |         |         |   V     |
15+30       0.3248      0.38  |Q        |         |         |   V     |
15+35       0.3273      0.37  |Q        |         |         |   V     |
15+40       0.3297      0.34  |Q        |         |         |    V    |
15+45       0.3320      0.33  |Q        |         |         |    V    |
15+50       0.3342      0.32  |Q        |         |         |    V    |
15+55       0.3363      0.31  |Q        |         |         |    V    |
16+ 0       0.3385      0.31  |Q        |         |         |     V   |
16+ 5       0.3405      0.29  |Q        |         |         |     V   |
16+10       0.3418      0.19  Q        |         |         |     V   |
16+15       0.3426      0.12  Q        |         |         |     V   |
16+20       0.3433      0.09  Q        |         |         |     V   |
16+25       0.3438      0.08  Q        |         |         |     V   |
16+30       0.3443      0.07  Q        |         |         |     V   |
16+35       0.3447      0.07  Q        |         |         |     V   |
16+40       0.3452      0.06  Q        |         |         |     V   |
16+45       0.3455      0.05  Q        |         |         |     V   |
16+50       0.3459      0.05  Q        |         |         |     V   |
16+55       0.3462      0.05  Q        |         |         |     V   |
17+ 0       0.3466      0.05  Q        |         |         |     V   |
17+ 5       0.3469      0.05  Q        |         |         |      V  |
17+10       0.3474      0.07  Q        |         |         |      V  |
17+15       0.3479      0.07  Q        |         |         |      V  |
17+20       0.3484      0.08  Q        |         |         |      V  |
17+25       0.3490      0.08  Q        |         |         |      V  |
17+30       0.3495      0.08  Q        |         |         |      V  |
17+35       0.3501      0.08  Q        |         |         |      V  |
17+40       0.3506      0.08  Q        |         |         |      V  |
17+45       0.3512      0.08  Q        |         |         |      V  |
17+50       0.3518      0.08  Q        |         |         |      V  |
17+55       0.3523      0.07  Q        |         |         |      V  |
18+ 0       0.3527      0.07  Q        |         |         |      V  |
18+ 5       0.3532      0.07  Q        |         |         |      V  |
18+10       0.3537      0.07  Q        |         |         |      V  |
18+15       0.3541      0.07  Q        |         |         |      V  |
18+20       0.3546      0.07  Q        |         |         |      V  |
18+25       0.3550      0.07  Q        |         |         |      V  |
18+30       0.3555      0.07  Q        |         |         |      V  |
18+35       0.3559      0.06  Q        |         |         |      V  |
18+40       0.3563      0.06  Q        |         |         |       V |
18+45       0.3567      0.05  Q        |         |         |       V |
18+50       0.3570      0.05  Q        |         |         |       V |
18+55       0.3573      0.04  Q        |         |         |       V |
19+ 0       0.3576      0.04  Q        |         |         |       V |
19+ 5       0.3578      0.04  Q        |         |         |       V |
19+10       0.3581      0.04  Q        |         |         |       V |
19+15       0.3584      0.05  Q        |         |         |       V |
19+20       0.3587      0.05  Q        |         |         |       V |
19+25       0.3591      0.06  Q        |         |         |       V |
19+30       0.3596      0.06  Q        |         |         |       V |
19+35       0.3600      0.06  Q        |         |         |       V |
19+40       0.3604      0.06  Q        |         |         |       V |
19+45       0.3607      0.05  Q        |         |         |       V |
19+50       0.3611      0.05  Q        |         |         |       V |
19+55       0.3614      0.04  Q        |         |         |       V |
20+ 0       0.3616      0.04  Q        |         |         |       V |
20+ 5       0.3619      0.04  Q        |         |         |       V |
20+10       0.3622      0.04  Q        |         |         |       V |
20+15       0.3625      0.05  Q        |         |         |       V |
20+20       0.3628      0.05  Q        |         |         |       V |
20+25       0.3631      0.05  Q        |         |         |       V |
20+30       0.3635      0.05  Q        |         |         |       V |
20+35       0.3638      0.05  Q        |         |         |       V |
20+40       0.3641      0.05  Q        |         |         |       V |
20+45       0.3645      0.05  Q        |         |         |       V |
20+50       0.3648      0.05  Q        |         |         |       V |
20+55       0.3651      0.04  Q        |         |         |       V |
21+ 0       0.3653      0.04  Q        |         |         |       V |
21+ 5       0.3656      0.04  Q        |         |         |        V|
21+10       0.3659      0.04  Q        |         |         |        V|
21+15       0.3662      0.05  Q        |         |         |        V|
21+20       0.3665      0.05  Q        |         |         |        V|
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21+25	0.3668	0.04	Q	|	|	|	v|
21+30	0.3670	0.04	Q	|	|	|	v|
21+35	0.3673	0.04	Q	|	|	|	v|
21+40	0.3676	0.04	Q	|	|	|	v|
21+45	0.3679	0.05	Q	|	|	|	v|
21+50	0.3682	0.05	Q	|	|	|	v|
21+55	0.3685	0.04	Q	|	|	|	v|
22+ 0	0.3687	0.04	Q	|	|	|	v|
22+ 5	0.3690	0.04	Q	|	|	|	v|
22+10	0.3692	0.04	Q	|	|	|	v|
22+15	0.3696	0.05	Q	|	|	|	v|
22+20	0.3699	0.05	Q	|	|	|	v|
22+25	0.3702	0.04	Q	|	|	|	v|
22+30	0.3704	0.04	Q	|	|	|	v|
22+35	0.3706	0.03	Q	|	|	|	v|
22+40	0.3709	0.03	Q	|	|	|	v|
22+45	0.3711	0.03	Q	|	|	|	v|
22+50	0.3713	0.03	Q	|	|	|	v|
22+55	0.3716	0.03	Q	|	|	|	v|
23+ 0	0.3718	0.03	Q	|	|	|	v|
23+ 5	0.3720	0.03	Q	|	|	|	v|
23+10	0.3722	0.03	Q	|	|	|	v|
23+15	0.3725	0.03	Q	|	|	|	v|
23+20	0.3727	0.03	Q	|	|	|	v|
23+25	0.3729	0.03	Q	|	|	|	v|
23+30	0.3731	0.03	Q	|	|	|	v|
23+35	0.3734	0.03	Q	|	|	|	v|
23+40	0.3736	0.03	Q	|	|	|	v|
23+45	0.3738	0.03	Q	|	|	|	v|
23+50	0.3740	0.03	Q	|	|	|	v|
23+55	0.3743	0.03	Q	|	|	|	v|
24+ 0	0.3745	0.03	Q	|	|	|	v|
24+ 5	0.3747	0.03	Q	|	|	|	v|
24+10	0.3748	0.02	Q	|	|	|	v|
24+15	0.3749	0.01	Q	|	|	|	v|
24+20	0.3749	0.00	Q	|	|	|	v|
24+25	0.3749	0.00	Q	|	|	|	v|
24+30	0.3749	0.00	Q	|	|	|	v|
24+35	0.3749	0.00	Q	|	|	|	v|
24+40	0.3749	0.00	Q	|	|	|	v|
24+45	0.3749	0.00	Q	|	|	|	v|

PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/09/21 File: PROP2YRD1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA D1 PROPOSED CONDITION
2-YEAR STORM EVENT
21-0034
2021-11-09 EP

Drainage Area = 14.10(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 14.10(Ac.) = 0.022 Sq. Mi.
Length along longest watercourse = 1473.00(Ft.)
Length along longest watercourse measured to centroid = 540.00(Ft.)
Length along longest watercourse = 0.279 Mi.
Length along longest watercourse measured to centroid = 0.102 Mi.
Difference in elevation = 7.00(Ft.)
Slope along watercourse = 25.0916 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.051 Hr.
Lag time = 3.03 Min.
25% of lag time = 0.76 Min.
40% of lag time = 1.21 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
14.10	2.40	33.84

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
14.10	6.20	87.42

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
14.100	60.80	0.790

Total Area Entered = 14.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

60.8	40.8	0.662	0.790	0.191	1.000	0.191
					Sum (F) =	0.191

Area averaged mean soil loss (F) (In/Hr) = 0.191
Minimum soil loss rate ((In/Hr)) = 0.096
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	164.969	34.459	4.897
2	0.167	329.938	53.153	7.553
3	0.250	494.907	10.103	1.436
4	0.333	659.875	1.778	0.253
5	0.417	824.844	0.507	0.072
			Sum = 100.000	Sum= 14.210

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time		Pattern	Storm Rain	Loss rate(In./Hr)		Effective
	(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	0.07	0.019	(0.339)	0.005	0.014
2	0.17	0.07	0.019	(0.338)	0.005	0.014
3	0.25	0.07	0.019	(0.337)	0.005	0.014
4	0.33	0.10	0.029	(0.335)	0.008	0.021
5	0.42	0.10	0.029	(0.334)	0.008	0.021
6	0.50	0.10	0.029	(0.333)	0.008	0.021
7	0.58	0.10	0.029	(0.331)	0.008	0.021
8	0.67	0.10	0.029	(0.330)	0.008	0.021
9	0.75	0.10	0.029	(0.329)	0.008	0.021
10	0.83	0.13	0.038	(0.328)	0.010	0.028
11	0.92	0.13	0.038	(0.326)	0.010	0.028
12	1.00	0.13	0.038	(0.325)	0.010	0.028
13	1.08	0.10	0.029	(0.324)	0.008	0.021
14	1.17	0.10	0.029	(0.322)	0.008	0.021
15	1.25	0.10	0.029	(0.321)	0.008	0.021
16	1.33	0.10	0.029	(0.320)	0.008	0.021
17	1.42	0.10	0.029	(0.319)	0.008	0.021
18	1.50	0.10	0.029	(0.317)	0.008	0.021
19	1.58	0.10	0.029	(0.316)	0.008	0.021
20	1.67	0.10	0.029	(0.315)	0.008	0.021
21	1.75	0.10	0.029	(0.313)	0.008	0.021
22	1.83	0.13	0.038	(0.312)	0.010	0.028
23	1.92	0.13	0.038	(0.311)	0.010	0.028
24	2.00	0.13	0.038	(0.310)	0.010	0.028
25	2.08	0.13	0.038	(0.308)	0.010	0.028
26	2.17	0.13	0.038	(0.307)	0.010	0.028
27	2.25	0.13	0.038	(0.306)	0.010	0.028
28	2.33	0.13	0.038	(0.305)	0.010	0.028
29	2.42	0.13	0.038	(0.303)	0.010	0.028
30	2.50	0.13	0.038	(0.302)	0.010	0.028
31	2.58	0.17	0.048	(0.301)	0.013	0.035
32	2.67	0.17	0.048	(0.300)	0.013	0.035
33	2.75	0.17	0.048	(0.299)	0.013	0.035
34	2.83	0.17	0.048	(0.297)	0.013	0.035
35	2.92	0.17	0.048	(0.296)	0.013	0.035
36	3.00	0.17	0.048	(0.295)	0.013	0.035
37	3.08	0.17	0.048	(0.294)	0.013	0.035
38	3.17	0.17	0.048	(0.292)	0.013	0.035
39	3.25	0.17	0.048	(0.291)	0.013	0.035
40	3.33	0.17	0.048	(0.290)	0.013	0.035
41	3.42	0.17	0.048	(0.289)	0.013	0.035
42	3.50	0.17	0.048	(0.288)	0.013	0.035
43	3.58	0.17	0.048	(0.286)	0.013	0.035
44	3.67	0.17	0.048	(0.285)	0.013	0.035
45	3.75	0.17	0.048	(0.284)	0.013	0.035

46	3.83	0.20	0.058	(0.283)	0.016	0.042
47	3.92	0.20	0.058	(0.282)	0.016	0.042
48	4.00	0.20	0.058	(0.280)	0.016	0.042
49	4.08	0.20	0.058	(0.279)	0.016	0.042
50	4.17	0.20	0.058	(0.278)	0.016	0.042
51	4.25	0.20	0.058	(0.277)	0.016	0.042
52	4.33	0.23	0.067	(0.276)	0.018	0.049
53	4.42	0.23	0.067	(0.274)	0.018	0.049
54	4.50	0.23	0.067	(0.273)	0.018	0.049
55	4.58	0.23	0.067	(0.272)	0.018	0.049
56	4.67	0.23	0.067	(0.271)	0.018	0.049
57	4.75	0.23	0.067	(0.270)	0.018	0.049
58	4.83	0.27	0.077	(0.269)	0.021	0.056
59	4.92	0.27	0.077	(0.267)	0.021	0.056
60	5.00	0.27	0.077	(0.266)	0.021	0.056
61	5.08	0.20	0.058	(0.265)	0.016	0.042
62	5.17	0.20	0.058	(0.264)	0.016	0.042
63	5.25	0.20	0.058	(0.263)	0.016	0.042
64	5.33	0.23	0.067	(0.262)	0.018	0.049
65	5.42	0.23	0.067	(0.261)	0.018	0.049
66	5.50	0.23	0.067	(0.259)	0.018	0.049
67	5.58	0.27	0.077	(0.258)	0.021	0.056
68	5.67	0.27	0.077	(0.257)	0.021	0.056
69	5.75	0.27	0.077	(0.256)	0.021	0.056
70	5.83	0.27	0.077	(0.255)	0.021	0.056
71	5.92	0.27	0.077	(0.254)	0.021	0.056
72	6.00	0.27	0.077	(0.253)	0.021	0.056
73	6.08	0.30	0.086	(0.251)	0.023	0.063
74	6.17	0.30	0.086	(0.250)	0.023	0.063
75	6.25	0.30	0.086	(0.249)	0.023	0.063
76	6.33	0.30	0.086	(0.248)	0.023	0.063
77	6.42	0.30	0.086	(0.247)	0.023	0.063
78	6.50	0.30	0.086	(0.246)	0.023	0.063
79	6.58	0.33	0.096	(0.245)	0.026	0.070
80	6.67	0.33	0.096	(0.244)	0.026	0.070
81	6.75	0.33	0.096	(0.243)	0.026	0.070
82	6.83	0.33	0.096	(0.242)	0.026	0.070
83	6.92	0.33	0.096	(0.240)	0.026	0.070
84	7.00	0.33	0.096	(0.239)	0.026	0.070
85	7.08	0.33	0.096	(0.238)	0.026	0.070
86	7.17	0.33	0.096	(0.237)	0.026	0.070
87	7.25	0.33	0.096	(0.236)	0.026	0.070
88	7.33	0.37	0.106	(0.235)	0.029	0.077
89	7.42	0.37	0.106	(0.234)	0.029	0.077
90	7.50	0.37	0.106	(0.233)	0.029	0.077
91	7.58	0.40	0.115	(0.232)	0.031	0.084
92	7.67	0.40	0.115	(0.231)	0.031	0.084
93	7.75	0.40	0.115	(0.230)	0.031	0.084
94	7.83	0.43	0.125	(0.229)	0.034	0.091
95	7.92	0.43	0.125	(0.228)	0.034	0.091
96	8.00	0.43	0.125	(0.226)	0.034	0.091
97	8.08	0.50	0.144	(0.225)	0.039	0.105
98	8.17	0.50	0.144	(0.224)	0.039	0.105
99	8.25	0.50	0.144	(0.223)	0.039	0.105
100	8.33	0.50	0.144	(0.222)	0.039	0.105
101	8.42	0.50	0.144	(0.221)	0.039	0.105
102	8.50	0.50	0.144	(0.220)	0.039	0.105
103	8.58	0.53	0.154	(0.219)	0.041	0.112
104	8.67	0.53	0.154	(0.218)	0.041	0.112
105	8.75	0.53	0.154	(0.217)	0.041	0.112
106	8.83	0.57	0.163	(0.216)	0.044	0.119
107	8.92	0.57	0.163	(0.215)	0.044	0.119
108	9.00	0.57	0.163	(0.214)	0.044	0.119
109	9.08	0.63	0.182	(0.213)	0.049	0.133
110	9.17	0.63	0.182	(0.212)	0.049	0.133
111	9.25	0.63	0.182	(0.211)	0.049	0.133
112	9.33	0.67	0.192	(0.210)	0.052	0.140
113	9.42	0.67	0.192	(0.209)	0.052	0.140
114	9.50	0.67	0.192	(0.208)	0.052	0.140
115	9.58	0.70	0.202	(0.207)	0.054	0.147
116	9.67	0.70	0.202	(0.206)	0.054	0.147
117	9.75	0.70	0.202	(0.205)	0.054	0.147
118	9.83	0.73	0.211	(0.204)	0.057	0.154
119	9.92	0.73	0.211	(0.203)	0.057	0.154
120	10.00	0.73	0.211	(0.202)	0.057	0.154

121	10.08	0.50	0.144	(0.201)	0.039	0.105
122	10.17	0.50	0.144	(0.200)	0.039	0.105
123	10.25	0.50	0.144	(0.199)	0.039	0.105
124	10.33	0.50	0.144	(0.198)	0.039	0.105
125	10.42	0.50	0.144	(0.197)	0.039	0.105
126	10.50	0.50	0.144	(0.196)	0.039	0.105
127	10.58	0.67	0.192	(0.195)	0.052	0.140
128	10.67	0.67	0.192	(0.194)	0.052	0.140
129	10.75	0.67	0.192	(0.193)	0.052	0.140
130	10.83	0.67	0.192	(0.192)	0.052	0.140
131	10.92	0.67	0.192	(0.192)	0.052	0.140
132	11.00	0.67	0.192	(0.191)	0.052	0.140
133	11.08	0.63	0.182	(0.190)	0.049	0.133
134	11.17	0.63	0.182	(0.189)	0.049	0.133
135	11.25	0.63	0.182	(0.188)	0.049	0.133
136	11.33	0.63	0.182	(0.187)	0.049	0.133
137	11.42	0.63	0.182	(0.186)	0.049	0.133
138	11.50	0.63	0.182	(0.185)	0.049	0.133
139	11.58	0.57	0.163	(0.184)	0.044	0.119
140	11.67	0.57	0.163	(0.183)	0.044	0.119
141	11.75	0.57	0.163	(0.182)	0.044	0.119
142	11.83	0.60	0.173	(0.181)	0.047	0.126
143	11.92	0.60	0.173	(0.180)	0.047	0.126
144	12.00	0.60	0.173	(0.180)	0.047	0.126
145	12.08	0.83	0.240	(0.179)	0.065	0.175
146	12.17	0.83	0.240	(0.178)	0.065	0.175
147	12.25	0.83	0.240	(0.177)	0.065	0.175
148	12.33	0.87	0.250	(0.176)	0.067	0.182
149	12.42	0.87	0.250	(0.175)	0.067	0.182
150	12.50	0.87	0.250	(0.174)	0.067	0.182
151	12.58	0.93	0.269	(0.173)	0.073	0.196
152	12.67	0.93	0.269	(0.172)	0.073	0.196
153	12.75	0.93	0.269	(0.172)	0.073	0.196
154	12.83	0.97	0.278	(0.171)	0.075	0.203
155	12.92	0.97	0.278	(0.170)	0.075	0.203
156	13.00	0.97	0.278	(0.169)	0.075	0.203
157	13.08	1.13	0.326	(0.168)	0.088	0.238
158	13.17	1.13	0.326	(0.167)	0.088	0.238
159	13.25	1.13	0.326	(0.166)	0.088	0.238
160	13.33	1.13	0.326	(0.166)	0.088	0.238
161	13.42	1.13	0.326	(0.165)	0.088	0.238
162	13.50	1.13	0.326	(0.164)	0.088	0.238
163	13.58	0.77	0.221	(0.163)	0.060	0.161
164	13.67	0.77	0.221	(0.162)	0.060	0.161
165	13.75	0.77	0.221	(0.161)	0.060	0.161
166	13.83	0.77	0.221	(0.161)	0.060	0.161
167	13.92	0.77	0.221	(0.160)	0.060	0.161
168	14.00	0.77	0.221	(0.159)	0.060	0.161
169	14.08	0.90	0.259	(0.158)	0.070	0.189
170	14.17	0.90	0.259	(0.157)	0.070	0.189
171	14.25	0.90	0.259	(0.157)	0.070	0.189
172	14.33	0.87	0.250	(0.156)	0.067	0.182
173	14.42	0.87	0.250	(0.155)	0.067	0.182
174	14.50	0.87	0.250	(0.154)	0.067	0.182
175	14.58	0.87	0.250	(0.153)	0.067	0.182
176	14.67	0.87	0.250	(0.153)	0.067	0.182
177	14.75	0.87	0.250	(0.152)	0.067	0.182
178	14.83	0.83	0.240	(0.151)	0.065	0.175
179	14.92	0.83	0.240	(0.150)	0.065	0.175
180	15.00	0.83	0.240	(0.149)	0.065	0.175
181	15.08	0.80	0.230	(0.149)	0.062	0.168
182	15.17	0.80	0.230	(0.148)	0.062	0.168
183	15.25	0.80	0.230	(0.147)	0.062	0.168
184	15.33	0.77	0.221	(0.146)	0.060	0.161
185	15.42	0.77	0.221	(0.146)	0.060	0.161
186	15.50	0.77	0.221	(0.145)	0.060	0.161
187	15.58	0.63	0.182	(0.144)	0.049	0.133
188	15.67	0.63	0.182	(0.143)	0.049	0.133
189	15.75	0.63	0.182	(0.143)	0.049	0.133
190	15.83	0.63	0.182	(0.142)	0.049	0.133
191	15.92	0.63	0.182	(0.141)	0.049	0.133
192	16.00	0.63	0.182	(0.141)	0.049	0.133
193	16.08	0.13	0.038	(0.140)	0.010	0.028
194	16.17	0.13	0.038	(0.139)	0.010	0.028
195	16.25	0.13	0.038	(0.138)	0.010	0.028

196	16.33	0.13	0.038	(0.138)	0.010	0.028
197	16.42	0.13	0.038	(0.137)	0.010	0.028
198	16.50	0.13	0.038	(0.136)	0.010	0.028
199	16.58	0.10	0.029	(0.136)	0.008	0.021
200	16.67	0.10	0.029	(0.135)	0.008	0.021
201	16.75	0.10	0.029	(0.134)	0.008	0.021
202	16.83	0.10	0.029	(0.134)	0.008	0.021
203	16.92	0.10	0.029	(0.133)	0.008	0.021
204	17.00	0.10	0.029	(0.132)	0.008	0.021
205	17.08	0.17	0.048	(0.132)	0.013	0.035
206	17.17	0.17	0.048	(0.131)	0.013	0.035
207	17.25	0.17	0.048	(0.130)	0.013	0.035
208	17.33	0.17	0.048	(0.130)	0.013	0.035
209	17.42	0.17	0.048	(0.129)	0.013	0.035
210	17.50	0.17	0.048	(0.128)	0.013	0.035
211	17.58	0.17	0.048	(0.128)	0.013	0.035
212	17.67	0.17	0.048	(0.127)	0.013	0.035
213	17.75	0.17	0.048	(0.126)	0.013	0.035
214	17.83	0.13	0.038	(0.126)	0.010	0.028
215	17.92	0.13	0.038	(0.125)	0.010	0.028
216	18.00	0.13	0.038	(0.124)	0.010	0.028
217	18.08	0.13	0.038	(0.124)	0.010	0.028
218	18.17	0.13	0.038	(0.123)	0.010	0.028
219	18.25	0.13	0.038	(0.123)	0.010	0.028
220	18.33	0.13	0.038	(0.122)	0.010	0.028
221	18.42	0.13	0.038	(0.121)	0.010	0.028
222	18.50	0.13	0.038	(0.121)	0.010	0.028
223	18.58	0.10	0.029	(0.120)	0.008	0.021
224	18.67	0.10	0.029	(0.120)	0.008	0.021
225	18.75	0.10	0.029	(0.119)	0.008	0.021
226	18.83	0.07	0.019	(0.119)	0.005	0.014
227	18.92	0.07	0.019	(0.118)	0.005	0.014
228	19.00	0.07	0.019	(0.117)	0.005	0.014
229	19.08	0.10	0.029	(0.117)	0.008	0.021
230	19.17	0.10	0.029	(0.116)	0.008	0.021
231	19.25	0.10	0.029	(0.116)	0.008	0.021
232	19.33	0.13	0.038	(0.115)	0.010	0.028
233	19.42	0.13	0.038	(0.115)	0.010	0.028
234	19.50	0.13	0.038	(0.114)	0.010	0.028
235	19.58	0.10	0.029	(0.114)	0.008	0.021
236	19.67	0.10	0.029	(0.113)	0.008	0.021
237	19.75	0.10	0.029	(0.113)	0.008	0.021
238	19.83	0.07	0.019	(0.112)	0.005	0.014
239	19.92	0.07	0.019	(0.112)	0.005	0.014
240	20.00	0.07	0.019	(0.111)	0.005	0.014
241	20.08	0.10	0.029	(0.111)	0.008	0.021
242	20.17	0.10	0.029	(0.110)	0.008	0.021
243	20.25	0.10	0.029	(0.110)	0.008	0.021
244	20.33	0.10	0.029	(0.109)	0.008	0.021
245	20.42	0.10	0.029	(0.109)	0.008	0.021
246	20.50	0.10	0.029	(0.108)	0.008	0.021
247	20.58	0.10	0.029	(0.108)	0.008	0.021
248	20.67	0.10	0.029	(0.107)	0.008	0.021
249	20.75	0.10	0.029	(0.107)	0.008	0.021
250	20.83	0.07	0.019	(0.106)	0.005	0.014
251	20.92	0.07	0.019	(0.106)	0.005	0.014
252	21.00	0.07	0.019	(0.106)	0.005	0.014
253	21.08	0.10	0.029	(0.105)	0.008	0.021
254	21.17	0.10	0.029	(0.105)	0.008	0.021
255	21.25	0.10	0.029	(0.104)	0.008	0.021
256	21.33	0.07	0.019	(0.104)	0.005	0.014
257	21.42	0.07	0.019	(0.104)	0.005	0.014
258	21.50	0.07	0.019	(0.103)	0.005	0.014
259	21.58	0.10	0.029	(0.103)	0.008	0.021
260	21.67	0.10	0.029	(0.102)	0.008	0.021
261	21.75	0.10	0.029	(0.102)	0.008	0.021
262	21.83	0.07	0.019	(0.102)	0.005	0.014
263	21.92	0.07	0.019	(0.101)	0.005	0.014
264	22.00	0.07	0.019	(0.101)	0.005	0.014
265	22.08	0.10	0.029	(0.101)	0.008	0.021
266	22.17	0.10	0.029	(0.100)	0.008	0.021
267	22.25	0.10	0.029	(0.100)	0.008	0.021
268	22.33	0.07	0.019	(0.100)	0.005	0.014
269	22.42	0.07	0.019	(0.099)	0.005	0.014
270	22.50	0.07	0.019	(0.099)	0.005	0.014

271	22.58	0.07	0.019	(0.099)	0.005	0.014
272	22.67	0.07	0.019	(0.099)	0.005	0.014
273	22.75	0.07	0.019	(0.098)	0.005	0.014
274	22.83	0.07	0.019	(0.098)	0.005	0.014
275	22.92	0.07	0.019	(0.098)	0.005	0.014
276	23.00	0.07	0.019	(0.098)	0.005	0.014
277	23.08	0.07	0.019	(0.097)	0.005	0.014
278	23.17	0.07	0.019	(0.097)	0.005	0.014
279	23.25	0.07	0.019	(0.097)	0.005	0.014
280	23.33	0.07	0.019	(0.097)	0.005	0.014
281	23.42	0.07	0.019	(0.097)	0.005	0.014
282	23.50	0.07	0.019	(0.096)	0.005	0.014
283	23.58	0.07	0.019	(0.096)	0.005	0.014
284	23.67	0.07	0.019	(0.096)	0.005	0.014
285	23.75	0.07	0.019	(0.096)	0.005	0.014
286	23.83	0.07	0.019	(0.096)	0.005	0.014
287	23.92	0.07	0.019	(0.096)	0.005	0.014
288	24.00	0.07	0.019	(0.096)	0.005	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 21.0

Flood volume = Effective rainfall 1.75(In)
times area 14.1(Ac.)/[(In)/(Ft.)] = 2.1(Ac.Ft)
Total soil loss = 0.65(In)
Total soil loss = 0.761(Ac.Ft)
Total rainfall = 2.40(In)
Flood volume = 89670.1 Cubic Feet
Total soil loss = 33165.7 Cubic Feet

Peak flow rate of this hydrograph = 3.388(CFS)

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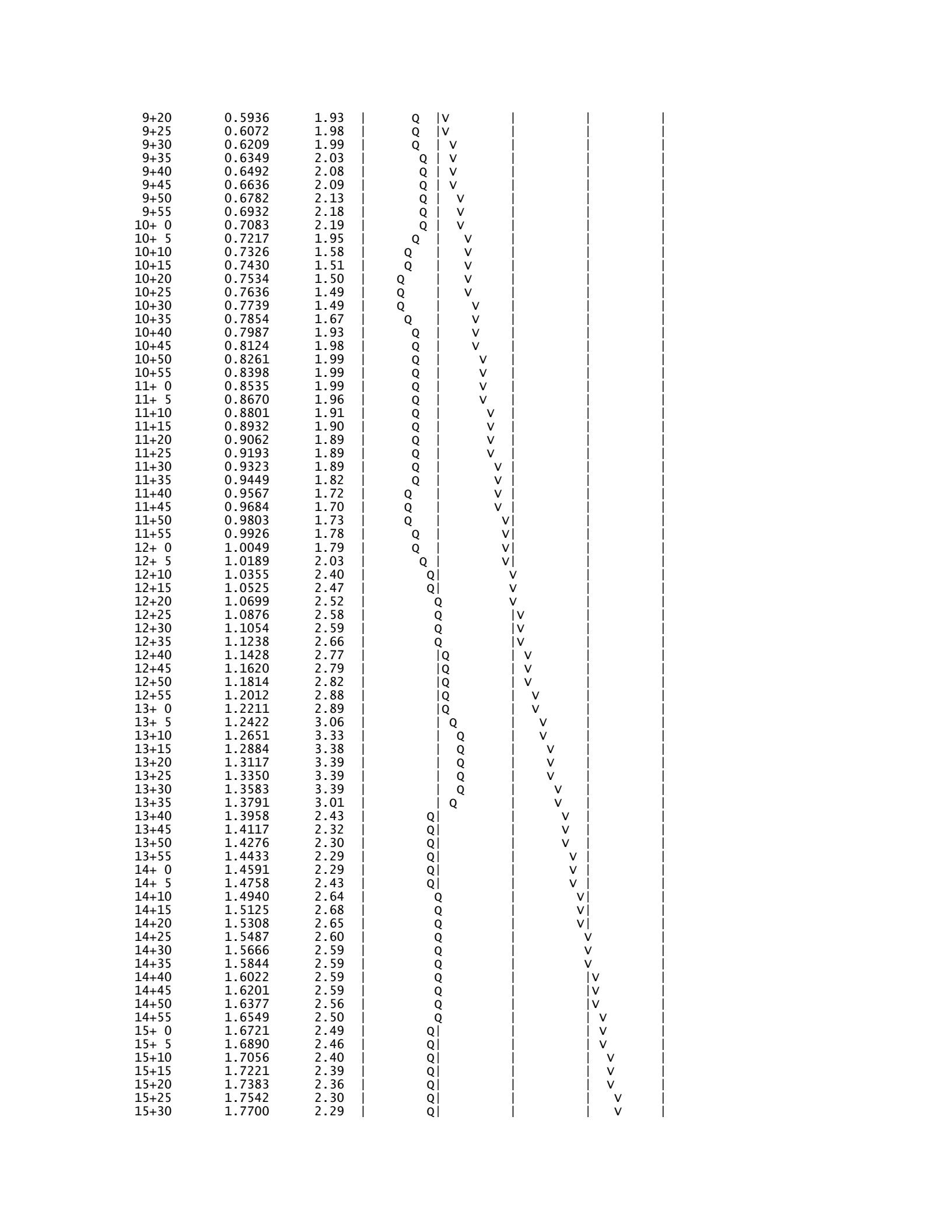
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0005	0.07	Q				
0+10	0.0017	0.17	Q				
0+15	0.0030	0.19	Q				
0+20	0.0046	0.23	Q				
0+25	0.0066	0.29	VQ				
0+30	0.0086	0.30	VQ				
0+35	0.0107	0.30	VQ				
0+40	0.0127	0.30	VQ				
0+45	0.0148	0.30	VQ				
0+50	0.0171	0.33	VQ				
0+55	0.0198	0.39	VQ				
1+ 0	0.0225	0.40	VQ				
1+ 5	0.0250	0.36	VQ				
1+10	0.0271	0.31	VQ				
1+15	0.0292	0.30	VQ				
1+20	0.0313	0.30	VQ				
1+25	0.0333	0.30	VQ				
1+30	0.0354	0.30	VQ				
1+35	0.0375	0.30	VQ				
1+40	0.0395	0.30	VQ				
1+45	0.0416	0.30	VQ				
1+50	0.0439	0.33	VQ				
1+55	0.0465	0.39	VQ				
2+ 0	0.0493	0.40	VQ				
2+ 5	0.0520	0.40	|Q				
2+10	0.0547	0.40	|Q				
2+15	0.0575	0.40	|Q				
2+20	0.0602	0.40	|Q				
2+25	0.0630	0.40	|Q				
2+30	0.0657	0.40	|Q				
2+35	0.0687	0.43	|Q				
2+40	0.0720	0.49	|Q				
2+45	0.0755	0.50	|Q				
2+50	0.0789	0.50	|Q				
2+55	0.0823	0.50	|Q				
3+ 0	0.0857	0.50	|Q				

3+ 5	0.0892	0.50	Q			
3+10	0.0926	0.50	Q			
3+15	0.0960	0.50	Q			
3+20	0.0995	0.50	Q			
3+25	0.1029	0.50	Q			
3+30	0.1063	0.50	QV			
3+35	0.1098	0.50	QV			
3+40	0.1132	0.50	QV			
3+45	0.1166	0.50	QV			
3+50	0.1203	0.53	Q			
3+55	0.1243	0.59	Q			
4+ 0	0.1284	0.60	Q			
4+ 5	0.1325	0.60	Q			
4+10	0.1367	0.60	Q			
4+15	0.1408	0.60	Q			
4+20	0.1451	0.63	Q			
4+25	0.1498	0.69	Q			
4+30	0.1546	0.70	QV			
4+35	0.1594	0.70	QV			
4+40	0.1642	0.70	QV			
4+45	0.1690	0.70	QV			
4+50	0.1741	0.73	QV			
4+55	0.1795	0.78	Q			
5+ 0	0.1850	0.79	Q			
5+ 5	0.1900	0.73	QV			
5+10	0.1943	0.62	QV			
5+15	0.1984	0.60	QV			
5+20	0.2028	0.63	QV			
5+25	0.2075	0.69	Q V			
5+30	0.2123	0.70	Q V			
5+35	0.2173	0.73	Q V			
5+40	0.2227	0.78	QV			
5+45	0.2282	0.79	QV			
5+50	0.2337	0.80	QV			
5+55	0.2392	0.80	QV			
6+ 0	0.2447	0.80	QV			
6+ 5	0.2504	0.83	QV			
6+10	0.2565	0.88	QV			
6+15	0.2626	0.89	Q V			
6+20	0.2688	0.90	Q V			
6+25	0.2750	0.90	Q V			
6+30	0.2812	0.90	Q V			
6+35	0.2876	0.93	Q V			
6+40	0.2943	0.98	Q V			
6+45	0.3012	0.99	Q V			
6+50	0.3080	1.00	Q V			
6+55	0.3149	1.00	Q V			
7+ 0	0.3218	1.00	Q V			
7+ 5	0.3286	1.00	Q V			
7+10	0.3355	1.00	Q V			
7+15	0.3424	1.00	Q V			
7+20	0.3495	1.03	Q V			
7+25	0.3569	1.08	Q V			
7+30	0.3644	1.09	Q V			
7+35	0.3722	1.13	Q V			
7+40	0.3804	1.18	Q V			
7+45	0.3886	1.19	Q V			
7+50	0.3971	1.23	Q V			
7+55	0.4059	1.28	Q V			
8+ 0	0.4148	1.29	Q V			
8+ 5	0.4242	1.36	Q V			
8+10	0.4343	1.47	Q V			
8+15	0.4446	1.49	Q V			
8+20	0.4549	1.49	Q V			
8+25	0.4652	1.49	Q V			
8+30	0.4754	1.49	Q V			
8+35	0.4860	1.53	Q V			
8+40	0.4969	1.58	Q V			
8+45	0.5078	1.59	Q V			
8+50	0.5190	1.63	Q V			
8+55	0.5306	1.68	Q V			
9+ 0	0.5423	1.69	Q V			
9+ 5	0.5544	1.76	Q V			
9+10	0.5673	1.87	Q V			
9+15	0.5803	1.89	Q V			



15+35	1.7848	2.15	| Q |	|	|	| V |
15+40	1.7982	1.94	| Q |	|	|	| V |
15+45	1.8113	1.90	| Q |	|	|	| V |
15+50	1.8243	1.90	| Q |	|	|	| V |
15+55	1.8374	1.89	| Q |	|	|	| V |
16+ 0	1.8504	1.89	| Q |	|	|	| V |
16+ 5	1.8599	1.38	| Q |	|	|	| V |
16+10	1.8639	0.58	| Q |	|	|	| V |
16+15	1.8669	0.43	|Q |	|	|	| V |
16+20	1.8697	0.41	|Q |	|	|	| V |
16+25	1.8724	0.40	|Q |	|	|	| V |
16+30	1.8752	0.40	|Q |	|	|	| V |
16+35	1.8777	0.36	|Q |	|	|	| V |
16+40	1.8798	0.31	|Q |	|	|	| V |
16+45	1.8819	0.30	|Q |	|	|	| V |
16+50	1.8840	0.30	|Q |	|	|	| V |
16+55	1.8860	0.30	|Q |	|	|	| V |
17+ 0	1.8881	0.30	|Q |	|	|	| V |
17+ 5	1.8906	0.37	|Q |	|	|	| V |
17+10	1.8939	0.47	|Q |	|	|	| V |
17+15	1.8973	0.49	|Q |	|	|	| V |
17+20	1.9007	0.50	|Q |	|	|	| V |
17+25	1.9041	0.50	|Q |	|	|	| V |
17+30	1.9076	0.50	|Q |	|	|	| V |
17+35	1.9110	0.50	|Q |	|	|	| V |
17+40	1.9144	0.50	|Q |	|	|	| V |
17+45	1.9179	0.50	|Q |	|	|	| V |
17+50	1.9210	0.46	|Q |	|	|	| V |
17+55	1.9239	0.41	|Q |	|	|	| V |
18+ 0	1.9266	0.40	|Q |	|	|	| V |
18+ 5	1.9294	0.40	|Q |	|	|	| V |
18+10	1.9321	0.40	|Q |	|	|	| V |
18+15	1.9349	0.40	|Q |	|	|	| V |
18+20	1.9376	0.40	|Q |	|	|	| V |
18+25	1.9404	0.40	|Q |	|	|	| V |
18+30	1.9431	0.40	|Q |	|	|	| V |
18+35	1.9456	0.36	|Q |	|	|	| V |
18+40	1.9478	0.31	|Q |	|	|	| V |
18+45	1.9498	0.30	|Q |	|	|	| V |
18+50	1.9517	0.27	|Q |	|	|	| V |
18+55	1.9531	0.21	| Q |	|	|	| V |
19+ 0	1.9545	0.20	| Q |	|	|	| V |
19+ 5	1.9561	0.23	| Q |	|	|	| V |
19+10	1.9581	0.29	|Q |	|	|	| V |
19+15	1.9601	0.30	|Q |	|	|	| V |
19+20	1.9624	0.33	|Q |	|	|	| V |
19+25	1.9651	0.39	|Q |	|	|	| V |
19+30	1.9678	0.40	|Q |	|	|	| V |
19+35	1.9703	0.36	|Q |	|	|	| V |
19+40	1.9725	0.31	|Q |	|	|	| V |
19+45	1.9745	0.30	|Q |	|	|	| V |
19+50	1.9764	0.27	|Q |	|	|	| V |
19+55	1.9778	0.21	| Q |	|	|	| V |
20+ 0	1.9792	0.20	| Q |	|	|	| V |
20+ 5	1.9808	0.23	| Q |	|	|	| V |
20+10	1.9828	0.29	|Q |	|	|	| V |
20+15	1.9848	0.30	|Q |	|	|	| V |
20+20	1.9869	0.30	|Q |	|	|	| V |
20+25	1.9889	0.30	|Q |	|	|	| V |
20+30	1.9910	0.30	|Q |	|	|	| V |
20+35	1.9931	0.30	|Q |	|	|	| V |
20+40	1.9951	0.30	|Q |	|	|	| V |
20+45	1.9972	0.30	|Q |	|	|	| V |
20+50	1.9990	0.26	|Q |	|	|	| V |
20+55	2.0005	0.21	| Q |	|	|	| V |
21+ 0	2.0019	0.20	| Q |	|	|	| V |
21+ 5	2.0035	0.23	| Q |	|	|	| V |
21+10	2.0054	0.29	|Q |	|	|	| V |
21+15	2.0075	0.30	|Q |	|	|	| V|
21+20	2.0093	0.26	|Q |	|	|	| V|
21+25	2.0108	0.21	| Q |	|	|	| V|
21+30	2.0121	0.20	| Q |	|	|	| V|
21+35	2.0138	0.23	| Q |	|	|	| V|
21+40	2.0157	0.29	|Q |	|	|	| V|
21+45	2.0178	0.30	|Q |	|	|	| V|

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   21+50       2.0196      0.26  |Q        |         |         |         V|
   21+55       2.0210      0.21  Q        |         |         |         V|
   22+ 0       2.0224      0.20  Q        |         |         |         V|
   22+ 5       2.0240      0.23  Q        |         |         |         V|
   22+10       2.0260      0.29  |Q        |         |         |         V|
   22+15       2.0281      0.30  |Q        |         |         |         V|
   22+20       2.0299      0.26  |Q        |         |         |         V|
   22+25       2.0313      0.21  Q        |         |         |         V|
   22+30       2.0327      0.20  Q        |         |         |         V|
   22+35       2.0341      0.20  Q        |         |         |         V|
   22+40       2.0355      0.20  Q        |         |         |         V|
   22+45       2.0369      0.20  Q        |         |         |         V|
   22+50       2.0382      0.20  Q        |         |         |         V|
   22+55       2.0396      0.20  Q        |         |         |         V|
   23+ 0       2.0410      0.20  Q        |         |         |         V|
   23+ 5       2.0423      0.20  Q        |         |         |         V|
   23+10       2.0437      0.20  Q        |         |         |         V|
   23+15       2.0451      0.20  Q        |         |         |         V|
   23+20       2.0465      0.20  Q        |         |         |         V|
   23+25       2.0478      0.20  Q        |         |         |         V|
   23+30       2.0492      0.20  Q        |         |         |         V|
   23+35       2.0506      0.20  Q        |         |         |         V|
   23+40       2.0519      0.20  Q        |         |         |         V|
   23+45       2.0533      0.20  Q        |         |         |         V|
   23+50       2.0547      0.20  Q        |         |         |         V|
   23+55       2.0561      0.20  Q        |         |         |         V|
   24+ 0       2.0574      0.20  Q        |         |         |         V|
   24+ 5       2.0583      0.13  Q        |         |         |         V|
   24+10       2.0585      0.02  Q        |         |         |         V|
   24+15       2.0585      0.00  Q        |         |         |         V|
   24+20       2.0585      0.00  Q        |         |         |         V|
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/09/21 File: PROP2YRD2242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA D2 PROPOSED CONDITION- 2 YR STORM
21-0034
2021-11-09 EP

Drainage Area = 14.10(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 14.10(Ac.) = 0.022 Sq. Mi.
Length along longest watercourse = 1370.00(Ft.)
Length along longest watercourse measured to centroid = 486.00(Ft.)
Length along longest watercourse = 0.259 Mi.
Length along longest watercourse measured to centroid = 0.092 Mi.
Difference in elevation = 3.00(Ft.)
Slope along watercourse = 11.5620 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.055 Hr.
Lag time = 3.28 Min.
25% of lag time = 0.82 Min.
40% of lag time = 1.31 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
14.10	2.40	33.84

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
14.10	6.20	87.42

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
14.100	65.50	0.760

Total Area Entered = 14.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

65.5	45.6	0.615	0.760	0.194	1.000	0.194
					Sum (F) =	0.194

Area averaged mean soil loss (F) (In/Hr) = 0.194
Minimum soil loss rate ((In/Hr)) = 0.097
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.290

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	152.342	31.187	4.432
2	0.167	304.684	54.150	7.695
3	0.250	457.025	11.586	1.646
4	0.333	609.367	2.274	0.323
5	0.417	761.709	0.803	0.114
			Sum = 100.000	Sum= 14.210

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.345)	0.006	0.014
2	0.17	0.07	0.019	(0.343)	0.006	0.014
3	0.25	0.07	0.019	(0.342)	0.006	0.014
4	0.33	0.10	0.029	(0.341)	0.008	0.020
5	0.42	0.10	0.029	(0.339)	0.008	0.020
6	0.50	0.10	0.029	(0.338)	0.008	0.020
7	0.58	0.10	0.029	(0.337)	0.008	0.020
8	0.67	0.10	0.029	(0.335)	0.008	0.020
9	0.75	0.10	0.029	(0.334)	0.008	0.020
10	0.83	0.13	0.038	(0.333)	0.011	0.027
11	0.92	0.13	0.038	(0.331)	0.011	0.027
12	1.00	0.13	0.038	(0.330)	0.011	0.027
13	1.08	0.10	0.029	(0.329)	0.008	0.020
14	1.17	0.10	0.029	(0.327)	0.008	0.020
15	1.25	0.10	0.029	(0.326)	0.008	0.020
16	1.33	0.10	0.029	(0.325)	0.008	0.020
17	1.42	0.10	0.029	(0.324)	0.008	0.020
18	1.50	0.10	0.029	(0.322)	0.008	0.020
19	1.58	0.10	0.029	(0.321)	0.008	0.020
20	1.67	0.10	0.029	(0.320)	0.008	0.020
21	1.75	0.10	0.029	(0.318)	0.008	0.020
22	1.83	0.13	0.038	(0.317)	0.011	0.027
23	1.92	0.13	0.038	(0.316)	0.011	0.027
24	2.00	0.13	0.038	(0.315)	0.011	0.027
25	2.08	0.13	0.038	(0.313)	0.011	0.027
26	2.17	0.13	0.038	(0.312)	0.011	0.027
27	2.25	0.13	0.038	(0.311)	0.011	0.027
28	2.33	0.13	0.038	(0.310)	0.011	0.027
29	2.42	0.13	0.038	(0.308)	0.011	0.027
30	2.50	0.13	0.038	(0.307)	0.011	0.027
31	2.58	0.17	0.048	(0.306)	0.014	0.034
32	2.67	0.17	0.048	(0.304)	0.014	0.034
33	2.75	0.17	0.048	(0.303)	0.014	0.034
34	2.83	0.17	0.048	(0.302)	0.014	0.034
35	2.92	0.17	0.048	(0.301)	0.014	0.034
36	3.00	0.17	0.048	(0.299)	0.014	0.034
37	3.08	0.17	0.048	(0.298)	0.014	0.034
38	3.17	0.17	0.048	(0.297)	0.014	0.034
39	3.25	0.17	0.048	(0.296)	0.014	0.034
40	3.33	0.17	0.048	(0.295)	0.014	0.034
41	3.42	0.17	0.048	(0.293)	0.014	0.034
42	3.50	0.17	0.048	(0.292)	0.014	0.034
43	3.58	0.17	0.048	(0.291)	0.014	0.034
44	3.67	0.17	0.048	(0.290)	0.014	0.034
45	3.75	0.17	0.048	(0.288)	0.014	0.034

46	3.83	0.20	0.058	(0.287)	0.017	0.041
47	3.92	0.20	0.058	(0.286)	0.017	0.041
48	4.00	0.20	0.058	(0.285)	0.017	0.041
49	4.08	0.20	0.058	(0.284)	0.017	0.041
50	4.17	0.20	0.058	(0.282)	0.017	0.041
51	4.25	0.20	0.058	(0.281)	0.017	0.041
52	4.33	0.23	0.067	(0.280)	0.019	0.048
53	4.42	0.23	0.067	(0.279)	0.019	0.048
54	4.50	0.23	0.067	(0.278)	0.019	0.048
55	4.58	0.23	0.067	(0.276)	0.019	0.048
56	4.67	0.23	0.067	(0.275)	0.019	0.048
57	4.75	0.23	0.067	(0.274)	0.019	0.048
58	4.83	0.27	0.077	(0.273)	0.022	0.055
59	4.92	0.27	0.077	(0.272)	0.022	0.055
60	5.00	0.27	0.077	(0.270)	0.022	0.055
61	5.08	0.20	0.058	(0.269)	0.017	0.041
62	5.17	0.20	0.058	(0.268)	0.017	0.041
63	5.25	0.20	0.058	(0.267)	0.017	0.041
64	5.33	0.23	0.067	(0.266)	0.019	0.048
65	5.42	0.23	0.067	(0.265)	0.019	0.048
66	5.50	0.23	0.067	(0.263)	0.019	0.048
67	5.58	0.27	0.077	(0.262)	0.022	0.055
68	5.67	0.27	0.077	(0.261)	0.022	0.055
69	5.75	0.27	0.077	(0.260)	0.022	0.055
70	5.83	0.27	0.077	(0.259)	0.022	0.055
71	5.92	0.27	0.077	(0.258)	0.022	0.055
72	6.00	0.27	0.077	(0.257)	0.022	0.055
73	6.08	0.30	0.086	(0.255)	0.025	0.061
74	6.17	0.30	0.086	(0.254)	0.025	0.061
75	6.25	0.30	0.086	(0.253)	0.025	0.061
76	6.33	0.30	0.086	(0.252)	0.025	0.061
77	6.42	0.30	0.086	(0.251)	0.025	0.061
78	6.50	0.30	0.086	(0.250)	0.025	0.061
79	6.58	0.33	0.096	(0.249)	0.028	0.068
80	6.67	0.33	0.096	(0.248)	0.028	0.068
81	6.75	0.33	0.096	(0.246)	0.028	0.068
82	6.83	0.33	0.096	(0.245)	0.028	0.068
83	6.92	0.33	0.096	(0.244)	0.028	0.068
84	7.00	0.33	0.096	(0.243)	0.028	0.068
85	7.08	0.33	0.096	(0.242)	0.028	0.068
86	7.17	0.33	0.096	(0.241)	0.028	0.068
87	7.25	0.33	0.096	(0.240)	0.028	0.068
88	7.33	0.37	0.106	(0.239)	0.031	0.075
89	7.42	0.37	0.106	(0.238)	0.031	0.075
90	7.50	0.37	0.106	(0.237)	0.031	0.075
91	7.58	0.40	0.115	(0.235)	0.033	0.082
92	7.67	0.40	0.115	(0.234)	0.033	0.082
93	7.75	0.40	0.115	(0.233)	0.033	0.082
94	7.83	0.43	0.125	(0.232)	0.036	0.089
95	7.92	0.43	0.125	(0.231)	0.036	0.089
96	8.00	0.43	0.125	(0.230)	0.036	0.089
97	8.08	0.50	0.144	(0.229)	0.042	0.102
98	8.17	0.50	0.144	(0.228)	0.042	0.102
99	8.25	0.50	0.144	(0.227)	0.042	0.102
100	8.33	0.50	0.144	(0.226)	0.042	0.102
101	8.42	0.50	0.144	(0.225)	0.042	0.102
102	8.50	0.50	0.144	(0.224)	0.042	0.102
103	8.58	0.53	0.154	(0.223)	0.045	0.109
104	8.67	0.53	0.154	(0.222)	0.045	0.109
105	8.75	0.53	0.154	(0.221)	0.045	0.109
106	8.83	0.57	0.163	(0.219)	0.047	0.116
107	8.92	0.57	0.163	(0.218)	0.047	0.116
108	9.00	0.57	0.163	(0.217)	0.047	0.116
109	9.08	0.63	0.182	(0.216)	0.053	0.130
110	9.17	0.63	0.182	(0.215)	0.053	0.130
111	9.25	0.63	0.182	(0.214)	0.053	0.130
112	9.33	0.67	0.192	(0.213)	0.056	0.136
113	9.42	0.67	0.192	(0.212)	0.056	0.136
114	9.50	0.67	0.192	(0.211)	0.056	0.136
115	9.58	0.70	0.202	(0.210)	0.058	0.143
116	9.67	0.70	0.202	(0.209)	0.058	0.143
117	9.75	0.70	0.202	(0.208)	0.058	0.143
118	9.83	0.73	0.211	(0.207)	0.061	0.150
119	9.92	0.73	0.211	(0.206)	0.061	0.150
120	10.00	0.73	0.211	(0.205)	0.061	0.150

121	10.08	0.50	0.144	(0.204)	0.042	0.102
122	10.17	0.50	0.144	(0.203)	0.042	0.102
123	10.25	0.50	0.144	(0.202)	0.042	0.102
124	10.33	0.50	0.144	(0.201)	0.042	0.102
125	10.42	0.50	0.144	(0.200)	0.042	0.102
126	10.50	0.50	0.144	(0.199)	0.042	0.102
127	10.58	0.67	0.192	(0.198)	0.056	0.136
128	10.67	0.67	0.192	(0.197)	0.056	0.136
129	10.75	0.67	0.192	(0.196)	0.056	0.136
130	10.83	0.67	0.192	(0.195)	0.056	0.136
131	10.92	0.67	0.192	(0.195)	0.056	0.136
132	11.00	0.67	0.192	(0.194)	0.056	0.136
133	11.08	0.63	0.182	(0.193)	0.053	0.130
134	11.17	0.63	0.182	(0.192)	0.053	0.130
135	11.25	0.63	0.182	(0.191)	0.053	0.130
136	11.33	0.63	0.182	(0.190)	0.053	0.130
137	11.42	0.63	0.182	(0.189)	0.053	0.130
138	11.50	0.63	0.182	(0.188)	0.053	0.130
139	11.58	0.57	0.163	(0.187)	0.047	0.116
140	11.67	0.57	0.163	(0.186)	0.047	0.116
141	11.75	0.57	0.163	(0.185)	0.047	0.116
142	11.83	0.60	0.173	(0.184)	0.050	0.123
143	11.92	0.60	0.173	(0.183)	0.050	0.123
144	12.00	0.60	0.173	(0.182)	0.050	0.123
145	12.08	0.83	0.240	(0.181)	0.070	0.170
146	12.17	0.83	0.240	(0.181)	0.070	0.170
147	12.25	0.83	0.240	(0.180)	0.070	0.170
148	12.33	0.87	0.250	(0.179)	0.072	0.177
149	12.42	0.87	0.250	(0.178)	0.072	0.177
150	12.50	0.87	0.250	(0.177)	0.072	0.177
151	12.58	0.93	0.269	(0.176)	0.078	0.191
152	12.67	0.93	0.269	(0.175)	0.078	0.191
153	12.75	0.93	0.269	(0.174)	0.078	0.191
154	12.83	0.97	0.278	(0.173)	0.081	0.198
155	12.92	0.97	0.278	(0.173)	0.081	0.198
156	13.00	0.97	0.278	(0.172)	0.081	0.198
157	13.08	1.13	0.326	(0.171)	0.095	0.232
158	13.17	1.13	0.326	(0.170)	0.095	0.232
159	13.25	1.13	0.326	(0.169)	0.095	0.232
160	13.33	1.13	0.326	(0.168)	0.095	0.232
161	13.42	1.13	0.326	(0.167)	0.095	0.232
162	13.50	1.13	0.326	(0.166)	0.095	0.232
163	13.58	0.77	0.221	(0.166)	0.064	0.157
164	13.67	0.77	0.221	(0.165)	0.064	0.157
165	13.75	0.77	0.221	(0.164)	0.064	0.157
166	13.83	0.77	0.221	(0.163)	0.064	0.157
167	13.92	0.77	0.221	(0.162)	0.064	0.157
168	14.00	0.77	0.221	(0.161)	0.064	0.157
169	14.08	0.90	0.259	(0.161)	0.075	0.184
170	14.17	0.90	0.259	(0.160)	0.075	0.184
171	14.25	0.90	0.259	(0.159)	0.075	0.184
172	14.33	0.87	0.250	(0.158)	0.072	0.177
173	14.42	0.87	0.250	(0.157)	0.072	0.177
174	14.50	0.87	0.250	(0.157)	0.072	0.177
175	14.58	0.87	0.250	(0.156)	0.072	0.177
176	14.67	0.87	0.250	(0.155)	0.072	0.177
177	14.75	0.87	0.250	(0.154)	0.072	0.177
178	14.83	0.83	0.240	(0.153)	0.070	0.170
179	14.92	0.83	0.240	(0.153)	0.070	0.170
180	15.00	0.83	0.240	(0.152)	0.070	0.170
181	15.08	0.80	0.230	(0.151)	0.067	0.164
182	15.17	0.80	0.230	(0.150)	0.067	0.164
183	15.25	0.80	0.230	(0.149)	0.067	0.164
184	15.33	0.77	0.221	(0.149)	0.064	0.157
185	15.42	0.77	0.221	(0.148)	0.064	0.157
186	15.50	0.77	0.221	(0.147)	0.064	0.157
187	15.58	0.63	0.182	(0.146)	0.053	0.130
188	15.67	0.63	0.182	(0.146)	0.053	0.130
189	15.75	0.63	0.182	(0.145)	0.053	0.130
190	15.83	0.63	0.182	(0.144)	0.053	0.130
191	15.92	0.63	0.182	(0.143)	0.053	0.130
192	16.00	0.63	0.182	(0.143)	0.053	0.130
193	16.08	0.13	0.038	(0.142)	0.011	0.027
194	16.17	0.13	0.038	(0.141)	0.011	0.027
195	16.25	0.13	0.038	(0.141)	0.011	0.027

196	16.33	0.13	0.038	(0.140)	0.011	0.027
197	16.42	0.13	0.038	(0.139)	0.011	0.027
198	16.50	0.13	0.038	(0.138)	0.011	0.027
199	16.58	0.10	0.029	(0.138)	0.008	0.020
200	16.67	0.10	0.029	(0.137)	0.008	0.020
201	16.75	0.10	0.029	(0.136)	0.008	0.020
202	16.83	0.10	0.029	(0.136)	0.008	0.020
203	16.92	0.10	0.029	(0.135)	0.008	0.020
204	17.00	0.10	0.029	(0.134)	0.008	0.020
205	17.08	0.17	0.048	(0.134)	0.014	0.034
206	17.17	0.17	0.048	(0.133)	0.014	0.034
207	17.25	0.17	0.048	(0.132)	0.014	0.034
208	17.33	0.17	0.048	(0.132)	0.014	0.034
209	17.42	0.17	0.048	(0.131)	0.014	0.034
210	17.50	0.17	0.048	(0.130)	0.014	0.034
211	17.58	0.17	0.048	(0.130)	0.014	0.034
212	17.67	0.17	0.048	(0.129)	0.014	0.034
213	17.75	0.17	0.048	(0.128)	0.014	0.034
214	17.83	0.13	0.038	(0.128)	0.011	0.027
215	17.92	0.13	0.038	(0.127)	0.011	0.027
216	18.00	0.13	0.038	(0.126)	0.011	0.027
217	18.08	0.13	0.038	(0.126)	0.011	0.027
218	18.17	0.13	0.038	(0.125)	0.011	0.027
219	18.25	0.13	0.038	(0.125)	0.011	0.027
220	18.33	0.13	0.038	(0.124)	0.011	0.027
221	18.42	0.13	0.038	(0.123)	0.011	0.027
222	18.50	0.13	0.038	(0.123)	0.011	0.027
223	18.58	0.10	0.029	(0.122)	0.008	0.020
224	18.67	0.10	0.029	(0.122)	0.008	0.020
225	18.75	0.10	0.029	(0.121)	0.008	0.020
226	18.83	0.07	0.019	(0.120)	0.006	0.014
227	18.92	0.07	0.019	(0.120)	0.006	0.014
228	19.00	0.07	0.019	(0.119)	0.006	0.014
229	19.08	0.10	0.029	(0.119)	0.008	0.020
230	19.17	0.10	0.029	(0.118)	0.008	0.020
231	19.25	0.10	0.029	(0.118)	0.008	0.020
232	19.33	0.13	0.038	(0.117)	0.011	0.027
233	19.42	0.13	0.038	(0.117)	0.011	0.027
234	19.50	0.13	0.038	(0.116)	0.011	0.027
235	19.58	0.10	0.029	(0.115)	0.008	0.020
236	19.67	0.10	0.029	(0.115)	0.008	0.020
237	19.75	0.10	0.029	(0.114)	0.008	0.020
238	19.83	0.07	0.019	(0.114)	0.006	0.014
239	19.92	0.07	0.019	(0.113)	0.006	0.014
240	20.00	0.07	0.019	(0.113)	0.006	0.014
241	20.08	0.10	0.029	(0.112)	0.008	0.020
242	20.17	0.10	0.029	(0.112)	0.008	0.020
243	20.25	0.10	0.029	(0.111)	0.008	0.020
244	20.33	0.10	0.029	(0.111)	0.008	0.020
245	20.42	0.10	0.029	(0.110)	0.008	0.020
246	20.50	0.10	0.029	(0.110)	0.008	0.020
247	20.58	0.10	0.029	(0.110)	0.008	0.020
248	20.67	0.10	0.029	(0.109)	0.008	0.020
249	20.75	0.10	0.029	(0.109)	0.008	0.020
250	20.83	0.07	0.019	(0.108)	0.006	0.014
251	20.92	0.07	0.019	(0.108)	0.006	0.014
252	21.00	0.07	0.019	(0.107)	0.006	0.014
253	21.08	0.10	0.029	(0.107)	0.008	0.020
254	21.17	0.10	0.029	(0.106)	0.008	0.020
255	21.25	0.10	0.029	(0.106)	0.008	0.020
256	21.33	0.07	0.019	(0.106)	0.006	0.014
257	21.42	0.07	0.019	(0.105)	0.006	0.014
258	21.50	0.07	0.019	(0.105)	0.006	0.014
259	21.58	0.10	0.029	(0.104)	0.008	0.020
260	21.67	0.10	0.029	(0.104)	0.008	0.020
261	21.75	0.10	0.029	(0.104)	0.008	0.020
262	21.83	0.07	0.019	(0.103)	0.006	0.014
263	21.92	0.07	0.019	(0.103)	0.006	0.014
264	22.00	0.07	0.019	(0.103)	0.006	0.014
265	22.08	0.10	0.029	(0.102)	0.008	0.020
266	22.17	0.10	0.029	(0.102)	0.008	0.020
267	22.25	0.10	0.029	(0.102)	0.008	0.020
268	22.33	0.07	0.019	(0.101)	0.006	0.014
269	22.42	0.07	0.019	(0.101)	0.006	0.014
270	22.50	0.07	0.019	(0.101)	0.006	0.014

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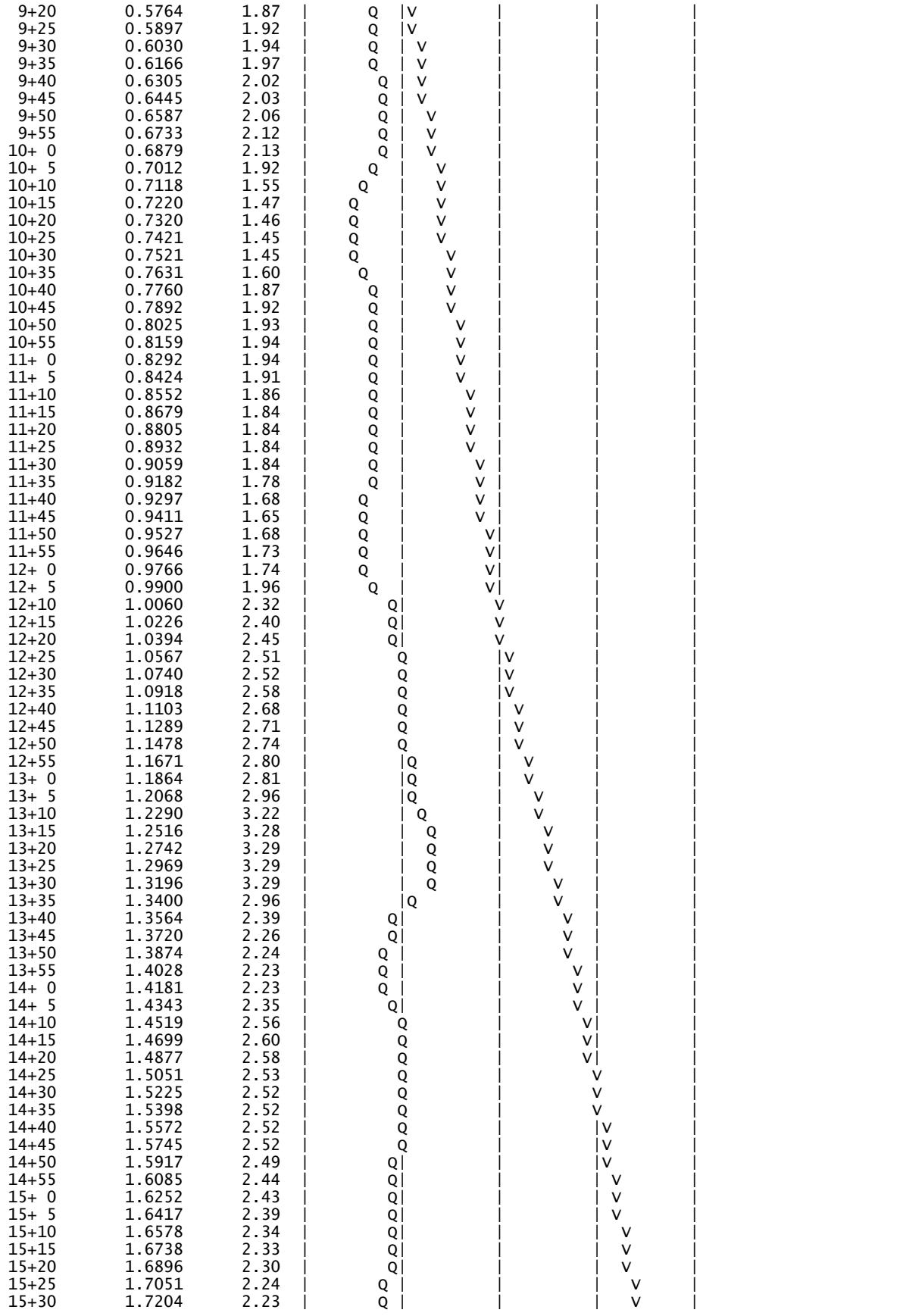
271  22.58     0.07      0.019       (  0.100)       0.006        0.014
272  22.67     0.07      0.019       (  0.100)       0.006        0.014
273  22.75     0.07      0.019       (  0.100)       0.006        0.014
274  22.83     0.07      0.019       (  0.100)       0.006        0.014
275  22.92     0.07      0.019       (  0.099)       0.006        0.014
276  23.00     0.07      0.019       (  0.099)       0.006        0.014
277  23.08     0.07      0.019       (  0.099)       0.006        0.014
278  23.17     0.07      0.019       (  0.099)       0.006        0.014
279  23.25     0.07      0.019       (  0.098)       0.006        0.014
280  23.33     0.07      0.019       (  0.098)       0.006        0.014
281  23.42     0.07      0.019       (  0.098)       0.006        0.014
282  23.50     0.07      0.019       (  0.098)       0.006        0.014
283  23.58     0.07      0.019       (  0.098)       0.006        0.014
284  23.67     0.07      0.019       (  0.098)       0.006        0.014
285  23.75     0.07      0.019       (  0.097)       0.006        0.014
286  23.83     0.07      0.019       (  0.097)       0.006        0.014
287  23.92     0.07      0.019       (  0.097)       0.006        0.014
288  24.00     0.07      0.019       (  0.097)       0.006        0.014
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    20.4
      Flood volume = Effective rainfall      1.70(In)
       times area      14.1(Ac.)/[(In)/(Ft.)] =       2.0(Ac.Ft)
      Total soil loss =      0.70(In)
      Total soil loss =     0.818(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       87213.4 Cubic Feet
      Total soil loss =       35622.4 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.295(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0004      0.06  Q         |         |         |         |
   0+10       0.0016      0.17  Q         |         |         |         |
   0+15       0.0028      0.19  Q         |         |         |         |
   0+20       0.0044      0.22  Q         |         |         |         |
   0+25       0.0063      0.28  VQ        |         |         |         |
   0+30       0.0083      0.29  VQ        |         |         |         |
   0+35       0.0103      0.29  VQ        |         |         |         |
   0+40       0.0123      0.29  VQ        |         |         |         |
   0+45       0.0143      0.29  VQ        |         |         |         |
   0+50       0.0165      0.32  VQ        |         |         |         |
   0+55       0.0191      0.37  VQ        |         |         |         |
   1+ 0       0.0217      0.38  VQ        |         |         |         |
   1+ 5       0.0242      0.36  VQ        |         |         |         |
   1+10       0.0263      0.30  VQ        |         |         |         |
   1+15       0.0283      0.29  VQ        |         |         |         |
   1+20       0.0303      0.29  VQ        |         |         |         |
   1+25       0.0323      0.29  VQ        |         |         |         |
   1+30       0.0343      0.29  VQ        |         |         |         |
   1+35       0.0363      0.29  VQ        |         |         |         |
   1+40       0.0383      0.29  VQ        |         |         |         |
   1+45       0.0403      0.29  VQ        |         |         |         |
   1+50       0.0425      0.32  VQ        |         |         |         |
   1+55       0.0451      0.37  VQ        |         |         |         |
   2+ 0       0.0477      0.38  VQ        |         |         |         |
   2+ 5       0.0504      0.39  |Q        |         |         |         |
   2+10       0.0531      0.39  |Q        |         |         |         |
   2+15       0.0557      0.39  |Q        |         |         |         |
   2+20       0.0584      0.39  |Q        |         |         |         |
   2+25       0.0611      0.39  |Q        |         |         |         |
   2+30       0.0637      0.39  |Q        |         |         |         |
   2+35       0.0666      0.42  |Q        |         |         |         |
   2+40       0.0699      0.47  |Q        |         |         |         |
   2+45       0.0732      0.48  |Q        |         |         |         |
   2+50       0.0765      0.48  |Q        |         |         |         |
   2+55       0.0798      0.48  |Q        |         |         |         |
   3+ 0       0.0832      0.48  |Q        |         |         |         |
```

```
3+ 5       0.0865      0.48  |Q         |          |          |          |
3+10       0.0899      0.48  |Q         |          |          |          |
3+15       0.0932      0.48  |Q         |          |          |          |
3+20       0.0965      0.48  |Q         |          |          |          |
3+25       0.0999      0.48  |Q         |          |          |          |
3+30       0.1032      0.48  |QV        |          |          |          |
3+35       0.1065      0.48  |QV        |          |          |          |
3+40       0.1099      0.48  |QV        |          |          |          |
3+45       0.1132      0.48  |QV        |          |          |          |
3+50       0.1168      0.51  | Q        |          |          |          |
3+55       0.1207      0.57  | Q        |          |          |          |
4+ 0       0.1246      0.58  | Q        |          |          |          |
4+ 5       0.1286      0.58  | Q        |          |          |          |
4+10       0.1326      0.58  | Q        |          |          |          |
4+15       0.1367      0.58  | Q        |          |          |          |
4+20       0.1409      0.61  | Q        |          |          |          |
4+25       0.1454      0.66  | Q        |          |          |          |
4+30       0.1501      0.68  | Q        |          |          |          |
4+35       0.1548      0.68  | QV       |          |          |          |
4+40       0.1594      0.68  | QV       |          |          |          |
4+45       0.1641      0.68  | QV       |          |          |          |
4+50       0.1690      0.71  | QV       |          |          |          |
4+55       0.1742      0.76  |  Q       |          |          |          |
5+ 0       0.1795      0.77  |  Q       |          |          |          |
5+ 5       0.1845      0.71  | QV       |          |          |          |
5+10       0.1887      0.61  | QV       |          |          |          |
5+15       0.1927      0.59  | QV       |          |          |          |
5+20       0.1969      0.61  | QV       |          |          |          |
5+25       0.2015      0.66  | Q V      |          |          |          |
5+30       0.2061      0.68  | Q V      |          |          |          |
5+35       0.2110      0.71  | Q V      |          |          |          |
5+40       0.2163      0.76  |  QV      |          |          |          |
5+45       0.2216      0.77  |  QV      |          |          |          |
5+50       0.2269      0.77  |  QV      |          |          |          |
5+55       0.2323      0.78  |  QV      |          |          |          |
6+ 0       0.2376      0.78  |  QV      |          |          |          |
6+ 5       0.2431      0.81  |  QV      |          |          |          |
6+10       0.2491      0.86  |  QV      |          |          |          |
6+15       0.2550      0.87  |  Q V     |          |          |          |
6+20       0.2610      0.87  |  Q V     |          |          |          |
6+25       0.2670      0.87  |  Q V     |          |          |          |
6+30       0.2731      0.87  |  Q V     |          |          |          |
6+35       0.2793      0.90  |  Q V     |          |          |          |
6+40       0.2858      0.95  |  Q V     |          |          |          |
6+45       0.2925      0.97  |  Q V     |          |          |          |
6+50       0.2992      0.97  |  Q V     |          |          |          |
6+55       0.3058      0.97  |  Q  V    |          |          |          |
7+ 0       0.3125      0.97  |  Q  V    |          |          |          |
7+ 5       0.3192      0.97  |  Q  V    |          |          |          |
7+10       0.3259      0.97  |  Q  V    |          |          |          |
7+15       0.3325      0.97  |  Q  V    |          |          |          |
7+20       0.3394      1.00  |  Q  V    |          |          |          |
7+25       0.3467      1.05  |   Q V    |          |          |          |
7+30       0.3540      1.06  |   Q  V   |          |          |          |
7+35       0.3615      1.10  |   Q  V   |          |          |          |
7+40       0.3694      1.15  |   Q  V   |          |          |          |
7+45       0.3774      1.16  |   Q  V   |          |          |          |
7+50       0.3856      1.19  |   Q  V   |          |          |          |
7+55       0.3942      1.25  |   Q  V   |          |          |          |
8+ 0       0.4029      1.26  |    Q  V  |          |          |          |
8+ 5       0.4120      1.32  |    Q  V  |          |          |          |
8+10       0.4218      1.43  |    Q  V  |          |          |          |
8+15       0.4317      1.45  |    Q  V  |          |          |          |
8+20       0.4417      1.45  |    Q  V  |          |          |          |
8+25       0.4517      1.45  |    Q   V|          |          |          |
8+30       0.4618      1.45  |    Q   V|          |          |          |
8+35       0.4720      1.48  |    Q   V|          |          |          |
8+40       0.4826      1.54  |     Q  V|          |          |          |
8+45       0.4932      1.55  |     Q  V|          |          |          |
8+50       0.5041      1.58  |     Q   V          |          |          |
8+55       0.5153      1.63  |     Q   V          |          |          |
9+ 0       0.5267      1.64  |     Q   V          |          |          |
9+ 5       0.5384      1.71  |     Q   V          |          |          |
9+10       0.5509      1.81  |      Q  |V         |          |          |
9+15       0.5635      1.84  |      Q  |V         |          |          |
```



15+35	1.7350	2.11	| Q |	|	|	| V |
15+40	1.7480	1.90	| Q |	|	|	| V |
15+45	1.7608	1.85	| Q |	|	|	| V |
15+50	1.7735	1.84	| Q |	|	|	| V |
15+55	1.7862	1.84	| Q |	|	|	| V |
16+ 0	1.7989	1.84	| Q |	|	|	| V |
16+ 5	1.8084	1.39	| Q |	|	|	| V |
16+10	1.8126	0.60	| Q |	|	|	| V |
16+15	1.8155	0.43	|Q |	|	|	| V |
16+20	1.8183	0.40	|Q |	|	|	| V |
16+25	1.8210	0.39	|Q |	|	|	| V |
16+30	1.8236	0.39	|Q |	|	|	| V |
16+35	1.8261	0.36	|Q |	|	|	| V |
16+40	1.8282	0.30	|Q |	|	|	| V |
16+45	1.8302	0.29	|Q |	|	|	| V |
16+50	1.8322	0.29	|Q |	|	|	| V |
16+55	1.8342	0.29	|Q |	|	|	| V |
17+ 0	1.8362	0.29	|Q |	|	|	| V |
17+ 5	1.8386	0.35	|Q |	|	|	| V |
17+10	1.8418	0.46	|Q |	|	|	| V |
17+15	1.8451	0.48	|Q |	|	|	| V |
17+20	1.8484	0.48	|Q |	|	|	| V |
17+25	1.8517	0.48	|Q |	|	|	| V |
17+30	1.8551	0.48	|Q |	|	|	| V |
17+35	1.8584	0.48	|Q |	|	|	| V |
17+40	1.8617	0.48	|Q |	|	|	| V |
17+45	1.8651	0.48	|Q |	|	|	| V |
17+50	1.8682	0.45	|Q |	|	|	| V |
17+55	1.8710	0.40	|Q |	|	|	| V |
18+ 0	1.8737	0.39	|Q |	|	|	| V |
18+ 5	1.8763	0.39	|Q |	|	|	| V |
18+10	1.8790	0.39	|Q |	|	|	| V |
18+15	1.8817	0.39	|Q |	|	|	| V |
18+20	1.8844	0.39	|Q |	|	|	| V |
18+25	1.8870	0.39	|Q |	|	|	| V |
18+30	1.8897	0.39	|Q |	|	|	| V |
18+35	1.8922	0.36	|Q |	|	|	| V |
18+40	1.8943	0.30	|Q |	|	|	| V |
18+45	1.8963	0.29	|Q |	|	|	| V |
18+50	1.8981	0.26	|Q |	|	|	| V |
18+55	1.8995	0.21	| Q |	|	|	| V |
19+ 0	1.9009	0.20	| Q |	|	|	| V |
19+ 5	1.9024	0.22	| Q |	|	|	| V |
19+10	1.9043	0.28	|Q |	|	|	| V |
19+15	1.9063	0.29	|Q |	|	|	| V |
19+20	1.9085	0.32	|Q |	|	|	| V |
19+25	1.9111	0.37	|Q |	|	|	| V |
19+30	1.9137	0.38	|Q |	|	|	| V |
19+35	1.9162	0.36	|Q |	|	|	| V |
19+40	1.9183	0.30	|Q |	|	|	| V |
19+45	1.9203	0.29	|Q |	|	|	| V |
19+50	1.9221	0.26	|Q |	|	|	| V |
19+55	1.9235	0.21	| Q |	|	|	| V |
20+ 0	1.9249	0.20	| Q |	|	|	| V |
20+ 5	1.9264	0.22	| Q |	|	|	| V |
20+10	1.9283	0.28	|Q |	|	|	| V |
20+15	1.9303	0.29	|Q |	|	|	| V |
20+20	1.9323	0.29	|Q |	|	|	| V |
20+25	1.9343	0.29	|Q |	|	|	| V |
20+30	1.9363	0.29	|Q |	|	|	| V |
20+35	1.9383	0.29	|Q |	|	|	| V |
20+40	1.9403	0.29	|Q |	|	|	| V |
20+45	1.9423	0.29	|Q |	|	|	| V |
20+50	1.9441	0.26	|Q |	|	|	| V |
20+55	1.9456	0.21	| Q |	|	|	| V |
21+ 0	1.9469	0.20	| Q |	|	|	| V |
21+ 5	1.9485	0.22	| Q |	|	|	| V |
21+10	1.9504	0.28	|Q |	|	|	| V |
21+15	1.9523	0.29	|Q |	|	|	| V|
21+20	1.9541	0.26	|Q |	|	|	| V|
21+25	1.9556	0.21	| Q |	|	|	| V|
21+30	1.9569	0.20	| Q |	|	|	| V|
21+35	1.9585	0.22	| Q |	|	|	| V|
21+40	1.9604	0.28	|Q |	|	|	| V|
21+45	1.9624	0.29	|Q |	|	|	| V|

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   21+50       1.9641      0.26  |Q        |         |         |         V|
   21+55       1.9656      0.21  Q        |         |         |         V|
   22+ 0       1.9669      0.20  Q        |         |         |         V|
   22+ 5       1.9685      0.22  Q        |         |         |         V|
   22+10       1.9704      0.28  |Q        |         |         |         V|
   22+15       1.9724      0.29  |Q        |         |         |         V|
   22+20       1.9742      0.26  |Q        |         |         |         V|
   22+25       1.9756      0.21  Q        |         |         |         V|
   22+30       1.9769      0.20  Q        |         |         |         V|
   22+35       1.9783      0.19  Q        |         |         |         V|
   22+40       1.9796      0.19  Q        |         |         |         V|
   22+45       1.9810      0.19  Q        |         |         |         V|
   22+50       1.9823      0.19  Q        |         |         |         V|
   22+55       1.9836      0.19  Q        |         |         |         V|
   23+ 0       1.9850      0.19  Q        |         |         |         V|
   23+ 5       1.9863      0.19  Q        |         |         |         V|
   23+10       1.9876      0.19  Q        |         |         |         V|
   23+15       1.9890      0.19  Q        |         |         |         V|
   23+20       1.9903      0.19  Q        |         |         |         V|
   23+25       1.9916      0.19  Q        |         |         |         V|
   23+30       1.9930      0.19  Q        |         |         |         V|
   23+35       1.9943      0.19  Q        |         |         |         V|
   23+40       1.9956      0.19  Q        |         |         |         V|
   23+45       1.9970      0.19  Q        |         |         |         V|
   23+50       1.9983      0.19  Q        |         |         |         V|
   23+55       1.9996      0.19  Q        |         |         |         V|
   24+ 0       2.0010      0.19  Q        |         |         |         V|
   24+ 5       2.0019      0.13  Q        |         |         |         V|
   24+10       2.0021      0.03  Q        |         |         |         V|
   24+15       2.0021      0.01  Q        |         |         |         V|
   24+20       2.0021      0.00  Q        |         |         |          V
-------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 11/09/21 File: PROP2YRD3242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA D3 PROPOSED CONDITION
2-YEAR STORM EVENT
21-0034
2021-11-9 EP

Drainage Area = 2.90(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.90(Ac.) = 0.005 Sq. Mi.
Length along longest watercourse = 622.00(Ft.)
Length along longest watercourse measured to centroid = 341.00(Ft.)
Length along longest watercourse = 0.118 Mi.
Length along longest watercourse measured to centroid = 0.065 Mi.
Difference in elevation = 9.00(Ft.)
Slope along watercourse = 76.3987 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.025 Hr.
Lag time = 1.48 Min.
25% of lag time = 0.37 Min.
40% of lag time = 0.59 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.90	2.40	6.96

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.90	6.20	17.98

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.900	59.80	0.790

Total Area Entered = 2.90(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

59.8	39.8	0.672	0.790	0.194	1.000	0.194
					Sum (F) =	0.194

Area averaged mean soil loss (F) (In/Hr) = 0.194
Minimum soil loss rate ((In/Hr)) = 0.097
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	336.835	61.739	1.804
2	0.167	673.670	36.985	1.081
3	0.250	1010.505	1.276	0.037
		Sum = 100.000	Sum=	2.923

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.344)	0.005	0.014
2	0.17	0.07	0.019	(0.343)	0.005	0.014
3	0.25	0.07	0.019	(0.342)	0.005	0.014
4	0.33	0.10	0.029	(0.340)	0.008	0.021
5	0.42	0.10	0.029	(0.339)	0.008	0.021
6	0.50	0.10	0.029	(0.338)	0.008	0.021
7	0.58	0.10	0.029	(0.336)	0.008	0.021
8	0.67	0.10	0.029	(0.335)	0.008	0.021
9	0.75	0.10	0.029	(0.334)	0.008	0.021
10	0.83	0.13	0.038	(0.332)	0.010	0.028
11	0.92	0.13	0.038	(0.331)	0.010	0.028
12	1.00	0.13	0.038	(0.330)	0.010	0.028
13	1.08	0.10	0.029	(0.328)	0.008	0.021
14	1.17	0.10	0.029	(0.327)	0.008	0.021
15	1.25	0.10	0.029	(0.326)	0.008	0.021
16	1.33	0.10	0.029	(0.324)	0.008	0.021
17	1.42	0.10	0.029	(0.323)	0.008	0.021
18	1.50	0.10	0.029	(0.322)	0.008	0.021
19	1.58	0.10	0.029	(0.321)	0.008	0.021
20	1.67	0.10	0.029	(0.319)	0.008	0.021
21	1.75	0.10	0.029	(0.318)	0.008	0.021
22	1.83	0.13	0.038	(0.317)	0.010	0.028
23	1.92	0.13	0.038	(0.315)	0.010	0.028
24	2.00	0.13	0.038	(0.314)	0.010	0.028
25	2.08	0.13	0.038	(0.313)	0.010	0.028
26	2.17	0.13	0.038	(0.312)	0.010	0.028
27	2.25	0.13	0.038	(0.310)	0.010	0.028
28	2.33	0.13	0.038	(0.309)	0.010	0.028
29	2.42	0.13	0.038	(0.308)	0.010	0.028
30	2.50	0.13	0.038	(0.307)	0.010	0.028
31	2.58	0.17	0.048	(0.305)	0.013	0.035
32	2.67	0.17	0.048	(0.304)	0.013	0.035
33	2.75	0.17	0.048	(0.303)	0.013	0.035
34	2.83	0.17	0.048	(0.302)	0.013	0.035
35	2.92	0.17	0.048	(0.300)	0.013	0.035
36	3.00	0.17	0.048	(0.299)	0.013	0.035
37	3.08	0.17	0.048	(0.298)	0.013	0.035
38	3.17	0.17	0.048	(0.297)	0.013	0.035
39	3.25	0.17	0.048	(0.295)	0.013	0.035
40	3.33	0.17	0.048	(0.294)	0.013	0.035
41	3.42	0.17	0.048	(0.293)	0.013	0.035
42	3.50	0.17	0.048	(0.292)	0.013	0.035
43	3.58	0.17	0.048	(0.291)	0.013	0.035
44	3.67	0.17	0.048	(0.289)	0.013	0.035
45	3.75	0.17	0.048	(0.288)	0.013	0.035
46	3.83	0.20	0.058	(0.287)	0.016	0.042
47	3.92	0.20	0.058	(0.286)	0.016	0.042

48	4.00	0.20	0.058	(0.284)	0.016	0.042
49	4.08	0.20	0.058	(0.283)	0.016	0.042
50	4.17	0.20	0.058	(0.282)	0.016	0.042
51	4.25	0.20	0.058	(0.281)	0.016	0.042
52	4.33	0.23	0.067	(0.280)	0.018	0.049
53	4.42	0.23	0.067	(0.278)	0.018	0.049
54	4.50	0.23	0.067	(0.277)	0.018	0.049
55	4.58	0.23	0.067	(0.276)	0.018	0.049
56	4.67	0.23	0.067	(0.275)	0.018	0.049
57	4.75	0.23	0.067	(0.274)	0.018	0.049
58	4.83	0.27	0.077	(0.273)	0.021	0.056
59	4.92	0.27	0.077	(0.271)	0.021	0.056
60	5.00	0.27	0.077	(0.270)	0.021	0.056
61	5.08	0.20	0.058	(0.269)	0.016	0.042
62	5.17	0.20	0.058	(0.268)	0.016	0.042
63	5.25	0.20	0.058	(0.267)	0.016	0.042
64	5.33	0.23	0.067	(0.265)	0.018	0.049
65	5.42	0.23	0.067	(0.264)	0.018	0.049
66	5.50	0.23	0.067	(0.263)	0.018	0.049
67	5.58	0.27	0.077	(0.262)	0.021	0.056
68	5.67	0.27	0.077	(0.261)	0.021	0.056
69	5.75	0.27	0.077	(0.260)	0.021	0.056
70	5.83	0.27	0.077	(0.259)	0.021	0.056
71	5.92	0.27	0.077	(0.257)	0.021	0.056
72	6.00	0.27	0.077	(0.256)	0.021	0.056
73	6.08	0.30	0.086	(0.255)	0.023	0.063
74	6.17	0.30	0.086	(0.254)	0.023	0.063
75	6.25	0.30	0.086	(0.253)	0.023	0.063
76	6.33	0.30	0.086	(0.252)	0.023	0.063
77	6.42	0.30	0.086	(0.251)	0.023	0.063
78	6.50	0.30	0.086	(0.249)	0.023	0.063
79	6.58	0.33	0.096	(0.248)	0.026	0.070
80	6.67	0.33	0.096	(0.247)	0.026	0.070
81	6.75	0.33	0.096	(0.246)	0.026	0.070
82	6.83	0.33	0.096	(0.245)	0.026	0.070
83	6.92	0.33	0.096	(0.244)	0.026	0.070
84	7.00	0.33	0.096	(0.243)	0.026	0.070
85	7.08	0.33	0.096	(0.242)	0.026	0.070
86	7.17	0.33	0.096	(0.241)	0.026	0.070
87	7.25	0.33	0.096	(0.240)	0.026	0.070
88	7.33	0.37	0.106	(0.238)	0.029	0.077
89	7.42	0.37	0.106	(0.237)	0.029	0.077
90	7.50	0.37	0.106	(0.236)	0.029	0.077
91	7.58	0.40	0.115	(0.235)	0.031	0.084
92	7.67	0.40	0.115	(0.234)	0.031	0.084
93	7.75	0.40	0.115	(0.233)	0.031	0.084
94	7.83	0.43	0.125	(0.232)	0.034	0.091
95	7.92	0.43	0.125	(0.231)	0.034	0.091
96	8.00	0.43	0.125	(0.230)	0.034	0.091
97	8.08	0.50	0.144	(0.229)	0.039	0.105
98	8.17	0.50	0.144	(0.228)	0.039	0.105
99	8.25	0.50	0.144	(0.227)	0.039	0.105
100	8.33	0.50	0.144	(0.226)	0.039	0.105
101	8.42	0.50	0.144	(0.224)	0.039	0.105
102	8.50	0.50	0.144	(0.223)	0.039	0.105
103	8.58	0.53	0.154	(0.222)	0.041	0.112
104	8.67	0.53	0.154	(0.221)	0.041	0.112
105	8.75	0.53	0.154	(0.220)	0.041	0.112
106	8.83	0.57	0.163	(0.219)	0.044	0.119
107	8.92	0.57	0.163	(0.218)	0.044	0.119
108	9.00	0.57	0.163	(0.217)	0.044	0.119
109	9.08	0.63	0.182	(0.216)	0.049	0.133
110	9.17	0.63	0.182	(0.215)	0.049	0.133
111	9.25	0.63	0.182	(0.214)	0.049	0.133
112	9.33	0.67	0.192	(0.213)	0.052	0.140
113	9.42	0.67	0.192	(0.212)	0.052	0.140
114	9.50	0.67	0.192	(0.211)	0.052	0.140
115	9.58	0.70	0.202	(0.210)	0.054	0.147
116	9.67	0.70	0.202	(0.209)	0.054	0.147
117	9.75	0.70	0.202	(0.208)	0.054	0.147
118	9.83	0.73	0.211	(0.207)	0.057	0.154
119	9.92	0.73	0.211	(0.206)	0.057	0.154
120	10.00	0.73	0.211	(0.205)	0.057	0.154
121	10.08	0.50	0.144	(0.204)	0.039	0.105
122	10.17	0.50	0.144	(0.203)	0.039	0.105

123	10.25	0.50	0.144	(0.202)	0.039	0.105
124	10.33	0.50	0.144	(0.201)	0.039	0.105
125	10.42	0.50	0.144	(0.200)	0.039	0.105
126	10.50	0.50	0.144	(0.199)	0.039	0.105
127	10.58	0.67	0.192	(0.198)	0.052	0.140
128	10.67	0.67	0.192	(0.197)	0.052	0.140
129	10.75	0.67	0.192	(0.196)	0.052	0.140
130	10.83	0.67	0.192	(0.195)	0.052	0.140
131	10.92	0.67	0.192	(0.194)	0.052	0.140
132	11.00	0.67	0.192	(0.193)	0.052	0.140
133	11.08	0.63	0.182	(0.192)	0.049	0.133
134	11.17	0.63	0.182	(0.191)	0.049	0.133
135	11.25	0.63	0.182	(0.190)	0.049	0.133
136	11.33	0.63	0.182	(0.190)	0.049	0.133
137	11.42	0.63	0.182	(0.189)	0.049	0.133
138	11.50	0.63	0.182	(0.188)	0.049	0.133
139	11.58	0.57	0.163	(0.187)	0.044	0.119
140	11.67	0.57	0.163	(0.186)	0.044	0.119
141	11.75	0.57	0.163	(0.185)	0.044	0.119
142	11.83	0.60	0.173	(0.184)	0.047	0.126
143	11.92	0.60	0.173	(0.183)	0.047	0.126
144	12.00	0.60	0.173	(0.182)	0.047	0.126
145	12.08	0.83	0.240	(0.181)	0.065	0.175
146	12.17	0.83	0.240	(0.180)	0.065	0.175
147	12.25	0.83	0.240	(0.179)	0.065	0.175
148	12.33	0.87	0.250	(0.179)	0.067	0.182
149	12.42	0.87	0.250	(0.178)	0.067	0.182
150	12.50	0.87	0.250	(0.177)	0.067	0.182
151	12.58	0.93	0.269	(0.176)	0.073	0.196
152	12.67	0.93	0.269	(0.175)	0.073	0.196
153	12.75	0.93	0.269	(0.174)	0.073	0.196
154	12.83	0.97	0.278	(0.173)	0.075	0.203
155	12.92	0.97	0.278	(0.172)	0.075	0.203
156	13.00	0.97	0.278	(0.171)	0.075	0.203
157	13.08	1.13	0.326	(0.171)	0.088	0.238
158	13.17	1.13	0.326	(0.170)	0.088	0.238
159	13.25	1.13	0.326	(0.169)	0.088	0.238
160	13.33	1.13	0.326	(0.168)	0.088	0.238
161	13.42	1.13	0.326	(0.167)	0.088	0.238
162	13.50	1.13	0.326	(0.166)	0.088	0.238
163	13.58	0.77	0.221	(0.165)	0.060	0.161
164	13.67	0.77	0.221	(0.165)	0.060	0.161
165	13.75	0.77	0.221	(0.164)	0.060	0.161
166	13.83	0.77	0.221	(0.163)	0.060	0.161
167	13.92	0.77	0.221	(0.162)	0.060	0.161
168	14.00	0.77	0.221	(0.161)	0.060	0.161
169	14.08	0.90	0.259	(0.160)	0.070	0.189
170	14.17	0.90	0.259	(0.160)	0.070	0.189
171	14.25	0.90	0.259	(0.159)	0.070	0.189
172	14.33	0.87	0.250	(0.158)	0.067	0.182
173	14.42	0.87	0.250	(0.157)	0.067	0.182
174	14.50	0.87	0.250	(0.156)	0.067	0.182
175	14.58	0.87	0.250	(0.156)	0.067	0.182
176	14.67	0.87	0.250	(0.155)	0.067	0.182
177	14.75	0.87	0.250	(0.154)	0.067	0.182
178	14.83	0.83	0.240	(0.153)	0.065	0.175
179	14.92	0.83	0.240	(0.152)	0.065	0.175
180	15.00	0.83	0.240	(0.152)	0.065	0.175
181	15.08	0.80	0.230	(0.151)	0.062	0.168
182	15.17	0.80	0.230	(0.150)	0.062	0.168
183	15.25	0.80	0.230	(0.149)	0.062	0.168
184	15.33	0.77	0.221	(0.149)	0.060	0.161
185	15.42	0.77	0.221	(0.148)	0.060	0.161
186	15.50	0.77	0.221	(0.147)	0.060	0.161
187	15.58	0.63	0.182	(0.146)	0.049	0.133
188	15.67	0.63	0.182	(0.146)	0.049	0.133
189	15.75	0.63	0.182	(0.145)	0.049	0.133
190	15.83	0.63	0.182	(0.144)	0.049	0.133
191	15.92	0.63	0.182	(0.143)	0.049	0.133
192	16.00	0.63	0.182	(0.143)	0.049	0.133
193	16.08	0.13	0.038	(0.142)	0.010	0.028
194	16.17	0.13	0.038	(0.141)	0.010	0.028
195	16.25	0.13	0.038	(0.140)	0.010	0.028
196	16.33	0.13	0.038	(0.140)	0.010	0.028
197	16.42	0.13	0.038	(0.139)	0.010	0.028

198	16.50	0.13	0.038	(0.138)	0.010	0.028
199	16.58	0.10	0.029	(0.138)	0.008	0.021
200	16.67	0.10	0.029	(0.137)	0.008	0.021
201	16.75	0.10	0.029	(0.136)	0.008	0.021
202	16.83	0.10	0.029	(0.135)	0.008	0.021
203	16.92	0.10	0.029	(0.135)	0.008	0.021
204	17.00	0.10	0.029	(0.134)	0.008	0.021
205	17.08	0.17	0.048	(0.133)	0.013	0.035
206	17.17	0.17	0.048	(0.133)	0.013	0.035
207	17.25	0.17	0.048	(0.132)	0.013	0.035
208	17.33	0.17	0.048	(0.131)	0.013	0.035
209	17.42	0.17	0.048	(0.131)	0.013	0.035
210	17.50	0.17	0.048	(0.130)	0.013	0.035
211	17.58	0.17	0.048	(0.129)	0.013	0.035
212	17.67	0.17	0.048	(0.129)	0.013	0.035
213	17.75	0.17	0.048	(0.128)	0.013	0.035
214	17.83	0.13	0.038	(0.128)	0.010	0.028
215	17.92	0.13	0.038	(0.127)	0.010	0.028
216	18.00	0.13	0.038	(0.126)	0.010	0.028
217	18.08	0.13	0.038	(0.126)	0.010	0.028
218	18.17	0.13	0.038	(0.125)	0.010	0.028
219	18.25	0.13	0.038	(0.124)	0.010	0.028
220	18.33	0.13	0.038	(0.124)	0.010	0.028
221	18.42	0.13	0.038	(0.123)	0.010	0.028
222	18.50	0.13	0.038	(0.123)	0.010	0.028
223	18.58	0.10	0.029	(0.122)	0.008	0.021
224	18.67	0.10	0.029	(0.121)	0.008	0.021
225	18.75	0.10	0.029	(0.121)	0.008	0.021
226	18.83	0.07	0.019	(0.120)	0.005	0.014
227	18.92	0.07	0.019	(0.120)	0.005	0.014
228	19.00	0.07	0.019	(0.119)	0.005	0.014
229	19.08	0.10	0.029	(0.119)	0.008	0.021
230	19.17	0.10	0.029	(0.118)	0.008	0.021
231	19.25	0.10	0.029	(0.117)	0.008	0.021
232	19.33	0.13	0.038	(0.117)	0.010	0.028
233	19.42	0.13	0.038	(0.116)	0.010	0.028
234	19.50	0.13	0.038	(0.116)	0.010	0.028
235	19.58	0.10	0.029	(0.115)	0.008	0.021
236	19.67	0.10	0.029	(0.115)	0.008	0.021
237	19.75	0.10	0.029	(0.114)	0.008	0.021
238	19.83	0.07	0.019	(0.114)	0.005	0.014
239	19.92	0.07	0.019	(0.113)	0.005	0.014
240	20.00	0.07	0.019	(0.113)	0.005	0.014
241	20.08	0.10	0.029	(0.112)	0.008	0.021
242	20.17	0.10	0.029	(0.112)	0.008	0.021
243	20.25	0.10	0.029	(0.111)	0.008	0.021
244	20.33	0.10	0.029	(0.111)	0.008	0.021
245	20.42	0.10	0.029	(0.110)	0.008	0.021
246	20.50	0.10	0.029	(0.110)	0.008	0.021
247	20.58	0.10	0.029	(0.109)	0.008	0.021
248	20.67	0.10	0.029	(0.109)	0.008	0.021
249	20.75	0.10	0.029	(0.108)	0.008	0.021
250	20.83	0.07	0.019	(0.108)	0.005	0.014
251	20.92	0.07	0.019	(0.108)	0.005	0.014
252	21.00	0.07	0.019	(0.107)	0.005	0.014
253	21.08	0.10	0.029	(0.107)	0.008	0.021
254	21.17	0.10	0.029	(0.106)	0.008	0.021
255	21.25	0.10	0.029	(0.106)	0.008	0.021
256	21.33	0.07	0.019	(0.105)	0.005	0.014
257	21.42	0.07	0.019	(0.105)	0.005	0.014
258	21.50	0.07	0.019	(0.105)	0.005	0.014
259	21.58	0.10	0.029	(0.104)	0.008	0.021
260	21.67	0.10	0.029	(0.104)	0.008	0.021
261	21.75	0.10	0.029	(0.104)	0.008	0.021
262	21.83	0.07	0.019	(0.103)	0.005	0.014
263	21.92	0.07	0.019	(0.103)	0.005	0.014
264	22.00	0.07	0.019	(0.103)	0.005	0.014
265	22.08	0.10	0.029	(0.102)	0.008	0.021
266	22.17	0.10	0.029	(0.102)	0.008	0.021
267	22.25	0.10	0.029	(0.102)	0.008	0.021
268	22.33	0.07	0.019	(0.101)	0.005	0.014
269	22.42	0.07	0.019	(0.101)	0.005	0.014
270	22.50	0.07	0.019	(0.101)	0.005	0.014
271	22.58	0.07	0.019	(0.100)	0.005	0.014
272	22.67	0.07	0.019	(0.100)	0.005	0.014

273	22.75	0.07	0.019	(0.100)	0.005	0.014
274	22.83	0.07	0.019	(0.099)	0.005	0.014
275	22.92	0.07	0.019	(0.099)	0.005	0.014
276	23.00	0.07	0.019	(0.099)	0.005	0.014
277	23.08	0.07	0.019	(0.099)	0.005	0.014
278	23.17	0.07	0.019	(0.099)	0.005	0.014
279	23.25	0.07	0.019	(0.098)	0.005	0.014
280	23.33	0.07	0.019	(0.098)	0.005	0.014
281	23.42	0.07	0.019	(0.098)	0.005	0.014
282	23.50	0.07	0.019	(0.098)	0.005	0.014
283	23.58	0.07	0.019	(0.098)	0.005	0.014
284	23.67	0.07	0.019	(0.097)	0.005	0.014
285	23.75	0.07	0.019	(0.097)	0.005	0.014
286	23.83	0.07	0.019	(0.097)	0.005	0.014
287	23.92	0.07	0.019	(0.097)	0.005	0.014
288	24.00	0.07	0.019	(0.097)	0.005	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 21.0

Flood volume = Effective rainfall 1.75(In)
times area 2.9(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 0.65(In)
Total soil loss = 0.157(Ac.Ft)
Total rainfall = 2.40(In)
Flood volume = 18443.2 Cubic Feet
Total soil loss = 6821.5 Cubic Feet

Peak flow rate of this hydrograph = 0.697(CFS)

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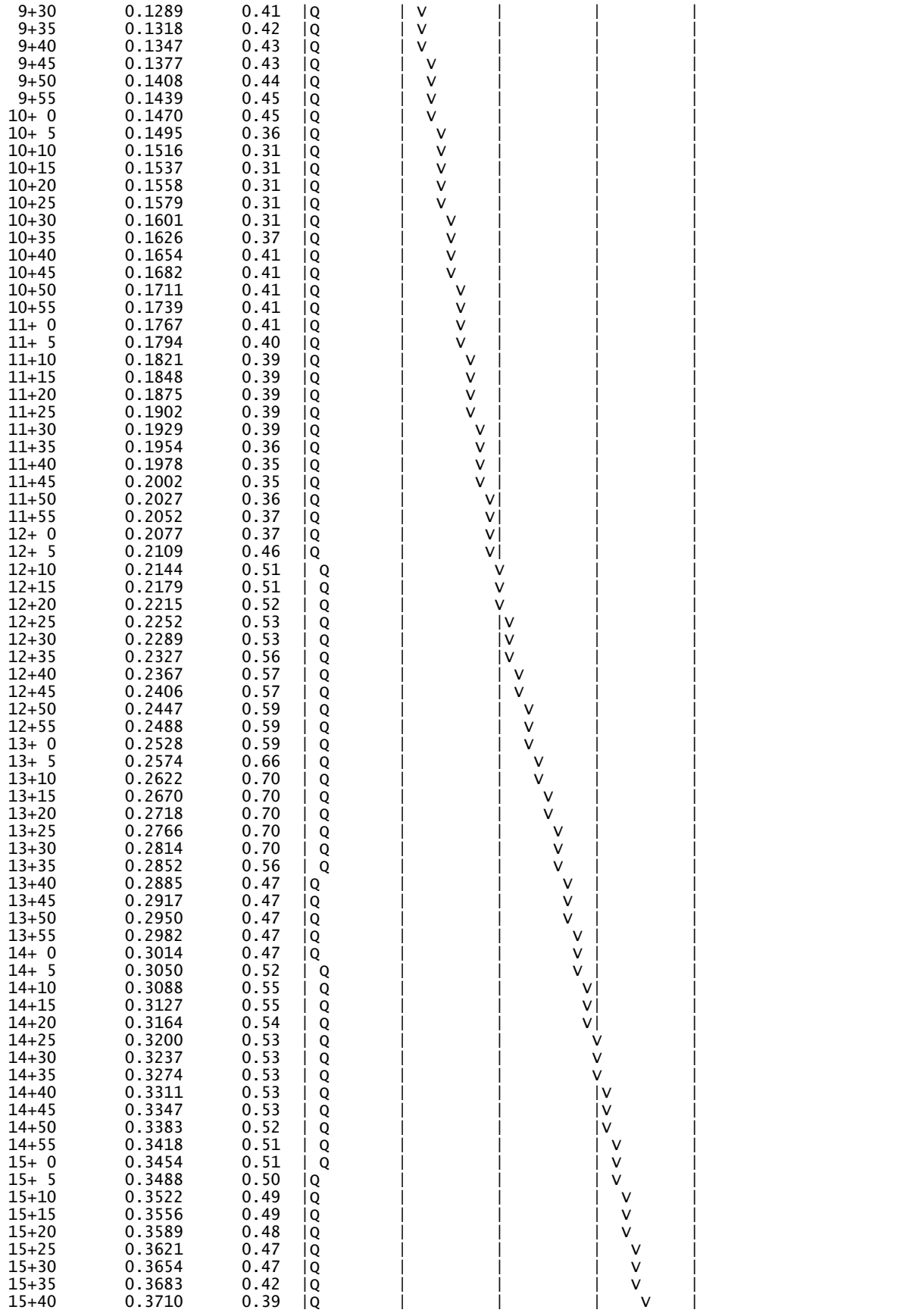
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0002	0.03	Q				
0+10	0.0005	0.04	Q				
0+15	0.0007	0.04	Q				
0+20	0.0011	0.05	Q				
0+25	0.0015	0.06	Q				
0+30	0.0019	0.06	Q				
0+35	0.0024	0.06	Q				
0+40	0.0028	0.06	Q				
0+45	0.0032	0.06	Q				
0+50	0.0037	0.07	Q				
0+55	0.0043	0.08	Q				
1+ 0	0.0049	0.08	Q				
1+ 5	0.0053	0.07	Q				
1+10	0.0058	0.06	Q				
1+15	0.0062	0.06	Q				
1+20	0.0066	0.06	Q				
1+25	0.0070	0.06	Q				
1+30	0.0075	0.06	Q				
1+35	0.0079	0.06	Q				
1+40	0.0083	0.06	Q				
1+45	0.0087	0.06	Q				
1+50	0.0092	0.07	Q				
1+55	0.0098	0.08	Q				
2+ 0	0.0104	0.08	Q				
2+ 5	0.0109	0.08	QV				
2+10	0.0115	0.08	QV				
2+15	0.0121	0.08	QV				
2+20	0.0126	0.08	QV				
2+25	0.0132	0.08	QV				
2+30	0.0137	0.08	QV				
2+35	0.0144	0.09	QV				
2+40	0.0151	0.10	QV				
2+45	0.0158	0.10	QV				
2+50	0.0165	0.10	QV				
2+55	0.0172	0.10	QV				
3+ 0	0.0179	0.10	QV				
3+ 5	0.0186	0.10	QV				
3+10	0.0193	0.10	QV				

```
3+15       0.0200      0.10  QV         |          |          |          |
3+20       0.0207      0.10  QV         |          |          |          |
3+25       0.0215      0.10  Q V        |          |          |          |
3+30       0.0222      0.10  Q V        |          |          |          |
3+35       0.0229      0.10  Q V        |          |          |          |
3+40       0.0236      0.10  Q V        |          |          |          |
3+45       0.0243      0.10  Q V        |          |          |          |
3+50       0.0251      0.12  Q V        |          |          |          |
3+55       0.0259      0.12  Q V        |          |          |          |
4+ 0       0.0268      0.12  Q V        |          |          |          |
4+ 5       0.0276      0.12  Q V        |          |          |          |
4+10       0.0285      0.12  Q V        |          |          |          |
4+15       0.0293      0.12  Q V        |          |          |          |
4+20       0.0302      0.14  Q V        |          |          |          |
4+25       0.0312      0.14  Q V        |          |          |          |
4+30       0.0322      0.14  Q  V       |          |          |          |
4+35       0.0332      0.14  Q  V       |          |          |          |
4+40       0.0342      0.14  Q  V       |          |          |          |
4+45       0.0352      0.14  Q  V       |          |          |          |
4+50       0.0362      0.16  Q  V       |          |          |          |
4+55       0.0374      0.16  Q  V       |          |          |          |
5+ 0       0.0385      0.16  Q  V       |          |          |          |
5+ 5       0.0395      0.14  Q  V       |          |          |          |
5+10       0.0403      0.12  Q  V       |          |          |          |
5+15       0.0412      0.12  Q  V       |          |          |          |
5+20       0.0421      0.14  Q  V       |          |          |          |
5+25       0.0431      0.14  Q   V      |          |          |          |
5+30       0.0441      0.14  Q   V      |          |          |          |
5+35       0.0451      0.16  Q   V      |          |          |          |
5+40       0.0463      0.16  Q   V      |          |          |          |
5+45       0.0474      0.16  Q   V      |          |          |          |
5+50       0.0485      0.16  Q   V      |          |          |          |
5+55       0.0497      0.16  Q   V      |          |          |          |
6+ 0       0.0508      0.16  Q   V      |          |          |          |
6+ 5       0.0520      0.18  Q   V      |          |          |          |
6+10       0.0533      0.18  Q    V     |          |          |          |
6+15       0.0545      0.18  Q    V     |          |          |          |
6+20       0.0558      0.18  Q    V     |          |          |          |
6+25       0.0571      0.18  Q    V     |          |          |          |
6+30       0.0584      0.18  Q    V     |          |          |          |
6+35       0.0597      0.20  Q    V     |          |          |          |
6+40       0.0611      0.20  Q    V     |          |          |          |
6+45       0.0625      0.20  Q    V     |          |          |          |
6+50       0.0639      0.20  Q     V    |          |          |          |
6+55       0.0654      0.20  Q     V    |          |          |          |
7+ 0       0.0668      0.20  Q     V    |          |          |          |
7+ 5       0.0682      0.20  Q     V    |          |          |          |
7+10       0.0696      0.20  Q     V    |          |          |          |
7+15       0.0710      0.20  Q     V    |          |          |          |
7+20       0.0725      0.22  Q     V    |          |          |          |
7+25       0.0740      0.23  Q     V    |          |          |          |
7+30       0.0756      0.23  Q      V   |          |          |          |
7+35       0.0772      0.24  Q      V   |          |          |          |
7+40       0.0789      0.25  Q      V   |          |          |          |
7+45       0.0806      0.25  Q      V   |          |          |          |
7+50       0.0824      0.26  |Q     V   |          |          |          |
7+55       0.0842      0.27  |Q     V   |          |          |          |
8+ 0       0.0861      0.27  |Q      V  |          |          |          |
8+ 5       0.0881      0.29  |Q      V  |          |          |          |
8+10       0.0902      0.31  |Q      V  |          |          |          |
8+15       0.0923      0.31  |Q      V  |          |          |          |
8+20       0.0944      0.31  |Q      V  |          |          |          |
8+25       0.0965      0.31  |Q       V|          |          |          |
8+30       0.0987      0.31  |Q       V|          |          |          |
8+35       0.1009      0.32  |Q       V|          |          |          |
8+40       0.1031      0.33  |Q       V|          |          |          |
8+45       0.1054      0.33  |Q       V|          |          |          |
8+50       0.1077      0.34  |Q        V          |          |          |
8+55       0.1101      0.35  |Q        V          |          |          |
9+ 0       0.1125      0.35  |Q        V          |          |          |
9+ 5       0.1151      0.37  |Q        V          |          |          |
9+10       0.1178      0.39  |Q         |V        |          |          |
9+15       0.1205      0.39  |Q         |V        |          |          |
9+20       0.1232      0.40  |Q         |V        |          |          |
9+25       0.1260      0.41  |Q         |V        |          |          |
```



15+45	0.3736	0.39	|Q	|	|	|	V |
15+50	0.3763	0.39	|Q	|	|	|	V |
15+55	0.3790	0.39	|Q	|	|	|	V |
16+ 0	0.3817	0.39	|Q	|	|	|	V |
16+ 5	0.3831	0.20	Q	|	|	|	V |
16+10	0.3837	0.09	Q	|	|	|	V |
16+15	0.3842	0.08	Q	|	|	|	V |
16+20	0.3848	0.08	Q	|	|	|	V |
16+25	0.3854	0.08	Q	|	|	|	V |
16+30	0.3859	0.08	Q	|	|	|	V |
16+35	0.3864	0.07	Q	|	|	|	V |
16+40	0.3868	0.06	Q	|	|	|	V |
16+45	0.3872	0.06	Q	|	|	|	V |
16+50	0.3877	0.06	Q	|	|	|	V |
16+55	0.3881	0.06	Q	|	|	|	V |
17+ 0	0.3885	0.06	Q	|	|	|	V |
17+ 5	0.3891	0.09	Q	|	|	|	V |
17+10	0.3898	0.10	Q	|	|	|	V |
17+15	0.3905	0.10	Q	|	|	|	V |
17+20	0.3912	0.10	Q	|	|	|	V |
17+25	0.3919	0.10	Q	|	|	|	V |
17+30	0.3926	0.10	Q	|	|	|	V |
17+35	0.3933	0.10	Q	|	|	|	V |
17+40	0.3940	0.10	Q	|	|	|	V |
17+45	0.3948	0.10	Q	|	|	|	V |
17+50	0.3954	0.09	Q	|	|	|	V |
17+55	0.3959	0.08	Q	|	|	|	V |
18+ 0	0.3965	0.08	Q	|	|	|	V |
18+ 5	0.3971	0.08	Q	|	|	|	V |
18+10	0.3976	0.08	Q	|	|	|	V |
18+15	0.3982	0.08	Q	|	|	|	V |
18+20	0.3988	0.08	Q	|	|	|	V |
18+25	0.3993	0.08	Q	|	|	|	V |
18+30	0.3999	0.08	Q	|	|	|	V |
18+35	0.4004	0.07	Q	|	|	|	V |
18+40	0.4008	0.06	Q	|	|	|	V |
18+45	0.4012	0.06	Q	|	|	|	V |
18+50	0.4015	0.05	Q	|	|	|	V |
18+55	0.4018	0.04	Q	|	|	|	V |
19+ 0	0.4021	0.04	Q	|	|	|	V |
19+ 5	0.4025	0.05	Q	|	|	|	V |
19+10	0.4029	0.06	Q	|	|	|	V |
19+15	0.4033	0.06	Q	|	|	|	V |
19+20	0.4038	0.07	Q	|	|	|	V |
19+25	0.4044	0.08	Q	|	|	|	V |
19+30	0.4050	0.08	Q	|	|	|	V |
19+35	0.4054	0.07	Q	|	|	|	V |
19+40	0.4059	0.06	Q	|	|	|	V |
19+45	0.4063	0.06	Q	|	|	|	V |
19+50	0.4066	0.05	Q	|	|	|	V |
19+55	0.4069	0.04	Q	|	|	|	V |
20+ 0	0.4072	0.04	Q	|	|	|	V |
20+ 5	0.4076	0.05	Q	|	|	|	V |
20+10	0.4080	0.06	Q	|	|	|	V |
20+15	0.4084	0.06	Q	|	|	|	V |
20+20	0.4088	0.06	Q	|	|	|	V |
20+25	0.4093	0.06	Q	|	|	|	V |
20+30	0.4097	0.06	Q	|	|	|	V |
20+35	0.4101	0.06	Q	|	|	|	V |
20+40	0.4105	0.06	Q	|	|	|	V |
20+45	0.4110	0.06	Q	|	|	|	V |
20+50	0.4113	0.05	Q	|	|	|	V |
20+55	0.4116	0.04	Q	|	|	|	V |
21+ 0	0.4119	0.04	Q	|	|	|	V |
21+ 5	0.4122	0.05	Q	|	|	|	V |
21+10	0.4126	0.06	Q	|	|	|	V |
21+15	0.4131	0.06	Q	|	|	|	V|
21+20	0.4134	0.05	Q	|	|	|	V|
21+25	0.4137	0.04	Q	|	|	|	V|
21+30	0.4140	0.04	Q	|	|	|	V|
21+35	0.4143	0.05	Q	|	|	|	V|
21+40	0.4148	0.06	Q	|	|	|	V|
21+45	0.4152	0.06	Q	|	|	|	V|
21+50	0.4155	0.05	Q	|	|	|	V|
21+55	0.4158	0.04	Q	|	|	|	V|

```
  22+ 0       0.4161      0.04  Q          |          |          |         v|
  22+ 5       0.4165      0.05  Q          |          |          |         v|
  22+10       0.4169      0.06  Q          |          |          |         v|
  22+15       0.4173      0.06  Q          |          |          |         v|
  22+20       0.4176      0.05  Q          |          |          |         v|
  22+25       0.4179      0.04  Q          |          |          |         v|
  22+30       0.4182      0.04  Q          |          |          |         v|
  22+35       0.4185      0.04  Q          |          |          |         v|
  22+40       0.4188      0.04  Q          |          |          |         v|
  22+45       0.4191      0.04  Q          |          |          |         v|
  22+50       0.4193      0.04  Q          |          |          |         v|
  22+55       0.4196      0.04  Q          |          |          |         v|
  23+ 0       0.4199      0.04  Q          |          |          |         v|
  23+ 5       0.4202      0.04  Q          |          |          |         v|
  23+10       0.4205      0.04  Q          |          |          |         v|
  23+15       0.4207      0.04  Q          |          |          |         v|
  23+20       0.4210      0.04  Q          |          |          |         v|
  23+25       0.4213      0.04  Q          |          |          |         v|
  23+30       0.4216      0.04  Q          |          |          |         v|
  23+35       0.4219      0.04  Q          |          |          |         v|
  23+40       0.4222      0.04  Q          |          |          |         v|
  23+45       0.4224      0.04  Q          |          |          |         v|
  23+50       0.4227      0.04  Q          |          |          |         v|
  23+55       0.4230      0.04  Q          |          |          |         v|
  24+ 0       0.4233      0.04  Q          |          |          |         v|
  24+ 5       0.4234      0.02  Q          |          |          |         v|
  24+10       0.4234      0.00  Q          |          |          |          v
-------------------------------------------------------------------------
```

STAGE-STORAGE/OUTFLOW TABLES

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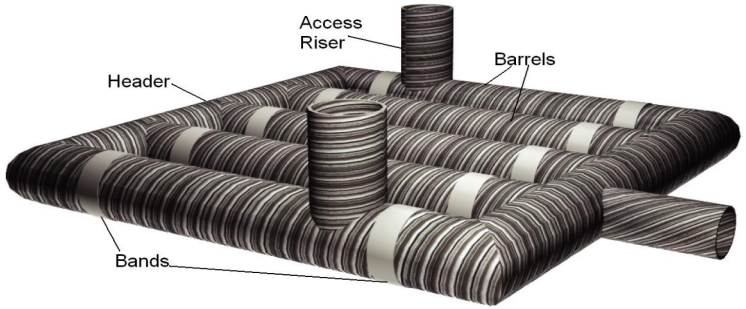


Project Summary

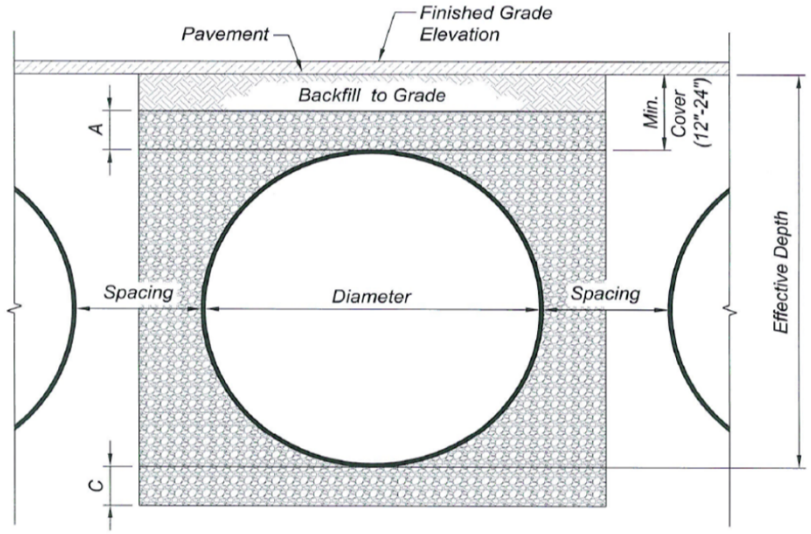
Date:	12/1/2021
Project Name:	BCCOV BLDG D AREA 10
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	84,000
Limiting Width (ft):	50.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	84,144	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	84,144	cf	100.2% Of Required Storage
Number of Barrels:	4	barrels	
Length per Barrel:	398.0	ft	
Length Per Header:	41.0	ft	
Rectangular Footprint (W x L):	44. ft x 417. ft		

CONTECH Materials

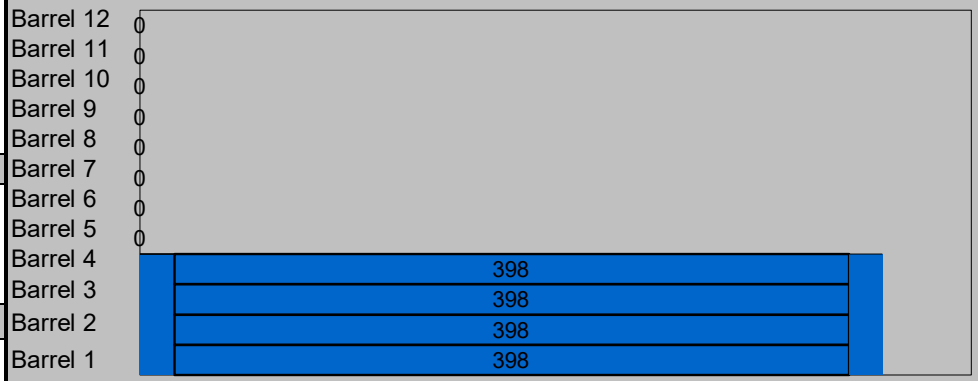
Total CMP Footage:	1,674	ft
Approximate Total Pieces:	72	pcs
Approximate Coupling Bands:	74	bands
Approximate Truckloads:	36	trucks

Construction Quantities**

Total Excavation:	6796	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	3680	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



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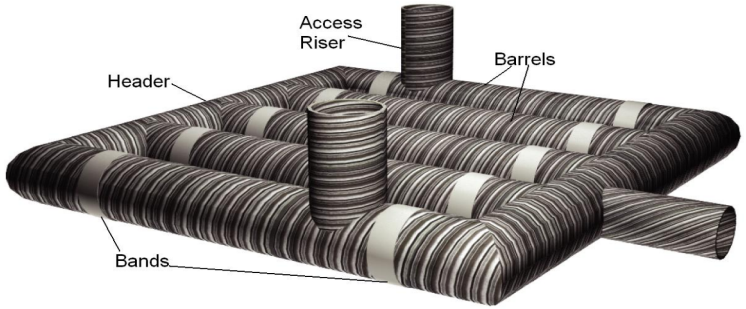


Project Summary

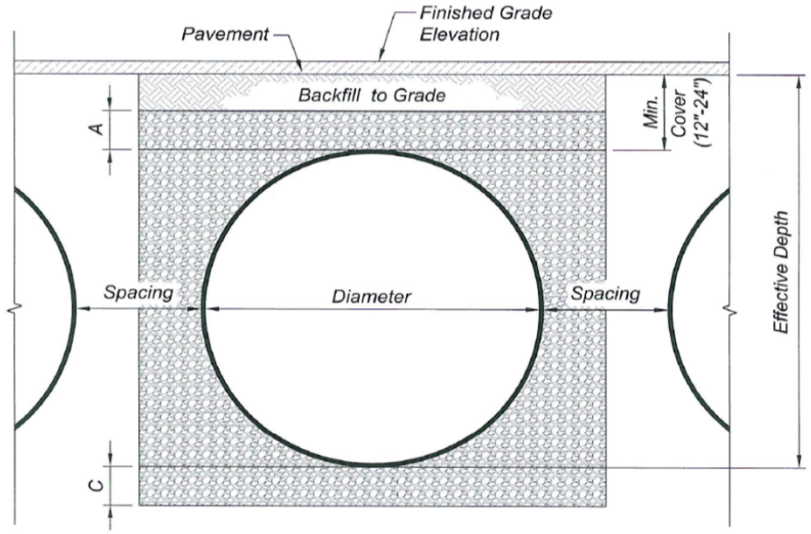
Date:	12/1/2021
Project Name:	BCCOV BLDG D AREA 11
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	80,000
Limiting Width (ft):	50.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	80,123	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	80,123	cf	100.2% Of Required Storage
Number of Barrels:	4	barrels	
Length per Barrel:	378.0	ft	
Length Per Header:	41.0	ft	
Rectangular Footprint (W x L):	44. ft x 397. ft		

CONTECH Materials

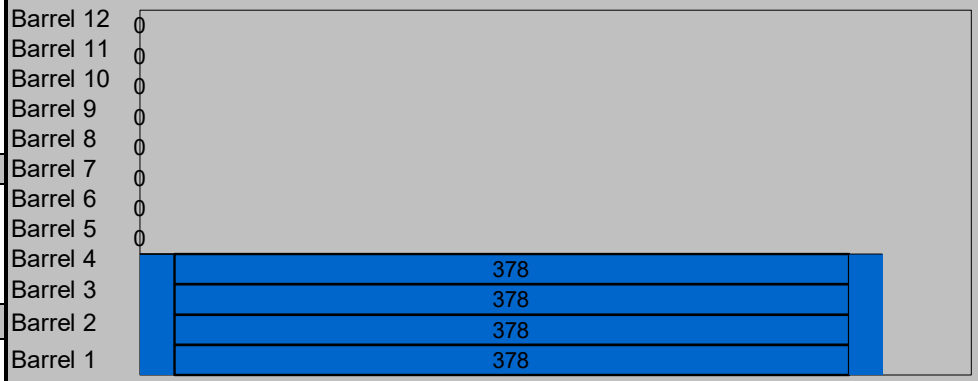
Total CMP Footage:	1,594	ft
Approximate Total Pieces:	68	pcs
Approximate Coupling Bands:	70	bands
Approximate Truckloads:	34	trucks

Construction Quantities**

Total Excavation:	6470	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	3502	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

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CMP CHAMBERS D3

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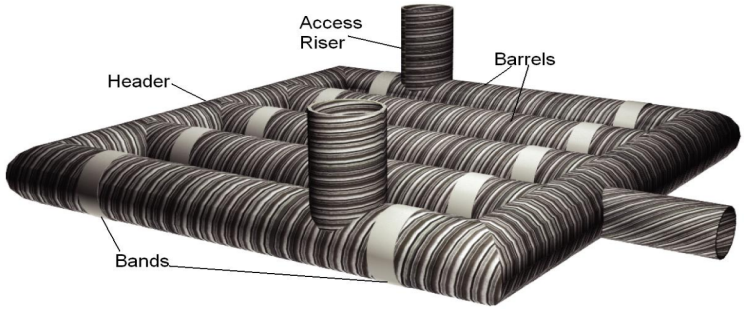


Project Summary

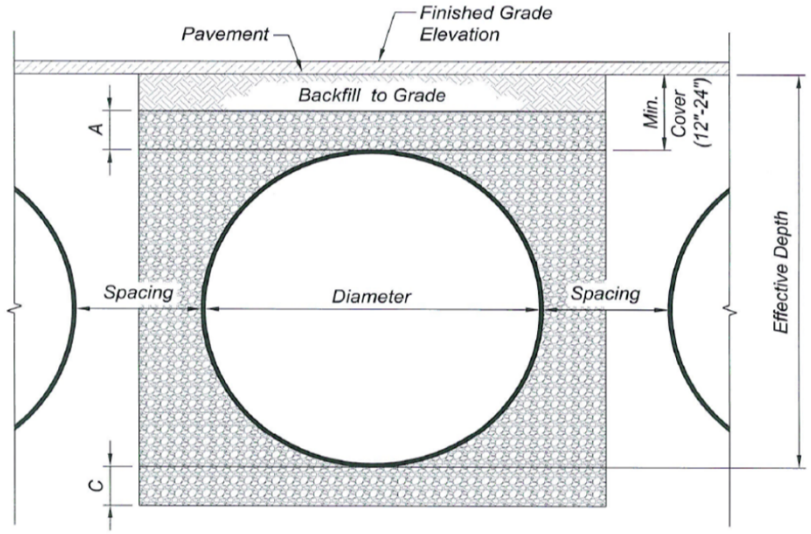
Date:	12/6/2021
Project Name:	BCCOV BLDG D AREA 12
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	8,500
Limiting Width (ft):	45.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	8,545	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	8,545	cf	100.5% Of Required Storage
Number of Barrels:	4	barrels	
Length per Barrel:	22.0	ft	
Length Per Header:	41.0	ft	
Rectangular Footprint (W x L):	44. ft x 41. ft		

CONTECH Materials

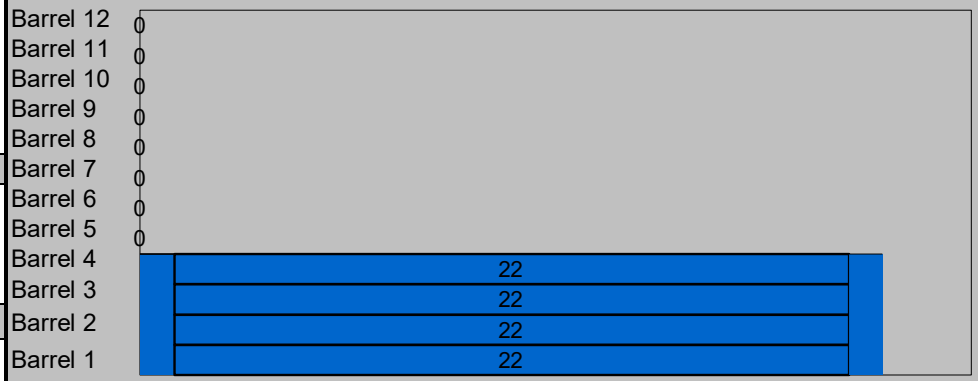
Total CMP Footage:	170	ft
Approximate Total Pieces:	8	pcs
Approximate Coupling Bands:	10	bands
Approximate Truckloads:	4	trucks

Construction Quantities**

Total Excavation:	669	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	353	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



TWO CHAMBER SYSTEMS CONNECTED BY AN EQUALIZER PIPE ARE PROPOSED TO DETAIN A TOTAL 17,000 CF

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BLDG D CMP CHAMBERS D1 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	0.91
Opening (in)	4
# of Orifices	1
Area (sf)	0.0873
Opening (ft)	0.3333
Total Area (sf)	0.0873
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= Cd*Area*$(2*G*H)^{0.5}$

Q_{WEIR}= C*L*$H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.167	**0.16667**	**729.89**	**0.017**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**2189.67**	**0.050**	**0.333333333**	0.27	0.27	
4	2209	1	**6070.75**	**0.139**	**0.833333333**	0.42	0.42	
5	**2209.5**	1.5	**10921.83**	**0.251**	**1.333333333**	0.53	0.53	
6	2210	2	**16450.33**	**0.378**	**1.833333333**	0.63	0.63	
7	**2210.5**	2.5	**22465.49**	**0.516**	**2.333333333**	0.71	0.71	
8	2211	3	**28821.05**	**0.662**	**2.833333333**	0.78	0.78	
9	**2211.5**	**3.5**	**35393.69**	**0.813**	**3.333333333**	**0.84**	0.84	
10	2212	4	**42072.21**	**0.966**	**3.833333333**	0.90	0.90	
11	**2212.5**	4.5	**48750.73**	**1.119**	**4.333333333**	0.96	0.96	
12	2213	5	**55323.37**	**1.270**	**4.833333333**	1.02	1.02	
13	**2213.5**	5.5	**61678.93**	**1.416**	**5.333333333**	1.07	1.07	
14	2214	6	**67694.09**	**1.554**	**5.833333333**	1.12	1.12	
15	**2214.5**	6.5	**73222.59**	**1.681**	**6.333333333**	1.16	1.16	
16	2215	7	**78073.67**	**1.792**	**6.833333333**	1.21	1.21	
17	**2215.5**	7.50	**81954.75**	**1.881**	**7.333333333**	1.25	1.25	
18	2216	8	**84144.42**	**1.932**	**7.833333333**	1.29	1.29	Top of chambers

BLDG D CMP CHAMBERS D2- Stage/Storage/Outflow Table

W.O.# 20-0258

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	1.1
Opening (in)	4.5
# of Orifices	1
Area (sf)	0.1104
Opening (ft)	0.3750
Total Area (sf)	0.1104
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= $Cd*Area*(2*G*H)^{0.5}$

Q_{WEIR}= $C*L*H^{3/2}$

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.188	**0.1875**	**781.89**	**0.018**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**2085.03**	**0.048**	**0.3125**	0.33	0.33	
4	2209	1	**5780.63**	**0.133**	**0.8125**	0.53	0.53	
5	**2209.5**	1.5	**10399.88**	**0.239**	**1.3125**	0.67	0.67	
6	2210	2	**15664.17**	**0.360**	**1.8125**	0.79	0.79	
7	**2210.5**	2.5	**21391.87**	**0.491**	**2.3125**	0.89	0.89	
8	2211	3	**27443.70**	**0.630**	**2.8125**	0.98	0.98	
9	**2211.5**	**3.5**	**33702.23**	**0.774**	**3.3125**	**1.06**	1.06	
10	2212	4	**40061.59**	**0.920**	**3.8125**	1.14	1.14	
11	**2212.5**	4.5	**46420.95**	**1.066**	**4.3125**	1.21	1.21	
12	2213	5	**52679.48**	**1.209**	**4.8125**	1.28	1.28	
13	**2213.5**	5.5	**58731.31**	**1.348**	**5.3125**	1.35	1.35	
14	2214	6	**64459.01**	**1.480**	**5.8125**	1.41	1.41	
15	**2214.5**	6.5	**69723.30**	**1.601**	**6.3125**	1.47	1.47	
16	2215	7	**74342.55**	**1.707**	**6.8125**	1.53	1.53	
17	**2215.5**	7.50	**78038.15**	**1.792**	**7.3125**	1.58	1.58	
18	2216	8	**80123.18**	**1.839**	**7.8125**	1.64	1.64	Top of chambers

BLDG D CMP CHAMBERS D3 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

$Q_{ORIFICE}$= Cd*Area*(2*G*H)$^{0.5}$

Q_{WEIR}= C*L*H$^{3/2}$

2-Year	ORIFICE
Q EXISTING	0.22
Opening (in)	2
# of Orifices	1
Area (sf)	0.0218
Opening (ft)	0.1667
Total Area (sf)	0.0218
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

2-Year

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.083	**0.08333**	**75.21**	**0.002**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**451.28**	**0.010**	**0.416666667**	0.07	0.07	
4	2209	1	**1251.14**	**0.029**	**0.916666667**	0.11	0.11	
5	**2209.5**	1.5	**2250.91**	**0.052**	**1.416666667**	0.14	0.14	
6	2210	2	**3390.30**	**0.078**	**1.916666667**	0.16	0.16	
7	**2210.5**	2.5	**4629.98**	**0.106**	**2.416666667**	0.18	0.18	
8	2211	3	**5939.82**	**0.136**	**2.916666667**	0.20	0.20	
9	**2211.5**	**3.5**	**7294.40**	**0.167**	**3.416666667**	**0.21**	0.21	
10	2212	4	**8670.80**	**0.199**	**3.916666667**	0.23	0.23	
11	**2212.5**	4.5	**10047.19**	**0.231**	**4.416666667**	0.24	0.24	
12	2213	5	**11401.77**	**0.262**	**4.916666667**	0.26	0.26	
13	**2213.5**	5.5	**12711.61**	**0.292**	**5.416666667**	0.27	0.27	
14	2214	6	**13951.29**	**0.320**	**5.916666667**	0.28	0.28	
15	**2214.5**	6.5	**15090.68**	**0.346**	**6.416666667**	0.29	0.29	
16	2215	7	**16090.45**	**0.369**	**6.916666667**	0.30	0.30	
17	**2215.5**	7.50	**16890.32**	**0.388**	**7.416666667**	0.31	0.31	
18	2216	8	**17341.59**	**0.398**	**7.916666667**	0.33	0.33	Top of chambers

BASIN ROUTING (2-YEAR, 24-HOUR STORM EVENT)

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/25/21

BCCOV BLDG D AREA 10
2 YR 24 HR STORM EVENT
21-0034
2021-11-25 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YRD1242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 3.388 (CFS)
Total volume = 2.059 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.167	0.017	0.001	0.017	0.017
0.500	0.050	0.270	0.049	0.051
1.000	0.139	0.420	0.138	0.140
1.500	0.251	0.530	0.249	0.253
2.000	0.378	0.630	0.376	0.380
2.500	0.516	0.710	0.514	0.518
3.000	0.662	0.780	0.659	0.665
3.500	0.813	0.840	0.810	0.816
4.000	0.966	0.900	0.963	0.969
4.500	1.119	0.960	1.116	1.122
5.000	1.270	1.020	1.266	1.274
5.500	1.416	1.070	1.412	1.420
6.000	1.554	1.120	1.550	1.558
6.500	1.681	1.160	1.677	1.685
7.000	1.792	1.210	1.788	1.796
7.500	1.881	1.250	1.877	1.885
8.000	1.932	1.290	1.928	1.936

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.8	1.69	2.54	3.39	Depth (Ft.)
0.083	0.07	0.00	0.000	O	|	|	|	|	0.00
0.167	0.17	0.00	0.001	OI	|	|	|	|	0.01
0.250	0.19	0.00	0.002	OI	|	|	|	|	0.02
0.333	0.23	0.00	0.004	O I	|	|	|	|	0.04
0.417	0.29	0.00	0.006	O I	|	|	|	|	0.06
0.500	0.30	0.00	0.008	O I	|	|	|	|	0.07
0.583	0.30	0.00	0.010	O I	|	|	|	|	0.09
0.667	0.30	0.00	0.012	O I	|	|	|	|	0.11
0.750	0.30	0.00	0.014	O I	|	|	|	|	0.14
0.833	0.33	0.00	0.016	O I	|	|	|	|	0.16
0.917	0.39	0.01	0.018	O I	|	|	|	|	0.18
1.000	0.40	0.03	0.021	O I	|	|	|	|	0.21
1.083	0.36	0.05	0.023	O I	|	|	|	|	0.23
1.167	0.31	0.07	0.025	O I	|	|	|	|	0.25
1.250	0.30	0.08	0.027	O I	|	|	|	|	0.27
1.333	0.30	0.09	0.028	O I	|	|	|	|	0.28
1.417	0.30	0.10	0.030	O I	|	|	|	|	0.29
1.500	0.30	0.11	0.031	|OI	|	|	|	|	0.31
1.583	0.30	0.12	0.032	|OI	|	|	|	|	0.32
1.667	0.30	0.13	0.033	|OI	|	|	|	|	0.33
1.750	0.30	0.14	0.034	|OI	|	|	|	|	0.34
1.833	0.33	0.15	0.036	|O I	|	|	|	|	0.35
1.917	0.39	0.16	0.037	|O I	|	|	|	|	0.37
2.000	0.40	0.18	0.038	|O I	|	|	|	|	0.38
2.083	0.40	0.19	0.040	|O I	|	|	|	|	0.40
2.167	0.40	0.20	0.041	|O I	|	|	|	|	0.41
2.250	0.40	0.21	0.043	|O I	|	|	|	|	0.43
2.333	0.40	0.22	0.044	| OI	|	|	|	|	0.44
2.417	0.40	0.23	0.045	| OI	|	|	|	|	0.45
2.500	0.40	0.24	0.046	| OI	|	|	|	|	0.46
2.583	0.43	0.25	0.047	| O I	|	|	|	|	0.47
2.667	0.49	0.26	0.049	| O I	|	|	|	|	0.49
2.750	0.50	0.27	0.050	| O I	|	|	|	|	0.50
2.833	0.50	0.27	0.052	| O I	|	|	|	|	0.51
2.917	0.50	0.28	0.054	| O I	|	|	|	|	0.52
3.000	0.50	0.28	0.055	| O I	|	|	|	|	0.53
3.083	0.50	0.28	0.057	| O I	|	|	|	|	0.54
3.167	0.50	0.28	0.058	| O I	|	|	|	|	0.55
3.250	0.50	0.29	0.059	| O I	|	|	|	|	0.55
3.333	0.50	0.29	0.061	| O I	|	|	|	|	0.56
3.417	0.50	0.29	0.062	| O I	|	|	|	|	0.57
3.500	0.50	0.29	0.064	| O I	|	|	|	|	0.58
3.583	0.50	0.30	0.065	| O I	|	|	|	|	0.59
3.667	0.50	0.30	0.067	| O I	|	|	|	|	0.59
3.750	0.50	0.30	0.068	| O I	|	|	|	|	0.60
3.833	0.53	0.30	0.069	| O I	|	|	|	|	0.61
3.917	0.59	0.31	0.071	| O I	|	|	|	|	0.62
4.000	0.60	0.31	0.073	| O I	|	|	|	|	0.63
4.083	0.60	0.31	0.075	| O I	|	|	|	|	0.64
4.167	0.60	0.32	0.077	| O I	|	|	|	|	0.65
4.250	0.60	0.32	0.079	| O I	|	|	|	|	0.66
4.333	0.63	0.32	0.081	| O I	|	|	|	|	0.67
4.417	0.69	0.33	0.083	| O I	|	|	|	|	0.69
4.500	0.70	0.33	0.086	| O I	|	|	|	|	0.70
4.583	0.70	0.33	0.088	| O I	|	|	|	|	0.72
4.667	0.70	0.34	0.091	| O I	|	|	|	|	0.73
4.750	0.70	0.34	0.093	| O I	|	|	|	|	0.74
4.833	0.73	0.35	0.096	| O I	|	|	|	|	0.76
4.917	0.78	0.35	0.099	| O I|	|	|	|	0.77
5.000	0.79	0.36	0.102	| O I|	|	|	|	0.79
5.083	0.73	0.36	0.104	| O I |	|	|	|	0.81
5.167	0.62	0.37	0.107	| O I |	|	|	|	0.82
5.250	0.60	0.37	0.108	| O I |	|	|	|	0.83
5.333	0.63	0.37	0.110	| O I |	|	|	|	0.84
5.417	0.69	0.37	0.112	| O I |	|	|	|	0.85
5.500	0.70	0.38	0.114	| O I |	|	|	|	0.86
5.583	0.73	0.38	0.116	| O I |	|	|	|	0.87
5.667	0.78	0.39	0.119	| O I|	|	|	|	0.89

5.750	0.79	0.39	0.122	o I				0.90
5.833	0.80	0.40	0.124	o I				0.92
5.917	0.80	0.40	0.127	o I				0.93
6.000	0.80	0.40	0.130	o I				0.95
6.083	0.83	0.41	0.133	o I				0.96
6.167	0.88	0.41	0.136	o I				0.98
6.250	0.89	0.42	0.139	o I				1.00
6.333	0.90	0.42	0.142	o I				1.01
6.417	0.90	0.43	0.146	o I				1.03
6.500	0.90	0.43	0.149	o I				1.04
6.583	0.93	0.43	0.152	o I				1.06
6.667	0.98	0.44	0.156	o I				1.07
6.750	0.99	0.44	0.160	o I				1.09
6.833	1.00	0.44	0.163	o I				1.11
6.917	1.00	0.45	0.167	o I				1.13
7.000	1.00	0.45	0.171	o I				1.14
7.083	1.00	0.45	0.175	o I				1.16
7.167	1.00	0.46	0.178	o I				1.18
7.250	1.00	0.46	0.182	o I				1.19
7.333	1.03	0.47	0.186	o I				1.21
7.417	1.08	0.47	0.190	o I				1.23
7.500	1.09	0.47	0.194	o I				1.25
7.583	1.13	0.48	0.198	o I				1.27
7.667	1.18	0.48	0.203	o I				1.29
7.750	1.19	0.49	0.208	o I				1.31
7.833	1.23	0.49	0.213	o I				1.33
7.917	1.28	0.50	0.218	o I				1.35
8.000	1.29	0.50	0.224	o I				1.38
8.083	1.36	0.51	0.229	o I				1.40
8.167	1.47	0.51	0.236	o I				1.43
8.250	1.49	0.52	0.242	o I				1.46
8.333	1.49	0.53	0.249	o I				1.49
8.417	1.49	0.53	0.255	o I				1.52
8.500	1.49	0.54	0.262	o I				1.54
8.583	1.53	0.54	0.269	o I				1.57
8.667	1.58	0.55	0.276	o I				1.60
8.750	1.59	0.56	0.283	o I				1.63
8.833	1.63	0.56	0.290	o I				1.65
8.917	1.68	0.57	0.298	o I				1.68
9.000	1.69	0.57	0.305	o I				1.71
9.083	1.76	0.58	0.313	o I				1.74
9.167	1.87	0.59	0.322	o I				1.78
9.250	1.89	0.59	0.331	o I				1.81
9.333	1.93	0.60	0.340	o I				1.85
9.417	1.98	0.61	0.349	o I				1.89
9.500	1.99	0.61	0.358	o I				1.92
9.583	2.03	0.62	0.368	o I				1.96
9.667	2.08	0.63	0.378	o I				2.00
9.750	2.09	0.64	0.388	o I				2.04
9.833	2.13	0.64	0.398	o I				2.07
9.917	2.18	0.65	0.408	o I				2.11
10.000	2.19	0.65	0.419	o I				2.15
10.083	1.95	0.66	0.429	o I				2.18
10.167	1.58	0.66	0.436	o I				2.21
10.250	1.51	0.67	0.442	o I				2.23
10.333	1.50	0.67	0.448	o I				2.25
10.417	1.49	0.67	0.454	o I				2.27
10.500	1.49	0.68	0.459	o I				2.29
10.583	1.67	0.68	0.465	o I				2.32
10.667	1.93	0.69	0.473	o I				2.34
10.750	1.98	0.69	0.482	o I				2.38
10.833	1.99	0.70	0.491	o I				2.41
10.917	1.99	0.70	0.500	o I				2.44
11.000	1.99	0.71	0.509	o I				2.47
11.083	1.96	0.71	0.517	o I				2.50
11.167	1.91	0.71	0.526	o I				2.53
11.250	1.90	0.72	0.534	o I				2.56
11.333	1.89	0.72	0.542	o I				2.59
11.417	1.89	0.73	0.550	o I				2.62
11.500	1.89	0.73	0.558	o I				2.64
11.583	1.82	0.73	0.566	o I				2.67
11.667	1.72	0.74	0.573	o I				2.69
11.750	1.70	0.74	0.580	o I				2.72
11.833	1.73	0.74	0.586	o I				2.74
11.917	1.78	0.75	0.593	o I				2.76

12.000	1.79	0.75	0.600	|	o|	I	|	|	2.79
12.083	2.03	0.75	0.608	|	o|	| I	|	|	2.82
12.167	2.40	0.76	0.618	|	o|	| I |	|	2.85
12.250	2.47	0.76	0.630	|	o|	| I|	|	2.89
12.333	2.52	0.77	0.642	|	o|	| I|	|	2.93
12.417	2.58	0.78	0.654	|	o|	| I	|	2.97
12.500	2.59	0.78	0.667	|	o|	| I	|	3.02
12.583	2.66	0.79	0.679	|	o|	| |I	|	3.06
12.667	2.77	0.79	0.692	|	o|	| | I	|	3.10
12.750	2.79	0.80	0.706	|	o|	| | I	|	3.15
12.833	2.82	0.80	0.720	|	o|	| | I	|	3.19
12.917	2.88	0.81	0.734	|	o|	| | I |	|	3.24
13.000	2.89	0.81	0.748	|	o|	| | I |	|	3.29
13.083	3.06	0.82	0.763	|	o|	| | I |	|	3.33
13.167	3.33	0.83	0.779	|	o|	| | I|	|	3.39
13.250	3.38	0.83	0.797	|	o|	| | I|	|	3.45
13.333	3.39	0.84	0.814	|	o|	| | I|	|	3.50
13.417	3.39	0.85	0.832	|	o	| |	I	|	3.56
13.500	3.39	0.85	0.849	|	o	| |	I	|	3.62
13.583	3.01	0.86	0.865	|	o	| | I |	|	3.67
13.667	2.43	0.87	0.878	|	o	| | I |	|	3.71
13.750	2.32	0.87	0.889	|	o	| | I |	|	3.75
13.833	2.30	0.87	0.898	|	o	| | I |	|	3.78
13.917	2.29	0.88	0.908	|	o	| | I |	|	3.81
14.000	2.29	0.88	0.918	|	o	| | I |	|	3.84
14.083	2.43	0.89	0.928	|	o	| | I |	|	3.88
14.167	2.64	0.89	0.939	|	o	| | I	|	3.91
14.250	2.68	0.89	0.952	|	o	| | |I	|	3.95
14.333	2.65	0.90	0.964	|	o	| | |I	|	3.99
14.417	2.60	0.90	0.976	|	o	| | I	|	4.03
14.500	2.59	0.91	0.987	|	o	| | I	|	4.07
14.583	2.59	0.91	0.999	|	o	| | I	|	4.11
14.667	2.59	0.92	1.011	|	o	| | I	|	4.15
14.750	2.59	0.92	1.022	|	o	| | I	|	4.18
14.833	2.56	0.93	1.033	|	o	| | I	|	4.22
14.917	2.50	0.93	1.044	|	o	| | I|	|	4.26
15.000	2.49	0.93	1.055	|	o	| | I|	|	4.29
15.083	2.46	0.94	1.066	|	o	| | I|	|	4.33
15.167	2.40	0.94	1.076	|	o	| | I |	|	4.36
15.250	2.39	0.95	1.086	|	o	| | I |	|	4.39
15.333	2.36	0.95	1.096	|	o	| | I |	|	4.42
15.417	2.30	0.95	1.105	|	|o	| | I |	|	4.46
15.500	2.29	0.96	1.115	|	|o	| | I |	|	4.49
15.583	2.15	0.96	1.123	|	|o	| | I |	|	4.51
15.667	1.94	0.96	1.131	|	|o	| I |	|	4.54
15.750	1.90	0.97	1.137	|	|o	|I |	|	4.56
15.833	1.90	0.97	1.144	|	|o	|I |	|	4.58
15.917	1.89	0.97	1.150	|	|o	|I |	|	4.60
16.000	1.89	0.97	1.156	|	|o	|I |	|	4.62
16.083	1.38	0.98	1.161	|	|o I |	|	|	4.64
16.167	0.58	0.98	1.161	|	I |o |	|	|	4.64
16.250	0.43	0.98	1.158	|	I |o |	|	|	4.63
16.333	0.41	0.97	1.154	|	I |o |	|	|	4.62
16.417	0.40	0.97	1.150	|	I |o |	|	|	4.60
16.500	0.40	0.97	1.146	|	I |o |	|	|	4.59
16.583	0.36	0.97	1.142	|	I |o |	|	|	4.58
16.667	0.31	0.97	1.138	|	I |o |	|	|	4.56
16.750	0.30	0.97	1.133	|	I |o |	|	|	4.55
16.833	0.30	0.96	1.129	|	I |o |	|	|	4.53
16.917	0.30	0.96	1.124	|	I |o |	|	|	4.52
17.000	0.30	0.96	1.119	|	I |o |	|	|	4.50
17.083	0.37	0.96	1.115	|	I |o |	|	|	4.49
17.167	0.47	0.96	1.111	|	I |o |	|	|	4.48
17.250	0.49	0.96	1.108	|	I |o |	|	|	4.46
17.333	0.50	0.95	1.105	|	I |o |	|	|	4.45
17.417	0.50	0.95	1.102	|	I |o |	|	|	4.44
17.500	0.50	0.95	1.099	|	I o	|	|	4.43
17.583	0.50	0.95	1.096	|	I o	|	|	4.42
17.667	0.50	0.95	1.093	|	I o	|	|	4.41
17.750	0.50	0.95	1.089	|	I o	|	|	4.40
17.833	0.46	0.95	1.086	|	I o	|	|	4.39
17.917	0.41	0.95	1.083	|	I o	|	|	4.38
18.000	0.40	0.94	1.079	|	I o	|	|	4.37
18.083	0.40	0.94	1.075	|	I o	|	|	4.36
18.167	0.40	0.94	1.071	|	I o	|	|	4.34

18.250	0.40	0.94	1.068	| I o	|	|	|	4.33
18.333	0.40	0.94	1.064	| I o	|	|	|	4.32
18.417	0.40	0.94	1.060	| I o	|	|	|	4.31
18.500	0.40	0.94	1.057	| I o	|	|	|	4.30
18.583	0.36	0.93	1.053	| I o	|	|	|	4.28
18.667	0.31	0.93	1.049	| I o	|	|	|	4.27
18.750	0.30	0.93	1.044	| I o	|	|	|	4.26
18.833	0.27	0.93	1.040	| I o	|	|	|	4.24
18.917	0.21	0.93	1.035	|I o	|	|	|	4.23
19.000	0.20	0.93	1.030	|I o	|	|	|	4.21
19.083	0.23	0.92	1.025	| I o	|	|	|	4.19
19.167	0.29	0.92	1.021	| I o	|	|	|	4.18
19.250	0.30	0.92	1.016	| I o	|	|	|	4.16
19.333	0.33	0.92	1.012	| I o	|	|	|	4.15
19.417	0.39	0.92	1.008	| I o	|	|	|	4.14
19.500	0.40	0.92	1.005	| I o	|	|	|	4.13
19.583	0.36	0.91	1.001	| I o	|	|	|	4.11
19.667	0.31	0.91	0.997	| I o	|	|	|	4.10
19.750	0.30	0.91	0.993	| I o	|	|	|	4.09
19.833	0.27	0.91	0.989	| I o	|	|	|	4.07
19.917	0.21	0.91	0.984	|I o	|	|	|	4.06
20.000	0.20	0.91	0.979	|I o	|	|	|	4.04
20.083	0.23	0.90	0.975	| I o	|	|	|	4.03
20.167	0.29	0.90	0.970	| I o	|	|	|	4.01
20.250	0.30	0.90	0.966	| I o	|	|	|	4.00
20.333	0.30	0.90	0.962	| I o	|	|	|	3.99
20.417	0.30	0.90	0.958	| I o	|	|	|	3.97
20.500	0.30	0.90	0.954	| I o	|	|	|	3.96
20.583	0.30	0.89	0.949	| I o	|	|	|	3.95
20.667	0.30	0.89	0.945	| I o	|	|	|	3.93
20.750	0.30	0.89	0.941	| I o	|	|	|	3.92
20.833	0.26	0.89	0.937	| I o	|	|	|	3.91
20.917	0.21	0.89	0.933	|I o	|	|	|	3.89
21.000	0.20	0.89	0.928	|I o	|	|	|	3.88
21.083	0.23	0.88	0.923	| I o	|	|	|	3.86
21.167	0.29	0.88	0.919	| I o	|	|	|	3.85
21.250	0.30	0.88	0.915	| I o	|	|	|	3.83
21.333	0.26	0.88	0.911	| I o	|	|	|	3.82
21.417	0.21	0.88	0.907	|I o	|	|	|	3.81
21.500	0.20	0.87	0.902	|I o	|	|	|	3.79
21.583	0.23	0.87	0.897	| I o	|	|	|	3.78
21.667	0.29	0.87	0.893	| I o	|	|	|	3.76
21.750	0.30	0.87	0.889	| I o	|	|	|	3.75
21.833	0.26	0.87	0.885	| I o	|	|	|	3.74
21.917	0.21	0.87	0.881	|I o	|	|	|	3.72
22.000	0.20	0.86	0.876	|I o	|	|	|	3.71
22.083	0.23	0.86	0.872	| I o	|	|	|	3.69
22.167	0.29	0.86	0.868	| I o	|	|	|	3.68
22.250	0.30	0.86	0.864	| I o	|	|	|	3.67
22.333	0.26	0.86	0.860	| I o	|	|	|	3.65
22.417	0.21	0.86	0.855	|I o	|	|	|	3.64
22.500	0.20	0.85	0.851	|I o	|	|	|	3.62
22.583	0.20	0.85	0.847	|I o	|	|	|	3.61
22.667	0.20	0.85	0.842	|I o	|	|	|	3.59
22.750	0.20	0.85	0.838	|I o	|	|	|	3.58
22.833	0.20	0.85	0.833	|I o	|	|	|	3.57
22.917	0.20	0.85	0.829	|I o|	|	|	|	3.55
23.000	0.20	0.84	0.824	|I o|	|	|	|	3.54
23.083	0.20	0.84	0.820	|I o|	|	|	|	3.52
23.167	0.20	0.84	0.815	|I o|	|	|	|	3.51
23.250	0.20	0.84	0.811	|I o|	|	|	|	3.49
23.333	0.20	0.84	0.806	|I o|	|	|	|	3.48
23.417	0.20	0.84	0.802	|I o|	|	|	|	3.46
23.500	0.20	0.83	0.798	|I o|	|	|	|	3.45
23.583	0.20	0.83	0.793	|I o|	|	|	|	3.43
23.667	0.20	0.83	0.789	|I o|	|	|	|	3.42
23.750	0.20	0.83	0.785	|I o|	|	|	|	3.41
23.833	0.20	0.83	0.780	|I o|	|	|	|	3.39
23.917	0.20	0.83	0.776	|I o|	|	|	|	3.38
24.000	0.20	0.82	0.772	|I o|	|	|	|	3.36
24.083	0.13	0.82	0.767	|I o|	|	|	|	3.35
24.167	0.02	0.82	0.762	I o|	|	|	|	3.33
24.250	0.00	0.82	0.757	I o|	|	|	|	3.31
24.333	0.00	0.82	0.751	I o|	|	|	|	3.29
24.417	0.00	0.81	0.745	I o|	|	|	|	3.28

24.500	0.00	0.81	0.740	I	o	|	|	|	3.26
24.583	0.00	0.81	0.734	I	o	|	|	|	3.24
24.667	0.00	0.81	0.729	I	o	|	|	|	3.22
24.750	0.00	0.80	0.723	I	o	|	|	|	3.20
24.833	0.00	0.80	0.717	I	o	|	|	|	3.18
24.917	0.00	0.80	0.712	I	o	|	|	|	3.17
25.000	0.00	0.80	0.706	I	o	|	|	|	3.15
25.083	0.00	0.80	0.701	I	o	|	|	|	3.13
25.167	0.00	0.79	0.696	I	o	|	|	|	3.11
25.250	0.00	0.79	0.690	I	o	|	|	|	3.09
25.333	0.00	0.79	0.685	I	o	|	|	|	3.07
25.417	0.00	0.79	0.679	I	o	|	|	|	3.06
25.500	0.00	0.78	0.674	I	o	|	|	|	3.04
25.583	0.00	0.78	0.668	I	o	|	|	|	3.02
25.667	0.00	0.78	0.663	I	o	|	|	|	3.00
25.750	0.00	0.78	0.658	I	o	|	|	|	2.99
25.833	0.00	0.78	0.652	I	o	|	|	|	2.97
25.917	0.00	0.77	0.647	I	o	|	|	|	2.95
26.000	0.00	0.77	0.642	I	o	|	|	|	2.93
26.083	0.00	0.77	0.636	I	o	|	|	|	2.91
26.167	0.00	0.77	0.631	I	o	|	|	|	2.89
26.250	0.00	0.76	0.626	I	o	|	|	|	2.88
26.333	0.00	0.76	0.621	I	o	|	|	|	2.86
26.417	0.00	0.76	0.615	I	o	|	|	|	2.84
26.500	0.00	0.76	0.610	I	o	|	|	|	2.82
26.583	0.00	0.75	0.605	I	o	|	|	|	2.80
26.667	0.00	0.75	0.600	I	o	|	|	|	2.79
26.750	0.00	0.75	0.595	I	o	|	|	|	2.77
26.833	0.00	0.75	0.589	I	o	|	|	|	2.75
26.917	0.00	0.74	0.584	I	o	|	|	|	2.73
27.000	0.00	0.74	0.579	I	o	|	|	|	2.72
27.083	0.00	0.74	0.574	I	o	|	|	|	2.70
27.167	0.00	0.74	0.569	I	o	|	|	|	2.68
27.250	0.00	0.73	0.564	I	o	|	|	|	2.66
27.333	0.00	0.73	0.559	I	o	|	|	|	2.65
27.417	0.00	0.73	0.554	I	o	|	|	|	2.63
27.500	0.00	0.73	0.549	I	o	|	|	|	2.61
27.583	0.00	0.72	0.544	I	o	|	|	|	2.60
27.667	0.00	0.72	0.539	I	o	|	|	|	2.58
27.750	0.00	0.72	0.534	I	o	|	|	|	2.56
27.833	0.00	0.72	0.529	I	o	|	|	|	2.54
27.917	0.00	0.71	0.524	I	o	|	|	|	2.53
28.000	0.00	0.71	0.519	I	o	|	|	|	2.51
28.083	0.00	0.71	0.514	I	o	|	|	|	2.49
28.167	0.00	0.71	0.509	I	o	|	|	|	2.48
28.250	0.00	0.70	0.505	I	o	|	|	|	2.46
28.333	0.00	0.70	0.500	I	o	|	|	|	2.44
28.417	0.00	0.70	0.495	I	o	|	|	|	2.42
28.500	0.00	0.70	0.490	I	o	|	|	|	2.41
28.583	0.00	0.69	0.485	I	o	|	|	|	2.39
28.667	0.00	0.69	0.481	I	o	|	|	|	2.37
28.750	0.00	0.69	0.476	I	o	|	|	|	2.35
28.833	0.00	0.68	0.471	I	o	|	|	|	2.34
28.917	0.00	0.68	0.466	I	o	|	|	|	2.32
29.000	0.00	0.68	0.462	I	o	|	|	|	2.30
29.083	0.00	0.68	0.457	I	o	|	|	|	2.29
29.167	0.00	0.67	0.452	I	o	|	|	|	2.27
29.250	0.00	0.67	0.448	I	o	|	|	|	2.25
29.333	0.00	0.67	0.443	I	o	|	|	|	2.24
29.417	0.00	0.67	0.439	I	o	|	|	|	2.22
29.500	0.00	0.66	0.434	I	o	|	|	|	2.20
29.583	0.00	0.66	0.430	I	o	|	|	|	2.19
29.667	0.00	0.66	0.425	I	o	|	|	|	2.17
29.750	0.00	0.65	0.420	I	o	|	|	|	2.15
29.833	0.00	0.65	0.416	I	o	|	|	|	2.14
29.917	0.00	0.65	0.412	I	o	|	|	|	2.12
30.000	0.00	0.65	0.407	I	o	|	|	|	2.11
30.083	0.00	0.64	0.403	I	o	|	|	|	2.09
30.167	0.00	0.64	0.398	I	o	|	|	|	2.07
30.250	0.00	0.64	0.394	I	o	|	|	|	2.06
30.333	0.00	0.64	0.389	I	o	|	|	|	2.04
30.417	0.00	0.63	0.385	I	o	|	|	|	2.03
30.500	0.00	0.63	0.381	I	o	|	|	|	2.01
30.583	0.00	0.63	0.376	I	o	|	|	|	1.99
30.667	0.00	0.63	0.372	I	o	|	|	|	1.98

30.750	0.00	0.62	0.368	I	o	|	|	|	1.96
30.833	0.00	0.62	0.363	I	o	|	|	|	1.94
30.917	0.00	0.62	0.359	I	o	|	|	|	1.93
31.000	0.00	0.61	0.355	I	o	|	|	|	1.91
31.083	0.00	0.61	0.351	I	o	|	|	|	1.89
31.167	0.00	0.61	0.347	I	o	|	|	|	1.88
31.250	0.00	0.60	0.342	I	o	|	|	|	1.86
31.333	0.00	0.60	0.338	I	o	|	|	|	1.84
31.417	0.00	0.60	0.334	I	o	|	|	|	1.83
31.500	0.00	0.59	0.330	I	o	|	|	|	1.81
31.583	0.00	0.59	0.326	I	o	|	|	|	1.80
31.667	0.00	0.59	0.322	I	o	|	|	|	1.78
31.750	0.00	0.58	0.318	I	o	|	|	|	1.76
31.833	0.00	0.58	0.314	I	o	|	|	|	1.75
31.917	0.00	0.58	0.310	I	o	|	|	|	1.73
32.000	0.00	0.57	0.306	I	o	|	|	|	1.72
32.083	0.00	0.57	0.302	I	o	|	|	|	1.70
32.167	0.00	0.57	0.298	I	o	|	|	|	1.69
32.250	0.00	0.56	0.294	I	o	|	|	|	1.67
32.333	0.00	0.56	0.290	I	o	|	|	|	1.65
32.417	0.00	0.56	0.287	I	o	|	|	|	1.64
32.500	0.00	0.55	0.283	I	o	|	|	|	1.62
32.583	0.00	0.55	0.279	I	o	|	|	|	1.61
32.667	0.00	0.55	0.275	I	o	|	|	|	1.59
32.750	0.00	0.55	0.271	I	o	|	|	|	1.58
32.833	0.00	0.54	0.268	I	o	|	|	|	1.57
32.917	0.00	0.54	0.264	I	o	|	|	|	1.55
33.000	0.00	0.54	0.260	I	o	|	|	|	1.54
33.083	0.00	0.53	0.256	I	o	|	|	|	1.52
33.167	0.00	0.53	0.253	I	o	|	|	|	1.51
33.250	0.00	0.53	0.249	I	o	|	|	|	1.49
33.333	0.00	0.52	0.245	I	o	|	|	|	1.48
33.417	0.00	0.52	0.242	I	o	|	|	|	1.46
33.500	0.00	0.52	0.238	I	o	|	|	|	1.44
33.583	0.00	0.51	0.235	I	o	|	|	|	1.43
33.667	0.00	0.51	0.231	I	o	|	|	|	1.41
33.750	0.00	0.51	0.228	I	o	|	|	|	1.40
33.833	0.00	0.50	0.224	I	o	|	|	|	1.38
33.917	0.00	0.50	0.221	I	o	|	|	|	1.37
34.000	0.00	0.50	0.217	I	o	|	|	|	1.35
34.083	0.00	0.49	0.214	I	o	|	|	|	1.33
34.167	0.00	0.49	0.211	I	o	|	|	|	1.32
34.250	0.00	0.49	0.207	I	o	|	|	|	1.30
34.333	0.00	0.48	0.204	I	o	|	|	|	1.29
34.417	0.00	0.48	0.201	I	o	|	|	|	1.27
34.500	0.00	0.48	0.197	I	o	|	|	|	1.26
34.583	0.00	0.47	0.194	I	o	|	|	|	1.25
34.667	0.00	0.47	0.191	I	o	|	|	|	1.23
34.750	0.00	0.47	0.187	I	o	|	|	|	1.22
34.833	0.00	0.46	0.184	I	o	|	|	|	1.20
34.917	0.00	0.46	0.181	I	o	|	|	|	1.19
35.000	0.00	0.46	0.178	I	o	|	|	|	1.17
35.083	0.00	0.46	0.175	I	o	|	|	|	1.16
35.167	0.00	0.45	0.172	I	o	|	|	|	1.15
35.250	0.00	0.45	0.169	I	o	|	|	|	1.13
35.333	0.00	0.45	0.165	I	o	|	|	|	1.12
35.417	0.00	0.44	0.162	I	o	|	|	|	1.10
35.500	0.00	0.44	0.159	I	o	|	|	|	1.09
35.583	0.00	0.44	0.156	I	o	|	|	|	1.08
35.667	0.00	0.43	0.153	I	o	|	|	|	1.06
35.750	0.00	0.43	0.150	I	o	|	|	|	1.05
35.833	0.00	0.43	0.147	I	o	|	|	|	1.04
35.917	0.00	0.43	0.144	I	o	|	|	|	1.02
36.000	0.00	0.42	0.142	I	o	|	|	|	1.01
36.083	0.00	0.42	0.139	I	o	|	|	|	1.00
36.167	0.00	0.41	0.136	I	o	|	|	|	0.98
36.250	0.00	0.41	0.133	I	o	|	|	|	0.97
36.333	0.00	0.41	0.130	I	o	|	|	|	0.95
36.417	0.00	0.40	0.127	I	o	|	|	|	0.93
36.500	0.00	0.40	0.125	I	o	|	|	|	0.92
36.583	0.00	0.39	0.122	I	o	|	|	|	0.90
36.667	0.00	0.39	0.119	I	o	|	|	|	0.89
36.750	0.00	0.38	0.117	I	o	|	|	|	0.87
36.833	0.00	0.38	0.114	I	o	|	|	|	0.86
36.917	0.00	0.37	0.111	I	o	|	|	|	0.84

37.000	0.00	0.37	0.109	I O	|	|	|	0.83
37.083	0.00	0.36	0.106	I O	|	|	|	0.82
37.167	0.00	0.36	0.104	I O	|	|	|	0.80
37.250	0.00	0.36	0.101	I O	|	|	|	0.79
37.333	0.00	0.35	0.099	I O	|	|	|	0.77
37.417	0.00	0.35	0.096	I O	|	|	|	0.76
37.500	0.00	0.34	0.094	I O	|	|	|	0.75
37.583	0.00	0.34	0.092	I O	|	|	|	0.73
37.667	0.00	0.34	0.089	I O	|	|	|	0.72
37.750	0.00	0.33	0.087	I O	|	|	|	0.71
37.833	0.00	0.33	0.085	I O	|	|	|	0.70
37.917	0.00	0.32	0.083	I O	|	|	|	0.68
38.000	0.00	0.32	0.080	I O	|	|	|	0.67
38.083	0.00	0.32	0.078	I O	|	|	|	0.66
38.167	0.00	0.31	0.076	I O	|	|	|	0.65
38.250	0.00	0.31	0.074	I O	|	|	|	0.63
38.333	0.00	0.31	0.072	I O	|	|	|	0.62
38.417	0.00	0.30	0.070	I O	|	|	|	0.61
38.500	0.00	0.30	0.068	I O	|	|	|	0.60
38.583	0.00	0.30	0.065	I O	|	|	|	0.59
38.667	0.00	0.29	0.063	I O	|	|	|	0.58
38.750	0.00	0.29	0.061	I O	|	|	|	0.56
38.833	0.00	0.29	0.059	I O	|	|	|	0.55
38.917	0.00	0.28	0.057	I O	|	|	|	0.54
39.000	0.00	0.28	0.056	I O	|	|	|	0.53
39.083	0.00	0.28	0.054	I O	|	|	|	0.52
39.167	0.00	0.27	0.052	I O	|	|	|	0.51
39.250	0.00	0.27	0.050	I O	|	|	|	0.50
39.333	0.00	0.25	0.048	I O	|	|	|	0.48
39.417	0.00	0.24	0.046	I O	|	|	|	0.46
39.500	0.00	0.23	0.045	I O	|	|	|	0.45
39.583	0.00	0.21	0.043	I O	|	|	|	0.43
39.667	0.00	0.20	0.042	IO	|	|	|	0.42
39.750	0.00	0.19	0.040	IO	|	|	|	0.40
39.833	0.00	0.18	0.039	IO	|	|	|	0.39
39.917	0.00	0.17	0.038	IO	|	|	|	0.38
40.000	0.00	0.16	0.037	IO	|	|	|	0.37
40.083	0.00	0.15	0.036	IO	|	|	|	0.36
40.167	0.00	0.15	0.035	IO	|	|	|	0.35
40.250	0.00	0.14	0.034	IO	|	|	|	0.34
40.333	0.00	0.13	0.033	IO	|	|	|	0.33
40.417	0.00	0.12	0.032	IO	|	|	|	0.32
40.500	0.00	0.12	0.031	IO	|	|	|	0.31
40.583	0.00	0.11	0.030	IO	|	|	|	0.30
40.667	0.00	0.10	0.030	O	|	|	|	0.29
40.750	0.00	0.10	0.029	O	|	|	|	0.29
40.833	0.00	0.09	0.028	O	|	|	|	0.28
40.917	0.00	0.09	0.028	O	|	|	|	0.27
41.000	0.00	0.08	0.027	O	|	|	|	0.27
41.083	0.00	0.08	0.026	O	|	|	|	0.26
41.167	0.00	0.07	0.026	O	|	|	|	0.26
41.250	0.00	0.07	0.025	O	|	|	|	0.25
41.333	0.00	0.07	0.025	O	|	|	|	0.25
41.417	0.00	0.06	0.025	O	|	|	|	0.24
41.500	0.00	0.06	0.024	O	|	|	|	0.24
41.583	0.00	0.06	0.024	O	|	|	|	0.23
41.667	0.00	0.05	0.023	O	|	|	|	0.23
41.750	0.00	0.05	0.023	O	|	|	|	0.23
41.833	0.00	0.05	0.023	O	|	|	|	0.22
41.917	0.00	0.04	0.022	O	|	|	|	0.22
42.000	0.00	0.04	0.022	O	|	|	|	0.22
42.083	0.00	0.04	0.022	O	|	|	|	0.22
42.167	0.00	0.04	0.022	O	|	|	|	0.21
42.250	0.00	0.04	0.021	O	|	|	|	0.21
42.333	0.00	0.03	0.021	O	|	|	|	0.21
42.417	0.00	0.03	0.021	O	|	|	|	0.21
42.500	0.00	0.03	0.021	O	|	|	|	0.20
42.583	0.00	0.03	0.020	O	|	|	|	0.20
42.667	0.00	0.03	0.020	O	|	|	|	0.20
42.750	0.00	0.03	0.020	O	|	|	|	0.20
42.833	0.00	0.02	0.020	O	|	|	|	0.20
42.917	0.00	0.02	0.020	O	|	|	|	0.19
43.000	0.00	0.02	0.020	O	|	|	|	0.19
43.083	0.00	0.02	0.019	O	|	|	|	0.19
43.167	0.00	0.02	0.019	O	|	|	|	0.19

43.250	0.00	0.02	0.019	o	|	|	|	|	0.19
43.333	0.00	0.02	0.019	o	|	|	|	|	0.19
43.417	0.00	0.02	0.019	o	|	|	|	|	0.19
43.500	0.00	0.02	0.019	o	|	|	|	|	0.18
43.583	0.00	0.01	0.019	o	|	|	|	|	0.18
43.667	0.00	0.01	0.019	o	|	|	|	|	0.18
43.750	0.00	0.01	0.018	o	|	|	|	|	0.18
43.833	0.00	0.01	0.018	o	|	|	|	|	0.18
43.917	0.00	0.01	0.018	o	|	|	|	|	0.18
44.000	0.00	0.01	0.018	o	|	|	|	|	0.18
44.083	0.00	0.01	0.018	o	|	|	|	|	0.18
44.167	0.00	0.01	0.018	o	|	|	|	|	0.18
44.250	0.00	0.01	0.018	o	|	|	|	|	0.18
44.333	0.00	0.01	0.018	o	|	|	|	|	0.18
44.417	0.00	0.01	0.018	o	|	|	|	|	0.18
44.500	0.00	0.01	0.018	o	|	|	|	|	0.18
44.583	0.00	0.01	0.018	o	|	|	|	|	0.17
44.667	0.00	0.01	0.018	o	|	|	|	|	0.17
44.750	0.00	0.01	0.018	o	|	|	|	|	0.17
44.833	0.00	0.01	0.018	o	|	|	|	|	0.17
44.917	0.00	0.01	0.018	o	|	|	|	|	0.17
45.000	0.00	0.01	0.018	o	|	|	|	|	0.17
45.083	0.00	0.01	0.018	o	|	|	|	|	0.17
45.167	0.00	0.00	0.017	o	|	|	|	|	0.17
45.250	0.00	0.00	0.017	o	|	|	|	|	0.17
45.333	0.00	0.00	0.017	o	|	|	|	|	0.17
45.417	0.00	0.00	0.017	o	|	|	|	|	0.17
45.500	0.00	0.00	0.017	o	|	|	|	|	0.17
45.583	0.00	0.00	0.017	o	|	|	|	|	0.17
45.667	0.00	0.00	0.017	o	|	|	|	|	0.17
45.750	0.00	0.00	0.017	o	|	|	|	|	0.17
45.833	0.00	0.00	0.017	o	|	|	|	|	0.17
45.917	0.00	0.00	0.017	o	|	|	|	|	0.17
46.000	0.00	0.00	0.017	o	|	|	|	|	0.17
46.083	0.00	0.00	0.017	o	|	|	|	|	0.17
46.167	0.00	0.00	0.017	o	|	|	|	|	0.17
46.250	0.00	0.00	0.017	o	|	|	|	|	0.17
46.333	0.00	0.00	0.017	o	|	|	|	|	0.17
46.417	0.00	0.00	0.017	o	|	|	|	|	0.17
46.500	0.00	0.00	0.017	o	|	|	|	|	0.17
46.583	0.00	0.00	0.017	o	|	|	|	|	0.17
46.667	0.00	0.00	0.017	o	|	|	|	|	0.17
46.750	0.00	0.00	0.017	o	|	|	|	|	0.17
46.833	0.00	0.00	0.017	o	|	|	|	|	0.17
46.917	0.00	0.00	0.017	o	|	|	|	|	0.17
47.000	0.00	0.00	0.017	o	|	|	|	|	0.17
47.083	0.00	0.00	0.017	o	|	|	|	|	0.17
47.167	0.00	0.00	0.017	o	|	|	|	|	0.17
47.250	0.00	0.00	0.017	o	|	|	|	|	0.17
47.333	0.00	0.00	0.017	o	|	|	|	|	0.17
47.417	0.00	0.00	0.017	o	|	|	|	|	0.17
47.500	0.00	0.00	0.017	o	|	|	|	|	0.17
47.583	0.00	0.00	0.017	o	|	|	|	|	0.17

Remaining water in basin = 0.02 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 571
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.977 (CFS)
Total volume = 2.042 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/25/21

BCCOV BLDG D AREA 11
2 YR 24 HR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YRD2242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 3.295 (CFS)
Total volume = 2.002 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

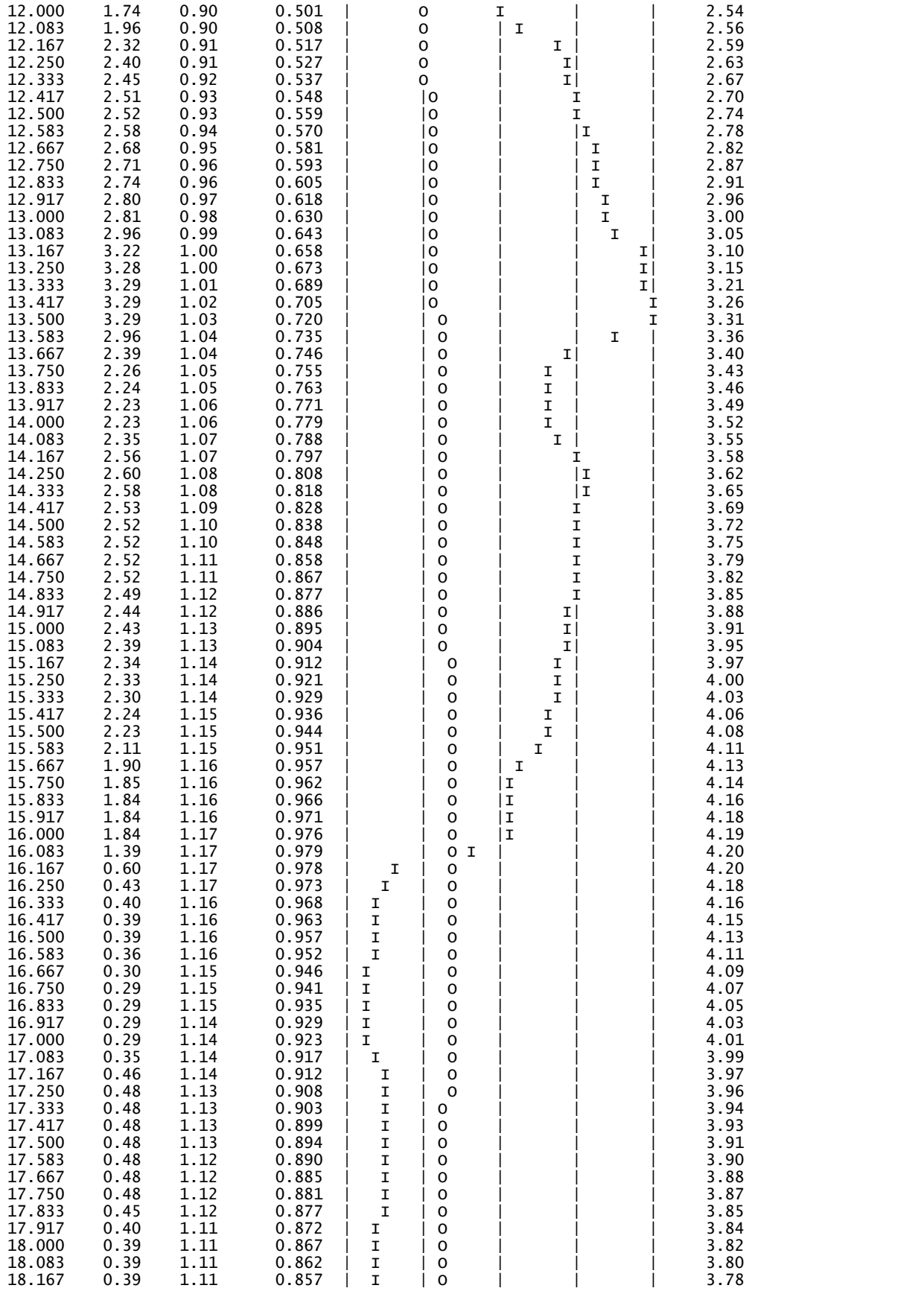
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.188	0.018	0.001	0.018	0.018
0.500	0.048	0.330	0.047	0.049
1.000	0.133	0.530	0.131	0.135
1.500	0.239	0.670	0.237	0.241
2.000	0.360	0.790	0.357	0.363
2.500	0.491	0.890	0.488	0.494
3.000	0.630	0.980	0.627	0.633
3.500	0.774	1.060	0.770	0.778
4.000	0.920	1.140	0.916	0.924
4.500	1.066	1.210	1.062	1.070
5.000	1.209	1.280	1.205	1.213
5.500	1.348	1.350	1.343	1.353
6.000	1.480	1.410	1.475	1.485
6.500	1.601	1.470	1.596	1.606
7.000	1.707	1.530	1.702	1.712
7.500	1.792	1.580	1.787	1.797
8.000	1.839	1.640	1.833	1.845

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.8	1.65	2.47	3.29	Depth (Ft.)
0.083	0.06	0.00	0.000	O					0.00
0.167	0.17	0.00	0.001	OI					0.01
0.250	0.19	0.00	0.002	OI					0.02
0.333	0.22	0.00	0.004	O I					0.04
0.417	0.28	0.00	0.005	O I					0.06
0.500	0.29	0.00	0.007	O I					0.08
0.583	0.29	0.00	0.009	O I					0.10
0.667	0.29	0.00	0.011	O I					0.12
0.750	0.29	0.00	0.013	O I					0.14
0.833	0.32	0.00	0.015	O I					0.16
0.917	0.37	0.00	0.018	O I					0.19
1.000	0.38	0.03	0.020	O I					0.21
1.083	0.36	0.05	0.023	O I					0.24
1.167	0.30	0.07	0.024	O I					0.25
1.250	0.29	0.09	0.026	O I					0.27
1.333	0.29	0.10	0.027	O I					0.28
1.417	0.29	0.12	0.029	OI					0.30
1.500	0.29	0.13	0.030	OI					0.31
1.583	0.29	0.14	0.031	OI					0.32
1.667	0.29	0.15	0.032	OI					0.33
1.750	0.29	0.16	0.033	OI					0.34
1.833	0.32	0.17	0.034	O I					0.35
1.917	0.37	0.19	0.035	O I					0.36
2.000	0.38	0.20	0.036	O I					0.38
2.083	0.39	0.21	0.037	OI					0.39
2.167	0.39	0.23	0.038	OI					0.40
2.250	0.39	0.24	0.040	OI					0.41
2.333	0.39	0.25	0.041	OI					0.42
2.417	0.39	0.26	0.041	OI					0.43
2.500	0.39	0.27	0.042	OI					0.44
2.583	0.42	0.28	0.043	O I					0.45
2.667	0.47	0.29	0.044	O I					0.46
2.750	0.48	0.30	0.046	O I					0.47
2.833	0.48	0.32	0.047	OI					0.49
2.917	0.48	0.33	0.048	OI					0.50
3.000	0.48	0.33	0.049	OI					0.51
3.083	0.48	0.33	0.050	OI					0.51
3.167	0.48	0.34	0.051	OI					0.52
3.250	0.48	0.34	0.052	OI					0.52
3.333	0.48	0.34	0.053	OI					0.53
3.417	0.48	0.34	0.054	OI					0.54
3.500	0.48	0.35	0.055	OI					0.54
3.583	0.48	0.35	0.056	OI					0.55
3.667	0.48	0.35	0.057	OI					0.55
3.750	0.48	0.35	0.058	OI					0.56
3.833	0.51	0.36	0.059	OI					0.56
3.917	0.57	0.36	0.060	O I					0.57
4.000	0.58	0.36	0.061	O I					0.58
4.083	0.58	0.37	0.063	O I					0.59
4.167	0.58	0.37	0.064	O I					0.60
4.250	0.58	0.37	0.066	O I					0.61
4.333	0.61	0.38	0.067	O I					0.61
4.417	0.66	0.38	0.069	O I					0.62
4.500	0.68	0.38	0.071	O I					0.64
4.583	0.68	0.39	0.073	O I					0.65
4.667	0.68	0.39	0.075	O I					0.66
4.750	0.68	0.40	0.077	O I					0.67
4.833	0.71	0.40	0.079	O I					0.68
4.917	0.76	0.41	0.081	O I					0.70
5.000	0.77	0.41	0.084	O I					0.71
5.083	0.71	0.42	0.086	O I					0.72
5.167	0.61	0.42	0.088	OI					0.73
5.250	0.59	0.43	0.089	OI					0.74
5.333	0.61	0.43	0.090	OI					0.75
5.417	0.66	0.43	0.092	O I					0.76
5.500	0.68	0.44	0.093	O I					0.77
5.583	0.71	0.44	0.095	O I					0.78
5.667	0.76	0.45	0.097	O I					0.79

5.750	0.77	0.45	0.099	o I				0.80
5.833	0.77	0.46	0.101	o I				0.81
5.917	0.78	0.46	0.103	o I				0.83
6.000	0.78	0.47	0.106	o I				0.84
6.083	0.81	0.47	0.108	o I				0.85
6.167	0.86	0.48	0.110	o I				0.87
6.250	0.87	0.48	0.113	o I				0.88
6.333	0.87	0.49	0.116	o I				0.90
6.417	0.87	0.50	0.118	o I				0.91
6.500	0.87	0.50	0.121	o I				0.93
6.583	0.90	0.51	0.123	o I				0.94
6.667	0.95	0.51	0.126	o I				0.96
6.750	0.97	0.52	0.129	o I				0.98
6.833	0.97	0.53	0.132	o I				1.00
6.917	0.97	0.53	0.135	o I				1.01
7.000	0.97	0.54	0.138	o I				1.03
7.083	0.97	0.54	0.141	o I				1.04
7.167	0.97	0.54	0.144	o I				1.05
7.250	0.97	0.55	0.147	o I				1.07
7.333	1.00	0.55	0.150	o I				1.08
7.417	1.05	0.56	0.153	o I				1.10
7.500	1.06	0.56	0.157	o I				1.11
7.583	1.10	0.57	0.160	o I				1.13
7.667	1.15	0.57	0.164	o I				1.15
7.750	1.16	0.58	0.168	o I				1.17
7.833	1.19	0.58	0.172	o I				1.19
7.917	1.25	0.59	0.177	o I				1.21
8.000	1.26	0.59	0.181	o I				1.23
8.083	1.32	0.60	0.186	o I				1.25
8.167	1.43	0.61	0.191	o I				1.28
8.250	1.45	0.61	0.197	o I				1.30
8.333	1.45	0.62	0.203	o I				1.33
8.417	1.45	0.63	0.208	o I				1.36
8.500	1.45	0.64	0.214	o I				1.38
8.583	1.48	0.64	0.220	o I				1.41
8.667	1.54	0.65	0.226	o I				1.44
8.750	1.55	0.66	0.232	o I				1.47
8.833	1.58	0.67	0.238	o I				1.50
8.917	1.63	0.68	0.244	o I				1.52
9.000	1.64	0.68	0.251	o I				1.55
9.083	1.71	0.69	0.258	o I				1.58
9.167	1.81	0.70	0.265	o I				1.61
9.250	1.84	0.70	0.273	o I				1.64
9.333	1.87	0.71	0.281	o I				1.67
9.417	1.92	0.72	0.289	o I				1.71
9.500	1.94	0.73	0.297	o I				1.74
9.583	1.97	0.74	0.306	o I				1.78
9.667	2.02	0.74	0.314	o I				1.81
9.750	2.03	0.75	0.323	o I				1.85
9.833	2.06	0.76	0.332	o I				1.88
9.917	2.12	0.77	0.341	o I				1.92
10.000	2.13	0.78	0.350	o I				1.96
10.083	1.92	0.79	0.359	o I				2.00
10.167	1.55	0.79	0.365	o I				2.02
10.250	1.47	0.80	0.370	o I				2.04
10.333	1.46	0.80	0.375	o I				2.06
10.417	1.45	0.80	0.379	o I				2.07
10.500	1.45	0.81	0.384	o I				2.09
10.583	1.60	0.81	0.389	o I				2.11
10.667	1.87	0.82	0.395	o I				2.13
10.750	1.92	0.82	0.403	o I				2.16
10.833	1.93	0.83	0.410	o I				2.19
10.917	1.94	0.83	0.418	o I				2.22
11.000	1.94	0.84	0.425	o I				2.25
11.083	1.91	0.85	0.433	o I				2.28
11.167	1.86	0.85	0.440	o I				2.31
11.250	1.84	0.86	0.447	o I				2.33
11.333	1.84	0.86	0.454	o I				2.36
11.417	1.84	0.87	0.460	o I				2.38
11.500	1.84	0.87	0.467	o I				2.41
11.583	1.78	0.88	0.473	o I				2.43
11.667	1.68	0.88	0.479	o I				2.46
11.750	1.65	0.89	0.485	o I				2.48
11.833	1.68	0.89	0.490	o I				2.50
11.917	1.73	0.89	0.496	o I				2.52



18.250	0.39	1.10	0.852	| I |	o	|	|	3.77
18.333	0.39	1.10	0.847	| I |	o	|	|	3.75
18.417	0.39	1.10	0.842	| I |	o	|	|	3.73
18.500	0.39	1.09	0.837	| I |	o	|	|	3.72
18.583	0.36	1.09	0.832	| I |	o	|	|	3.70
18.667	0.30	1.09	0.827	| I	o	|	|	3.68
18.750	0.29	1.09	0.822	| I	o	|	|	3.66
18.833	0.26	1.08	0.816	| I	o	|	|	3.64
18.917	0.21	1.08	0.810	| I	o	|	|	3.62
19.000	0.20	1.08	0.804	|I	o	|	|	3.60
19.083	0.22	1.07	0.798	| I	o	|	|	3.58
19.167	0.28	1.07	0.793	| I	o	|	|	3.56
19.250	0.29	1.07	0.787	| I	o	|	|	3.55
19.333	0.32	1.06	0.782	| I	o	|	|	3.53
19.417	0.37	1.06	0.777	| I	o	|	|	3.51
19.500	0.38	1.06	0.772	| I	o	|	|	3.49
19.583	0.36	1.06	0.768	| I	o	|	|	3.48
19.667	0.30	1.05	0.763	| I	o	|	|	3.46
19.750	0.29	1.05	0.758	| I	o	|	|	3.44
19.833	0.26	1.05	0.752	| I	o	|	|	3.42
19.917	0.21	1.04	0.747	| I	o	|	|	3.41
20.000	0.20	1.04	0.741	|I	o	|	|	3.38
20.083	0.22	1.04	0.735	| I	o	|	|	3.37
20.167	0.28	1.04	0.730	| I	o	|	|	3.35
20.250	0.29	1.03	0.725	| I	o	|	|	3.33
20.333	0.29	1.03	0.719	| I	o	|	|	3.31
20.417	0.29	1.03	0.714	| I	|o	|	|	3.29
20.500	0.29	1.02	0.709	| I	|o	|	|	3.28
20.583	0.29	1.02	0.704	| I	|o	|	|	3.26
20.667	0.29	1.02	0.699	| I	|o	|	|	3.24
20.750	0.29	1.02	0.694	| I	|o	|	|	3.22
20.833	0.26	1.01	0.689	| I	|o	|	|	3.21
20.917	0.21	1.01	0.684	| I	|o	|	|	3.19
21.000	0.20	1.01	0.678	|I	|o	|	|	3.17
21.083	0.22	1.00	0.673	| I	|o	|	|	3.15
21.167	0.28	1.00	0.668	| I	|o	|	|	3.13
21.250	0.29	1.00	0.663	| I	|o	|	|	3.11
21.333	0.26	1.00	0.658	| I	|o	|	|	3.10
21.417	0.21	0.99	0.652	| I	|o	|	|	3.08
21.500	0.20	0.99	0.647	|I	|o	|	|	3.06
21.583	0.22	0.99	0.642	| I	|o	|	|	3.04
21.667	0.28	0.98	0.637	| I	|o	|	|	3.02
21.750	0.29	0.98	0.632	| I	|o	|	|	3.01
21.833	0.26	0.98	0.627	| I	|o	|	|	2.99
21.917	0.21	0.97	0.622	| I	|o	|	|	2.97
22.000	0.20	0.97	0.616	|I	|o	|	|	2.95
22.083	0.22	0.97	0.611	| I	|o	|	|	2.93
22.167	0.28	0.96	0.606	| I	|o	|	|	2.91
22.250	0.29	0.96	0.602	| I	|o	|	|	2.90
22.333	0.26	0.96	0.597	| I	|o	|	|	2.88
22.417	0.21	0.96	0.592	| I	|o	|	|	2.86
22.500	0.20	0.95	0.587	|I	|o	|	|	2.84
22.583	0.19	0.95	0.582	|I	|o	|	|	2.83
22.667	0.19	0.95	0.576	|I	|o	|	|	2.81
22.750	0.19	0.94	0.571	|I	|o	|	|	2.79
22.833	0.19	0.94	0.566	|I	|o	|	|	2.77
22.917	0.19	0.94	0.561	|I	|o	|	|	2.75
23.000	0.19	0.93	0.556	|I	|o	|	|	2.73
23.083	0.19	0.93	0.551	|I	|o	|	|	2.72
23.167	0.19	0.93	0.546	|I	o	|	|	2.70
23.250	0.19	0.92	0.541	|I	o	|	|	2.68
23.333	0.19	0.92	0.536	|I	o	|	|	2.66
23.417	0.19	0.92	0.531	|I	o	|	|	2.64
23.500	0.19	0.91	0.526	|I	o	|	|	2.63
23.583	0.19	0.91	0.521	|I	o	|	|	2.61
23.667	0.19	0.91	0.516	|I	o	|	|	2.59
23.750	0.19	0.90	0.511	|I	o	|	|	2.57
23.833	0.19	0.90	0.506	|I	o	|	|	2.55
23.917	0.19	0.90	0.501	|I	o	|	|	2.54
24.000	0.19	0.89	0.496	|I	o	|	|	2.52
24.083	0.13	0.89	0.491	|I	o	|	|	2.50
24.167	0.03	0.89	0.486	I	o	|	|	2.48
24.250	0.01	0.88	0.480	I	o	|	|	2.46
24.333	0.00	0.88	0.474	I	o	|	|	2.43
24.417	0.00	0.87	0.468	I	o	|	|	2.41

24.500	0.00	0.87	0.462	I	o	|	|	|	2.39
24.583	0.00	0.86	0.456	I	o	|	|	|	2.37
24.667	0.00	0.86	0.450	I	o	|	|	|	2.34
24.750	0.00	0.85	0.444	I	o	|	|	|	2.32
24.833	0.00	0.85	0.438	I	o	|	|	|	2.30
24.917	0.00	0.85	0.432	I	o	|	|	|	2.28
25.000	0.00	0.84	0.427	I	o	|	|	|	2.25
25.083	0.00	0.84	0.421	I	o	|	|	|	2.23
25.167	0.00	0.83	0.415	I	o	|	|	|	2.21
25.250	0.00	0.83	0.409	I	o	|	|	|	2.19
25.333	0.00	0.82	0.404	I	o|	|	|	|	2.17
25.417	0.00	0.82	0.398	I	o|	|	|	|	2.15
25.500	0.00	0.81	0.392	I	o|	|	|	|	2.12
25.583	0.00	0.81	0.387	I	o|	|	|	|	2.10
25.667	0.00	0.81	0.381	I	o|	|	|	|	2.08
25.750	0.00	0.80	0.376	I	o|	|	|	|	2.06
25.833	0.00	0.80	0.370	I	o|	|	|	|	2.04
25.917	0.00	0.79	0.365	I	o|	|	|	|	2.02
26.000	0.00	0.79	0.359	I	o|	|	|	|	2.00
26.083	0.00	0.78	0.354	I	o|	|	|	|	1.97
26.167	0.00	0.78	0.348	I	o|	|	|	|	1.95
26.250	0.00	0.77	0.343	I	o|	|	|	|	1.93
26.333	0.00	0.77	0.338	I	o|	|	|	|	1.91
26.417	0.00	0.76	0.333	I	o|	|	|	|	1.89
26.500	0.00	0.76	0.327	I	o|	|	|	|	1.86
26.583	0.00	0.75	0.322	I	o|	|	|	|	1.84
26.667	0.00	0.75	0.317	I	o|	|	|	|	1.82
26.750	0.00	0.74	0.312	I	o|	|	|	|	1.80
26.833	0.00	0.74	0.307	I	o|	|	|	|	1.78
26.917	0.00	0.73	0.302	I	o|	|	|	|	1.76
27.000	0.00	0.73	0.297	I	o|	|	|	|	1.74
27.083	0.00	0.72	0.292	I	o|	|	|	|	1.72
27.167	0.00	0.72	0.287	I	o |	|	|	|	1.70
27.250	0.00	0.71	0.282	I	o |	|	|	|	1.68
27.333	0.00	0.71	0.277	I	o |	|	|	|	1.66
27.417	0.00	0.70	0.272	I	o |	|	|	|	1.64
27.500	0.00	0.70	0.267	I	o |	|	|	|	1.62
27.583	0.00	0.69	0.262	I	o |	|	|	|	1.60
27.667	0.00	0.69	0.258	I	o |	|	|	|	1.58
27.750	0.00	0.68	0.253	I	o |	|	|	|	1.56
27.833	0.00	0.68	0.248	I	o |	|	|	|	1.54
27.917	0.00	0.67	0.244	I	o |	|	|	|	1.52
28.000	0.00	0.67	0.239	I	o |	|	|	|	1.50
28.083	0.00	0.66	0.234	I	o |	|	|	|	1.48
28.167	0.00	0.66	0.230	I	o |	|	|	|	1.46
28.250	0.00	0.65	0.225	I	o |	|	|	|	1.44
28.333	0.00	0.65	0.221	I	o |	|	|	|	1.41
28.417	0.00	0.64	0.216	I	o |	|	|	|	1.39
28.500	0.00	0.63	0.212	I	o |	|	|	|	1.37
28.583	0.00	0.63	0.208	I	o |	|	|	|	1.35
28.667	0.00	0.62	0.203	I	o |	|	|	|	1.33
28.750	0.00	0.62	0.199	I	o |	|	|	|	1.31
28.833	0.00	0.61	0.195	I	o |	|	|	|	1.29
28.917	0.00	0.61	0.191	I	o |	|	|	|	1.27
29.000	0.00	0.60	0.186	I	o |	|	|	|	1.25
29.083	0.00	0.60	0.182	I	o |	|	|	|	1.23
29.167	0.00	0.59	0.178	I	o |	|	|	|	1.21
29.250	0.00	0.58	0.174	I	o |	|	|	|	1.19
29.333	0.00	0.58	0.170	I	o |	|	|	|	1.18
29.417	0.00	0.57	0.166	I	o |	|	|	|	1.16
29.500	0.00	0.57	0.162	I	o |	|	|	|	1.14
29.583	0.00	0.56	0.158	I	o |	|	|	|	1.12
29.667	0.00	0.56	0.155	I	o |	|	|	|	1.10
29.750	0.00	0.55	0.151	I	o |	|	|	|	1.08
29.833	0.00	0.55	0.147	I	o |	|	|	|	1.07
29.917	0.00	0.54	0.143	I	o |	|	|	|	1.05
30.000	0.00	0.54	0.139	I	o |	|	|	|	1.03
30.083	0.00	0.53	0.136	I	o |	|	|	|	1.01
30.167	0.00	0.53	0.132	I	o |	|	|	|	0.99
30.250	0.00	0.52	0.128	I	o |	|	|	|	0.97
30.333	0.00	0.51	0.125	I	o |	|	|	|	0.95
30.417	0.00	0.50	0.121	I	o |	|	|	|	0.93
30.500	0.00	0.49	0.118	I	o |	|	|	|	0.91
30.583	0.00	0.49	0.115	I	o |	|	|	|	0.89
30.667	0.00	0.48	0.111	I	o |	|	|	|	0.87

30.750	0.00	0.47	0.108	I o	|	|	|	0.85
30.833	0.00	0.46	0.105	I o	|	|	|	0.83
30.917	0.00	0.46	0.102	I o	|	|	|	0.82
31.000	0.00	0.45	0.099	I o	|	|	|	0.80
31.083	0.00	0.44	0.095	I o	|	|	|	0.78
31.167	0.00	0.43	0.092	I o	|	|	|	0.76
31.250	0.00	0.43	0.089	I o	|	|	|	0.74
31.333	0.00	0.42	0.087	I o	|	|	|	0.73
31.417	0.00	0.41	0.084	I o	|	|	|	0.71
31.500	0.00	0.41	0.081	I o	|	|	|	0.69
31.583	0.00	0.40	0.078	I o	|	|	|	0.68
31.667	0.00	0.39	0.075	I o	|	|	|	0.66
31.750	0.00	0.39	0.073	I o	|	|	|	0.64
31.833	0.00	0.38	0.070	I o	|	|	|	0.63
31.917	0.00	0.38	0.067	I o	|	|	|	0.61
32.000	0.00	0.37	0.065	I o	|	|	|	0.60
32.083	0.00	0.36	0.062	I o	|	|	|	0.58
32.167	0.00	0.36	0.060	I o	|	|	|	0.57
32.250	0.00	0.35	0.057	I o	|	|	|	0.56
32.333	0.00	0.35	0.055	I o	|	|	|	0.54
32.417	0.00	0.34	0.053	I o	|	|	|	0.53
32.500	0.00	0.34	0.050	I o	|	|	|	0.51
32.583	0.00	0.33	0.048	I o	|	|	|	0.50
32.667	0.00	0.31	0.046	I o	|	|	|	0.48
32.750	0.00	0.28	0.044	I o	|	|	|	0.46
32.833	0.00	0.26	0.042	I o	|	|	|	0.44
32.917	0.00	0.24	0.040	I o	|	|	|	0.42
33.000	0.00	0.23	0.039	I o	|	|	|	0.40
33.083	0.00	0.21	0.037	I o	|	|	|	0.39
33.167	0.00	0.19	0.036	IO	|	|	|	0.37
33.250	0.00	0.18	0.034	IO	|	|	|	0.36
33.333	0.00	0.17	0.033	IO	|	|	|	0.35
33.417	0.00	0.15	0.032	IO	|	|	|	0.33
33.500	0.00	0.14	0.031	IO	|	|	|	0.32
33.583	0.00	0.13	0.030	IO	|	|	|	0.31
33.667	0.00	0.12	0.029	IO	|	|	|	0.30
33.750	0.00	0.11	0.028	IO	|	|	|	0.30
33.833	0.00	0.11	0.028	IO	|	|	|	0.29
33.917	0.00	0.10	0.027	O	|	|	|	0.28
34.000	0.00	0.09	0.026	O	|	|	|	0.27
34.083	0.00	0.08	0.026	O	|	|	|	0.27
34.167	0.00	0.08	0.025	O	|	|	|	0.26
34.250	0.00	0.07	0.025	O	|	|	|	0.26
34.333	0.00	0.07	0.024	O	|	|	|	0.25
34.417	0.00	0.06	0.024	O	|	|	|	0.25
34.500	0.00	0.06	0.023	O	|	|	|	0.24
34.583	0.00	0.05	0.023	O	|	|	|	0.24
34.667	0.00	0.05	0.022	O	|	|	|	0.23
34.750	0.00	0.05	0.022	O	|	|	|	0.23
34.833	0.00	0.04	0.022	O	|	|	|	0.23
34.917	0.00	0.04	0.022	O	|	|	|	0.22
35.000	0.00	0.04	0.021	O	|	|	|	0.22
35.083	0.00	0.03	0.021	O	|	|	|	0.22
35.167	0.00	0.03	0.021	O	|	|	|	0.22
35.250	0.00	0.03	0.021	O	|	|	|	0.21
35.333	0.00	0.03	0.020	O	|	|	|	0.21
35.417	0.00	0.03	0.020	O	|	|	|	0.21
35.500	0.00	0.02	0.020	O	|	|	|	0.21
35.583	0.00	0.02	0.020	O	|	|	|	0.21
35.667	0.00	0.02	0.020	O	|	|	|	0.21
35.750	0.00	0.02	0.020	O	|	|	|	0.20
35.833	0.00	0.02	0.019	O	|	|	|	0.20
35.917	0.00	0.02	0.019	O	|	|	|	0.20
36.000	0.00	0.01	0.019	O	|	|	|	0.20
36.083	0.00	0.01	0.019	O	|	|	|	0.20
36.167	0.00	0.01	0.019	O	|	|	|	0.20
36.250	0.00	0.01	0.019	O	|	|	|	0.20
36.333	0.00	0.01	0.019	O	|	|	|	0.20
36.417	0.00	0.01	0.019	O	|	|	|	0.20
36.500	0.00	0.01	0.019	O	|	|	|	0.20
36.583	0.00	0.01	0.019	O	|	|	|	0.20
36.667	0.00	0.01	0.019	O	|	|	|	0.19
36.750	0.00	0.01	0.019	O	|	|	|	0.19
36.833	0.00	0.01	0.019	O	|	|	|	0.19
36.917	0.00	0.01	0.018	O	|	|	|	0.19

37.000	0.00	0.01	0.018	o	|	|	|	0.19
37.083	0.00	0.01	0.018	o	|	|	|	0.19
37.167	0.00	0.01	0.018	o	|	|	|	0.19
37.250	0.00	0.00	0.018	o	|	|	|	0.19
37.333	0.00	0.00	0.018	o	|	|	|	0.19
37.417	0.00	0.00	0.018	o	|	|	|	0.19
37.500	0.00	0.00	0.018	o	|	|	|	0.19
37.583	0.00	0.00	0.018	o	|	|	|	0.19
37.667	0.00	0.00	0.018	o	|	|	|	0.19
37.750	0.00	0.00	0.018	o	|	|	|	0.19
37.833	0.00	0.00	0.018	o	|	|	|	0.19
37.917	0.00	0.00	0.018	o	|	|	|	0.19
38.000	0.00	0.00	0.018	o	|	|	|	0.19
38.083	0.00	0.00	0.018	o	|	|	|	0.19
38.167	0.00	0.00	0.018	o	|	|	|	0.19
38.250	0.00	0.00	0.018	o	|	|	|	0.19
38.333	0.00	0.00	0.018	o	|	|	|	0.19
38.417	0.00	0.00	0.018	o	|	|	|	0.19
38.500	0.00	0.00	0.018	o	|	|	|	0.19
38.583	0.00	0.00	0.018	o	|	|	|	0.19
38.667	0.00	0.00	0.018	o	|	|	|	0.19
38.750	0.00	0.00	0.018	o	|	|	|	0.19
38.833	0.00	0.00	0.018	o	|	|	|	0.19
38.917	0.00	0.00	0.018	o	|	|	|	0.19
39.000	0.00	0.00	0.018	o	|	|	|	0.19

Remaining water in basin = 0.02 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 468
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.168 (CFS)
Total volume = 1.984 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 11/25/21

BCCOV BLDG D AREA 12
2 YR 24 HR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YRD3242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 290
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.697 (CFS)
Total volume = 0.423 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 290
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.083	0.002	0.001	0.002	0.002
0.500	0.010	0.070	0.010	0.010
1.000	0.029	0.110	0.029	0.029
1.500	0.052	0.140	0.052	0.052
2.000	0.078	0.160	0.077	0.079
2.500	0.106	0.180	0.105	0.107
3.000	0.136	0.200	0.135	0.137
3.500	0.167	0.210	0.166	0.168
4.000	0.199	0.230	0.198	0.200
4.500	0.231	0.240	0.230	0.232
5.000	0.262	0.260	0.261	0.263
5.500	0.292	0.270	0.291	0.293
6.000	0.320	0.280	0.319	0.321
6.500	0.346	0.290	0.345	0.347
7.000	0.369	0.300	0.368	0.370
7.500	0.388	0.310	0.387	0.389
8.000	0.398	0.330	0.397	0.399

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.2	0.35	0.52	0.70	Depth (Ft.)
0.083	0.03	0.00	0.000	OI	|	|	|	|	0.00
0.167	0.04	0.00	0.000	OI	|	|	|	|	0.01
0.250	0.04	0.00	0.001	OI	|	|	|	|	0.02
0.333	0.05	0.00	0.001	O I	|	|	|	|	0.04
0.417	0.06	0.00	0.001	O I	|	|	|	|	0.05
0.500	0.06	0.00	0.002	O I	|	|	|	|	0.07
0.583	0.06	0.00	0.002	O I	|	|	|	|	0.09
0.667	0.06	0.01	0.003	O I	|	|	|	|	0.11
0.750	0.06	0.01	0.003	O I	|	|	|	|	0.13
0.833	0.07	0.01	0.003	O I	|	|	|	|	0.15
0.917	0.08	0.02	0.004	O I	|	|	|	|	0.17
1.000	0.08	0.02	0.004	O I	|	|	|	|	0.20
1.083	0.07	0.02	0.005	|O I	|	|	|	|	0.22
1.167	0.06	0.03	0.005	|OI	|	|	|	|	0.23
1.250	0.06	0.03	0.005	|OI	|	|	|	|	0.24
1.333	0.06	0.03	0.005	|OI	|	|	|	|	0.26
1.417	0.06	0.03	0.006	|OI	|	|	|	|	0.27
1.500	0.06	0.03	0.006	|OI	|	|	|	|	0.28
1.583	0.06	0.03	0.006	|OI	|	|	|	|	0.29
1.667	0.06	0.04	0.006	|OI	|	|	|	|	0.30
1.750	0.06	0.04	0.006	|OI	|	|	|	|	0.31
1.833	0.07	0.04	0.006	|O I	|	|	|	|	0.32
1.917	0.08	0.04	0.007	|O I	|	|	|	|	0.33
2.000	0.08	0.04	0.007	| OI	|	|	|	|	0.34
2.083	0.08	0.05	0.007	| OI	|	|	|	|	0.36
2.167	0.08	0.05	0.007	| OI	|	|	|	|	0.37
2.250	0.08	0.05	0.008	| OI	|	|	|	|	0.38
2.333	0.08	0.05	0.008	| OI	|	|	|	|	0.39
2.417	0.08	0.05	0.008	| OI	|	|	|	|	0.40
2.500	0.08	0.06	0.008	| OI	|	|	|	|	0.41
2.583	0.09	0.06	0.009	| O I	|	|	|	|	0.42
2.667	0.10	0.06	0.009	| O I	|	|	|	|	0.44
2.750	0.10	0.06	0.009	| O I	|	|	|	|	0.45
2.833	0.10	0.06	0.009	| O I	|	|	|	|	0.47
2.917	0.10	0.07	0.010	| OI	|	|	|	|	0.48
3.000	0.10	0.07	0.010	| OI	|	|	|	|	0.49
3.083	0.10	0.07	0.010	| OI	|	|	|	|	0.50
3.167	0.10	0.07	0.010	| OI	|	|	|	|	0.51
3.250	0.10	0.07	0.011	| OI	|	|	|	|	0.51
3.333	0.10	0.07	0.011	| OI	|	|	|	|	0.52
3.417	0.10	0.07	0.011	| OI	|	|	|	|	0.52
3.500	0.10	0.07	0.011	| OI	|	|	|	|	0.53
3.583	0.10	0.07	0.011	| OI	|	|	|	|	0.54
3.667	0.10	0.07	0.012	| OI	|	|	|	|	0.54
3.750	0.10	0.07	0.012	| OI	|	|	|	|	0.55
3.833	0.12	0.07	0.012	| O I	|	|	|	|	0.55
3.917	0.12	0.07	0.012	| O I	|	|	|	|	0.56
4.000	0.12	0.08	0.013	| O I	|	|	|	|	0.57
4.083	0.12	0.08	0.013	| O I	|	|	|	|	0.58
4.167	0.12	0.08	0.013	| O I	|	|	|	|	0.59
4.250	0.12	0.08	0.014	| O I	|	|	|	|	0.59
4.333	0.14	0.08	0.014	| O I	|	|	|	|	0.60
4.417	0.14	0.08	0.014	| O I	|	|	|	|	0.61
4.500	0.14	0.08	0.015	| O I	|	|	|	|	0.63
4.583	0.14	0.08	0.015	| O I	|	|	|	|	0.64
4.667	0.14	0.08	0.016	| O I	|	|	|	|	0.65
4.750	0.14	0.08	0.016	| O I	|	|	|	|	0.66
4.833	0.16	0.08	0.017	| O I|	|	|	|	0.67
4.917	0.16	0.08	0.017	| O I|	|	|	|	0.69
5.000	0.16	0.09	0.018	| O I|	|	|	|	0.70
5.083	0.14	0.09	0.018	| O I |	|	|	|	0.71
5.167	0.12	0.09	0.018	| OI |	|	|	|	0.72
5.250	0.12	0.09	0.019	| OI |	|	|	|	0.73
5.333	0.14	0.09	0.019	| O I |	|	|	|	0.73
5.417	0.14	0.09	0.019	| O I |	|	|	|	0.74
5.500	0.14	0.09	0.020	| O I |	|	|	|	0.75
5.583	0.16	0.09	0.020	| O I|	|	|	|	0.76
5.667	0.16	0.09	0.020	| O I|	|	|	|	0.78

5.750	0.16	0.09	0.021	o I|				0.79
5.833	0.16	0.09	0.021	o I|				0.80
5.917	0.16	0.10	0.022	o I|				0.81
6.000	0.16	0.10	0.022	o I|				0.83
6.083	0.18	0.10	0.023	o I				0.84
6.167	0.18	0.10	0.023	o I				0.85
6.250	0.18	0.10	0.024	o I				0.87
6.333	0.18	0.10	0.025	o I				0.89
6.417	0.18	0.10	0.025	o I				0.90
6.500	0.18	0.10	0.026	o I				0.91
6.583	0.20	0.10	0.026	o |I				0.93
6.667	0.20	0.11	0.027	o |I				0.95
6.750	0.20	0.11	0.028	o |I				0.97
6.833	0.20	0.11	0.028	o |I				0.98
6.917	0.20	0.11	0.029	o |I				1.00
7.000	0.20	0.11	0.030	o |I				1.01
7.083	0.20	0.11	0.030	o |I				1.03
7.167	0.20	0.11	0.031	o |I				1.04
7.250	0.20	0.11	0.032	o |I				1.06
7.333	0.22	0.11	0.032	o |I				1.07
7.417	0.23	0.12	0.033	o | I				1.09
7.500	0.23	0.12	0.034	o | I				1.10
7.583	0.24	0.12	0.035	o | I				1.12
7.667	0.25	0.12	0.035	o | I				1.14
7.750	0.25	0.12	0.036	o | I				1.16
7.833	0.26	0.12	0.037	o | I				1.18
7.917	0.27	0.12	0.038	o | I				1.20
8.000	0.27	0.12	0.039	o | I				1.22
8.083	0.29	0.12	0.040	o | I				1.24
8.167	0.31	0.13	0.041	o | I				1.27
8.250	0.31	0.13	0.043	o | I				1.30
8.333	0.31	0.13	0.044	o | I				1.32
8.417	0.31	0.13	0.045	o | I				1.35
8.500	0.31	0.13	0.046	o | I				1.38
8.583	0.32	0.13	0.048	o | I				1.40
8.667	0.33	0.14	0.049	o | I|				1.43
8.750	0.33	0.14	0.050	o | I|				1.46
8.833	0.34	0.14	0.052	o | I|				1.49
8.917	0.35	0.14	0.053	o | I|				1.52
9.000	0.35	0.14	0.054	o | I				1.55
9.083	0.37	0.14	0.056	o | |I				1.57
9.167	0.39	0.14	0.057	o | |I				1.61
9.250	0.39	0.15	0.059	o | |I				1.64
9.333	0.40	0.15	0.061	o | | I				1.67
9.417	0.41	0.15	0.063	o | | I				1.71
9.500	0.41	0.15	0.064	o | | I				1.74
9.583	0.42	0.15	0.066	o | | I				1.78
9.667	0.43	0.15	0.068	o| | I				1.81
9.750	0.43	0.15	0.070	o| | I				1.85
9.833	0.44	0.16	0.072	o| | I				1.89
9.917	0.45	0.16	0.074	o| | I				1.92
10.000	0.45	0.16	0.076	o| | I				1.96
10.083	0.36	0.16	0.078	o| I				2.00
10.167	0.31	0.16	0.079	o| I				2.02
10.250	0.31	0.16	0.080	o| I				2.04
10.333	0.31	0.16	0.081	o| I				2.05
10.417	0.31	0.16	0.082	o| I				2.07
10.500	0.31	0.16	0.083	o| I				2.09
10.583	0.37	0.16	0.084	o| |I				2.11
10.667	0.41	0.17	0.086	o| | I				2.14
10.750	0.41	0.17	0.087	o| | I				2.17
10.833	0.41	0.17	0.089	o| | I				2.20
10.917	0.41	0.17	0.091	o| | I				2.23
11.000	0.41	0.17	0.092	o| | I				2.26
11.083	0.40	0.17	0.094	o| | I				2.29
11.167	0.39	0.17	0.096	o| |I				2.31
11.250	0.39	0.17	0.097	o| |I				2.34
11.333	0.39	0.17	0.098	o |I				2.37
11.417	0.39	0.18	0.100	o |I				2.39
11.500	0.39	0.18	0.101	o |I				2.42
11.583	0.36	0.18	0.103	o I				2.44
11.667	0.35	0.18	0.104	o I				2.47
11.750	0.35	0.18	0.105	o I				2.49
11.833	0.36	0.18	0.106	o I				2.51
11.917	0.37	0.18	0.108	o I				2.53

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12.000    0.37    0.18      0.109  |       o       I       |       |       |     2.55
12.083    0.46    0.18      0.111  |       o       |    I  |       |       |     2.58
12.167    0.51    0.18      0.113  |       o       |      I|       |       |     2.61
12.250    0.51    0.19      0.115  |       o       |      I|       |       |     2.65
12.333    0.52    0.19      0.117  |       o       |       I       |       |     2.69
12.417    0.53    0.19      0.120  |       o       |       I       |       |     2.73
12.500    0.53    0.19      0.122  |       o       |       I       |       |     2.76
12.583    0.56    0.19      0.124  |       o       |       |I      |       |     2.81
12.667    0.57    0.19      0.127  |       o       |       | I     |       |     2.85
12.750    0.57    0.20      0.129  |       o       |       | I     |       |     2.89
12.833    0.59    0.20      0.132  |       |o      |       | I     |       |     2.94
12.917    0.59    0.20      0.135  |       |o      |       |  I    |       |     2.98
13.000    0.59    0.20      0.138  |       |o      |       |  I    |       |     3.02
13.083    0.66    0.20      0.140  |       |o      |       |     I |       |     3.07
13.167    0.70    0.20      0.144  |       |o      |       |      I|       |     3.12
13.250    0.70    0.20      0.147  |       |o      |       |       I       |     3.18
13.333    0.70    0.20      0.151  |       |o      |       |       I       |     3.23
13.417    0.70    0.21      0.154  |       |o      |       |       I       |     3.29
13.500    0.70    0.21      0.157  |       |o      |       |       I       |     3.34
13.583    0.56    0.21      0.160  |       |o      |       |I      |       |     3.39
13.667    0.47    0.21      0.162  |       |o      |    I  |       |       |     3.42
13.750    0.47    0.21      0.164  |       |o      |    I  |       |       |     3.45
13.833    0.47    0.21      0.166  |       |o      |    I  |       |       |     3.48
13.917    0.47    0.21      0.168  |       |o      |    I  |       |       |     3.51
14.000    0.47    0.21      0.170  |       |o      |    I  |       |       |     3.54
14.083    0.52    0.21      0.171  |       |o      |      I|       |       |     3.57
14.167    0.55    0.21      0.174  |       |o      |       |I      |       |     3.60
14.250    0.55    0.22      0.176  |       |o      |       |I      |       |     3.64
14.333    0.54    0.22      0.178  |       |o      |       I       |       |     3.68
14.417    0.53    0.22      0.180  |       | o     |       I       |       |     3.71
14.500    0.53    0.22      0.183  |       | o     |       I       |       |     3.74
14.583    0.53    0.22      0.185  |       | o     |       I       |       |     3.78
14.667    0.53    0.22      0.187  |       | o     |       I       |       |     3.81
14.750    0.53    0.22      0.189  |       | o     |       I       |       |     3.85
14.833    0.52    0.23      0.191  |       | o     |      I|       |       |     3.88
14.917    0.51    0.23      0.193  |       | o     |      I|       |       |     3.91
15.000    0.51    0.23      0.195  |       | o     |      I|       |       |     3.94
15.083    0.50    0.23      0.197  |       | o     |     I |       |       |     3.97
15.167    0.49    0.23      0.199  |       | o     |     I |       |       |     4.00
15.250    0.49    0.23      0.201  |       | o     |     I |       |       |     4.03
15.333    0.48    0.23      0.202  |       | o     |     I |       |       |     4.05
15.417    0.47    0.23      0.204  |       | o     |    I  |       |       |     4.08
15.500    0.47    0.23      0.206  |       | o     |    I  |       |       |     4.11
15.583    0.42    0.23      0.207  |       | o     |  I    |       |       |     4.13
15.667    0.39    0.23      0.208  |       | o     |I      |       |       |     4.15
15.750    0.39    0.23      0.210  |       | o     |I      |       |       |     4.16
15.833    0.39    0.23      0.211  |       | o     |I      |       |       |     4.18
15.917    0.39    0.23      0.212  |       | o     |I      |       |       |     4.20
16.000    0.39    0.23      0.213  |       | o     |I      |       |       |     4.21
16.083    0.20    0.23      0.213  |       |Io     |       |       |       |     4.22
16.167    0.09    0.23      0.213  |  I    | o     |       |       |       |     4.21
16.250    0.08    0.23      0.211  |  I    | o     |       |       |       |     4.19
16.333    0.08    0.23      0.210  |  I    | o     |       |       |       |     4.18
16.417    0.08    0.23      0.209  |  I    | o     |       |       |       |     4.16
16.500    0.08    0.23      0.208  |  I    | o     |       |       |       |     4.15
16.583    0.07    0.23      0.207  |  I    | o     |       |       |       |     4.13
16.667    0.06    0.23      0.206  | I     | o     |       |       |       |     4.11
16.750    0.06    0.23      0.205  | I     | o     |       |       |       |     4.09
16.833    0.06    0.23      0.204  | I     | o     |       |       |       |     4.07
16.917    0.06    0.23      0.203  | I     | o     |       |       |       |     4.06
17.000    0.06    0.23      0.201  | I     | o     |       |       |       |     4.04
17.083    0.09    0.23      0.200  |  I    | o     |       |       |       |     4.02
17.167    0.10    0.23      0.199  |   I   | o     |       |       |       |     4.01
17.250    0.10    0.23      0.199  |   I   | o     |       |       |       |     3.99
17.333    0.10    0.23      0.198  |   I   | o     |       |       |       |     3.98
17.417    0.10    0.23      0.197  |   I   | o     |       |       |       |     3.97
17.500    0.10    0.23      0.196  |   I   | o     |       |       |       |     3.95
17.583    0.10    0.23      0.195  |   I   | o     |       |       |       |     3.94
17.667    0.10    0.23      0.194  |   I   | o     |       |       |       |     3.93
17.750    0.10    0.23      0.193  |   I   | o     |       |       |       |     3.91
17.833    0.09    0.23      0.192  |   I   | o     |       |       |       |     3.90
17.917    0.08    0.23      0.191  |  I    | o     |       |       |       |     3.88
18.000    0.08    0.22      0.191  |  I    | o     |       |       |       |     3.87
18.083    0.08    0.22      0.190  |  I    | o     |       |       |       |     3.85
18.167    0.08    0.22      0.189  |  I    | o     |       |       |       |     3.84
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18.250	0.08	0.22	0.188	I	O			3.82
18.333	0.08	0.22	0.187	I	O			3.81
18.417	0.08	0.22	0.186	I	O			3.79
18.500	0.08	0.22	0.185	I	O			3.78
18.583	0.07	0.22	0.184	I	O			3.76
18.667	0.06	0.22	0.183	I	O			3.74
18.750	0.06	0.22	0.182	I	O			3.73
18.833	0.05	0.22	0.180	I	O			3.71
18.917	0.04	0.22	0.179	I	O			3.69
19.000	0.04	0.22	0.178	I	O			3.67
19.083	0.05	0.22	0.177	I	O			3.65
19.167	0.06	0.22	0.176	I	O			3.64
19.250	0.06	0.21	0.175	I	O			3.62
19.333	0.07	0.21	0.174	I	O			3.60
19.417	0.08	0.21	0.173	I	O			3.59
19.500	0.08	0.21	0.172	I	O			3.58
19.583	0.07	0.21	0.171	I	O			3.56
19.667	0.06	0.21	0.170	I	O			3.54
19.750	0.06	0.21	0.169	I	O			3.53
19.833	0.05	0.21	0.168	I	O			3.51
19.917	0.04	0.21	0.167	I	O			3.49
20.000	0.04	0.21	0.165	I	O			3.48
20.083	0.05	0.21	0.164	I	O			3.46
20.167	0.06	0.21	0.163	I	O			3.44
20.250	0.06	0.21	0.162	I	O			3.42
20.333	0.06	0.21	0.161	I	O			3.41
20.417	0.06	0.21	0.160	I	O			3.39
20.500	0.06	0.21	0.159	I	O			3.38
20.583	0.06	0.21	0.158	I	O			3.36
20.667	0.06	0.21	0.157	I	O			3.34
20.750	0.06	0.21	0.156	I	O			3.33
20.833	0.05	0.21	0.155	I	O			3.31
20.917	0.04	0.21	0.154	I	O			3.29
21.000	0.04	0.21	0.153	I	O			3.27
21.083	0.05	0.21	0.152	I	O			3.26
21.167	0.06	0.20	0.151	I	O			3.24
21.250	0.06	0.20	0.150	I	O			3.22
21.333	0.05	0.20	0.149	I	O			3.21
21.417	0.04	0.20	0.148	I	O			3.19
21.500	0.04	0.20	0.147	I	O			3.17
21.583	0.05	0.20	0.146	I	O			3.15
21.667	0.06	0.20	0.145	I	O			3.14
21.750	0.06	0.20	0.144	I	O			3.12
21.833	0.05	0.20	0.143	I	O			3.11
21.917	0.04	0.20	0.142	I	O			3.09
22.000	0.04	0.20	0.140	I	O			3.07
22.083	0.05	0.20	0.139	I	O			3.05
22.167	0.06	0.20	0.138	I	O			3.04
22.250	0.06	0.20	0.137	I	O			3.02
22.333	0.05	0.20	0.136	I	O			3.01
22.417	0.04	0.20	0.135	I	O			2.99
22.500	0.04	0.20	0.134	I	O			2.97
22.583	0.04	0.20	0.133	I	O			2.95
22.667	0.04	0.20	0.132	I	O			2.93
22.750	0.04	0.20	0.131	I	O			2.92
22.833	0.04	0.20	0.130	I	O			2.90
22.917	0.04	0.20	0.129	I	O			2.88
23.000	0.04	0.19	0.128	I	O			2.86
23.083	0.04	0.19	0.127	I	O			2.85
23.167	0.04	0.19	0.126	I	O			2.83
23.250	0.04	0.19	0.125	I	O			2.81
23.333	0.04	0.19	0.124	I	O			2.79
23.417	0.04	0.19	0.123	I	O			2.78
23.500	0.04	0.19	0.122	I	O			2.76
23.583	0.04	0.19	0.121	I	O			2.74
23.667	0.04	0.19	0.120	I	O			2.73
23.750	0.04	0.19	0.118	I	O			2.71
23.833	0.04	0.19	0.117	I	O			2.69
23.917	0.04	0.19	0.116	I	O			2.67
24.000	0.04	0.19	0.115	I	O			2.66
24.083	0.02	0.19	0.114	I	O			2.64
24.167	0.00	0.18	0.113	I	O			2.62
24.250	0.00	0.18	0.112	I	O			2.60
24.333	0.00	0.18	0.111	I	O			2.58
24.417	0.00	0.18	0.109	I	O			2.56

24.500	0.00	0.18	0.108	I	o	|	|	2.54
24.583	0.00	0.18	0.107	I	o	|	|	2.51
24.667	0.00	0.18	0.106	I	o	|	|	2.49
24.750	0.00	0.18	0.104	I	o	|	|	2.47
24.833	0.00	0.18	0.103	I	o	|	|	2.45
24.917	0.00	0.18	0.102	I	o	|	|	2.43
25.000	0.00	0.18	0.101	I	o	|	|	2.41
25.083	0.00	0.18	0.100	I	o	|	|	2.38
25.167	0.00	0.17	0.098	I	o	|	|	2.36
25.250	0.00	0.17	0.097	I	o|	|	|	2.34
25.333	0.00	0.17	0.096	I	o|	|	|	2.32
25.417	0.00	0.17	0.095	I	o|	|	|	2.30
25.500	0.00	0.17	0.094	I	o|	|	|	2.28
25.583	0.00	0.17	0.092	I	o|	|	|	2.26
25.667	0.00	0.17	0.091	I	o|	|	|	2.24
25.750	0.00	0.17	0.090	I	o|	|	|	2.21
25.833	0.00	0.17	0.089	I	o|	|	|	2.19
25.917	0.00	0.17	0.088	I	o|	|	|	2.17
26.000	0.00	0.17	0.087	I	o|	|	|	2.15
26.083	0.00	0.17	0.085	I	o|	|	|	2.13
26.167	0.00	0.16	0.084	I	o|	|	|	2.11
26.250	0.00	0.16	0.083	I	o|	|	|	2.09
26.333	0.00	0.16	0.082	I	o|	|	|	2.07
26.417	0.00	0.16	0.081	I	o|	|	|	2.05
26.500	0.00	0.16	0.080	I	o|	|	|	2.03
26.583	0.00	0.16	0.079	I	o|	|	|	2.01
26.667	0.00	0.16	0.078	I	o|	|	|	1.99
26.750	0.00	0.16	0.077	I	o|	|	|	1.97
26.833	0.00	0.16	0.075	I	o|	|	|	1.95
26.917	0.00	0.16	0.074	I	o|	|	|	1.93
27.000	0.00	0.16	0.073	I	o|	|	|	1.91
27.083	0.00	0.16	0.072	I	o|	|	|	1.89
27.167	0.00	0.15	0.071	I	o|	|	|	1.87
27.250	0.00	0.15	0.070	I	o|	|	|	1.85
27.333	0.00	0.15	0.069	I	o|	|	|	1.83
27.417	0.00	0.15	0.068	I	o |	|	|	1.81
27.500	0.00	0.15	0.067	I	o |	|	|	1.79
27.583	0.00	0.15	0.066	I	o |	|	|	1.77
27.667	0.00	0.15	0.065	I	o |	|	|	1.75
27.750	0.00	0.15	0.064	I	o |	|	|	1.73
27.833	0.00	0.15	0.063	I	o |	|	|	1.71
27.917	0.00	0.15	0.062	I	o |	|	|	1.69
28.000	0.00	0.15	0.061	I	o |	|	|	1.67
28.083	0.00	0.15	0.060	I	o |	|	|	1.65
28.167	0.00	0.15	0.059	I	o |	|	|	1.63
28.250	0.00	0.14	0.058	I	o |	|	|	1.61
28.333	0.00	0.14	0.057	I	o |	|	|	1.59
28.417	0.00	0.14	0.056	I	o |	|	|	1.57
28.500	0.00	0.14	0.055	I	o |	|	|	1.55
28.583	0.00	0.14	0.054	I	o |	|	|	1.53
28.667	0.00	0.14	0.053	I	o |	|	|	1.52
28.750	0.00	0.14	0.052	I	o |	|	|	1.50
28.833	0.00	0.14	0.051	I	o |	|	|	1.48
28.917	0.00	0.14	0.050	I	o |	|	|	1.46
29.000	0.00	0.14	0.049	I	o |	|	|	1.43
29.083	0.00	0.13	0.048	I	o |	|	|	1.41
29.167	0.00	0.13	0.047	I	o |	|	|	1.39
29.250	0.00	0.13	0.046	I	o |	|	|	1.37
29.333	0.00	0.13	0.045	I	o |	|	|	1.35
29.417	0.00	0.13	0.044	I	o |	|	|	1.34
29.500	0.00	0.13	0.044	I	o |	|	|	1.32
29.583	0.00	0.13	0.043	I	o |	|	|	1.30
29.667	0.00	0.13	0.042	I	o |	|	|	1.28
29.750	0.00	0.13	0.041	I	o |	|	|	1.26
29.833	0.00	0.12	0.040	I	o |	|	|	1.24
29.917	0.00	0.12	0.039	I	o |	|	|	1.22
30.000	0.00	0.12	0.038	I	o |	|	|	1.20
30.083	0.00	0.12	0.038	I	o |	|	|	1.18
30.167	0.00	0.12	0.037	I	o |	|	|	1.17
30.250	0.00	0.12	0.036	I	o |	|	|	1.15
30.333	0.00	0.12	0.035	I	o |	|	|	1.13
30.417	0.00	0.12	0.034	I	o |	|	|	1.11
30.500	0.00	0.12	0.033	I	o |	|	|	1.10
30.583	0.00	0.11	0.033	I	o |	|	|	1.08
30.667	0.00	0.11	0.032	I	o |	|	|	1.06

30.750	0.00	0.11	0.031	I o	|	|	|	1.04
30.833	0.00	0.11	0.030	I o	|	|	|	1.03
30.917	0.00	0.11	0.030	I o	|	|	|	1.01
31.000	0.00	0.11	0.029	I o	|	|	|	0.99
31.083	0.00	0.11	0.028	I o	|	|	|	0.97
31.167	0.00	0.11	0.027	I o	|	|	|	0.95
31.250	0.00	0.10	0.027	I o	|	|	|	0.94
31.333	0.00	0.10	0.026	I o	|	|	|	0.92
31.417	0.00	0.10	0.025	I o	|	|	|	0.90
31.500	0.00	0.10	0.024	I o	|	|	|	0.88
31.583	0.00	0.10	0.024	I o	|	|	|	0.86
31.667	0.00	0.10	0.023	I o	|	|	|	0.84
31.750	0.00	0.10	0.022	I o	|	|	|	0.83
31.833	0.00	0.09	0.022	I o	|	|	|	0.81
31.917	0.00	0.09	0.021	I o	|	|	|	0.79
32.000	0.00	0.09	0.020	I o	|	|	|	0.78
32.083	0.00	0.09	0.020	I o	|	|	|	0.76
32.167	0.00	0.09	0.019	I o	|	|	|	0.74
32.250	0.00	0.09	0.019	I o	|	|	|	0.73
32.333	0.00	0.09	0.018	I o	|	|	|	0.71
32.417	0.00	0.09	0.017	I o	|	|	|	0.69
32.500	0.00	0.08	0.017	I o	|	|	|	0.68
32.583	0.00	0.08	0.016	I o	|	|	|	0.66
32.667	0.00	0.08	0.016	I o	|	|	|	0.65
32.750	0.00	0.08	0.015	I o	|	|	|	0.63
32.833	0.00	0.08	0.015	I o	|	|	|	0.62
32.917	0.00	0.08	0.014	I o	|	|	|	0.61
33.000	0.00	0.08	0.013	I o	|	|	|	0.59
33.083	0.00	0.08	0.013	I o	|	|	|	0.58
33.167	0.00	0.08	0.012	I o	|	|	|	0.56
33.250	0.00	0.07	0.012	I o	|	|	|	0.55
33.333	0.00	0.07	0.011	I o	|	|	|	0.54
33.417	0.00	0.07	0.011	I o	|	|	|	0.52
33.500	0.00	0.07	0.010	I o	|	|	|	0.51
33.583	0.00	0.07	0.010	I o	|	|	|	0.50
33.667	0.00	0.07	0.009	I o	|	|	|	0.47
33.750	0.00	0.06	0.009	I o	|	|	|	0.45
33.833	0.00	0.06	0.009	I o	|	|	|	0.43
33.917	0.00	0.05	0.008	I o	|	|	|	0.41
34.000	0.00	0.05	0.008	I o	|	|	|	0.39
34.083	0.00	0.05	0.008	I o	|	|	|	0.37
34.167	0.00	0.05	0.007	I o	|	|	|	0.35
34.250	0.00	0.04	0.007	IO	|	|	|	0.34
34.333	0.00	0.04	0.007	IO	|	|	|	0.32
34.417	0.00	0.04	0.006	IO	|	|	|	0.31
34.500	0.00	0.04	0.006	IO	|	|	|	0.30
34.583	0.00	0.03	0.006	IO	|	|	|	0.28
34.667	0.00	0.03	0.006	IO	|	|	|	0.27
34.750	0.00	0.03	0.005	IO	|	|	|	0.26
34.833	0.00	0.03	0.005	IO	|	|	|	0.25
34.917	0.00	0.03	0.005	IO	|	|	|	0.24
35.000	0.00	0.03	0.005	IO	|	|	|	0.23
35.083	0.00	0.02	0.005	IO	|	|	|	0.22
35.167	0.00	0.02	0.004	IO	|	|	|	0.21
35.250	0.00	0.02	0.004	O	|	|	|	0.20
35.333	0.00	0.02	0.004	O	|	|	|	0.20
35.417	0.00	0.02	0.004	O	|	|	|	0.19
35.500	0.00	0.02	0.004	O	|	|	|	0.18
35.583	0.00	0.02	0.004	O	|	|	|	0.18
35.667	0.00	0.02	0.004	O	|	|	|	0.17
35.750	0.00	0.01	0.004	O	|	|	|	0.17
35.833	0.00	0.01	0.004	O	|	|	|	0.16
35.917	0.00	0.01	0.003	O	|	|	|	0.16
36.000	0.00	0.01	0.003	O	|	|	|	0.15
36.083	0.00	0.01	0.003	O	|	|	|	0.15
36.167	0.00	0.01	0.003	O	|	|	|	0.14
36.250	0.00	0.01	0.003	O	|	|	|	0.14
36.333	0.00	0.01	0.003	O	|	|	|	0.14
36.417	0.00	0.01	0.003	O	|	|	|	0.13
36.500	0.00	0.01	0.003	O	|	|	|	0.13
36.583	0.00	0.01	0.003	O	|	|	|	0.13
36.667	0.00	0.01	0.003	O	|	|	|	0.12
36.750	0.00	0.01	0.003	O	|	|	|	0.12
36.833	0.00	0.01	0.003	O	|	|	|	0.12
36.917	0.00	0.01	0.003	O	|	|	|	0.12

37.000	0.00	0.01	0.003	o	|	|	|	0.11
37.083	0.00	0.01	0.003	o	|	|	|	0.11
37.167	0.00	0.01	0.003	o	|	|	|	0.11
37.250	0.00	0.01	0.002	o	|	|	|	0.11
37.333	0.00	0.00	0.002	o	|	|	|	0.11
37.417	0.00	0.00	0.002	o	|	|	|	0.10
37.500	0.00	0.00	0.002	o	|	|	|	0.10
37.583	0.00	0.00	0.002	o	|	|	|	0.10
37.667	0.00	0.00	0.002	o	|	|	|	0.10
37.750	0.00	0.00	0.002	o	|	|	|	0.10
37.833	0.00	0.00	0.002	o	|	|	|	0.10
37.917	0.00	0.00	0.002	o	|	|	|	0.10
38.000	0.00	0.00	0.002	o	|	|	|	0.09
38.083	0.00	0.00	0.002	o	|	|	|	0.09
38.167	0.00	0.00	0.002	o	|	|	|	0.09
38.250	0.00	0.00	0.002	o	|	|	|	0.09
38.333	0.00	0.00	0.002	o	|	|	|	0.09
38.417	0.00	0.00	0.002	o	|	|	|	0.09
38.500	0.00	0.00	0.002	o	|	|	|	0.09
38.583	0.00	0.00	0.002	o	|	|	|	0.09
38.667	0.00	0.00	0.002	o	|	|	|	0.09
38.750	0.00	0.00	0.002	o	|	|	|	0.09
38.833	0.00	0.00	0.002	o	|	|	|	0.09
38.917	0.00	0.00	0.002	o	|	|	|	0.09
39.000	0.00	0.00	0.002	o	|	|	|	0.09
39.083	0.00	0.00	0.002	o	|	|	|	0.09
39.167	0.00	0.00	0.002	o	|	|	|	0.08
39.250	0.00	0.00	0.002	o	|	|	|	0.08
39.333	0.00	0.00	0.002	o	|	|	|	0.08
39.417	0.00	0.00	0.002	o	|	|	|	0.08
39.500	0.00	0.00	0.002	o	|	|	|	0.08
39.583	0.00	0.00	0.002	o	|	|	|	0.08

Remaining water in basin = 0.00 (Ac.Ft)

**********HYDROGRAPH DATA**********

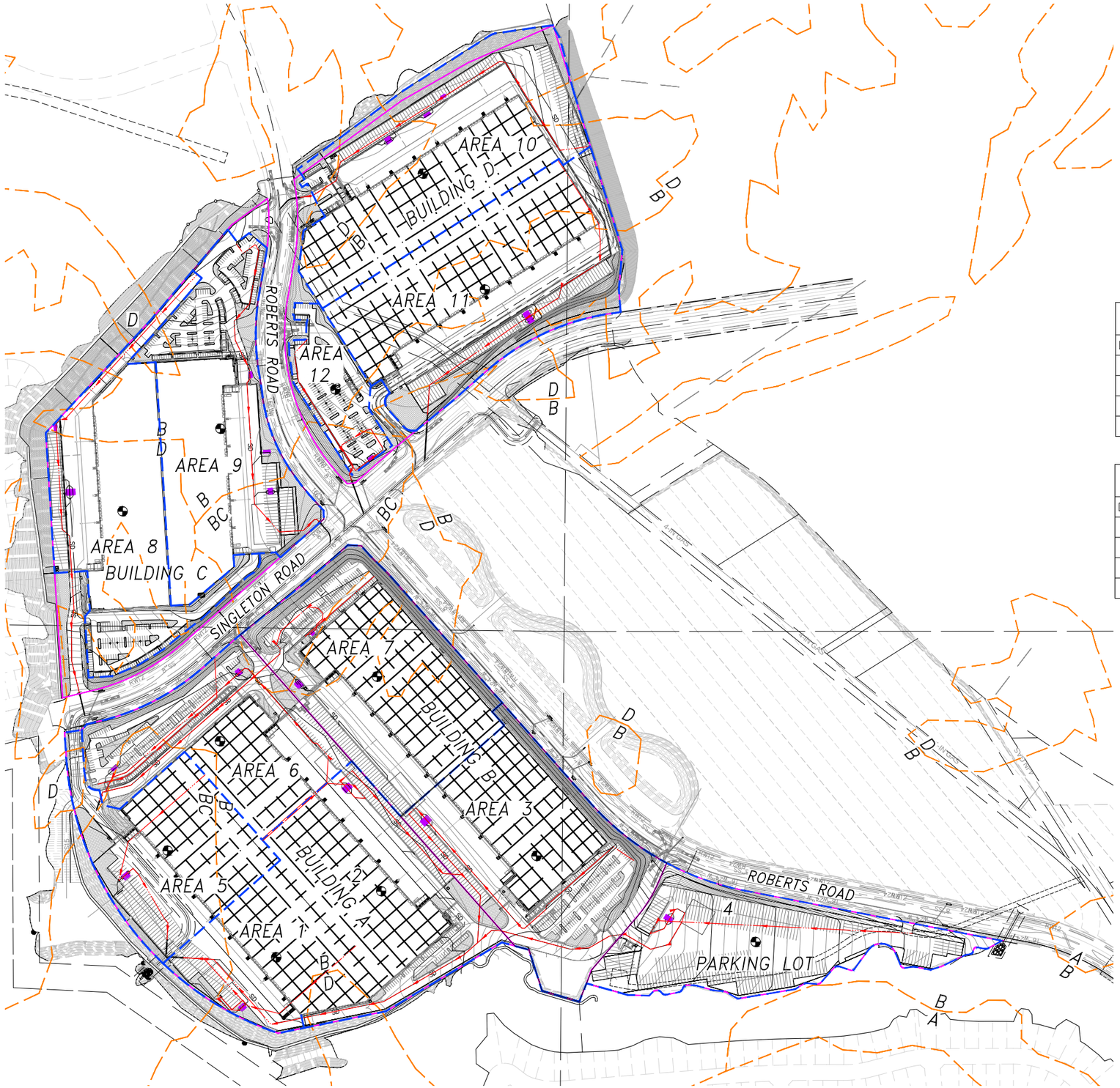
Number of intervals = 475
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.234 (CFS)
Total volume = 0.421 (Ac.Ft)

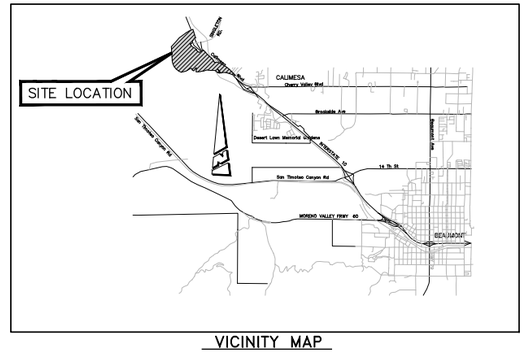
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

UNIT HYDROGRAPH HYDROLOGY MAP





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

PROPOSED AREAS						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA	6.8 AC	9.5 AC	12.3 AC	9.2 AC	8.1 AC	9.0 AC
L_T	1116 Ft	2462 Ft	2287 Ft	3348 Ft	899 Ft	1634 Ft
L_{CA}	860 Ft	2251 Ft	2251 Ft	2754 Ft	602 Ft	512 Ft
ΔH	6.5 Ft	6.50 Ft	9.30 Ft	37.50 Ft	6.50	3.70 Ft

PROPOSED AREAS						
DRAINAGE AREA	7	8	9	10	11	12
TOTAL AREA	12.5 AC	11.2 AC	12.1 AC	14.1 AC	14.1 AC	2.9 AC
L_T	1378 Ft	1821 Ft	1395 Ft	1473 Ft	1370 Ft	621 Ft
L_{CA}	1136 Ft	683 Ft	552 Ft	540 Ft	486 Ft	341 Ft
ΔH	3.3 Ft	29.30 Ft	18 Ft	7 Ft	2.80 Ft	9 Ft

LEGEND

NODE / ELEV – NODE NUMBER
– ELEVATION (FT)

AC / FT – AREA (AC)
– LENGTH (FT)

– DRAINAGE AREA BOUNDARY (PROPOSED)
– FLOWLINE (PROPOSED)
– PROJECT BOUNDARY
– NRCS SOIL BOUNDARY

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
W WEBB E
S

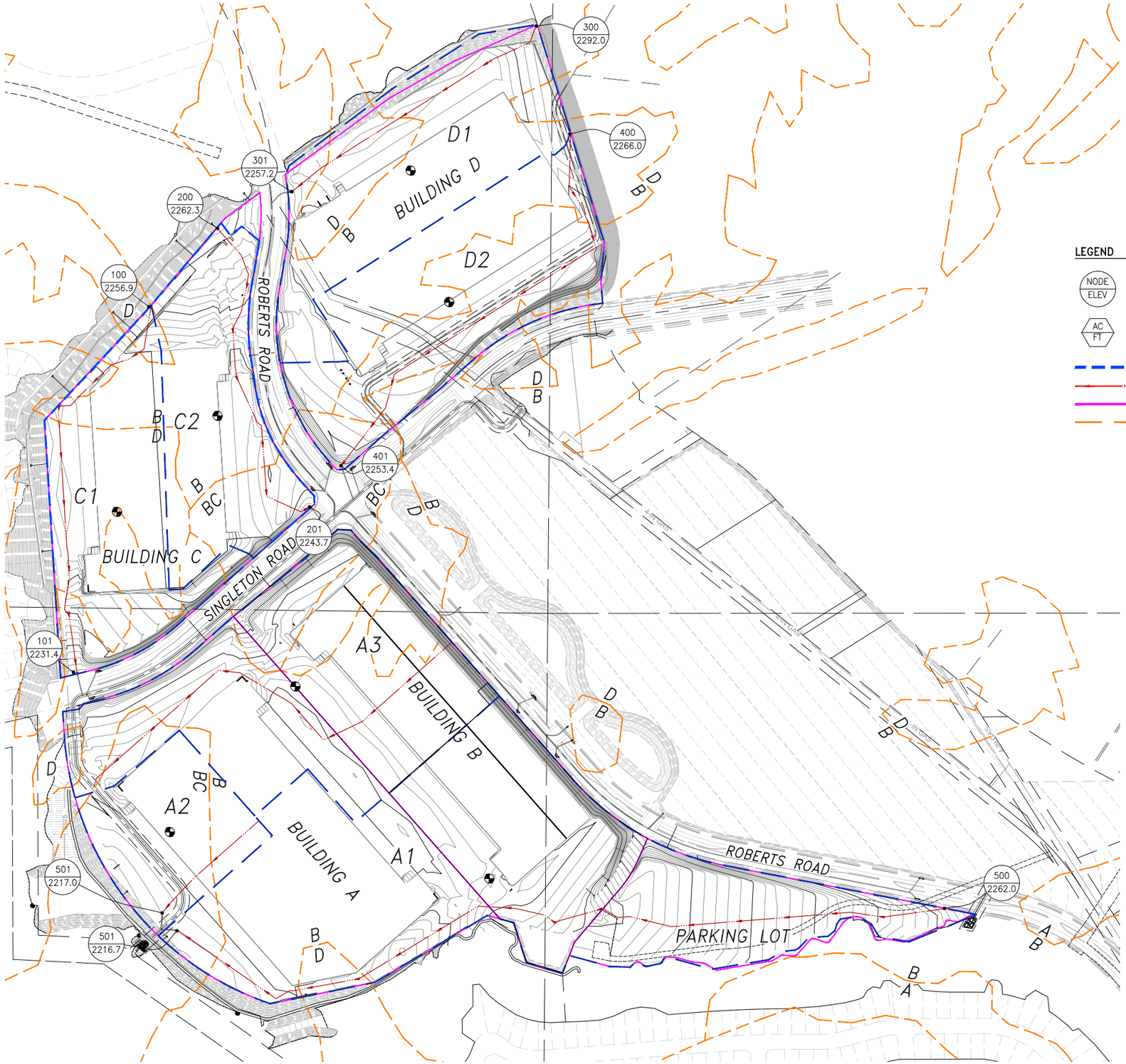
1" = 200'
200 0 200 400 600

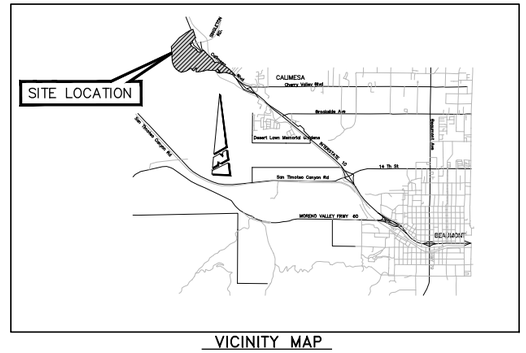
CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
PRELIMINARY PROPOSED UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

H:\2021\21-0034\DRAINAGE\PHYD\DWG FOLDER\21-0034 PRELIM UH MAP 2021-11-23.DWG 12/6/2021 4:30:41 PM





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

LEGEND

NODE / ELEV	– NODE NUMBER – ELEVATION (FT)
AC / FT	– AREA (AC) – LENGTH (FT)
	– DRAINAGE AREA BOUNDARY
	– FLOWLINE (PROPOSED)
	– PROJECT BOUNDARY
	– NRCS SOIL BOUNDARY

EXISTING AREAS			
DRAINAGE AREA	A1	A2	A3
TOTAL AREA	37.7 AC	7.5 AC	21.7 AC
L_T	3231 Ft	526 Ft	1790 Ft
L_{CA}	1394 Ft	234 Ft	939 Ft
ΔH	45.0 Ft	7 Ft	23 Ft

EXISTING AREAS		
DRAINAGE AREA	C1	C2
TOTAL AREA	13.2 AC	11.8 AC
L_T	1645 Ft	1321 Ft
L_{CA}	629 Ft	574 Ft
ΔH	25.0 Ft	19 Ft

EXISTING AREAS		
DRAINAGE AREA	D1	D2
TOTAL AREA	15.8 AC	16.9 AC
L_T	1174 Ft	1828 Ft
L_{CA}	440 Ft	756 Ft
ΔH	35.0 Ft	13 Ft

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.



1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
EXISTING UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

H:\2021\21-0034\DRAINAGE\PHYD\DWG FOLDER\21-0034 PRELIM UH MAP 2021-11-23.DWG 12/6/2021 4:30:41 PM

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be provided during Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided during Final Engineering

FOR REVIEW ONLY

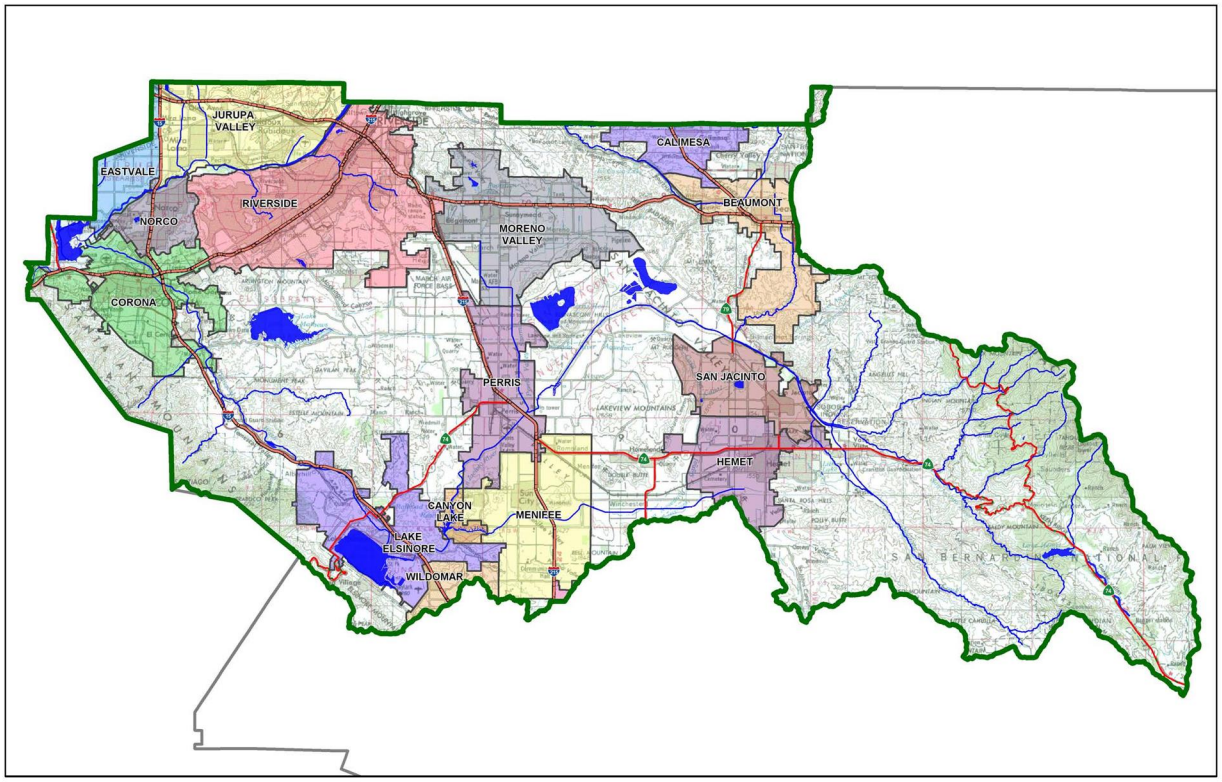
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Birtcher Commerce Center Oak Valley – Parking Lot

Development No: DPR 21-02

Design Review/Case No:



☒ **Preliminary**
☐ **Final**

Original Date Prepared: May 2021

Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Contact Information:

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Prepared by:
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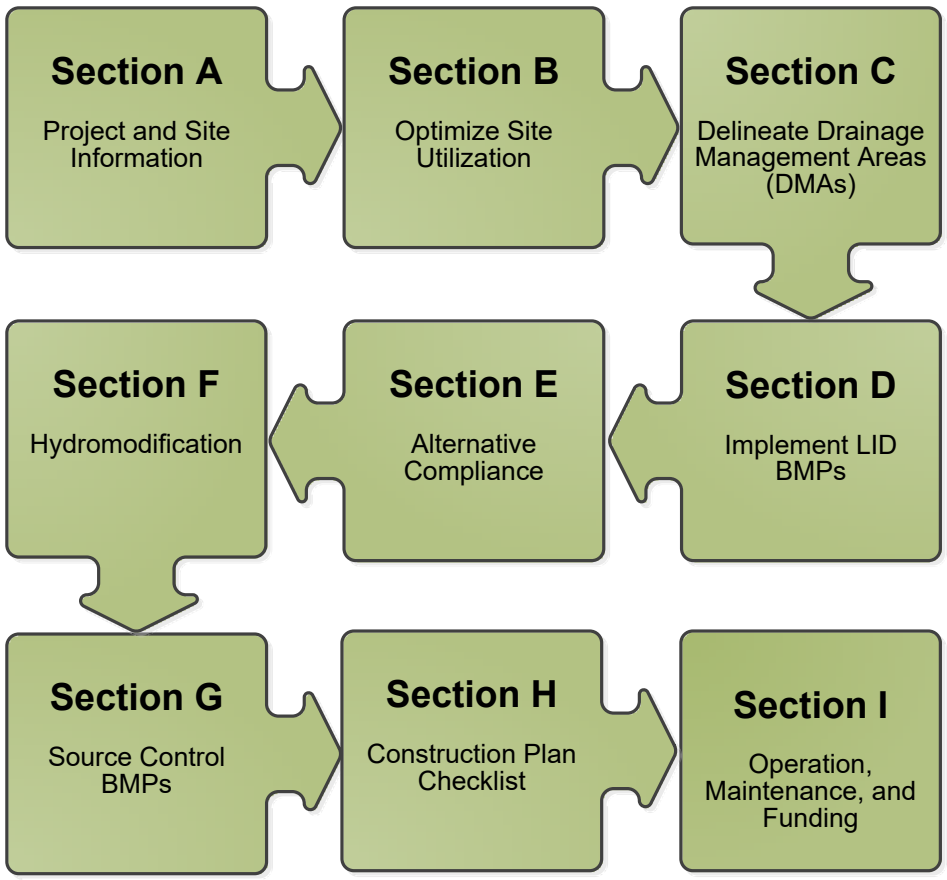
3788 McCray St
Riverside, CA 92506
(951) 686 – 1070

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Birtcher Development by Albert A. Webb Associates for the Birtcher Commerce Center Oak Valley – Parking Lot project.

This WQMP is intended to comply with the requirements of City of Calimesa, County of Riverside for County of Riverside Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (Municipal Code Section 13.12 – Stormwater Drainage System Protection Regulations).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 8
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 10

Section C: Delineate Drainage Management Areas (DMAs) 12

Section D: Implement LID BMPs 14

D.1 Infiltration Applicability 14
D.2 Harvest and Use Assessment 15
D.3 Bioretention and Biotreatment Assessment 17
D.4 Feasibility Assessment Summaries 18
D.5 LID BMP Sizing 19

Section E: Alternative Compliance (LID Waiver Program) 21

E.1 Identify Pollutants of Concern 22
E.2 Stormwater Credits 23
E.3 Sizing Criteria 23
E.4 Treatment Control BMP Selection 24

Section F: Hydromodification 25

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 25
F.2 HCOC Mitigation 26

Section G: Source Control BMPs 27

Section H: Construction Plan Checklist 30

Section I: Operation, Maintenance and Funding 31

List of Tables

Table A.1 Identification of Receiving Waters....8
Table A.2 Other Applicable Permits....8
Table C.1 DMA Classifications....12
Table C.2 Type 'A', Self-Treating Areas....12
Table C.3 Type 'B', Self-Retaining Areas....12
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas....13
Table C.5 Type 'D', Areas Draining to BMPs....13
Table D.1 Infiltration Feasibility....14
Table D.2 LID Prioritization Summary Matrix....18
Table D.3 DCV Calculations for LID BMPs....19
Table E.1 Potential Pollutants by Land Use Type....22
Table E.2 Water Quality Credits....23
Table E.3 Treatment Control BMP Sizing....23
Table E.4 Treatment Control BMP Selection....24
Table F.1 Hydrologic Conditions of Concern Summary....25
Table G.1 Permanent and Operational Source Control Measures....27
Table H.1 Construction Plan Cross-reference....30

List of Appendices

Appendix 1: Maps and Site Plans....32
Appendix 2: Construction Plans....33
Appendix 3: Soils Information....34
Appendix 4: Historical Site Conditions....35
Appendix 5: LID Infeasibility....36
Appendix 6: BMP Design Details....37
Appendix 7: Hydromodification....38
Appendix 8: Source Control....39
Appendix 9: O&M....40
Appendix 10: Educational Materials....41

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Business Park / Parking Lot
Planning Area:	Summerwind Ranch at Oak Valley Specific Plan
Community Name:	Birtcher Commerce Center Oak Valley
Development Name:	Birtcher Commerce Center Oak Valley – Parking Lot
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°58'25.59"N / 117°03'51.79"W	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
APN(s): 413-190-025 & 413-290-047	
Map Book and Page No.: Thomas Bros Page: 689, Grid: H3, H4, J3, J4 ; Page: 690, Grid: A4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Business Park, Parking Lot
Proposed or Potential SIC Code(s)	7521 – Automobile Parking
Area of Impervious Project Footprint (SF)	296,266 SF
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	296,266 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B
What is the Water Quality Design Storm Depth for the project?	0.78
Design rainfall intensity for QBMP calculations	0.2 inches/hr

Project Description

The Birtcher Commerce Center Oak Valley (BCCOV) – Parking Lot project proposes an industrial development in the City of Calimesa on approximately 8.8 acres of vacant land located within the boundaries of the 220-acre PM 37862 (overall BCCOV project site). The overall BCCOV project site consists of approximately 220 acres of vacant land and is bounded by the Interstate-10 (I-10) highway along its northeast, the single-family residential tract TR 32702 (currently under construction) along its southeastern boundary, vacant land along its southern boundary, and a future residential development to its northwest. The San Timoteo Creek runs from north to south along the eastern boundary of the overall BCCOV site and continues south of the site. The BCCOV - Parking Lot project is bounded by Roberts Road to its north, future industrial development BCCOV – Building B to its west, and the San Timoteo Creek along its southern and eastern boundaries.

The overall BCCOV project site is currently vacant. Runoff from the onsite area and offsite areas north of the project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from north to south. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue through the southern boundary and before ultimately discharging into the San Timoteo Creek.

Prior to any construction commencing for the BCCOV – Parking Lot project, the overall BCCOV project site will be mass graded. The mass grading phase also includes the construction of retaining walls along the boundaries of the overall BCCOV project, graded pads, the construction of backbone street improvements for Singleton Road and Roberts Road, the installation of backbone storm drain facilities, and the installation of storm drain stub-outs for the individual BCCOV industrial developments to discharge into. The overall drainage pattern of the mass grade phase will perpetuate the drainage pattern of the existing, vacant project site. However, runoff in the mass graded phase will be captured in temporary inlets and conveyed towards the backbone storm drain facilities. The backbone storm drain facilities have been designed to convey the fully developed flows from the overall BCCOV project as well as the existing offsite flows generated north of the I-10 highway southerly towards the San Timoteo Creek. A separate drainage study titled "Hydrology and Hydraulics Study: Oak Valley Town Center Parcel Map No. 37862 Mass Grading Plan" was conducted for the mass grade phase of the project and encompasses the design and layout of the backbone storm drain facilities.

For the proposed condition, runoff is captured through a series of grate inlets located throughout the site at localized low points. Captured flows are directed towards proposed treatment devices in order to treat for water quality requirements. Flows are then conveyed towards the existing stub-outs via proposed onsite storm drain pipe that connect into the backbone storm drain facilities. Flows generated by the BCCOV - Parking Lot project development ultimately discharge south of the overall BCCOV project site and into the San Timoteo Creek similar to the existing condition.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to highly variable infiltration rates of the existing soil as well as potentially collapsible soil being present throughout the site. Due to site constraints, most notably the significant offsite grading requirements of the overall BCCOV site, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary actually drains offsite and into the backbone streets. However, in this preliminary analysis all areas within the project boundary have been considered in the Qbmp calculations in order to provide a conservative treatment flow rate.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharging into the proposed CMP chamber detention systems. Mitigated flows outlet to the provided stub-outs. The proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm events to bypass the vault and enter the onsite storm drain facilities. All captured onsite flows will be directed towards the provided lateral stub-outs constructed in the mass grade phase.

The project is required to address increased runoff mitigation for the 24-hour, 2-year storm event to meet HCOC requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	N/A	GWR, MUN, REC1, REC2, WARM, WILD	20± miles
San Timoteo Creek Reach 2	N/A	GWR, MUN, REC1, REC2, WARM, WILD	10± miles
San Timoteo Creek Reach 1B & 1A	N/A	AGR, MUN, REC1, REC2, WARM, WILD	5± miles
Santa Ana River Reach #5	N/A	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.
Santa Ana River Reach #4	Pathogens	AGR, GWR MUN, RARE, REC1, REC2, WARM, WILD	Designated as RARE beneficial use.

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required

State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* *City of Calimesa Grading Permit*	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The currently vacant site generally drains from north to south towards the San Timoteo Creek. In this existing condition, flows are generally conveyed via smaller streambed areas that run from north to south through the overall BCCOV site. These smaller streambed areas discharge flows south, offsite into the San Timoteo Creek. In the mass grade phase, the project site generally sheet flows towards temporary inlets that discharge into the backbone storm drain facilities located along Singleton Road/Roberts Road. This backbone storm drain discharges flows towards the San Timoteo Creek south of the overall project site similar to the vacant site conditions.

In the developed condition, a network of inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards west towards the proposed storm drain facilities of the BCCOV – Building B project and ultimately discharges into the existing stub-outs provided in the mass grade phase. From there, flows are conveyed into the backbone storm drain line located within the future BCCOV – Building A project before ultimately discharging south, offsite towards the San Timoteo Creek similar to the existing condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing vegetation is very minimal. The existing project site is primarily barren, so no vegetation is proposed to be protected.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Due to poor infiltration capacities and potentially collapsible underlying soils throughout the site, an infiltration-based BMP is not feasible to treat for water quality requirements.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious areas will be minimized as much as possible while maintaining safe and usable facilities onsite. Landscaped areas have been provided throughout the projects site along concrete walkways, adjacent to parking areas, and in other feasible locations throughout the site.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, however, based on the nature of the development, not all runoff can feasibly be directed towards a pervious area before being captured. Pervious landscaped areas are proposed throughout the site where possible in order to maximize the chances of runoff dispersing into landscaped areas before being captured. All runoff that is captured onsite will be directed towards an MWS vault (or series of MWS vaults) to provide water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA P-1	Mixed Use – Concrete or Asphalt, Ornamental Landscaping	394,305	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	**Area (Sq. Ft.)**	**Stabilization Type**	**Irrigation Type (if any)**

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA	**Receiving Self-Retaining DMA**

DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA P-1	MWS Vaults (3 - 8'x16' vaults in series)

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: All DMAs		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Soils underlying project site are potentially collapsible and not suitable for infiltration		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☒ Reclaimed water will be used for the non-potable water demands for the project.

☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
N/A	N/A

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
N/A	N/A

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA P-1	☐	☐	☐	☒	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Based on the LID BMP Hierarchy, the BCCOV - Parking Lot project will utilize biotreatment (MWS vaults) throughout the site to treat for water quality requirements. Infiltration-based BMPs are not feasible due to poor infiltration capacities of underlying soils and potentially collapsible soils (see Appendix 3 for preliminary geotechnical investigation). Harvest and use BMPs are not feasible as reclaimed water will be used for non-potable water demands. Bioretention BMPs are not feasible due to site constraints including minimum parking density requirements and significant offsite grading conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA P-1*		
	[A]		[B]	[C]	[A] x [C]			
Concrete / Asphalt	*297585*	*Concrete or Asphalt*	*1*	*0.89*	*265445.8*			
Landscape	*96720*	*Ornamental Landscaping*	*0.1*	*.11*	*10683.5*			
	$A_T = \Sigma[A]$ **394305**				Σ= [D] **276129.3**	*Design Rainfall Intensity (in/hr)* [E] **0.2**	*Design Flow Rate,* Q_{BMP} *(cfs)* $[F] = \frac{[D]x[E]}{12}$ **1.3**	*Proposed Flow Rate (cfs)* [G] ***1.3***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☒ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
All DMAs	Bacteria/ Pathogens	Medium

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project site does not meet the HCOC exemptions in Section F.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 24-hour, 2-year storm event to meet the condition C in Section F.2. There are no offsite flows from the backbone streets constructed in the mass grading phase entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. Offsite flows which require mitigation are to be addressed in a separate drainage study. The 24-hour, 2-year unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. A routing analysis was performed to demonstrate that the proposed CMP chamber systems have substantial volume needed to mitigate flows to existing condition flow rates and determine the required orifice outlet sizing. See Appendix 7 for the unit hydrograph and routing analysis details. Further details can also be found in the "Preliminary Drainage Study – BCCOV Parking Lot".

EXISTING CONDITION 2-YEAR, 24-HOUR STORM		
	VOL (AC-FT)	PEAK FLOW (CFS)
AREA A1	0.76	1.26
18.1% A1 (PROP. AREA 1)	-	0.23
25% A1 (PROP. AREA 2)	-	0.31
32.4% A1 (PROP AREA 3)	-	0.41
24.5%A1 (PROP AREA 4)	-	0.31

PROPOSED CONDITION 2-YEAR, 24-HOUR STORM			
	VOL (AC-FT)	PEAK FLOW (CFS)	ROUTING PEAK FLOW (CFS)
AREA 1	1.06	1.75	0.16
AREA 2	1.40	2.37	0.33
AREA 3	1.67	2.75	0.47
AREA 4 (PARKING LOT)	1.20	1.96	0.32
COMBINED (EXISTING A1)	5.33	8.83	1.28

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	*Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.*	*Maintain and periodically repaint or replace inlet markings.* *Provide stormwater pollution prevention information to new site owners, lessees, or operators.* *See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*
Landscape/Outdoor Pesticide Use	*Preserve existing native trees, shrubs, and ground cover to the maximum*	*Maintain landscaping using minimum or no pesticides.*

	extent possible. *Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.* *Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.* *Consider using pest-resistant plants, especially adjacent to hardscape.* *To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.*	*See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/* *Provide IPM information to new owners, lessees and operators.* *Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Refuse Areas	*Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash.* *Trash dumpsters (containers) shall be leak proof and have attached covers or lids.* *Trash enclosures shall be roofed per City standards.* *Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited.* *See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional information.* *Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.*	*Adequate number of receptacles shall be provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook at www.cabmphandbooks.com*
Vehicle and Equipment Cleaning	*If a car wash area is not provided, describe any measures taken to discourage on-site car washing and*	*Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain*

	explain how these will be enforced.	*system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/*
Plazas, Sidewalks and parking lots.		*Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.*
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
All DMAs	MWS Vaults	Appendix 6

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section H will be completed and addressed during Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

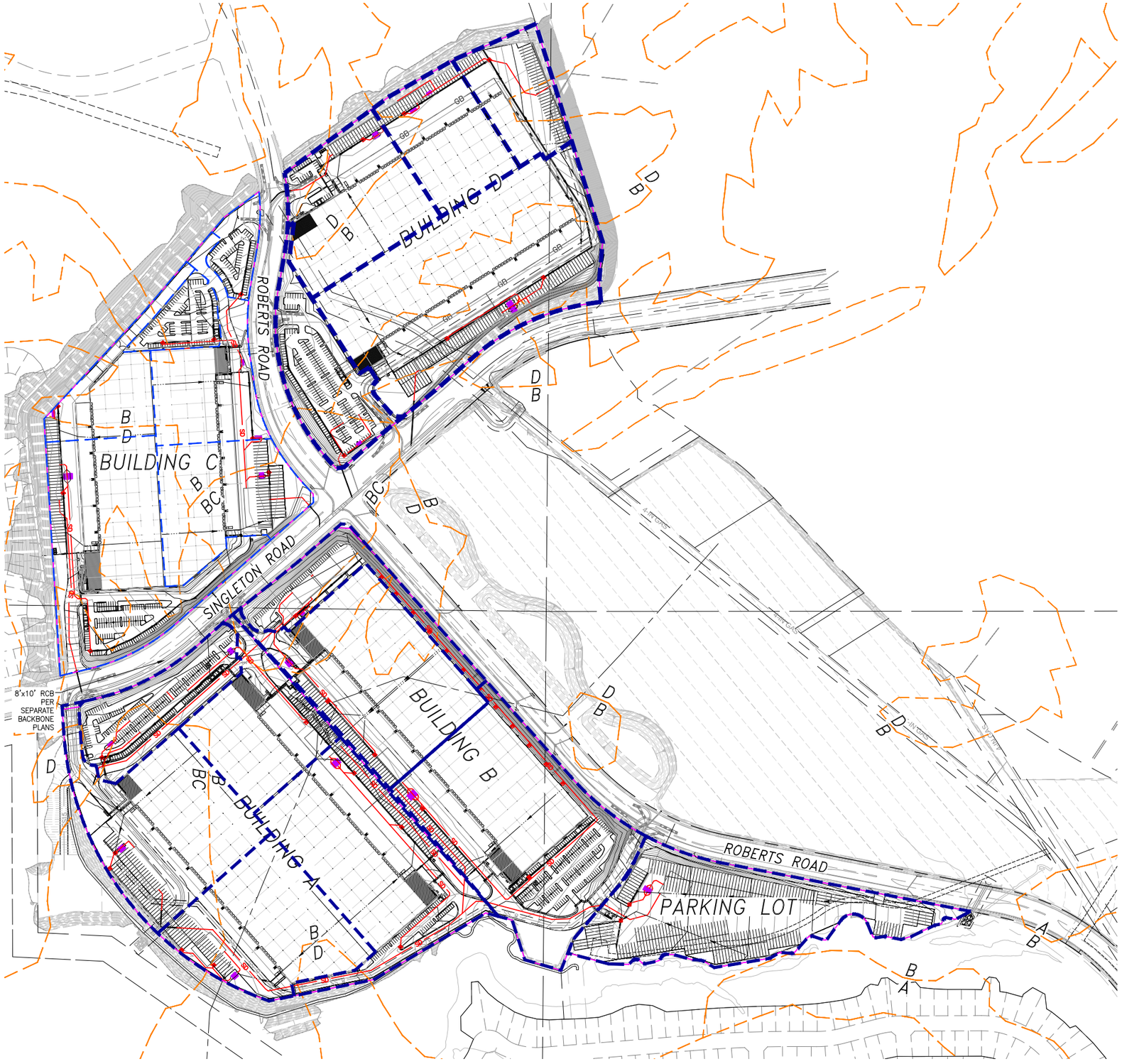
☒ Y ☐ N

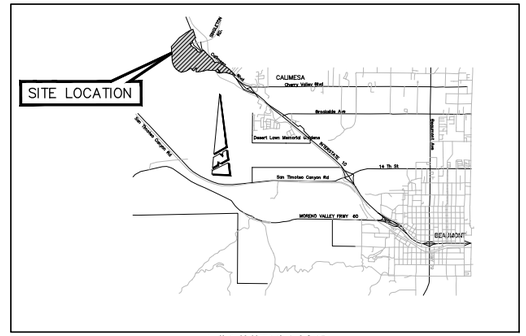
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section I will be completed and addressed during Final WQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

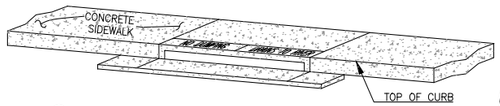


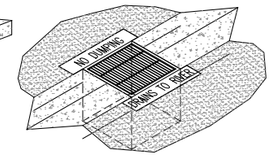


VICINITY MAP

N.T.S.

T2S, R2W, SECTION 23,24,25,26





1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING – DRAINS TO RIVER"
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENINGS AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NTS

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL BELOW (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).
3. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
4. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

SITE CONSTRAINTS:

1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE USE OF RECYCLED WATER FOR IRRIGATION PURPOSES.

LEGEND

- ROOF
- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

N
W WEBB E
S

1" = 200'

200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

OVERALL BCCOV SITE PLAN
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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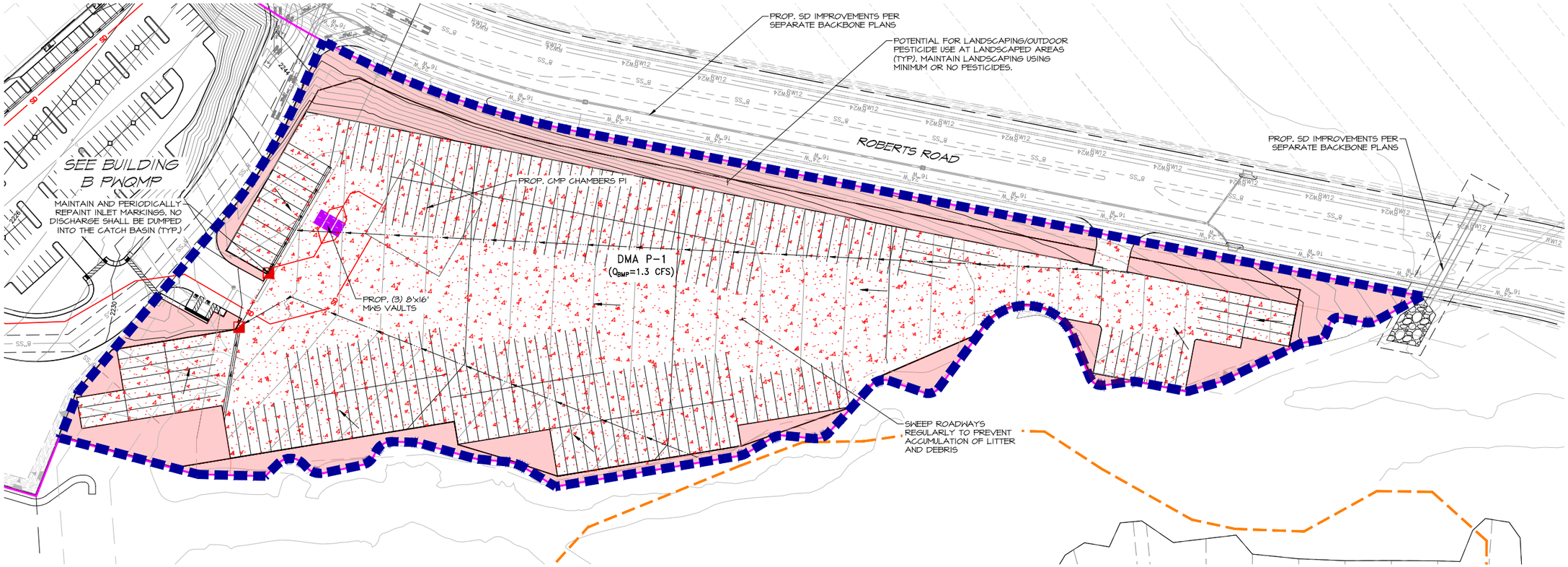

LEGEND

- CONCRETE/ASPHALT
- LANDSCAPE
- DMA BOUNDARY
- PROJECT BOUNDARY
- FLOWLINE
- PROPOSED ONSITE STORM DRAIN
- NRCS SOIL BOUNDARY
- PROPOSED INLET
- PROPOSED MWS TREATMENT VAULT (SEE APPENDIX 6)

DMA AREA TABLE	
	DMA P-1
CONCRETE (SF)	297,585
LANDSCAPE (SF)	96,720
QBMP (CFS)	1.3
QTREAT (CFS)	1.3

N
W WEBB E
S

1" = 60'

60 0 60 120 180

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

BCCOV – PARKING LOT
INDUSTRIAL DEVELOPMENT
POST CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE:	1"=60'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/2/2021	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 2
DESIGNED:	AYS		OF 2 SHEETS
CHECKED:	BJV		
PLN CK REF:			DWG. NO.
F.B.			

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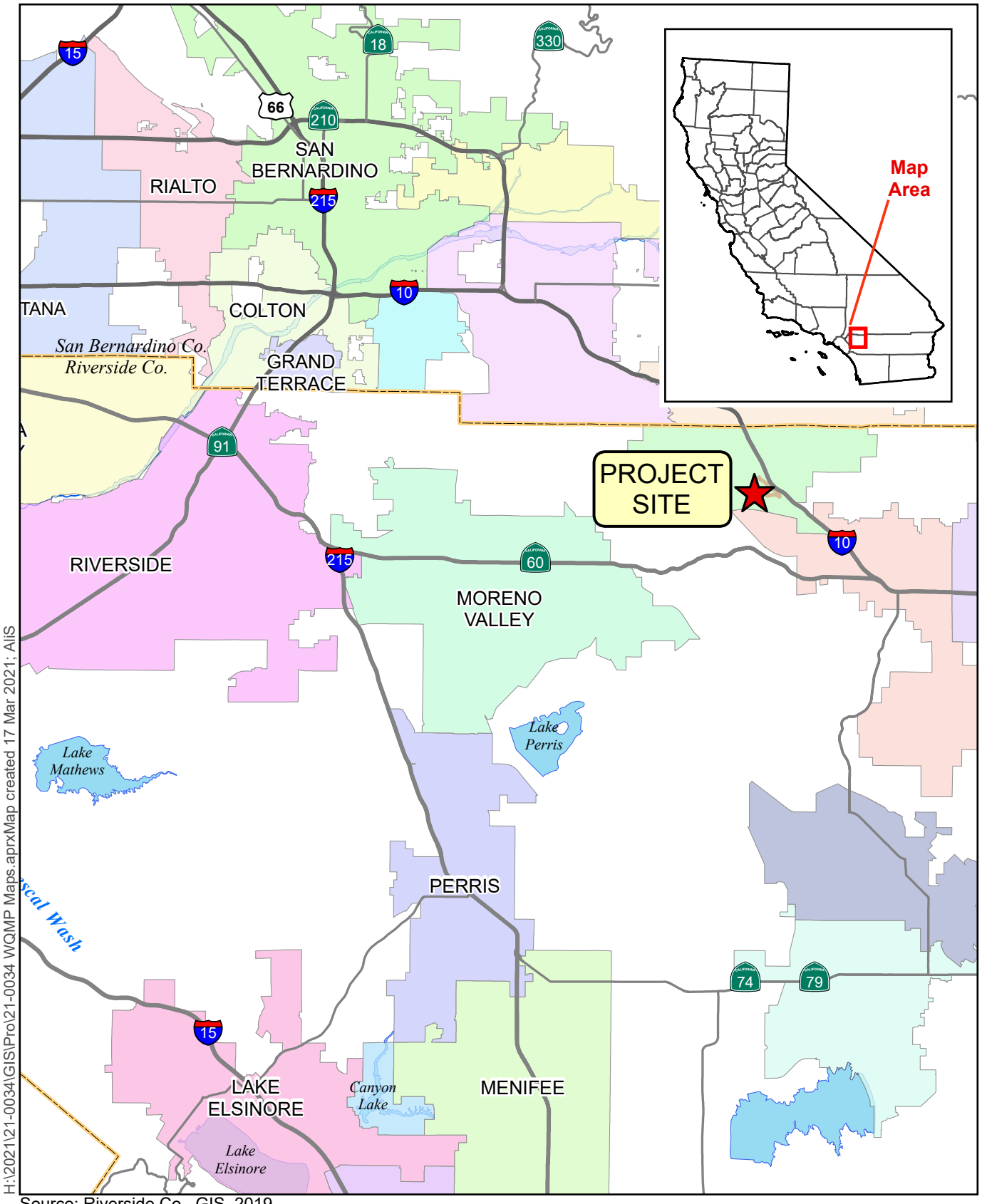


H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprxMap created 17 Mar 2021; AliS

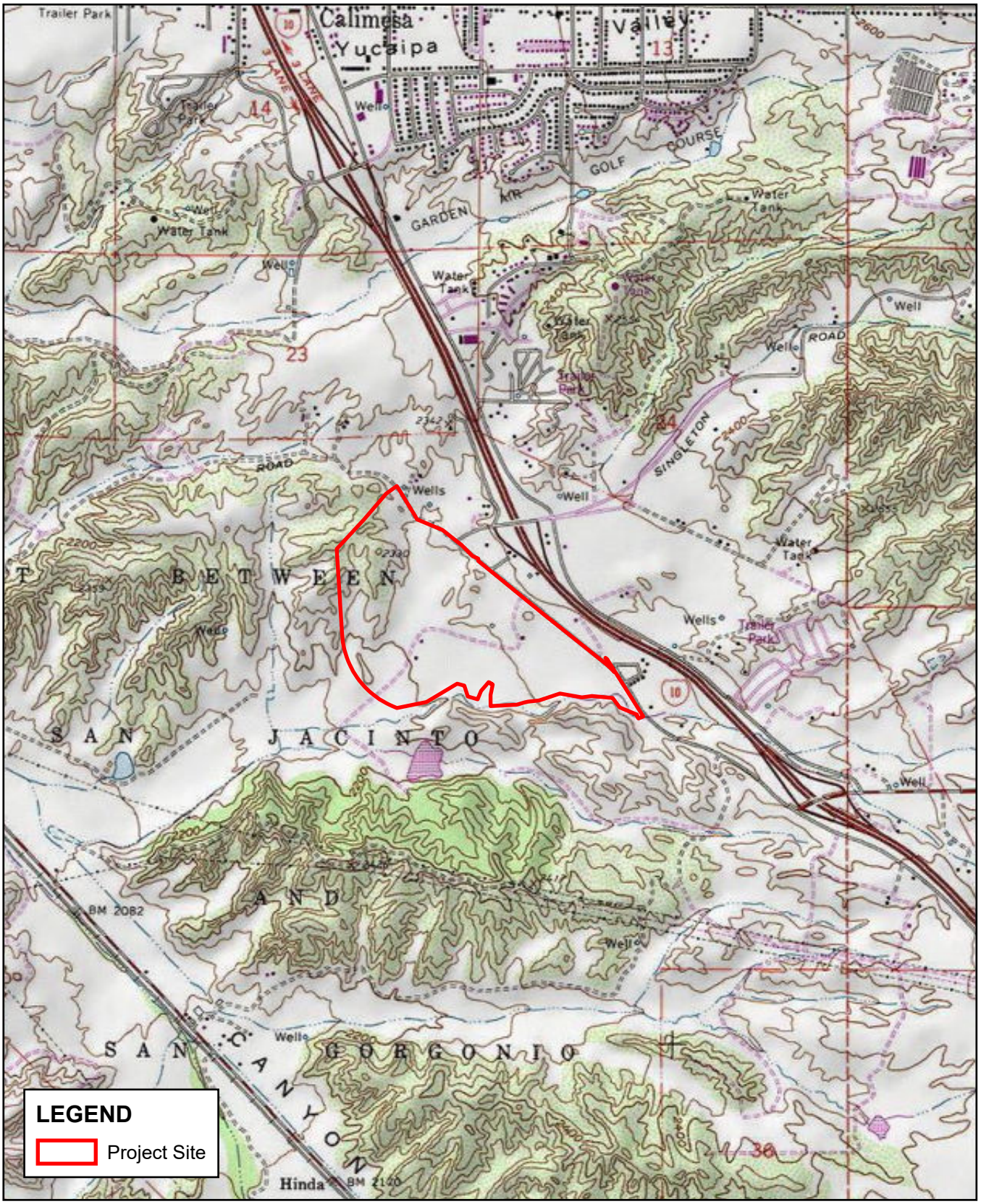
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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Sources: ESRI / USGS 7.5min Quad
DRGs: EL CASCO

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



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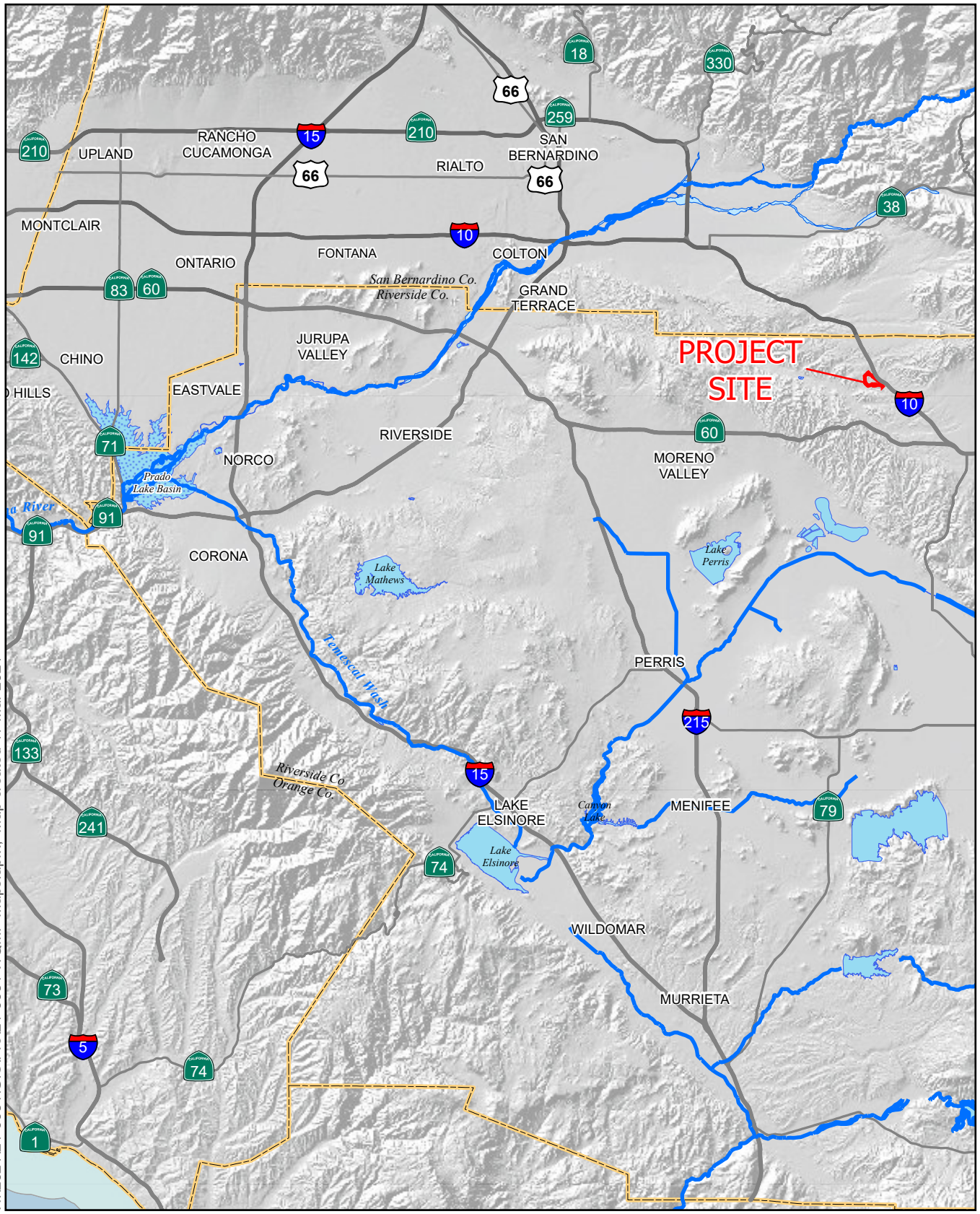
Source: Riverside Co. GIS, Jan. 2020.

0 600 1,200 1,800 Feet

Figure 3 - Aerial Map

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES



H:\2021\21-0034\GIS\Pro\21-0034 WQMP Maps.aprx; Map created 17 Mar 2021

Sources: USGS DLG; USGS 30m DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

21-0034 OVTC INDUSTRIAL

ALBERT A. WEBB ASSOCIATES

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.88 PradoDam
0.50 LakeMathews
0.51 Woodcrest
0.68 PigeonPass
0.66 MorenoEast
0.68 PerrisReservoir
PROJECT SITE
0.85 Beaumont
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.90 HurkeyCreek
0.65 Anza
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.77 SantaRosaPlateau
0.52 SkinnerLake
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Appendix 2: Construction Plans

Grading and Drainage Plans

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

January 21, 2021

Birtcher Development
450 Newport Center Drive, Suite 220
Newport Beach, California 92660

Attention: Mr. Randy Rankin
President of Construction

Project No.: **20G144-2**

Subject: **Geotechnical Review Letter**
Proposed Commercial/Industrial Development
Singleton Road at Roberts Road
Calimesa, California

Reference: Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, City of Calimesa, County of Riverside, California, prepared for Oak Valley Development Company by Advanced Geotechnical Solutions, Inc. (AGS), Report No. 2004-04-B-5, P/W 2004-01, dated December 23, 2020.

Dear Mr. Rankin:

In accordance with your request, we have reviewed the above-referenced geotechnical report for the proposed development. These reports were reviewed for conformance with generally accepted standards of practice for commercial/industrial development.

Document Review

Southern California Geotechnical, Inc. (SCG) was provided with copies of the above-referenced report previously prepared for the subject site. Comments generated during our review of the referenced documents are presented below:

This report consists of a geotechnical investigation performed in 2020 for a 266-acre site located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in Calimesa, California. The site is identified as being a part of Parcel Map 37862.

The overall site, which was the subject of this report, includes:

a) Four (4) new commercial/industrial buildings, ranging in size from 250,000± ft^2 to 500,000± ft^2, to be constructed in the western and southern areas of the subject site,
b) A new proposed commercial/retail center in the northeast portion of the site bounded by Singleton Road, and
c) A new sewer lift station to be constructed near the southwest corner of the tract.

Please note that only the four (4) proposed commercial/industrial buildings are included in the scope for our client, Birtcher Development. It is our understanding that the remaining proposed structures will be developed by a different developer, Oak Valley Development Company.

The stated scope of this report included providing geologic and geotechnical information and recommendations for the development of the Parcel Map 37862 relative to:

- Unsuitable soil removals,
- Cut, fill and natural slope stability,
- Buttress/stabilization fill requirements,
- Cut/fill pad overexcavation criteria,
- Remedial and design grading recommendations,
- Handling and disposal of oversize hard earth materials,
- Stabilization and removal of saturated removal bottoms, and
- Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

The report indicates that AGS conducted two phases of subsurface investigations. The first phase was performed on May 6, 2020 and May 7, 2020. The second investigation was performed between August 5, 2020 and August 14, 2020. These investigations included twenty-two (22) test pits ranging in depth from 9 to 14 feet and twenty-seven (27) borings drilled to a depth of up to 71½± feet.

The report identified five (5) main geologic units at the subject site. They are, from youngest to oldest:

- Artificial Fill – Undocumented (Map symbol Afu)
- Alluvium (Map symbol Qal)
- Older Alluvium (Map symbol Qoa) – The report states that the older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.
- Very Old Alluvial Fan Deposits (Map symbol Qvof), and
- Sedimentary Deposits of Live Oak Canyon (Map symbol Qlo)

The report indicates that groundwater was encountered throughout the site at highly variable elevations. This variability combined with the range in planned cuts and fills, will likely result in the presence of saturated soils at or near the planned removal depths. This condition will likely require mitigation that may include drying and/or mechanical stabilization of the saturated subgrade soils as well as possible dewatering.

This report states that the expansion potential of the on-site materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D-4829. AGS recommends that further testing and geologic mapping should be conducted during and upon completion of grading operations to provide design recommendations on a pad-by-pad basis.

This report states that on-site materials are significantly compressible, which includes undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. AGS recommends that these significantly compressible materials and the alluvial soils prone to hydro-consolidation be removed and replaced with compacted fill.

This report states that based on the chemical testing performed, the potential for sulfate attack on concrete in contact with the on-site soils is negligible and the on-site surface soils are not considered corrosive to buried ferrous metals.

Isolated layers of peat were encountered at the site and were recommended to be removed in their entirety due to their highly compressible nature.

Estimated depths of removal, ranging from ½ to 40+ feet, for both structural areas and landscape/parking areas for different geologic units were included in Table 7.1 on page 18 of this report.

This report included geotechnical mitigation recommendations related to overexcavation of building pads and streets related to cut/fill transition pads, steep cut and cut/fill transitions.

Comments

This report states that on-site materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the older alluvial deposits and Live Oak Canyon deposits. We would also include portions of the "very old alluvium."

Based on our review of the boring log data, it appears that some of the soils identified as older alluvium has similar and even lower blowcounts and relative densities than some of the soils identified as younger alluvium. **Based on our review of the blowcount and consolidation data, it is our opinion that some localized deeper removals of the Qoa and Qvof will be required.**

The report indicates Mirafi RS280i as a possible geotextile to be used to help mitigate an unstable excavation bottom. We would recommend consideration be given to include RS580i as an additional alternative for more unstable bottoms.

Page 23 of the report states that the on-site fill soils are subject to post-grading settlement and it is recommended that all fills overlying saturated soils be monitored prior to release for construction. The report recommends surface monuments. We concur with this recommendation and recommend that consideration should also be given to monitoring the settlement of the underlying bottoms using settlement plates similar to AGS's Plate 11 in the Appendix of their report.

Based on the presence of highly compressible soils at the subject site, we recommend that consideration should be given to requiring a 95 percent relative compaction standard for all new fill soils placed deeper than 20 feet below proposed site grades within the foundation influence zones of proposed buildings.

We concur with AGS's recommendation that additional investigations may be required at a later date to develop more detailed design-level recommendations after more details are provided about the proposed development including, but not limited to: final site elevations, proposed building configurations/locations, and structural requirements/settlement tolerances.

It is our opinion that the report has been prepared in general accordance with accepted geotechnical standards of practice.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, GE 2655
Principal Engineer



Daryl A. Kas, CEG 2467
Senior Geologist

Distribution: (1) Addressee

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CITY OF CALIMESA COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for:
Oak Valley Development Company
10410 Roberts Road
Calimesa, CA 92320

Prepared by:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

December 23, 2020
Report No. 2004-01-B-5
P/W 2004-01

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

Oak Valley Development Company
10410 Roberts Road
Calimesa, California 92320

December 23, 2020
P/W 2004-01
Report No. 2004-01-B-5

Attention: Mr. John Ohanian

Subject: ***Geotechnical Investigation and Review of Mass Grading Plans, Parcel Map 37862, Calimesa, County of Riverside, California***

References: See Appendix

Gentlemen:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Geotechnical Investigation and Review of Mass Grading Plans for the Oak Valley Town Center Project, Parcel Map 37862, located in the City of Calimesa, California. In this report, AGS compiled previous investigative data, new data, and analyzed how it affects the proposed design as shown on the Mass Grading Plan prepared by Proactive Engineering Consultants West.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Prepared by:

SHANE P. SMITH
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN J. DONOVAN
GE 2790
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Reviewed by:

JOHN J. DONOVAN
RCE 65051, RGE 2790, Reg. Exp. 6-30-21

PAUL J. DERISI
CEG 2536, Reg. Exp. 5-31-21

Distribution: (1) Addressee (electronic copy)

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1. Scope of Work 1
1.2. Geotechnical Study Limitations 2
2.0 SITE LOCATION AND DESCRIPTION 2
2.1. Site Location 2
2.2. Site Description 2
3.0 PROPOSED DEVELOPMENT 2
4.0 FIELD AND LABORATORY INVESTIGATION 3
4.1. Previous Investigations 3
4.2. Current Investigation 3
5.0 ENGINEERING GEOLOGY 4
5.1. Geologic Analysis 4
5.1.1. Literature Review 4
5.1.2. Aerial Photograph Review 4
5.1.3. Field Mapping 4
5.2. Geologic and Geomorphic Setting 4
5.3. Stratigraphy 5
5.3.1. Artificial Fill – Undocumented (Map Symbols afu) 5
5.3.2. Alluvium (Map Symbol Qal) 5
5.3.3. Older Alluvium (Map Symbol Qoa) 5
5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof) 6
5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo) 6
5.4. Groundwater 6
5.5. Non-seismic Geologic Hazards 7
5.5.1. Mass Wasting and Debris Flows 7
5.5.2. Flooding 7
5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring 7
5.6. Seismic Hazards 8
5.6.1. Surface Fault Rupture 8
5.6.2. Liquefaction/Dynamic Settlement 8
5.6.3. Lateral Spreading 10
5.6.4. Seismically Induced Landsliding 10
5.6.5. Earthquake Induced Flooding 10
5.7. Seismic Design Parameters 10
5.8. Site Specific Ground Motion Hazard Analysis 11
5.8.1. Probabilistic Seismic Hazard Analysis 11
5.8.2. Deterministic Seismic Hazard Analysis 12
5.8.3. Site-Specific Design Response Spectrum 12
6.0 GEOTECHNICAL ENGINEERING 14
6.1. Material Properties 14
6.1.1. Excavation Characteristics 14
6.1.2. Compressibility 14
6.1.3. Collapse Potential/Hydro-Consolidation 14
6.1.4. Expansion Potential 14
6.1.5. Shear Strength 14

6.1.6. Chemical and Resistivity Test Results 15
6.1.7. Earthwork Adjustments 15
6.1.8. Pavement Support Characteristics 16
6.2. Analytical Methods 16
6.2.1. Slope Stability Analysis 16
6.2.2. Pavement Design 16
6.2.3. Bearing Capacity and Lateral Pressure 16
7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS 16
7.1. Site Preparation and Removals/Overexcavation 17
7.1.1. Overexcavation of Building Pads and Streets 18
7.1.1.1. Cut/Fill Transition Pads 18
7.1.1.2. Steep Cut and Cut/Fill Transitions 18
7.1.1.3. Street Overexcavation 19
7.1.2. Removals Along Grading Limits and Property Lines 19
7.2. Subgrade Stabilization 19
7.3. Slope Stability and Remediation 20
7.3.1. Cut Slopes 20
7.3.2. Fill Slopes 20
7.3.3. Skin Cut and Skin Fill Slopes 21
7.3.4. Fill Over Cut Slopes 21
7.3.5. Offsite Drainage Channel Slopes 21
7.3.6. Surficial Stability 21
7.3.7. Excavation and Temporary Cut Slopes 22
7.3.8. Geologic Observation During Grading 22
7.4. Survey Control During Grading 22
7.5. Settlement Monitoring 23
7.6. Subsurface Drainage 23
7.6.1. Canyon Drains 23
7.6.2. Heel Drains 23
7.6.3. Cut Slope Toe Drains and Subdrains 23
7.7. Seepage 23
7.8. Construction Dewatering 23
7.9. Earthwork Considerations 24
7.9.1. Compaction Standards 24
7.9.2. Fill Materials/ Import Soils 24
7.9.3. Benching 24
7.9.4. Mixing and Moisture Control 24
7.9.5. Haul Roads 25
7.9.6. Oversize Rock 25
7.9.6.1. Rock Blankets 25
7.9.6.2. Rock Windrows 25
7.9.6.3. Individual Rock Burial 26
7.9.6.4. Rock Disposal Logistics 26
7.9.7. Fill Slope Construction 26
7.9.7.1. Overbuilding Fill Slopes 26
7.9.7.2. Compacting the Slope Face 26

7.9.8. Utility Trench Excavation and Backfill 27
7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation 27
8.0 DESIGN RECOMMENDATIONS 27
8.1. Structural Design Recommendations 27
8.1.1. Foundation Design 28
8.1.2. Settlement 28
8.1.3. Isolated Footings 29
8.1.4. Deepened Footings and Setbacks 29
8.1.5. Footing Excavations 29
8.1.6. Moisture and Vapor Barrier 30
8.1.7. Concrete Design 30
8.2. Retaining Wall Design 30
8.2.1. Retaining Walls (backfilled with Native Materials) 30
8.2.2. Retaining Wall Drainage 31
8.3. Civil Design Recommendations 32
8.3.1. Site Drainage 32
8.3.2. Exterior Flatwork 33
8.3.3. Pavement Design 33
8.3.3.1. Asphalt Concrete Pavement 33
8.3.3.2. Portland Cement Concrete Pavement 34
8.4. Corrosion 35
9.0 SLOPE AND LOT MAINTENANCE 35
9.1. Slope Planting 35
9.2. Pad Drainage 35
9.3. Slope Irrigation 35
9.4. Burrowing Animals 36
10.0 FUTURE STUDY NEEDS 36
10.1. Future Studies and Reviews 36
10.2. Grading Observation 36
11.0 CLOSURE 36
11.1. Geotechnical Review 36
11.2. Limitations 37

ATTACHMENTS

Figure 1 - Site Location Map
Figure 2 - Regional Geologic Map
Figure 3 - Fault Map
Figure 4 - Seismic Response Spectra

Appendix A - References
Appendix B - Subsurface Logs
Appendix C - Laboratory Test Results
Appendix D - Engineering Analyses
Appendix E - Earthwork Specifications and Grading Details
Appendix F - Homeowners Maintenance Guidelines

ENCLOSURES

Plates 1 through 9 - Geotechnical Maps (Mass Grading Plans)
Plates 10 through 12 - Geologic Cross-Sections A-A' through N-N'

GEOTECHNICAL INVESTIGATION AND REVIEW OF MASS GRADING PLANS PARCEL MAP 37862 CALIMESA, COUNTY OF RIVERSIDE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of this AGS's geotechnical investigation and review of the 60-scale Mass Grading Plans for Parcel Map 37862, in the City of Calimesa, County of Riverside, California prepared by Proactive Engineering Consultants provided to AGS on December 10, 2020.

The purpose of our review and report is to present geologic and geotechnical information obtained during previous geotechnical studies by Pacific Soils Engineering (PSE) with supplemental geologic and geotechnical data obtained by AGS during the current investigation. AGS has provided remedial grading recommendations for the ultimate mass grading configuration whereas an interim grading configuration is currently depicted on the 60-Scale Mass Grading Plan, shown on the attached plates. The interim grading condition avoids drainage areas. Proposed remedial grading conditions shown on Plates 1 through 9 are based on the ultimate mass grading condition. This study is aimed at providing geologic and geotechnical information and recommendations for the development of Parcel Map 37862 relative to: 1) Unsuitable soil removals; 2) Cut, fill and natural slope stability; 3) Buttress/stabilization fill requirements; 4) Cut/fill pad overexcavation criteria; 5) Remedial and design grading recommendations; 6) Handling and disposal of oversize hard earth materials; 7) Stabilization of saturated removal bottoms; and 8) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.1. Scope of Work

This study is aimed at providing geotechnical/geologic conclusions and recommendations for development of the Parcel Map 37862 commercial/retail development. The scope of this study included the following tasks:

- Review of readily available maps, geotechnical and geologic literature and aerial photographs (Appendix A).
- Compiling available data from previous published and unpublished studies by PSE.
- Preparation of Geotechnical Maps using the 60-scale plan with a base design provided by Proactive Engineering Consultants West, Inc. (Plates 1 through 9).
- Preparation of geologic cross-sections A-A' through N-N' (Plates 10 through 12).
- Perform data analyses in relation to the site-specific proposed improvements.
- Provide analysis and discussion of the excavation characteristics (i.e. rippability) of onsite formational materials.
- Formulation of grading, remedial grading and earthwork recommendations.
- Slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Determination of engineering parameters including earthwork adjustments, bearing and friction values, active, passive, and at-rest pressures for retaining walls.

- Perform a limited seismic hazard analysis.
- Preparing and publishing this report which presents geotechnical recommendations pertinent to the accompanying 60-scale grading plans.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on data developed during previous investigations performed by PSE and the current investigation performed by AGS. The conclusions presented herein are based upon the current design as reflected on the accompanying plans. Changes to the plans would necessitate further review.

The materials immediately adjacent to or beneath those observed and sampled may have different characteristics than those observed and sampled. No representations are made as to the quality or extent of materials not observed nor subjected to laboratory testing. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE LOCATION AND DESCRIPTION

2.1. Site Location

The subject site is an irregular shaped, 266-acre parcel located northwest of the intersection of Roberts Road and Cherry Valley Boulevard in the City of Calimesa, Riverside County, California (Figure 1).

2.2. Site Description

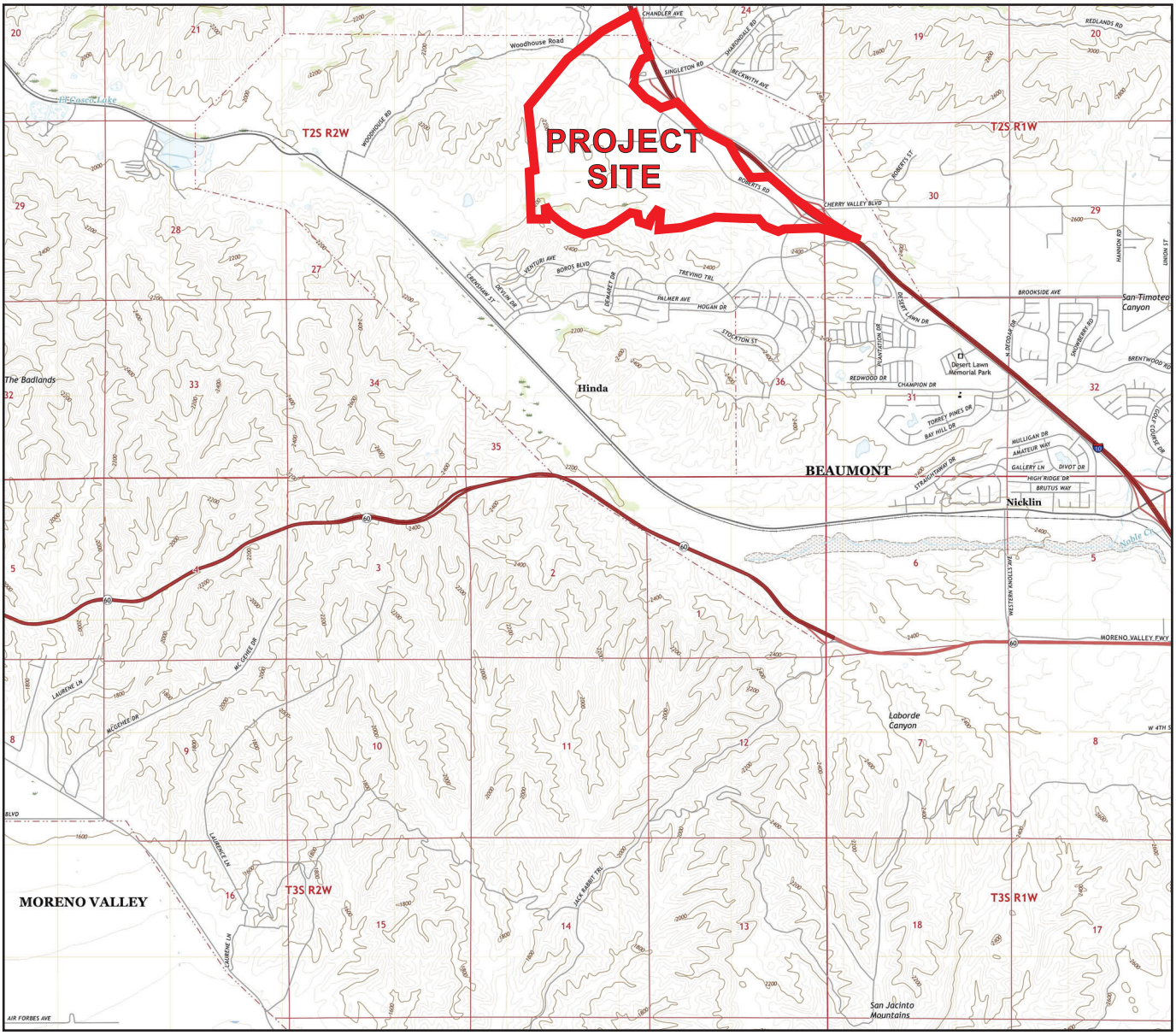
The site currently supports agricultural use (dry farming) on the southern and western portions of the site with several residential structures and outbuildings located within the northeastern, central, and southern portions of the site. Existing Roberts Road runs through the project site from southeast through the northeast. A failed concrete pipe culvert and associated headwall was observed beneath the northern portion of Roberts Road which has been undermined. The road was barricaded and closed to travel in this area.

Remnants of a prior low height dam are located across the main drainage that traverses the site, and its location is reflected by a line of artificial fill (afu) shown on Plate 1. A reservoir upstream of this dam is shown on older topographic maps of the area. Based on a review of historic aerial photographs, the active channel eroded a portion of this dam over 40 years ago.

The northwestern portion of the site consists of rolling hills underlain by formational materials consisting of the Live Oak Canyon and San Timoteo Formations. Several drainages exist onsite with two larger drainages transecting the site from northeast to southwest and one touching on the southwestern project boundary flowing from east to west.

3.0 PROPOSED DEVELOPMENT

It is our understanding that the proposed development as currently envisioned will consist of the following separate components:



SITE LOCATION MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

P/W 2004-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA (2018)

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- A commercial/retail center in the northeast portion of the site bounded by Singleton Road which will include extensive parking areas and possibly a new City Hall. These structures will likely be concrete "tilt-up" or conventional wood frame structures varying from 1 to 3 stories in height and would likely be supported by shallow slab-on-grade foundation systems. In addition to the commercial structures, a "man-made" lake would occupy the southwestern portion of the commercial/retail center.
- Large shipping and manufacturing buildings to be constructed on the western and southern areas of the property ranging in size from 250,000 to 500,000 square feet. The limits of these proposed structures are shown in blue on the attached Geotechnical Maps. It is anticipated that these structures will consist of concrete–tilt-up structures supported by shallow slab-on-grade foundation systems. Surrounding both the commercial and retail components will be interior roadways with primary access provided from Roberts Road and Singleton Road.
- A sewer lift station will be constructed near the southwest corner of the tract.

The mass grading plan shown on Plates 1 through 9 depicts an interim grading condition that avoid drainage areas. It is our understanding that the ultimate grades will be located within these areas.

4.0 FIELD AND LABORATORY INVESTIGATION

4.1. Previous Investigations

Several studies by PSE were previously completed onsite and near-by offsite. A description of the relevant data used within this current investigation is presented below.

- PSE conducted a subsurface investigation in 2004. AGS has utilized five (5) subsurface borings from this investigation (B-037, B-043, B-081, B-095, and B-096). These borings were excavated with a truck mounted drill rig equipped with 18-inch and 30-inch diameter bucket augers to depths ranging from 16 to 65 feet below ground surface (bgs). The locations of the exploratory excavations are shown on the Plates 1 through 9. Boring logs are presented in Appendix B.
- Laboratory testing was performed as a part of the PSE 2004 investigation and included chemical and resistivity testing, sieve analysis, maximum dry density and optimum moisture content, direct shear strength, and consolidation characteristics. Pertinent laboratory test results can be found in Appendix C.

4.2. Current Investigation

AGS conducted two phases of subsurface investigations, one on May 6 and 7, 2020, and the subsequent between August 5, 2020, and August 14, 2020, to evaluate the subsurface conditions as they relate to the proposed mass grading. Twenty two (22) test-pit excavations (T-1 through T-22) were excavated and logged to depths ranging from 9 to 14 feet bgs utilizing a JCB 3CX rubber-tired backhoe. Representative bulk samples were obtained and transported to our laboratory for testing to determine in-situ moisture content, maximum density and optimum moisture content, "remolded" shear strength, grain size distribution, and corrosivity. Test pit logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Twenty seven (27) borings were excavated, logged, and sampled with a truck mounted 8-inch hollow stem auger to depths of up to 71.5 feet. These borings were logged independently by both AGS and Southern California Geotechnical, Inc. (SCG). Representative bulk and relatively undisturbed samples were obtained and transported to AGS's laboratory for testing from eighteen of these borings (AGS-1 through AGS-18, except AGS-7 which was not used). Representative bulk and relatively undisturbed samples were obtained and transported to SCG's laboratory for testing from ten of these borings (SCG-1 through SCG-10). Test pit and boring logs and associated laboratory tests results are presented in Appendices B and C, respectively.

Plates 1 through 9 show the locations of these exploratory excavations.

5.0 ENGINEERING GEOLOGY

5.1. Geologic Analysis

5.1.1. Literature Review

As part of this study, AGS has reviewed the geologic documents referenced in Appendix A. Where deemed appropriate, relevant geologic information has been included in this report.

5.1.2. Aerial Photograph Review

AGS has reviewed current and historical aerial photographs available through sources on the internet.

5.1.3. Field Mapping

Geologic field mapping was performed during our subsurface explorations.

5.2. Geologic and Geomorphic Setting

The Oak Valley Town Center lies on the Beaumont Plains at the north edge of the San Jacinto Mountains – one of the several northwest-trending mountain ranges that comprise the Peninsular Ranges Province of Southern California. Displacements along a series of northwest-trending active faults that extends from the Mojave Desert in the east, to the California Channel Islands in the west have and are elevating the mountain ranges above intervening lowlands. The faults include nearby San Andres fault zone, and the related San Gorgonio Pass Fault, and San Jacinto faults. These faults are, respectively, about 7-miles northeast, 3-miles east, and 5-miles southwest of the site.

According to Matti (2016), the sedimentary section below the Beaumont Plains near the study site includes in decreasing age: Pliocene to Pleistocene alluvial fan and flood plain deposits (5 Mya to ~1.3 Mya), perhaps up to several thousand feet thick, assigned to the San Timoteo Formation which were sourced from San Gabriel Mountains northwest of the area; Pleistocene alluvial and flood plain deposits, assigned sediments of the Live Oak Canyon, that were deposited after the San Timoteo Anticline disrupted the previous depositional pattern around 1.3 Mya; Holocene alluvium and colluvium within active stream channels and swales; topsoil; and local prisms of artificial fill.

West-flowing San Timoteo Creek drains the Beaumont Plains. That high-order drainage has kept pace with uplift in the plains and the west-adjacent San Timoteo Badlands, resulting in ongoing

incision and headward erosion of its channel. Many low-order drainages have consequently formed as tributaries to San Timoteo Creek. These drainages dissect the Beaumont Plains and form distinctive badlands topography common to the area. The canyons and swales on the study site are part of this system.

5.3. Stratigraphy

Mapping and nomenclature following Matti, Morton and Langenheim (2015) are being used for this report (Figure 2, Regional Geologic Map). The site has been mapped as being underlain by Pleistocene and Pliocene age sedimentary deposits of Live Oak Canyon (formerly described as the upper member of the San Timoteo Formation) within the northern rolling hills portion of the site. The majority of the site is mapped as Pleistocene age very old alluvial fan deposits overlain by Holocene age young alluvial axial-valley and fan deposits. The existing channels onsite are mapped as modern age very young wash deposits. Undocumented fill exists in areas where the land surface has been modified in order to support access roads and berms, especially in the vicinity of the existing structures and Roberts Road. For the purpose of this report, the three younger (Holocene) alluvial deposits described below have been labeled as one unit (Qal) on Plates 1 through 9. Approximate surface geologic contacts are shown on Plates 1 through 9. Brief descriptions of the geologic units encountered at the site are presented below, from youngest to oldest.

5.3.1. Artificial Fill – Undocumented (Map Symbols afu)

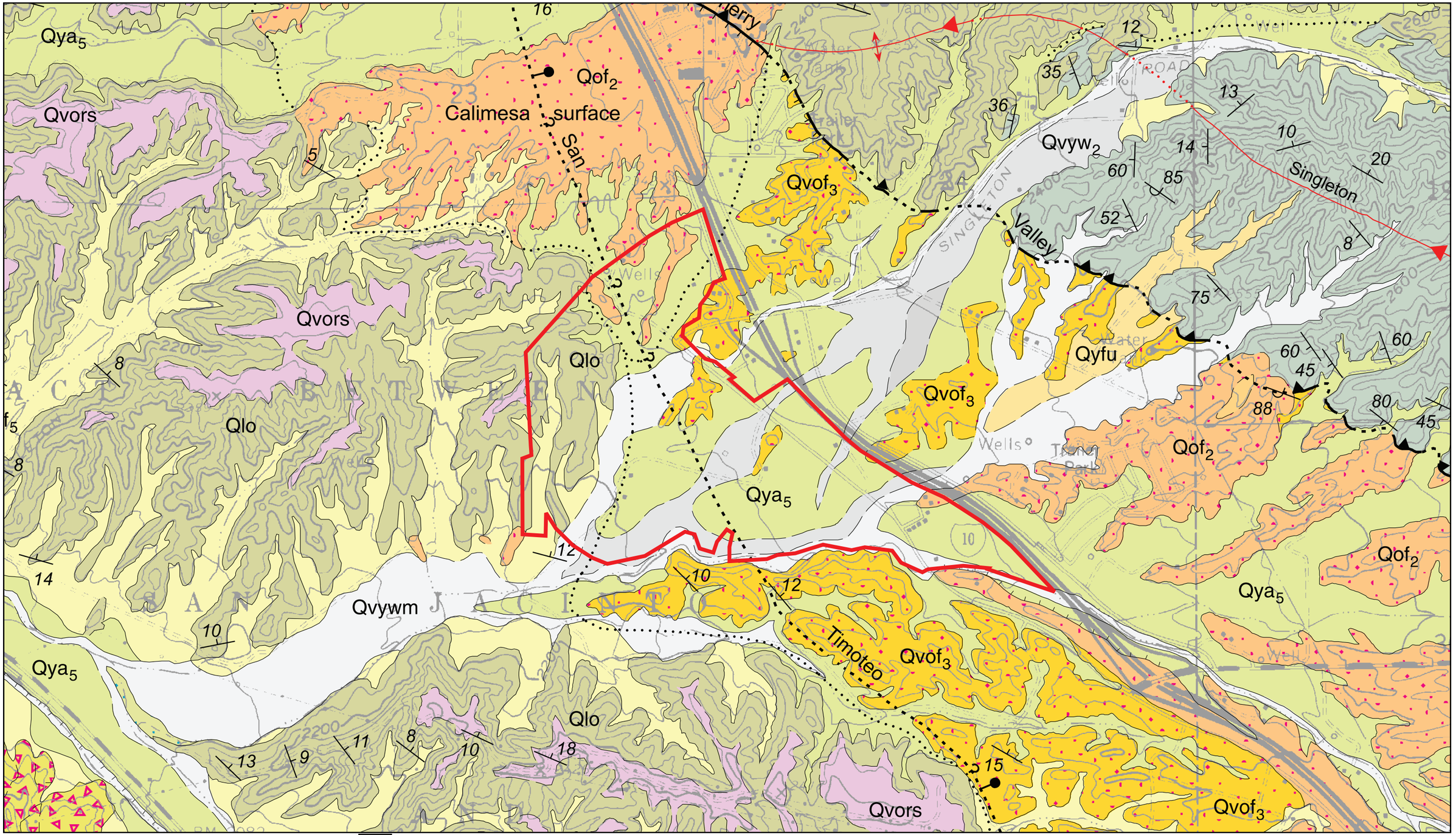
Artificial fill soils were observed throughout the site specifically along margins of adjacent residential developments, underlying existing structures and at roadway improvements including Roberts Road and other disturbed access roads onsite. Artificial fill was not encountered within our subsurface excavations however it is anticipated to be locally derived.

5.3.2. Alluvium (Map Symbol Qal)

Holocene age alluvium are located surrounding the major drainages onsite and cover most of the southerly portion of the site. The alluvium includes very young wash deposits, located within the active drainage channels, young axial valley deposits, and young alluvial fan deposits. These deposits have not been differentiated on the plans or boring logs. These deposits consisted of poorly consolidated sediments within the active drainage channels to more consolidated sediments elsewhere. The alluvium ranges from dry to wet with consistencies that generally range from soft/loose to medium dense/stiff. Up to 60 feet of alluvium was encountered in boring AGS-3. Abundant peat was encountered within boring AGS-4 at depths of up to 35 feet. Additional layers may be present between the roughly 5-foot sampling intervals. Cone penetration tests may be useful in identifying thin layers of peat deposits that may be present as well as the lateral extents.

5.3.3. Older Alluvium (Map Symbol Qoa)

An intermediate age alluvial deposit was observed in several borings and test pits underlying the young alluvial deposits. The older alluvium is distinguished from the overlying young alluvial deposits by its higher relative density and iron oxide development.



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SOURCE MAP - GEOLOGIC MAP OF THE EL CASCO 7.5 MINUTE QUADRANGLE, RIVERSIDE CALIFORNIA. HIRSCHBERG, MATTI AND COSSETTE (2015)

SCALE: 1 in. = 1000 ft.

Qvywm	Very young wash deposits (modern)
Qya_5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf_5	Young alluvial-fan deposits, unit 5 (middle Holocene)
$Qvof_3$	Very old alluvial-fan deposits, unit 3 (middle Pleistocene)
Qlo	Live Oak Canyon Formation (Pleistocene)

REGIONAL GEOLOGIC MAP

FIGURE 2

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The older alluvium has consistencies that range from medium dense/stiff to very dense/hard. This unit is considered to be late Pleistocene in age.

5.3.4. Very Old Alluvial Fan Deposits (Map Symbol Qvof)

Middle to Lower Pleistocene age very old alluvial fan deposits were encountered within the majority of test pit excavations underlying younger alluvial deposits. This unit was observed to be composed mainly of silty sand in a medium dense to dense condition. The very old alluvium is distinguished from the overlying younger alluvial deposits by its higher relative density, weakly cemented nature, and iron oxide development. Generally minor porosity within the upper five feet existed within this unit.

5.3.5. Sedimentary Deposits of Live Oak Canyon (Map Symbol Qlo)

Sedimentary deposits of Live Oak Canyon is a new unit name designated by Morton & Matti (2015) that applies to a sequence of sandy and conglomeratic rock that crops out in low hills and mesas north of San Timoteo Canyon. These materials were previously assigned to the upper member of the San Timoteo Formation and range in age from late Pliocene to early Pleistocene. The sedimentary deposits of Live Oak Canyon have been mapped within the rolling hills located in the northwestern portion of the project site. As encountered onsite, this unit is mostly composed of thickly bedded fine to medium-grained silty sandstone and conglomerate that is yellowish brown to light gray brown and moderately hard. In PSE's B-43 boring, some light grey moderately hard sandy siltstone was encountered. Iron oxide staining was observed in this unit. Although not encountered in exploratory excavations onsite, occasional clay beds may be present within this unit. Regionally, bedding within this unit has been mapped to dip at shallow inclinations (~10 degrees) to the northeast. One bedding attitude taken from B-43 indicates that the bedding dips at 10 degrees to the north-northeast.

5.4. Groundwater

Groundwater was encountered within several exploratory borings and Test Pit T-2 at various depths and elevations in the main drainage course that crosses the site. Standing water was present at the time of our current investigation within the drainage channel running under existing Roberts Road south of the Singleton and Roberts Road intersection. However, groundwater was not encountered in AGS-13, which was excavated just to the north of this drainage course to a depth of 50 feet (elevation 2195). The depth/elevation of the observed groundwater varied across the site and may be difficult to accurately predict. The presence of the concealed San Timoteo Canyon fault may have an impact on groundwater conditions. Matti, et al (2006) has shown groundwater to generally flow to the west in the area, and describes the presence of a groundwater barrier, which has been inferred to be a splay of the San Timoteo Canyon fault. There are four known active wells on the site. The depths of two are known (288 and 319 feet) whereas the other two are not known. The type of well construction, including limits of the screened zones, are unknown. Recent measurements maintained by the USGS California Water Science Center (July and December 2020) indicate that groundwater depths are around 100 to 170 feet (elevations 2105 to 2140). In Spring of 2000, groundwater elevations in the area upstream of the fault have been generalized at

an elevation of around 2175 feet (Matti 2006, Figure 28), which appear to be based on the nearby well readings (depths ranged from 59 to 102 feet in April 2020, which corresponded to an elevation of around 2175). Matti (2006) mentions the location of the fault coincides where springs have been documented historically in this area. However, Matti does not describe the precise locations of these springs. The well readings may be measuring a lower groundwater surface than those encountered in the recent borings.

Shallow groundwater conditions were encountered near the intersection of proposed Roberts and Singleton Roads and the northwest side of Lot 3. In this area, groundwater was encountered at depths of 15 feet (elevation 2216) in PSE-96, 11 feet (elevation 2217) in AGS-3, 10 feet in test pit T-10 (elevation 2216), 15 feet (elevation 2208) in AGS-16, and 40 feet (elevation 2210) in PSE-95. Just upstream of this area, groundwater was not encountered in AGS-13, which was excavated to a maximum depth of around 50 feet (elevation 2195). Groundwater was not encountered in SCG-10 located to the southeast, which was excavated to a maximum depth of around 50 feet (elevation 2180) nor in AGS-4, located downstream and drilled to a maximum depth of around 45 feet (elevation 2150).

Groundwater depths across the site will vary in relation to the time of year, rainfall, and discharge from upstream bodies of water. It should be anticipated that groundwater will be encountered during construction and will require mitigation, especially near the northwest corner of Lot 3. This mitigation may include dewatering areas where the remedial excavation extends below the groundwater level and stabilization of removal bottoms that are near the groundwater level. Subdrains are proposed in this area to mitigate the potential for groundwater rising and impacting surface improvements.

5.5. Non-seismic Geologic Hazards

5.5.1. Mass Wasting and Debris Flows

The site is gently sloping with some steeper topography within the northwestern portion of the project site. Due to the gently sloping existing terrain and proposed mass grading, mass wasting and debris flows are not considered a site hazard.

5.5.2. Flooding

The project site has been mapped as FEMA flood zone “X” which is characterized as an “Area of Minimal Flood Hazard”.

5.5.3. Subsidence, Hydro-Collapse and Ground Fissuring

Some layers of peat were identified in the recent alluvial deposits. Settlement of peat deposits can occur when the moisture content is reduced and oxidation/decomposition is allowed to occur. Subsidence is also related to groundwater withdrawal and changes in stresses. Hazards associated with subsidence can be mitigated with proper design and construction practices. It is proposed to remove peat within building pad areas to mitigate the potential for settlement. Other improvements located outside the areas of deep removals

may be subject to possible settlement/subsidence due to groundwater withdrawal and changes in stresses.

Evidence of ground fissuring has not been identified on the site, and AGS is unaware of ground fissuring in the surrounding areas

5.6. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding.

The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

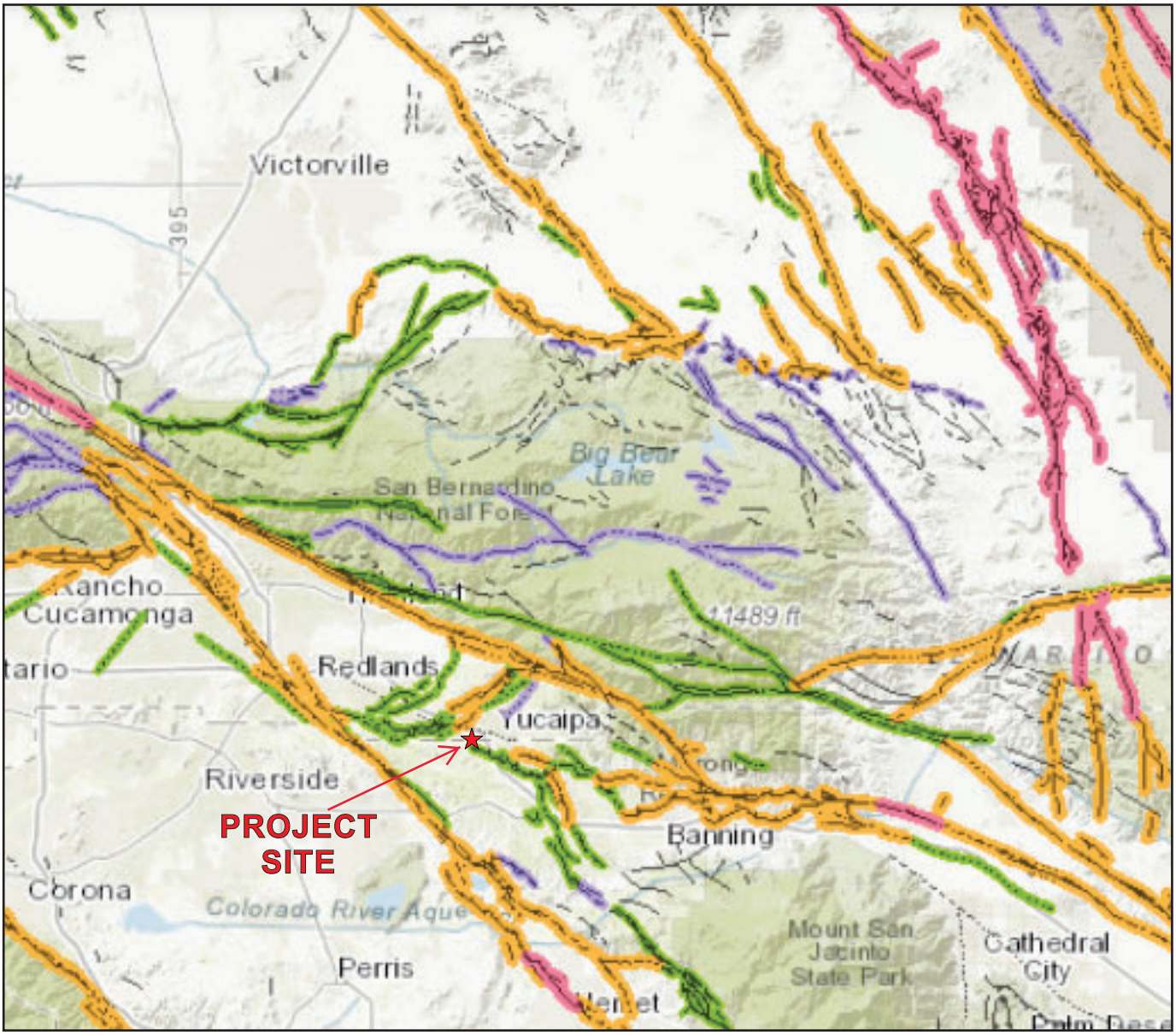
5.6.1. Surface Fault Rupture

There are no known active faults that transect or project into the site. The nearest known active fault is the San Gorgonio Pass Fault located approximately 1.5 miles northeast of the project site (See Figure 3, Regional Fault Map). The San Timoteo Canyon Fault is mapped transecting the site from the southeast to the northwest. The San Timoteo Canyon Fault is an inferred and concealed structure that is tagged with question marks to indicate that its existence is questionable and the evidence for the fault's existence is indirect. The San Timoteo Canyon Fault in the area is entirely concealed by younger Quaternary-age alluvial deposits. The fault is considered to be older than late Quaternary in age but its lower age limit is unknown. Accordingly, the potential for fault surface rupture within the project is considered low.

5.6.2. Liquefaction/Dynamic Settlement

Liquefaction is the phenomenon in which the buildup of excess pore pressures, in saturated granular soils due to seismic agitation, results in a temporary "quick" or "liquefied" condition. Loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. Once the excess pore water pressure dissipates, the liquefied zones/lenses will likely consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways, and may include ground deformation, loss of bearing strength, lateral spreading, flow failure, and dynamic settlement.

The very young wash deposits, young axial-valley deposits, and young alluvial fan deposits are potentially liquefiable in their present condition. Saturated younger alluvial deposits were encountered near the northeast corner of Lot 3. The potential for liquefaction of the saturated deposits was evaluated. The analyses were performed using LiqSVS software (Version 2.0.1.7 by GeoLogismiki, 2019). The deterministic methods presented in NCEER



N

FAULT MAP
OAK VALLEY TOWN CENTER
CITY OF CALIMESA,
COUNTY OF RIVERSIDE, CALIFORNIA

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

SOURCE MAP - CALIFORNIA DEPARTMENT OF CONSERVATION FAULT ACTIVITY MAP OF CALIFORNIA (2010)

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FIGURE 3

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(1997) were used, and a corresponding dynamic settlement was estimated by the program using the curves proposed by Ishihara and Yoshimine (1992) as described in Zhang et al. (2002) and a groundwater level of 11 feet. Borings AGS-3 and AGS-16 form the basis of our analysis. The peak ground acceleration was determined in accordance with ASCE 7-16 and was determined to be 0.87g. Based on the deaggregation analysis results from the USGS Unified Hazard Tool website, a mean earthquake magnitude of 7.5 for the 2% in 50 year risk was used for the analysis using 100 percent of the PGA_M.

The upper 10 feet of soils were excluded from the analysis since these soils should be removed during remedial grading efforts. Based on test results, certain layers were assumed to behave more "clay-like" and were considered non-liquefiable. Laboratory test results were used to substantiate which soil layers are considered potentially liquefiable or subject to cyclic softening. The moisture contents of the samples (most of which are considered saturated and below the ground water table) were determined and compared with the plasticity indices. The results indicate that fine-grained soils encountered are not considered sensitive and subject to cyclic softening. The liquidity index (LI) indicates that the clayey soils are generally low. Based on the test results, the finer-grained soils onsite are considered to behave clay-like and are not considered susceptible to liquefaction or cyclic softening.

Based on a calibration report for 2R Drilling, an Energy Transfer Ratio of 85.5 percent was used, which corresponds to a Hammer Efficiency Ratio (Ce) of 1.43. The blow counts obtained from the SPT were used in the analyses. Samples were also collected using the Modified California Sampler, and the blow counts were used after applying a reduction factor of 0.6.

The calculations, included in Appendix D, indicate that potentially liquefiable soil layers are located at depths of around 30 feet in AGS-3 and AGS-16. The significant 30-foot thick non-liquefiable crust is anticipated to mitigate the potential for surface manifestations, including settlement, reduced bearing capacity, ground deformation, and lateral spreading. Additionally, it is recommended that a geotextile such as Mirafi RS280i be placed on the saturated subgrade in order to stabilize the subgrade. The related total dynamic settlements summarized in Table 5.6.2, below, are based on methods described in Zhang et al. (2002), and are considered conservative estimates based on the significant thickness of a non-liquefiable soil crust and recommended placement of the geotextile fabric. According to SP-117A (CDMG 2008), up to two thirds of the total settlement should be considered as differential settlement unless more precise predictions of differential settlement can be made. Considering the thick non-liquefiable crust, and placement of 10 to 15 feet of newly compacted fill over a geotextile fabric, it is AGS's opinion that the differential settlement may be less than 2/3 of the total settlement. AGS has estimated that the differential settlement is one half of the total. The structural engineer should design the structures within the northwest corner of Lot 3 to accommodate this settlement without collapsing.

TABLE 5.6.2 ESTIMATED DYNAMIC SETTLEMENT		
Boring	**Full PGA**	
	Total Settlement (inches)	**Differential Settlement (inches)**
AGS-3	2.2	1.1
AGS-16	3.7	1.9

5.6.3. Lateral Spreading

Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore pressure build-up or liquefaction in a shallow underlying deposit during an earthquake. With the remedial grading recommendations of removing and recompacting the young alluvial soils, and the thickness of the non-liquefiable crust, the potential for lateral spread and surface manifestations is considered to be low. However, if saturated alluvial soils are left-in-place these areas may be prone to lateral spread. In that case, further evaluation of ground improvement measures may be necessary.

5.6.4. Seismically Induced Landsliding

No landslides, including shallow surficial failures have been mapped onsite. This indicates the lack of any seismically activated land sliding during past historic and ancient seismic events. Seismicially-induced landsliding is not considered a significant concern in either the pre- or post-development site conditions.

5.6.5. Earthquake Induced Flooding

Earthquake induced flooding can be caused by tsunamis, dam failures, or seiches. Also, earthquakes can cause landslides that dam rivers and streams, causing flooding upstream above the dam and also downstream when these dams are breached. A seiche is a free or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. Due to the lack of a freestanding body of water nearby, the potential for a seiche impacting the site is considered to be non-existent.

5.7. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 259 m/s. Table 5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 33.980°N and Longitude 117.051°W. The seismic provisions of 2019 CBC are different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located in Site Class D soil conditions except for certain cases noted in ASCE 7-16 Section 11.4.8.

TABLE 5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Seismic Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	2.239g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.772g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	2.687g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	1.791g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	1.099g
Seismic Design Category	N/A[3]

Notes:
[1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8
ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$.

5.8. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra including the probabilistic and deterministic seismic hazard analyses are described below.

5.8.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

5.8.2. Deterministic Seismic Hazard Analysis

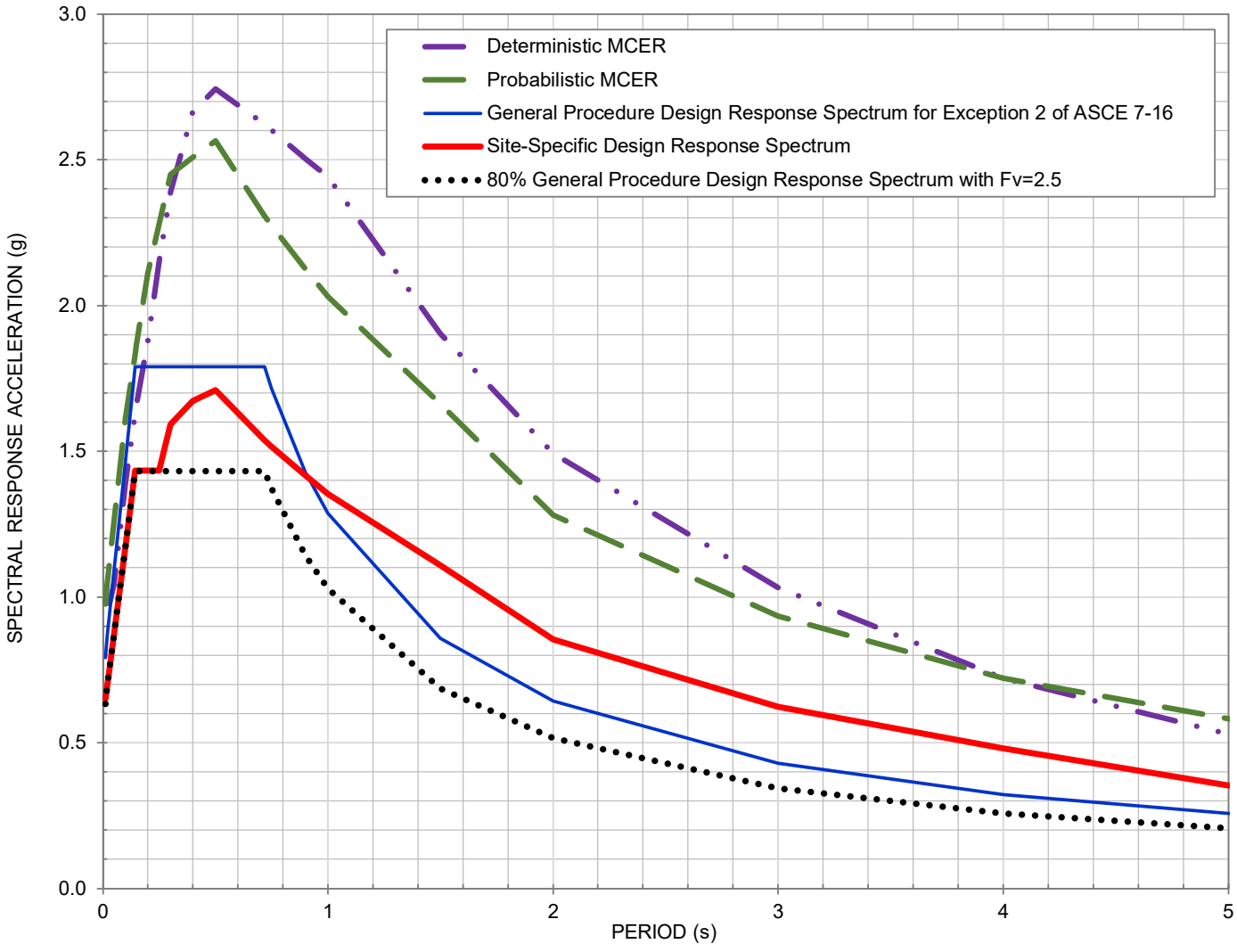
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation we selected three "controlling" sources and seismic events: the San Gorgonio Pass fault, the San Jacinto fault (San Jacinto Valley section) and the San Andreas fault (San Bernardino South section). Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

5.8.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 5.8.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.650
0.02	0.693
0.03	0.753
0.05	0.872
0.075	1.022
0.1	1.172
0.144	1.433
0.15	1.433
0.2	1.433
0.25	1.433
0.3	1.592

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	1.672
0.5	1.711
0.718	1.537
0.75	1.516
0.9	1.418
1.0	1.353
1.5	1.108
2.0	0.853
3.0	0.623
4.0	0.480
5.0	0.353



Note: See report for values of the various curves.

AGS

SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

PARCEL MAP 37862
ROBERTS RD AND CHERRY VALLEY BLVD
CALIMESA, CALIFORNIA

PROJECT NO.	DATE	
2004-01	12/20	**FIGURE 4**

TABLE 5.8.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.791	0.915	1.065	0.975	0.979	0.645	0.979	0.975	0.633	0.650
0.02	0.866	0.915	1.143	1.046	0.983	0.690	0.983	0.983	0.693	0.693
0.03	0.941	0.915	1.220	1.117	0.978	0.735	0.978	0.978	0.753	0.753
0.05	1.091	0.915	1.375	1.259	1.045	0.825	1.045	1.045	0.872	0.872
0.075	1.278	0.915	1.569	1.436	1.214	0.938	1.214	1.214	1.022	1.022
0.1	1.465	0.915	1.763	1.614	1.390	1.050	1.390	1.390	1.172	1.172
0.144	1.791	0.915	2.000	1.830	1.630	1.246	1.630	1.630	1.433	1.433
0.15	1.791	0.915	2.034	1.862	1.658	1.275	1.658	1.658	1.433	1.433
0.2	1.791	0.915	2.305	2.110	1.874	1.500	1.874	1.874	1.433	1.433
0.25	1.791	0.913	2.494	2.278	2.149	1.500	2.149	2.149	1.433	1.433
0.3	1.791	0.912	2.687	2.450	2.388	1.500	2.388	2.388	1.433	1.592
0.4	1.791	0.909	2.760	2.508	2.665	1.500	2.665	2.508	1.433	1.672
0.5	1.791	0.905	2.834	2.566	2.743	1.500	2.743	2.566	1.433	1.711
0.718	1.791	0.898	2.567	2.305	2.622	1.500	2.622	2.305	1.433	1.537
0.75	1.716	0.897	2.535	2.274	2.601	1.500	2.601	2.274	1.372	1.516
0.9	1.430	0.892	2.384	2.127	2.505	1.500	2.505	2.127	1.144	1.418
1	1.287	0.889	2.284	2.030	2.441	1.500	2.441	2.030	1.029	1.353
1.5	0.858	0.889	1.870	1.663	1.903	1.000	1.903	1.663	0.686	1.108
2	0.643	0.889	1.440	1.280	1.493	0.750	1.493	1.280	0.515	0.853
3	0.429	0.889	1.052	0.935	1.032	0.500	1.032	0.935	0.343	0.623
4	0.322	0.889	0.811	0.721	0.722	0.375	0.722	0.721	0.257	0.480
5	0.257	0.889	0.656	0.583	0.530	0.300	0.530	0.530	0.206	0.353

Site-specific design response parameters are provided in Table 5.8.3B. These parameters were derived from the Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 5.8.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	2.882g
Spectral Response Acceleration 1-second period, S_{M1}	2.882g
Design Spectral Response Acceleration for short period, S_{DS}	1.922g
Design Spectral Response Acceleration for 1-second period, S_{D1}	1.922g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.890g

6.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

6.1. Material Properties

6.1.1. Excavation Characteristics

It is anticipated that excavations within the undocumented artificial fill, topsoil, young alluvium, older alluvium, very old alluvial fan deposits, and the highly weathered portions of the formational materials can be accomplished with conventional heavy equipment. It is possible that the deep excavations within the unweathered formational materials on the northwestern portion of the property area could require heavy ripping in deeper cuts.

6.1.2. Compressibility

Onsite materials that are significantly compressible include undocumented fill, topsoil, young alluvial deposits, peat, and the highly weathered portions of the very old alluvial deposits and Live Oak Canyon deposits. These materials will require complete removal below structural areas prior to placement of fill, where exposed at design grade, and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 7.1 and earthwork adjustment estimates are presented in Section 6.1.7.

6.1.3. Collapse Potential/Hydro-Consolidation

Some of the upper alluvial soils are susceptible to hydro-consolidation. Beneath settlement sensitive improvements, it is recommended that the upper soils prone to hydro-consolidation be removed and replaced with compacted fill.

6.1.4. Expansion Potential

Based upon AGS's observations and preliminary testing and review of relevant laboratory testing by PSE, the expansion potential of the onsite materials is anticipated to range from "very low" to "medium" when classified in accordance with ASTM D4829. However, it is anticipated that the majority of materials will fall into the "very low" to "low" range. Further testing and geologic mapping should be conducted during and upon completion of the grading operations to provide design recommendations on a pad by pad basis.

6.1.5. Shear Strength

Based on our laboratory testing, reviewed laboratory testing from PSE and previous experience on similar projects, the following shear strength values may be used for design.

TABLE 6.1.5 Shear Strength Parameters Used for Design (Ultimate)			
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Moist Density (pcf)**
Artificial Compacted Fill	150	31	125
Young and Older Alluvial Deposits (Qal & Qoa))	100	30	125
Very Old Alluvial Fan Deposits (Qvoa)	200	32	125
San Timoteo and Live Oak Canyon Formations	400	34	130

6.1.6. Chemical and Resistivity Test Results

The results of previous preliminary chemical/resistivity testing are presented in Appendix C. Corrosive soils are defined as soils that have minimum resistivity less than 1,000 ohm-centimeters, chloride concentration greater than 500 ppm, sulfate concentration greater than 2,000 ppm, or pH less than 5.5 (Caltrans, 2018).

Test results indicate that the potential for sulfate attack on concrete in contact with the on-site soils is negligible in accordance with ACI 318, Table 4.3.1. In addition, test results also indicated that the potential for chloride attack of reinforcing steel in concrete structures and pipes in contact with the on-site soil is negligible.

Resistivity test results indicate that the on-site near-surface soils are not considered corrosive to buried ferrous metals. However, a corrosion specialist may be consulted regarding suitable types of piping and appropriate protection for underground metal conduits, if needed.

Final determination of the corrosivity of the site should be based upon testing of soils from the site and import soils during grading operations.

6.1.7. Earthwork Adjustments

In consideration of the proposed mass grading to develop the project as currently proposed, the following average earthwork adjustment factors presented in Table 6.1.7 have been formulated for use in the earthwork design of the project.

TABLE 6.1.7 EARTHWORK ADJUSTMENTS	
Geologic Unit	**Approximate Range**
Artificial Fill, Topsoil, Young Alluvial Deposits	5% to 15% shrinkage (average ~12%)
Old and Very Old Alluvium Live Oak Canyon Formation	5% shrinkage to 10% bulk (average ~3% bulk)

6.1.8. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. If structural pavements are to be constructed (concrete or asphaltic concrete), an R-value of 30 can be utilized for the preliminary design of pavements. Final design should be based upon representative sampling of the as-graded soils.

6.2. Analytical Methods

6.2.1. Slope Stability Analysis

Stability analyses were performed for both static and seismic (pseudo-static) conditions using the GSTABL7 computer program. The Modified Bishop method was used to analyze circular type failures. The critical failure surface determined in the static analysis was used in the pseudo-static analysis. A horizontal destabilizing seismic coefficient (kh) of 0.15g was selected for the site and used in the pseudo-static analyses.

Surficial stability analyses were conducted using an infinite height slope method assuming seepage parallel to the slope surface.

6.2.2. Pavement Design

Asphalt concrete pavement sections have been designed using the recommendations and methods presented in the Caltrans Highway Design Manual.

6.2.3. Bearing Capacity and Lateral Pressure

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases.

7.0 EARTHWORK CONCLUSIONS AND RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

Some of the alluvial soils onsite are considered prone to hydro-consolidation. Layers of peat were also encountered at depths of up to around 35 feet in AGS-4. Peat is considered highly compressible and is subject to significant volume changes, even with minor changes in stresses and moisture content. It is recommended that these materials be removed below proposed structural areas. Lesser removals can be considered for areas where the potential for settlement may not warrant the cost of complete removal, such as in landscape and parking areas, where the cost associated with possible additional maintenance may be less than the cost remedial grading.

7.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of Riverside and AGS's Earthwork Specifications (Appendix E).

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing foundations elements, standpipes, irrigation lines, and utility conduits should be removed and wasted off-site. Concrete can be placed in the fill provided it is broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations presented in Section 7.9.6. Cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

Topsoil, undocumented fills, the upper young alluvial deposits, and highly weathered portions of older and very old alluvial fan deposits and Live Oak Canyon deposits should be removed in areas planned to receive compacted fill. Additionally, younger alluvial deposits, peat deposits, and porous older alluvium above the groundwater should be completely removed in areas intended to support settlement-sensitive structures. The removals for building areas should extend a minimum of 10 feet outside the building limits or at a 1:1 projection down and away from the building limits until a competent bottom is achieved, whichever is greater. It is anticipated that the upper 3 feet of alluvial soils should be removed in parking and landscape areas. Deeper alluvial removals should be conducted in street areas to support utilities and facilitate trenching. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals are presented in Table 7.1 and shown on Plates 1 through 12.

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. The removal bottoms should be observed and mapped by the engineering geologist prior to fill placement.

In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

TABLE 7.1

ESTIMATED DEPTH OF REMOVALS

Geologic Unit (map symbol)	Estimated Removal Depth	
	Structural Areas	Landscape Parking Areas
Topsoil	0.5-3 feet	
Undocumented Artificial Fill (afu)	1-10+ feet	
Young Alluvial Deposits (Qal)	1-40+ feet	1-3+ feet
Old Alluvial (Qoa) and Very Old Alluvial Fan Deposits (Qvof)	1-5 feet	1-3 feet
Highly Weathered Live Oak Canyon Formation (Qlo)	1-3 feet	

7.1.1. Overexcavation of Building Pads and Streets

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur exposed at the design elevation. Overexcavation recommendations are provided below. The overexcavation should expose competent bottoms, and the replacement fill should be compacted to project specifications as described in Section 7.9.1.

7.1.1.1. Cut/Fill Transition Pads

Where design grades and/or remedial grading activities create a cut/fill transition beneath building pads, the cut and shallow fill portions of the commercial building pad should be over-excavated a minimum depth of five (5) feet and replaced to design grade with compacted fill. In Lot 3 where deeper removals are planned, the cut portions of the building pad exposing Very Old Alluvial Deposits and Live Oak Canyon Formation should be overexcavated a minimum of 10 feet. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas. At this time specific locations of the buildings on the east side of Roberts Road are not known. Accordingly, it may be prudent to sheet grade the lots, and wait to conduct the undercuts once final foundation depths and building locations are determined.

7.1.1.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) of the deepest fill section within the pad but need not exceed 10 feet. The transition between the deep fill and cut (capped) portion of the lot should not exceed a 2:1 gradient.

7.1.1.3. Street Overexcavation

The overexcavation of street areas to facilitate utility installation is not anticipated to be required.

7.1.2. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

It is our understanding that development is planned on the adjacent parcels. Development of one parcel may impact remedial grading efforts needed to support the adjacent parcel development. Coordination with the adjacent property owner should be considered to avoid negatively impacting future development efforts on the adjacent parcel.

7.2. Subgrade Stabilization

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of 1½" angular rock wrapped in geotextile (such as Mirafi RS280i) over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water

truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

7.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. If field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

7.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 or flatter (horizontal to vertical). The highest proposed cut slope is 72 feet in height- 35 feet of 3:1 (H:V) above a 37 foot 2:1 (H:V). It is anticipated that slopes excavated in very old alluvium will be grossly and surficially stable to the proposed heights. If unconsolidated coarse-grained lenses of materials are encountered on the slope face, local stabilization may be necessary.

Although not encountered during the subsurface investigation, occasional weak beds are present in the Live Oak Canyon Formation. It is anticipated that slopes excavated in Live Oak Canyon Formation will be grossly and surficially stable to the proposed heights unless out-of-slope bedding conditions are encountered. Bedding generally dips to the northeast, so cut slopes facing this direction may need to be stabilized. Generally, the proposed cut slopes within the Live Oak Canyon Formation face to the east, southeast and south.

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcut. Terrace drains and benches should be constructed on cut slopes in accordance with the County of Riverside Grading Ordinance.

7.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 46 feet. Fill slopes, when properly constructed with onsite materials and maintained as described herein, are expected to be grossly and surficially stable as designed.

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will

improve surficial stability and should be considered. Areas subject to potential scour should be armored.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of ascending slope, whichever is greater. Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward, from the catch point of the design toe at a minimum 1:1 projection, to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County of Riverside Grading Ordinance.

7.3.3. Skin Cut and Skin Fill Slopes

A review of the mass grading plans did not indicate any significant design skin fill and skin cut conditions, however, skin cut or thin fill sections may be created during grading. If these conditions occur, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half the remaining slope height, and not less than 15 feet, is provided. Where the design cut is insufficient to remove all unsuitable materials, overexcavation and replacement with a stabilization fill will be required, as shown on Grading Detail 6 in Appendix E.

7.3.4. Fill Over Cut Slopes

Fill over cut slopes should be constructed such that the cut portion is excavated first for geologic mapping and stability determination. If deemed stable then a "tilt-back" keyway half the remaining slope height or minimally twenty (20) feet wide should be established. Drains will be required for this condition with the locations determined based upon exposed field conditions.

7.3.5. Offsite Drainage Channel Slopes

Along the southerly boundary, steep natural slopes are present along the active drainage channel and outside the grading limits (See Cross Sections K-K', L-L', M-M', N-N'). Continued migration of this channel, scour, and/or undercutting of these slopes may impact onsite improvement and/or lead to slopes having a factor of safety that is less than desired. It is our understanding that future plans may include stabilization of portions of this channel. AGS should evaluate the proposed channel improvements to determine if additional stabilization measures or setbacks are warranted on this boundary.

7.3.6. Surficial Stability

The surficial stability of 2:1 (or flatter) fill and cut slopes have been analyzed, and the analysis presented in Appendix D indicates a factor-of-safety in excess of code minimums. When fill and cut slopes are properly constructed and maintained, satisfactory performance can be anticipated although slopes will be subject to erosion, particularly before landscaping is fully established.

7.3.7. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials (Live Oak Canyon Formation) can be considered a Type "A" soil. Very Old Alluvial Fan Deposits and Engineered Fill can be considered Type "B" soils. Young and older alluvial soils can be considered Type "C". Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material, 1:1 in fill soils, and 1.5:1 in young alluvial soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations. Final determination should be made during construction by the project Geotechnical Engineer based upon field observation.

For vertical excavations less than approximately 15 feet in height, cantilevered shoring may be used. Where cantilevered shoring is used for deeper excavations, the total deflection at the top of the wall tends to exceed acceptable magnitudes. Shoring of excavations deeper than approximately 15 feet may need to be accomplished with the aid of tied back earth anchors.

The shoring design should be provided by a California Registered Civil Engineer experienced in the design and construction of shoring under similar conditions. Once the final excavation and shoring plans are complete, the plans and the design should be reviewed by AGS for conformance with the design intent and recommendations. Further, the shoring system should satisfy applicable requirements of Cal-OSHA.

Personnel from AGS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including Cal-OSHA requirements, should be met.

7.3.8. Geologic Observation During Grading

All temporary slope excavations, including front, side and backcuts, and all cut slopes should be mapped to verify the geologic conditions that were modeled prior to grading are consistent with the exposures during the grading. Slope stability analyses and designed keyways may have to be modified based on conditions exposed during grading.

7.4. Survey Control During Grading

Removal bottoms, keyways, sub drains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations. Survey support will also be required to monitor settlement as discussed in Section 7.5.

7.5. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated alluvial soils be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix E).

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

7.6. Subsurface Drainage

7.6.1. Canyon Drains

Six- (6), eight- (8), and ten- (10) inch diameter canyon subdrains are recommended along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. The diameter and approximate locations of proposed subdrains are shown on Plates 1 and 9. Final determination of drain locations will be made in the field, based on exposed conditions. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

7.6.2. Heel Drains

Heel drains will be required for all stabilization fill keyways. Tentative heel drain locations can be provided when more detailed grading plans become available. Heel drains should be constructed in accordance with the details shown on Detail 3 (Appendix E).

7.6.3. Cut Slope Toe Drains and Subdrains

Consideration should be given to placing a toe drain on all major cut slopes in order to provide drainage for possible future nuisance water on the cut slopes.

Subdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

7.7. Seepage

Seepage, when encountered during grading, should be evaluated by the Geotechnical Consultant. If seepage is excessive, remedial measures such as horizontal drains or under drains may need to be installed.

7.8. Construction Dewatering

Due to the presence of shallow groundwater encountered during our field exploration, dewatering measures may be necessary during the excavation operation. It should be noted that controlling and maintaining of groundwater during construction is the responsibility of the contractor. As part of

the groundwater control, the quality of collected water should also be checked in accordance with applicable permits and regulations for water discharge.

7.9. Earthwork Considerations

7.9.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction listed below as determined by ASTM Test Method: D 1557. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

- Minimum 90% relative compaction: general fills unless higher compaction standard applies.
- Minimum 93% relative compaction: below subdrains.
- Minimum 95% relative compaction: upper 12-inches below pavement areas and fills deeper than 40 feet.

7.9.2. Fill Materials/ Import Soils

Most of the soils encountered during our subsurface exploration should be suitable for use as engineered fill provided oversize rock is disposed of in accordance with the recommendations in Section 7.9.6.

Any imported fill material should consist of granular soil having a "very low" expansion potential (expansion index of 20 or less). Import should also have a low corrosion potential (chloride content less than 500 parts per million, soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Import soils should be tested and approved by the Geotechnical Consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

7.9.3. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

7.9.4. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

7.9.5. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

7.9.6. Oversize Rock

Allow large quantities of oversize materials are not expected, some oversized rock material [i.e., rock fragments greater than eight (8) inches] may be encountered during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within commercial pads and to two (2) foot below the deepest utility in street and building utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

7.9.6.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

7.9.6.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural

fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

7.9.6.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

7.9.6.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

7.9.7. Fill Slope Construction

Fill slopes may be constructed by preferably overbuilding and cutting back to the compacted core or by back-rolling and compacting the slope face. The following recommendations should be incorporated into construction of the proposed fill slopes.

Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal before compaction, shaping and grid rolling.

Seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

7.9.7.1. Overbuilding Fill Slopes

Fill slopes should be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the compaction of the slope face meets the minimum project requirements for compaction. Compaction of each lift should extend out to the temporary slope face.

7.9.7.2. Compacting the Slope Face

As an alternative to overbuilding the fill slopes, the slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Back-rolling at more frequent intervals may be required. Compaction of each fill should extend to the face of the slope. Upon completion, the slopes should be watered, shaped, and track-walked with a D-8 bulldozer or

similar equipment until the compaction of the slope face meets the minimum project requirements. Multiple passes may be required.

7.9.8. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

7.9.9. Flatwork and Slab-on-Grade Subgrade Preparation

The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc., should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below the slab-on-grade, exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content prior to concrete placement.

8.0 DESIGN RECOMMENDATIONS

From a geotechnical perspective, the proposed development is feasible provided the following recommendations are incorporated into the design and construction. Preliminary design recommendations are presented herein and are based on some of the general soils conditions encountered during the geotechnical investigations. As such, recommendations provided herein are considered preliminary and subject to change based on the results of additional subsurface exploratory investigation.. Final design recommendations should be provided in a final rough/precise grading report.

8.1. Structural Design Recommendations

Precise building products, loading conditions, and locations are not currently available. It is anticipated that the as-graded near-surface soils could vary from “very low” to “medium” in

expansion potential when tested in general accordance with ASTM D 4829, although a majority is expected to be "very low" to "low". AGS has provided recommendations below assuming a "very low" to "low" expansion potential, which should be verified during grading.

8.1.1. Foundation Design

At this time specific building types, heights and locations have not been determined. Accordingly, the following general design parameters can be used for preliminary design and budgeting. Once the proposed buildings type and locations are known, site specific foundation design parameters should be developed by the project Geotechnical Engineer. The following values may be used in preliminary foundation design.

The values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

TABLE 8.1.1
FOUNDATION DESIGN PARAMETERS (COMMERCIAL/RETAIL)

Allowable Bearing	2,000 psf, increasing by 300 psf for each additional foot of embedment and width beyond the minimum provided, up to 3,000 psf assuming a minimum embedment of 18 inches below lowest adjacent finish grade.
Lateral Bearing	250 psf per foot of depth to a maximum of 2,000 psf for level conditions. Reduced values may be appropriate for descending slope conditions.
Sliding Coefficient	0.35
Assumed Expansion Potential	"Very Low" to "Low"
Slab-on-Grade Thickness	Minimum 4 inches
Slab-on-Grade Reinforcement	No. 3 rebar 18-inches on center each way
Continuous Footing Width	Minimum 12 inches (one-story), 15 inches (two stories)
Continuous Footing Depth*	Minimum 12 inches
Min. Footing Reinforcement	No. 4 rebar - 2 on top, 2 on bottom or No. 5 rebar, 1 on top and bottom
*Notes on Footing Embedment: Depth of embedment should be measured below lowest adjacent finish grade. Footings Adjacent to Swales and Slopes: If exterior footings adjacent to drainage swales are to exist within 5 feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least 5 feet is provided horizontally from edge of the footing to the face of the slope.	

8.1.2. Settlement

Settlements are likely to be produced from structural loads and long term settlement of the fill and underlying alluvial soils. As verified by settlement monitoring, primary settlement of the compacted fill materials should be completed prior to the release of lots for construction. AGS has provided a preliminary estimate of settlement for a typical one to two story building with shallow foundations. However, AGS should re-evaluate the settlement based on as-graded soil conditions and actual structural loads.

For lots with less than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 3/4 inch total and 3/8-inch across 20 feet.

For lots with greater than 20 feet of fill overlying older alluvium or formational materials, estimated settlements are 1 inch total and 1/2-inch across 20 feet.

For lots with left-in-place saturated alluvial soils, estimated settlements are 1.5 inches total and 3/4-inch across 20 feet. Structures should also be designed to accommodate the potential seismic settlement described in Section 5.6.2.

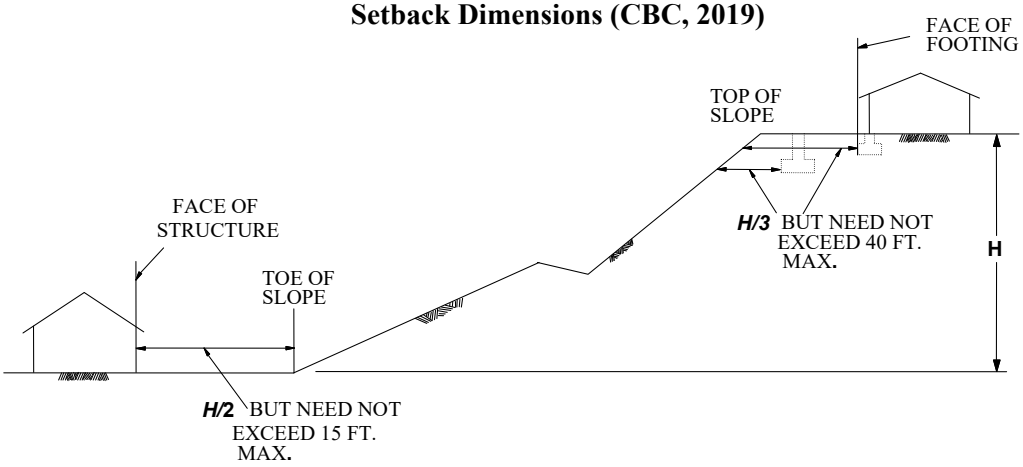
8.1.3. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

8.1.4. Deepened Footings and Setbacks

Improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code, require that structures be set back or footings deepened where subject to the influence of these natural processes. For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in the following figure.

FIGURE 8.1.4
Setback Dimensions (CBC, 2019)



8.1.5. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Spoils from the footing excavations should not be placed on slab-on-grade areas unless the soils are properly compacted. The footing excavations should not be allowed to dry back and should be kept moist until concrete is poured. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

8.1.6. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

8.1.7. Concrete Design

The test results from a sample collected during the current investigation indicated a sulfate concentration that corresponds to a S0 sulfate exposure class when classified in accordance with ACI 318.

Additional testing should be conducted after mass grading. It should be recognized that some fertilizers have been known to leach water-soluble sulfate compounds into soils containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. Accordingly, it is suggested that Portland cement type II/V be used for concrete in contact with soil.

8.2. Retaining Wall Design

8.2.1. Retaining Walls (backfilled with Native Materials)

The foundations for retaining walls should be founded on compacted fill, competent very old alluvial fan deposits, or Live Oak Canyon Formation and may be designed in accordance with the recommendations provided in Table 8.1.1. When calculating the lateral resistance, the upper 12 inches of soil cover should be ignored in areas that are not covered with hardscape. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance.

Retaining walls should be designed to resist earth pressures presented in the following table. These values assume that the retaining walls will be backfilled with native materials as shown in Detail RTW-A. Retaining walls should be designed to resist additional loads such as construction loads, temporary loads, traffic loads, and other surcharges as evaluated by the structural engineer.

The following Rankine earth pressure coefficients are recommended for the design of retaining walls onsite:

Static Case

"Native" backfill (C =150 psf, ϕ= 31°, density = 125 pcf)

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	390
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	63
Coefficient of Passive Pressure:	$K_p = 1.18$	148
Coefficient of At Rest Pressure:	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density (pcf)

k_h = seismic pseudostatic coefficient = $0.5 * PGA_M / g$

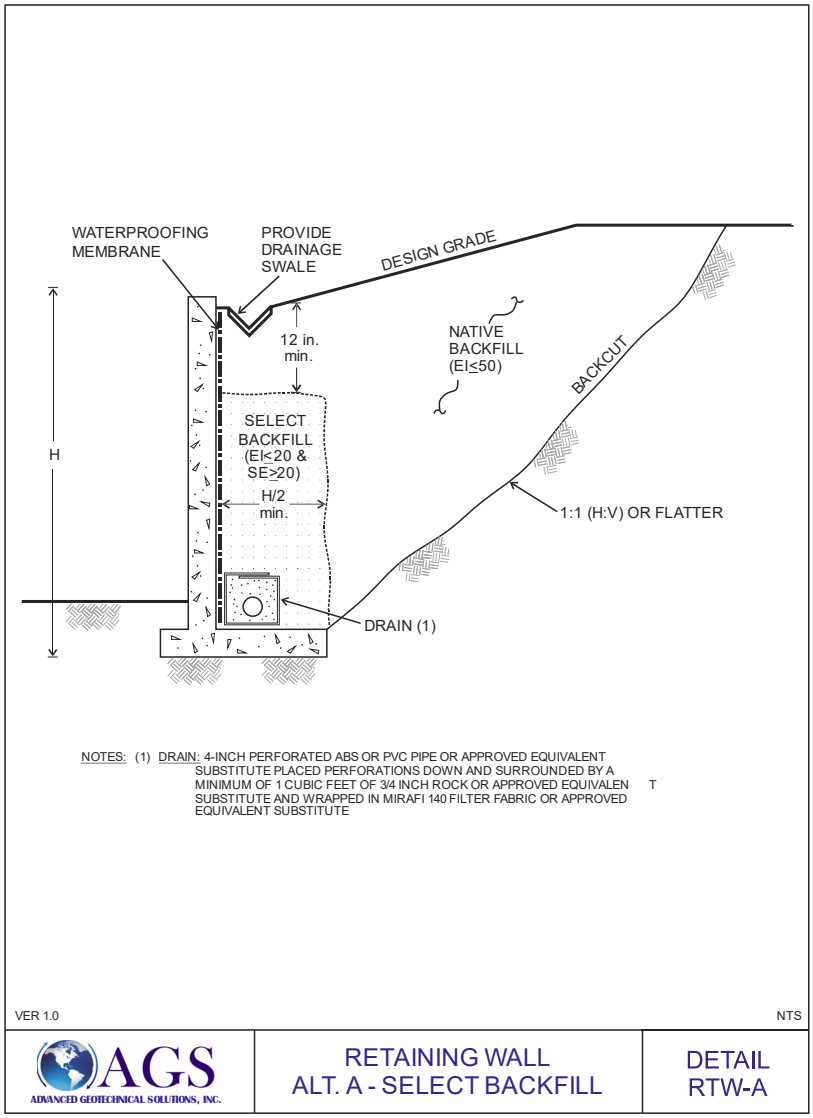
Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

8.2.2. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces as shown in Details RTW-A and RTW-B. Otherwise, the retaining walls should be designed to resist hydrostatic forces. Proper drainage devices should be installed along the top of the wall backfill and should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8 inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by

compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



8.3. Civil Design Recommendations

8.3.1. Site Drainage

Final site grading should assure positive drainage away from structures. Planter areas should be provided with area drains to transmit irrigation and rain water away from structures. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

8.3.2. Exterior Flatwork

- **Slab Thickness:** Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- **Control Joints:** Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.
- **Flatwork Reinforcement:** Consideration should be given to reinforcing any exterior flatwork.
- **Thickened Edge:** Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.3.3. Pavement Design

Preliminary pavement recommendations for streets and driveways are provided below. The performance of pavement is highly dependent on providing positive surface drainage away from the edge of pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed towards controlled drainage structures and not towards pavement areas. Landscaped areas adjacent to pavement areas are not recommended due the potential for surface or irrigation water infiltrating into the aggregate base and pavement subgrade. If landscaped areas are placed adjacent to pavement areas, consideration should be given to implementing measures that will reduce the potential for water to be introduced into the aggregate base. Such measures may include installing impermeable vertical barriers between the landscaped area and pavement areas including deepened curbs or 10 mil thick plastic liners extending a minimum of 6 inches below the bottom of the aggregate base.

8.3.3.1. Asphalt Concrete Pavement

Presented below are preliminary pavement sections for a range of traffic indices and an assumed Resistance-Value (R-Value) of 30 for the subgrade soils. R-Value testing of the subgrade soils should be performed during precise grading operations. The project Civil Engineer or Traffic Engineer should select traffic indices that are appropriate for the anticipated pavement usage and level of maintenance desired through the pavement life. Final pavement structural sections will be dependent on the R-value of the subgrade materials and the traffic index for the specific street or area being addressed. The pavement sections are subject to the review and approval by the County of Riverside.

TABLE 8.3.3.1. PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS*			
Traffic Index	**Assumed R-Value**	**Asphalt Concrete (inches)**	**Class II Aggregate Base (inches)**
4.5	30	3	5
5.0	30	3	6
5.5	30	3	7
6.0	30	3.5	8
6.5	30	4	8
7.0	30	4	10
7.5	30	4.5	10
8.0	30	5	11
*Note: See additional recommendations for subgrade preparation below.			

Pavement subgrade soils should be moisture conditioned to near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557 and should conform with the specifications listed in Section 26 of the *Standard Specifications for the State of California Department of Transportation* (Caltrans) or Section 200-2 of the *Standard Specifications for Public Works Construction* (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans *Standard Specifications* or Section 203-6 of the Green Book.

8.3.3.2. Portland Cement Concrete Pavement

Portland cement concrete may be used for the onsite driveways, trash enclosures, and truck loading docks. The following concrete pavement sections were determined using the recommendations provided in "Design of Concrete Pavement for City Streets" by the American Concrete Pavement Association. Testing of subgrade soils should be performed once driveway subgrades are achieved to determine the actual R-Value of the subgrade soils and/or corresponding modulus of subgrade reaction.

TABLE 8.3.3.2 PRELIMINARY PORTLAND CEMENT CONCRETE PAVEMENT SECTIONS				
Traffic Classification	**Maximum ADTT***	**Portland Cement Concrete Section (inches)**	**k* (pci)**	**MR* (psi)**
Collector	100	6.5	200	550
Industrial	300	8.0	200	550
*Notes: k = Modulus of subgrade reaction; ADDT = Average daily truck traffic; MR=Flexural strength of concrete (Modulus of Rupture) 550 corresponds to concrete having a minimum compressive strength of roughly 3,000 psi				

Joints should be provided at a minimum spacing of 8 feet. The joints should be caulked and sealed with a flexible compound to reduce the potential for moisture

infiltration. The civil engineer should determine the need for reinforcement and doweling.

The subgrade should be moisture conditioned and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Subgrade soils should be at or near the optimum moisture content to a depth of 12-inches immediately prior to placing concrete.

8.4. Corrosion

As discussed in Section 6.1.6, previous testing (pH, electrical resistivity, chloride content, and sulfate content) indicate that the soil conditions are not anticipated to be corrosive according to the Caltrans definition of a corrosive site. Final verification of site corrosivity will be based upon testing of import soil and soil from the site during grading operations. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of the construction materials.

9.0 SLOPE AND LOT MAINTENANCE

Maintenance of improvements is essential to the long-term performance of structures and slopes. Although the design and construction during mass grading created slopes that are considered both grossly and surficially stable, certain factors are beyond the control of the soil engineer and geologist. The property owners must implement certain maintenance procedures.

9.1. Slope Planting

Slope planting should consist of ground cover, shrubs and trees that possess deep, dense root structures and require a minimum of irrigation. The property owner should be advised of their responsibility to maintain such planting.

9.2. Pad Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure, or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water away from structures and slopes. Property owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, downdrains, and other devices that have been installed to promote structure and slope stability.

9.3. Slope Irrigation

The property owner should be advised of their responsibility to maintain irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful run-off and ground saturation should be avoided. If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

9.4. Burrowing Animals

Property owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

10.0 FUTURE STUDY NEEDS

10.1. Future Studies and Reviews

This report represents a geotechnical review of the current 60-scale mass grading plans for the project. From a geotechnical standpoint, it is AGS's opinion that additional subsurface investigation and analysis is required before construction of the proposed project begins.

As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Additional subsurface investigation and analysis
- Review of Rough Grading plans
- Review of Precise Grading plans
- Review of Foundation plans
- Review of Retaining Wall plans
- Review of road improvements, including potential impacts to existing improvements.

Project plans should be forwarded to the geotechnical engineer/geologist for evaluation and comment, as necessary

10.2. Grading Observation

Geologic exposures afforded during remedial and rough grading operations provide the best opportunity to evaluate the anticipated site geologic structure. Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional near-surface samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from the exploratory excavations at the locations indicated on the plans. The findings are based on the review of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A
REFERENCES

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APPENDIX B

SUBSURFACE LOGS

APPENDIX B-1

SUBSURFACE LOGS (AGS)

Date Excavated 5/6/2020, 5/7/2020 & 8/5/2020
Logged by SS
Equipment: JCB 3CX Backhoe

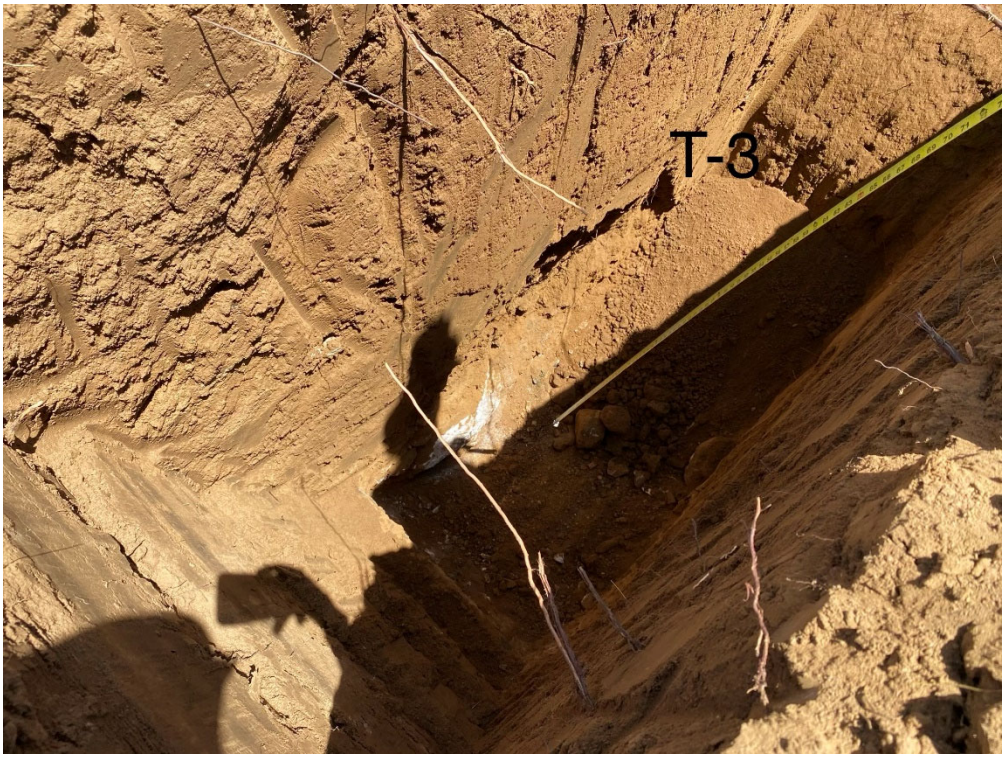
LOG OF TEST PITS

Excavation No.	Depth	USCS	Description
T-1	0.0 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @1.0 ft., moist; occasional gravel
	6.5 – 11.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @11.0 ft., increased density TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-2	0.0 – 4.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous
	4.5 – 11.5 ft.	SM/CL	@4.5 ft., Clayey SAND to Sandy CLAY, fine- to medium-grained, dark gray brown, very moist, loose to firm; micaceous @6.0 ft., wet @10.0 ft., Seepage, caving TOTAL DEPTH = 11.5 ft. SEEPAGE @ 10 ft., CAVING BELOW 10 ft.

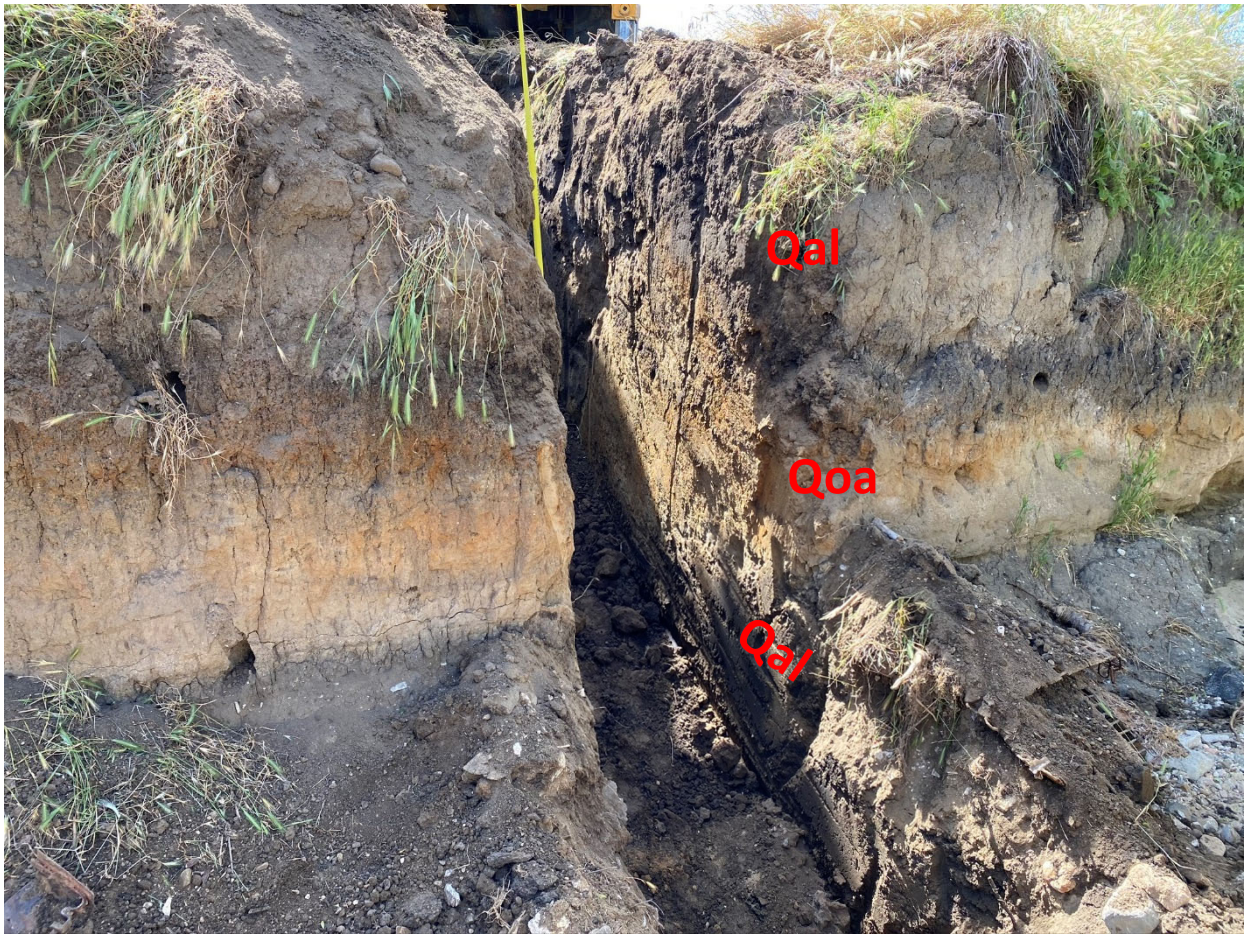


Excavation No.	Depth	USCS	Description
T-3	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to medium-grained SAND, brown, slightly moist, loose; roots
	1.0 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown, moist, medium dense; occasional gravel @6.0 ft., Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense; abundant sub-rounded to sub-angular gravel to cobble
	8.0 – 13.0 ft.	GM	@8.0 ft., Sandy sub-rounded GRAVEL layer, yellow brown to orange brown, slightly moist, medium dense; 2-3-foot boulder in sidewall
	13.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, slightly moist, medium dense to dense; micaceous, iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-4	0.0 – 4.0 ft.	SM	**Alluvium (Qal)** Clayey fine- to coarse-grained SAND, dark gray brown, moist, loose
	4.0 – 8.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, yellow brown to orange brown, slightly moist, medium dense to dense; micaceous, iron oxide staining, weakly cemented @6.0 ft., Silty fine-grained SAND
	8.0 – 12.0 ft.	SM/SC	**Alluvium (Qal)** Silty SAND to Clayey SAND, fine- to coarse-grained, dark gray brown, moist, loose; rounded to sub-rounded gravel to cobble. (Channel deposits undermining the side wall of channel)

TOTAL DEPTH = 12.0 ft.
NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-5	0.0 – 2.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.5 – 11.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; minor porosity, weakly cemented @4.0 ft., Yellow brown to orange brown; occasional sub-rounded gravel @8.0 ft., no longer porous @10.0 ft., increased density; occasional sub-angular gravel to cobble TOTAL DEPTH = 11.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-6	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous, roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, yellow brown, slightly moist to moist, loose to medium dense
	6.5 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; weakly cemented, micaceous, minor porosity, trace coarse-grained sand to fine gravel @9.0 ft., Dense; no longer porous
	11.0 – 12.0 ft.	GM	Fine- to coarse-grained Sandy GRAVEL to COBBLE, yellow brown, slightly moist, dense
			TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-7	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 14.0 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Silty fine- to coarse grained SAND, dark yellow brown, slightly moist, medium dense to dense; occasional gravel @3.0 ft., moist; weakly cemented @8.0 ft., trace clay
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-8	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @2.0 ft., occasional gravel @4.5 ft., increased moisture; minor porosity
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse grained SAND, yellow brown to gray brown, moist, medium dense to dense; some gravel to cobble @9.0 ft., trace clay; weakly cemented, minor porosity, micaceous @10.0 ft., trace clay TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-9	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 8.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, slightly moist to moist, loose; micaceous @6.0 ft., yellow brown to gray brown, medium dense
	8.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented @11.0 ft., no longer porous TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-10	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 12.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark gray brown, moist, loose; micaceous @3.0 ft., occasional sub-rounded gravel @7.0 ft., yellow brown to gray brown, increased moisture, loose to medium dense; porous @11.0 ft., with clay, moist to very moist
	12.0 – 13.0 ft.	ML/CL	Sandy SILT to Sandy CLAY, wet; occasional sub-rounded gravel to cobble
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-11	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	3.0 – 7.5 ft.	ML/SM	Sandy SILT to Silty SAND, fine-grained, dark gray brown, moist, firm to medium dense; micaceous
	7.5 – 13.0 ft.	ML	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, medium dense to dense; occasional fine gravel, minor porosity, weakly cemented
	8.0 – 13.0 ft.	SM	Silty fine-grained SAND, gray brown to yellow brown, moist, dense; trace clay, micaceous, manganese oxide nodules
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-12	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 3.0 ft.	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, slightly moist, loose; micaceous
	3.0 – 7.0 ft.	SW	Fine- to coarse-grained SAND with Silt with sub-rounded gravel
	7.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, yellow brown, moist, medium dense to dense; micaceous, weakly cemented
			TOTAL DEPTH = 14.0 ft. NO WATER, CAVING FROM 0 to 7 ft.

Excavation No.	Depth	USCS	Description
T-13	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 7.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense @2.0 ft., moist; occasional gravel, micaceous
	7.5 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to orange brown, slightly moist, dense; some gravel, weakly cemented @10.0 ft., increased density TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-14	0.0 – 2.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	2.0 – 11.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, loose; micaceous @5.0 ft., abundant sub-rounded gravel to cobble TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-15	0.0 – 4.0 ft.	SW	**Alluvium (Qal)** Fine- to coarse-grained SAND, yellow brown to gray brown, dry to slightly moist, loose; with sub-angular gravel
	4.0 – 9.5 ft.	SM	**Very Old Alluvial Fan Deposits, Unit 3 ($Qvof_3$)** Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, moist, medium dense to dense; micaceous
			TOTAL DEPTH = 9.5 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-16	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark gray brown, slightly moist, loose to medium dense; trace clay
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, minor porosity
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, yellow brown to gray brown, moist, dense to moderately hard; trace clay, micaceous TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-17	0.0 – 2.5 ft.	SM/ML	**Topsoil (No map symbol)** Silty SAND to Sandy SILT, very fine-grained, gray brown, moist, loose; roots
	2.5 – 7.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark gray brown, slightly moist, loose to medium dense; occasional sub-angular gravel to cobble
	7.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown, moist, dense; weakly cemented, micaceous, manganese oxide
	11.0 – 14.0 ft.	SM/ML	Silty SAND to Sandy SILT, fine-grained, dense to moderately hard; trace clay and gravel @13.0 becomes fine- to coarse-grained TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-18	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 6.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, red brown, slightly moist, medium dense
	6.0 – 12.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor porosity @11.0 ft., decreasing moisture TOTAL DEPTH = 12.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-19	0.0 – 0.5 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	0.5 – 6.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, moist, medium dense; trace clay
	6.5 – 11.0 ft.	SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to medium-grained SAND, light yellow brown to light gray brown, very dense; iron oxide staining
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING





Excavation No.	Depth	USCS	Description
T-20	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine- to coarse-grained SAND, dark brown to dark gray brown, slightly moist to moist, loose; roots
	1.0 – 10.0 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, slightly moist, medium dense; trace gravel
	10.0 – 14.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; occasional sub-angular gravel, weakly cemented, minor iron oxide staining
			TOTAL DEPTH = 14.0 ft. NO WATER, NO CAVING



Excavation No.	Depth	USCS	Description
T-21	0.0 – 1.0 ft.	SM	**Topsoil (No map symbol)** Silty fine-grained SAND, dark gray brown, slightly moist, loose; roots
	1.0 – 3.5 ft.	SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown to dark gray brown, moist, medium dense; minor porosity
	3.5.0 – 11.0 ft.	SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, dark yellow brown to gray brown, moist, dense; minor iron oxide staining, manganese oxide nodules
			TOTAL DEPTH = 11.0 ft. NO WATER, NO CAVING

Excavation No.	Depth	USCS	Description
T-22	0.0 – 9.0 ft.	SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, loose; occasional gravel
	9.0 – 13.0 ft.	SM	**Older Alluvium (Qoa)** Sandy Silt, fine-grained, yellow brown to gray brown, moist, stiff; occasional fine gravel, minor porosity, weakly cemented
			TOTAL DEPTH = 13.0 ft. NO WATER, NO CAVING

BORING NUMBER AGS-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to orange brown, moist, medium dense; trace coarse sand, micaceous										
5				SPT	5-7-9 (16)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to orange brown, slightly moist, dense; iron oxide staining, micaceous										
10			@10.0 ft., very dense	MC	24-38-50/3"	112	2.9	16	Consol				
15			@15.0 ft., Silty fine-grained SAND, orange brown to red brown, moist, very dense; trace clay, iron oxide staining, micaceous	SPT	40-47-50/5"								
20				MC	47-50/3"	124	6.1	46					
25			@25.0 ft., Silty fine- to coarse-grained, orange brown, slightly moist, very dense; iron oxide staining, micaceous	SPT	37-50/5"								

Total depth = 25.9 feet
No groundwater encountered
Backfilled with soil cuttings

AGS BORING LOG V2 - GINT STD US LAB.GDT - 10/21/20 15:06 - Z:\PROJECT FILES\2004-01 OAK VALLEY TOWN CENTER - CALIMESA\LOGS\2004-01 BORING LOGS.GPJ

BORING NUMBER AGS-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2270 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to brown, moist, medium dense; trace coarse sand, micaceous										
5				MC	4-4-5 (9)								
10		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND, yellow brown, slightly moist, dense; iron oxide staining, calcium carbonate development, micaceous	SPT	8-12-16 (28)								
15			@15.0 ft., occasional gray brown to blue gray siltstone fragments	MC	50								
20				SPT	25-50								
25		SM	@25.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown, moist, very dense; trace clay, occasional quartz fragments, iron oxide development, micaceous	MC	50	117	10.2	62	Shear				
			Total depth = 25.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2228 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 11.00 ft / Elev 2217.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5				MC	3-3-5 (8)	105	7.5	33					
10		ML	▽ @10.0 ft., Fine-grained Sandy SILT with Clay, dark gray brown, wet, soft; micaceous, mottled, minor iron oxide development	SPT	1-1-1 (2)								74
15			@15.0 ft., becomes gray brown	MC	3-4-6 (10)	106	16.9	77	Consol				
20			@20.0 ft., increased clay content; minor iron oxide development	SPT	3-3-3 (6)					46	29	17	71
25		CL	@25.0 ft., Silty CLAY with fine-grained Sand, brown to gray brown, wet, soft; minor iron oxide development	MC	5-7-9 (16)	95	25.6	89	Consol				
30		SC	@30.0 ft., Clayey SAND, blue gray to gray brown; occasional fine quartz fragments, trace root fibers	SPT	2-3-7 (10)					32	22	10	36
35													

(Continued Next Page)

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ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	@35.0 ft., Clayey SILT grades down to Silty fine-grained SAND, dark gray to dark olive brown, wet, stiff to medium dense	MC	6-9-12 (21)	89	17.0	51					
40		CL	@40.0 ft., Silty to Sandy CLAY, dark gray, wet, stiff	SPT	3-5-8 (13)								
45		SM	@45 ft., Silty fine-grained SAND with clay, blue gray to gray brown, wet, medium dense	MC	6-12-20 (32)	121	12.4	86					
50			@50.0 ft., Interbedded: from Silty fine- to coarse-grained SAND with fine quartz fragments to Clayey SILT with fine-grained Sand	SPT	4-4-7 (11)								59
55			@55.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown, wet, medium dense	SPT	6-5-11 (16)								
60		SC-SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to Clayey fine-grained SAND, dark yellow brown, wet, dense; iron oxide staining, micaceous	MC	11-22-35 (57)								
65			@65.0 ft., Sand becomes fine- to coarse-grained	SPT	8-10-10 (20)								
70		SP	@70.0 ft., Coarse-grained SAND with rock fragments	MC	30-20-26 (46)	115	13.3	78					
			@71.0 ft., Silty fine-grained SAND with Clay										
		SM	Total depth = 71.5 feet Groundwater encountered at 11 feet Backfilled with soil cuttings										

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2197 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND with Clay, dark gray brown, dry to slightly moist, loose										
5			@5.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to gray brown to olive, moist, medium dense to firm; micaceous	MC	10-12-14 (26)	103	19.4	83	Consol				
10		CL	@10.0 ft., Silty CLAY with fine-grained Sand, yellow brow to gray brown to black, moist, soft; abundant decomposing organic matter, minor iron oxide staining, micaceous	SPT	2-2-3 (5)								
15		CL-ML	@15.0 ft., Fine-grained Sandy SILT, yellow brown to gray brown with Silty CLAY, black, moist, medium dense to stiff; abundant decomposing organic matter, iron oxide staining, micaceous	MC	3-5-10 (15)	93	18.3	61	Consol				
20		OL	@20.0 ft., Organic SILT/PEAT, blue gray to black, moist, soft; abundant decomposing organic matter	SPT	1-2-4 (6)								
25			@25.0 ft., Silty CLAY to Clayey SILT with Peat layers, dark gray to blue gray to black, moist, soft; abundant decomposing organic matter	MC	4-5-6 (11)	60	37.8	57	Consol				
30		CL-ML	@30.0 ft., With fine-grained sand, very moist; trace fine root fibers	SPT	3-5-5 (10)								
35													

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BORING NUMBER AGS-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		ML	**Older Alluvium (Qoa)** Fine- to coarse-grained Sandy SILT with Clay, yellow brown to gray brown to olive, moist, very stiff; iron oxide staining, micaceous	MC	7-10-13 (23)	121	12.2	84					
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to orange brown, slightly moist, very dense; trace fine gravel, iron oxide staining, micaceous	SPT	17-21-21 (42)								
45				MC	50	110	4.8	24					

Total depth = 45.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
5		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND, light yellow brown to light gray brown, slightly moist, dense; minor iron oxide staining, micaceous, weakly cemented	MC	25-34-35 (69)	103	5.1	21	Consol				
10		SM	@10.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, medium dense to very stiff; iron oxide staining, micaceous	SPT	5-7-9 (16)								
15			@15.0 ft., becomes dark yellow brown to orange brown, increased fines and moisture content	MC	9-13-16 (29)	119	9.5	62	Shear				
20		SM	@20.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to orange brown, moist, dense; trace gravel, iron oxide staining, micaceous	SPT	9-14-11 (25)								
25				MC	18-50	126	6.5	52					

Total depth = 26.0 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2190 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to olive brown, slightly moist, medium dense; micaceous										
5				MC	15-13-20 (33)								
		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND with gravel, yellow brown to gray brown, slightly moist, dense; iron oxide staining, micaceous										
10				SPT	4-8-14 (22)								
15		ML	@15.0 ft., Clayey SILT with fine-grained Sand, gray brown to olive, moist, hard; iron oxide staining, manganese oxide nodules, micaceous	MC	9-15-26 (41)	120	11.7	24	Shear				
20		ML	@20.0 ft., Fine-grained Sandy SILT, blue green to gray, moist, very stiff; minor iron oxide staining, micaceous	SPT	5-5-8 (13)								
25				MC	17-22-30 (52)	122	8.6	61	Shear				
30		ML	@30.0 ft., with Clay, very moist; occasional quartz fragments	SPT	8-8-7 (15)								
35													

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BORING NUMBER AGS-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Silty fine-grained SAND, blue gray, slightly moist to moist, dense; iron oxide staining, micaceous	MC	9-19-24 (43)	110	11.4	58					
40		CL-ML	@40.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, blue gray, moist to very moist, very stiff; micaceous, trace root fibers	SPT	3-5-9 (14)								
45		SM	@45.0 ft., Silty fine-grained SAND	MC	20-36-50 (86)	127	7.6	63					
50		CL-ML	@50.0 ft., Silty CLAY to Clayey SILT	SPT	4-4-5 (9)								

Total depth = 51.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2238 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND with Clay, dark gray brown to black, moist, medium dense; micaceous										
5				MC	5-7-14 (21)	120	7.1	47					
10		SM	**Older Alluvium (Qoa)** Silty fine- to medium-grained SAND, dark yellow brown to olive brown, slightly moist, dense; iron oxide staining, carbonate, micaceous	SPT	5-11-12 (23)								
15		SM	@15.0 ft., Silty fine-grained SAND to fine-grained SILT, olive, moist, dense to hard; trace clay, iron oxide staining, micaceous	MC	10-26-49 (75)	122	11.4	81	Shear, Consol				
20			@20.0 ft., becomes yellow brown to orange brown to olive, increased clay content	SPT	8-11-25 (36)								
25				MC	18-40-50/4"	115	11.6	68					
			Total depth = 26.3 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-9

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	1-1-0 (1)								
10			@10.0 ft., trace coarse sand, trace fine gravel, micaceous	MC	10-15-15 (30)								
15		ML	Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, loose to stiff; trace coarse sand, trace fine gravel, micaceous	SPT	3-3-4 (7)								
20		ML	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, dense to hard; trace coarse sand, trace fine gravel, iron oxide staining, micaceous	MC	12-19-26 (45)	128	8.5	71	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND, yellow brown to gray brown, slightly moist, medium dense; trace fine gravel, iron oxide staining, micaceous	SPT	9-7-8 (15)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2258 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; micaceous										
5				SPT	5-6-7 (13)								
10		SM	**Older Alluvium (Qoa)** Silty fine-gained SAND with gravel, yellow brown to gray brown, slightly moist, dense; trace fine sand, iron oxide staining, micaceous	MC	20-20-30 (50)	126	2.0	16	Consol				
15			@15.0 ft., becomes dark yellow brown to orange brown, moist, trace clay	SPT	7-11-11 (22)								
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to olive brown, moist, dense to hard; trace clay, trace fine gravel, iron oxide staining, micaceous	MC	21-25-29 (54)	120	7.2	48					
25		SW	@25.0 ft., Fine- to coarse-grained SAND with gravel, light yellow brown to light gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	SPT	11-16-17 (33)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-11

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/12/20 **COMPLETED** 8/12/20
GROUND ELEVATION 2220 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		ML	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine-grained SAND to fine-grained Sandy SILT, yellow brown to orange brown, slightly moist, medium dense to very stiff; iron oxide staining, micaceous										
5				SPT	7-7-8 (15)								
10		SM	@10.0 ft., Silty fine-grained SAND, dark yellow brown to gray brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	22-50/5"	113	9.3	51					
15		ML	@15.0 ft., Clayey SILT with fine-grained SAND, dark yellow brown to gray brown to olive, moist, hard; iron oxide, micaceous	SPT	9-16-18 (34)								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with fine Gravel, yellow brown to gray, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	20-34-50/5"	115	3.1	18					
25				SPT	20-27-33 (60)								

Total depth = 26.5 feet
No groundwater encountered
backfilled with soil cuttings

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2320 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Sedimentary Deposits of Live Oak Canyon (Qlo)** Silty fine- to coarse-grained SAND with gravel to cobble, yellow brown, dry to slightly moist, dense										
5			@5.0 ft., Sand becomes fine-grained, minor iron oxide staining	SPT	16-22-26 (48)								
10				MC	50/4"	99	2.4	9					
15			@15.0 ft., quartz fragments	SPT	50/5"								
20		SW	@20.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50	113	2.5	14					
25		SP	@25.0 ft., Fine-grained SAND with Silt, dark yellow brown to gray brown to olive, moist, dense; trace clay, iron oxide staining, micaceous	SPT	12-17-20 (37)								
30		SW	@30.0 ft., Fine- to coarse-grained SAND with gravel, light gray brown to yellow brown, dry to slightly moist, very dense; iron oxide staining, micaceous	MC	50/5"	111	1.7	9					
35													

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BORING NUMBER AGS-12

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW		SPT	50/5"								
40		SM	@40.0 ft., Silty fine-grained SAND, yellow brown to orange brown to gray brown, moist very dense; trace clay, iron oxide staining, micaceous	MC	50	105	12.8	58					
45			@45.5 ft., occasional quartz fragments	SPT	11-26-36 (62)								
50			@50.0 ft., increased clay content, manganese oxide nodules	MC	50/5"	115	9.5	55					

Total depth = 50.4 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/7/20 **COMPLETED** 8/7/20
GROUND ELEVATION 2235 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine- to medium-grained SAND, gray brown, slightly moist, loose; trace fine gravel, micaceous										
5		SM	**Alluvium (Qal)** Silty fine- to medium-grained SAND, dark yellow brown, slightly moist, loose; trace fine gravel, micaceous										
		SP	@5.0 ft., Coarse-grained SAND, dark yellow brown to gray brown, dry to slightly moist, loose; trace fine gravel	SPT	3-2-5 (7)								
10				MC	11-19-29 (48)	122	2.4	17	Consol				
15		SM	@15.0 ft., Silty fine- to coarse-grained SAND, dark gray brown, moist, loose; trace clay, trace fine gravel, micaceous	SPT	1-2-4 (6)								
20		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown to gray brown to olive, dense; trace fine gravel, iron oxide staining, micaceous	MC	11-21-31 (52)	129	9.0	79	Consol				
25				SPT	8-10-14 (24)								
30		SM	@30.0 ft., becomes dark yellow brown to orange brown, moist, very dense; iron oxide staining, micaceous, weakly cemented	MC	30-50/5"	131	6.2	59					
35													

(Continued Next Page)

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BORING NUMBER AGS-13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SW	@35.0 ft., Fine- to coarse-grained SAND with Silt, dark yellow brown to gray brown, slightly moist, dense; trace gravel	SPT	15-16-17 (33)								
40				MC	25-47-50/5"	120	4.3	28					
45				SPT	10-13-23 (36)								
50				MC	50	115	3.9	22					
			Total depth = 50.5 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-14

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2275 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
	SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, loose; trace fine gravel, micaceous										
5			SPT	1-1-3 (4)								
10		@10.0 ft., medium dense	MC	9-11-13 (24)	102	3.5	14					
15	SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-9-9 (18)								
20	ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	MC	8-11-12 (23)	128	5.1	43	Consol				
25		@25.0 ft., with gravel	SPT	7-8-12 (20)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-15

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/14/20 **COMPLETED** 8/14/20
GROUND ELEVATION 2254 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Topsoil** Silty fine-grained SAND, dark yellow brown to dark gray brown, dry to slightly moist, loose										
		SM	**Alluvium (Qal)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist, medium dense; micaceous										
5				MC	10-6-9 (15)	107	6.7	32					
10		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-gained SAND with gravel, yellow brown to gray brown, slightly moist, medium dense; minor iron oxide staining, micaceous	SPT	6-10-8 (18)								
15				MC	13-21-23 (44)	108	5.7	28					
20		ML	@20.0 ft., Silty fine-grained SAND to fine-grained Sandy SILT, dark yellow brown to orange brown, moist, very stiff; trace clay, minor iron oxide, micaceous	SPT	6-8-8 (16)								
25			@25.0 ft., with gravel	MC	11-17-20 (37)	126	9.8	79	Consol				

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/11/20 **COMPLETED** 8/11/20
GROUND ELEVATION 2223 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 15.00 ft / Elev 2208.00 ft
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 22.25 ft / Elev 2200.75 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SP	**Alluvium (Qal)** Coarse-grained SAND with fine gravel, light yellow brown to light gray brown, slightly moist, loose; trace fine gravel, micaceous @0.5 ft., becomes fine-grained, dark gray brown to dark yellow brown, moist										
5		ML	@5.0 ft., Silty fine-grained SAND to Sandy SILT with Clay, gray brown to olive to dark yellow brown, moist, loose to soft; micaceous	SPT	3-1-2 (3)								
10		CL-ML	@10.0 ft., Silty CLAY to Clayey SILT with fine-grained Sand, dark gray brown, moist, stiff; micaceous	MC	3-6-8 (14)	92	21.2	68	Consol				
15		CL	▽ @15.0 ft., Silty CLAY with fine-grained Sand, gray brown, wet, stiff	SPT	1-2-4 (6)								78
20			@20.0 ft., brown to dark gray brown, mottled	MC	4-5-6 (11)	93	25.3	84	Consol				
25			▼	SPT	3-3-5 (8)					43	23	20	54
30		SC	@30.0 ft., Clayey fine- to coarse-grained SAND, gray brown to dark olive, saturated, medium dense; minor iron oxide staining, micaceous, trace organics	MC	10-8-13 (21)	122	12.3	88	Consol				
35													

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BORING NUMBER AGS-16

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	**Older Alluvium (Qoa)** Clayey fine- to coarse-grained SAND to fine- to coarse-grained Sandy CLAY	SPT	5-5-6 (11)								
40		SM	@40.0 ft., Silty fine- to coarse-grained SAND with Clay, dark yellow brown to gray brown, mottled, saturated, medium dense; trace fine gravel, iron oxide development	MC	6-8-12 (20)	118	14.9	95					
45		SC-SM	@45.0 ft., becomes Silty fine- to coarse-grained SAND to Clayey fine- to coarse-grained SAND; manganese oxide nodules	SPT	4-6-8 (14)								
50				MC	13-17-20 (37)	123	9.8	72					
55				SPT	9-11-13 (24)								

Total depth = 56.5 feet
Seepage @ 15 feet
groundwater measured at 22.25 feet
Backfilled with soil cuttings

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/6/20 **COMPLETED** 8/6/20
GROUND ELEVATION 2252 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine- to coarse-grained SAND, dark red brown, slightly moist, loose										
5				MC	4-10-12 (22)	111	4.5	23					
10			@8.0 ft., becomes dark red brown to dark yellow brown, minor porosity	SPT	4-5-7 (12)								
15		SM	**Older Alluvium (Qoa)** Silty fine- to coarse-grained SAND, dark yellow brown, slightly moist, dense; iron oxide staining	MC	21-27-41 (68)	127	4.5	37	Consol				
20			@20.0 ft., trace clay	SPT	7-9-10 (19)								
25				MC	18-50/5"	123	4.1	30					
30		SM	@30.0 ft., becomes yellow brown to orange brown, slightly moist, dense; iron oxide staining, minor carbonate development	SPT	13-17-18 (35)								
35													

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BORING NUMBER AGS-17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company **PROJECT NAME** Oak Valley Town Center

PROJECT NUMBER 2004-01 **PROJECT LOCATION** Calimesa, CA

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SM	@35.0 ft., Sand becomes more fine-grained; weakly cemented, micaceous	MC	12-24-35 (59)	120	3.2	21					
40			@40.0 ft., becomes dark yellow brown to gray brown, dry to slightly moist, very dense; occasional gravel, micaceous	SPT	13-29-50/3"								
45				MC	50/5"	110	1.6	8					
50				SPT	50/1"								
			Total depth = 50.1 feet No groundwater encountered Backfilled with soil cuttings										

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BORING NUMBER AGS-18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Oak Valley Development Company
PROJECT NAME Oak Valley Town Center
PROJECT NUMBER 2004-01
PROJECT LOCATION Calimesa, CA
DATE STARTED 8/13/20 **COMPLETED** 8/13/20
GROUND ELEVATION 2219 ft **HOLE SIZE** 8
DRILLING CONTRACTOR 2R-Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SS **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Alluvium (Qal)** Silty fine-grained SAND, brown to gray brown, slightly moist, loose										
5		SW	@5.0 ft., Fine- to coarse-grained SAND with Gravel, light yellow brown, light gray brown, dry to slightly moist, medium dense	SPT	4-7-7 (14)								
10		SM	**Older Alluvium (Qoa)** Silty fine-grained SAND to fine-grained Sandy SILT with Clay, gray brown to olive, moist, medium dense to very stiff; occasional gravel, iron oxide staining, micaceous	MC	13-16-21 (37)	124	8.9	67					
15				SPT	6-12-21 (33)								
20		CL-ML	@20.0 ft., Silty CLAY to Clayey SILT with fine-grained SAND, blue green to blue gray, moist, very stiff; occasional fine quartz fragments, iron oxide staining, micaceous	MC	3-7-15 (22)	117	12.3	75	Consol				
25		SM	@25.0 ft., Silty fine- to coarse-grained SAND with Gravel, blue gray, moist, very dense; micaceous	SPT	32-40-15 (55)								

Total depth = 26.5 feet
No groundwater encountered
Backfilled with soil cuttings

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APPENDIX B-2

DRAFT SUBSURFACE LOGS (SCG)

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium Sand, trace fine root fibers, slightly porous, medium dense-damp							
5		15				106	6					
10		15			@ 8.5', little medium to coarse Sand, trace fine Gravel, medium dense-damp		4					
15		34			Light Red Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp	112	3			27		
20		81			Light Gray Brown Silty fine Sand, trace medium Sand, very dense-damp		5					
25		50/5"			Light Gray Brown fine to coarse Sand, trace fine Gravel, trace Silt, very dense-dry	105	2					
30		89			Light Gray Brown fine Sandy Silt, trace medium Sand, very dense-damp		7					
		50/5"			Light Red Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, very dense-damp	108	4					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-1

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 45 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, very dense-moist							
40		50/4"					12					
		50/3"				118	11					
45					Light Gray Silty fine to coarse Sand, trace fine Gravel, very dense-dry to damp							
		50/4"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-2

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Orange Brown fine Sandy Silt, trace Clay, very dense-moist							
5		54					14					
					OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, very dense-moist							
10		50/5"				126	12					
15		50/5"					10					
					Red Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, very dense-damp							
20		50/5"				124	10					
					Red Brown fine Sandy Silt, trace Clay, very dense-moist							
25		67					15					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					COLLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, slightly porous, trace fine root fibers, medium dense-damp							
5		16				81	4					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
10		10					5					
15		39			@ 13.5', trace Clay	108	4					
20		18					4			33		
					OLDER ALLUVIUM: Orange Brown Silty fine to medium Sand, trace coarse Sand, very dense-dry to damp							
25		50/6"				92	3					
					LIVE OAK CANYON FORMATION: Light Gray Silty fine-grained Sandstone to fine-grained Siltstone, highly weathered, friable, weakly cemented, very dense-damp							
30		67					6			51		
					Gray Brown Silty fine to coarse-grained Conglomeratic Sandstone, little fine to coarse Gravel, highly weathered, friable, weakly cemented, very dense-dry to damp							
		50/3"					2					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-3

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/6"					5					
					Light Gray Brown Silty fine-grained Sandstone, some Iron Oxide staining, highly weathered, friable, weakly cemented, very dense-damp							
45		50/6"				103	5					
		50/5"					3					
50					Boring Terminated at 50'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-3b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-4

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		16			ALLUVIUM: Dark Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace to little fine Gravel, trace Clay, medium dense-damp	107	6					
10		17			Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		2					
15		39			Brown Silty fine Sand, trace medium to coarse Sand, trace Clay, medium dense-damp	117	4					
20		26			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense to very dense-dry to damp		4					
25		50/6"				116	3					
					Boring Terminated at 25'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		17	3.5		POSSIBLE FILL: Black to Dark Brown Clayey Silt, trace fine to medium Sand, slightly organic, very stiff-damp to moist	111	9					
10		13	3.5		ALLUVIUM: Light Gray Clayey Silt to Silty Clay, trace fine Sand, stiff-damp		8					
15		50/6"			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace clay, very dense-damp	124	7					
20		14			Brown Silty fine Sand, little medium to coarse Sand, medium dense-moist		13			44		
25		50			Gray Brown Silty Clay, little fine to medium Sand, abundant Calcareous veining, hard-moist to very moist	116	17			72		
30		50/6"			Light Gray Brown Gravelly fine to coarse Sand, little Silt, very dense-damp		6					
		59			Gray Brown Clayey Silt, trace fine Sand, hard-moist	115	16					

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-5

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/12/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium to coarse Sand, dense-damp							
		40					6			30		
40												
					Light Gray Brown Gravelly fine to coarse Sand, very dense-damp							
		50/4"				114	4					
45												
		56					5					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-6

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Light Gray Clayey Silt, trace fine Sand, stiff-moist		18					
10		17	4.5		Dark Brown Silty Clay, trace fine Sand, stiff-moist	107	15					
15		12	4.5		Gray Brown Clayey Silt, trace fine Sand, stiff-moist		16					
20		22			Light Brown Silty fine Sand, medium dense-damp to moist	94	11					
25		22			Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		8					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		13	4.5		ALLUVIUM: Dark Brown Clayey Silt, trace fine to coarse Sand, trace Iron Oxide staining, loose-moist	113	14					
10		7			Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, trace fine Gravel, loose-very moist		17					
15		13	4.5		Light Brown to Dark Brown Clayey Silt, trace fine Sand, trace fine root fibers, loose-moist	112	15			74		
20		10	1.0				19	29	17	66		
25		21	3.0			110	20	27	14	77		
30		16			Dark Gray fine Sandy Silt interbedded with 5" Dark Gray Silty Clay lenses, medium dense-moist		16			76		
		28				116	16			57		

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-7

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Light Brown to Brown fine Sandy Silt interbedded with Brown Silty fine to coarse Sand with trace fine Gravel and 3" lenses of Dark Gray Silty Clay, medium dense to very stiff-wet							
40		19					32			48		
					Gray Brown Silty fine to coarse Sand, trace Silt, trace fine Gravel, dense-dry to damp							
45		61				111	3			10		
					Dark Gray Silty Clay with lenses of Dark Gray Silty fine Sand, very stiff-very moist							
50		16	1.5				26	40	24	73		
					Dark Gray Clayey fine Sand, trace medium to coarse Sand, trace fine root fibers, very stiff-moist to very moist							
55		43	4.5			113	16					
					Boring Terminated at 55'							

DRAFT

TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-7b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-8

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		9			ALLUVIUM: Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, loose to medium dense-damp		7					
10		36				118	13					
15		15			@ 13.5,' trace Iron Oxide staining		9					
20		24			Dark Brown Clayey fine Sand, trace medium to coarse Sand, little Silt, little Iron Oxide staining, medium dense-damp to moist	114	14					
25		18			Dark Gray fine Sandy Silt with 3" lenses of Dark Gray Silty fine Sand, trace to little fine to coarse Sand, trace to little fine Gravel, medium dense-damp to moist		13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-9

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/13/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine Sand, trace fine root fibers, trace Clay, trace Calcareous nodules and veining, medium dense-damp to moist							
5		21				115	9					
10		29					9					
15		38				122	8					
20		20					11					
25		56				122	13					
					Boring Terminated at 25'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		7			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-damp		6					
10		58			Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, dense-damp	126	10			40		
15		14			Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Clay, medium dense-damp to moist		14					
20		50/6"			OLDER ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous nodules, trace to little fine Gravel, dense to very dense-damp	130	8					
25		34					7					
30		41			@ 28.5', medium dense-very moist	114	17					
		28			Brown Silty fine Sand, trace medium Sand, medium dense-damp		5					

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. SCG-10

JOB NO.: 20G144-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 8/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		24				105	10					
40												
					Dark Gray Silty fine Sand, trace to little medium to coarse Sand, trace Clay, trace fine Gravel, medium dense-very moist							
		25					24					
45												
		34				116	14					
50												
					Boring Terminated at 50'							

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TBL 20G144-1.GPJ SOCALGEO.GDT 11/3/20

TEST BORING LOG

PLATE B-10b

APPENDIX B-3

SUBSURFACE LOGS (PSE)

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-037
DATE STARTED	4/8/04	GROUND ELEV.	2268	LOGGED BY	DMP
DATE FINISHED	4/9/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ALLUVIUM** (Qal): SANDY SILT, fine grained, light brown, slightly moist, firm, trace coarse grains, visible porosity.				
	2265									
						@ 4.0 ft. color change to yellow brown.				
5		R	Push				5.4	100	22	
	2260					@ 8.0 ft. trace gravel.				
10		R	3		SM	@ 10.0 ft. SILTY SAND, fine grained, yellow brown, slightly moist to moist, medium dense, visible porosity, trace coarse grains, gravel.	4.4	115	27	
	2255	B								
						SAN TIMOTEO FORMATION (QTst): SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard to hard.				
15		R	9				8.6	131	85	CON, HY
						TOTAL DEPTH 16.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=49911b.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=38411b.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=24461b.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2275				CL	**TOPSOIL** (No Map Symbol): SANDY CLAY, sand is fine to coarse grained, dark red brown, moist, stiff, trace gravel, secondary clay development.				
						SAN TIMOTEO FORMATION (QTst): CONGLOMERATE, matrix supported, mostly granule sized clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard some secondary clay, calcium carbonate cementation.				
5	2270					@ 3.0 ft. SANDY SILTSTONE, fine grained, light yellow brown, dry, moderately hard, pinches out, interfingered contact with below.				
						@ 4.0 ft. PEBBLE CONGLOMERATE, matrix supported, 1/4-3" clasts in a fine to coarse grained sand matrix, yellow brown, moist, moderately hard, clasts are igneous and metamorphic, subrounded, occasional 4-5" clasts.				
						@ 6.0 ft. low cohesion, slight caving.				
10	2265					@ 8.0 ft. SILTY SAND matrix, greater cohesion, fewer clasts.				
						@ 11.0 ft. coarser grained, mostly medium to coarse grained SAND and granules, visible porosity, low cohesion.				
						@ 13.0 ft. occasional interfingered lenses of SANDY SILTSTONE, and SILTY SANDSTONE, fine grained, yellow brown, moist, moderately hard.				
15	2260									
						@ 17.0 ft. gradational change to SILTY SANDSTONE, fine to coarse grained, (coarse grained locally), yellow brown to reddish brown, moist, moderately hard, trace pebbles and granules.				
20	2255					@ 20.0 ft. 1.5' thick CONGLOMERATE bed, clast supported, up to 9" clasts.				
						@ 22.0 ft. N78W , 10NE-approximate attitude of bedding on coarse grained SANDSTONE bed, 6" thick.				
25	2250									
						@ 28.0 ft. SANDY SILTSTONE, fine grained, yellow brown, moist, moderately hard, trace granules and pebbles, locally SILTY SANDSTONE.				
30	2245	R B	6				11.3	123	87	
						@ 33.0 ft. 2' thick SANDSTONE bed, fine to coarse grained, light gray, moist, moderately hard, trace pebbles and granules.				
35	2240									
	2235					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-043
DATE STARTED	4/13/04	GROUND ELEV.	2275	LOGGED BY	DMP
DATE FINISHED	4/14/04	GW DEPTH (FT)		NOTE	0-30'=4991lb.
DRILLER	San Diego Drilling	DRIVE WT.	SEE NOTE		30-60'=3841lb.
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		60-90'=2446lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2235					**SAN TIMOTEO FORMATION** (QTst): Continued. @ 38.0 ft. interfingered contact with below, gradational change, alternating SANDY SILTSTONE and PEBBLE CONGLOMERATE, 3"-1' thick.				
45	2230	R	19			@ 43.0 ft. PEBBLE CONGLOMERATE, matrix supported, mostly 1/2-2" in diameter clasts in a fine to coarse grained sand matrix, yellow brown to yellow gray, moist, hard.	3.9	132	41	
						@ 46.0 ft. faint biotite rich laminations in sandy lenses, cross bedded, discontinuous, overall decrease in clast size to mostly granules for 3'.				
50	2225	R	22				2.3	128	21	
55	2220	B				@ 56.0 ft. increased cohesion/cementation, hard.				
						@ 57.0 ft. greater abundance of clasts, mostly 1/2-1" in diameter, subangular to subrounded, igneous and metamorphic.				
60	2215									
65	2210					TOTAL DEPTH 65.0 FT NO GROUNDWATER ENCOUNTERED CAVING OBSERVED @ 6.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind		
DATE STARTED	7/22/04	GROUND ELEV.	2280	BORING DESIG.	B-081
DATE FINISHED	7/22/04	GW DEPTH (FT)		LOGGED BY	SJD
DRILLER	Al Roy Drilling	DRIVE WT.	SEE NOTE	NOTE	0-24'=2150 lb
TYPE OF DRILL RIG	18" Bucket Auger	DROP	12 in.		25-44'=1350 lb
					45-65=650lb/65+=1150lb

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2280				SM	ALLUVIUM (Qal): SILTY SAND, fine to coarse-grained, trace gravel, reddish brown, dry to slightly moist.				
5	2275	R	4			@ 5 ft. slightly moist, medium dense.	5.2	96	19	
10	2270	R	3				5.0	110	26	
15	2265	R	5				5.5	112	31	CON, HY
						@ 17 ft. slightly moist to moist, fine-grained.				
20	2260	R/B	3			@ 20 ft. moist.	6.1	110	32	
25	2255	R	30 for 11"		SM	OLDER ALLUVIUM (QTst): SILTY SAND, fine-grained, trace medium to coarse-grained, reddish brown to yellowish brown, moist, dense.	6.8	128	61	
30	2250	R	32 for 8"			@ 30 ft. coarse-grained, reddish brown.	5.6	119	38	
					ML	@ 32 ft. SANDY SILT, fine-grained SAND, yellowish brown to reddish brown, moist, stiff.				
35	2245	R	30 for 8"		SM	@ 35 ft. SILTY SAND, fine to coarse-grained, some GRAVEL, reddish brown, slightly moist, dense.	5.3	118	35	
						TOTAL DEPTH 36 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-47

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-095
DATE STARTED	9/15/04	GROUND ELEV.	2225	LOGGED BY	FE
DATE FINISHED	9/15/04	GW DEPTH (FT)	15	NOTE	0-22'=2400lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		23-42'=
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		1200lb.43-65'=850lb.

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	2225				SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SAND, light yellow brown, dry, loose.				
5	2220	R	1				3.0			
					SM	ALLUVIUM (Qal): SILTY SAND, medium gray brown, moist, moderately dense, fine to medium grained.				
10	2215	R B	1			@ 10.0 ft. moist to very moist.	13.2	113	75	CON, HY MAX. CHEM HY
15	2210	R	2		SM	INTERMEDIATE-AGE ALLUVIUM (Qia): SILTY SAND, fine grained, dense, very moist to wet, some clay, brown and olive gray, slightly mottled, water entering boring @ 15.0 ft and 24.0 ft.	14.6	121	95	
20	2205	R	Push		ML	@ 20.0 ft. SANDY SILT to CLAYEY SILT, brown, very moist, soft, some fine grained sand.	19.1	110	95	
25	2200	R B	1			@ 25.0 ft. interlensed SAND and CLAYEY SILT, light gray to brown, soft, very moist to wet, sand is fine to coarse grained.	21.0	105	92	
30	2195	R	1				22.4	104	94	
35	2190					@ 34.0 ft. dark blueish gray.				
40	2185					TOTAL DEPTH 40.0 FT GROUNDWATER ENCOUNTERED @ 15.0 & 20.0 FT CAVING @ 40.0 FT				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-54

GEOTECHNICAL BORING LOG

PROJECT NO.	700065-J	PROJECT NAME	Summerwind	BORING DESIG.	B-096
DATE STARTED	9/16/04	GROUND ELEV.	2232	LOGGED BY	FE
DATE FINISHED	9/16/04	GW DEPTH (FT)		NOTE	0-22'=2400lb, 23-42'=1200lb, 43-65'=850lb.
DRILLER	Ledezma	DRIVE WT.	SEE NOTE		
TYPE OF DRILL RIG	30" Bucket Auger	DROP	12 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	2230				SM/SP	**ALLUVIUM** (Qal): interlensed SAND and SILTY SAND, light brown to light gray, fine to coarse grained, dry to slightly moist, abundant visible porosity, some clay, trace of gravel, loose, trace gravel.				
5		R	Push				3.9	103	17	CON, HY
	2225									
10						@ 10.0 ft. subrounded metamorphic clasts to 2" in diameter.				
		R	1			@ 11.0 ft. sharp contact, dark gray to black, moist, firm, some visible porosity.	14.4	112	79	CON, HY
	2220	B								DSR, MAX, HY, CHEM
					SM	**INTERMEDIATE-AGE ALLUVIUM** (Qia): SILTY SAND, light brown and olive gray, slightly mottled, moist, moderately dense, fine to medium gray, iron oxide, some clay, weathered.				
15		R	1				12.3	115	75	
						@ 16.0 ft. less weathered, dense.				
	2215									
20		R	4			@ 20.0 ft. brown and olive gray, mottled, moist, very dense, fine to coarse grained.	6.6	123	50	
	2210				SP	@ 22.0 ft. SAND, light yellow brown, fine to coarse grained, slightly moist, dense, some gravel to 1/8" in diameter.				
25		B								
					SM	@ 26.0 ft. SILTY SAND, light yellow brown, fine to coarse grained, slightly moist, dense.				
	2205					@ 26.0 ft. N35E, 20SE - erosional surface.				
30		R	3				12.5	118	82	
						SAN TIMOTEO FORMATION (QTst): fine SANDY SILTSTONE, light yellow brown, moist to very moist, moderately hard, massive, trace gravel.				
	2200					@ 31.0 ft. N30E, 15SE - contact.				
35						@ 33.0 ft. CLAYEY SILTSTONE, light olive gray, moist to very moist, very stiff, massive, some fine grained SAND.				
	2195	B								
40		R	10				12.5	118	82	
						TOTAL DEPTH 41.0 FT NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

PACIFIC SOILS ENGINEERING, INC.

PLATEB-55

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C-1

LABORATORY TEST RESULTS (AGS)

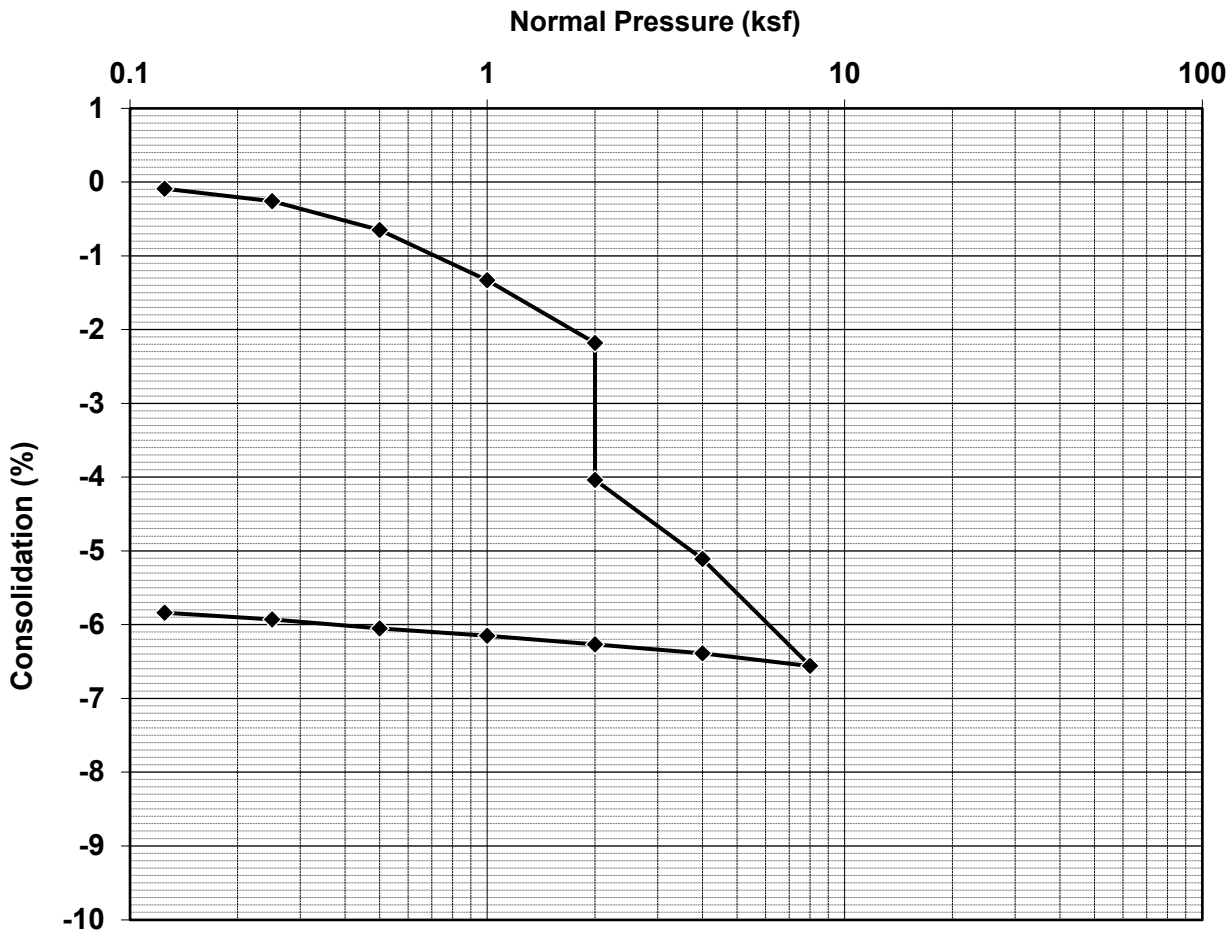
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-1
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.9%	15.3%
Void Ratio, e	0.57	0.48
Saturation, S	14%	86%
Dry Density (pcf)	107.4	114.1
Wet Density (pcf)	110.5	131.5

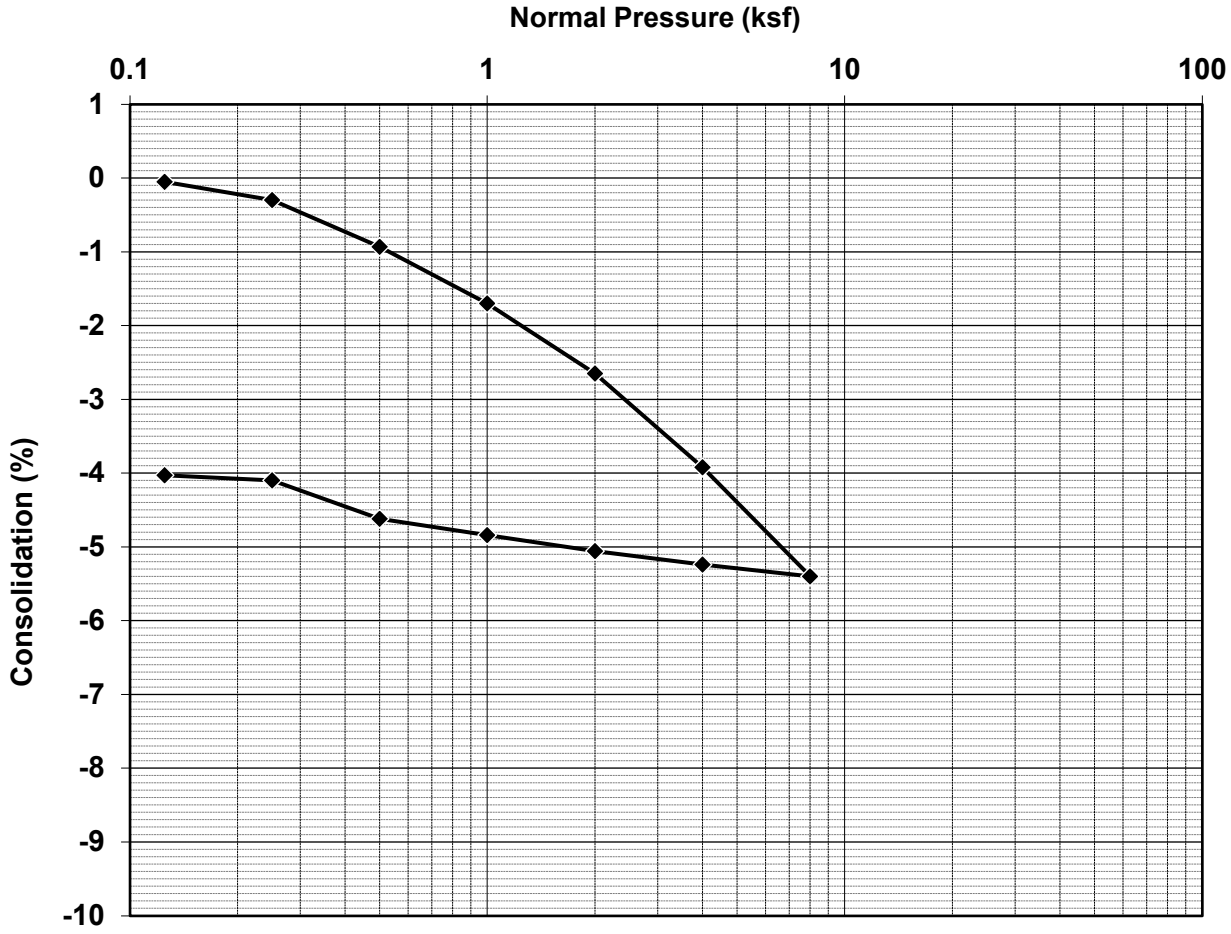
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	15 ft
Project No:	2001-04	Description:	Qal- Sandy Silt with Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	16.9%	22.2%
Void Ratio, e	0.64	0.57
Saturation, S	72%	105%
Dry Density (pcf)	102.8	107.1
Wet Density (pcf)	120.2	131.0

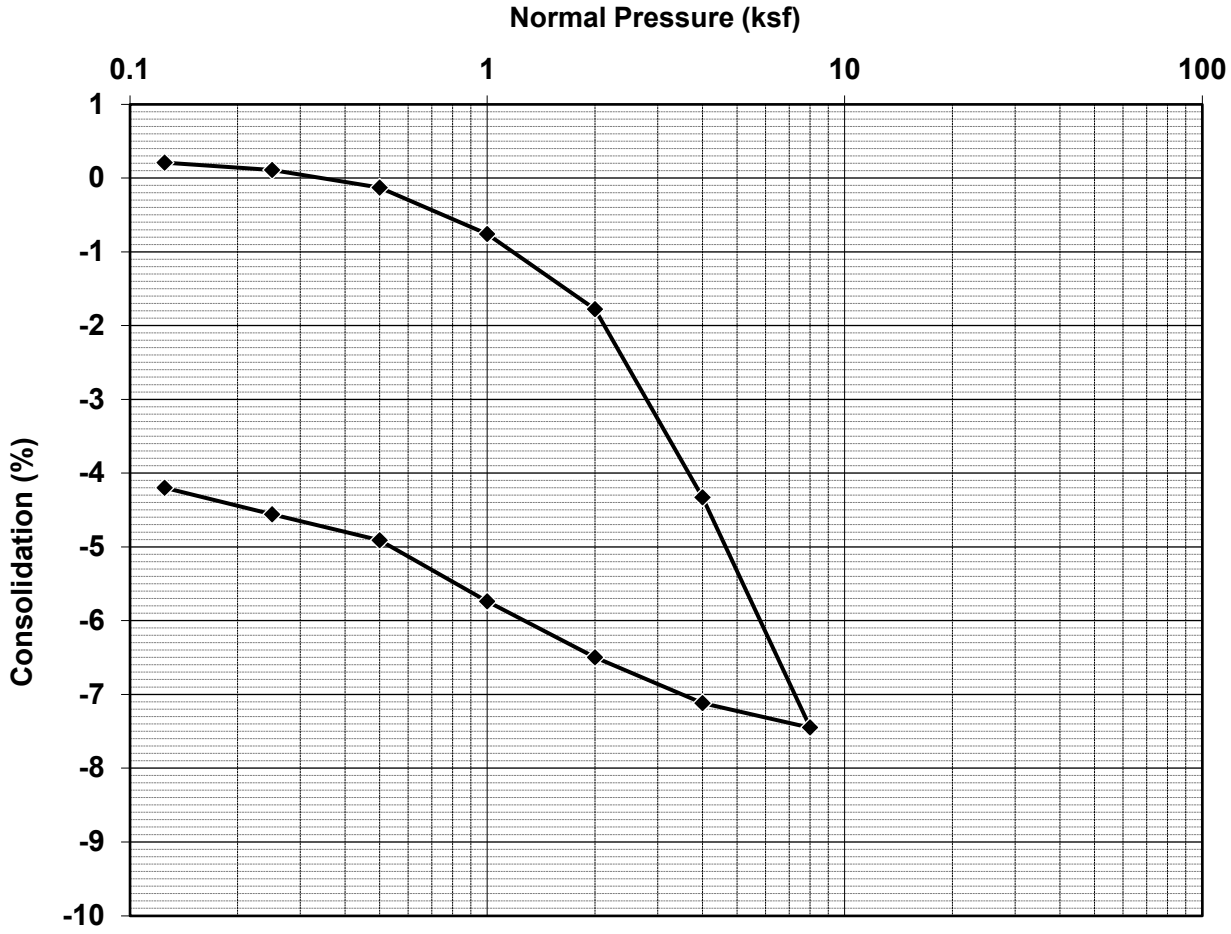
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 3
Location:	Calimesa, CA	Depth:	25 ft
Project No:	2001-04	Description:	Qal- Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.6%	27.4%
Void Ratio, e	0.82	0.74
Saturation, S	85%	100%
Dry Density (pcf)	92.7	96.8
Wet Density (pcf)	116.5	123.2

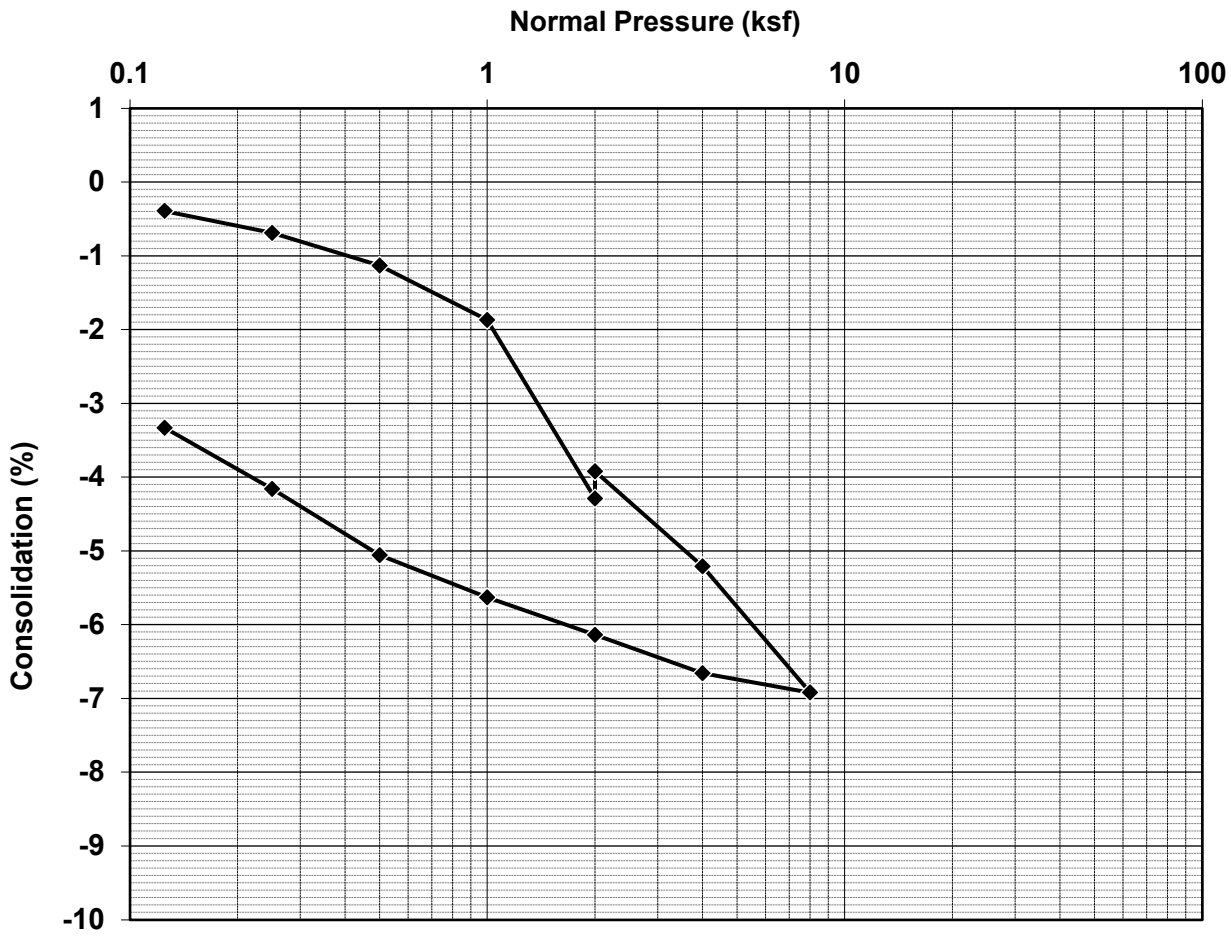
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qal- Sandy Silt
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	19.4%	34.5%
Void Ratio, e	0.91	0.84
Saturation, S	58%	111%
Dry Density (pcf)	88.4	91.5
Wet Density (pcf)	105.5	123.0

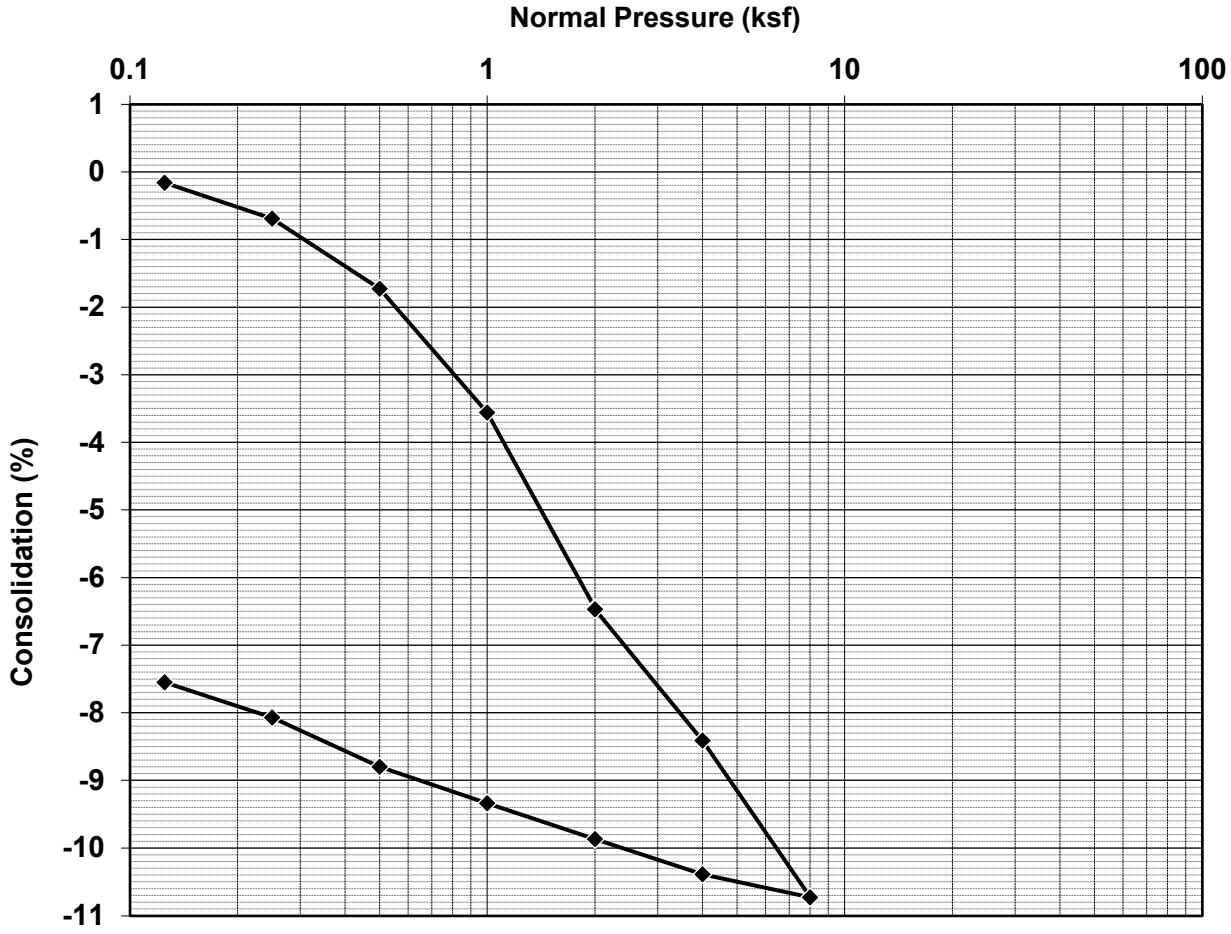
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qal- Sandy Silt with Peat
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	18.3%	34.0%
Void Ratio, e	0.81	0.67
Saturation, S	61%	137%
Dry Density (pcf)	93.3	100.9
Wet Density (pcf)	110.4	135.3

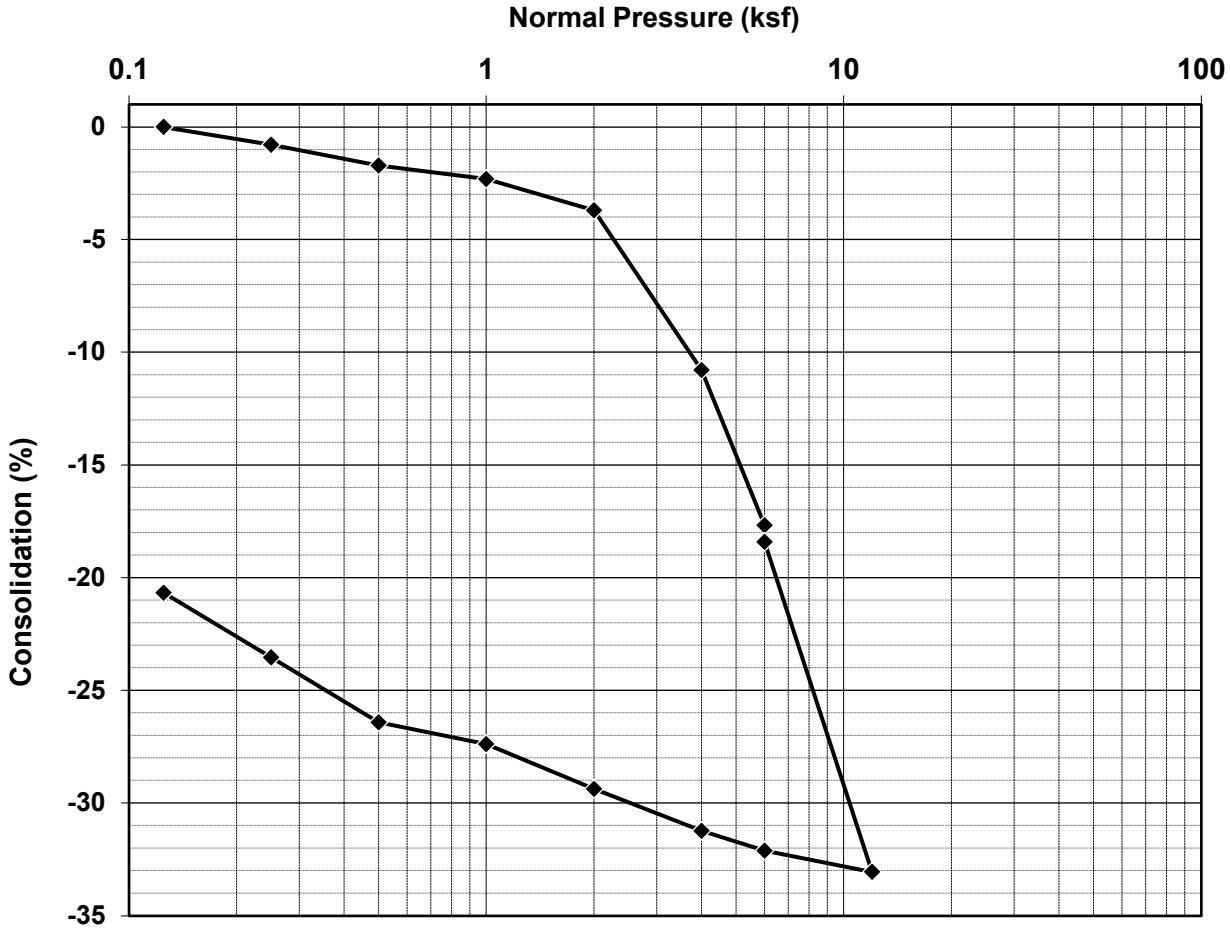
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-4
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Black Peat
Date:	9/10/2011	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w		143.9%
Void Ratio, e		
Saturation, S		
Dry Density (pcf)		33.1
Wet Density (pcf)	75.6	80.7

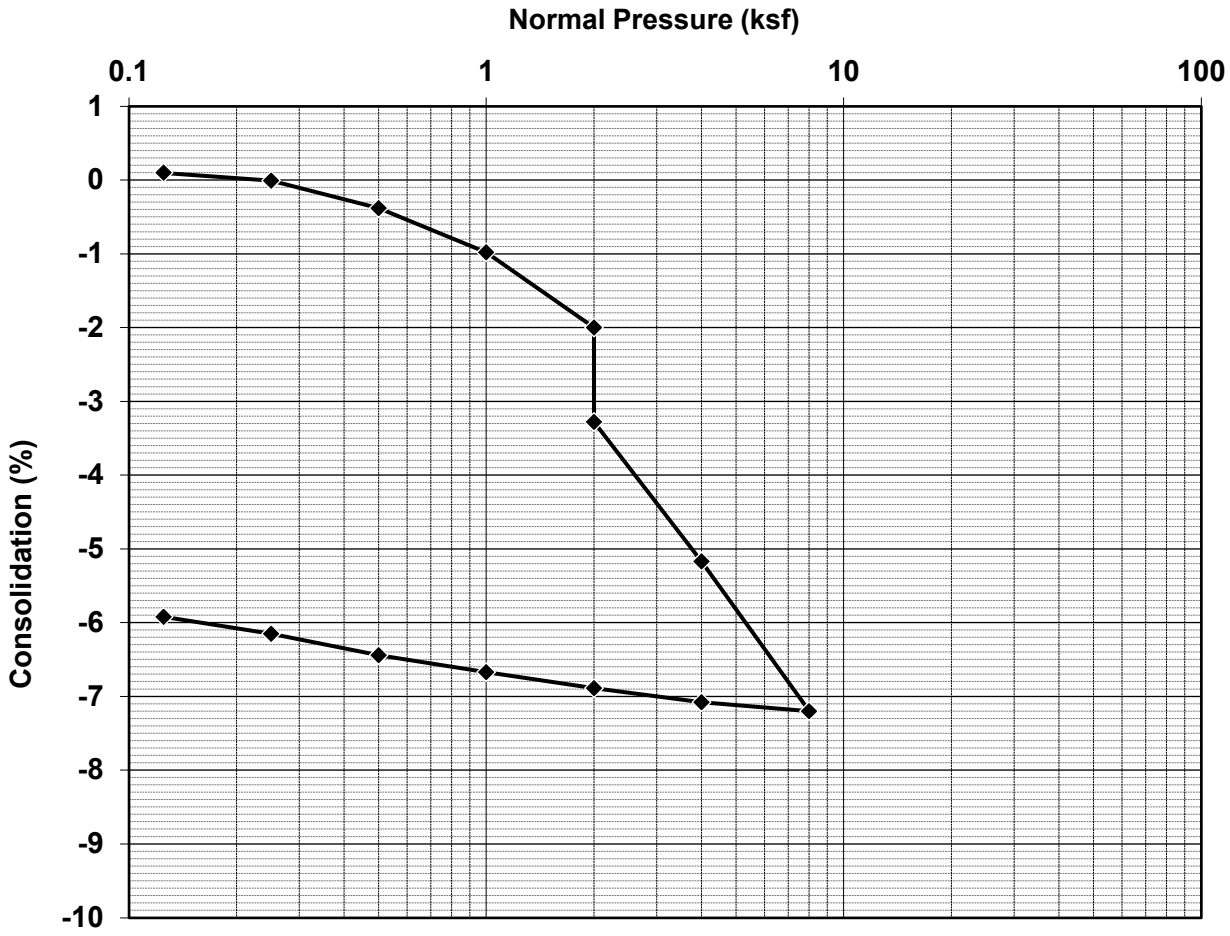
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	5 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/1/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	15.0%
Void Ratio, e	0.53	0.43
Saturation, S	26%	93%
Dry Density (pcf)	110.5	117.4
Wet Density (pcf)	116.1	135.0

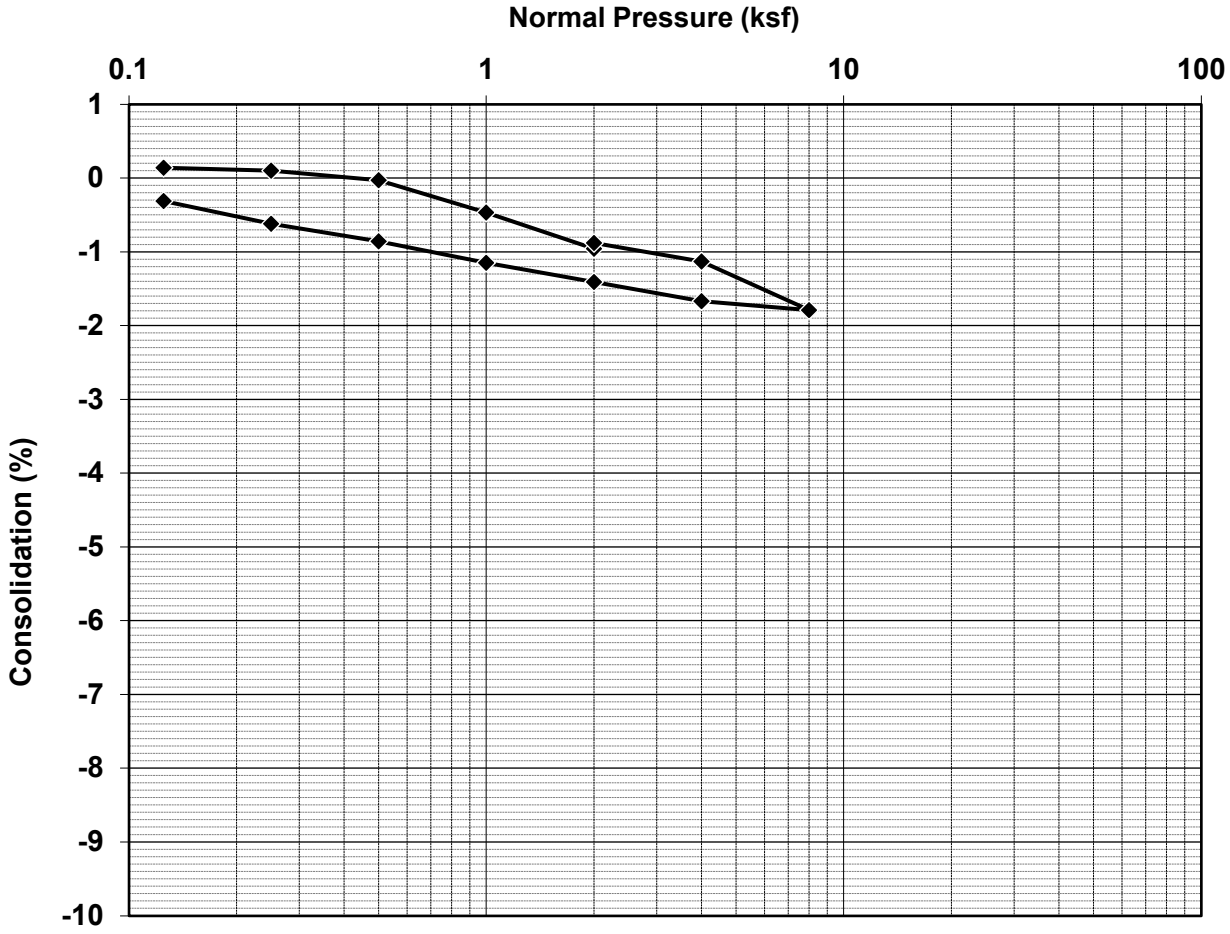
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/10/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	11.4%	17.0%
Void Ratio, e	0.46	0.46
Saturation, S	66%	100%
Dry Density (pcf)	115.1	115.5
Wet Density (pcf)	128.3	135.1

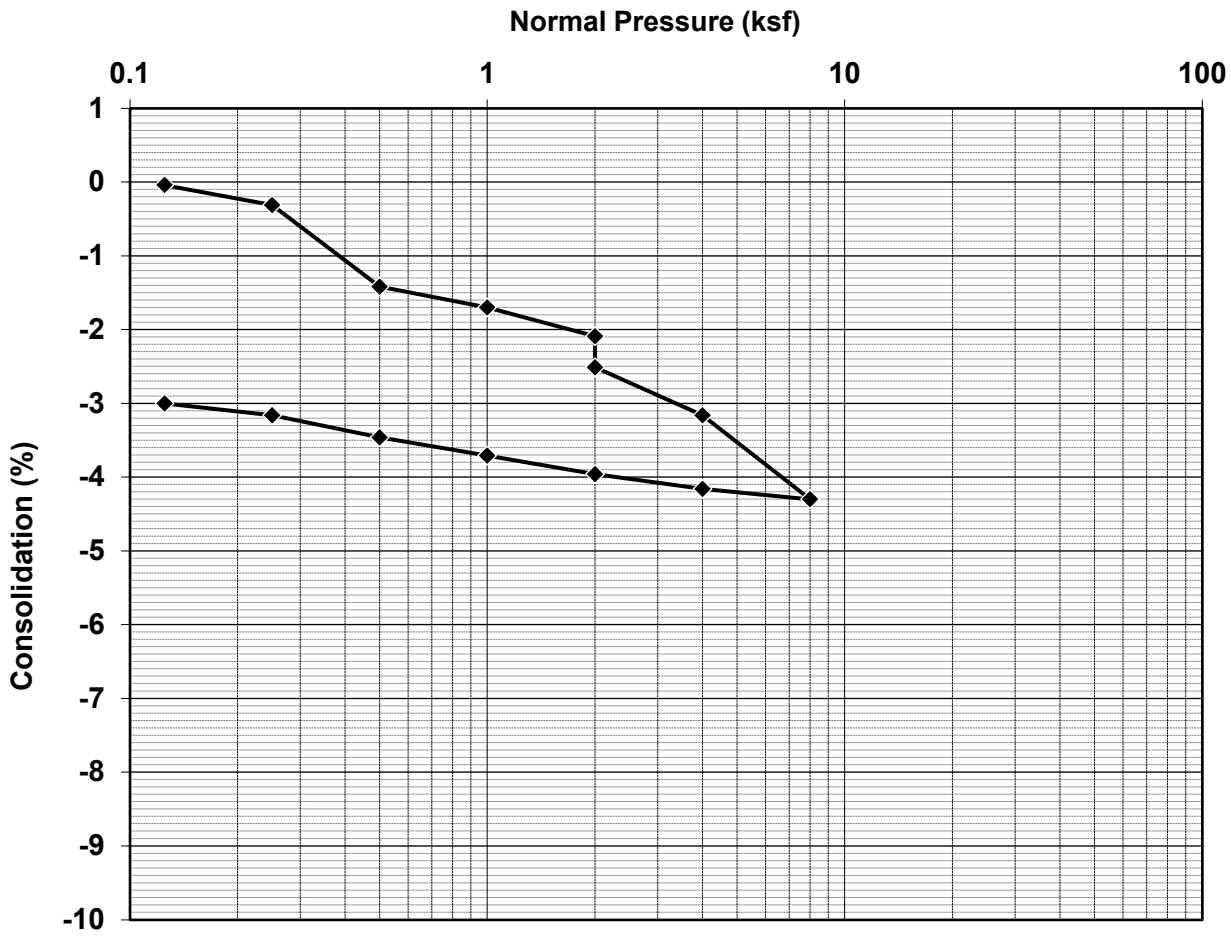
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-9
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand/Sandy Silt
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	8.5%	16.5%
Void Ratio, e	0.37	0.33
Saturation, S	62%	135%
Dry Density (pcf)	122.9	126.7
Wet Density (pcf)	133.4	147.6

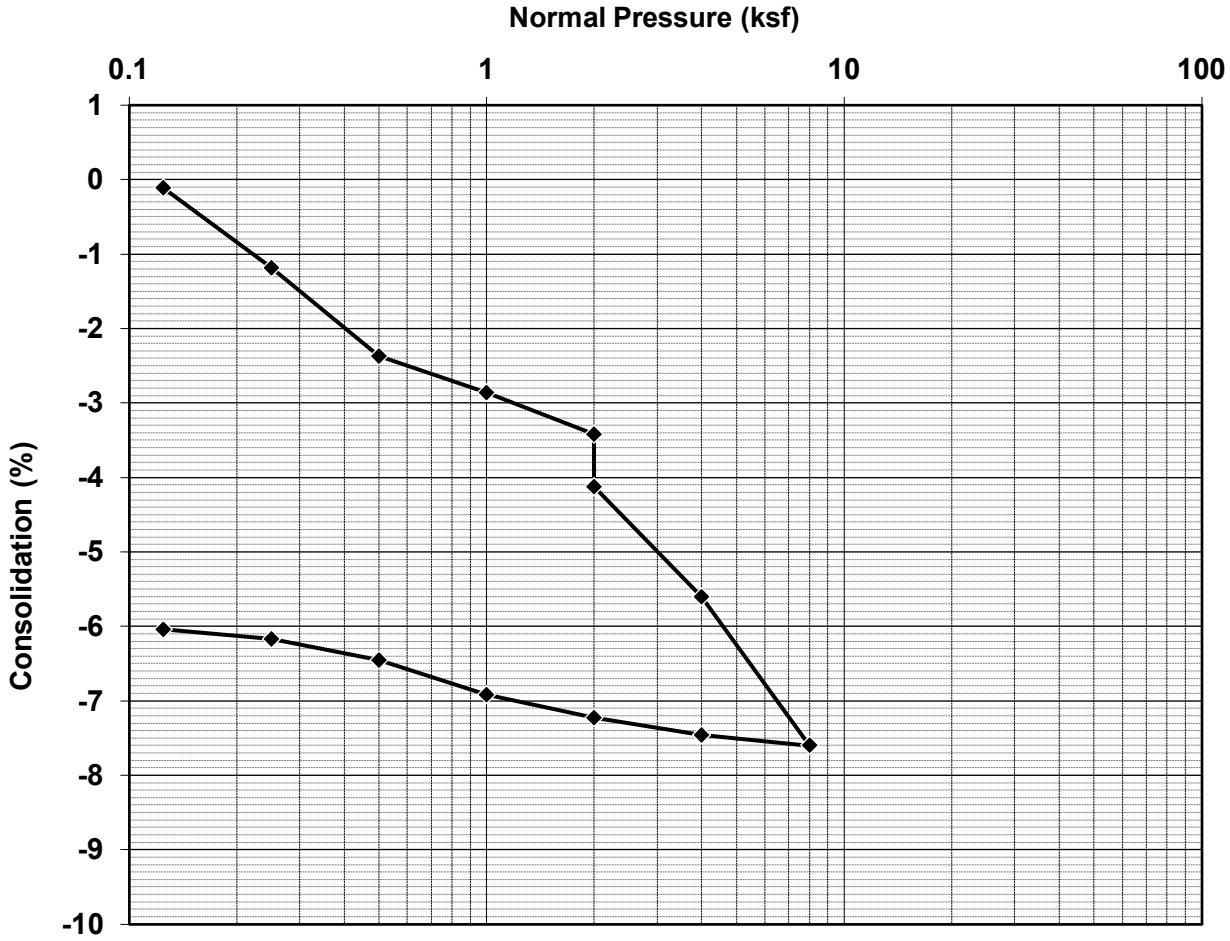
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-10
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.0%	15.9%
Void Ratio, e	0.40	0.31
Saturation, S	14%	138%
Dry Density (pcf)	120.7	128.5
Wet Density (pcf)	123.2	149.0

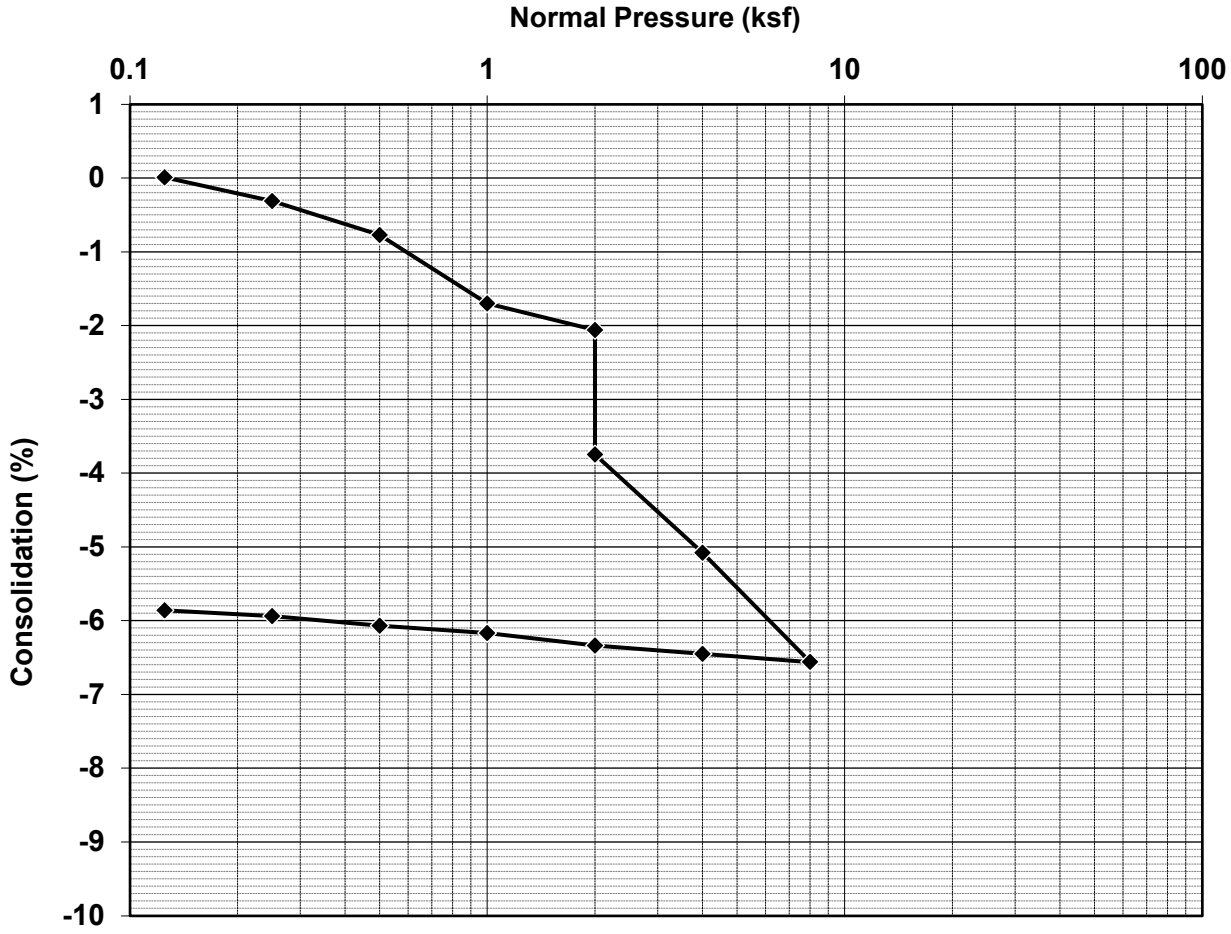
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	10 ft
Project No:	2004-01	Description:	Qal- Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	2.4%	13.0%
Void Ratio, e	0.48	0.39
Saturation, S	13%	89%
Dry Density (pcf)	113.9	121.0
Wet Density (pcf)	116.6	136.7

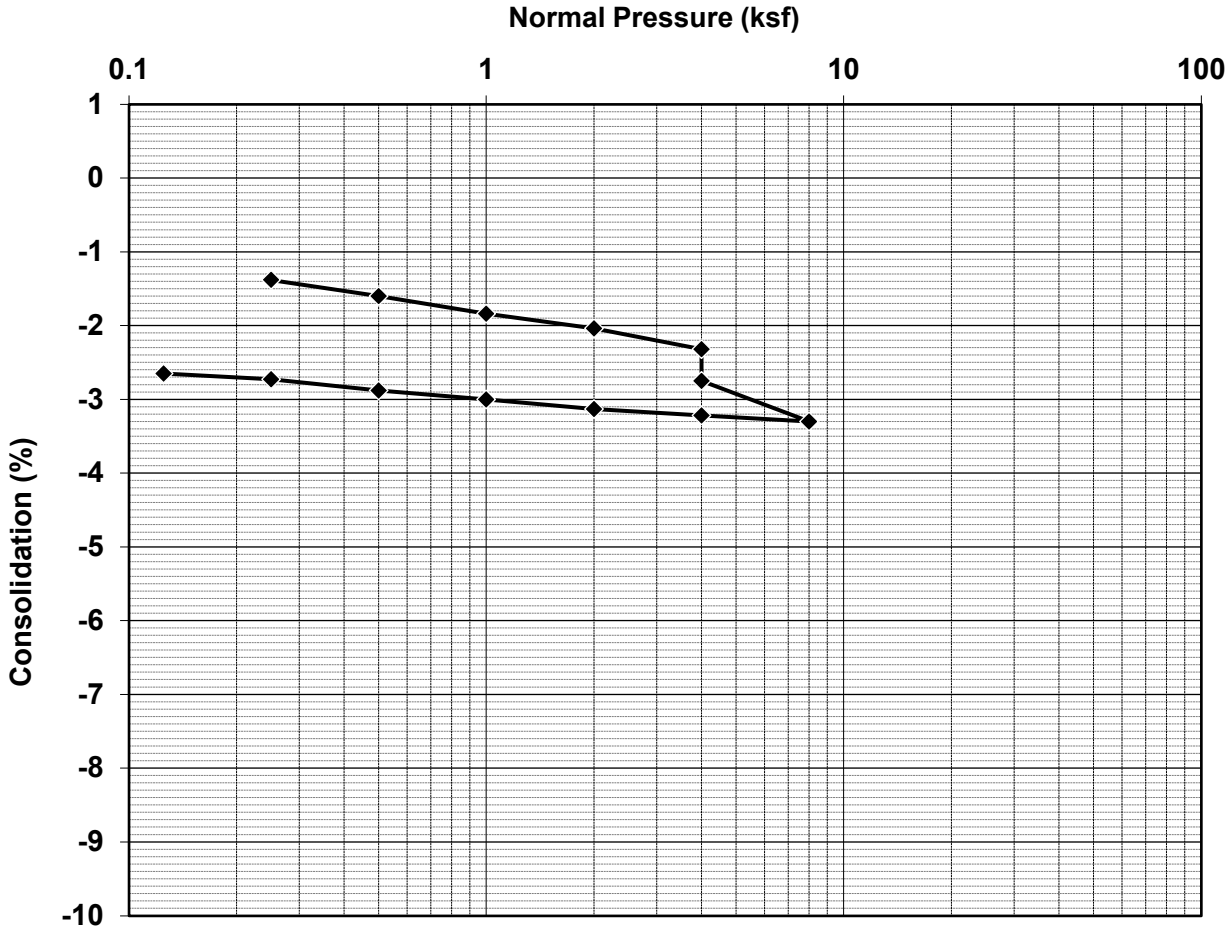
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-13
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.0%	12.0%
Void Ratio, e	0.34	0.31
Saturation, S	71%	106%
Dry Density (pcf)	125.6	129.0
Wet Density (pcf)	136.9	144.5

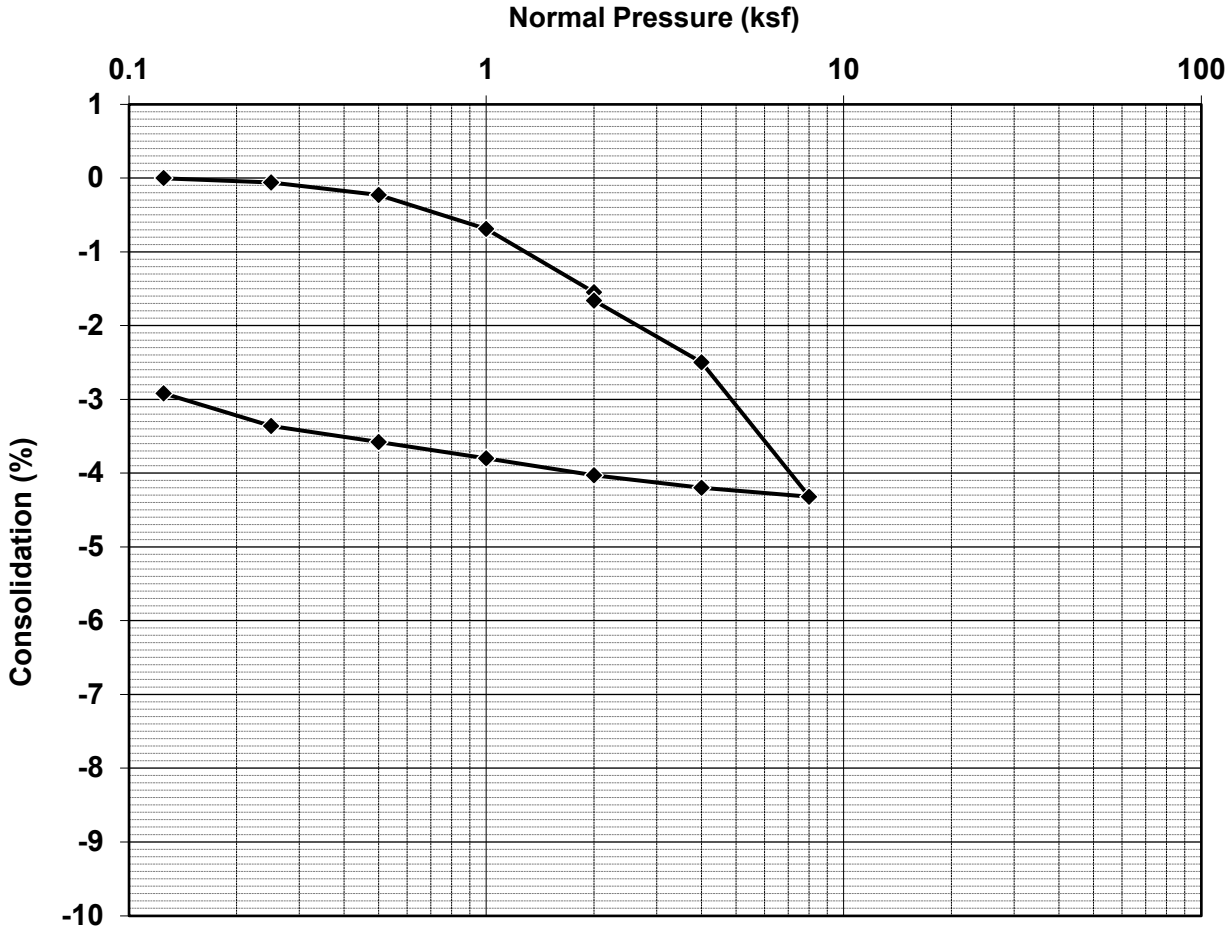
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS -14
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/22/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	5.1%	14.9%
Void Ratio, e	0.40	0.36
Saturation, S	34%	111%
Dry Density (pcf)	120.0	123.6
Wet Density (pcf)	126.1	142.0

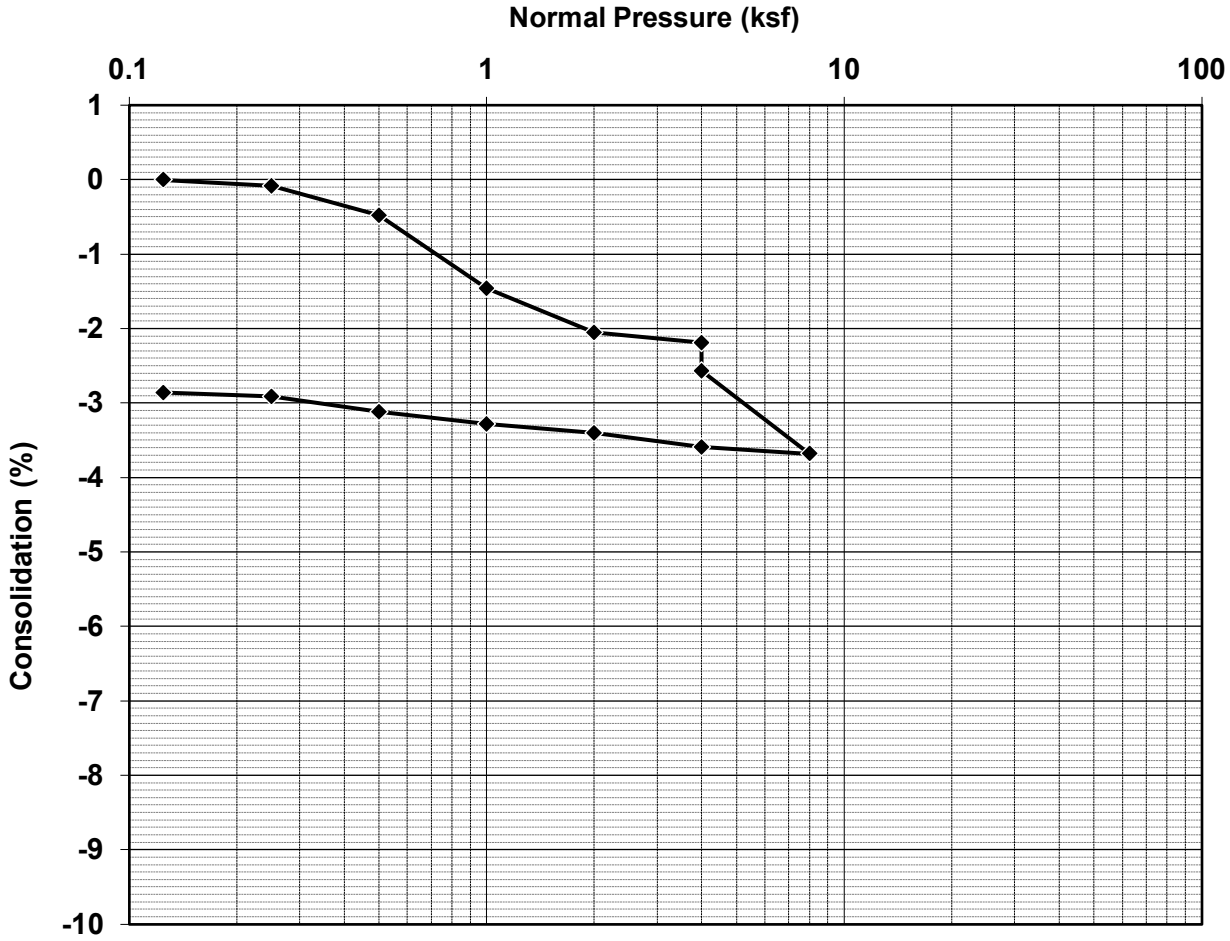
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-15
Location:	Calimesa	Depth:	25 ft
Project No:	2004-01	Description:	Qal- Silty to Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	9.8%	12.5%
Void Ratio, e	0.36	0.32
Saturation, S	74%	106%
Dry Density (pcf)	124.1	127.8
Wet Density (pcf)	136.3	143.8

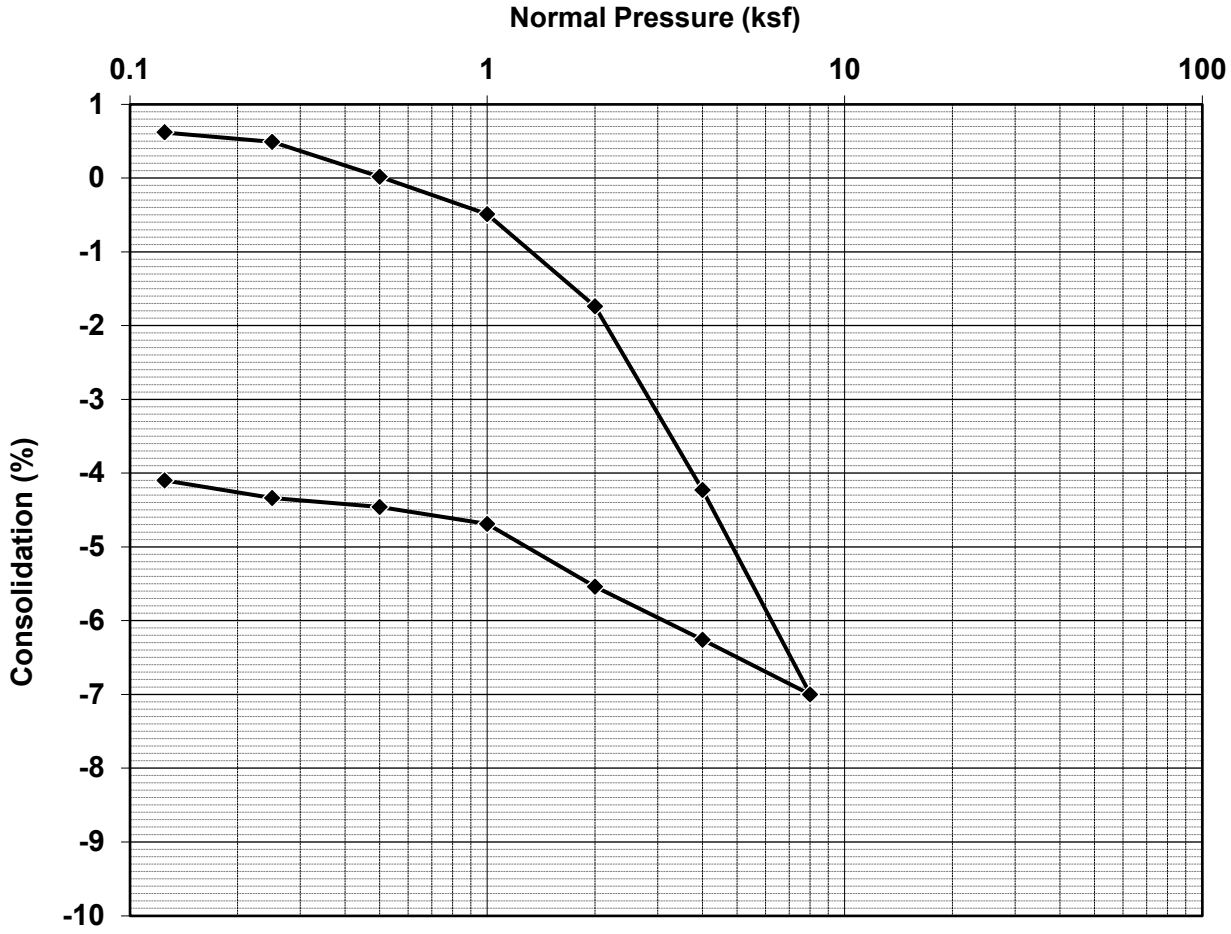
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	10 ft
Project No:	2001-04	Description:	Qal- Silty Clay
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	21.2%	28.0%
Void Ratio, e	0.86	0.78
Saturation, S	67%	97%
Dry Density (pcf)	90.7	94.6
Wet Density (pcf)	109.9	121.1

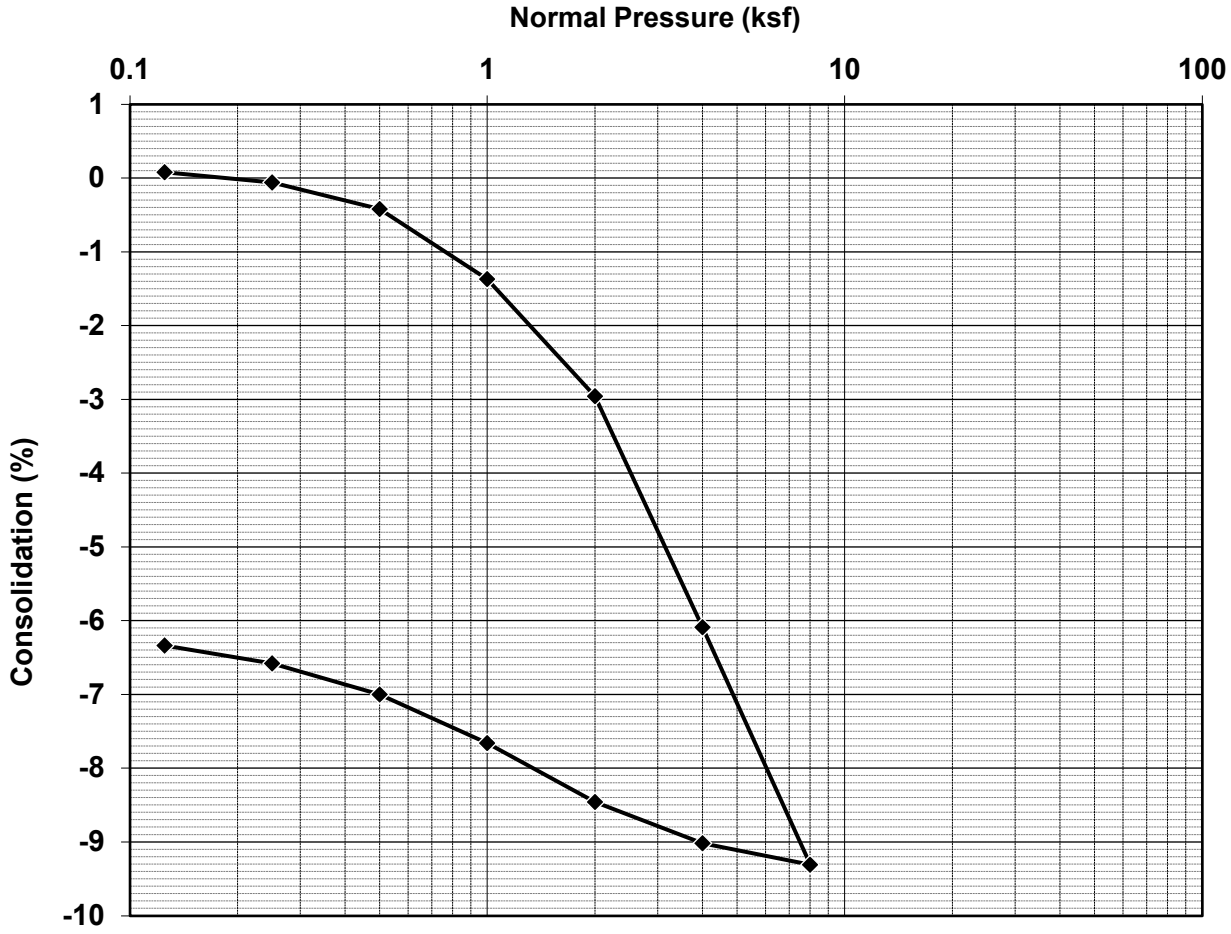
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS 16
Location:	Calimesa, CA	Depth:	20 ft
Project No:	2001-04	Description:	Qal- Silty Clay with Sand
Date:	8/17/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	25.3%	25.5%
Void Ratio, e	0.99	0.86
Saturation, S	69%	80%
Dry Density (pcf)	84.8	90.5
Wet Density (pcf)	106.3	113.6

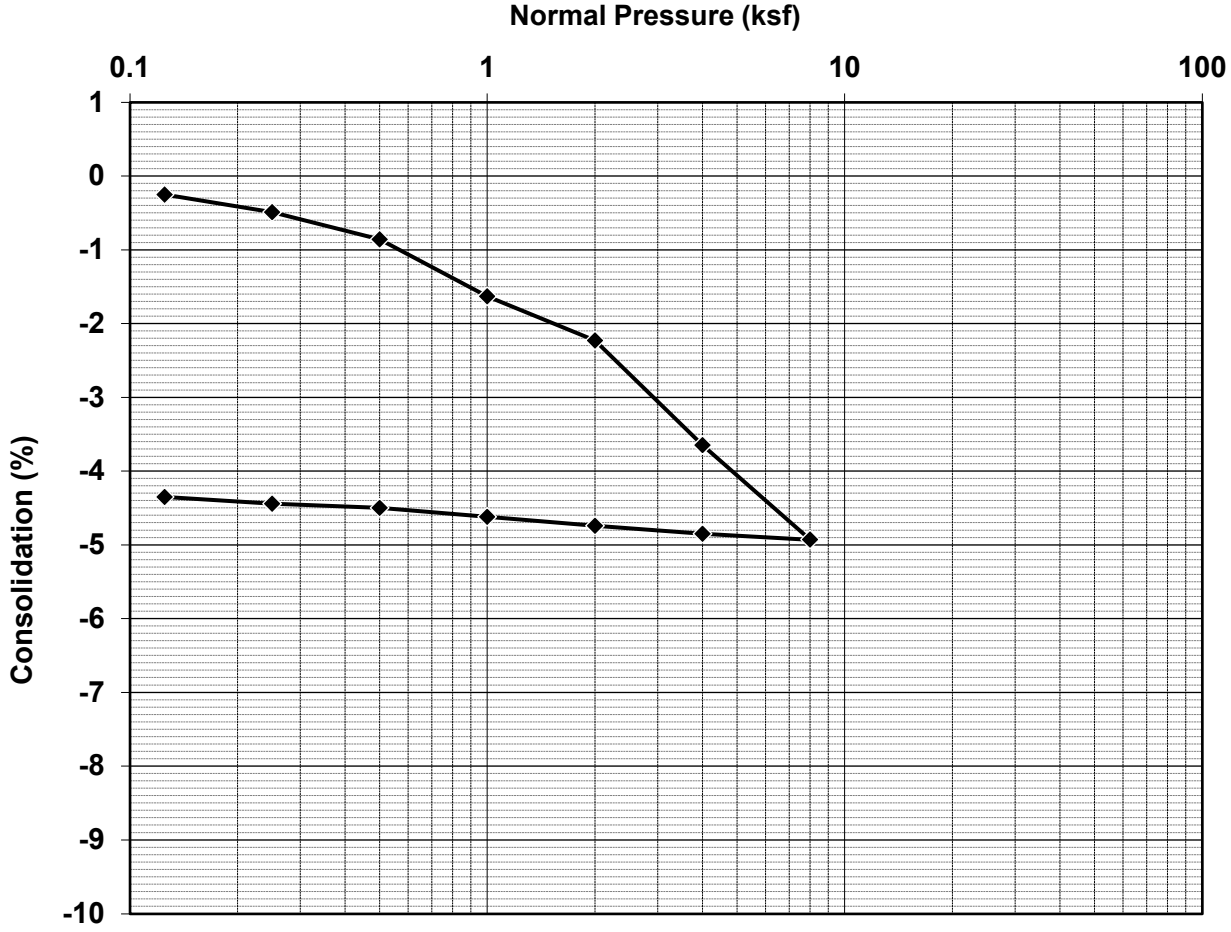
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No:	2004-01	Description:	Qoa- Clayey Sand
Date:	9/29/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	13.9%
Void Ratio, e	0.40	0.34
Saturation, S	84%	112%
Dry Density (pcf)	120.6	126.1
Wet Density (pcf)	135.5	143.6

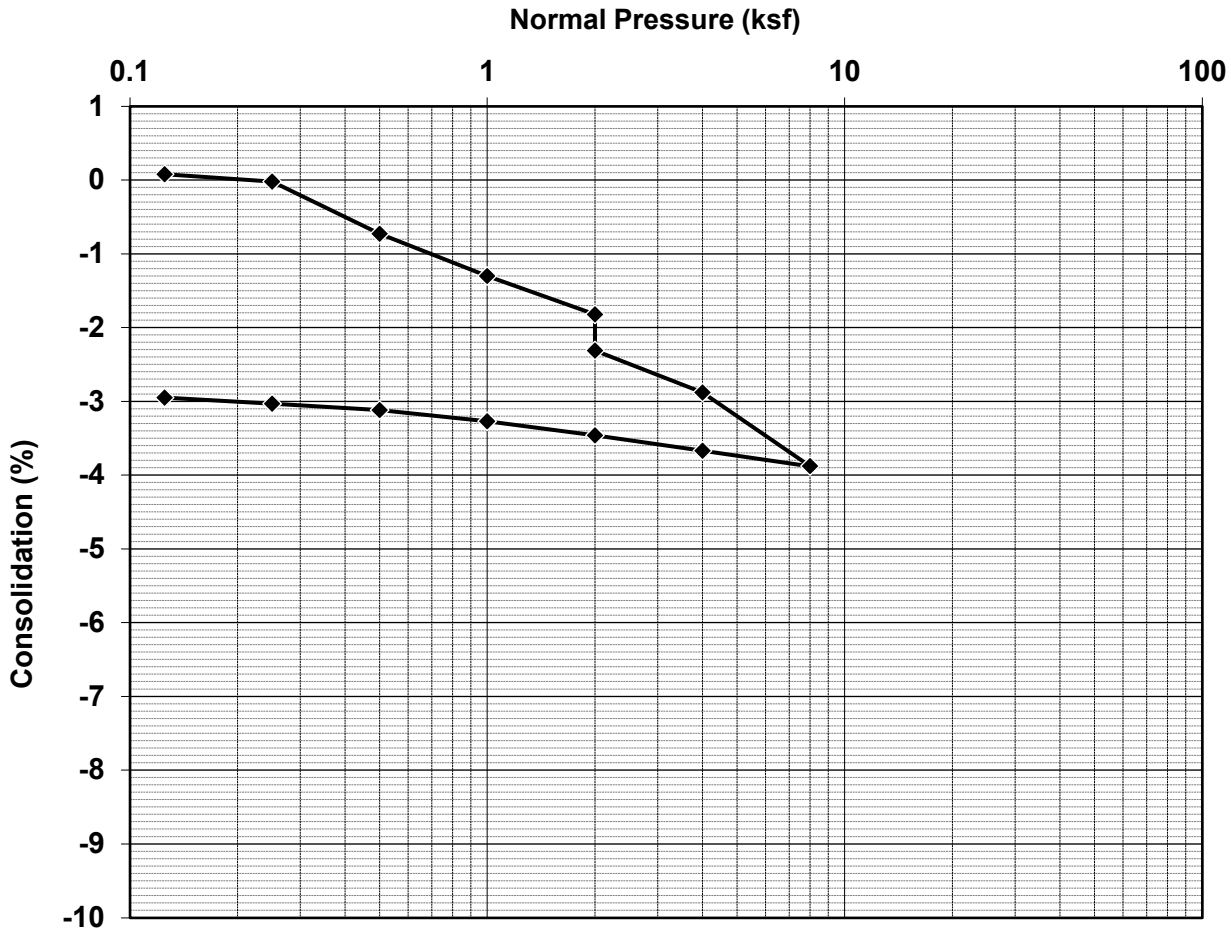
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-17
Location:	Calimesa	Depth:	15 ft
Project No:	2004-01	Description:	Qoa- Silty Sand
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	4.5%	14.1%
Void Ratio, e	0.41	0.37
Saturation, S	30%	104%
Dry Density (pcf)	119.6	123.3
Wet Density (pcf)	125.0	140.6

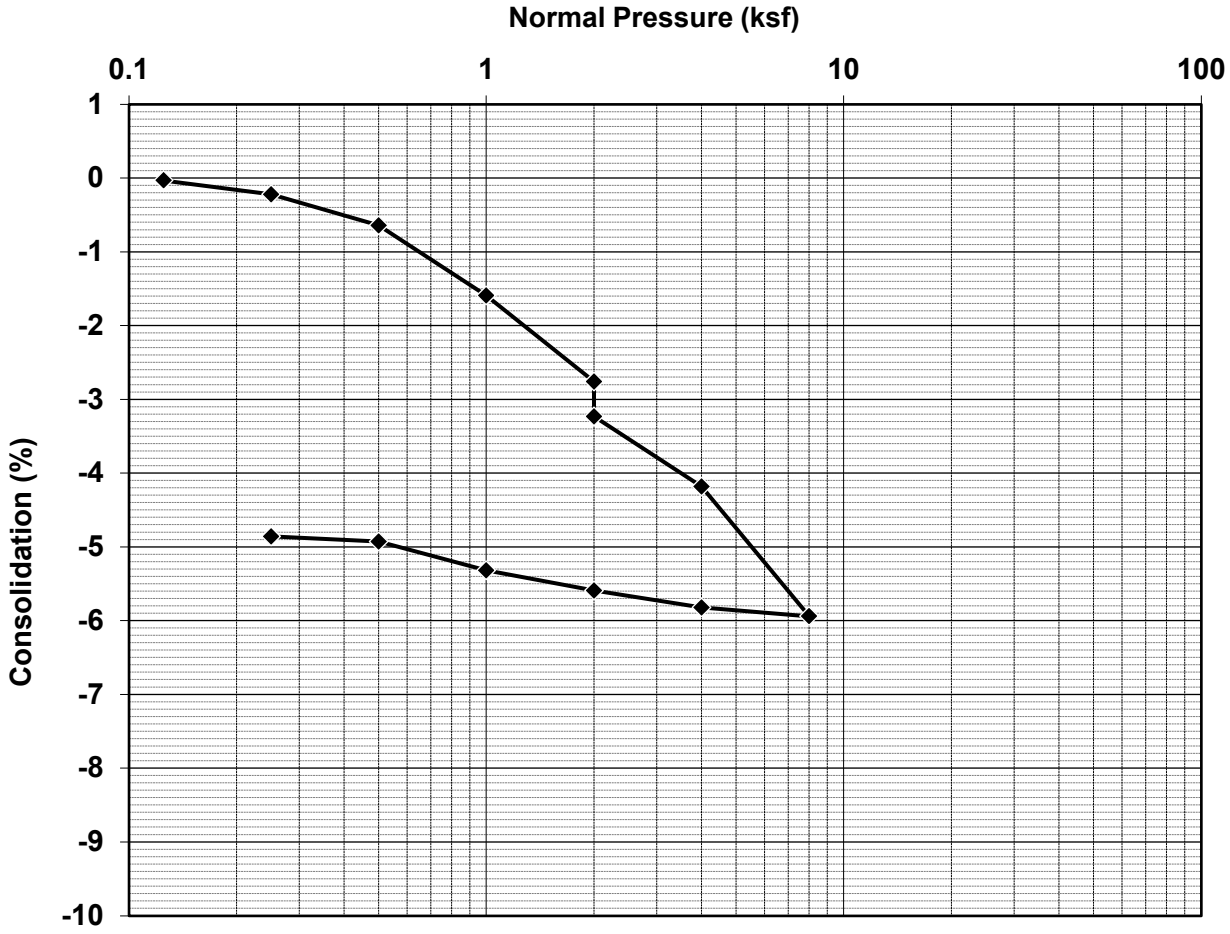
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	Oak Valley Town Center	Excavation:	AGS-18
Location:	Calimesa	Depth:	20 ft
Project No:	2004-01	Description:	Qal- Silty Clay
Date:	9/30/2020	By:	FV

Consolidation-Pressure Curve



Test Description:

	Before Test	After Test
Water Content, w	12.3%	19.0%
Void Ratio, e	0.57	0.50
Saturation, S	58%	103%
Dry Density (pcf)	107.1	112.6
Wet Density (pcf)	120.3	134.0

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

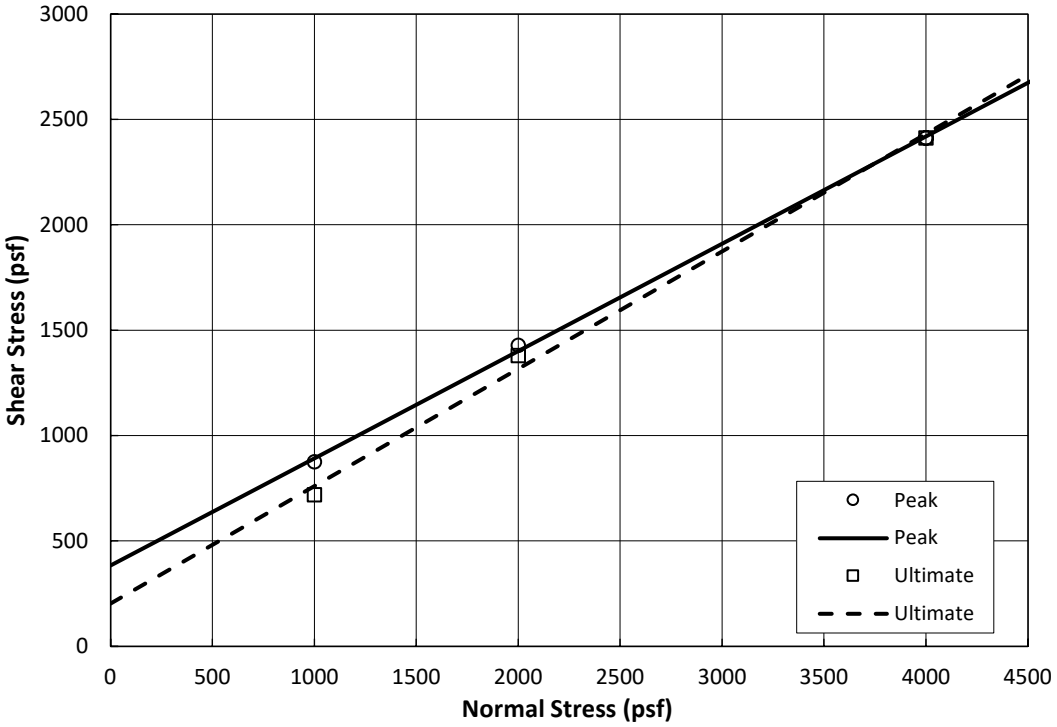
DIRECT SHEAR - ASTM D3080

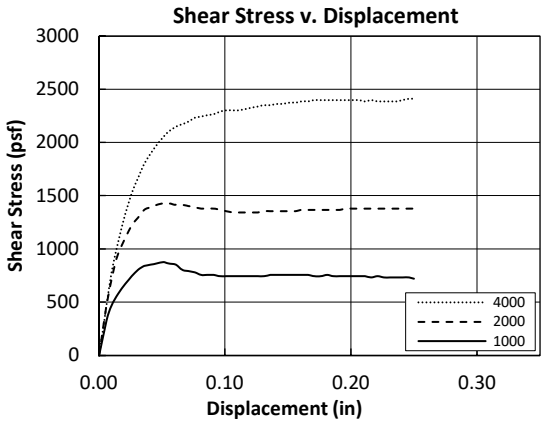
Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/19/2020	Reviewed by:	JC

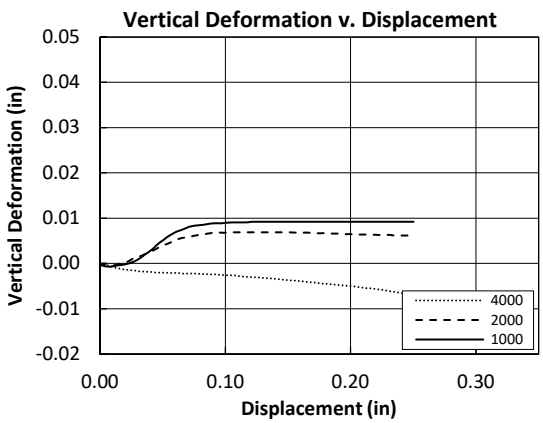
Samples Tested	1	2	3
Intial Moisture (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.5	111.5	111.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	876	1428	2412
Ult. Shear Stress (psf)	720	1380	2412

Soil Type:	Qya
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	27	29
Cohesion (psf)	384	204







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

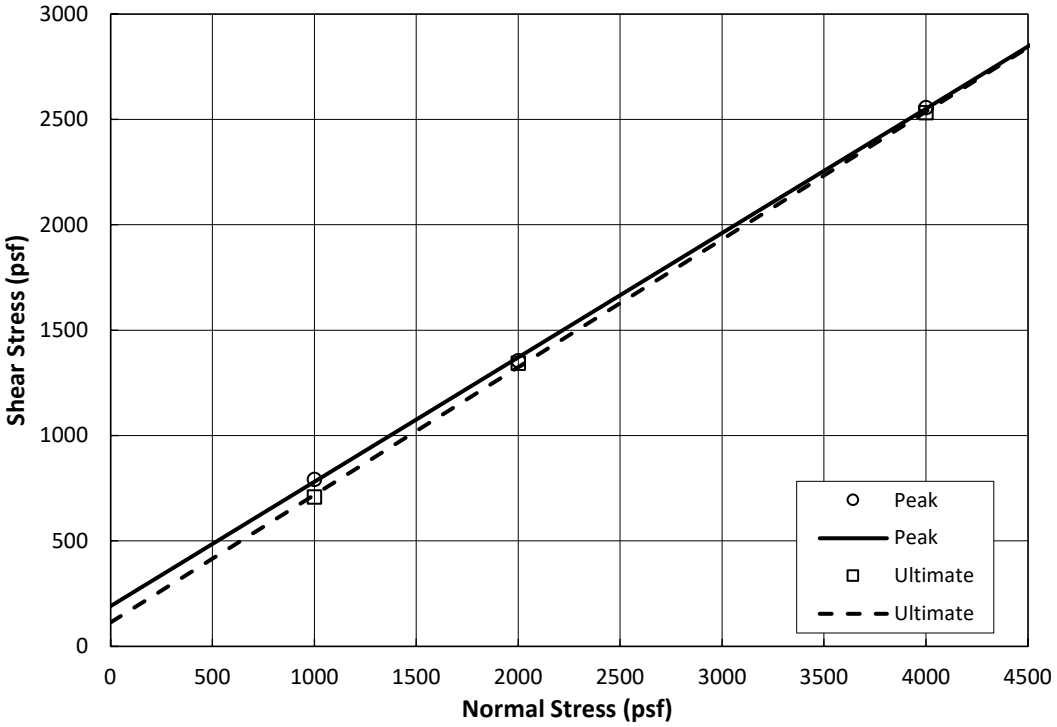
DIRECT SHEAR - ASTM D3080

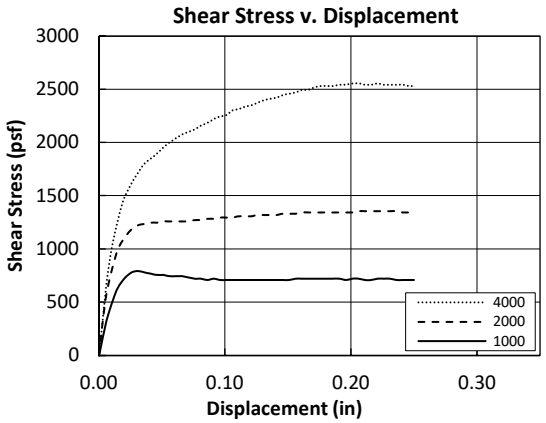
Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
Project No.:	2004-01	Tested by:	FV
Date:	5/20/2020	Reviewed by:	JC

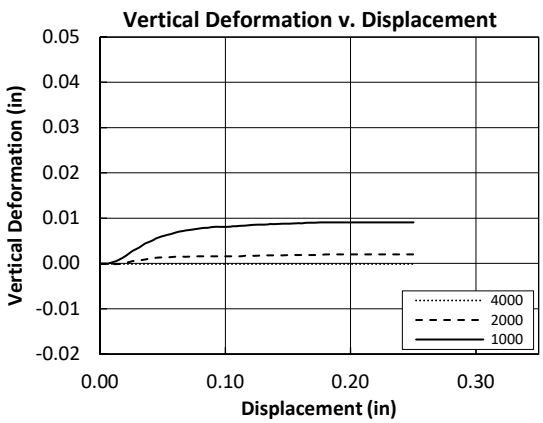
Samples Tested	1	2	3
Intial Moisture (%)	10.5	10.5	10.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	792	1356	2556
Ult. Shear Stress (psf)	708	1344	2532

Soil Type:	Qoa
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	31	31
Cohesion (psf)	192	114







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

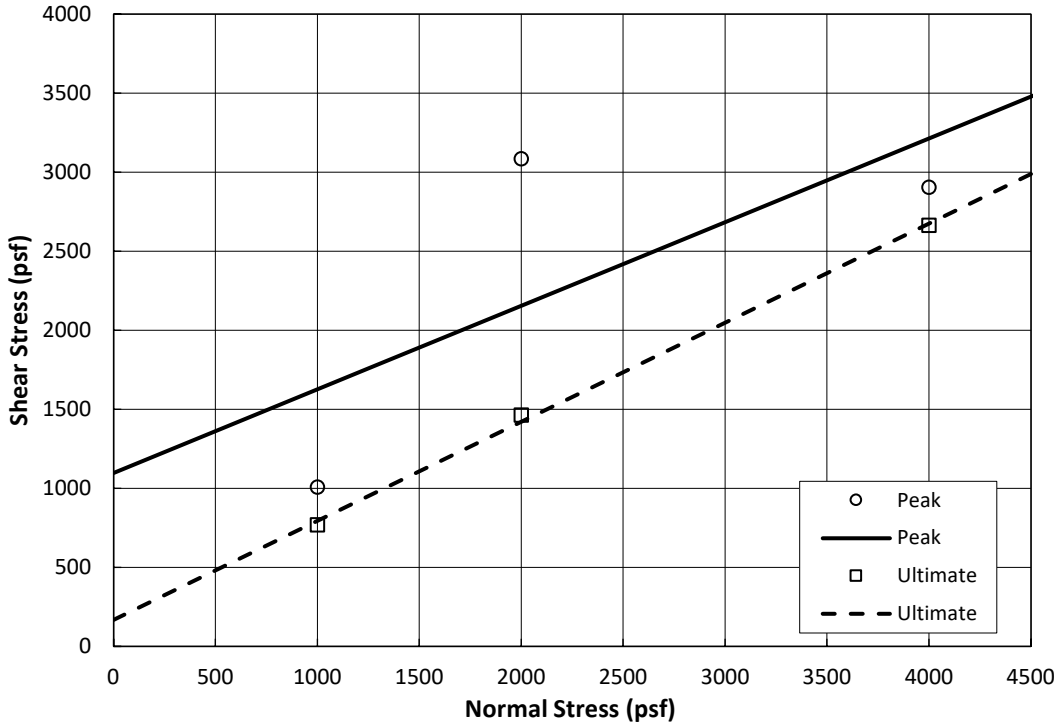
DIRECT SHEAR - ASTM D3080

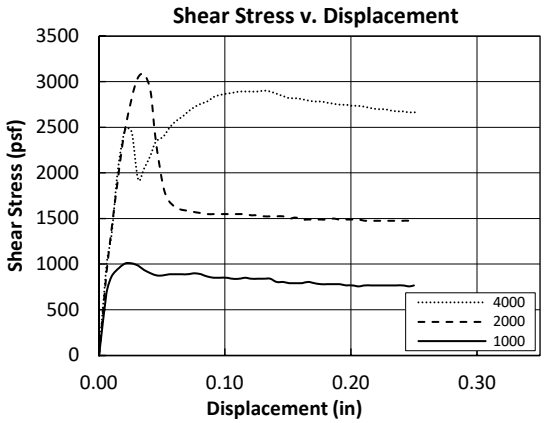
Project Name:	Oak Valley Town Center	Excavation:	AGS-2
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/3/2020	Reviewed by:	SS

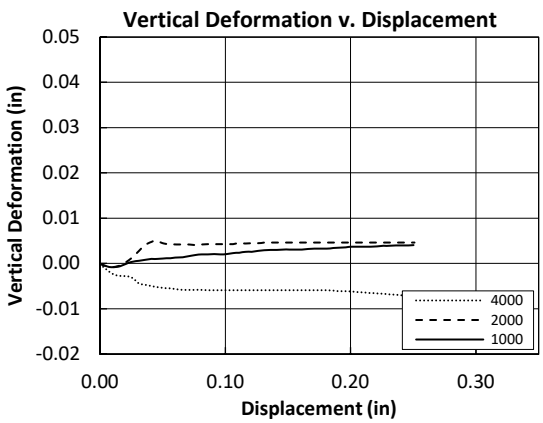
Samples Tested	1	2	3
Intial Moisture (%)	10.2	10.2	10.2
Initial Dry Density (pcf)	113.8	123.7	111.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	3084	2904
Ult. Shear Stress (psf)	768	1464	2664

Soil Type:	Yellowish SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	32
Cohesion (psf)	1098	168







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

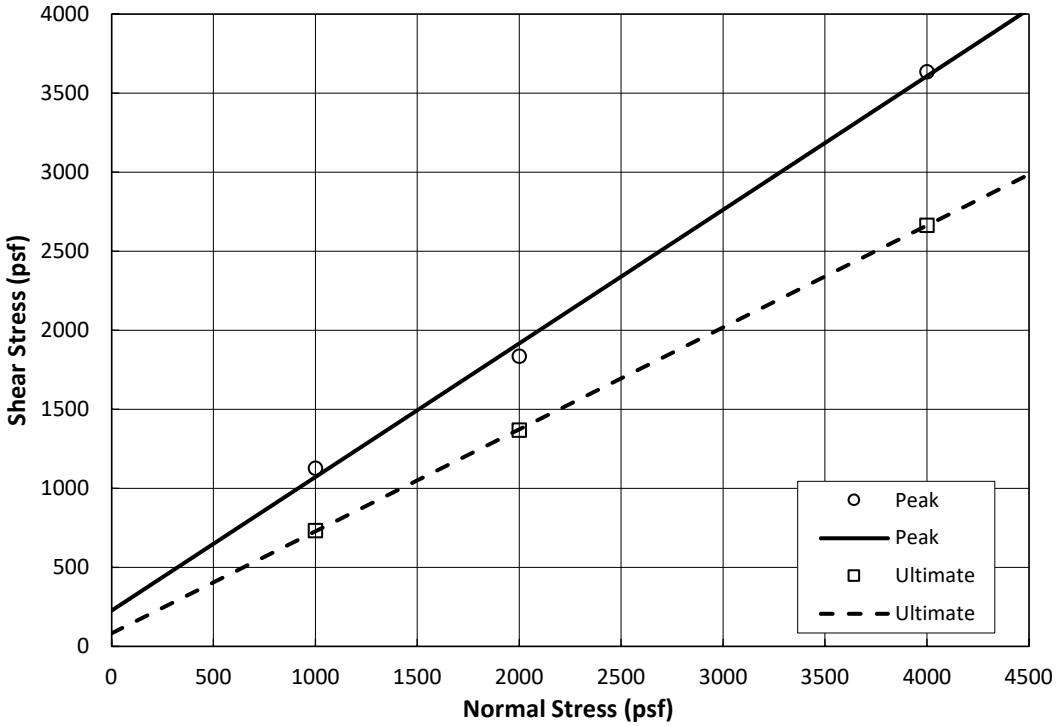
DIRECT SHEAR - ASTM D3080

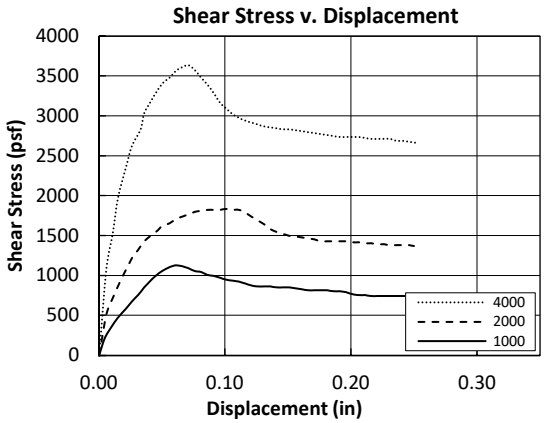
Project Name:	Oak Valley Town Center	Excavation:	AGS-5
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/31/2020	Reviewed by:	SS

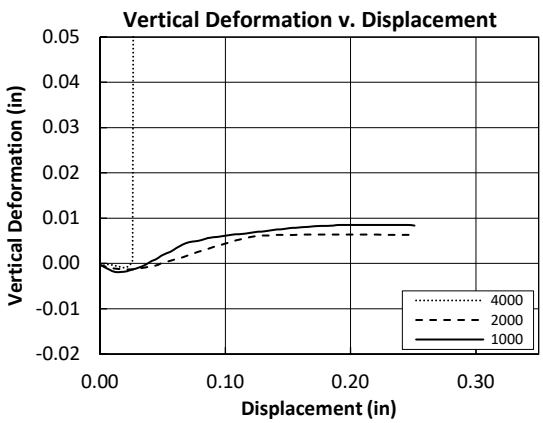
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	122.9	121.1	117.9
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1128	1836	3636
Ult. Shear Stress (psf)	732	1368	2664

Soil Type:	Light Brn SC-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	33
Cohesion (psf)	228	84







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

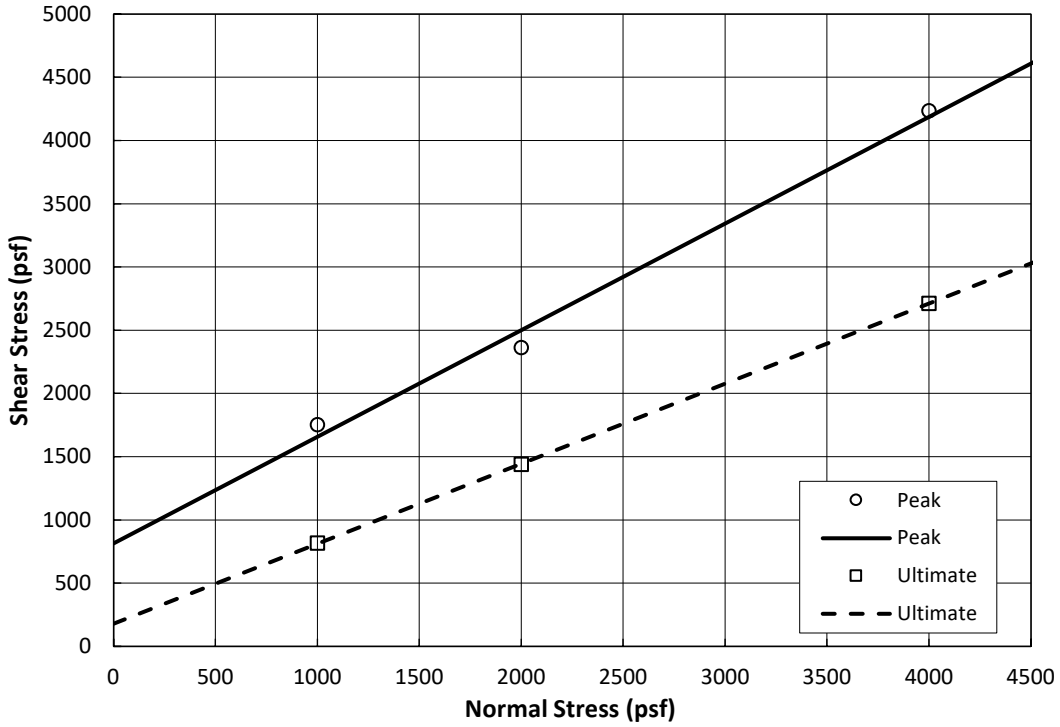
DIRECT SHEAR - ASTM D3080

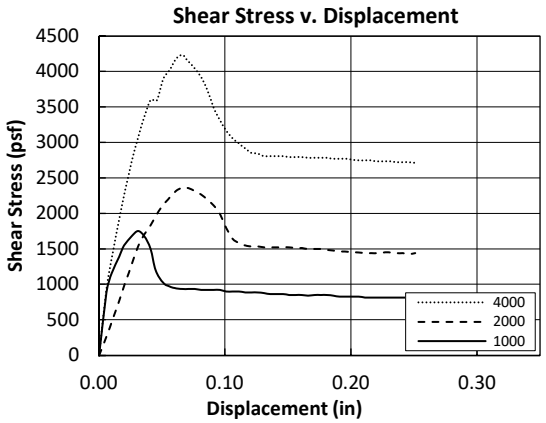
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/10/2020	Reviewed by:	SS

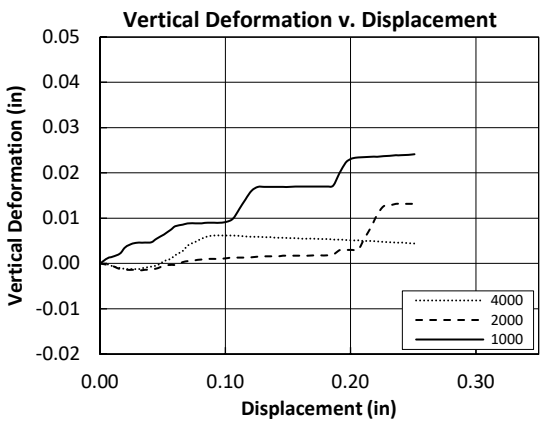
Samples Tested	1	2	3
Intial Moisture (%)	8.6	8.6	8.6
Initial Dry Density (pcf)	121.0	121.8	121.0
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1752	2364	4236
Ult. Shear Stress (psf)	816	1440	2712

Soil Type:	Blue SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	32
Cohesion (psf)	816	180







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

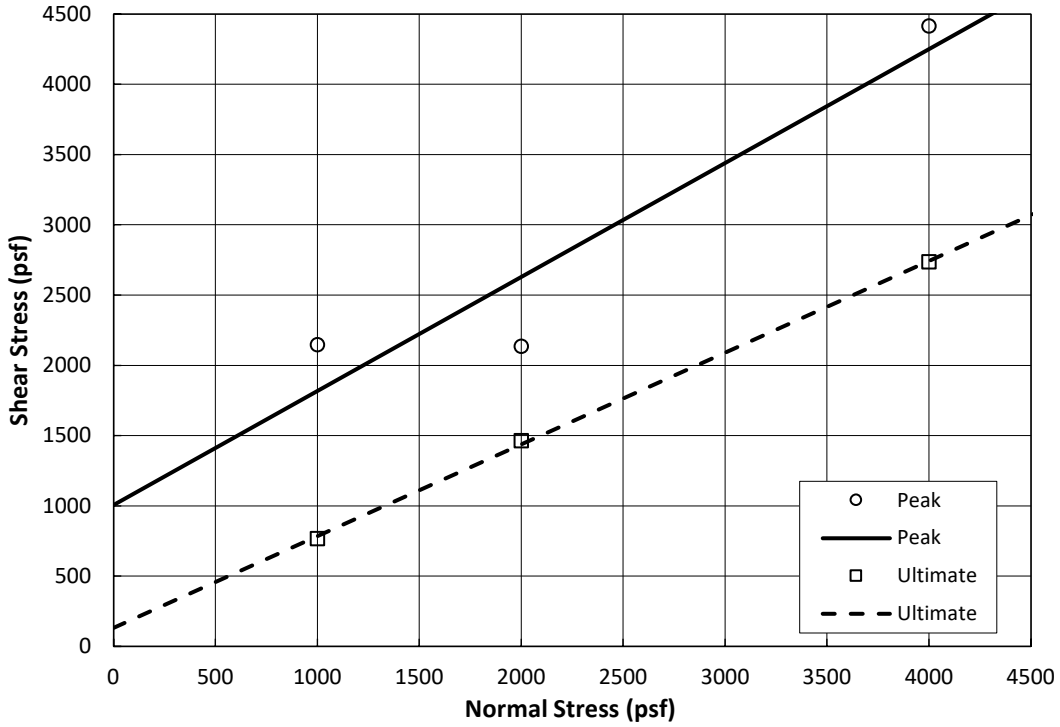
DIRECT SHEAR - ASTM D3080

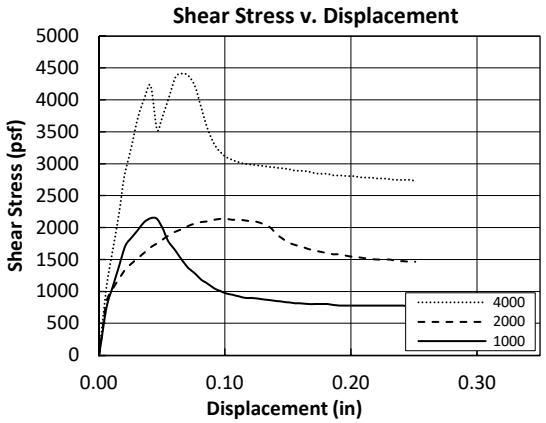
Project Name:	Oak Valley Town Center	Excavation:	AGS-6
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	9/4/2020	Reviewed by:	SS

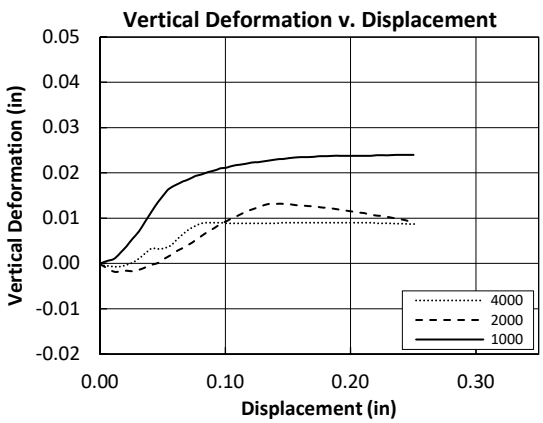
Samples Tested	1	2	3
Intial Moisture (%)	11.7	11.7	11.7
Initial Dry Density (pcf)	120.0	118.0	119.1
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	2148	2136	4416
Ult. Shear Stress (psf)	768	1464	2736

Soil Type:	Olive ML-SM
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	39	33
Cohesion (psf)	1008	132







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

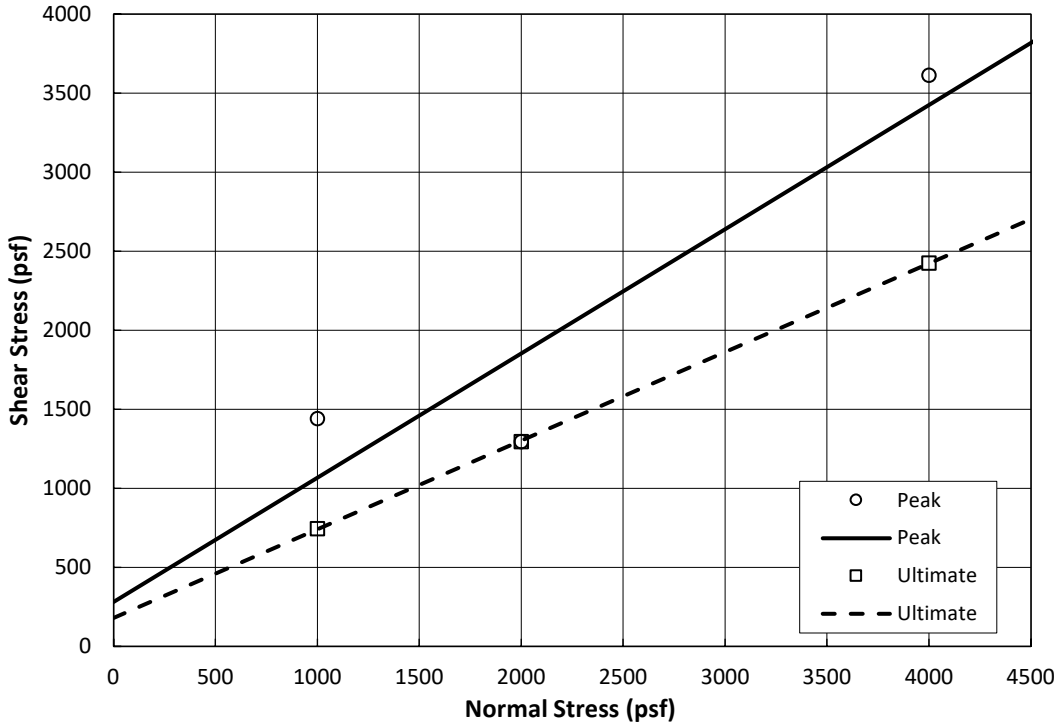
DIRECT SHEAR - ASTM D3080

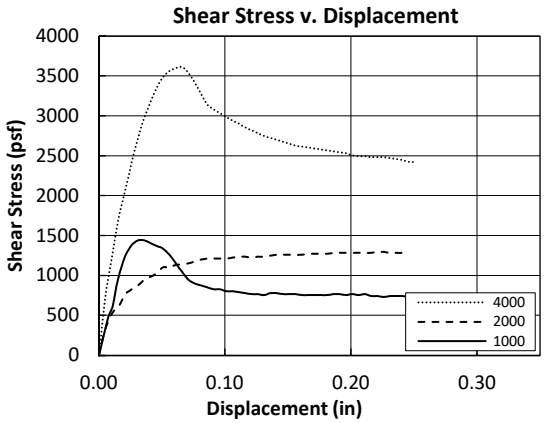
Project Name:	Oak Valeey Town Center	Excavation:	AGS-8
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	8/28/2020	Reviewed by:	SS

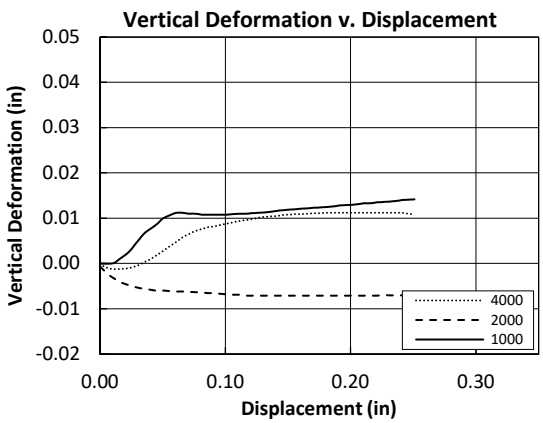
Samples Tested	1	2	3
Intial Moisture (%)	11.4	11.4	11.4
Initial Dry Density (pcf)	120.5	120.9	121.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1440	1296	3612
Ult. Shear Stress (psf)	744	1296	2424

Soil Type:	Olive SM-ML
Test:	Undisturbed
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	38	29
Cohesion (psf)	282	180







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 05/20/2020

P.O. NO.: Chain of Custody

LAB NO.: C-3816

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 2004-01
Project: Oak Valley Town Center
Date sampled: 05/18/2020
Sample ID: T-2 @ 8'-9'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
7.5	7,600	292	111

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Oak Valley Town Center	Excavation/Tract:	T-2
Location:	Calimesa	Depth/Lot:	6-9 ft
P/W:	2004-01	Description:	Qya
Date:	5/21/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	108.3
Initial Moisture Content (%):	10.4
Initial Saturation (%):	50.6
Final Dry Density (pcf):	106.8
Final Moisture Content (%):	20.1
Final Saturation (%):	93.9
Expansion Index:	14
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

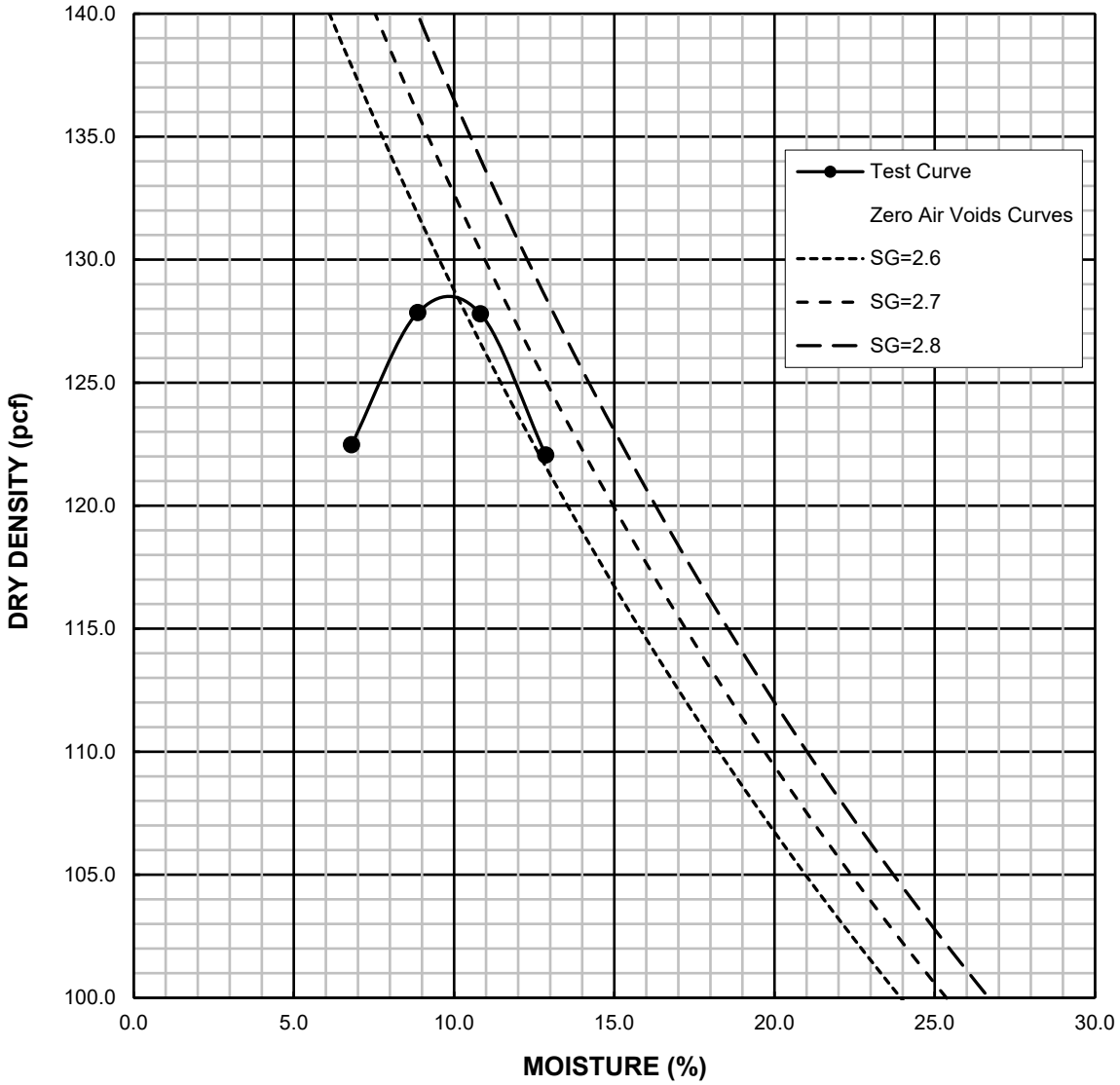
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-3
Location:	Calimesa	Depth:	8-10 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	FV
		Checked by:	SS

Method:	A	Oversize Retained: 25 %		
Point No.	1	2	3	4
Dry Density (pcf)	122.5	127.9	127.8	122.1
Moisture Content (%)	6.8	8.9	10.8	12.9

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**136.3 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**128.5 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

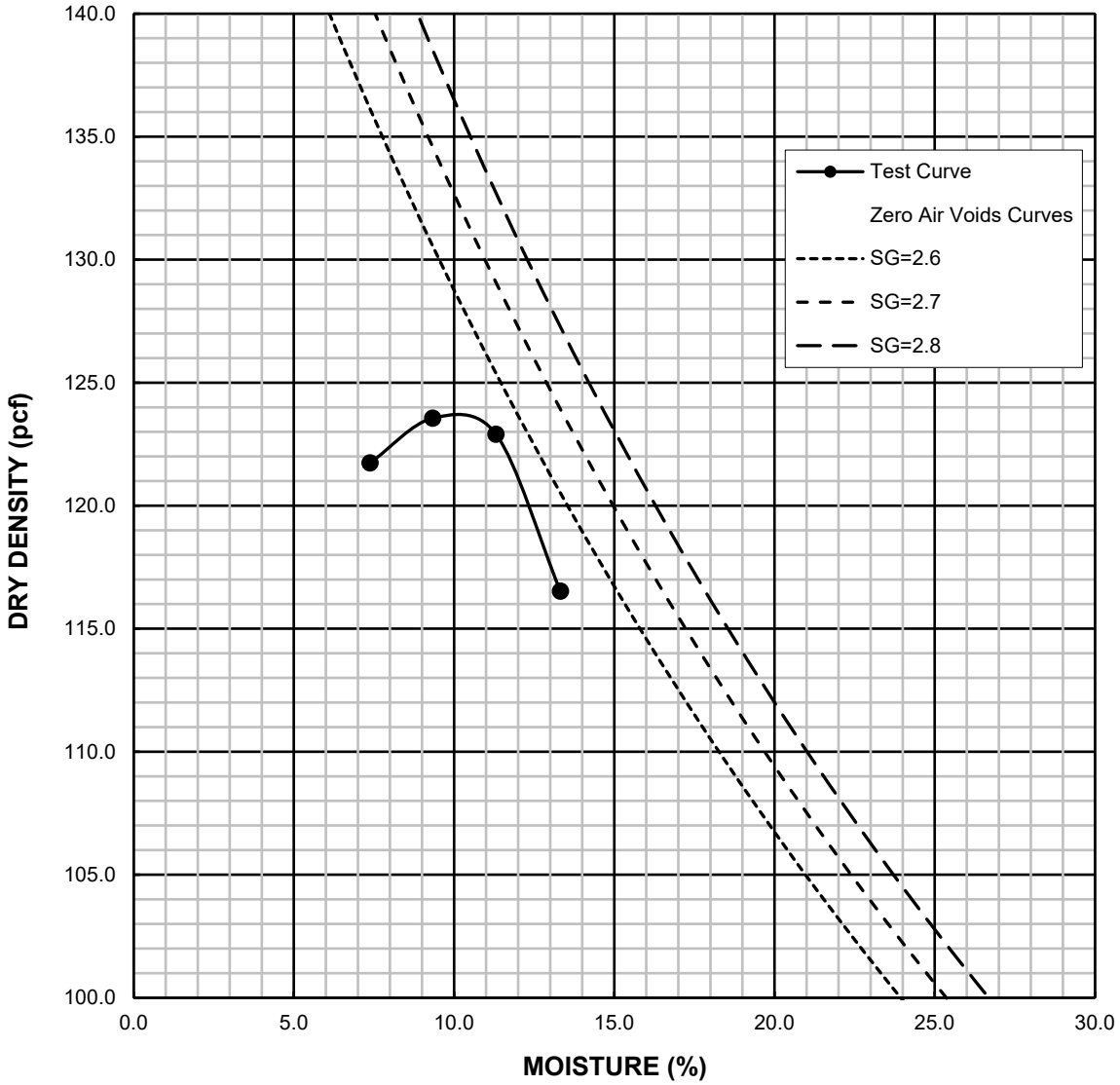
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-9
Location:	Calimesa	Depth:	1-3 ft
P/W No.:	2004-01	Soil Type:	Qya
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 2.9 %		
Point No.	1	2	3	4
Dry Density (pcf)	121.7	123.6	122.9	116.5
Moisture Content (%)	7.4	9.3	11.3	13.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**124.8 pcf**	Corrected Moisture	**9.7** %
Max. Dry Density	**123.9 pcf**	Optimum Moisture	**10.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

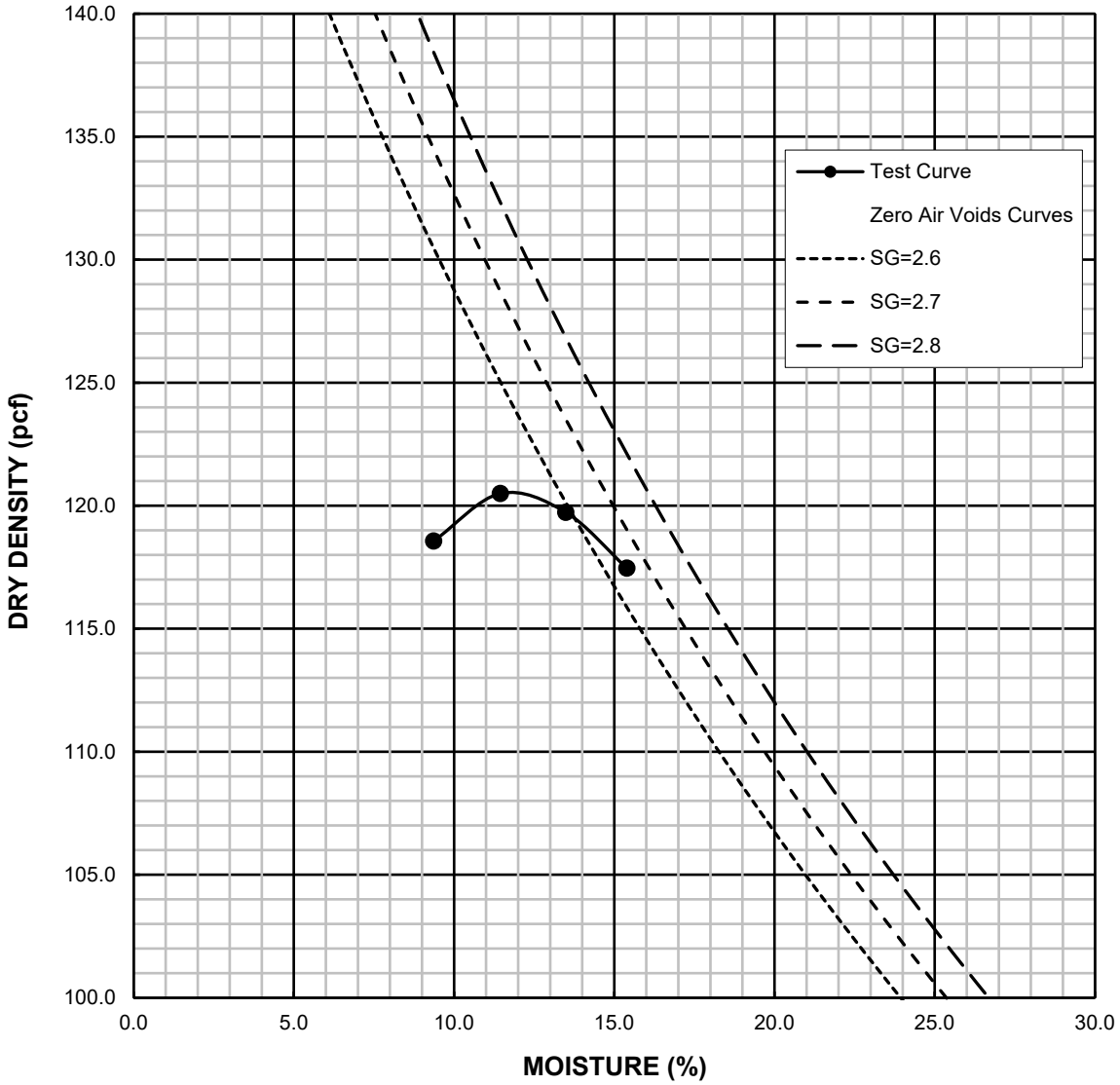
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-16
Location:	Calimesa	Depth:	7-9 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	DC
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.6	120.5	119.7	117.5
Moisture Content (%)	9.4	11.4	13.5	15.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**123.9 pcf**	Corrected Moisture	**9.9** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

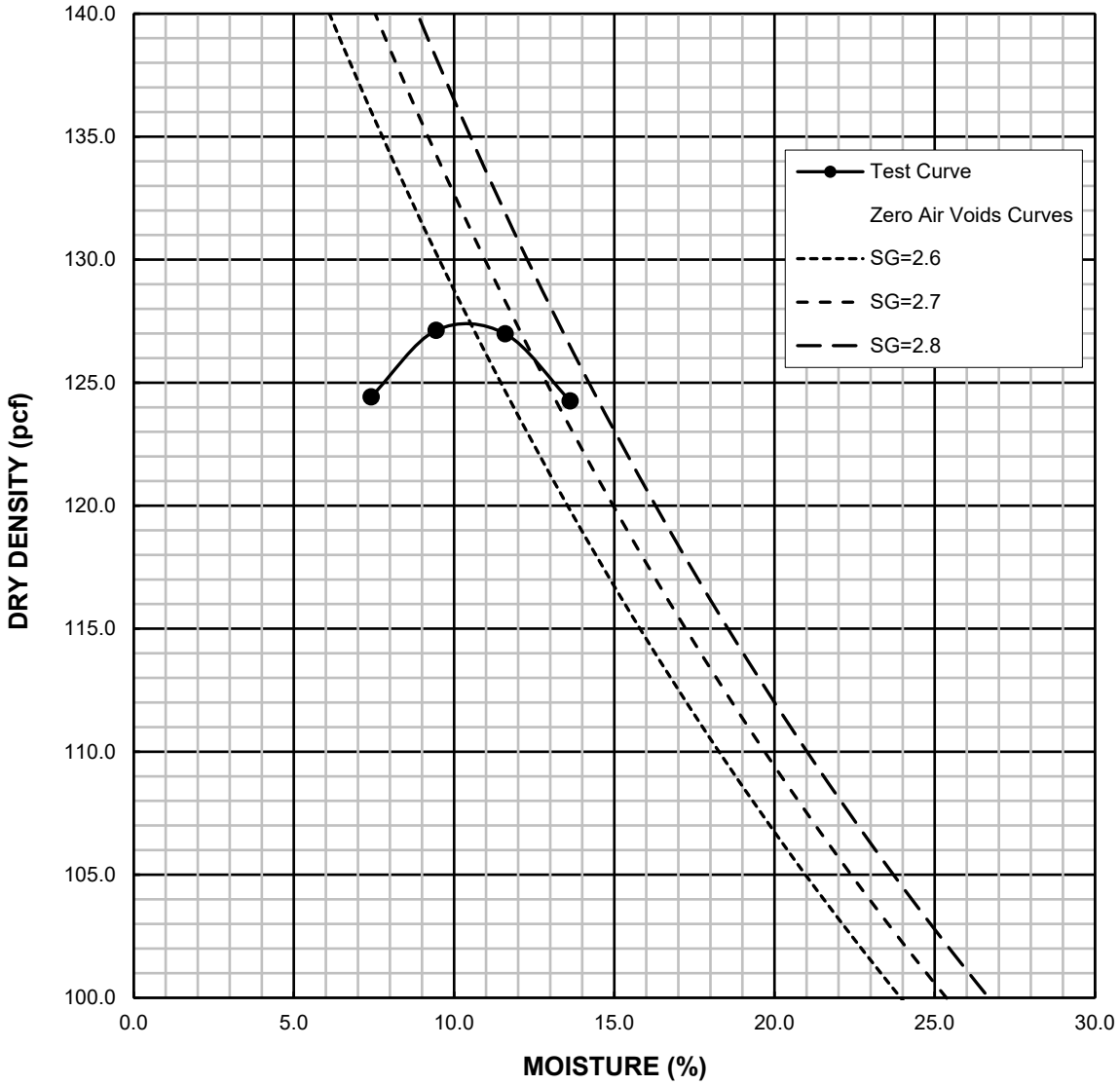
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-18
Location:	Calimesa	Depth:	6-7 ft
P/W No.:	2004-01	Soil Type:	Qoa
Date:	05-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	124.4	127.1	127.0	124.3
Moisture Content (%)	7.4	9.4	11.6	13.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**130.6 pcf**	Corrected Moisture	**9.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**10.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

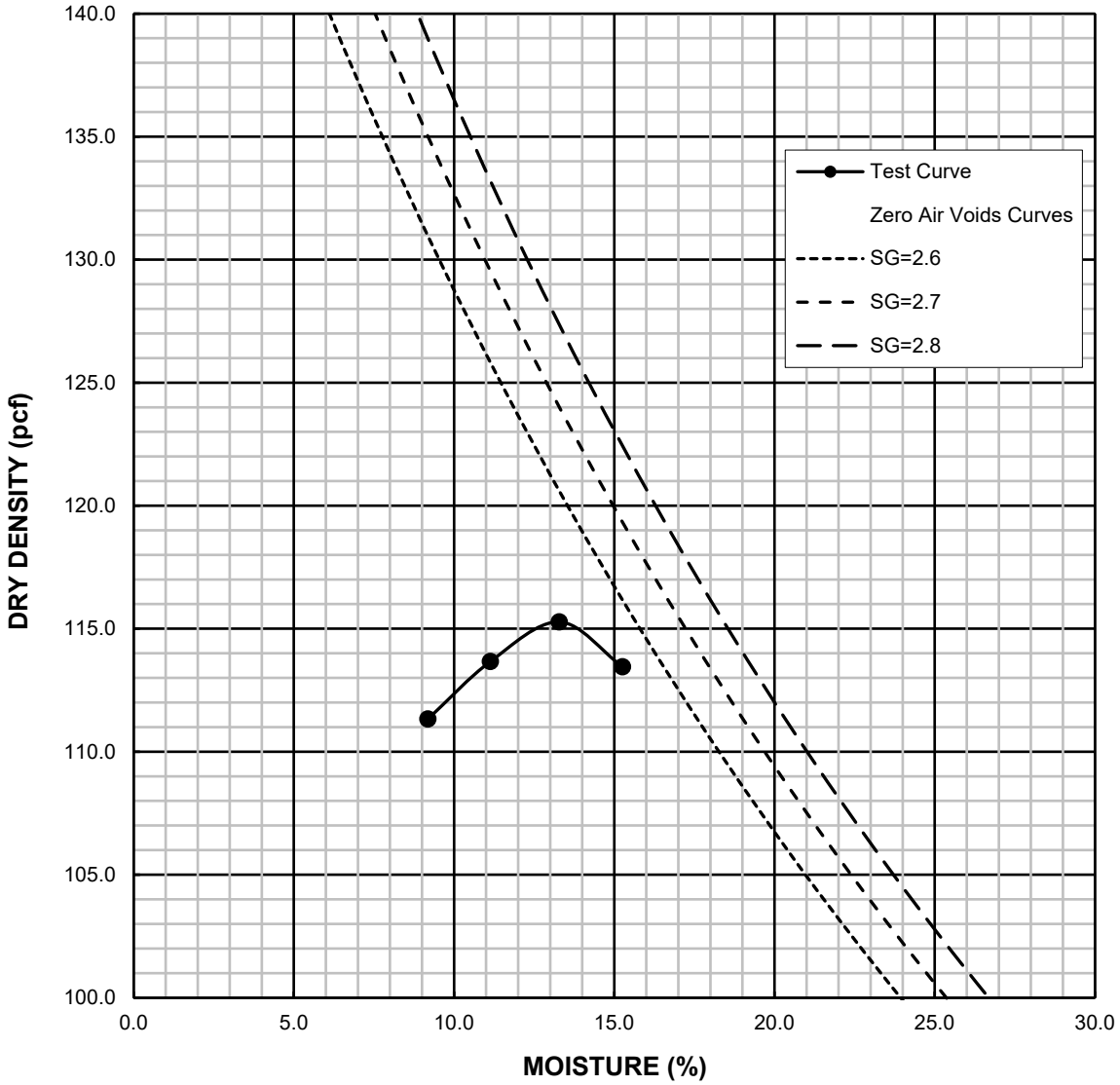
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Oak Valley Town Center	Excavation:	T-19
Location:	Calimesa	Depth:	6-9 ft
P/W No.:	2004-01	Soil Type:	Qlo
Date:	05-2019	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	111.3	113.7	115.3	113.5
Moisture Content (%)	9.2	11.1	13.3	15.3

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**118.7 pcf**	Corrected Moisture	**12.2** %
Max. Dry Density	**115 pcf**	Optimum Moisture	**13.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/24/2020

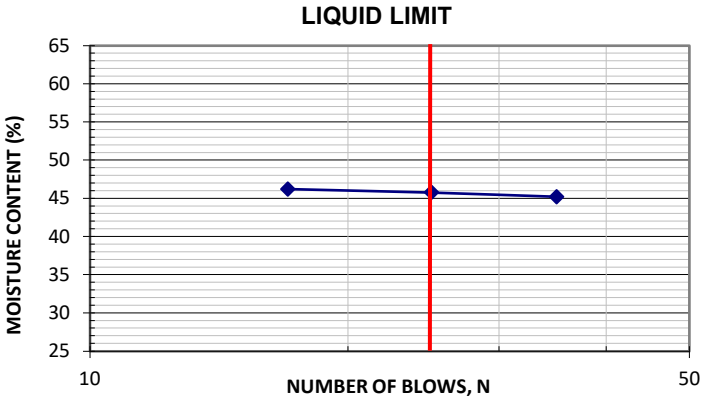
Excavation: AGS-3
Depth: 20 ft
Description: ML
By: FV

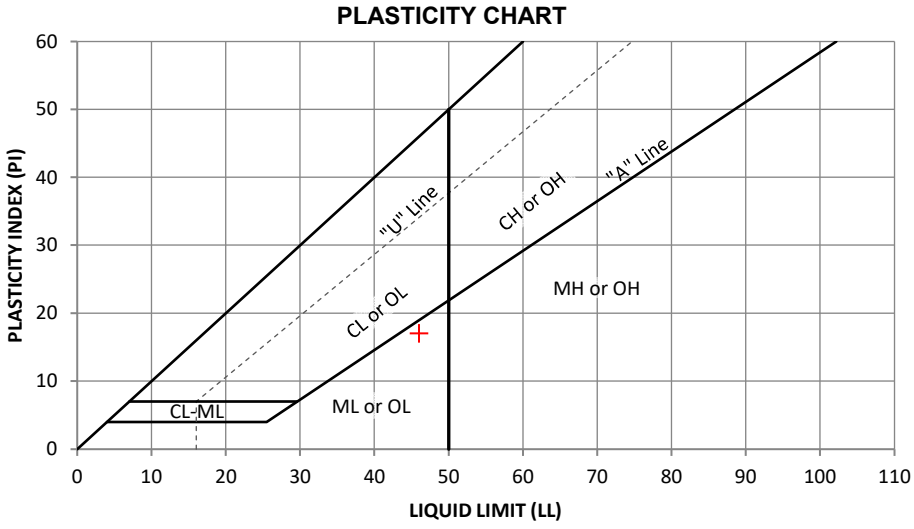
LIQUID LIMIT

Can No.	16	4	2
Wt. wet soil+can (g)	19.20	18.37	19.24
Wt. dry soil+can (g)	16.70	16.09	16.68
Wt. can (g)	11.17	11.11	11.14
Wt. mosture (g)	2.50	2.28	2.56
Wt. dry soil (g)	5.53	4.98	5.54
Water Content %	45.21	45.78	46.21
No. of Blows	35	25	17

PLASTIC LIMIT

101	105
58.85	57.22
57.12	55.77
51.09	50.74
1.73	1.45
6.03	5.03
28.69	28.83





Liquid Limit (LL) 46 Plastic Limit (PL) 29 Plasticity Index (PI) 17

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

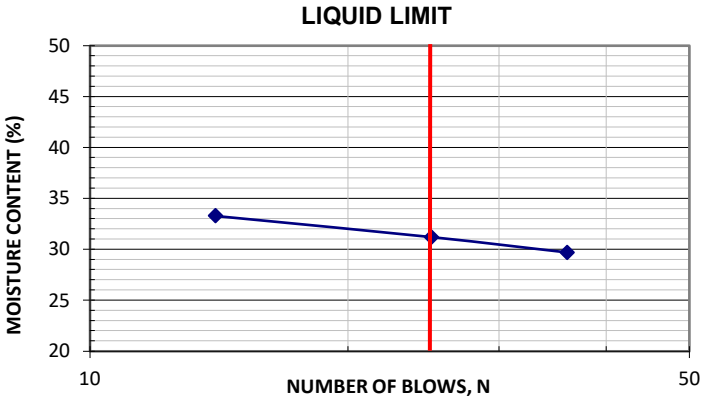
AGS Form E-2

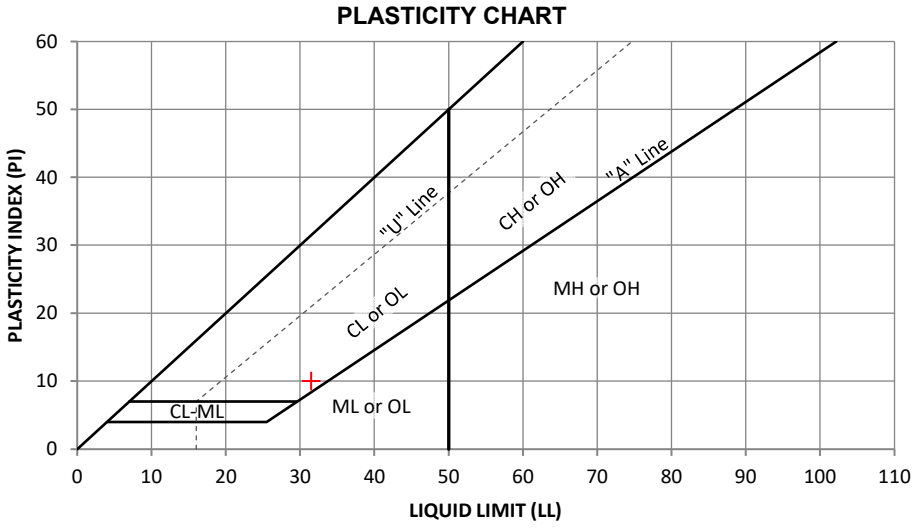
ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 9/21/2020

Excavation: AGS-3
Depth: 30 ft
Description: Grey Brn SC-SM
By: FV

	LIQUID LIMIT			PLASTIC LIMIT	
Can No.	3	11	1	108	102
Wt. wet soil+can (g)	21.32	23.11	23.84	60.31	62.31
Wt. dry soil+can (g)	18.80	20.29	20.96	58.63	60.41
Wt. can (g)	11.23	11.25	11.26	50.93	51.44
Wt. mosture (g)	2.52	2.82	2.88	1.68	1.90
Wt. dry soil (g)	7.57	9.04	9.70	7.70	8.97
Water Content %	33.29	31.19	29.69	21.82	21.18
No. of Blows	14	25	36		





Liquid Limit (LL) 31.5 Plastic Limit (PL) 21.5 Plasticity Index (PI) 10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

Excavation: AGS-3
Depth: 35 ft
Description: ML
By: FV

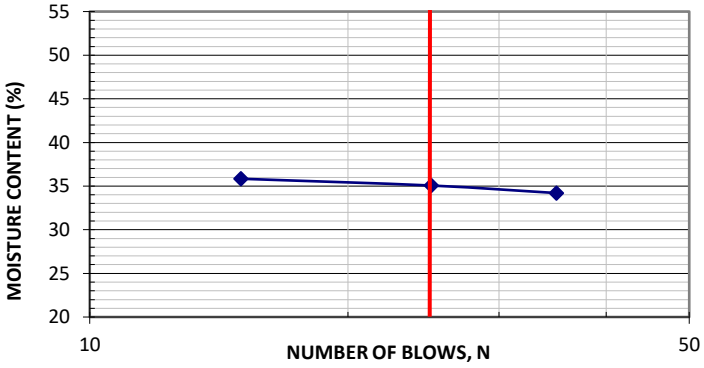
LIQUID LIMIT

Can No.	1	5	11
Wt. wet soil+can (g)	18.84	23.79	24.65
Wt. dry soil+can (g)	16.84	20.55	21.24
Wt. can (g)	11.26	11.31	11.27
Wt. mosture (g)	2.00	3.24	3.41
Wt. dry soil (g)	5.58	9.24	9.97
Water Content %	35.84	35.06	34.20
No. of Blows	15	25	35

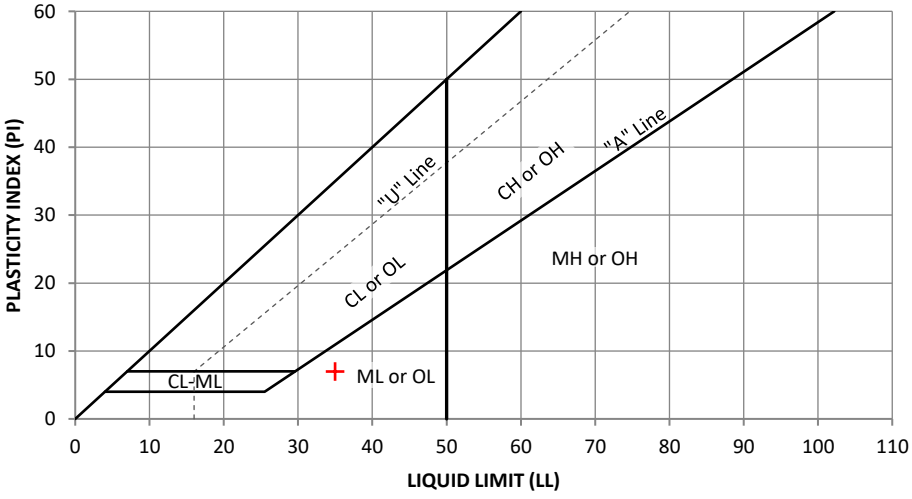
PLASTIC LIMIT

108	105
59.98	61.77
57.85	59.50
50.96	50.73
2.13	2.27
6.89	8.77
30.91	25.88

LIQUID LIMIT



PLASTICITY CHART



Liquid Limit (LL) 35 Plastic Limit (PL) 28 Plasticity Index (PI) 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

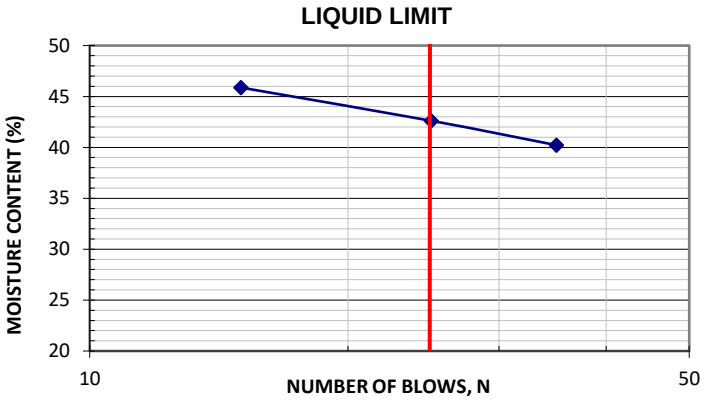
Excavation: AGS-3
Depth: 40 ft
Description: CL (Fine portion)
By: FV

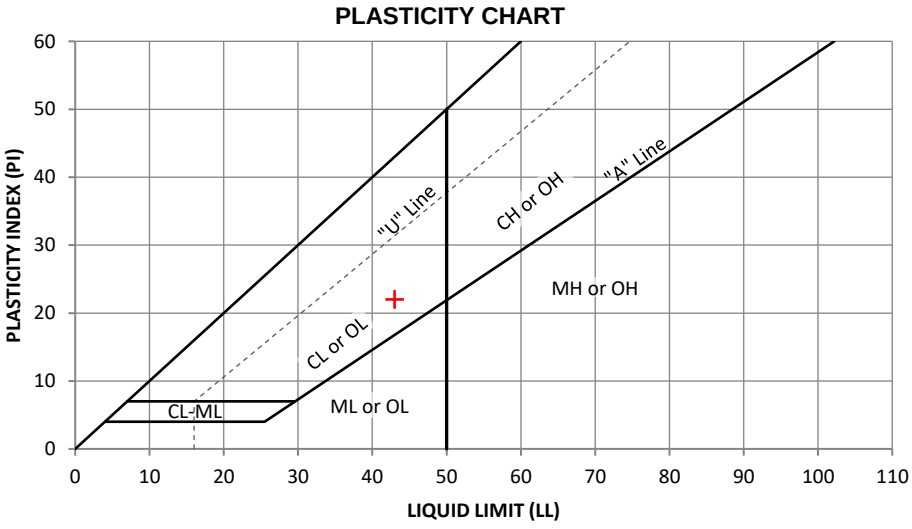
LIQUID LIMIT

Can No.	15	14	3
Wt. wet soil+can (g)	20.42	20.43	19.94
Wt. dry soil+can (g)	17.53	17.69	17.39
Wt. can (g)	11.23	11.26	11.05
Wt. mosture (g)	2.89	2.74	2.55
Wt. dry soil (g)	6.30	6.43	6.34
Water Content %	45.87	42.61	40.22
No. of Blows	15	25	35

PLASTIC LIMIT

104	102
59.27	57.85
57.87	56.74
51.04	51.47
1.40	1.11
6.83	5.27
20.50	21.06





Liquid Limit (LL) 43 Plastic Limit (PL) 21 Plasticity Index (PI) 22

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley town Center
Location: Calimesa
Project No: 2004-01
Date: 9/23/2020

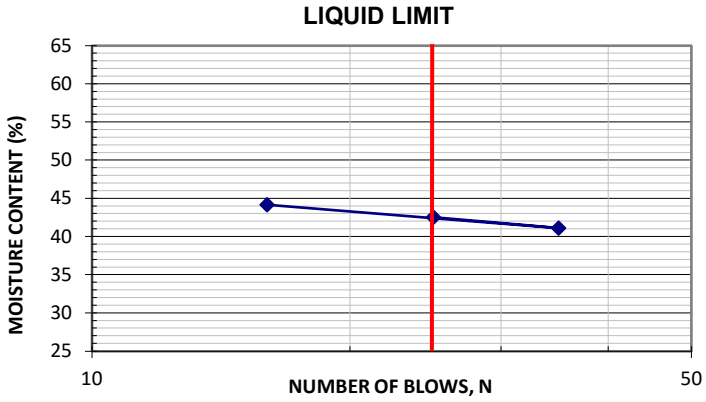
Excavation: AGS-16
Depth: 25 ft
Description: CL
By: FV

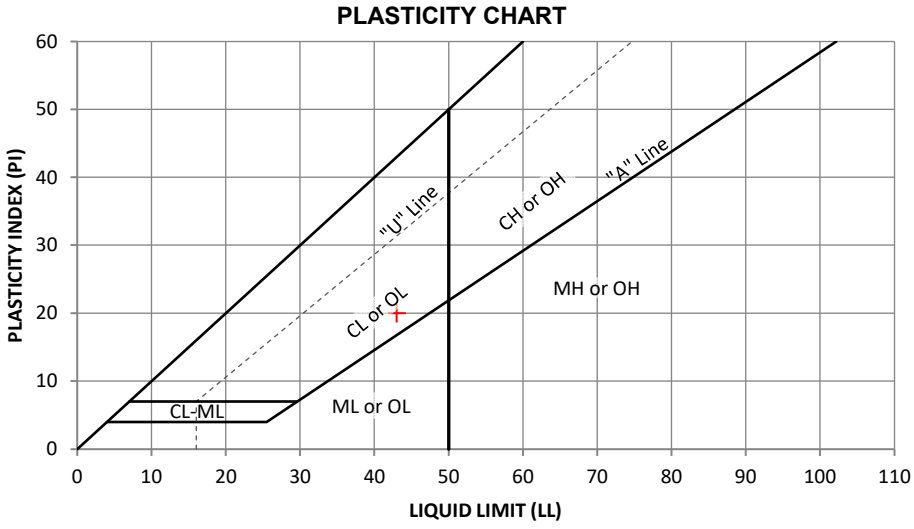
LIQUID LIMIT

Can No.	15	11	5
Wt. wet soil+can (g)	20.10	19.65	18.21
Wt. dry soil+can (g)	17.45	17.20	16.09
Wt. can (g)	11.22	11.24	11.29
Wt. mosture (g)	2.65	2.45	2.12
Wt. dry soil (g)	6.23	5.96	4.80
Water Content %	42.54	41.11	44.17
No. of Blows	25	35	16

PLASTIC LIMIT

109	106
56.91	58.04
55.89	56.78
51.56	51.34
1.02	1.26
4.33	5.44
23.56	23.16





Liquid Limit (LL) 43 Plastic Limit (PL) 23 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

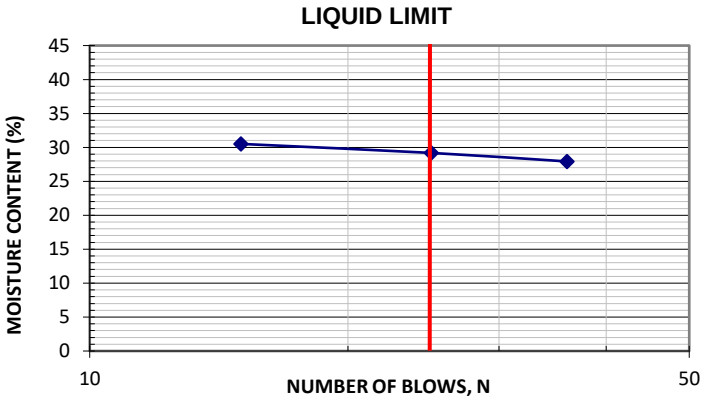
Excavation: AGS-16
Depth: 30 ft
Description: CL (Fine portion)
By: FV

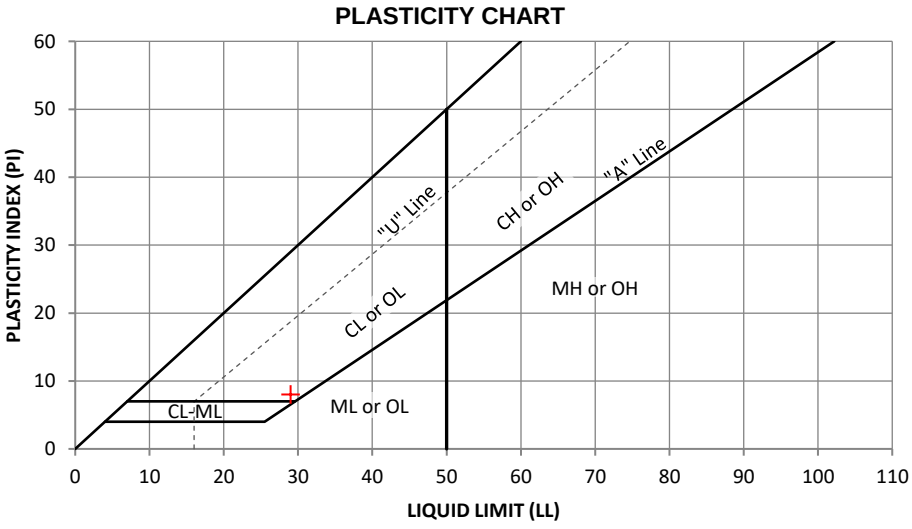
LIQUID LIMIT

Can No.	14	3	15
Wt. wet soil+can (g)	22.98	22.43	21.44
Wt. dry soil+can (g)	20.24	19.90	19.22
Wt. can (g)	11.26	11.23	11.27
Wt. mosture (g)	2.74	2.53	2.22
Wt. dry soil (g)	8.98	8.67	7.95
Water Content %	30.51	29.18	27.92
No. of Blows	15	25	36

PLASTIC LIMIT

101	109
58.25	58.32
56.94	57.20
51.08	51.55
1.31	1.12
5.86	5.65
22.35	19.82





Liquid Limit (LL) 29 Plastic Limit (PL) 21 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

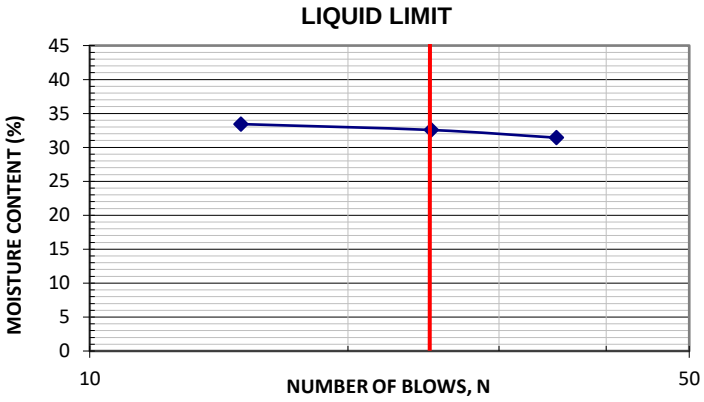
Excavation: AGS-16
Depth: 35 ft
Description: CL (Fine portion)
By: FV

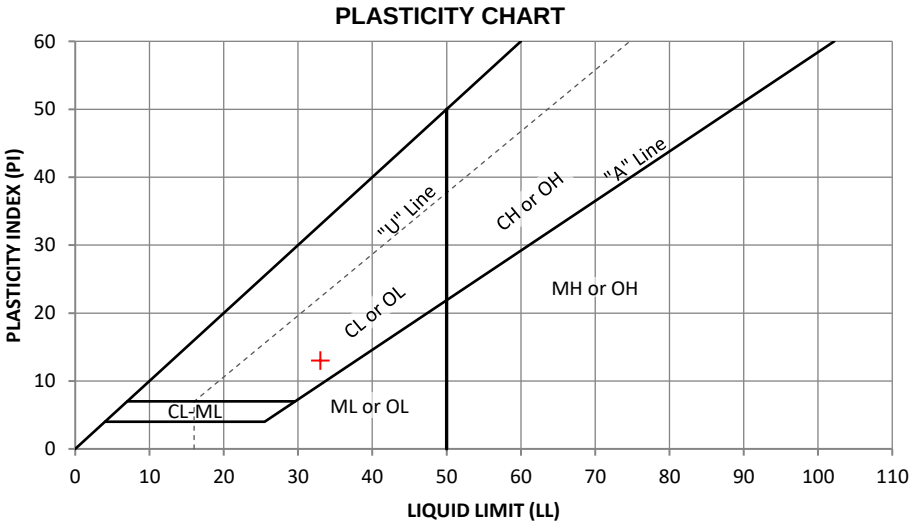
LIQUID LIMIT

Can No.	16	11	5
Wt. wet soil+can (g)	20.66	21.55	22.08
Wt. dry soil+can (g)	18.29	19.02	19.50
Wt. can (g)	11.20	11.25	11.29
Wt. mosture (g)	2.37	2.53	2.58
Wt. dry soil (g)	7.09	7.77	8.21
Water Content %	33.43	32.56	31.43
No. of Blows	15	25	35

PLASTIC LIMIT

106	111
57.80	57.64
56.66	56.63
51.34	51.42
1.14	1.01
5.32	5.21
21.43	19.39





Liquid Limit (LL) 33 Plastic Limit (PL) 20 Plasticity Index (PI) 13

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

Project Name: Oak Valley Town Center
Location: Calimesa
Project No: 2004-01
Date: 10/28/2020

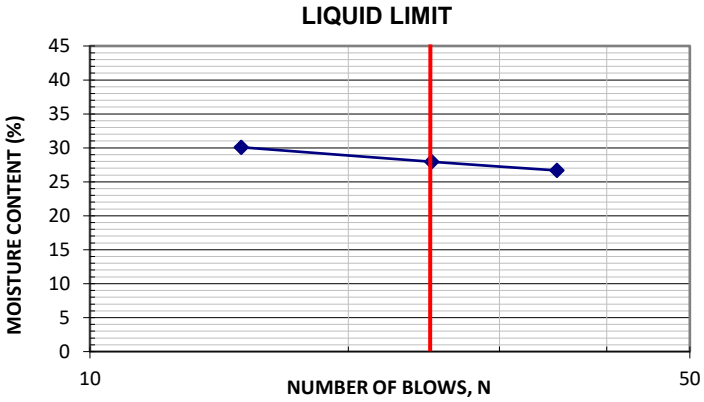
Excavation: AGS-16
Depth: 45 ft
Description: CL (Fine portion)
By: FV

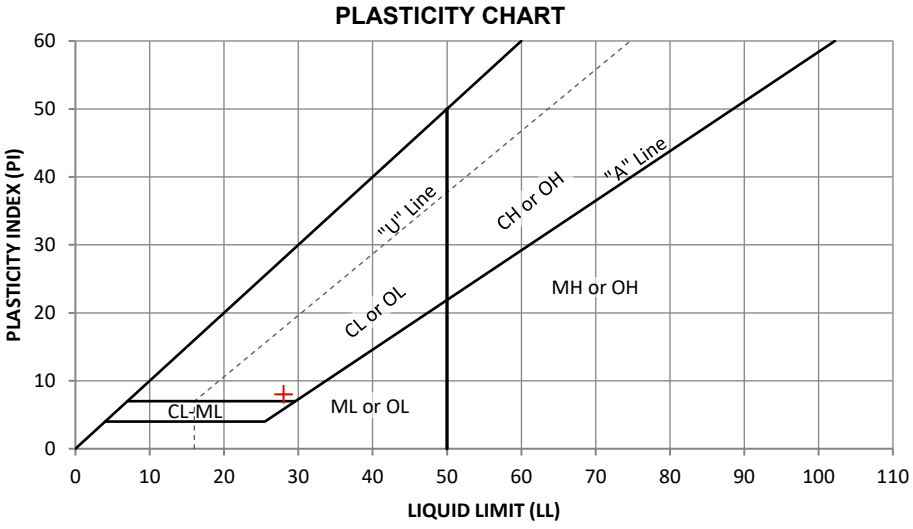
LIQUID LIMIT

Can No.	4	2	10
Wt. wet soil+can (g)	20.75	20.88	21.44
Wt. dry soil+can (g)	18.72	18.75	19.06
Wt. can (g)	11.11	11.13	11.15
Wt. mosture (g)	2.03	2.13	2.38
Wt. dry soil (g)	7.61	7.62	7.91
Water Content %	26.68	27.95	30.09
No. of Blows	35	25	15

PLASTIC LIMIT

100	103
58.69	58.58
57.45	57.40
51.53	51.47
1.24	1.18
5.92	5.93
20.95	19.90





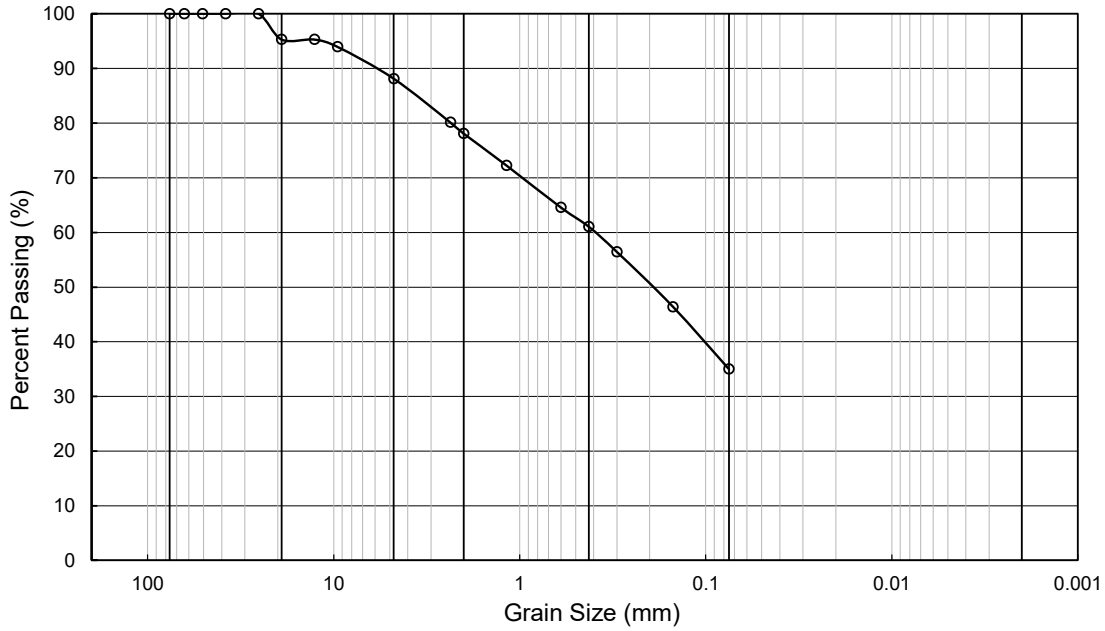
Liquid Limit (LL) 28 Plastic Limit (PL) 20 Plasticity Index (PI) 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-5
Location:	Calimesa	Depth:	4 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	95
1/2 "	12.70	95
3/8 "	9.53	94
# 4	4.75	88.1
# 8	2.36	80.1
#10	2.00	78.1
#16	1.18	72.3
# 30	0.60	64.5
# 40	0.425	61.0
# 50	0.30	56.4
# 100	0.15	46.4
# 200	0.075	35.0

Summary	
% Gravel =	11.9
% Sand =	53.1
% Fines =	35.0
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

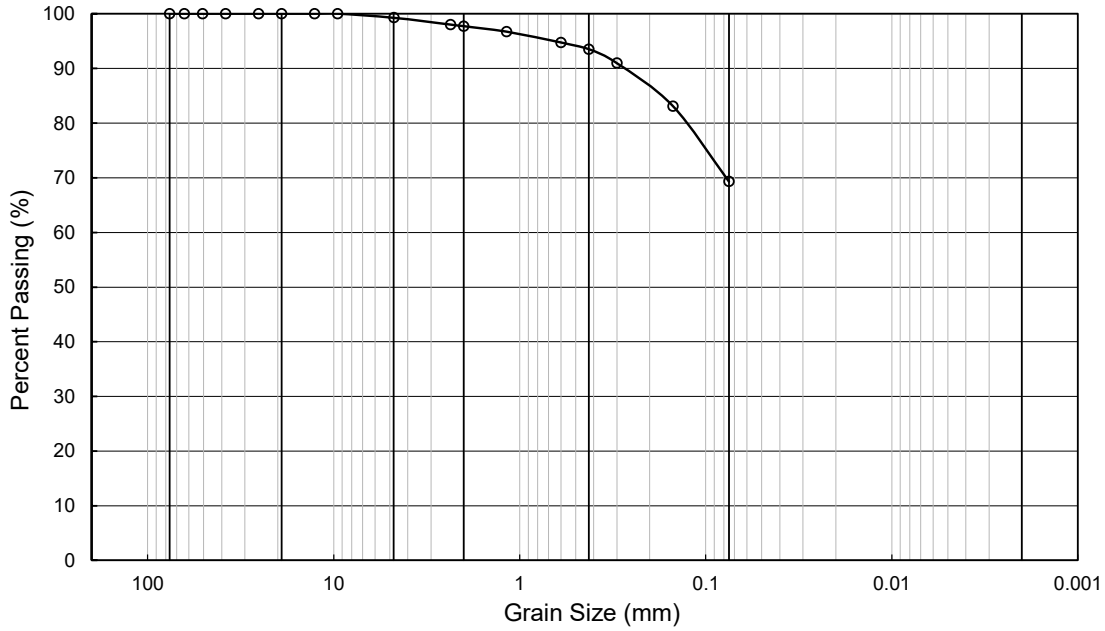
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-10
Location:	Calimesa	Depth:	12 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.3
# 8	2.36	98.0
#10	2.00	97.7
#16	1.18	96.7
# 30	0.60	94.7
# 40	0.425	93.5
# 50	0.30	91.0
# 100	0.15	83.1
# 200	0.075	69.3

Summary	
% Gravel =	0.7
% Sand =	30.0
% Fines =	69.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

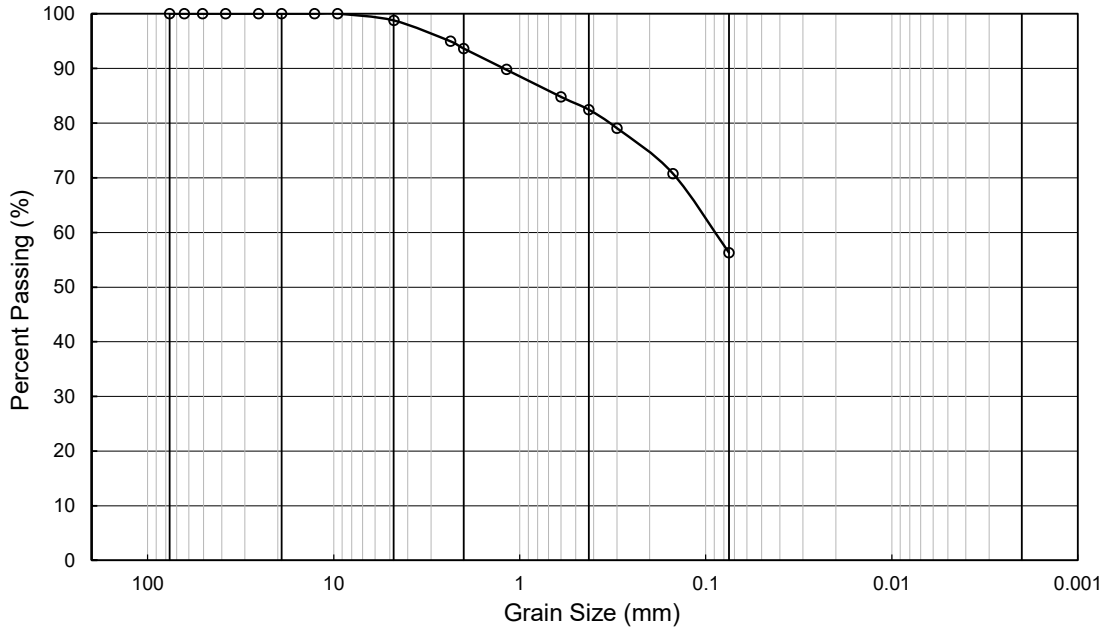
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-11
Location:	Calimesa	Depth:	7.5 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.8
# 8	2.36	95.0
#10	2.00	93.6
#16	1.18	89.8
# 30	0.60	84.8
# 40	0.425	82.4
# 50	0.30	79.1
# 100	0.15	70.7
# 200	0.075	56.3

Summary	
% Gravel =	1.2
% Sand =	42.5
% Fines =	56.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

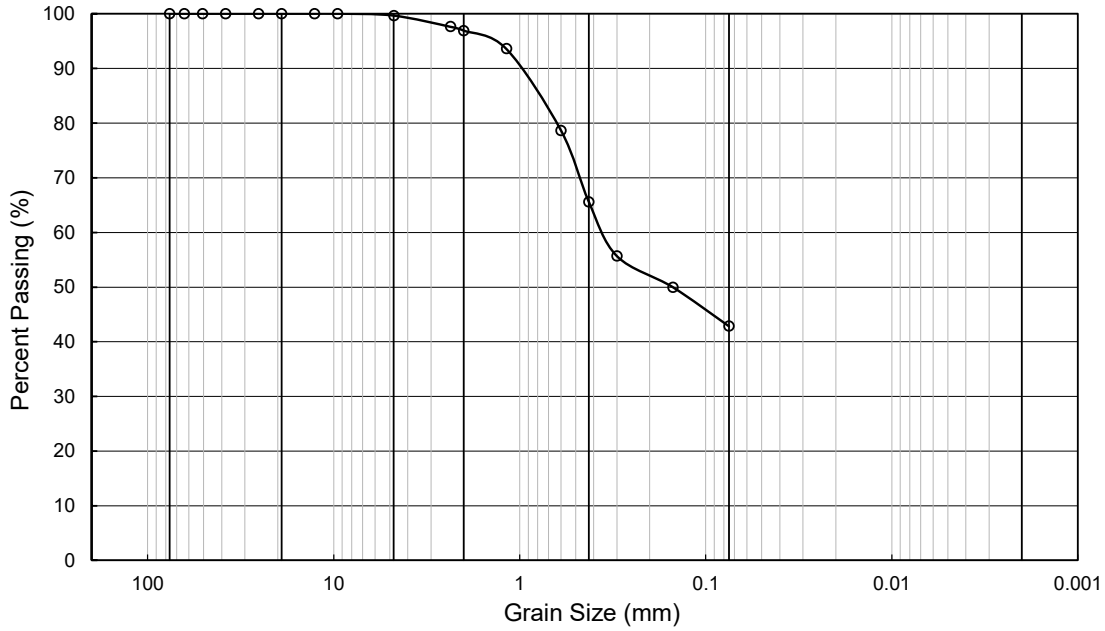
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	T-17
Location:	Calimesa	Depth:	13-14 ft
Project No.:	2004-01	Tested by:	FV
Date:	05-2020	Checked by:	JC



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.6
# 8	2.36	97.6
#10	2.00	96.9
#16	1.18	93.6
# 30	0.60	78.6
# 40	0.425	65.6
# 50	0.30	55.7
# 100	0.15	50.0
# 200	0.075	42.8

Summary	
% Gravel =	0.4
% Sand =	56.8
% Fines =	42.8
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

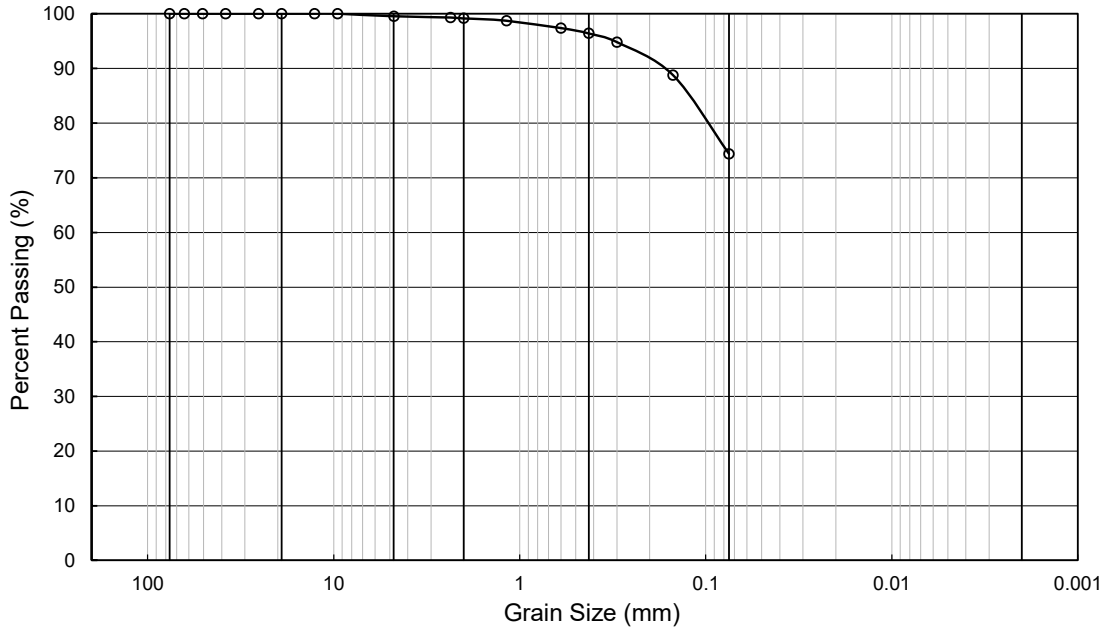
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	10 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.5
# 8	2.36	99.3
#10	2.00	99.2
#16	1.18	98.7
# 30	0.60	97.4
# 40	0.425	96.4
# 50	0.30	94.8
# 100	0.15	88.8
# 200	0.075	74.3

Summary	
% Gravel =	0.5
% Sand =	25.2
% Fines =	74.3
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

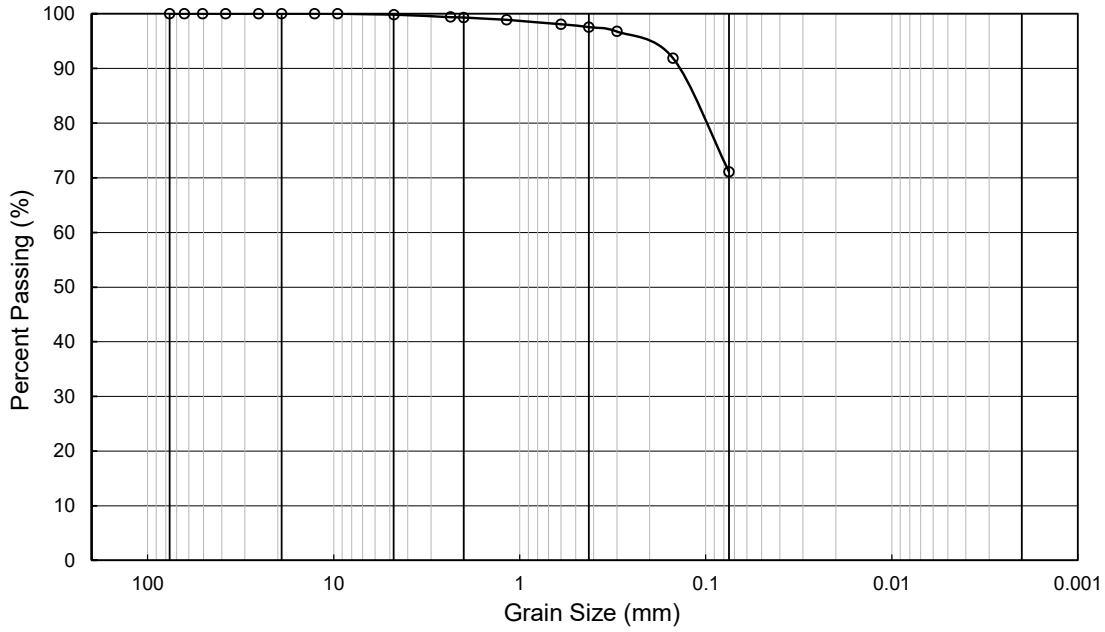
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	20 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	99.8
# 8	2.36	99.4
#10	2.00	99.3
#16	1.18	98.9
# 30	0.60	98.1
# 40	0.425	97.5
# 50	0.30	96.8
# 100	0.15	91.9
# 200	0.075	71.1

Summary	
% Gravel =	0.2
% Sand =	28.7
% Fines =	71.1
Sum =	100.0

LL=	46
PL=	29
PI =	17

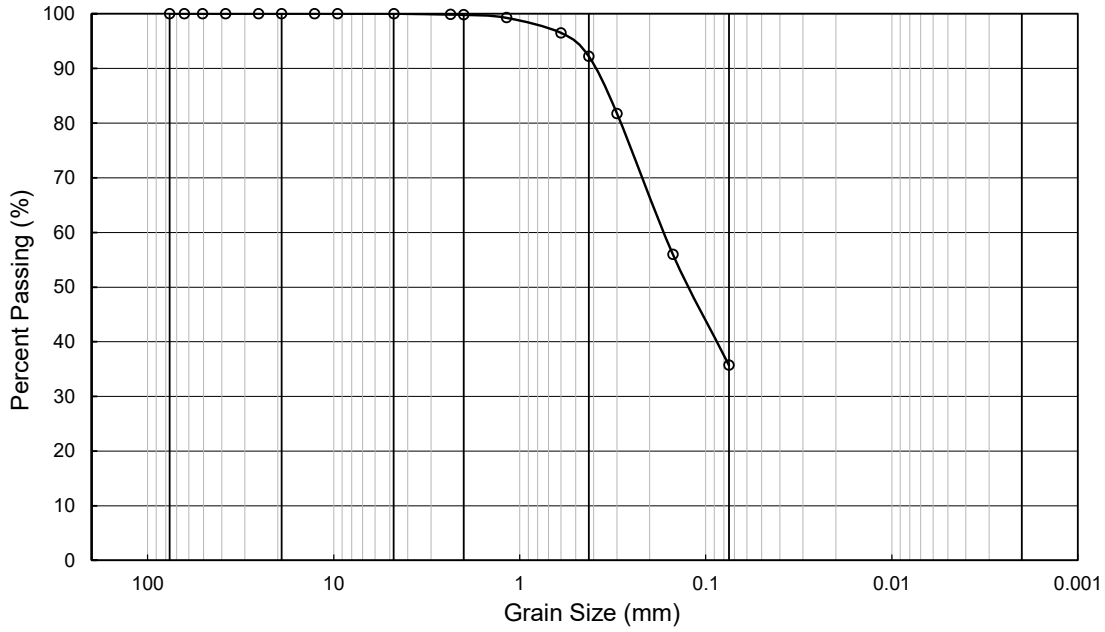
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.9
#10	2.00	99.8
#16	1.18	99.3
# 30	0.60	96.5
# 40	0.425	92.2
# 50	0.30	81.7
# 100	0.15	55.9
# 200	0.075	35.7

Summary	
% Gravel =	0.0
% Sand =	64.3
% Fines =	35.7
Sum =	100.0

LL=	31.5
PL=	21.5
PI =	10

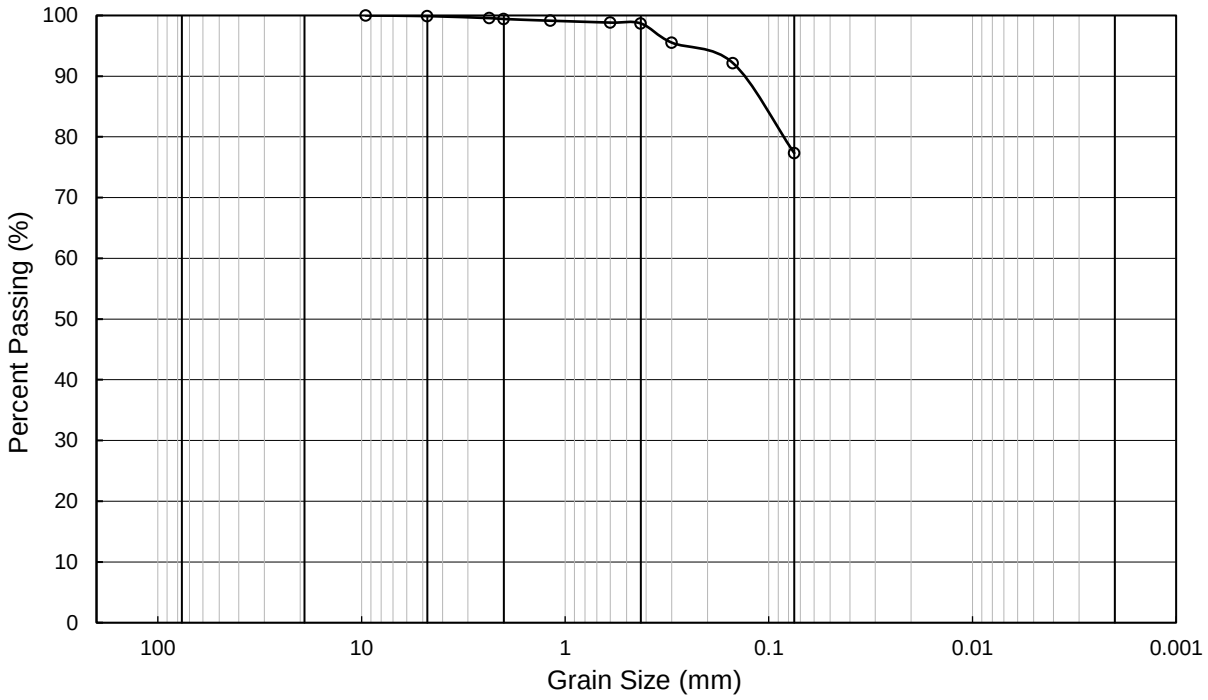
Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	99.9
# 8	2.36	99.6
#10	2.00	99.4
#16	1.18	99.1
# 30	0.60	98.8
# 40	0.425	98.7
# 50	0.30	95.5
# 100	0.15	92.2
# 200	0.075	77.3

Summary	
% Gravel =	0.1
% Sand =	22.6
% Fines =	77.3
Sum =	100.0

LL=	35
PL=	28
PI =	7

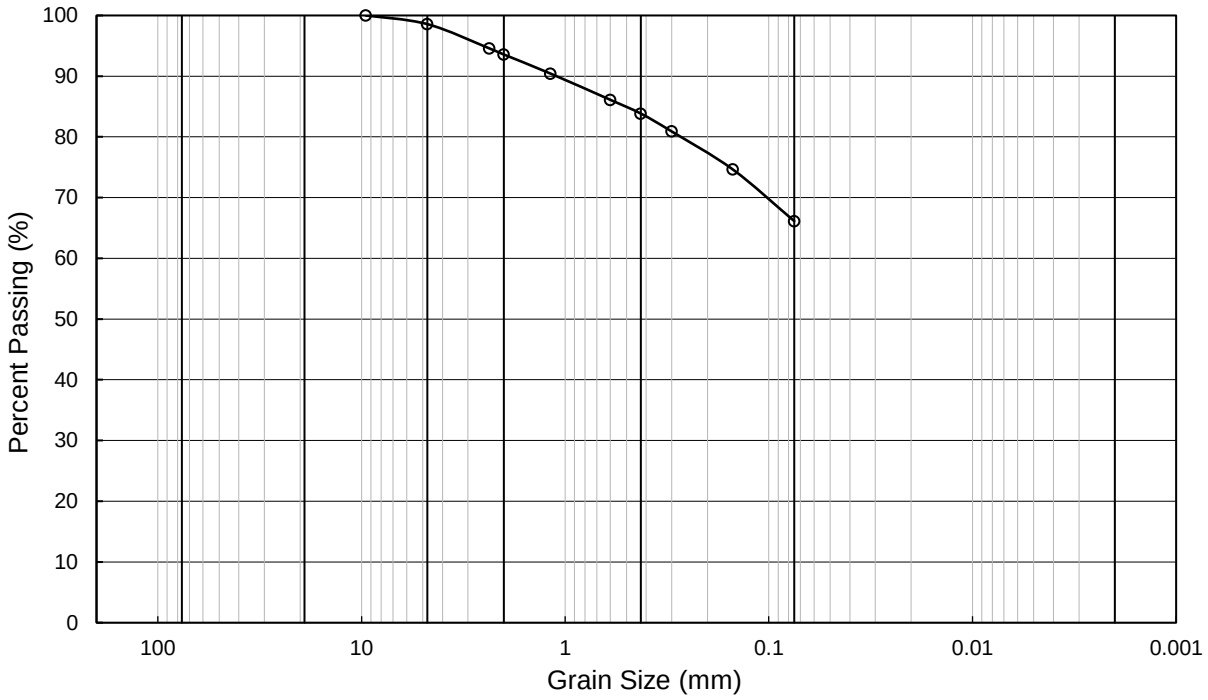
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	40 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	98.6
# 8	2.36	94.6
#10	2.00	93.6
#16	1.18	90.4
# 30	0.60	86.1
# 40	0.425	83.8
# 50	0.30	80.9
# 100	0.15	74.6
# 200	0.075	66.1

Summary	
% Gravel =	1.4
% Sand =	32.4
% Fines =	66.1
Sum =	100.0

LL=	43
PL=	21
PI =	22

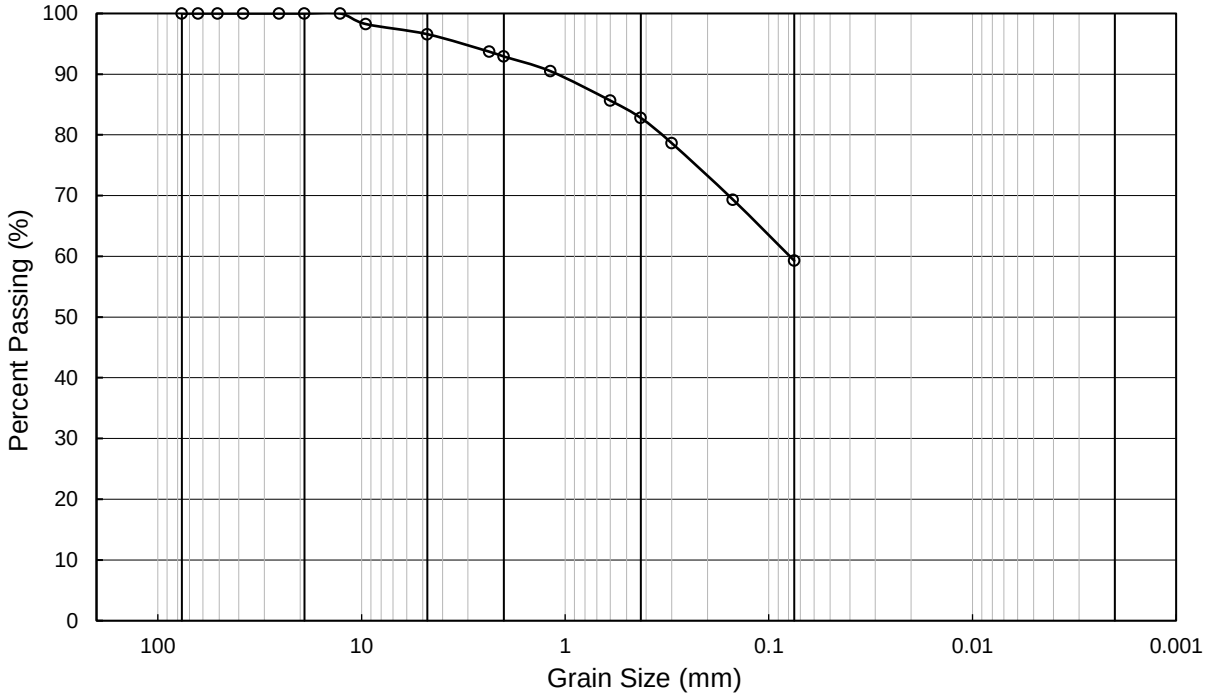
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-3
Location:	Calimesa	Depth:	50 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	98
# 4	4.75	96.6
# 8	2.36	93.7
#10	2.00	92.9
#16	1.18	90.5
# 30	0.60	85.6
# 40	0.425	82.8
# 50	0.30	78.7
# 100	0.15	69.3
# 200	0.075	59.3

Summary	
% Gravel =	3.4
% Sand =	37.3
% Fines =	59.3
Sum =	100.0

LL=	n/a
PL=	n/a
PI =	n/a

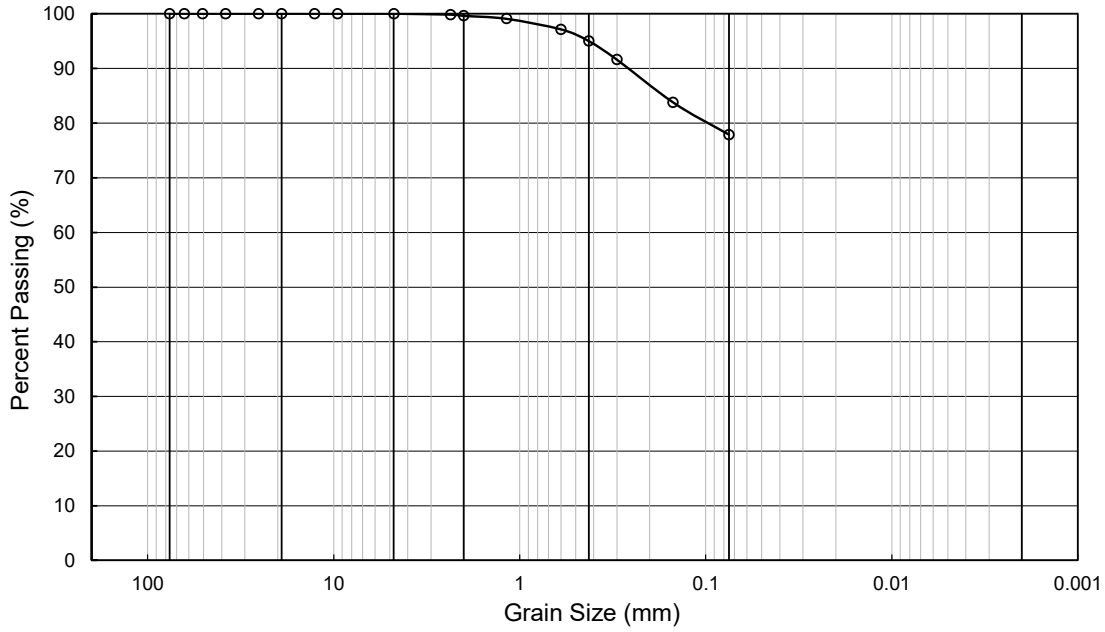
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	15 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.8
#10	2.00	99.6
#16	1.18	99.1
# 30	0.60	97.1
# 40	0.425	95.0
# 50	0.30	91.6
# 100	0.15	83.8
# 200	0.075	77.9

Summary	
% Gravel =	0.0
% Sand =	22.1
% Fines =	77.9
Sum =	100.0

LL= n/a

PL= n/a

PI = n/a

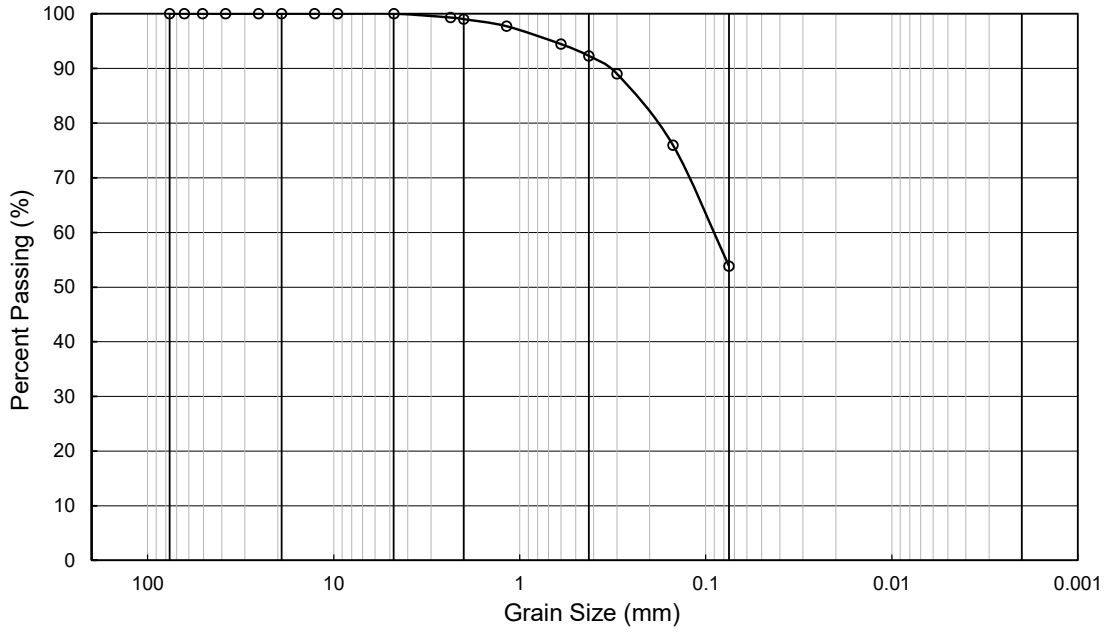
Soil Type: ML-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	25 ft
Project No.:	2004-01	Tested by:	FV
Date:	09-2020	Checked by:	SS



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	99.3
#10	2.00	99.0
#16	1.18	97.7
# 30	0.60	94.4
# 40	0.425	92.3
# 50	0.30	89.0
# 100	0.15	75.9
# 200	0.075	53.8

Summary	
% Gravel =	0.0
% Sand =	46.2
% Fines =	53.8
Sum =	100.0

LL=	43
PL=	23
PI =	20

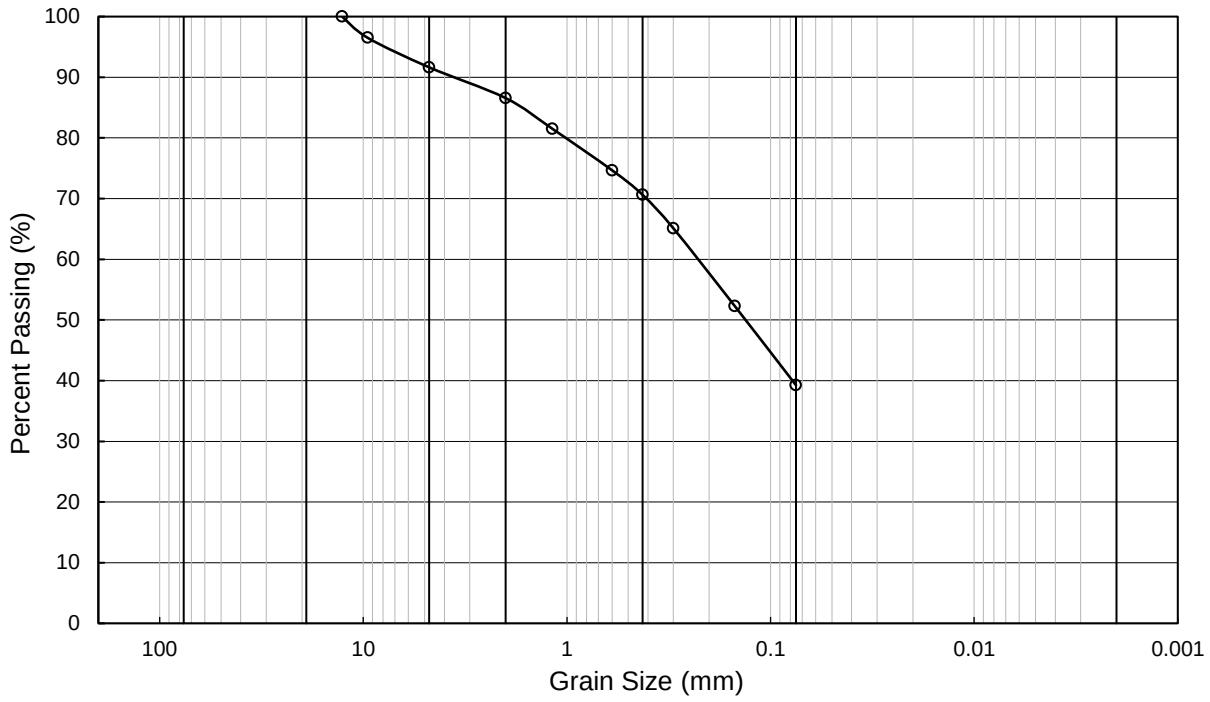
Soil Type: CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	30 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	100
3/8 "	9.53	97
# 4	4.75	91.6
#10	2.00	86.6
#16	1.18	81.5
# 30	0.60	74.7
# 40	0.425	70.6
# 50	0.30	65.1
# 100	0.15	52.3
# 200	0.075	39.3

Summary	
% Gravel =	8.4
% Sand =	52.4
% Fines =	39.3
Sum =	100.0

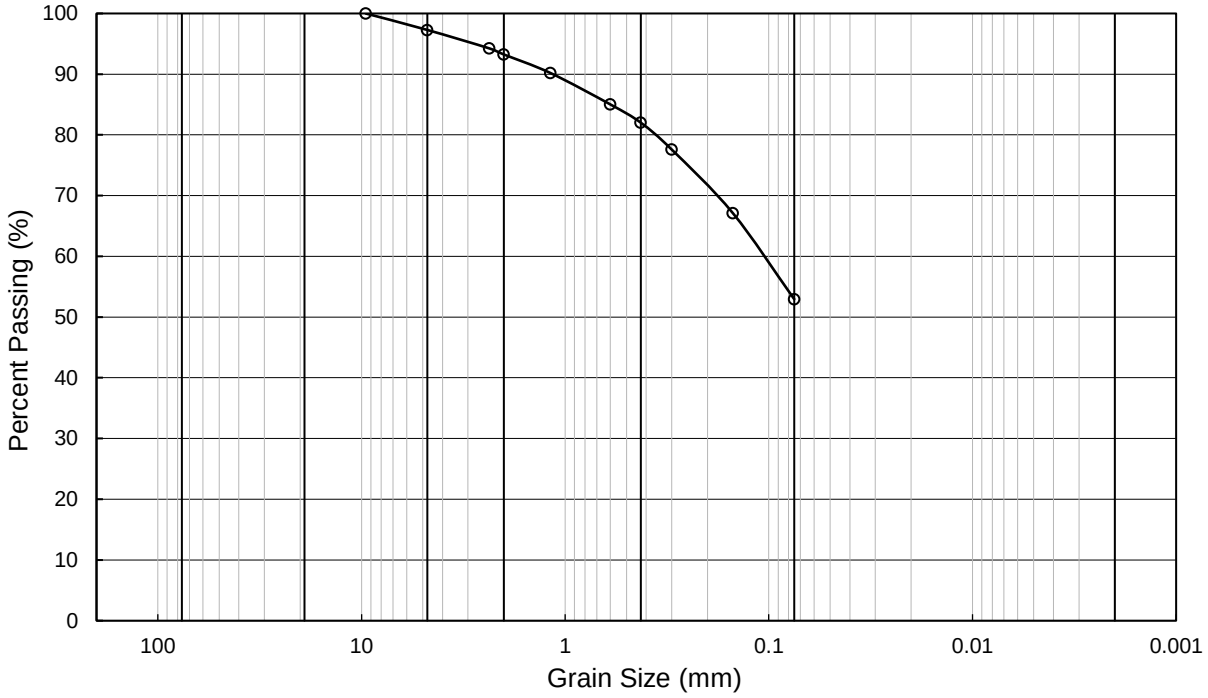
LL=	29
PL=	21
PI =	8
Soil Type:	SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	35 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.3
#10	2.00	93.2
#16	1.18	90.2
# 30	0.60	85.0
# 40	0.425	82.0
# 50	0.30	77.6
# 100	0.15	67.1
# 200	0.075	52.9

Summary	
% Gravel =	2.7
% Sand =	44.3
% Fines =	52.9
Sum =	100.0

LL=	33
PL=	20
PI =	13

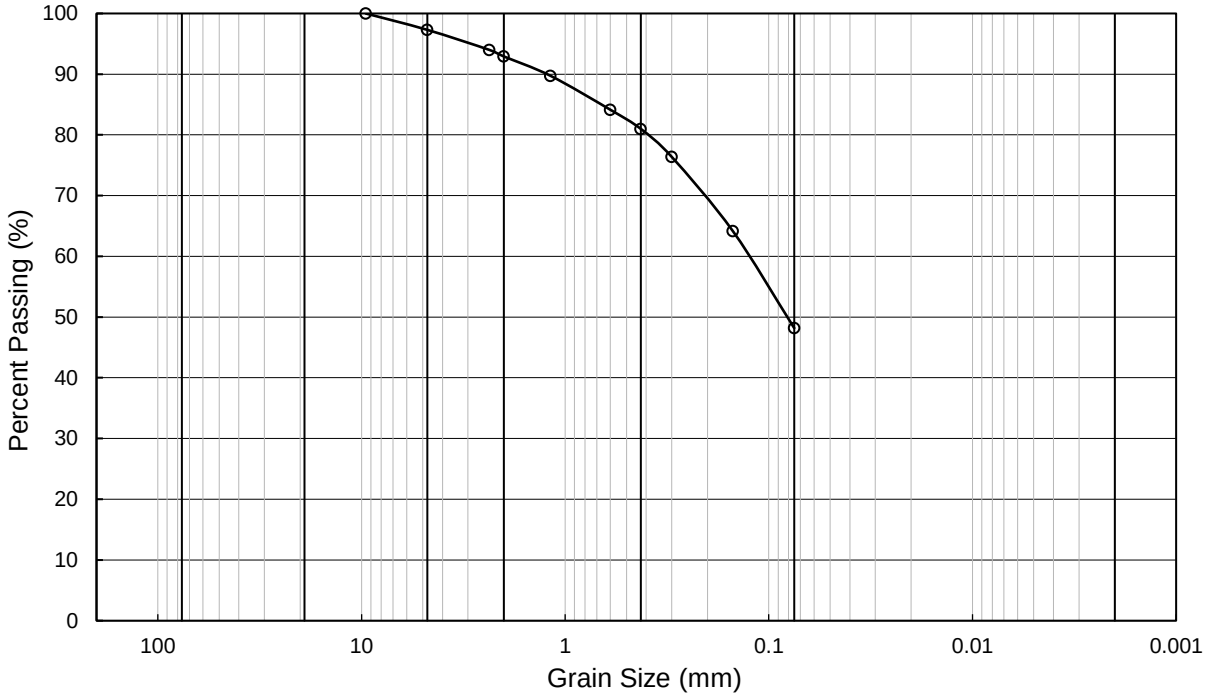
Soil Type: SC-CL

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	Oak Valley Town Center	Excavation:	AGS-16
Location:	Calimesa	Depth:	45 ft
Project No.:	2004-01	Tested by:	FV
Date:	10-2020	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	
2 1/2 "	63.50	
2 "	50.80	
1 1/2 "	38.10	
1 "	25.40	
3/4 "	19.05	
1/2 "	12.70	
3/8 "	9.53	100
# 4	4.75	97.3
# 8	2.36	94.0
#10	2.00	92.9
#16	1.18	89.7
# 30	0.60	84.1
# 40	0.425	81.0
# 50	0.30	76.4
# 100	0.15	64.1
# 200	0.075	48.2

Summary	
% Gravel =	2.7
% Sand =	49.1
% Fines =	48.2
Sum =	100.0

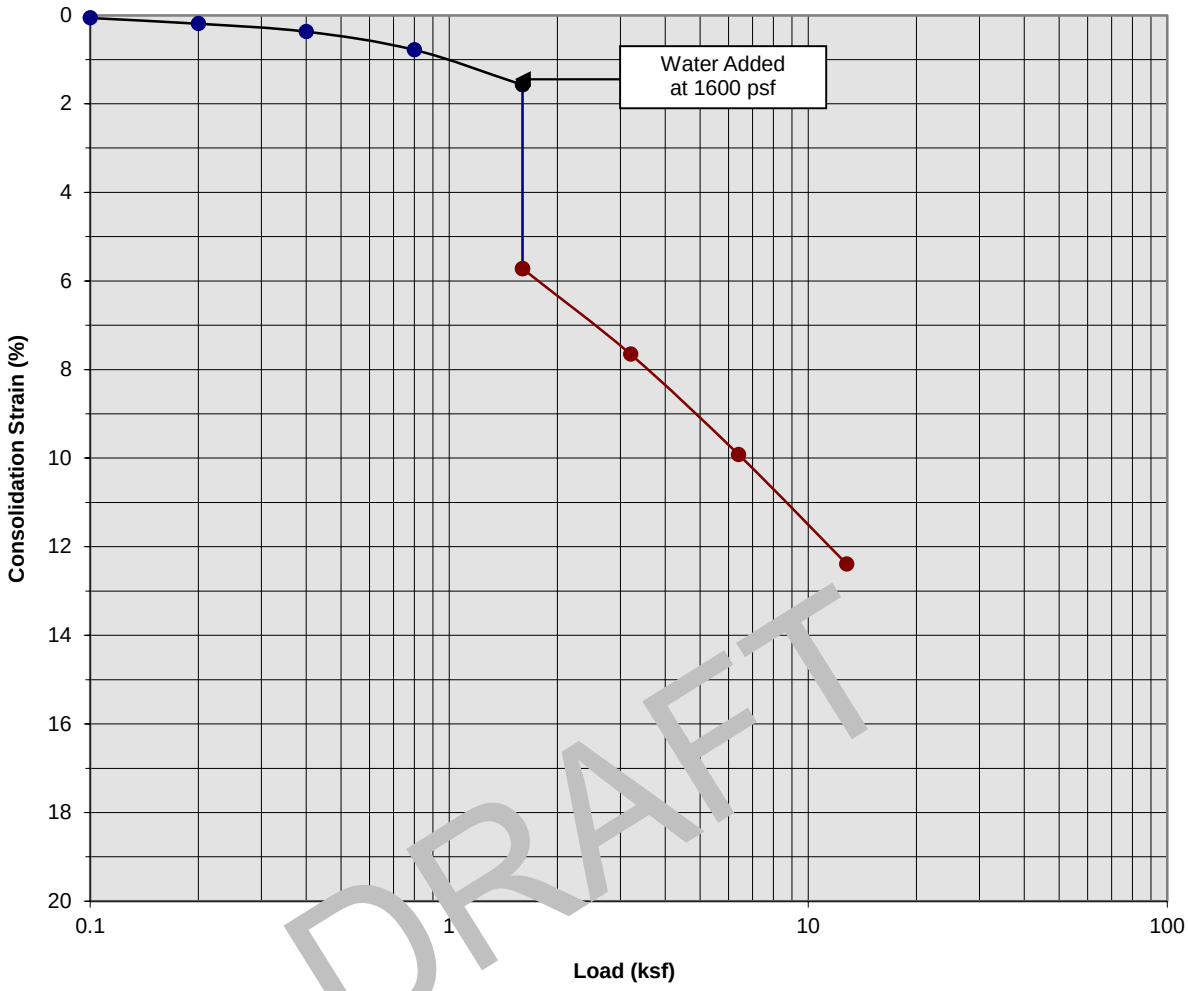
LL=	28
PL=	20
PI =	8

Soil Type: SC-CL

APPENDIX C-2

DRAFT LABORATORY TEST RESULTS (SCG)

Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Light Red Brown Silty fine to coarse Sand

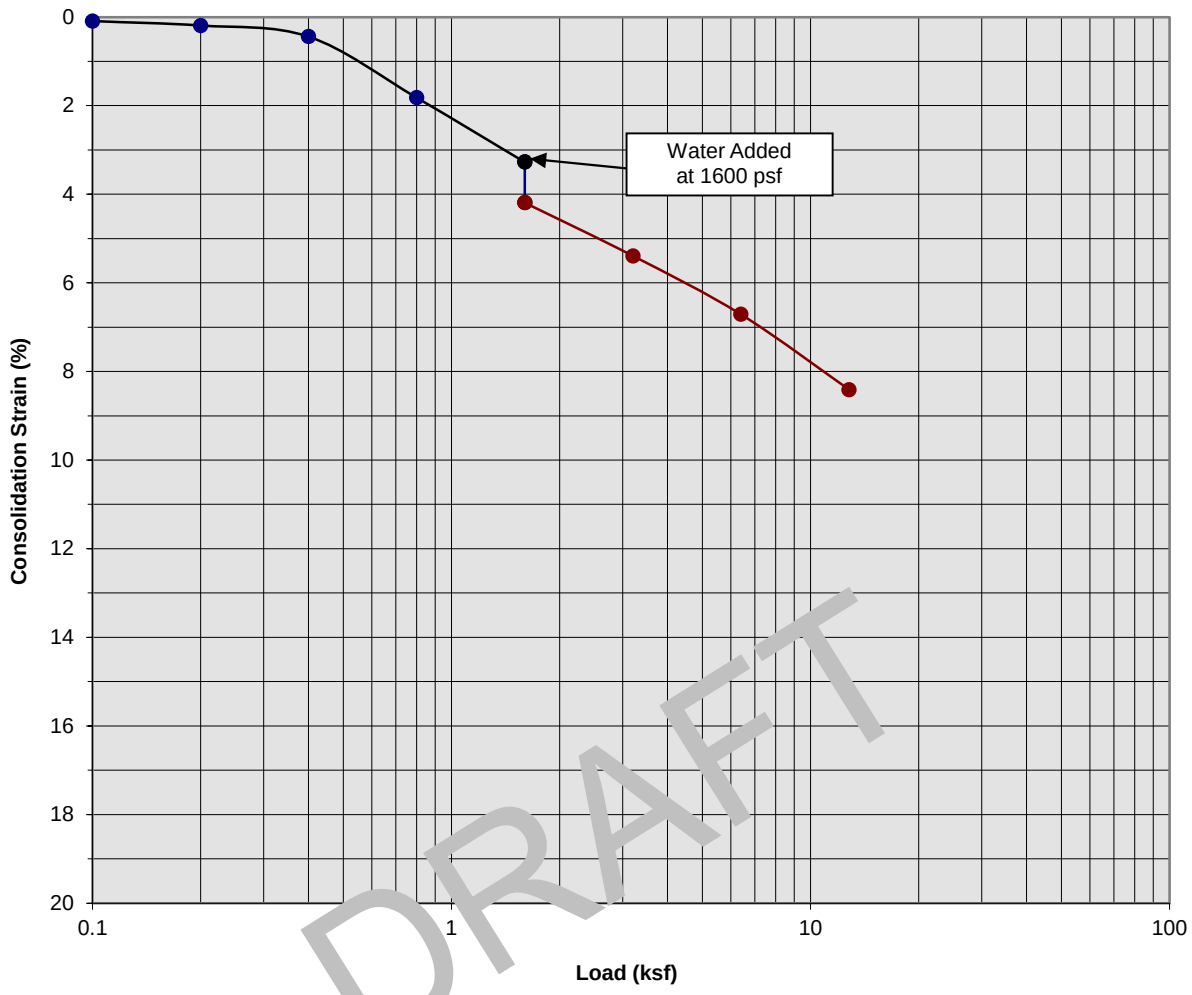
Boring Number:	SCG-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Red Brown Silty fine Sand, trace medium to coarse Sand

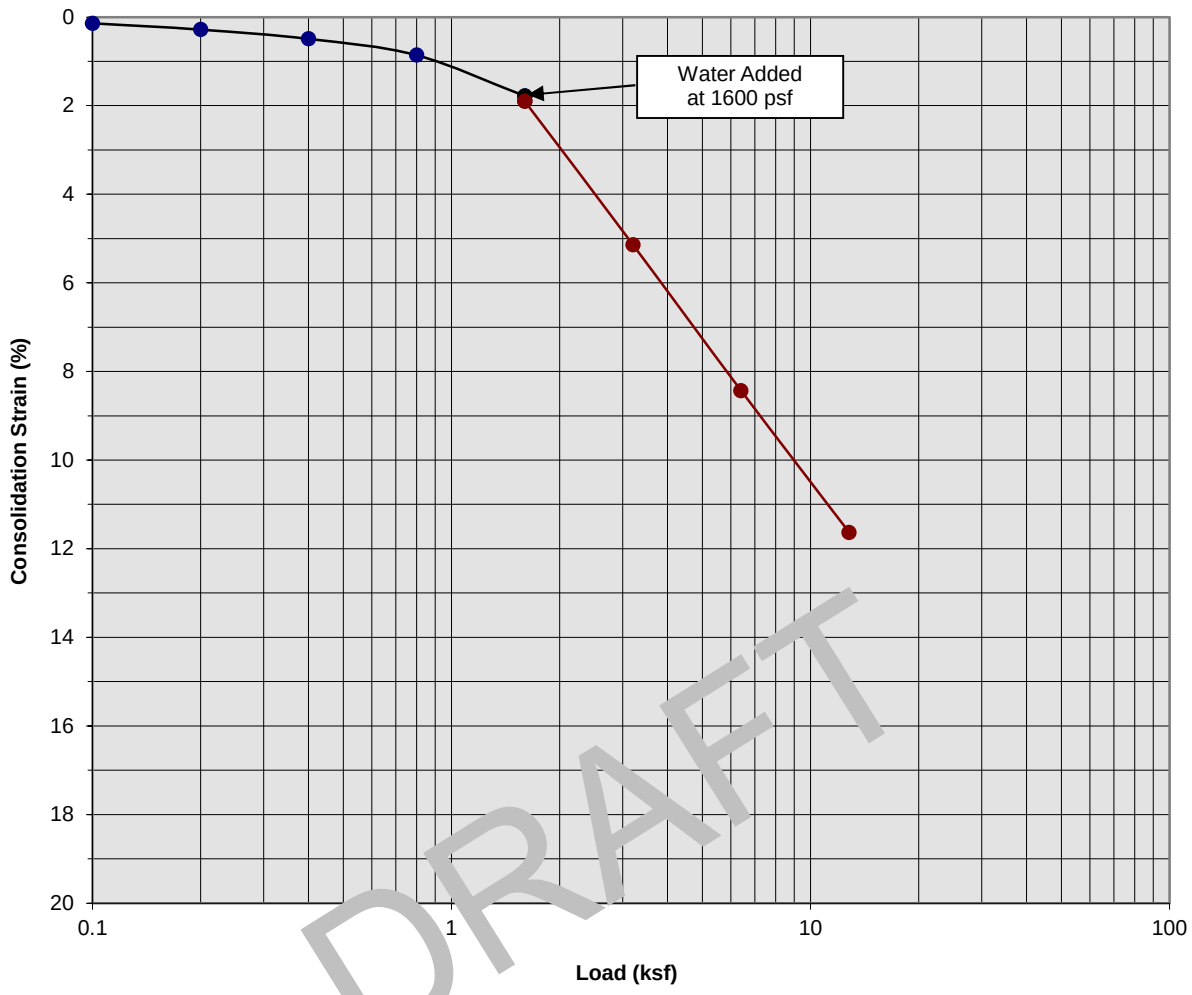
Boring Number:	SCG-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	121.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Colluvium: Dark Gray Brown Silty fine to medium Sand

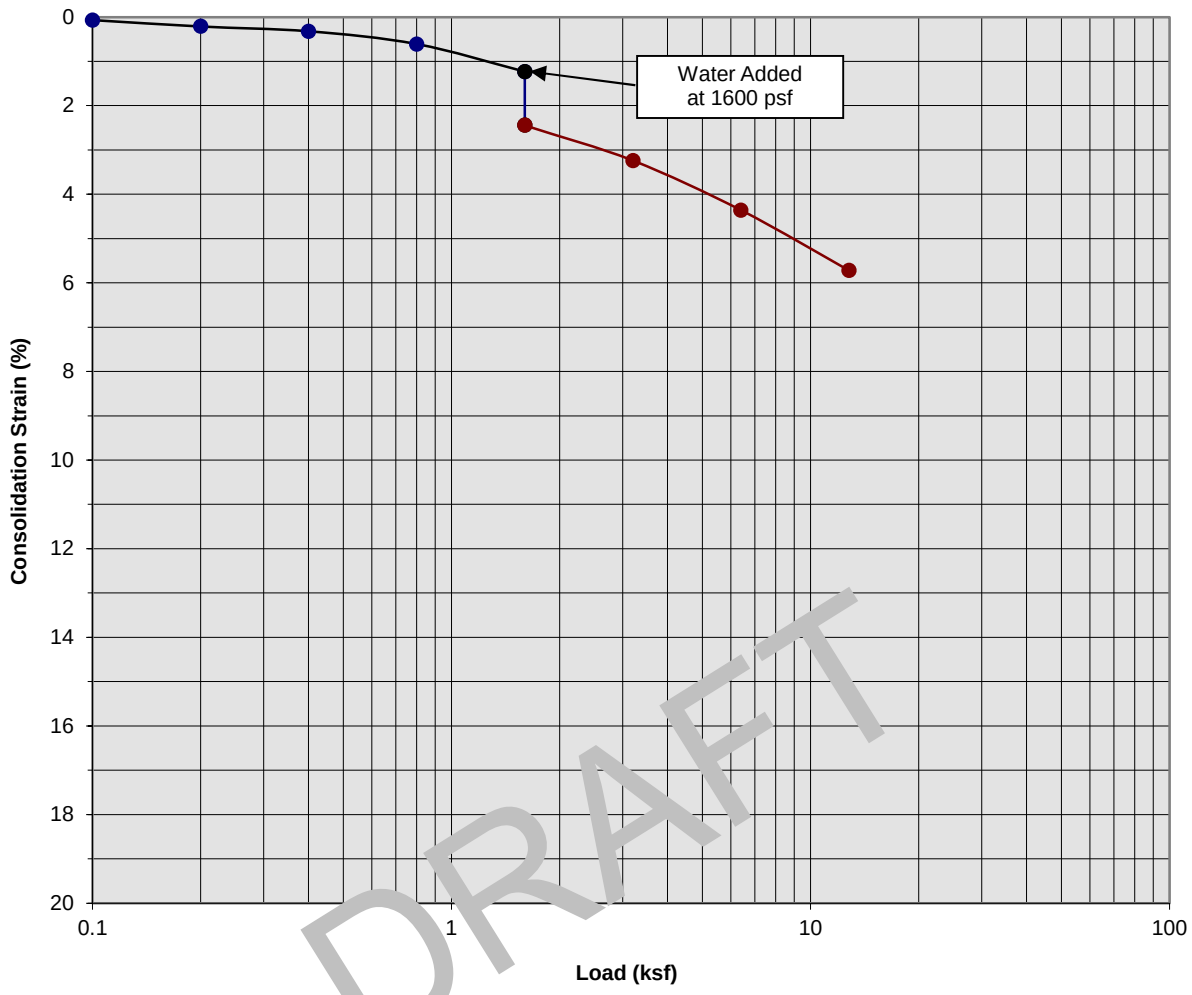
Boring Number:	SCG-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	99.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace medium to coarse Sand

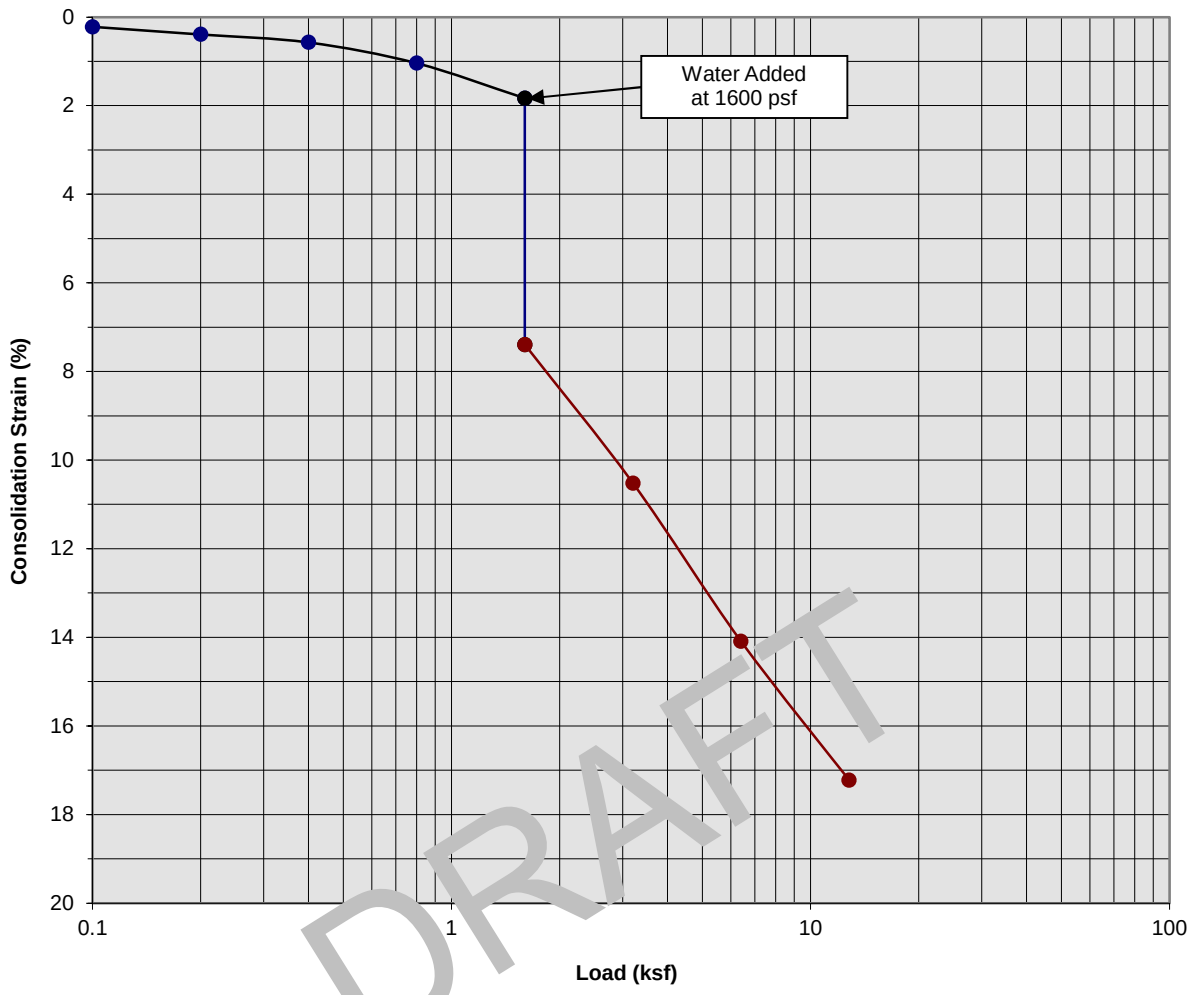
Boring Number:	SCG-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	125.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Gray Brown Silty fine to medium Sand

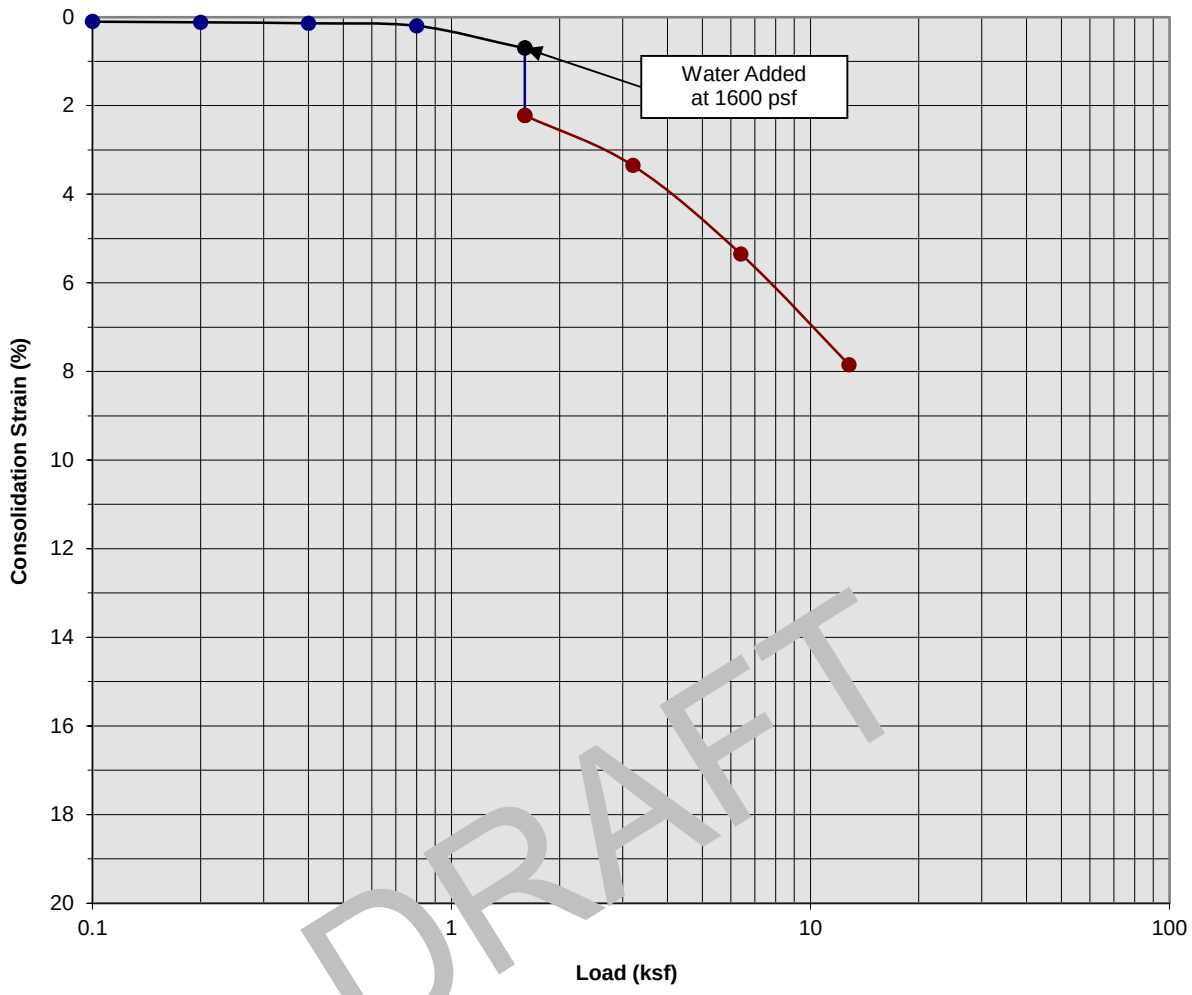
Boring Number:	SCG-4	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	102.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

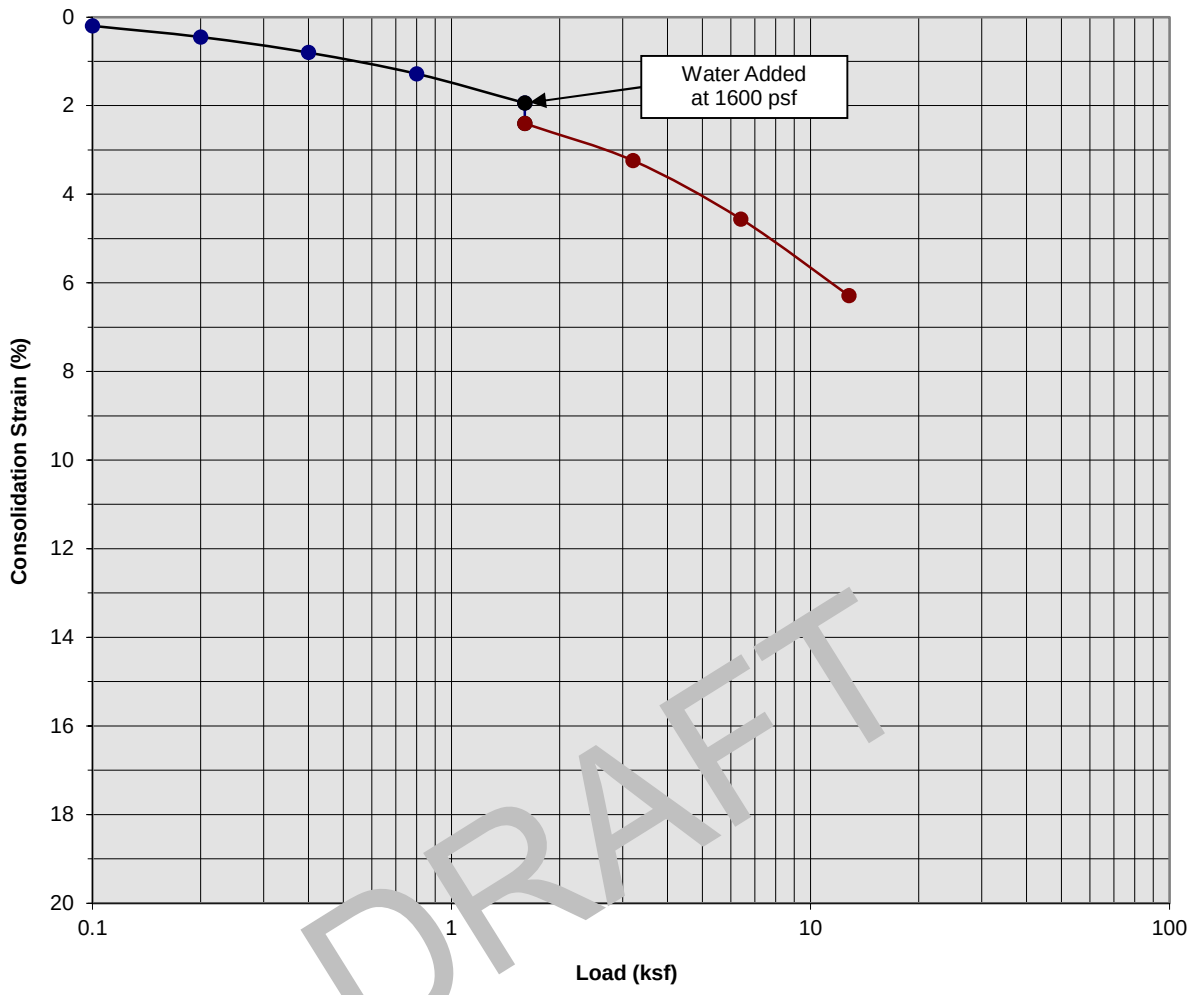
Boring Number:	SCG-4	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	126.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.52

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: FILL: Black to Dark Brown Clayey Silt

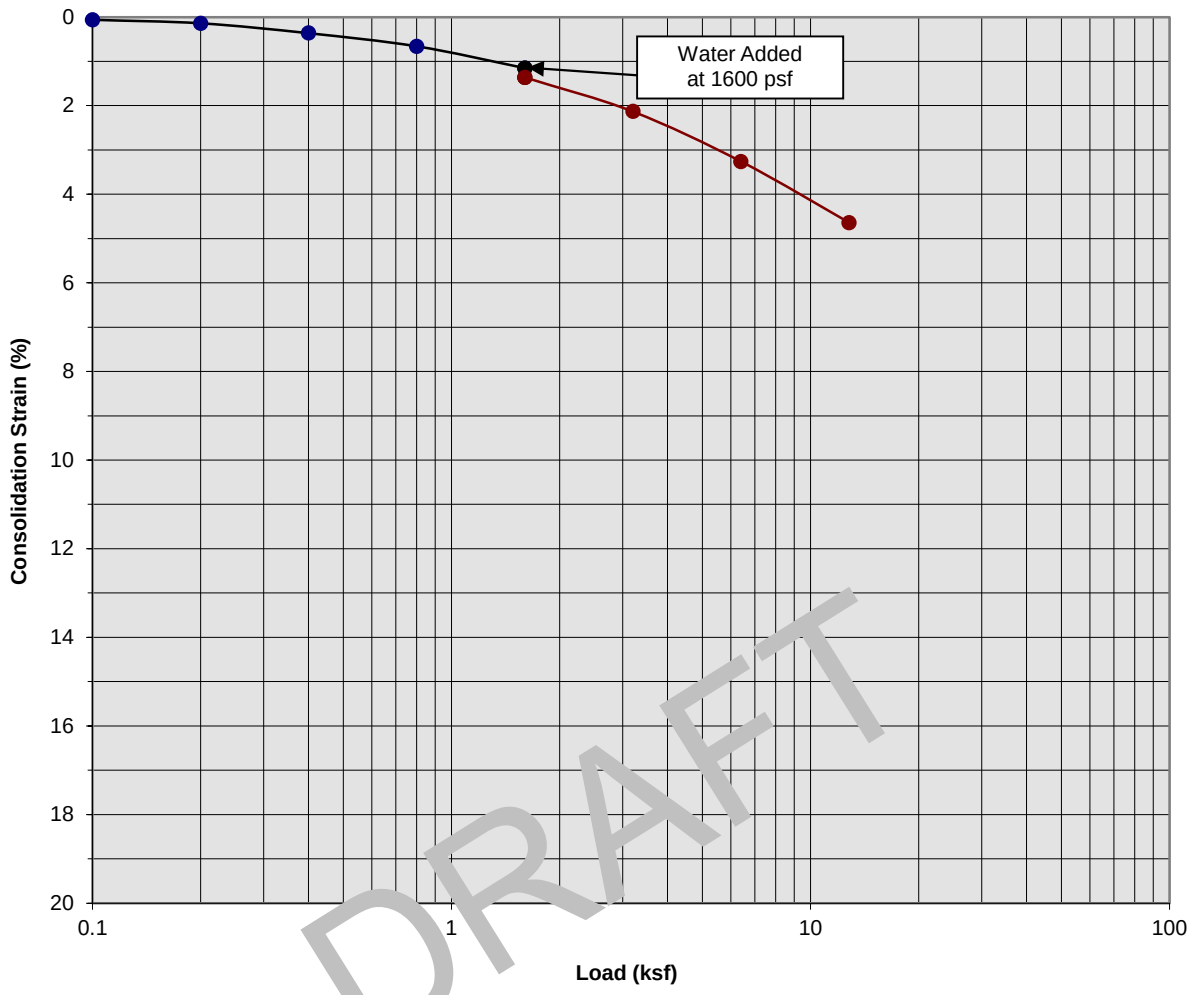
Boring Number:	SCG-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	115.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Bray Brown Silty Clay, little fine to medium Sand

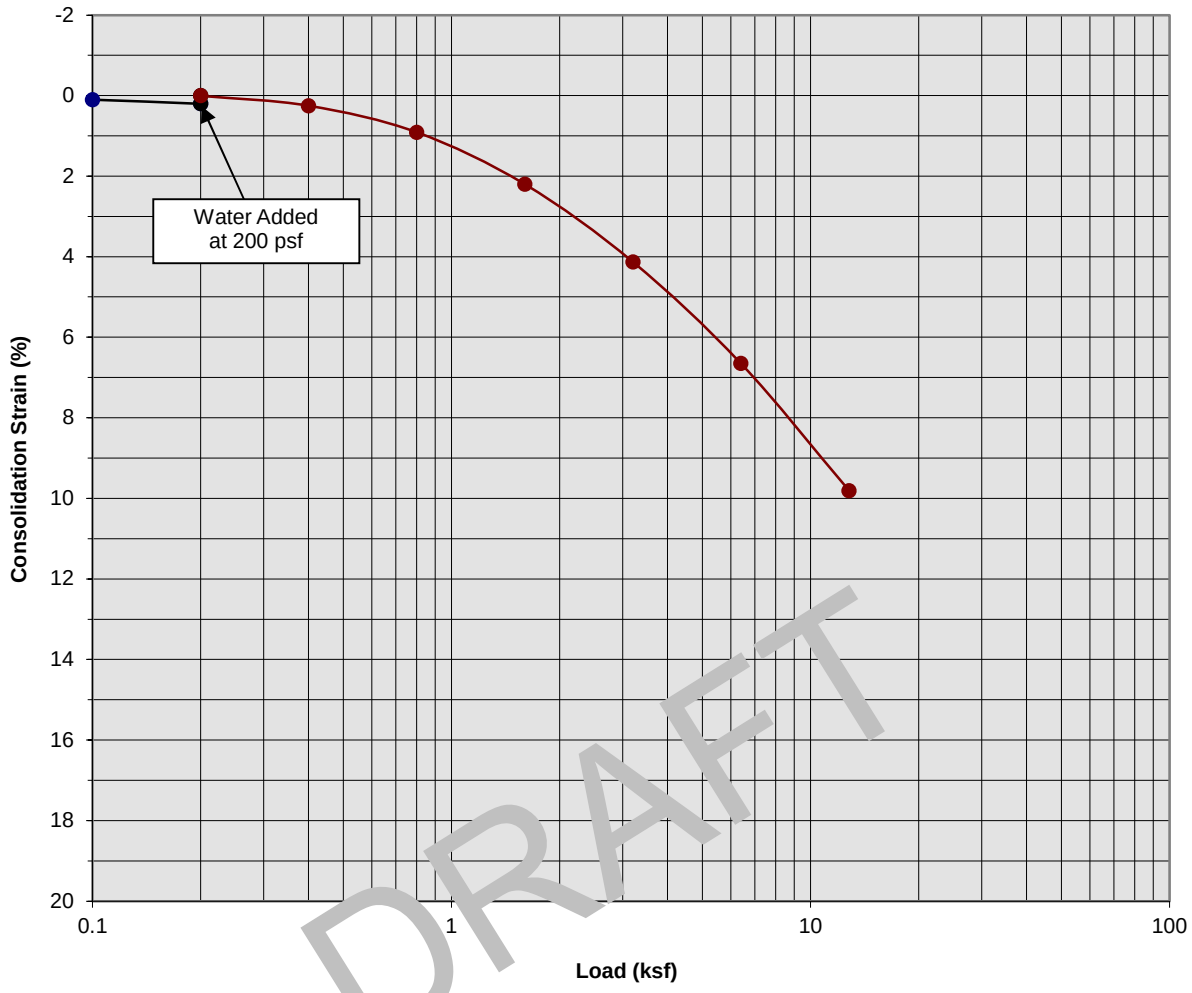
Boring Number:	SCG-5	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	131.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.21

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 8

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Silty Clay, trace fine Sand

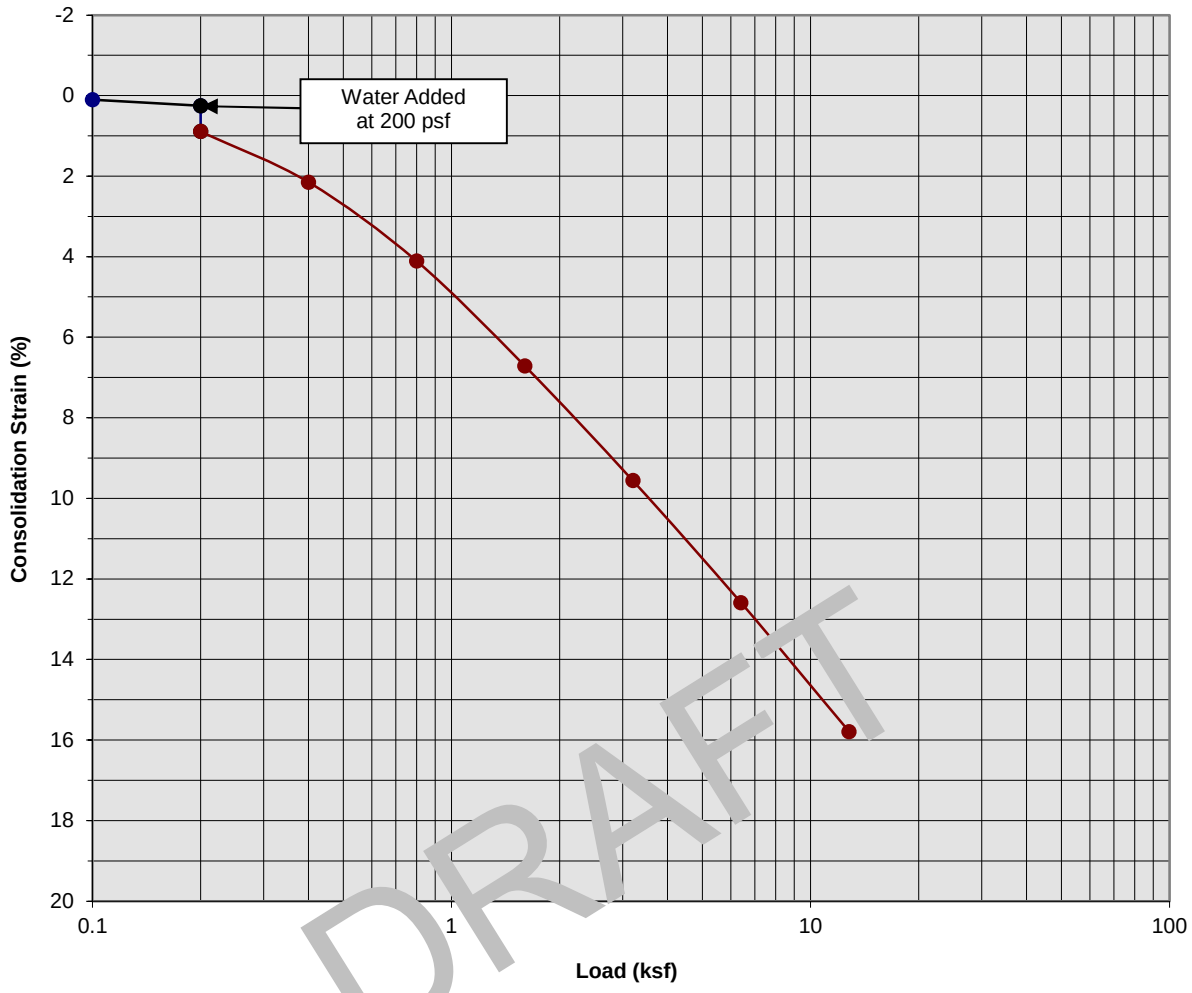
Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	102.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.20

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 9

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light Brown Silty fine Sand

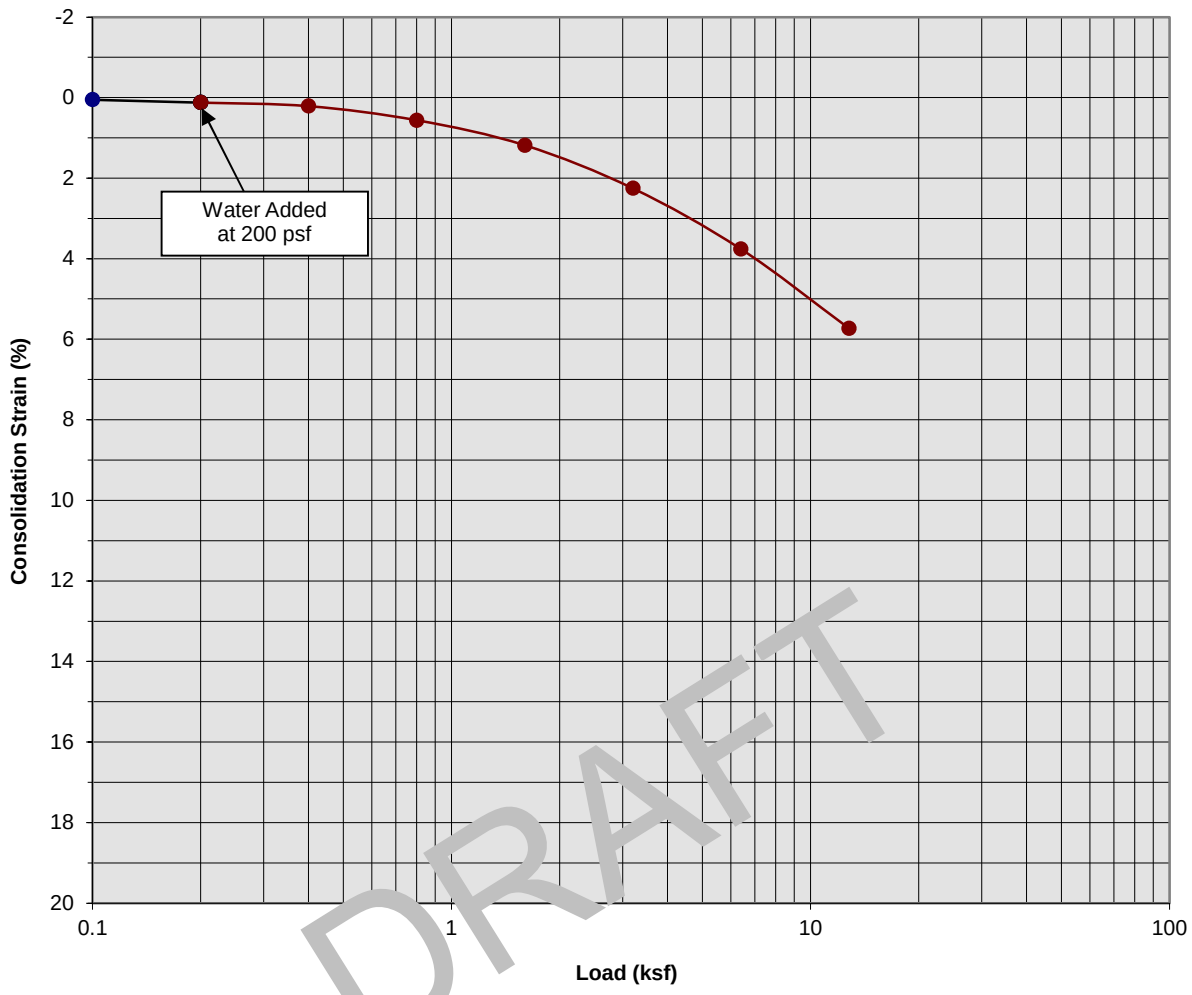
Boring Number:	SCG-6	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	95.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.64

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 10

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Dark Brown Clayey Silt, trace fine to coarse Sand

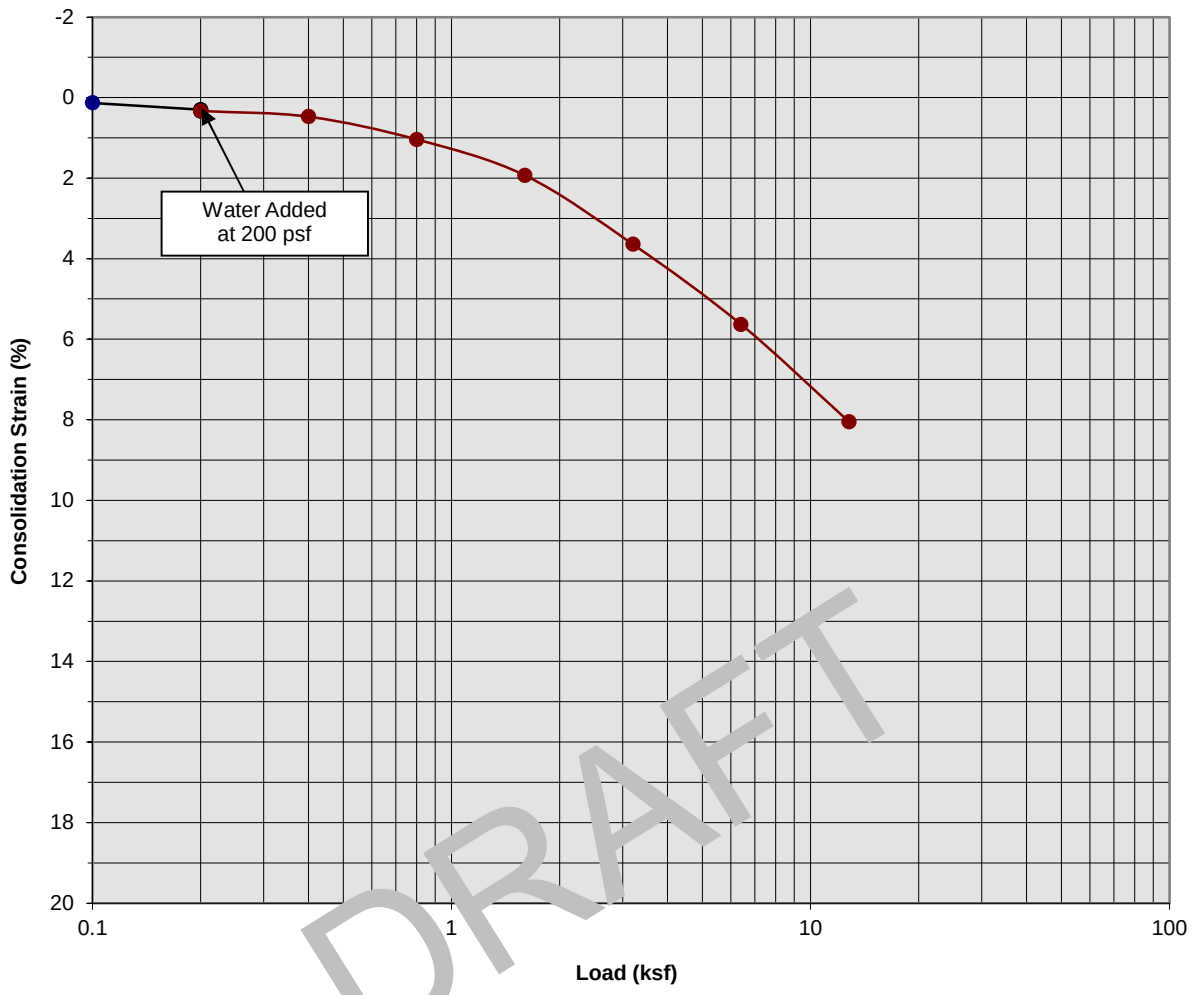
Boring Number:	SCG-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 11

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Light to Dark Brown Clayey Silt, trace fine Sand

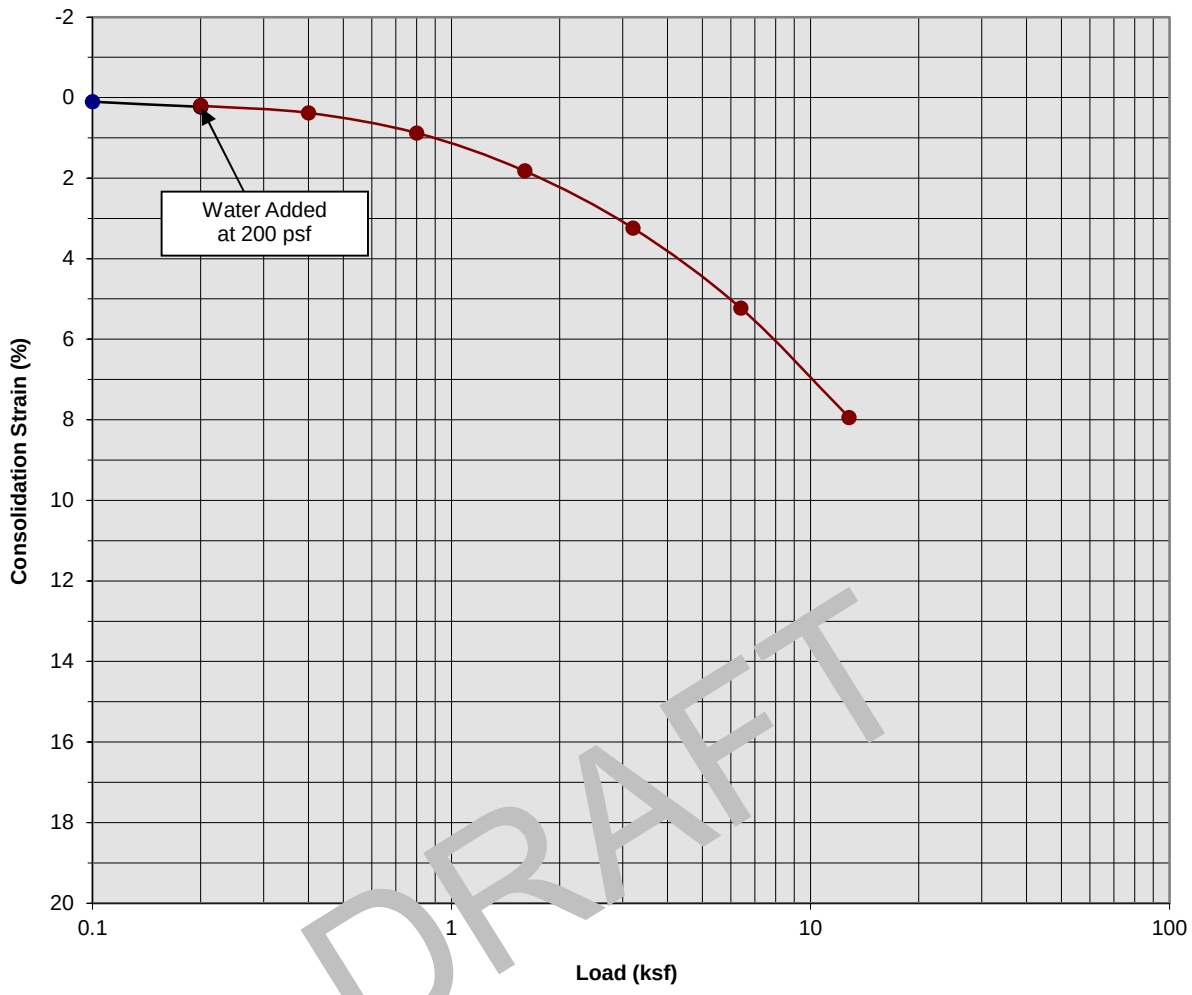
Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 12

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Light to Dark Brown Clayey Silt, trace fine Sand

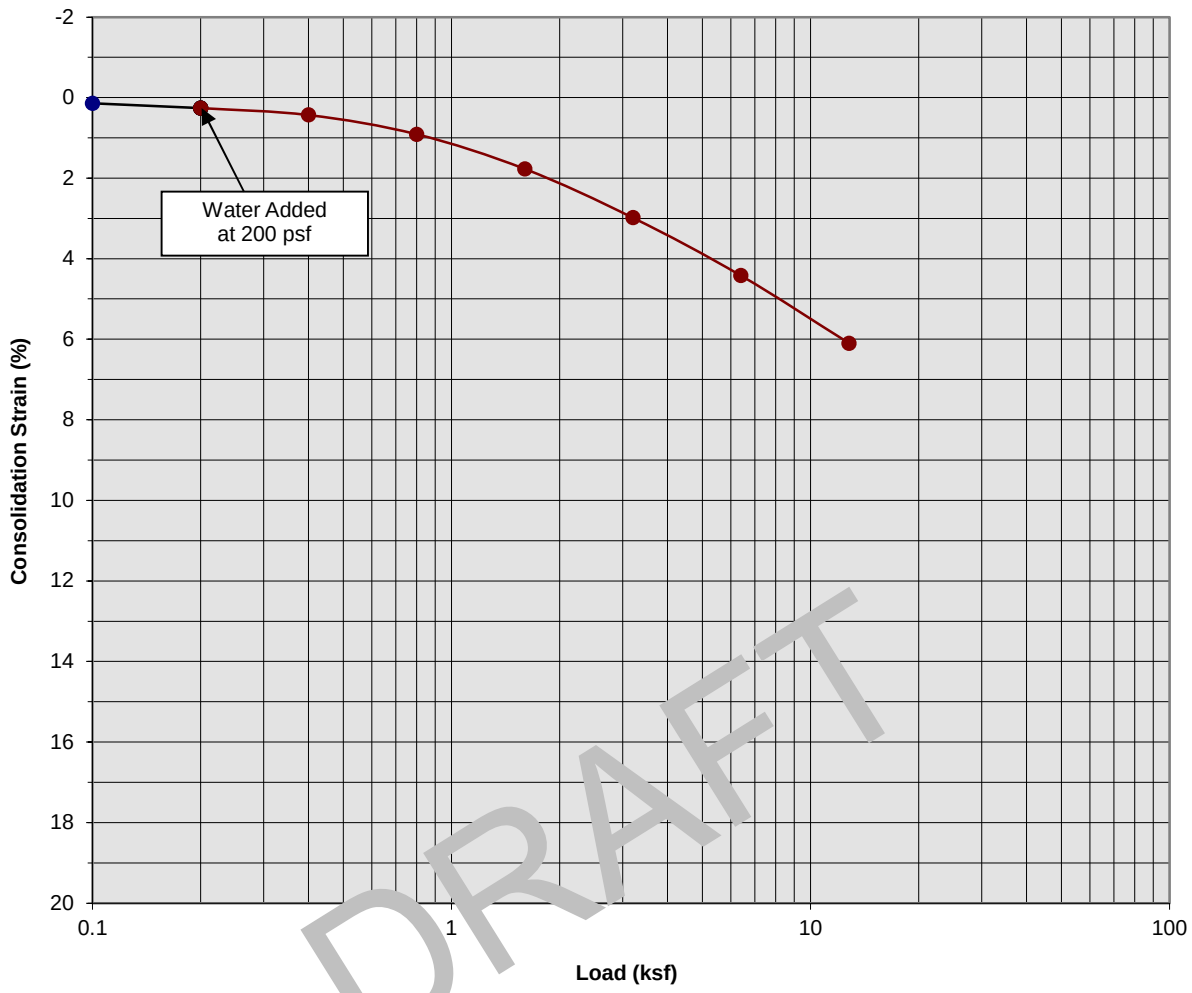
Boring Number:	SCG-7	Initial Moisture Content (%)	21
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	109.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.03

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 13

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Green Blue Silty fine Sand

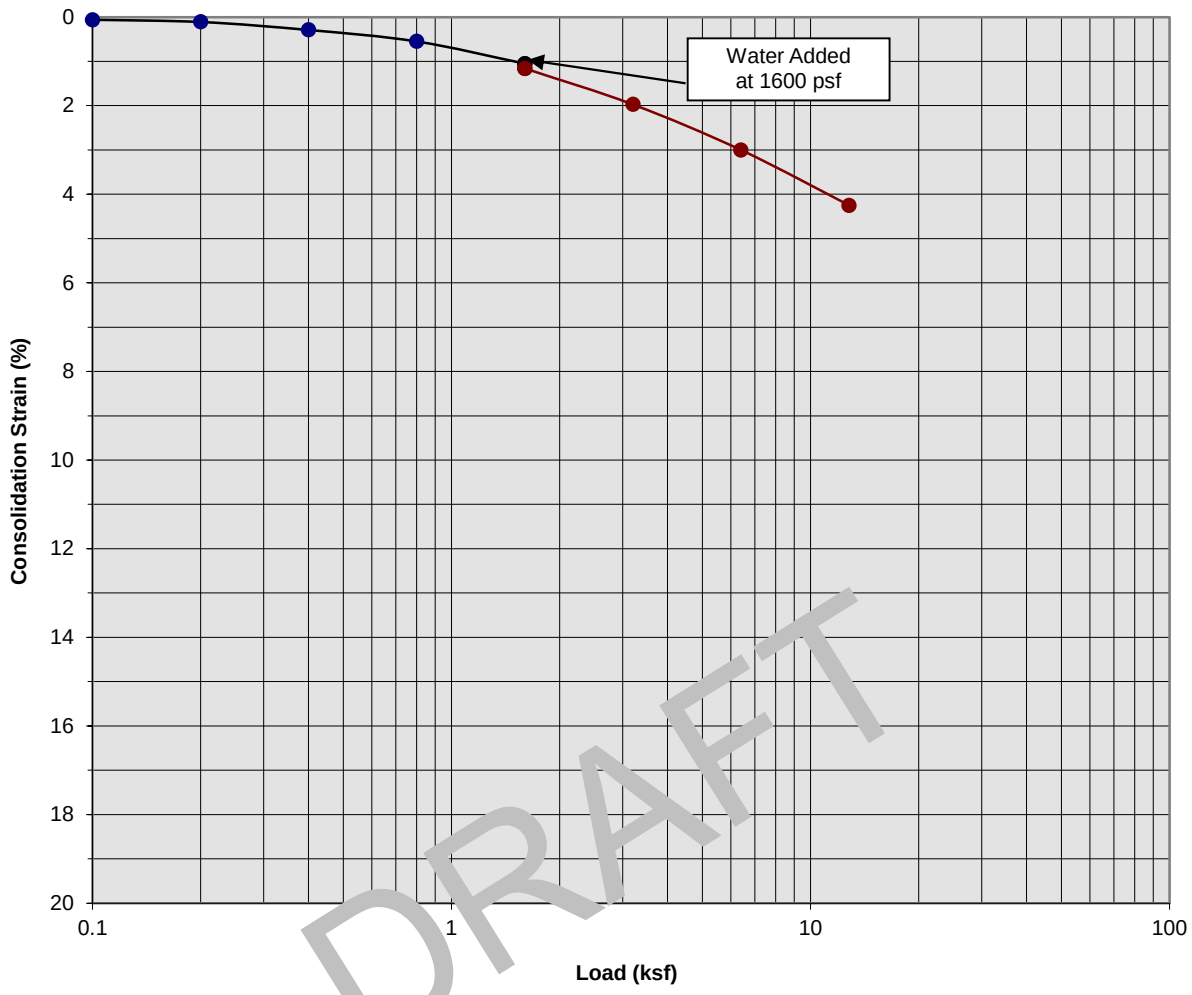
Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	33.5 to 34.5	Initial Dry Density (pcf)	113.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.00

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 14

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Gray Brown Silty fine to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	43.5 to 44.5	Initial Dry Density (pcf)	114.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.11

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 15

SoCalGeo
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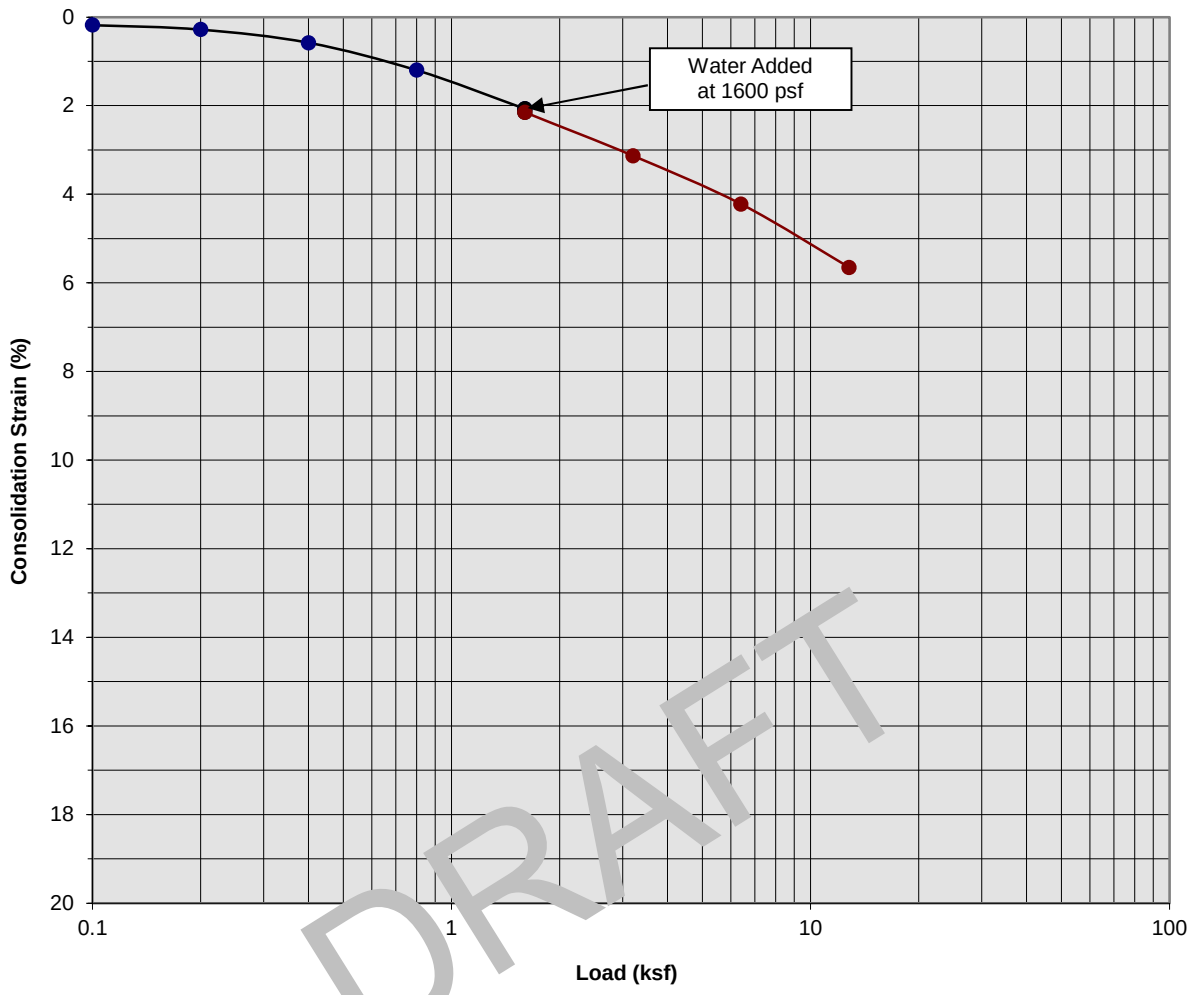
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Blue Green Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-7	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	53.5 to 54.5	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 16

SoCalGeo
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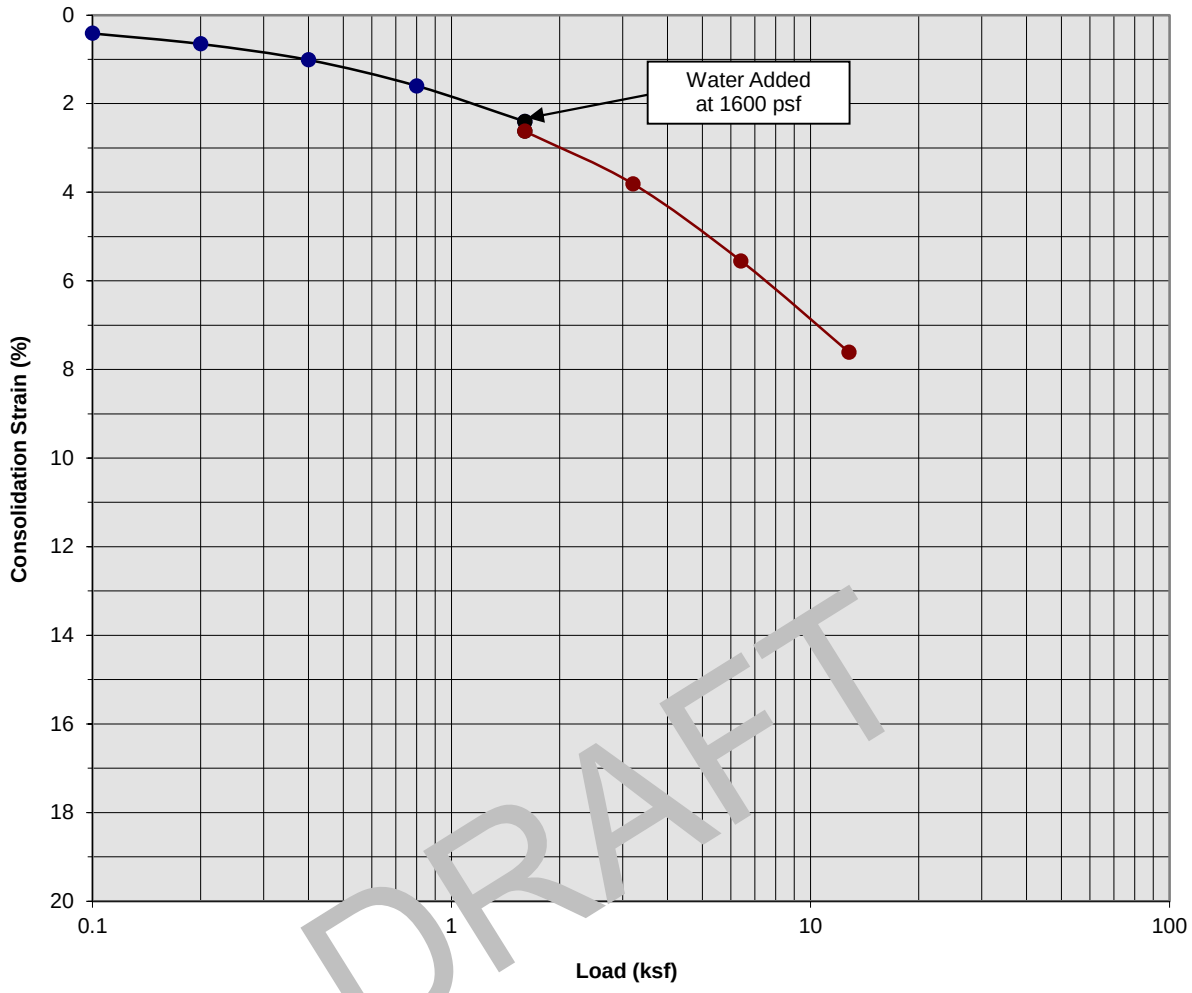
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	8.5 to 9.5	Initial Dry Density (pcf)	117.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.22

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 17

SoCalGeo
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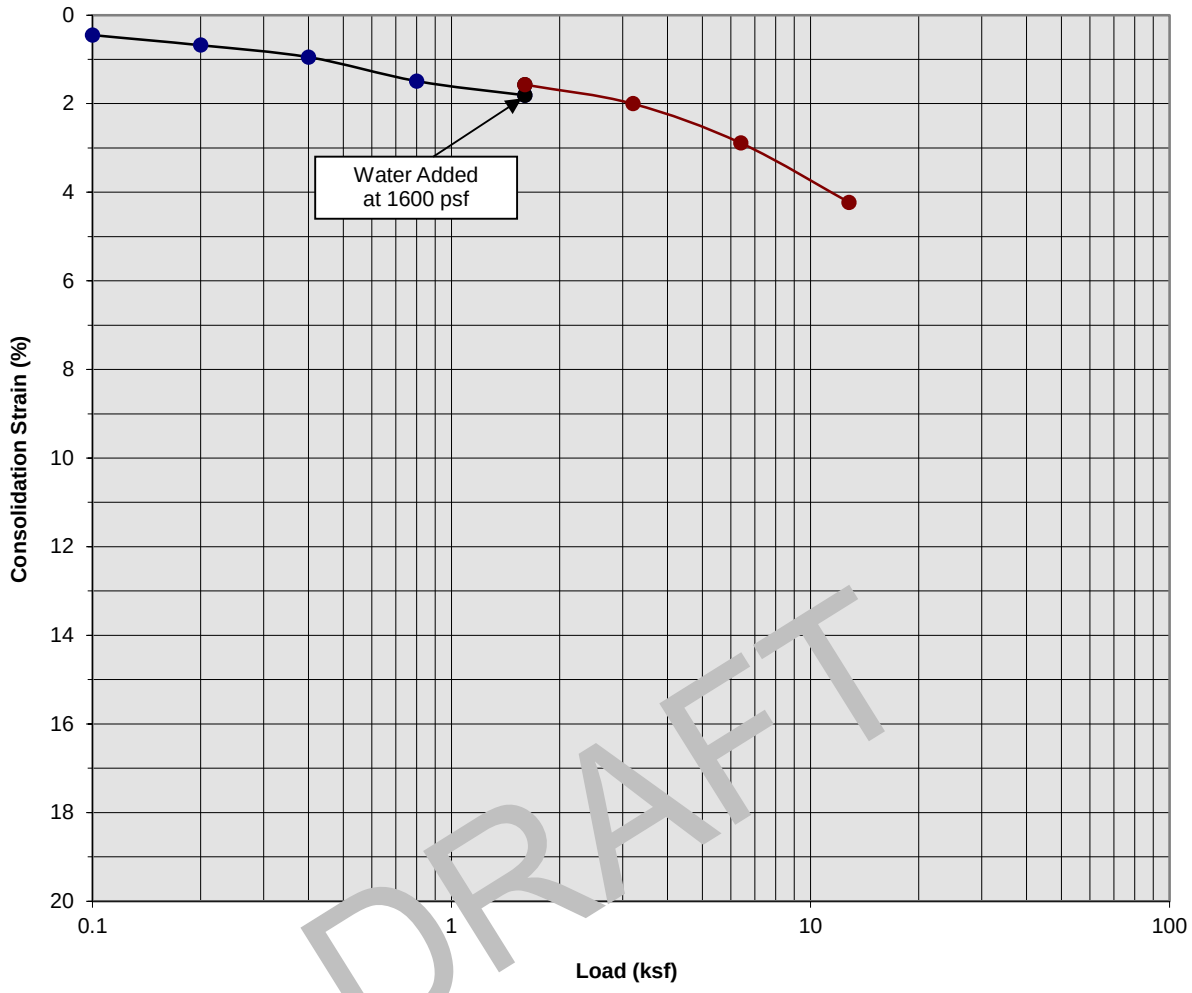
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Clayey fine Sand, trace medium to coarse Sand

Boring Number:	SCG-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	18.5 to 19.5	Initial Dry Density (pcf)	122.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.24

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 18

SoCalGeo
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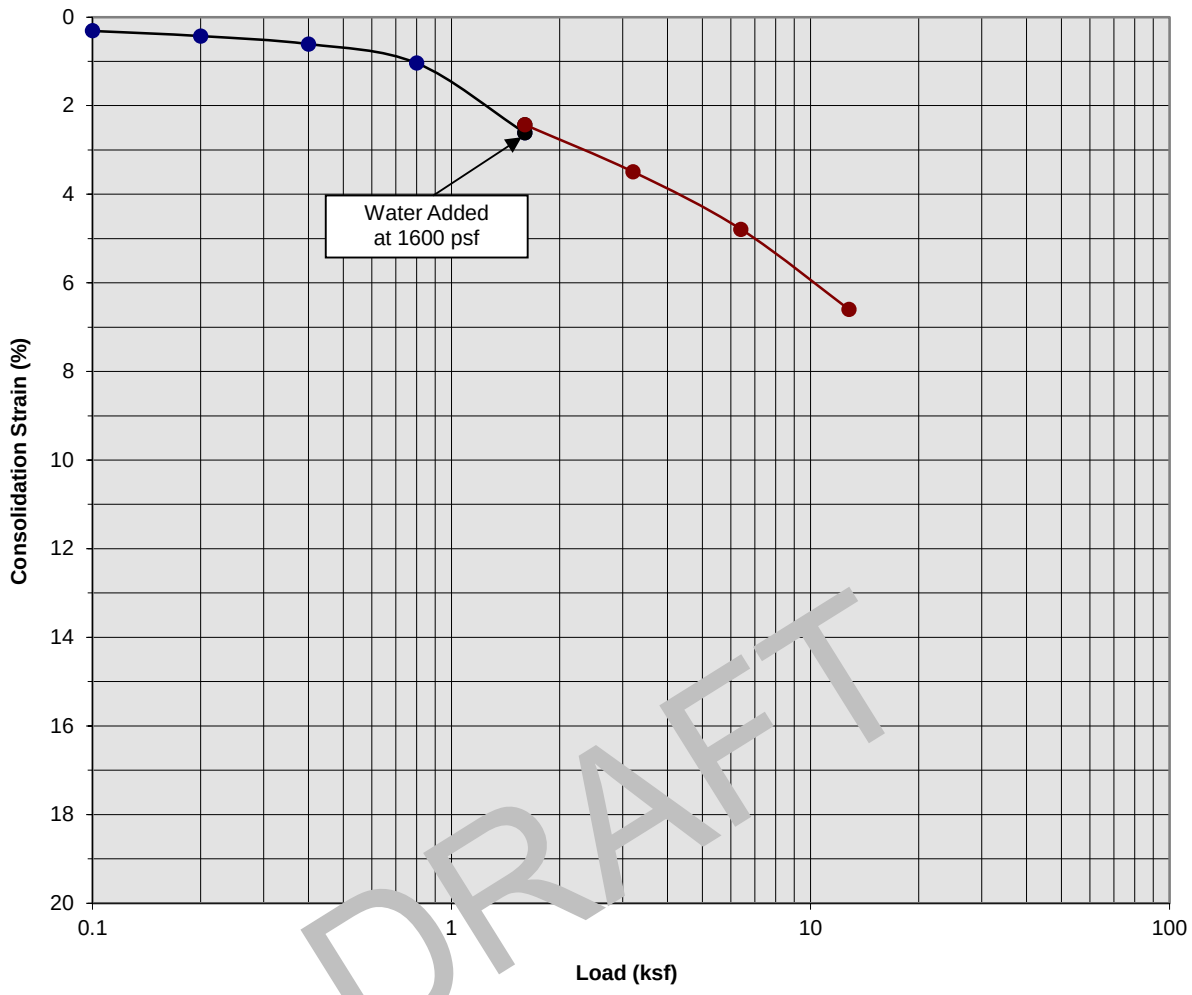
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3.5 to 4.5	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.18

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 19

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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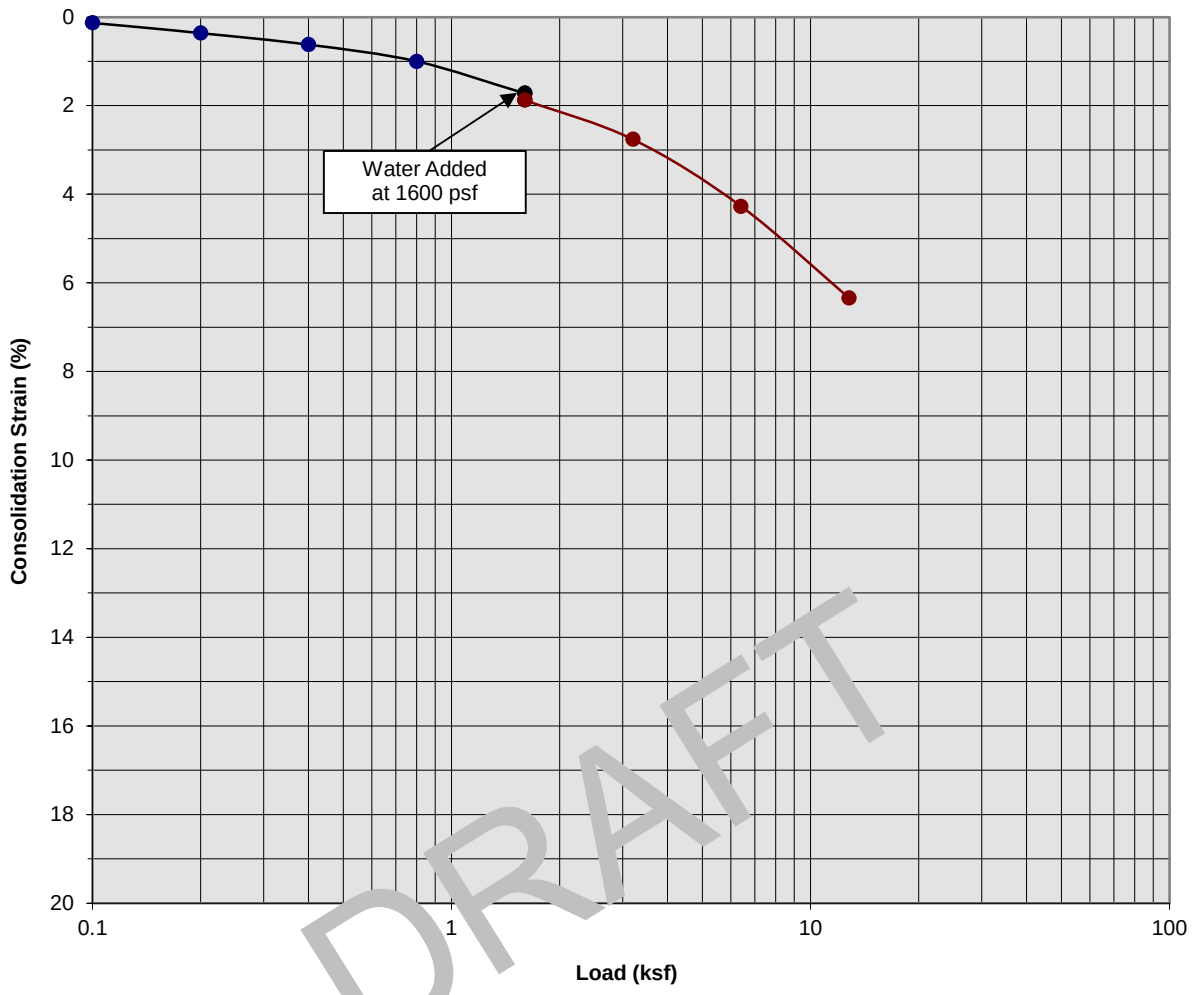
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	13.5 to 14.5	Initial Dry Density (pcf)	131.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 20

SoCalGeo
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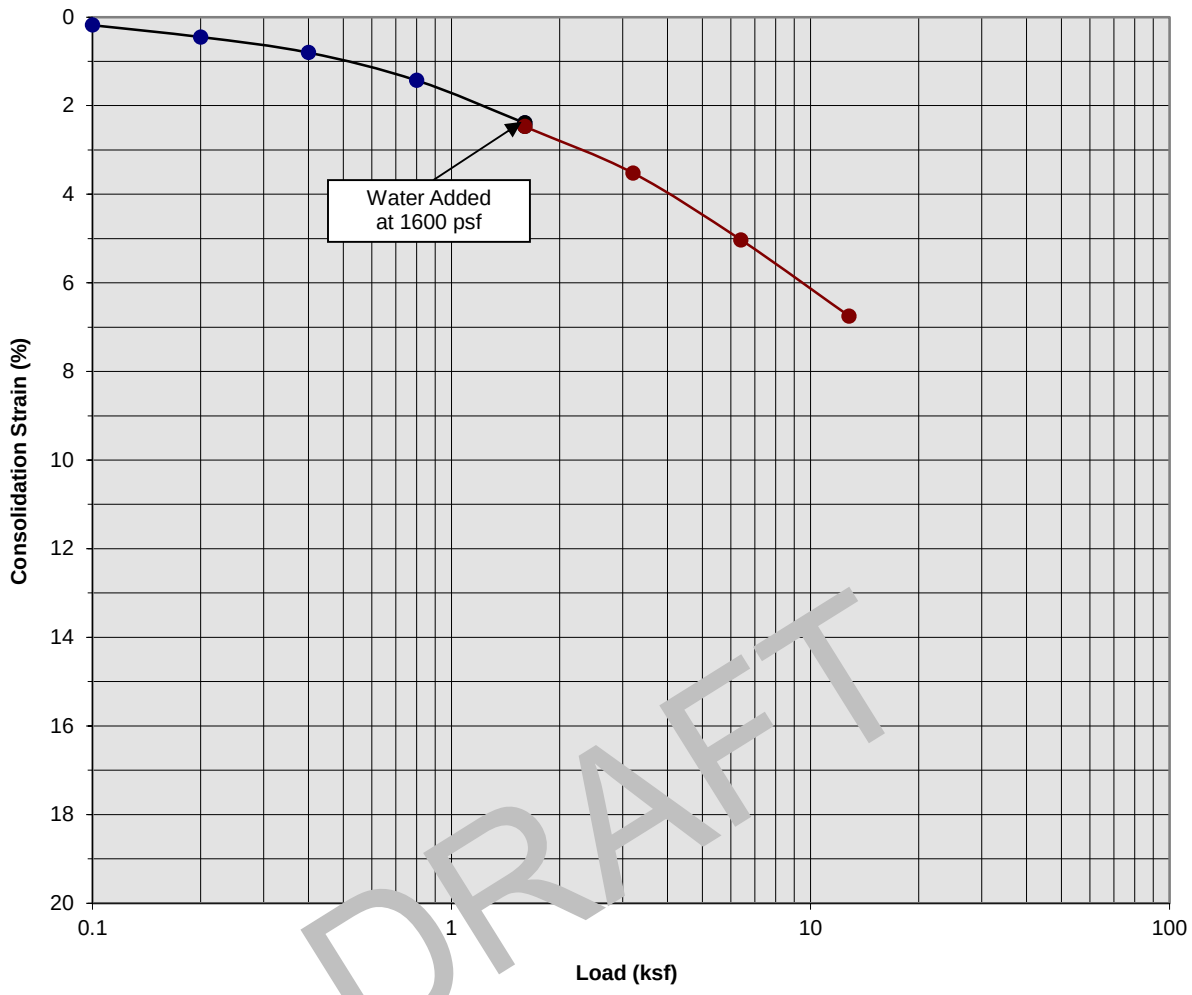
Consolidation/Collapse Test Results



DRAFT

Classification: Alluvium: Brown Silty fine Sand, trace Clay

Boring Number:	SCG-9	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	23.5 to 24.5	Initial Dry Density (pcf)	117.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.08

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 21

SoCalGeo
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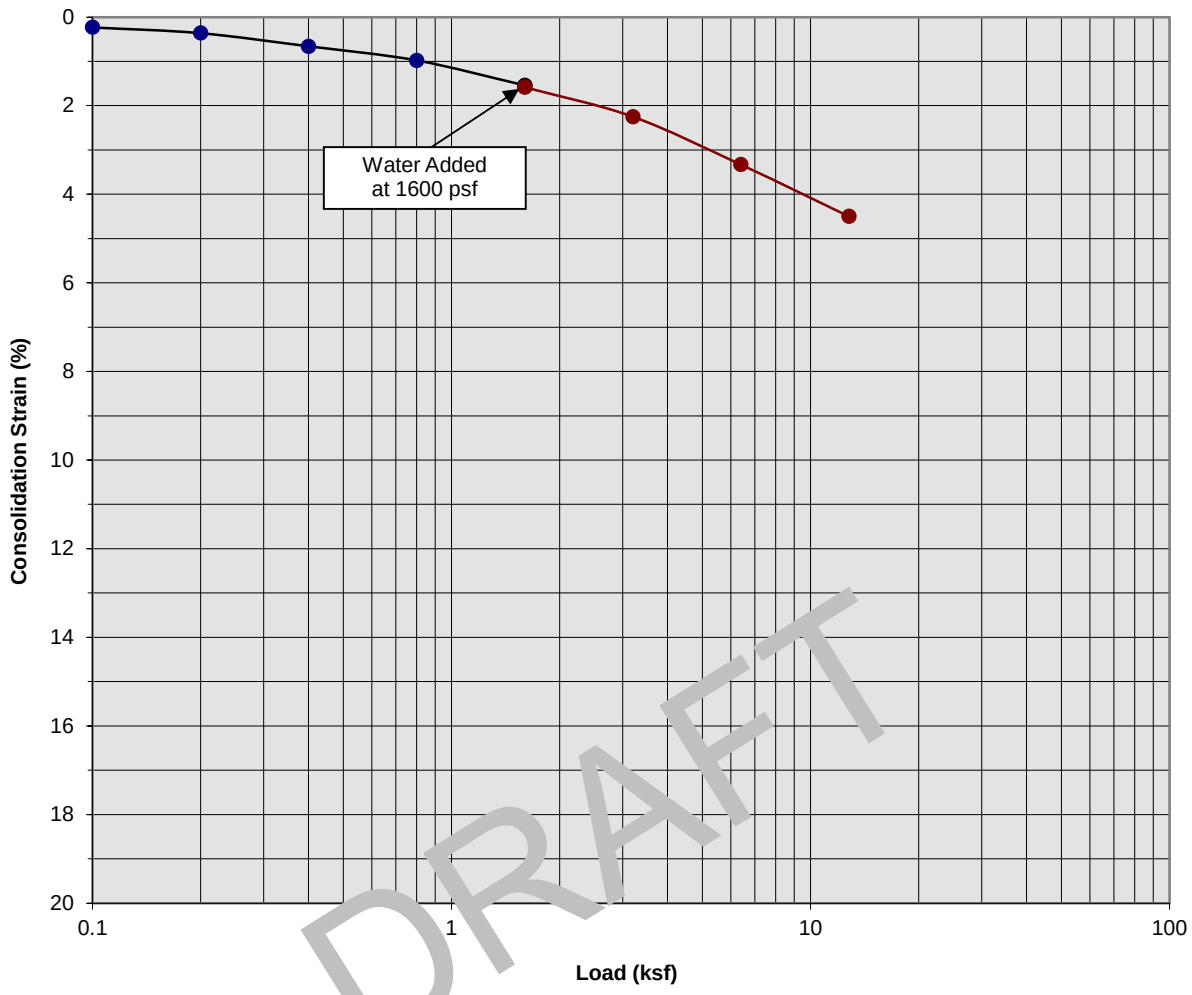
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	28.5 to 29.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.04

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 22

SoCalGeo
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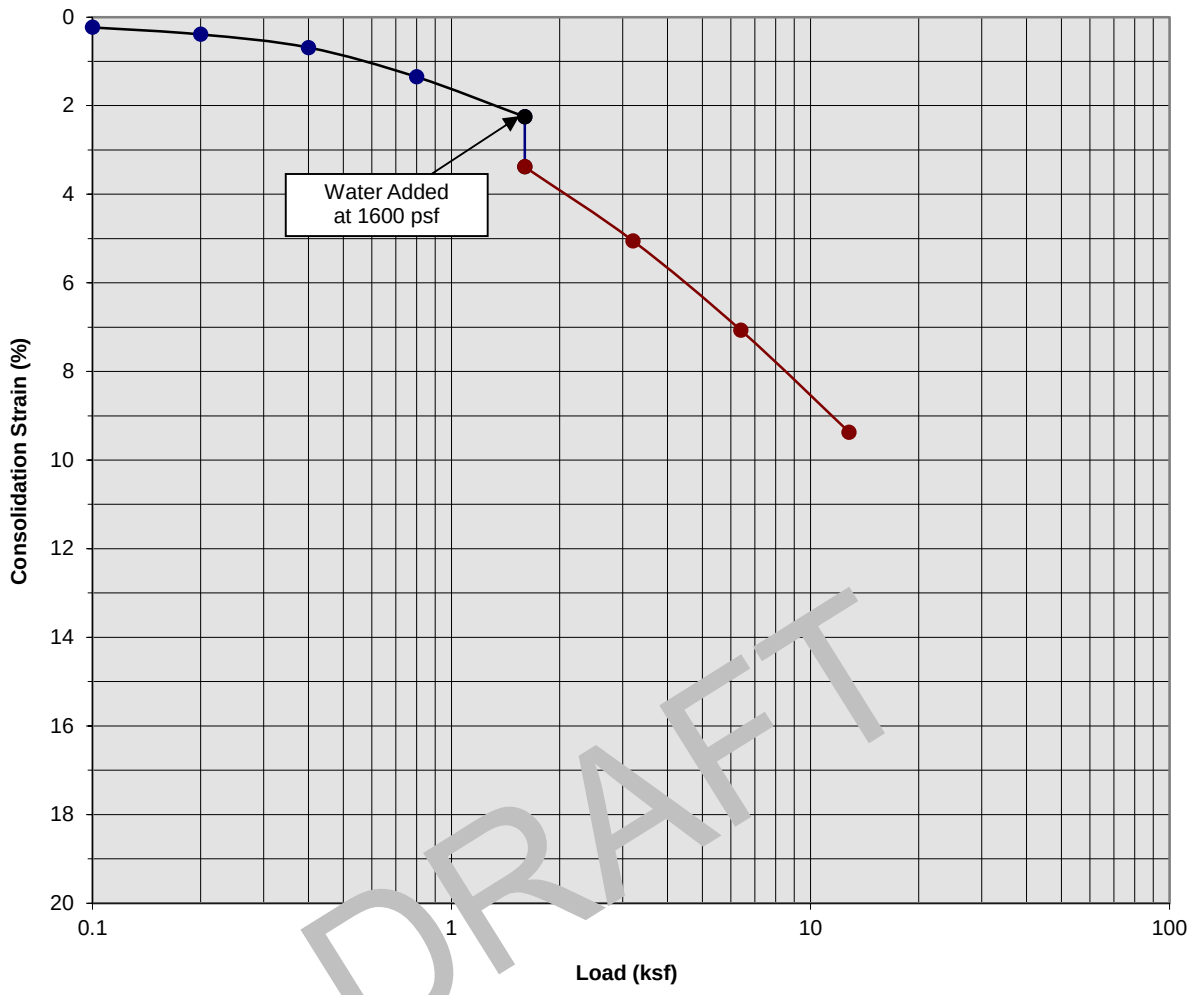
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Brown Silty fine Sand, trace medium Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	38.5 to 39.5	Initial Dry Density (pcf)	103.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 23

SoCalGeo
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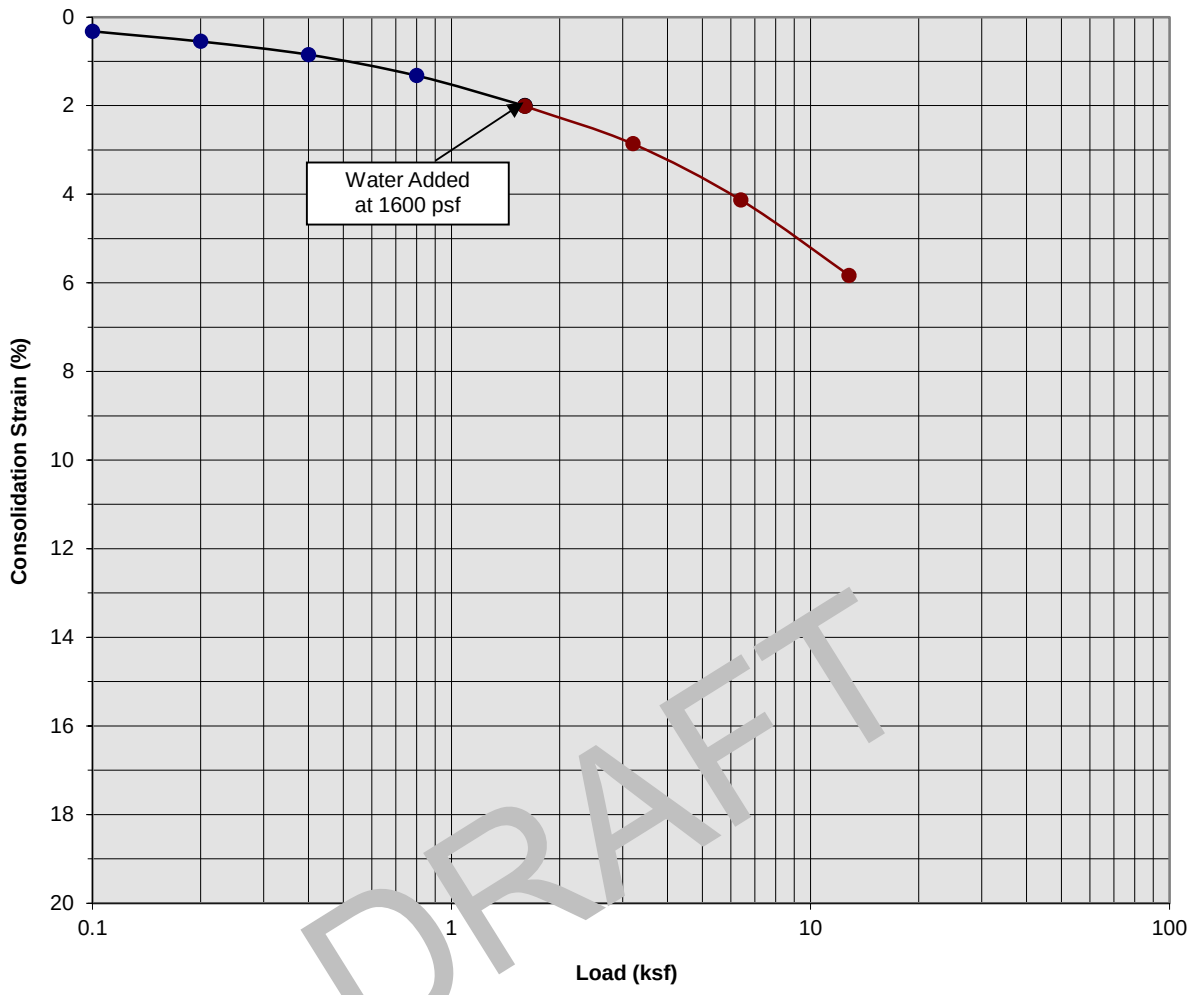
Consolidation/Collapse Test Results



DRAFT

Classification: Older Alluvium: Green Blue Silty fine Sand

Boring Number:	SCG-10	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	48.5 to 49.5	Initial Dry Density (pcf)	116.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Commerical/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C- 24

SoCalGeo
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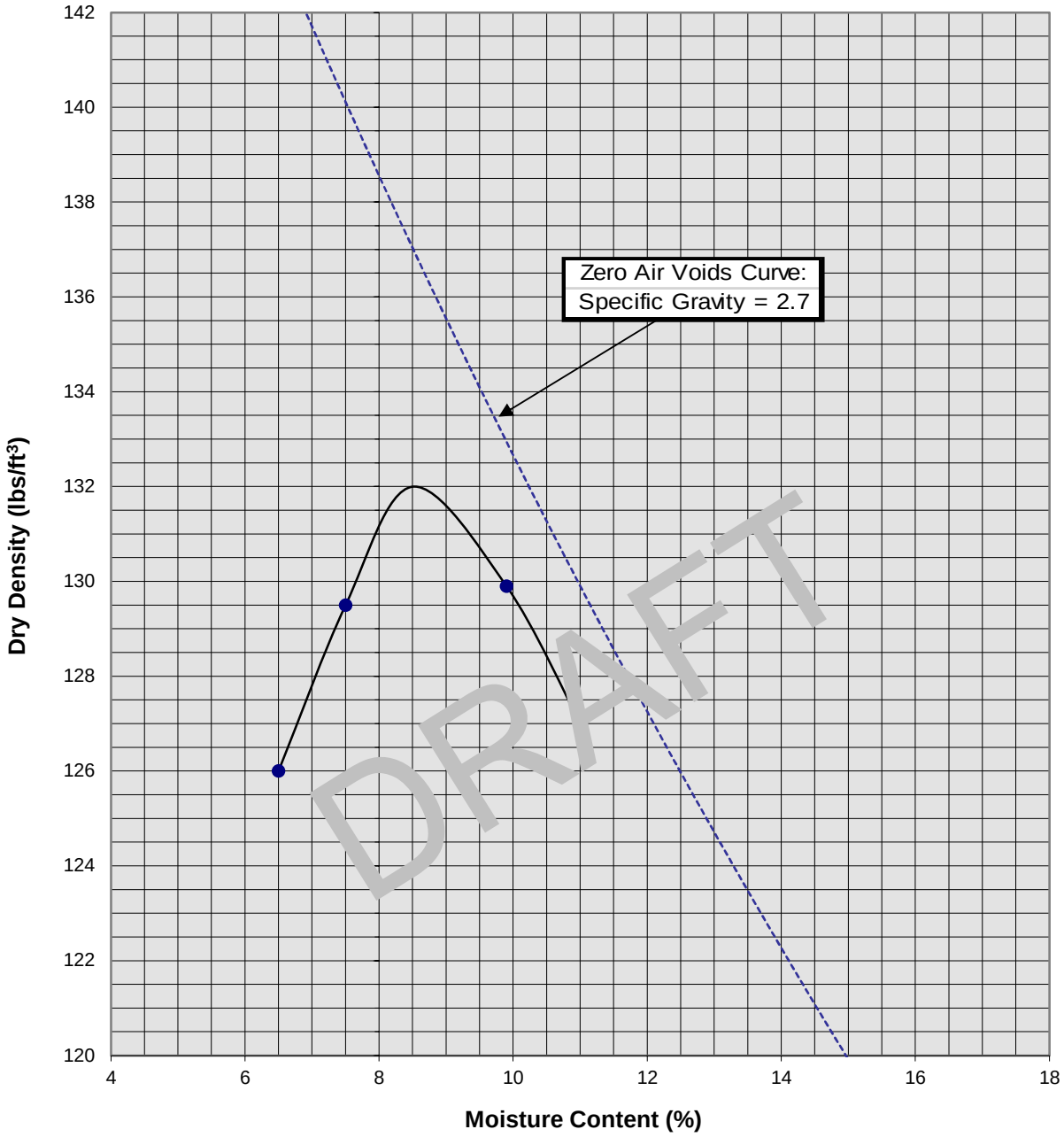
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-2 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	132
Soil Classification	Orange Brown fine Sandy Silt, trace Clay

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-25

SoCalGeo
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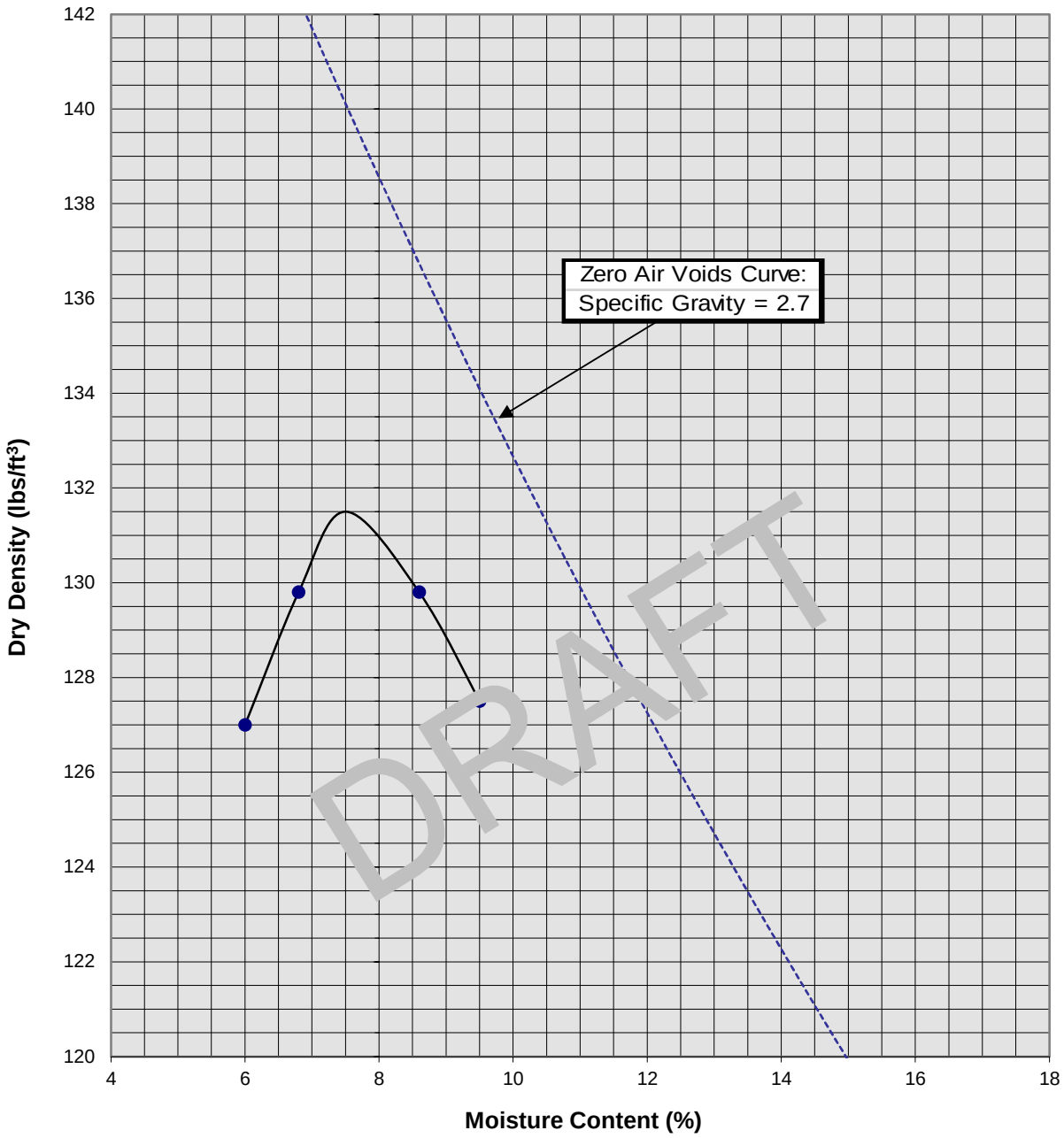
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-4 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	131.5
Soil Classification	Dark Gray Brown Silty fine to medium Sand, trace to little course Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-26

SoCalGeo
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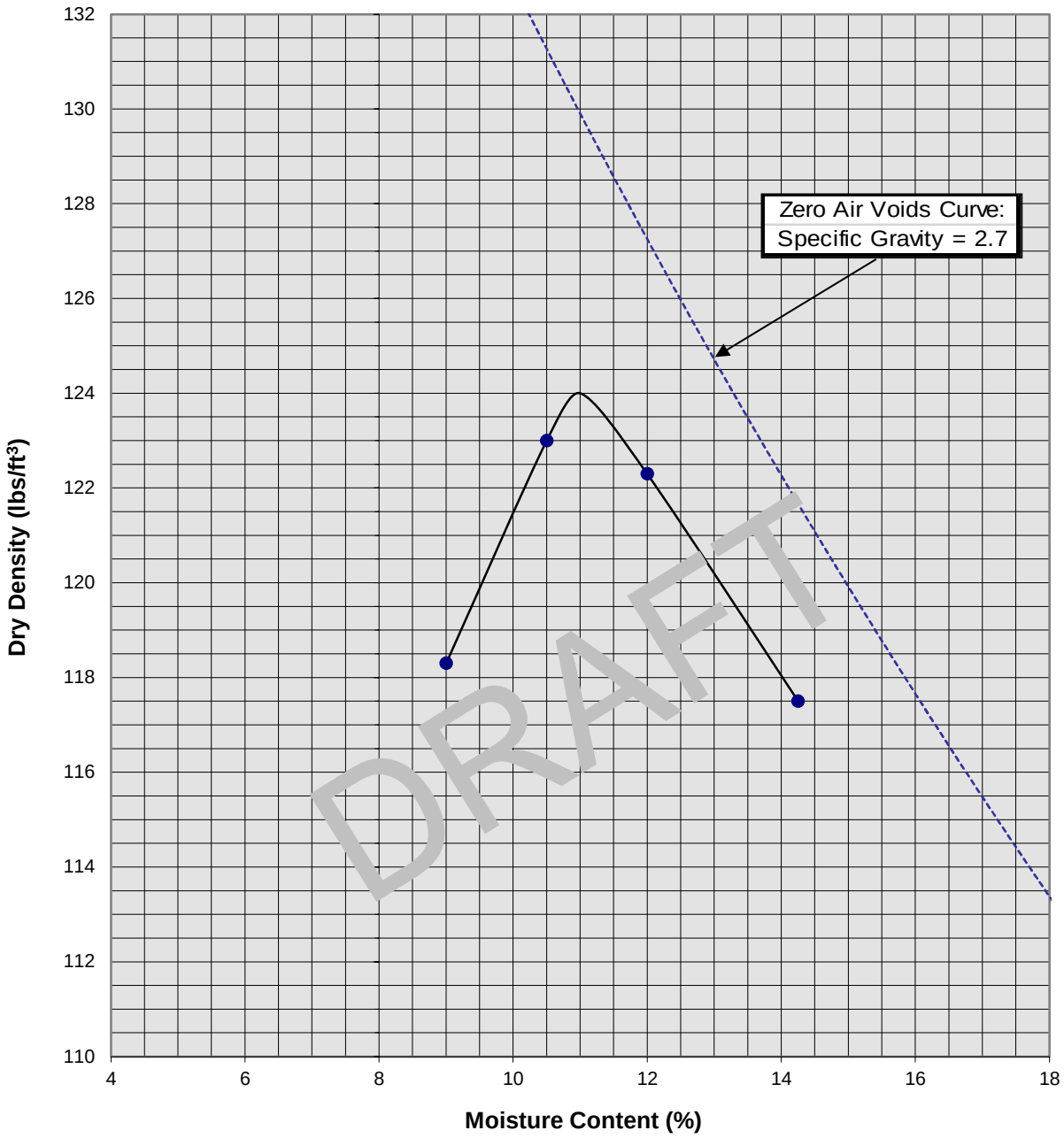
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-5 @ 0-5'
Optimum Moisture (%)	11
Maximum Dry Density (pcf)	124
Soil Classification	Dark Brown Clayey Silt, trace fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-27

SoCalGeo
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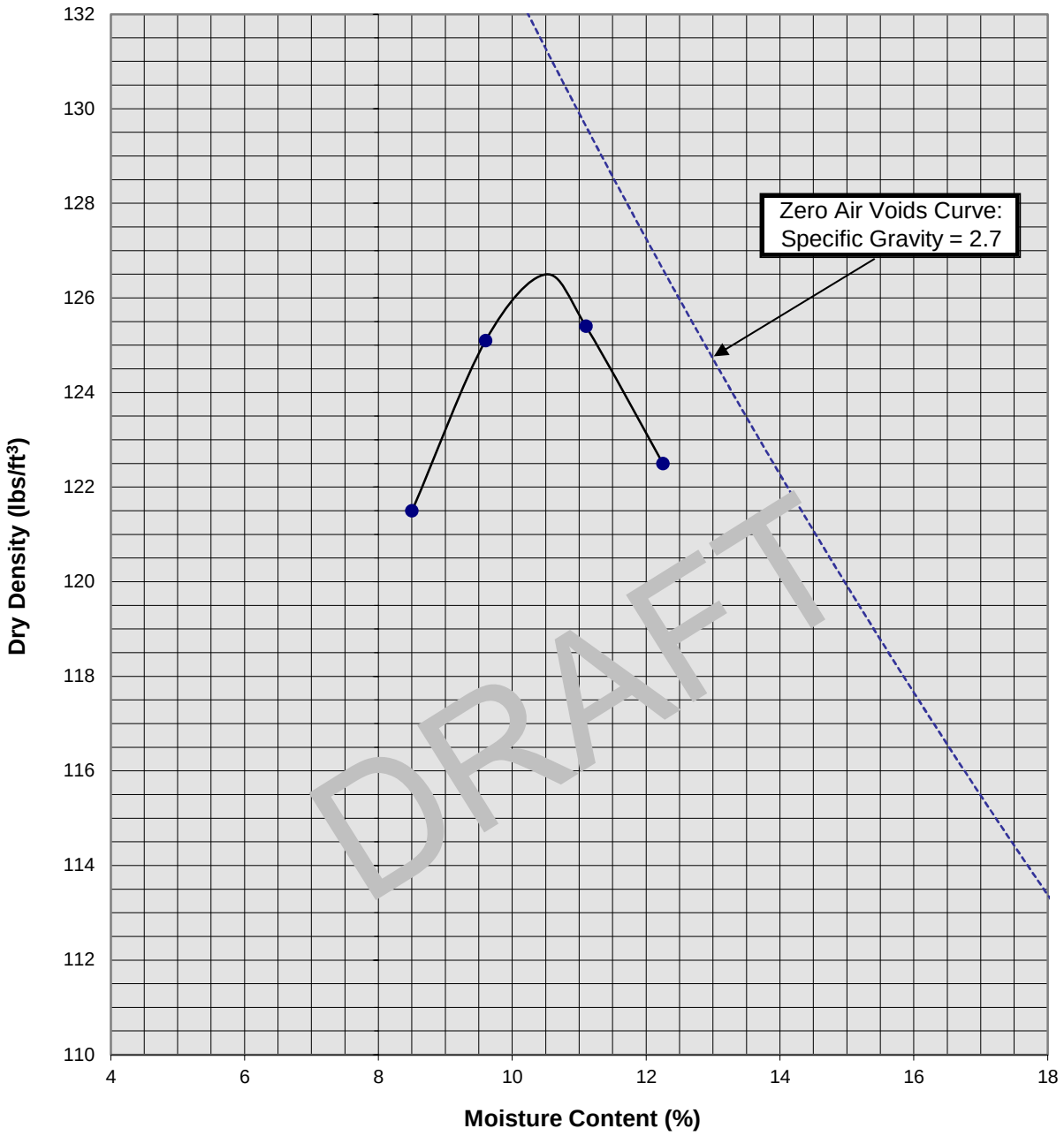
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	SCG-10 @ 0-5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	126.5
Soil Classification	Brown Silty fine Sand, trace medium to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G144-1

PLATE C-28

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APPENDIX C-3

LABORATORY TEST RESULTS (PSE)

Expansion Index Tests

Expansion Index tests were performed to evaluate the expansion potential of typical on-site soils. Testing was carried out according to UBC Method 18-2. The results are presented in Table C-1.

Corrosivity Testing

Corrosivity tests were performed to analyze the corrosion potential of the on-site soils on ferrous metals and concrete. Sulfate contents were determined and are shown on Plates 243 through 253.

The pH and electrical resistivity were also determined and are summarized in the following table.

Electrical Resistivity and pH			
Boring/Trench	**Depth**	**pH**	**Resistivity (ohms-cm)**
B-039	25	7.7	2360
B-039	55	7.0	3470
B-040	24	8.0	2090
B-054	20	7.8	3920
B-059	20	7.8	6130
B-067	5	6.6	3570
B-070	5	7.4	4200
B-073	10	7.3	4260
B-079	45	6.5	2180
B-093	6	6.8	6960
B-095	11	6.8	4090
B-096	12	6.8	3050
BB-01	16	8.2	4550
BB-03	11	8.3	4480
BB-05	11	8.3	4080
BB-08	4	8.4	3270
H-01	3	6.9	3950
H-04	3	6.9	3950
H-06	9	7.7	4100

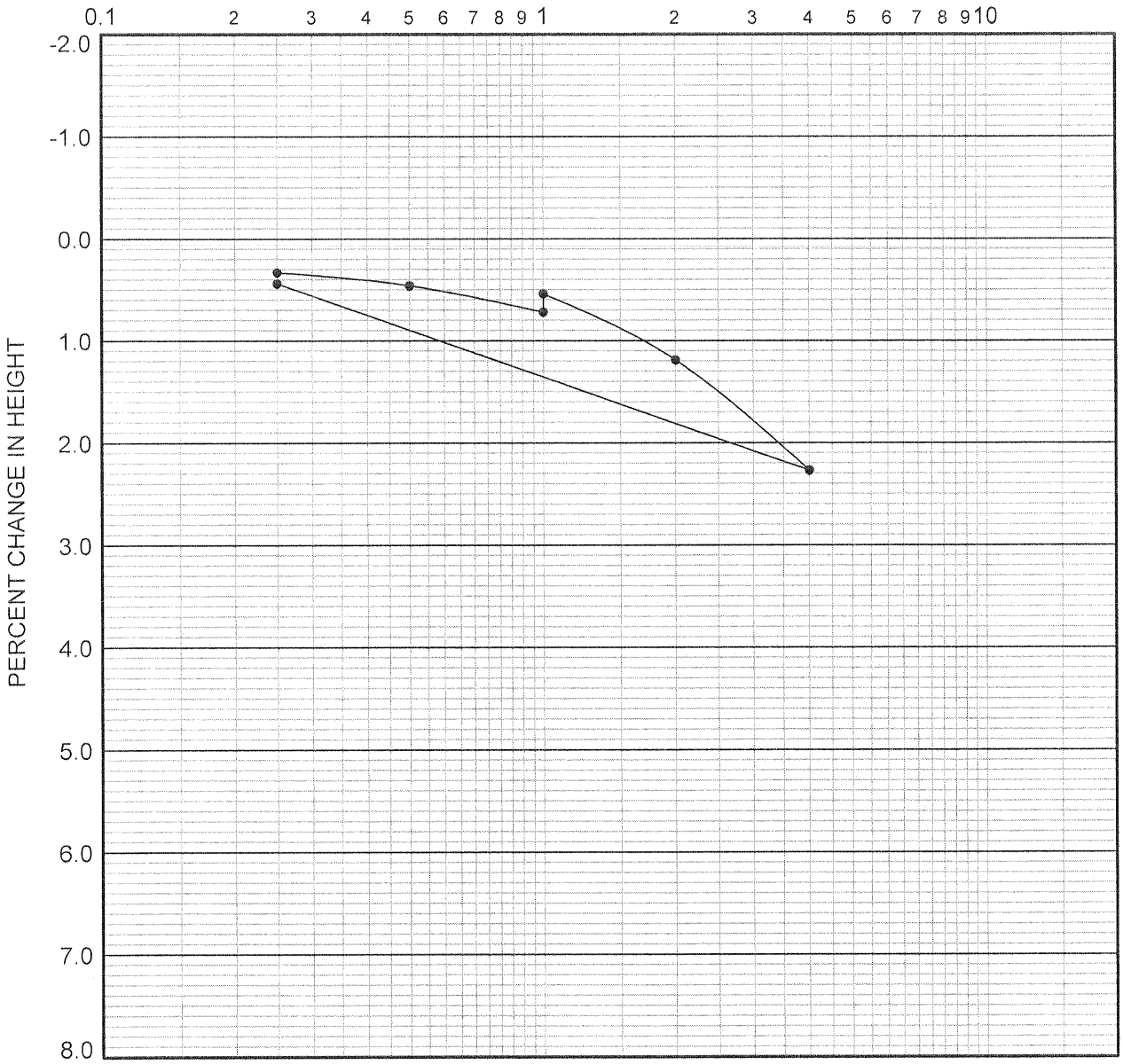
TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-035	20	Silty Sand (Qal)	SM				0	58	30	12		Consolidation-Plate C-1
B-035	27	Silty Sand (Qal)	SM	130.2	8.6		10	58	25	7		
B-035	30	Silty Sand (Qal)	SM				3	55	32	10		Consolidation-Plate C-2
B-036	21	Silty Sand (Qal)	SM	122.7	10.8		2	59	31	8		
B-037	15	Sandy Siltstone (QTst)					5	45	40	10		Consolidation-Plate C-3
B-038	20	Silty Sand (Qoa)	SM				0	76	17	7		Consolidation-Plate C-4
B-039	25	Sandy Siltstone (QTst)		120.4	12.5	SEE PLATE C-161	7	51	31	11	32	Chemical-Plate C-243 Resistivity = 2360, pH = 7.7
B-039	50	Sandy Siltstone (QTst)				SEE PLATE C-162	0	42	46	12		
B-039	55	Sandy Siltstone (QTst)		122.4	11.1	SEE PLATE C-163	5	52	33	10	11	Chemical-Plate C-243 Resistivity = 3470, pH = 7.0
B-040	24	Sandy Siltstone (QTst)		117.8	13.3	SEE PLATE C-164	5	55	29	11	42	Chemical-Plate C-243 Resistivity = 2090, pH = 8.0
B-041	30	Pebble Conglomerate (QTst)				SEE PLATE C-165	16	60	20	4		
B-041	51	Sandy Siltstone (QTst)				SEE PLATE C-166	2	51	34	13		
B-041	70	Silty Sandstone (QTst)					0	64	32	4		Consolidation - Plate C-5
B-041	71	Silty Sandstone (QTst)		125.0	9.0	SEE PLATE C-167	0	73	22	5	0	Chemical-Plate C-244
B-042	30	Sandy Siltstone (QTst)					0	63	28	9		Consolidation - Plate C-6
B-044	25	Silty Sand (Qal)	SM				14	66	16	4		Consolidation - Plate C-7
B-045	20	Gravelly Sand (Qal)	SP				17	72	8	3		Consolidation - Plate C-8
B-045	30	Silty Sand (Qal)	SM				16	52	25	7		Consolidation - Plate C-9
B-046	30	Silty Sand (Qal)	SM				9	62	21	8		Consolidation - Plate C-10
B-047	30	Silty Sand (Qal)	SM				0	53	32	15		Consolidation - Plate C-11
B-047	31	Silty Sand (Qal)	SM	128.8	9.5		2	58	30	10		
B-047	35	Silty Sand (Qal)	SM				2	53	30	15		Consolidation - Plate C-12

TABLE C-1
SUMMARY OF LABORATORY TEST DATA
W.O. 700065-J

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	OTHER TESTS REMARKS
B-079	70	Silty Sandstone (Qtst)		120.0	11.9	SEE PLATE C-186	0	33	44	23		
B-080	20	Silty Sand (Qoa)	SM	132.3	8.3		6	64	22	8		
B-081	15	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-58
B-082	10	Sand with Silt (Qal)	SP-SM				8	78	11	3		Consolidation-Plate C-59
B-082	20	Sandy Siltstone (Qtst)		126.2	9.1	SEE PLATE C-187	0	70	20	10		
B-082	35	Sandy Siltstone (Qtst)				SEE PLATE C-188	0	56	27	17		
B-082	45	Sandy Siltstone (Qtst)				SEE PLATE C-189	0	70	15	15		
B-083	20	Silty Sand (Qoa)	SM			SEE PLATE C-190	0	53	30	17		
B-084	20	Silty Sandstone (Qtst)				SEE PLATE C-191	0	60	30	10		
B-084	35	Sandy Siltstone (Qtst)				SEE PLATE C-192	0	45	42	13		
B-085	15	Silty Sand (Qoa)	SM	130.6	8.7		0	79	18	3		Consolidation-Plate C-60
B-090	26	Gravelly Sand (Qoa)	SP			SEE PLATE C-193						
B-093	6	Silty Sandstone (Qtst)		125.9	10.0	SEE PLATE C-194	0	71	20	9		Chemical-Plate C-249 Resistivity = 6960, pH = 6.8
B-093	13	Silty Sandstone (Qtst)				SEE PLATE C-195	0	58	22	10		
B-093	20	Sandy Siltstone (Qtst)					0	40	48	12		Consolidation-Plate C-61
B-095	10	Silty Sand (Qal)	SM				0	70	20	10		Consolidation-Plate C-62
B-095	11	Silty Sand (Qal)	SM	126.6	10.7							Chemical-Plate C-249 Resistivity = 4090, pH = 6.8
B-096	5	Silty Sand (Qal)	SM				0	71	22	7		Consolidation-Plate C-63
B-096	11	Silty Sand (Qal)	SM				0	60	20	20		Consolidation-Plate C-64
B-096	12	Silty Sand (Qal)	SM	125.1	11.9	SEE PLATE C-196	0	72	16	12		Chemical-Plate C-250 Resistivity = 3050, pH = 6.8
B-099	15	Silty Sand (Qal)	SM				10	69	12	9		Consolidation-Plate C-65
B-099	21	Gravelly Sand (Qal)	SP	130.2	7.9	SEE PLATE C-197	18	71	8	3	0	

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-037	15.0	131	8.6	85	49		Sandy Siltstone (QTst)

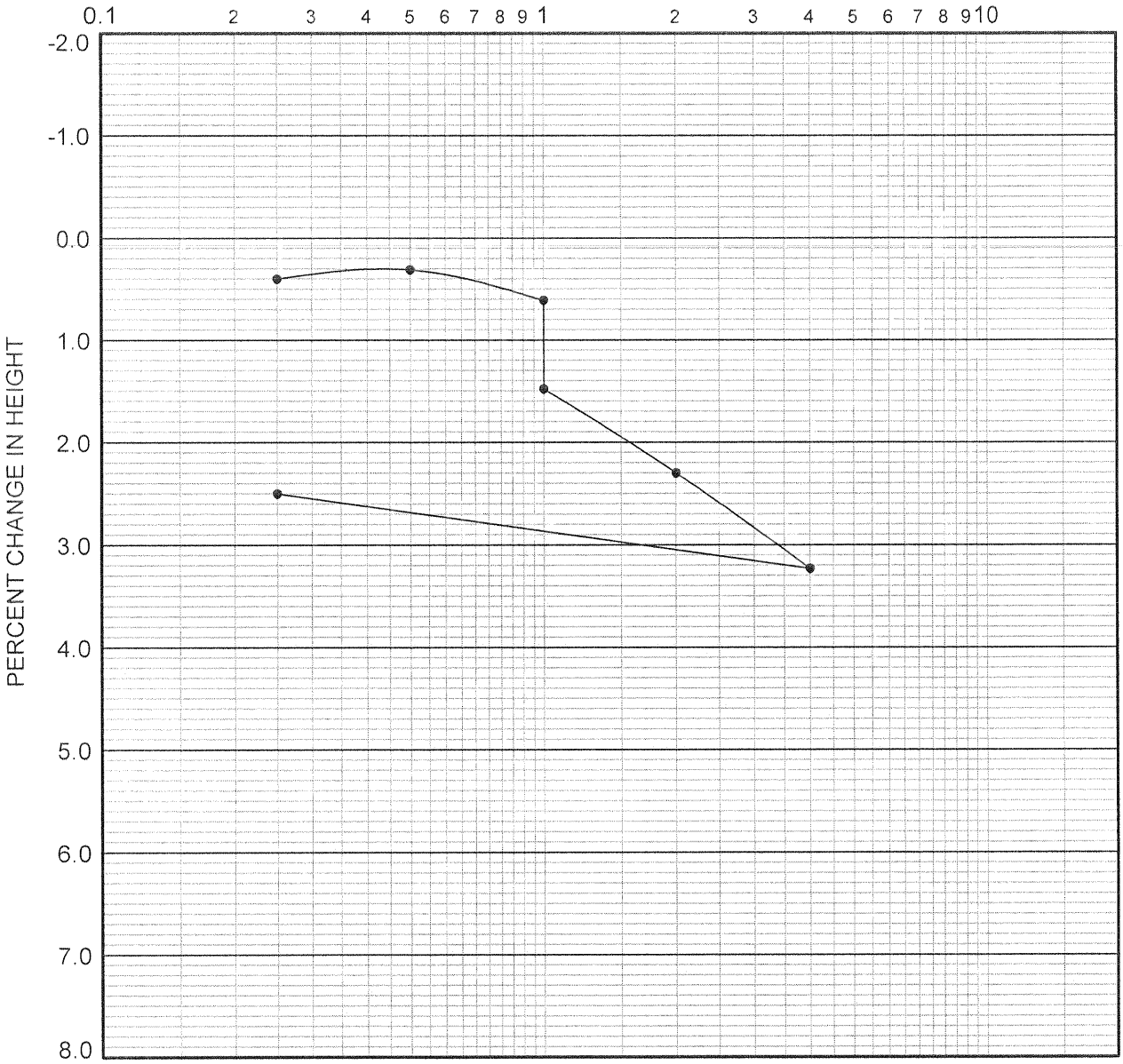
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-3

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-081	15.0	112	5.5	31	29	SM	Silty Sand (Qal)

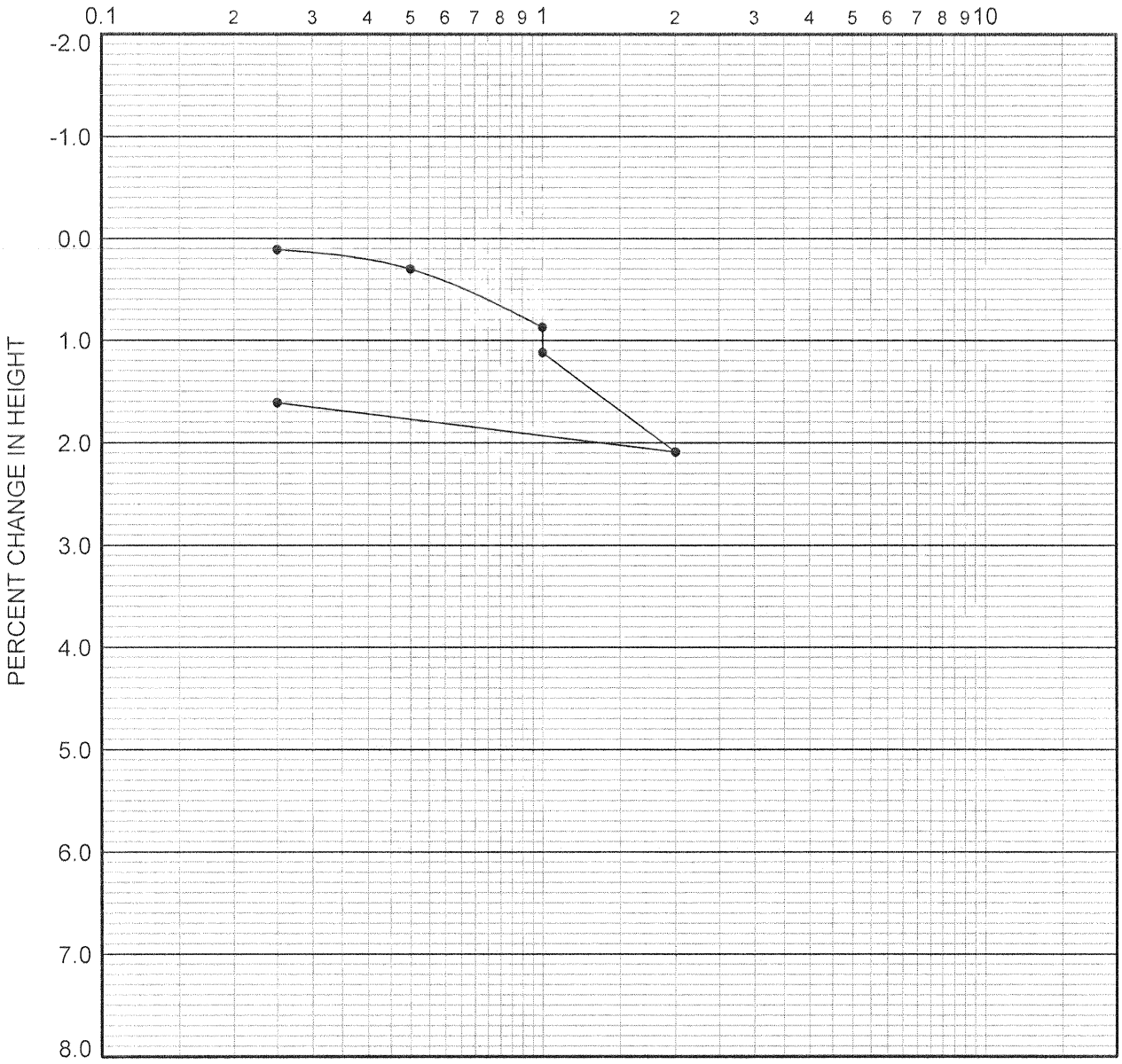
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-58

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-095	10.0	113	13.2	75	30	SM	Silty Sand (Qal)

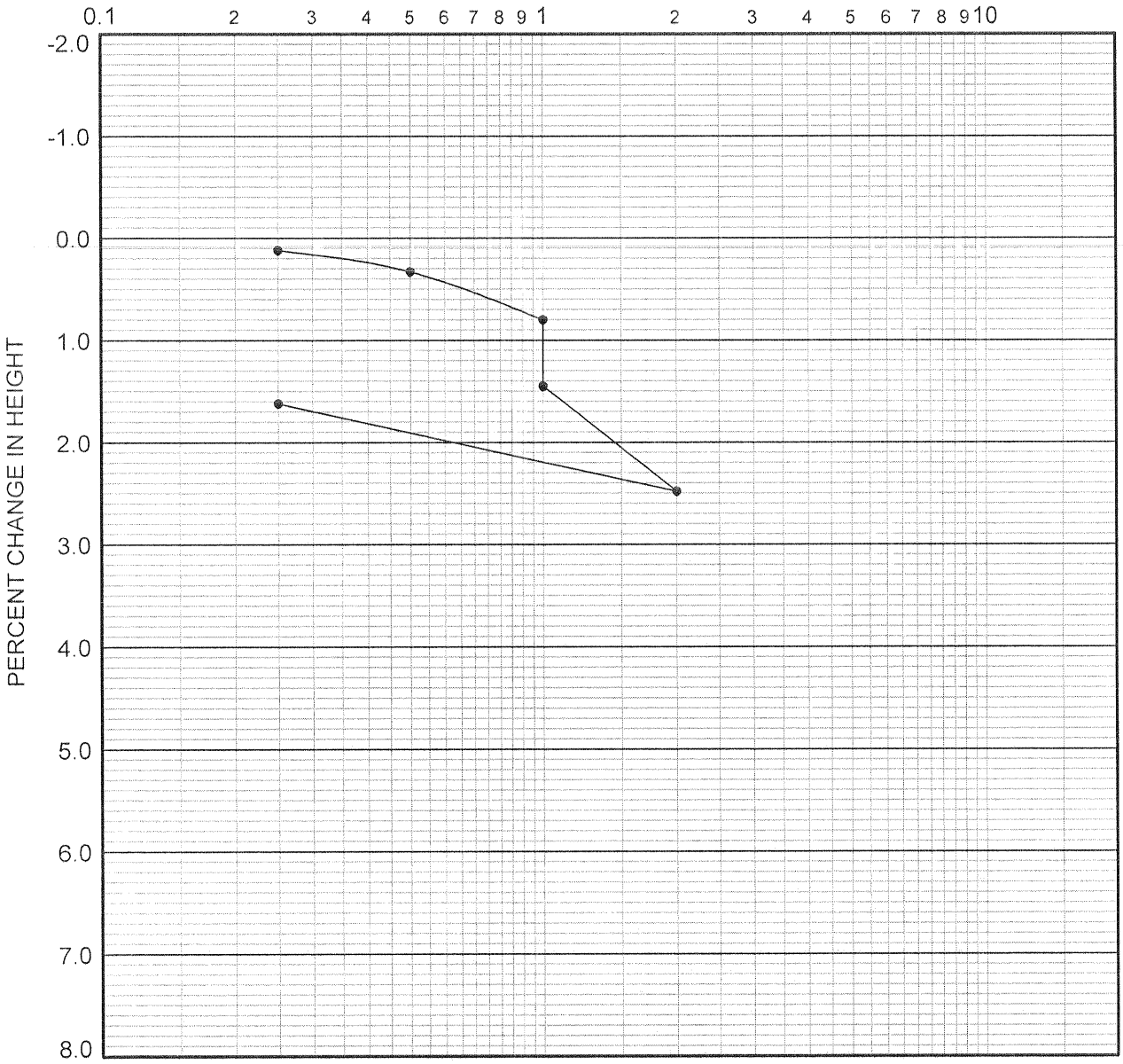
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-62

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	5.0	103	3.9	17	29	SM	Silty Sand (Qal)

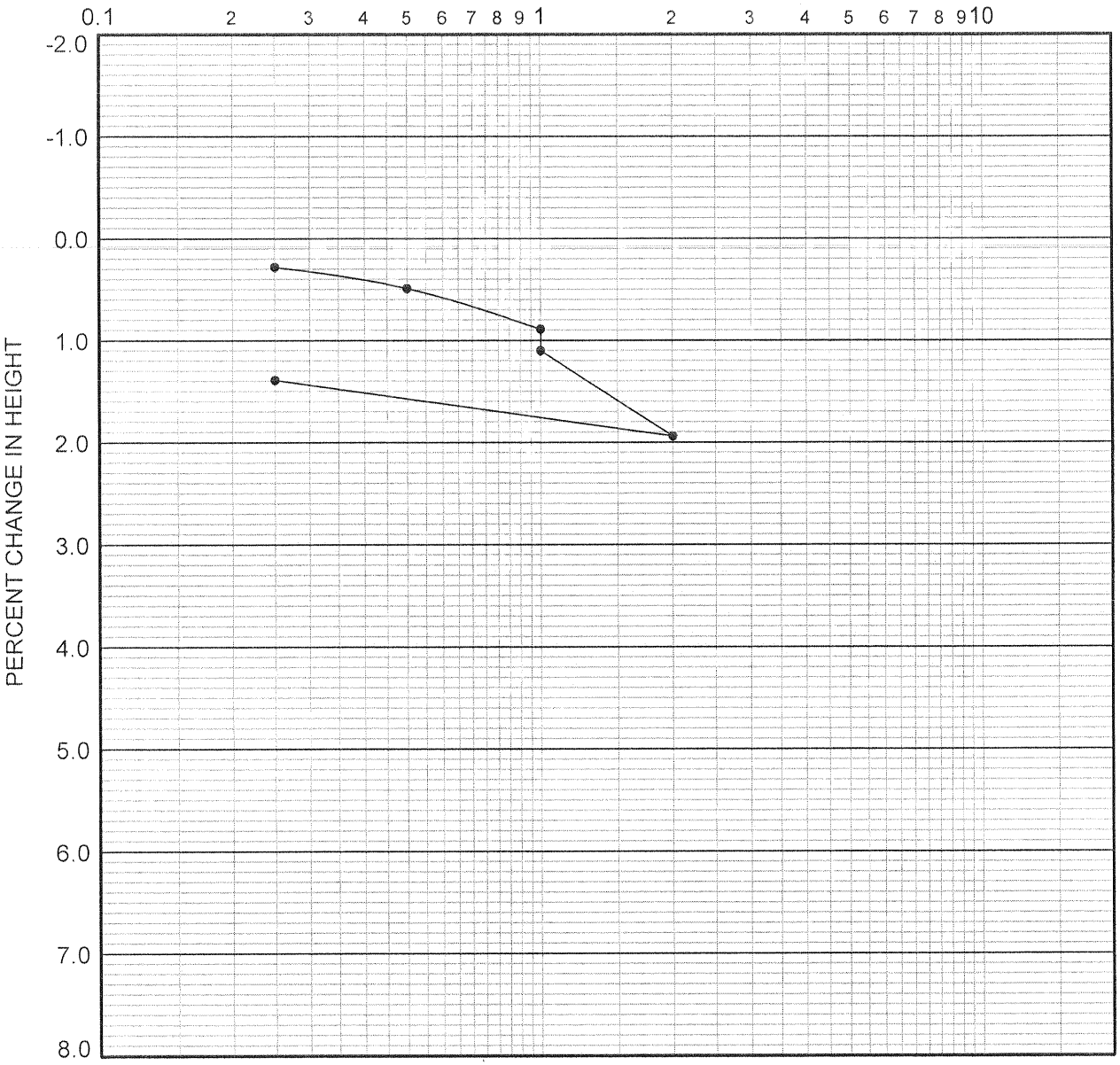
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-63

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-096	11.0	112	14.4	79	40	SM	Silty Sand (Qal)

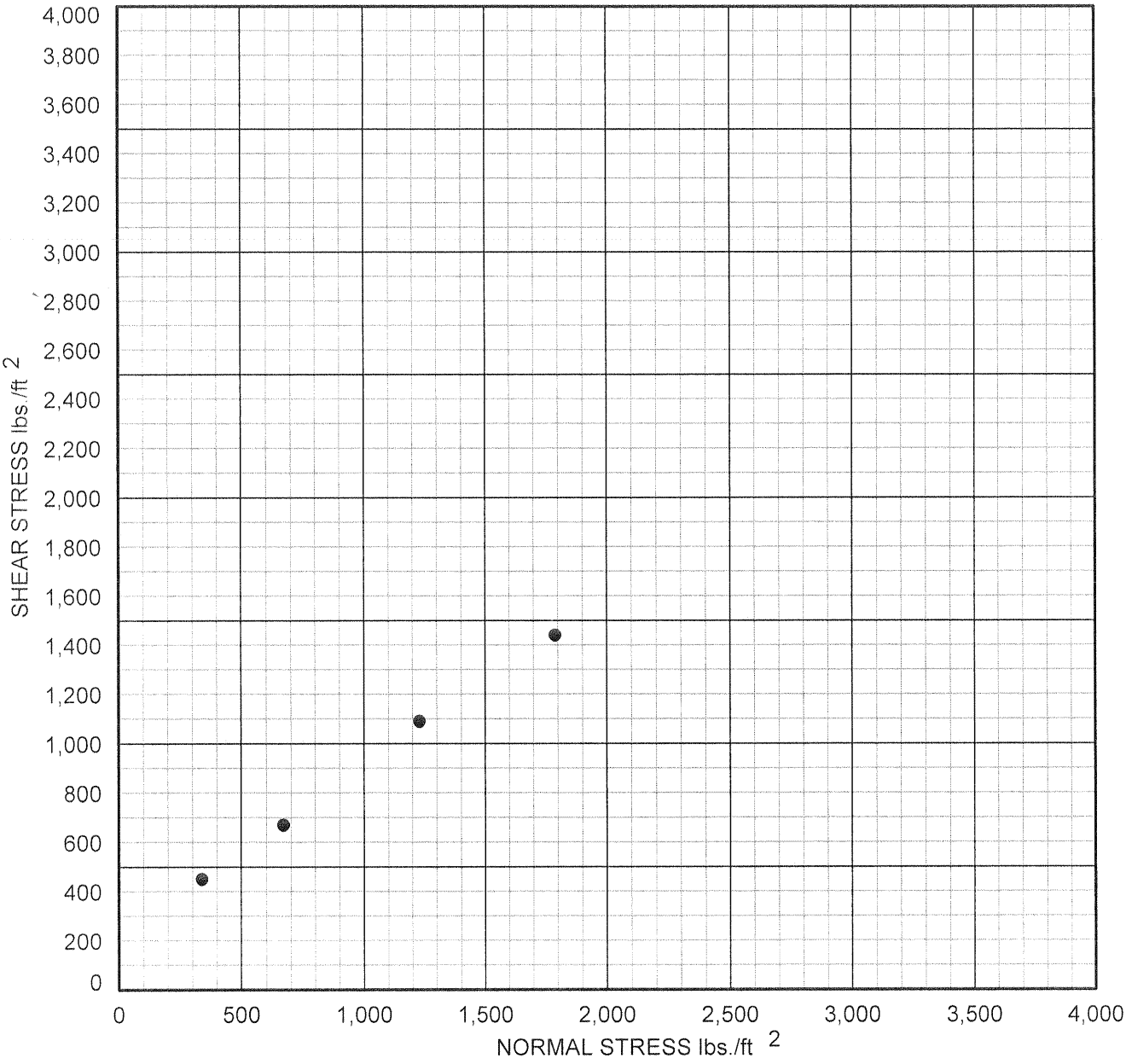
REMARKS: WATER ADDED AT 1.0 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-64

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
B-096	12.0			28	SM	Silty Sand (Qal)

COHESION	220	psf.
FRICTION ANGLE	35.0	degrees

DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.

W.O. 700065-J PLATE C-196

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 Tel: (714) 549-5824 Fax: (714) 549-8375

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246199R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.005~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-98 (20)~~	~~20978~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.004~~	~~0.001~~
B-93 (6)	20979	11-1-2004	Chloride Content	CalTrans 422	0.002	0.001
B-93 (6)	20979	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-93 (6)	20979	11-1-2004	Alkalinity	EPA 310.1	0.002	0.001
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-97 (14)~~	~~20980~~	~~11-1-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.001~~	~~0.001~~
B-95 (11)	20981	11-1-2004	Chloride Content	CalTrans 422	0.001	0.001
B-95 (11)	20981	11-1-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-95 (11)	20981	11-1-2004	Alkalinity	EPA 310.1	0.007	0.001

Authorized Signature

November 3, 2004
Report Date

PLATE C-249

KYH Co. Analytical Laboratory

3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704 *Tel: (714) 549-5824* *Fax: (714) 549-8375*

ANALYTICAL REPORT

Client Name:	Pacific Soils Engineering, Inc.	Report Number:	246148R
Address:	710 E. Parkridge Avenue, Suite 105 Corona, CA 92879	PSE W.O. Number:	700065
Contact Person:	Mr. Duane Irwin	P.O. Number:	Verbal

Sample Results

Client ID	Lab ID	Date Requested	Analysis	Method	Result (% wt)	MDL (% wt)
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.002~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-94 (9)~~	~~20855~~	~~10-5-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.005~~	~~0.001~~
B-96 (12)	20856	10-5-2004	Chloride Content	CalTrans 422	0.001	0.001
B-96 (12)	20856	10-5-2004	Sulfate Content	CalTrans 417	<0.001	0.001
B-96 (12)	20856	10-5-2004	Alkalinity	EPA 310.1	0.006	0.001
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Chloride Content~~	~~CalTrans 422~~	~~0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Sulfate Content~~	~~CalTrans 417~~	~~<0.001~~	~~0.001~~
~~B-52 (6)~~	~~20857~~	~~10-4-2004~~	~~Alkalinity~~	~~EPA 310.1~~	~~0.002~~	~~0.001~~

Authorized Signature

October 11, 2004
Report Date

PLATE C-250

APPENDIX D

ENGINEERING ANALYSES

APPENDIX D-1

LIQEFACTION ANALYSIS

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

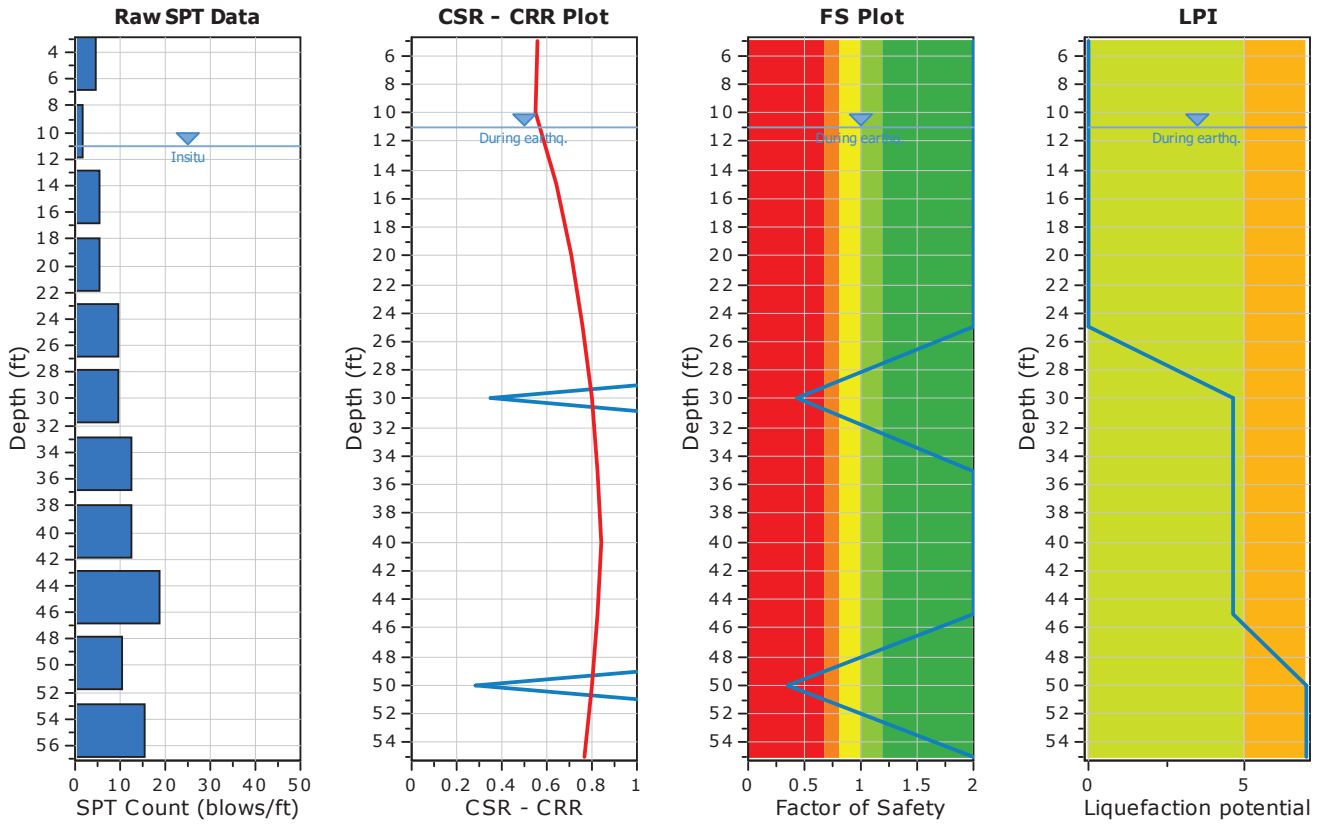
SPT BASED LIQUEFACTION ANALYSIS REPORT

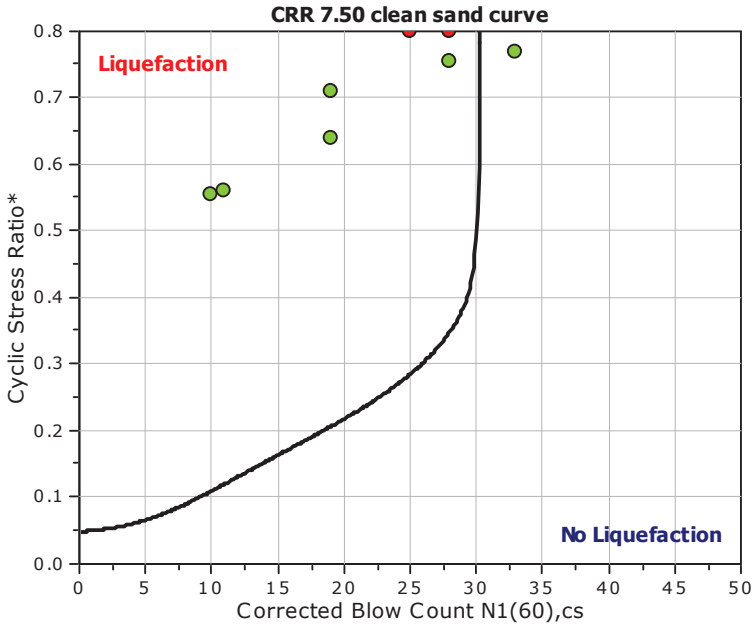
Project title : 2004-01 OVTC **SPT Name: AGS-3**

Location : Calimesa, CA

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	11.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	11.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	7.50
Borehole diameter:	200mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.42		

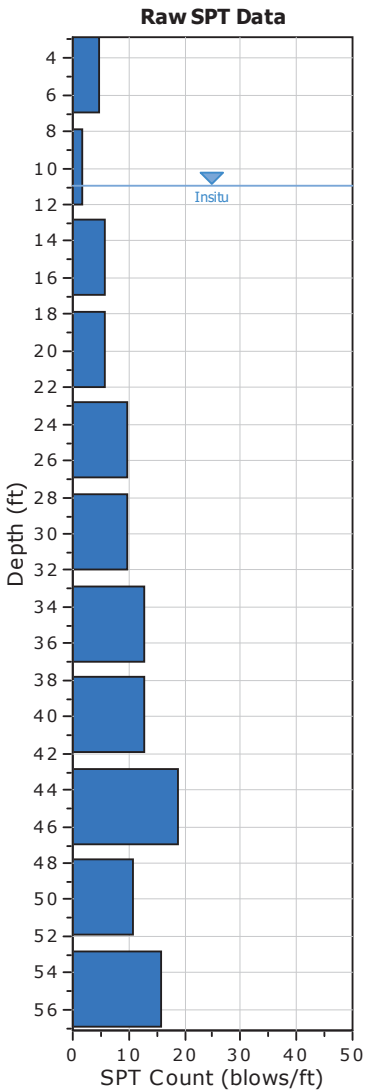


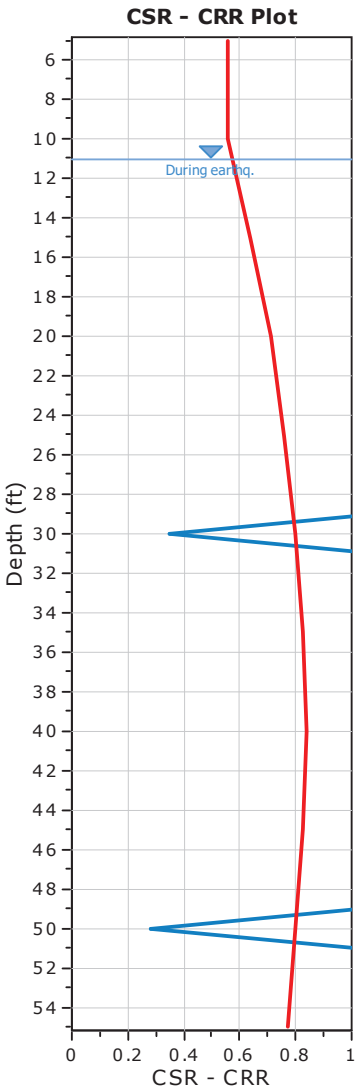


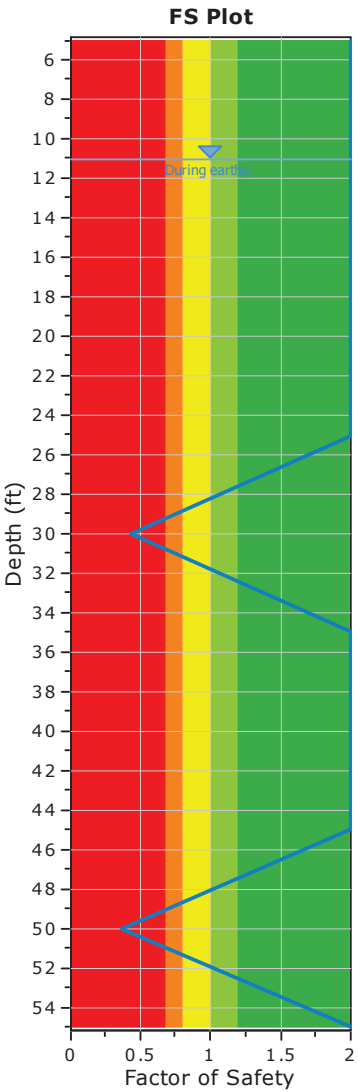
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

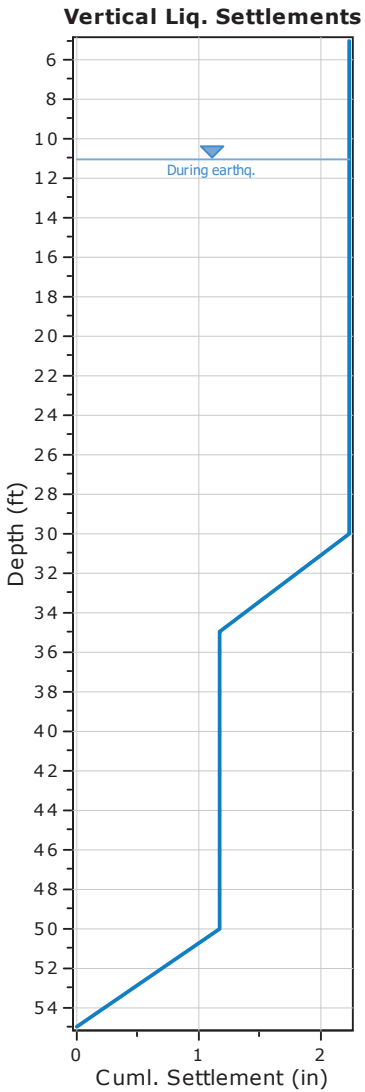
LPI color scheme
- Very high risk
- High risk
- Low risk

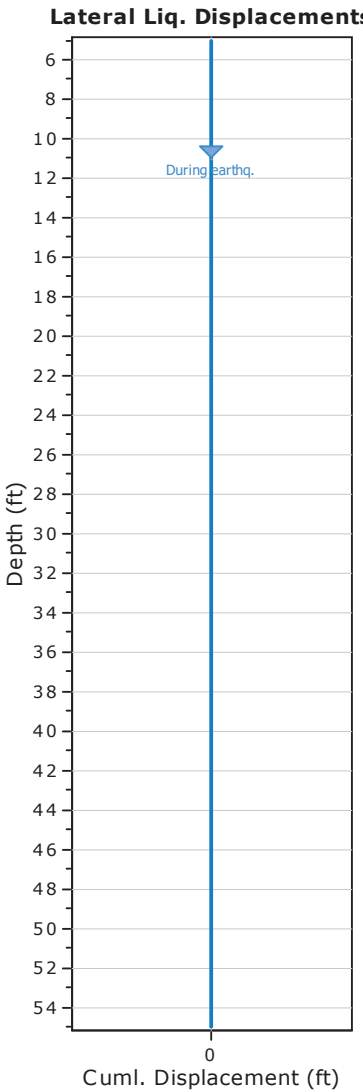
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	5	0.00	113.00	5.00	No
10.00	2	74.30	113.00	5.00	No
15.00	6	74.30	124.00	5.00	No
20.00	6	71.10	124.00	5.00	No
25.00	10	71.10	119.00	5.00	No
30.00	10	35.70	119.00	5.00	Yes
35.00	13	77.30	104.00	5.00	No
40.00	13	66.10	104.00	5.00	No
45.00	19	66.10	136.00	5.00	Yes
50.00	11	59.30	125.00	5.00	Yes
55.00	16	59.30	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	5	113.00	0.28	0.00	0.28	1.50	1.42	1.15	0.75	1.20	11	0.00	0.00	1.00	11	4.000
10.00	2	113.00	0.56	0.00	0.56	1.27	1.42	1.15	0.85	1.20	4	74.30	5.00	1.20	10	4.000
15.00	6	124.00	0.88	0.12	0.75	1.15	1.42	1.15	0.85	1.20	12	74.30	5.00	1.20	19	4.000
20.00	6	124.00	1.19	0.28	0.90	1.07	1.42	1.15	0.95	1.20	12	71.10	5.00	1.20	19	4.000
25.00	10	119.00	1.48	0.44	1.05	1.01	1.42	1.15	0.95	1.20	19	71.10	5.00	1.20	28	4.000
30.00	10	119.00	1.78	0.59	1.19	0.95	1.42	1.15	1.00	1.20	19	35.70	5.00	1.20	28	0.348
35.00	13	104.00	2.04	0.75	1.29	0.91	1.42	1.15	1.00	1.20	23	77.30	5.00	1.20	33	4.000
40.00	13	104.00	2.30	0.91	1.39	0.87	1.42	1.15	1.00	1.20	22	66.10	5.00	1.20	31	4.000
45.00	19	136.00	2.64	1.06	1.58	0.82	1.42	1.15	1.00	1.20	30	66.10	5.00	1.20	41	4.000
50.00	11	125.00	2.95	1.22	1.73	0.77	1.42	1.15	1.00	1.20	17	59.30	5.00	1.20	25	0.285
55.00	16	130.00	3.28	1.37	1.90	0.73	1.42	1.15	1.00	1.20	23	59.30	5.00	1.20	33	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	113.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	113.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	124.00	0.88	0.12	0.75	0.97	1.00	0.639	1.00	0.639	1.00	0.639	2.000	●
20.00	124.00	1.19	0.28	0.90	0.96	1.00	0.709	1.00	0.710	1.00	0.710	2.000	●
25.00	119.00	1.48	0.44	1.05	0.94	1.00	0.755	1.00	0.756	1.00	0.756	2.000	●
30.00	119.00	1.78	0.59	1.19	0.92	1.00	0.781	1.00	0.781	0.98	0.799	0.436	●
35.00	104.00	2.04	0.75	1.29	0.89	1.00	0.796	1.00	0.796	0.96	0.829	2.000	●
40.00	104.00	2.30	0.91	1.39	0.85	1.00	0.794	1.00	0.794	0.95	0.839	2.000	●
45.00	136.00	2.64	1.06	1.58	0.80	1.00	0.760	1.00	0.760	0.92	0.824	2.000	●
50.00	125.00	2.95	1.22	1.73	0.75	1.00	0.724	1.00	0.725	0.91	0.800	0.356	●
55.00	130.00	3.28	1.37	1.90	0.70	1.00	0.685	1.00	0.685	0.89	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.436	0.56	5.43	5.00	4.67
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	0.356	0.64	2.38	5.00	2.33
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 7.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
10.00	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.77	5.00	1.064
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	0.00	5.00	0.000
45.00	0.00	5.00	0.00	5.00	0.000
50.00	0.00	5.00	1.95	5.00	1.168
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 2.232

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	11	46.43	0.00	5.00	0.000	0.00
10.00	4	28.00	0.00	5.00	0.000	0.00
15.00	12	48.50	0.00	5.00	0.000	0.00
20.00	12	48.50	0.00	5.00	0.000	0.00
25.00	19	61.02	0.00	5.00	0.000	0.00
30.00	19	61.02	22.70	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	22	65.67	0.00	5.00	0.000	0.00
45.00	30	76.68	0.00	5.00	0.000	0.00
50.00	17	57.72	22.70	5.00	0.000	0.00
55.00	23	67.14	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

Advanced Geotechnical Solutions
485 Corporate Drive, Suite B
Escondido, CA 92029
P: (619) 867-0487 | F: (714) 409-3287

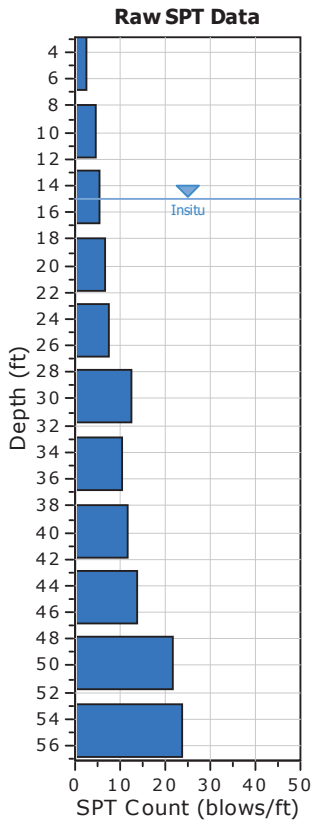
SPT BASED LIQUEFACTION ANALYSIS REPORT

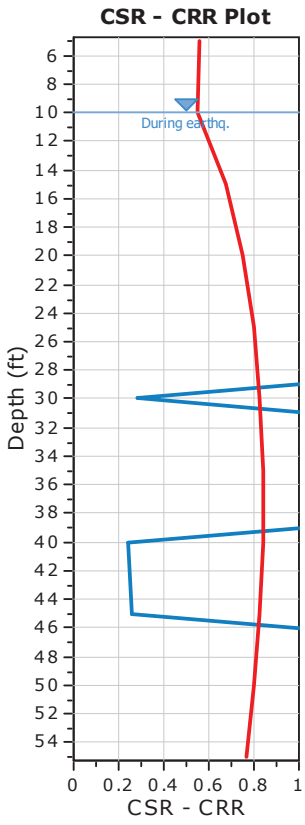
Project title : 2004-01 OVTC **SPT Name: AGS-16**

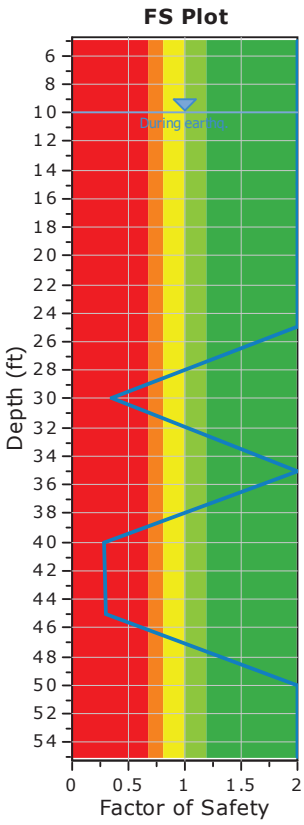
Location : Calimesa, CA

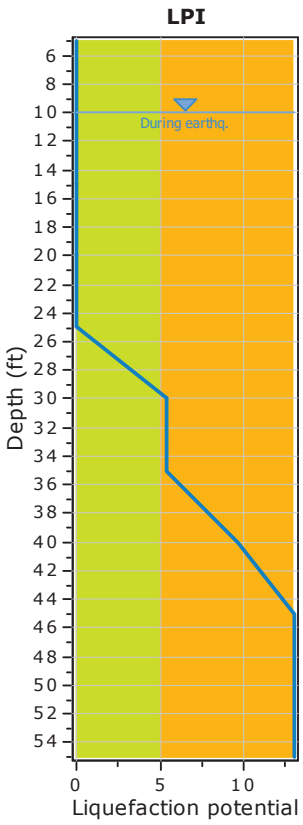
:: Input parameters and analysis properties ::

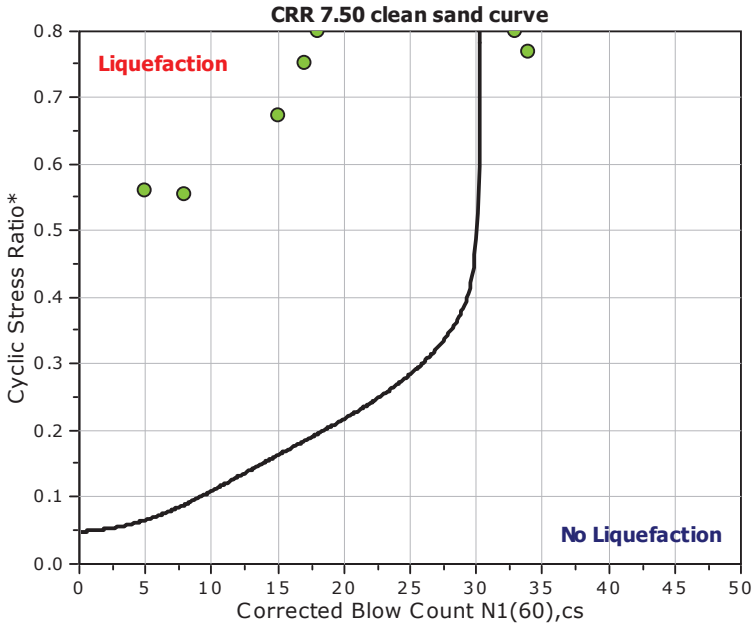
Analysis method:	NCEER 1998	G.W.T. (in-situ):	15.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.50
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.87 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.45		







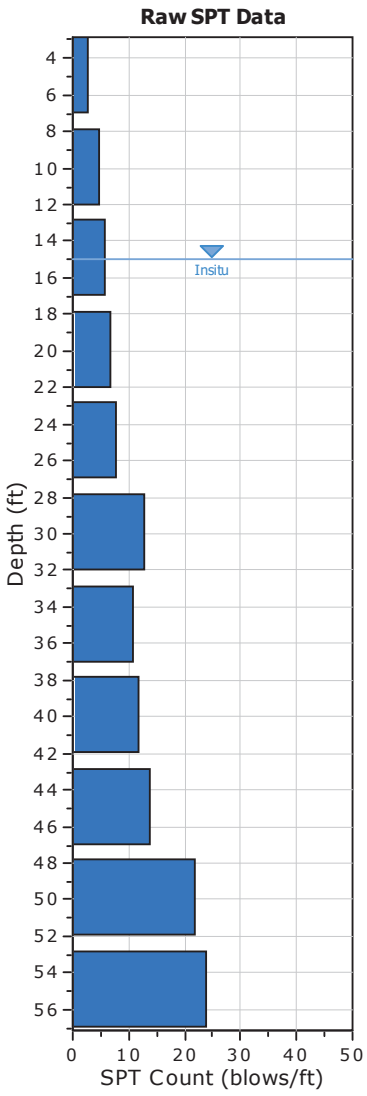


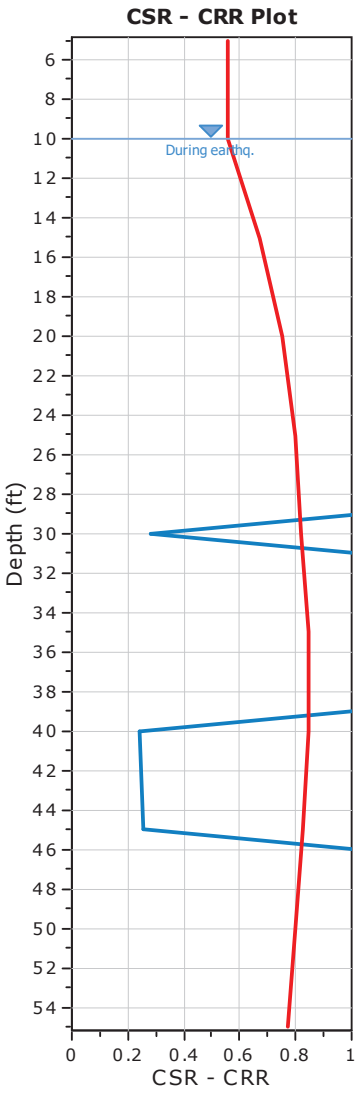


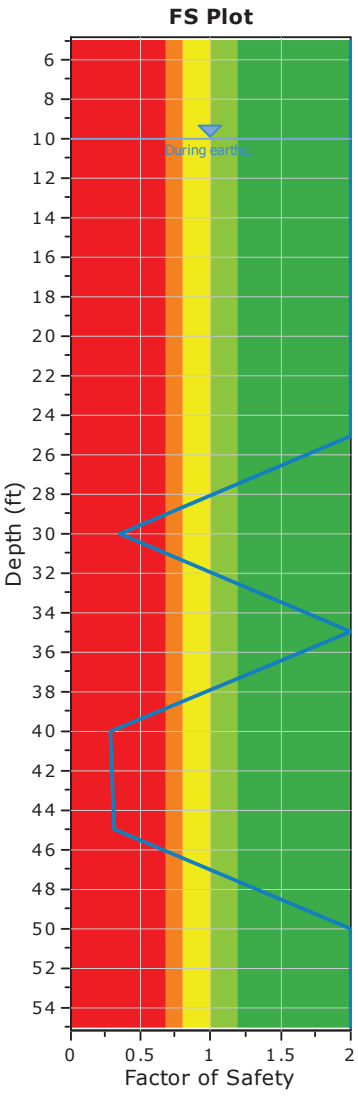
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

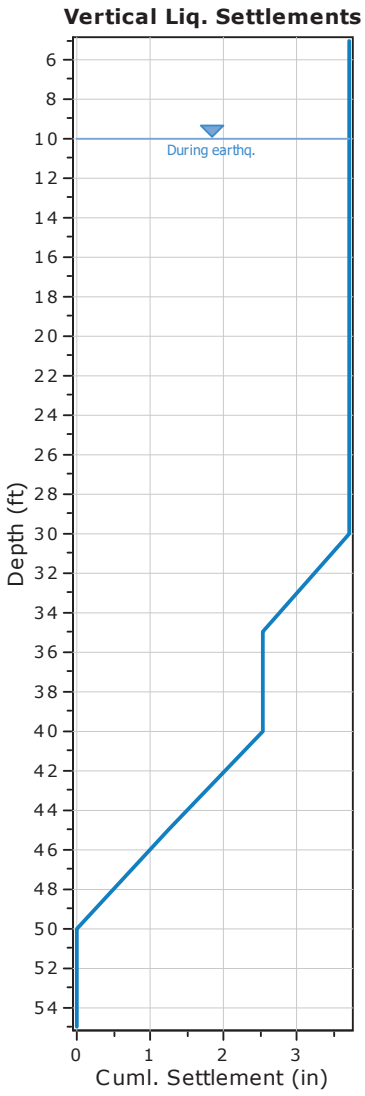
LPI color scheme
- Very high risk
- High risk
- Low risk

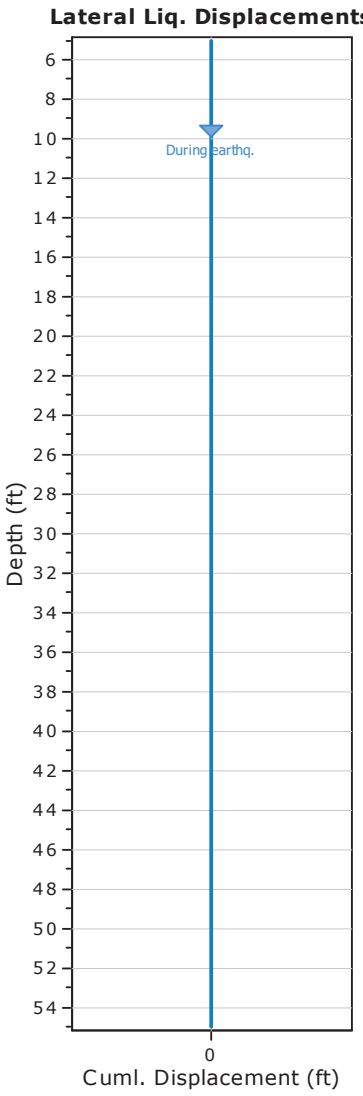
:: Overall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	3	0.00	111.00	5.00	No
10.00	5	0.00	111.00	5.00	No
15.00	6	77.90	111.00	5.00	No
20.00	7	77.90	113.00	5.00	No
25.00	8	53.80	113.00	5.00	No
30.00	13	34.00	134.00	5.00	Yes
35.00	11	52.90	125.00	5.00	No
40.00	12	52.90	135.00	5.00	Yes
45.00	14	48.20	135.00	5.00	Yes
50.00	22	48.20	135.00	5.00	Yes
55.00	24	48.20	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
5.00	3	111.00	0.28	0.00	0.28	1.50	1.45	1.00	0.75	1.00	5	0.00	0.00	1.00	5	4.000
10.00	5	111.00	0.56	0.00	0.56	1.28	1.45	1.00	0.85	1.00	8	0.00	0.00	1.00	8	4.000
15.00	6	111.00	0.83	0.00	0.83	1.11	1.45	1.00	0.85	1.00	8	77.90	5.00	1.20	15	4.000
20.00	7	113.00	1.12	0.16	0.96	1.04	1.45	1.00	0.95	1.00	10	77.90	5.00	1.20	17	4.000
25.00	8	113.00	1.40	0.31	1.09	0.99	1.45	1.00	0.95	1.00	11	53.80	5.00	1.20	18	4.000
30.00	13	134.00	1.73	0.47	1.26	0.92	1.45	1.00	1.00	1.00	17	34.00	4.93	1.19	25	0.285
35.00	11	125.00	2.05	0.62	1.42	0.87	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	4.000
40.00	12	135.00	2.38	0.78	1.60	0.81	1.45	1.00	1.00	1.00	14	52.90	5.00	1.20	22	0.242
45.00	14	135.00	2.72	0.94	1.78	0.76	1.45	1.00	1.00	1.00	15	48.20	5.00	1.20	23	0.255
50.00	22	135.00	3.06	1.09	1.97	0.72	1.45	1.00	1.00	1.00	23	48.20	5.00	1.20	33	4.000
55.00	24	135.00	3.40	1.25	2.15	0.68	1.45	1.00	1.00	1.00	24	48.20	5.00	1.20	34	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
5.00	111.00	0.28	0.00	0.28	0.99	1.00	0.560	1.00	0.560	1.00	0.560	2.000	●
10.00	111.00	0.56	0.00	0.56	0.98	1.00	0.554	1.00	0.554	1.00	0.554	2.000	●
15.00	111.00	0.83	0.16	0.68	0.97	1.00	0.674	1.00	0.674	1.00	0.674	2.000	●
20.00	113.00	1.12	0.31	0.80	0.96	1.00	0.751	1.00	0.752	1.00	0.752	2.000	●
25.00	113.00	1.40	0.47	0.93	0.94	1.00	0.801	1.00	0.801	1.00	0.801	2.000	●
30.00	134.00	1.73	0.62	1.11	0.92	1.00	0.814	1.00	0.814	0.99	0.822	0.347	●
35.00	125.00	2.05	0.78	1.26	0.89	1.00	0.814	1.00	0.814	0.96	0.844	2.000	●
40.00	135.00	2.38	0.94	1.45	0.85	1.00	0.793	1.00	0.793	0.94	0.844	0.286	●
45.00	135.00	2.72	1.09	1.63	0.80	1.00	0.759	1.00	0.760	0.92	0.828	0.308	●
50.00	135.00	3.06	1.25	1.81	0.75	1.00	0.719	1.00	0.719	0.90	0.801	2.000	●
55.00	135.00	3.40	1.40	1.99	0.70	1.00	0.678	1.00	0.678	0.88	0.770	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	0.347	0.65	5.43	5.00	5.40
35.00	2.000	0.00	4.67	5.00	0.00
40.00	0.286	0.71	3.90	5.00	4.25
45.00	0.308	0.69	3.14	5.00	3.31
50.00	2.000	0.00	2.38	5.00	0.00
55.00	2.000	0.00	1.62	5.00	0.00

Overall potential I_L : 12.96

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
10.00	0.00	5.00	0.00	5.00	0.000
15.00	0.00	5.00	0.00	5.00	0.000
20.00	0.00	5.00	0.00	5.00	0.000
25.00	0.00	5.00	0.00	5.00	0.000
30.00	0.00	5.00	1.95	5.00	1.168
35.00	0.00	5.00	0.00	5.00	0.000
40.00	0.00	5.00	2.16	5.00	1.297
45.00	0.00	5.00	2.08	5.00	1.250
50.00	0.00	5.00	0.00	5.00	0.000
55.00	0.00	5.00	0.00	5.00	0.000

Cumulative settlements: 3.714

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
5.00	5	31.30	0.00	5.00	0.000	0.00
10.00	8	39.60	0.00	5.00	0.000	0.00
15.00	8	39.60	0.00	5.00	0.000	0.00
20.00	10	44.27	0.00	5.00	0.000	0.00
25.00	11	46.43	0.00	5.00	0.000	0.00
30.00	17	57.72	22.70	5.00	0.000	0.00
35.00	14	52.38	0.00	5.00	0.000	0.00
40.00	14	52.38	34.10	5.00	0.000	0.00
45.00	15	54.22	34.10	5.00	0.000	0.00
50.00	23	67.14	0.00	5.00	0.000	0.00
55.00	24	68.59	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX D-2

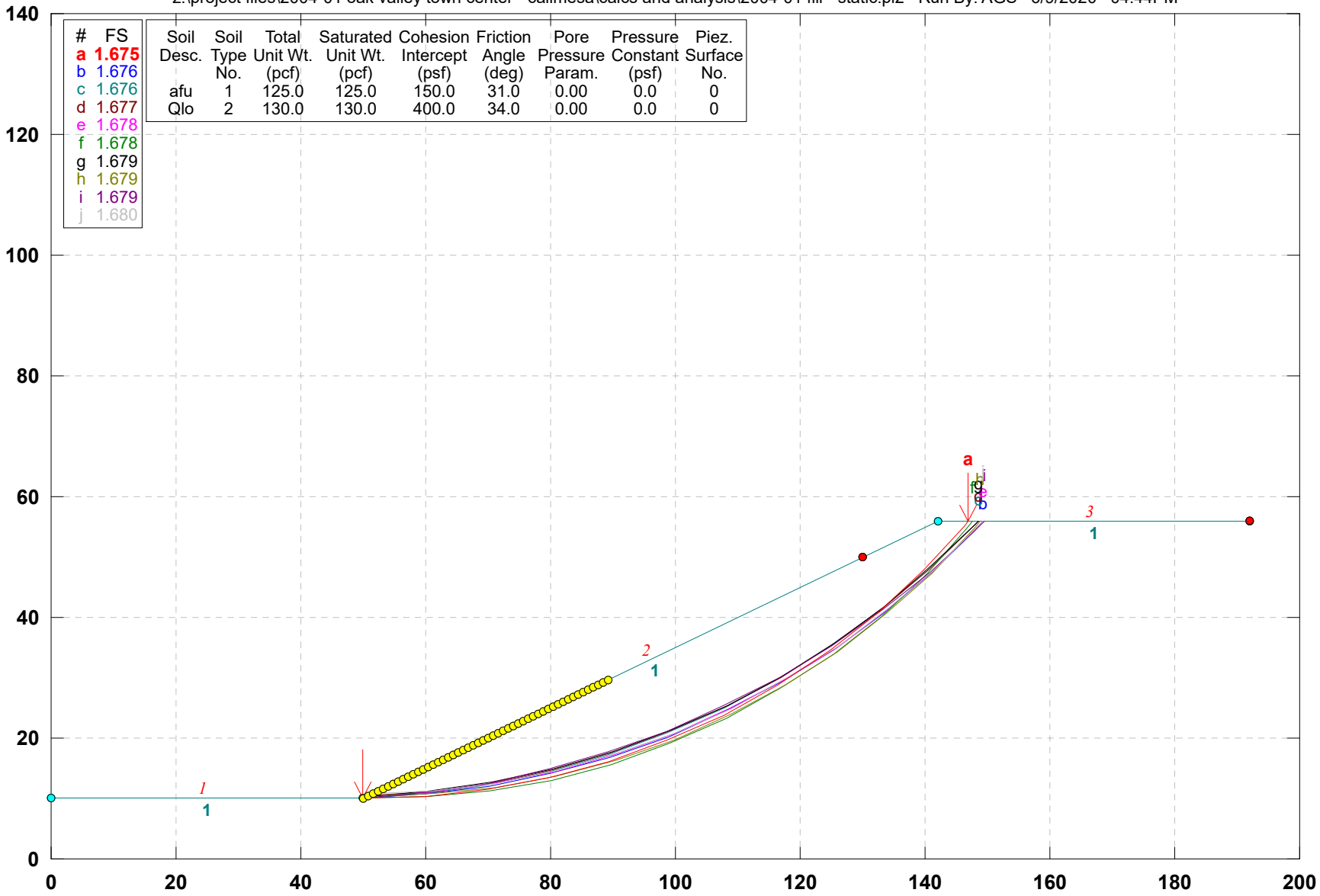
SLOPE STABILITY ANALYSIS

2004-01 OVTC 46 ft. Fill Slope - Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static.pl2 Run By: AGS 6/9/2020 04:44PM

#	FS
a	1.675
b	1.676
c	1.676
d	1.677
e	1.678
f	1.678
g	1.679
h	1.679
i	1.679
j	1.680

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.675

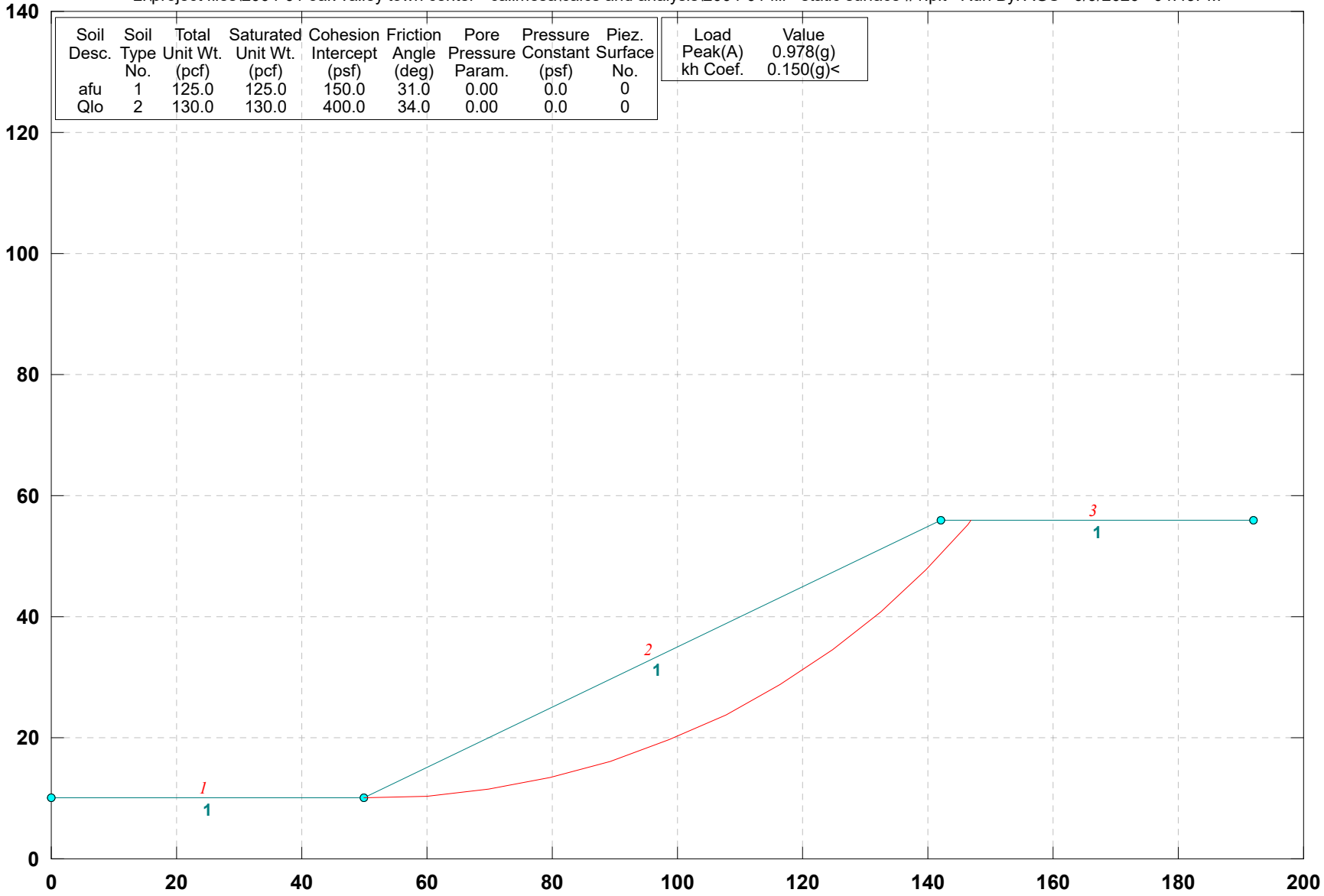
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 46 ft. Fill Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 fill - static surface #1.plt Run By: AGS 6/9/2020 04:49PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

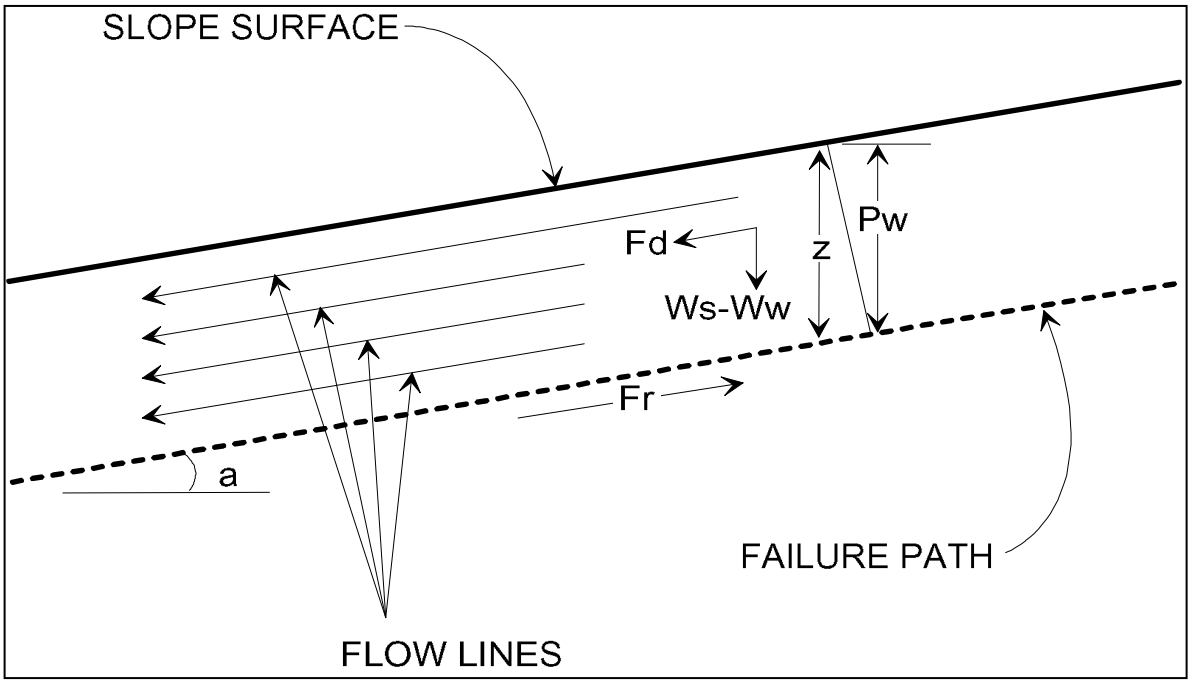
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.221

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
125	3	26.56505	0.463648	31	0.541052	150

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	240.27	**1.60**

2004-01 OVTC 72 ft Cut Slope - Static

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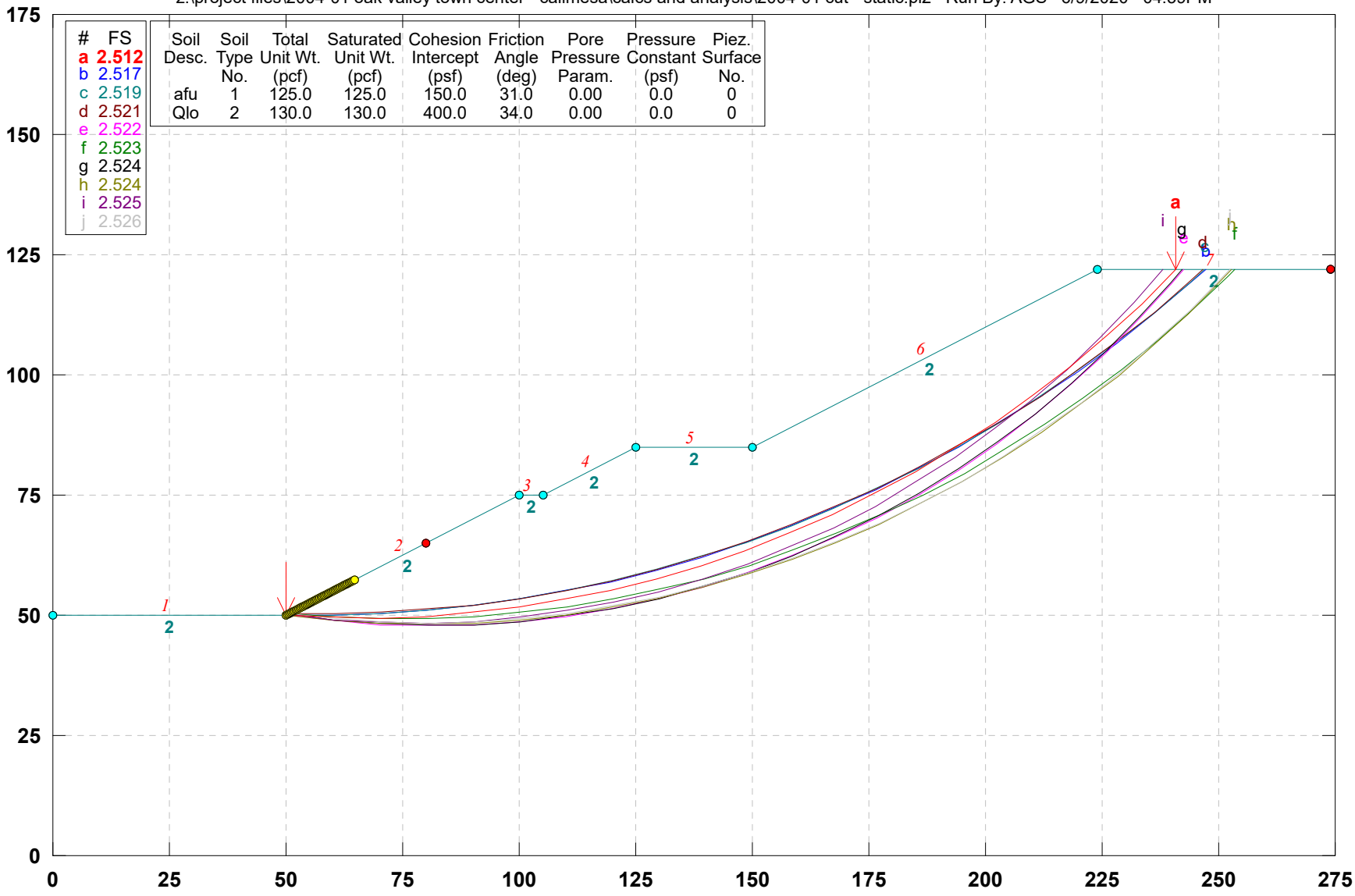


GSTABL7 v.2 FSmin=2.512

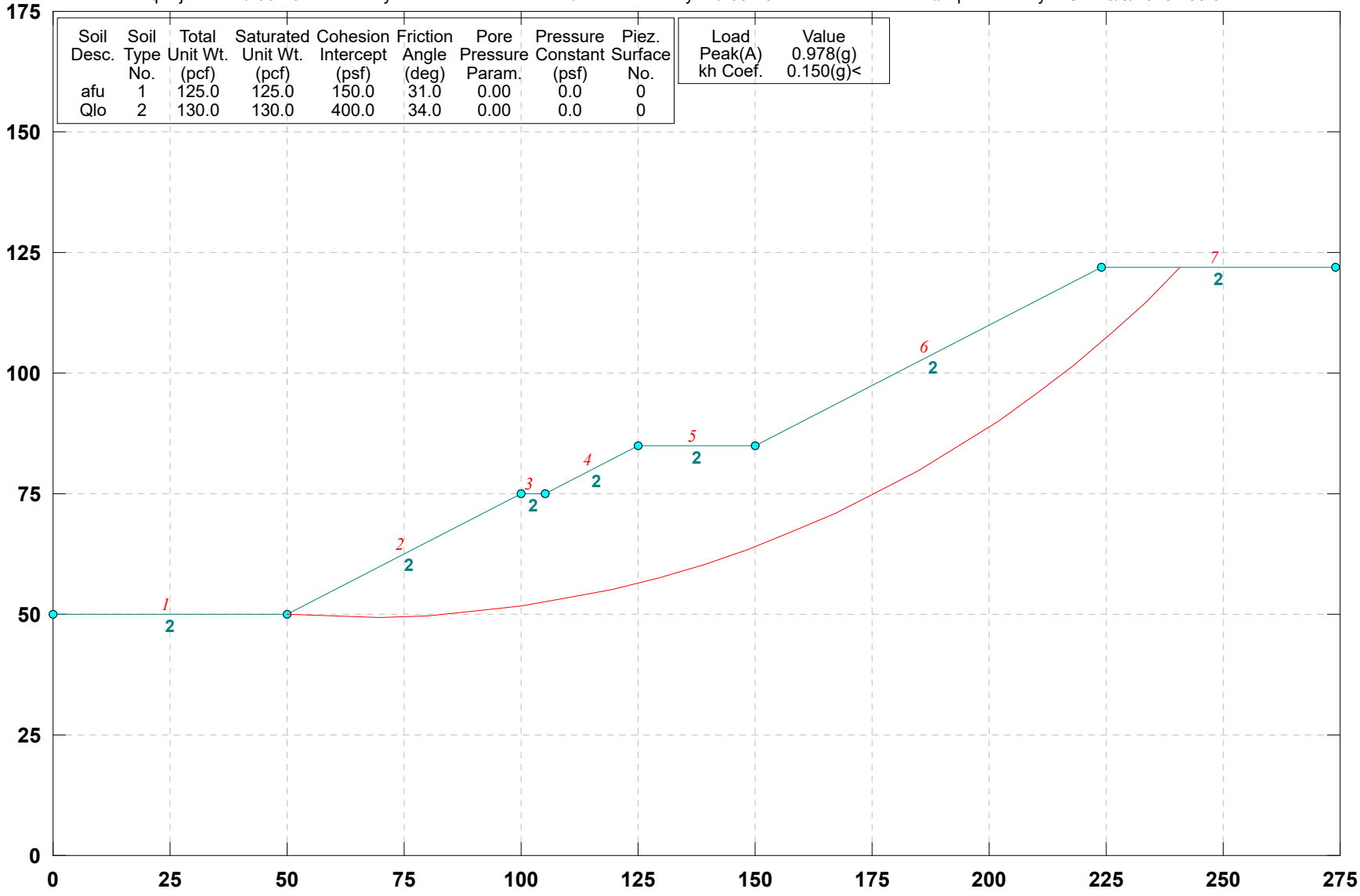
Safety Factors Are Calculated By The Modified Bishop Method

2004-01 OVTC 72 ft Cut Slope - Pseudo-Static

z:\project files\2004-01 oak valley town center - calimesa\calcs and analysis\2004-01 cut - static surface #1.plt Run By: AGS 6/9/2020 05:01PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afu	1	125.0	125.0	150.0	31.0	0.00	0.0	0
Qlo	2	130.0	130.0	400.0	34.0	0.00	0.0	0

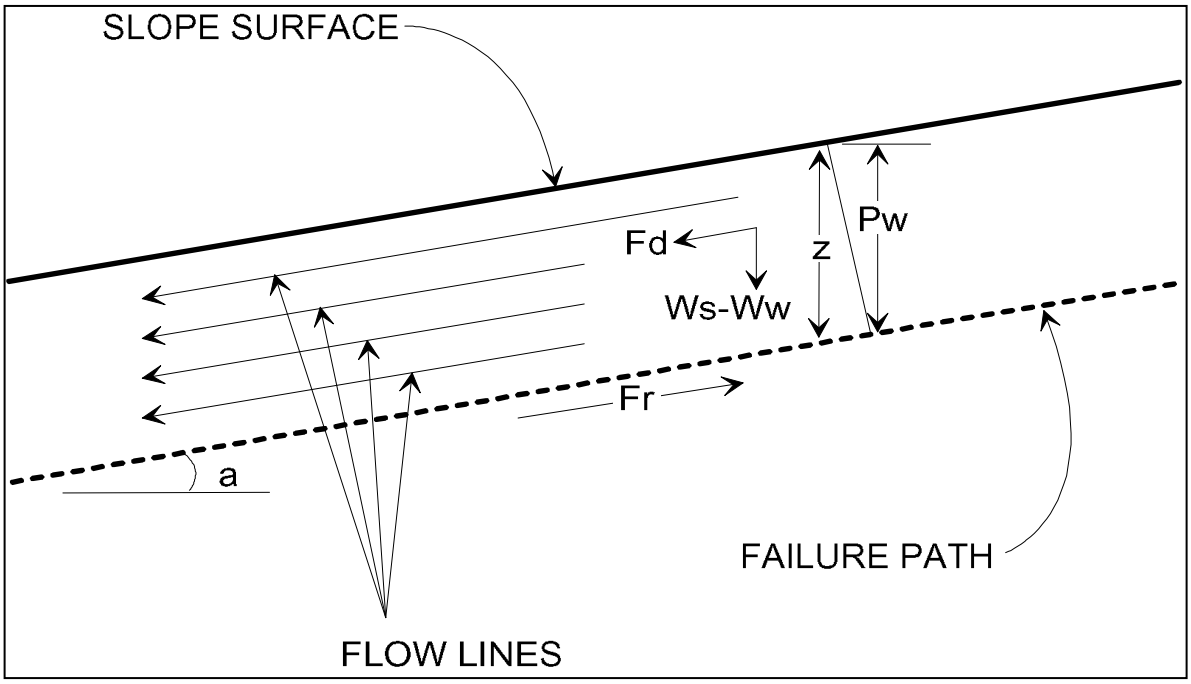
Load	Value
Peak(A)	0.978(g)
kh Coef.	0.150(g)<



GSTABL7 v.2 FSmin=1.727

Factor Of Safety Is Calculated By The Modified Bishop Method

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

Ws (pcf)	z (ft)	a (degrees)	a (radians)	phi (degrees)	phi (radians)	c (psf)
130	3	26.56505	0.463648	34	0.593412	400

Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	156.00	509.43	**3.27**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All clearing and grubbing, remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be

properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspoles, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant. Environmental evaluation of existing conditions is not the responsibility of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be processed or scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 12 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant and do not inhibit the ability to properly compact fill materials.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to ½ the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall observe all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Civil Engineer.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation

by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials to achieve compaction is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill will be tested and evaluated by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content is not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

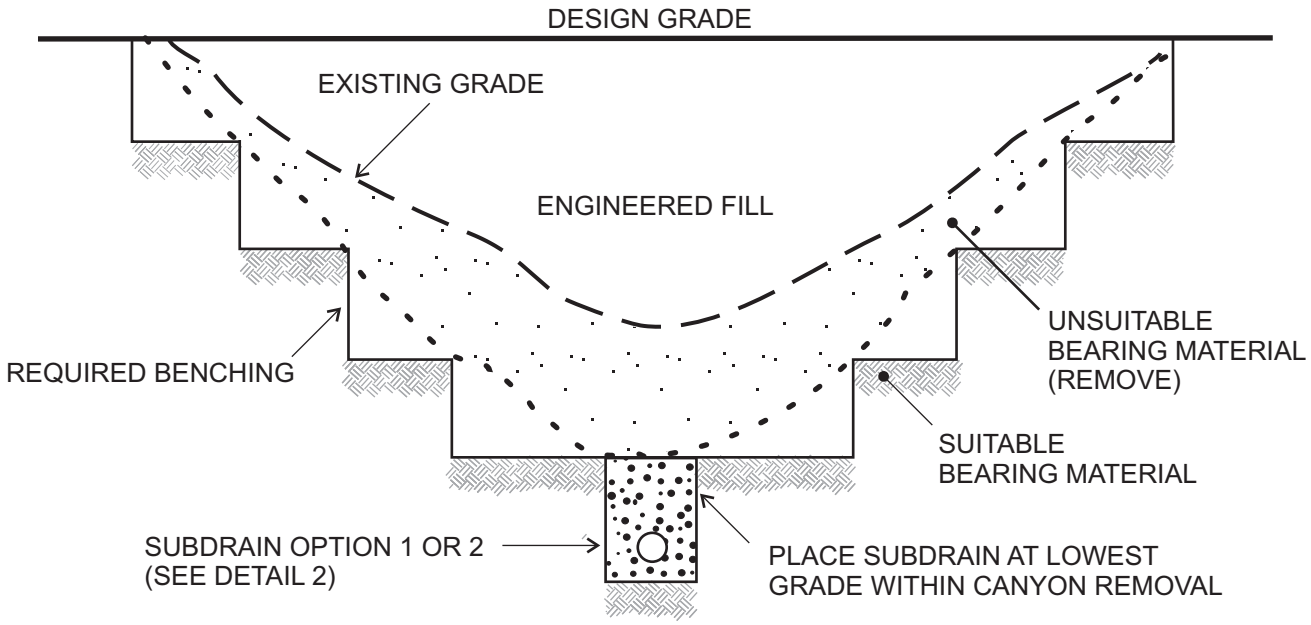
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals approximately two feet in fill height.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

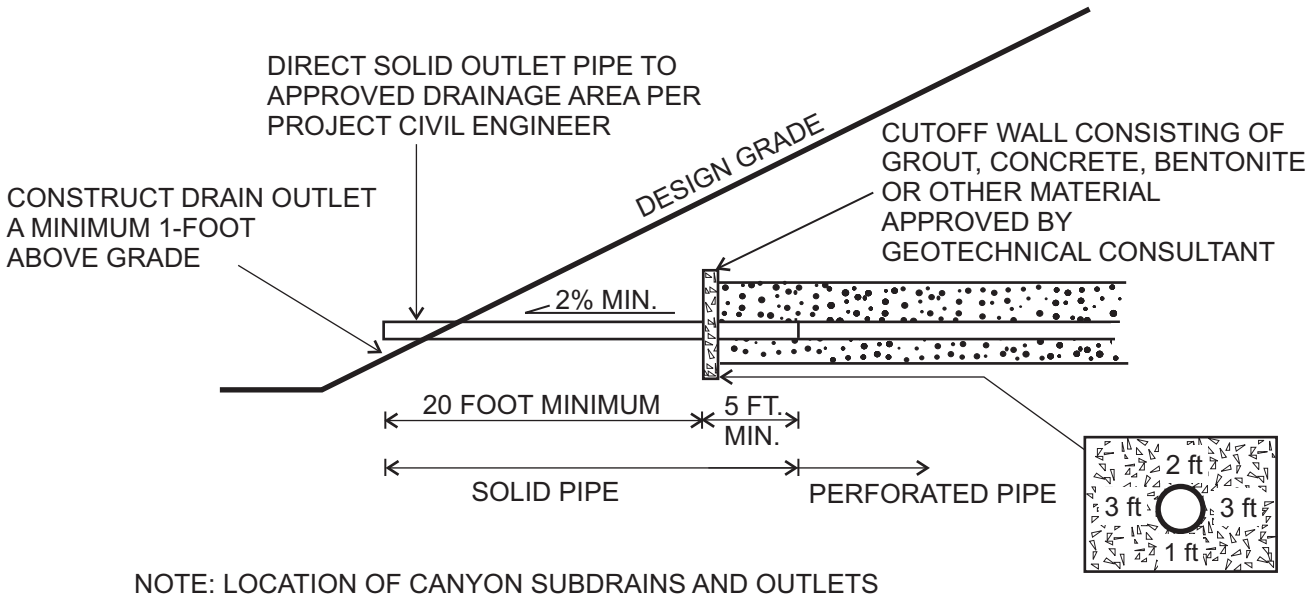
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

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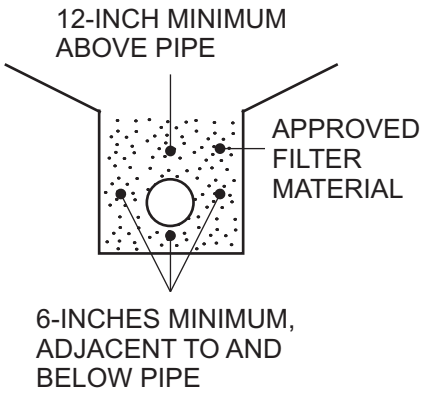
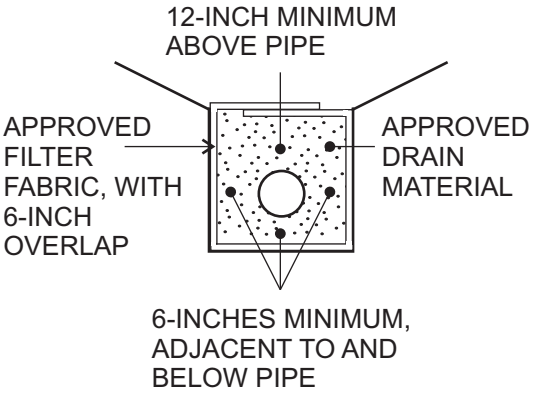
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

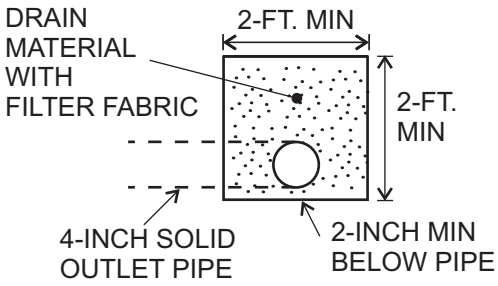
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

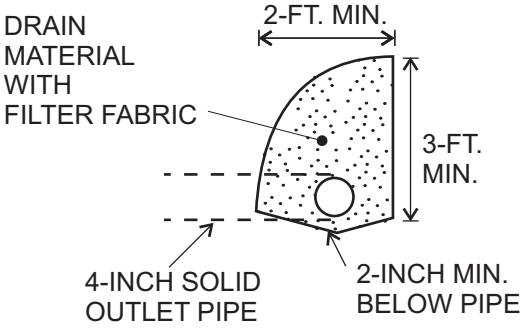
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

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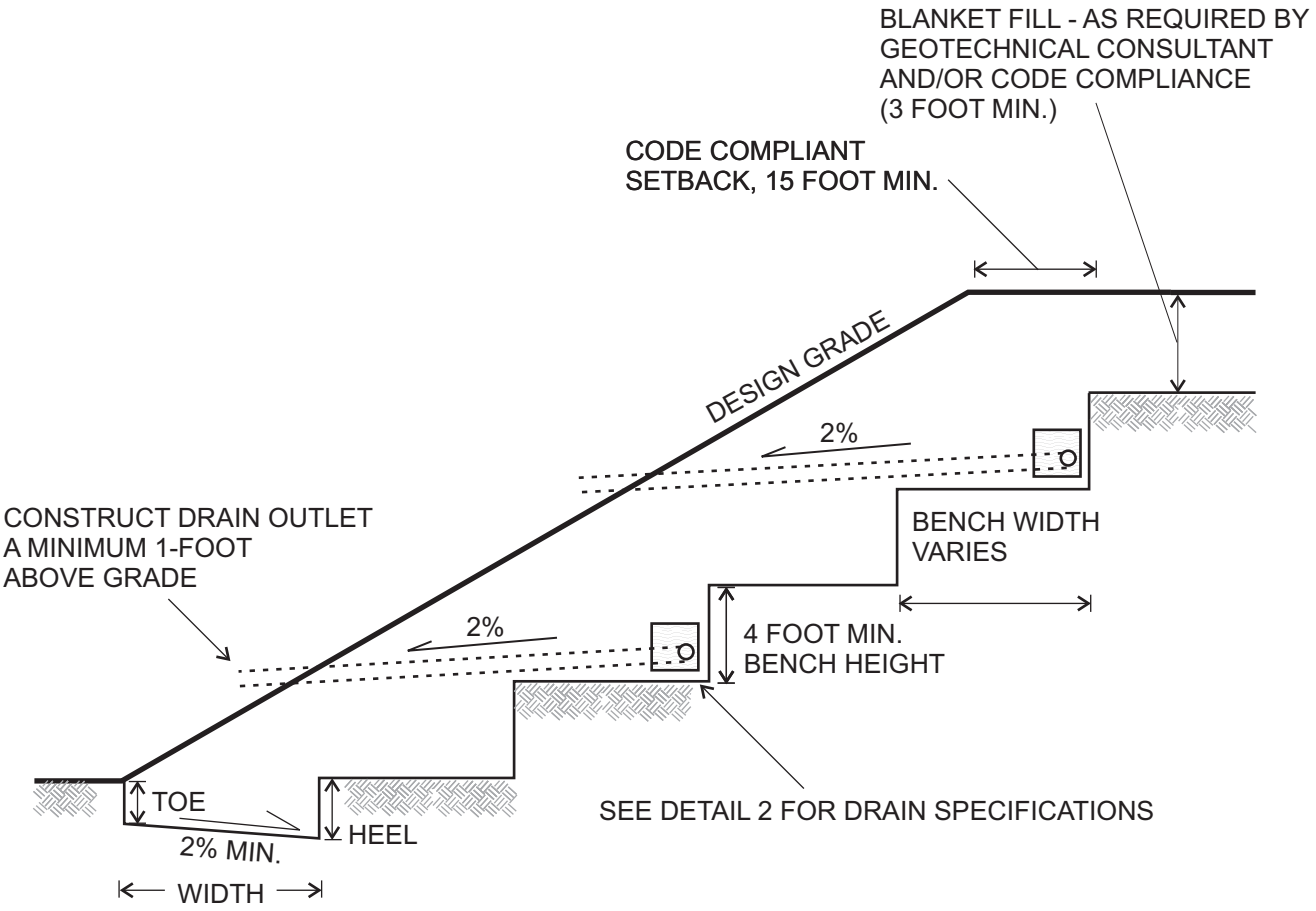
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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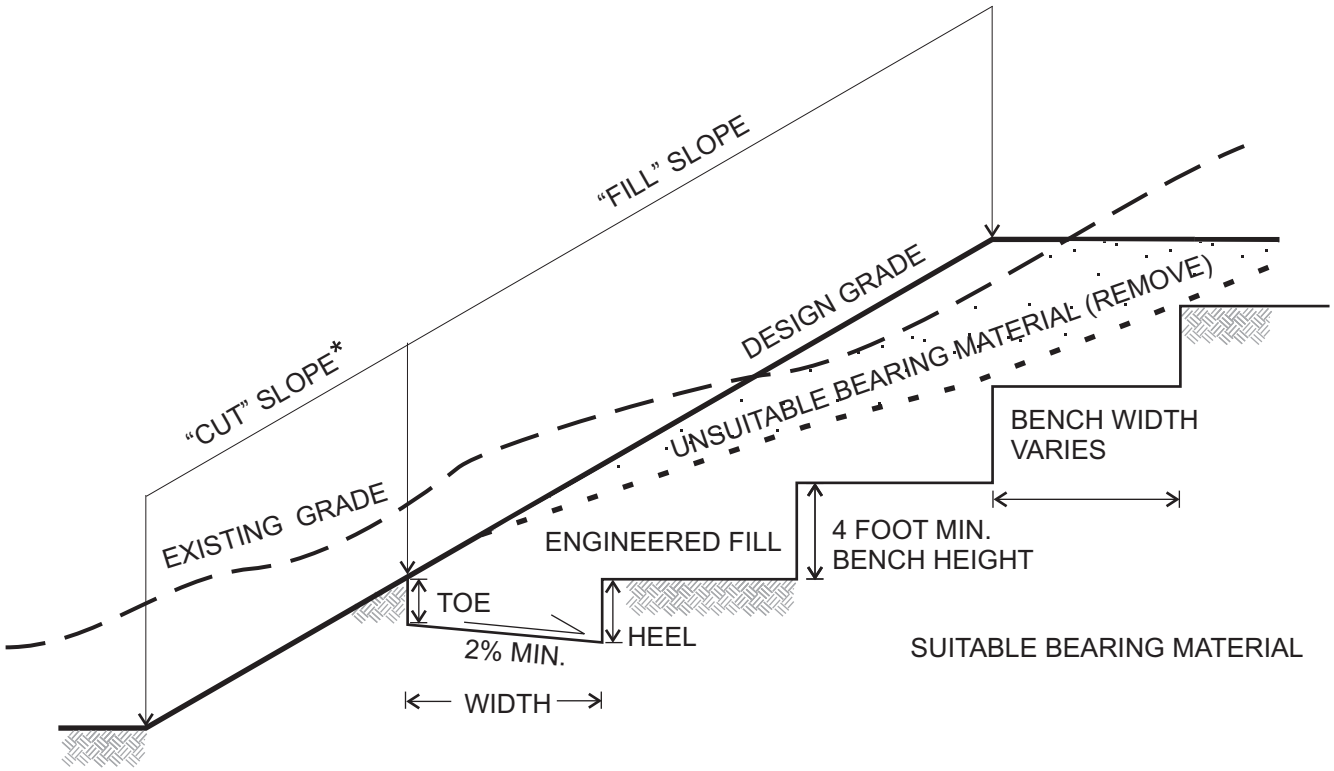
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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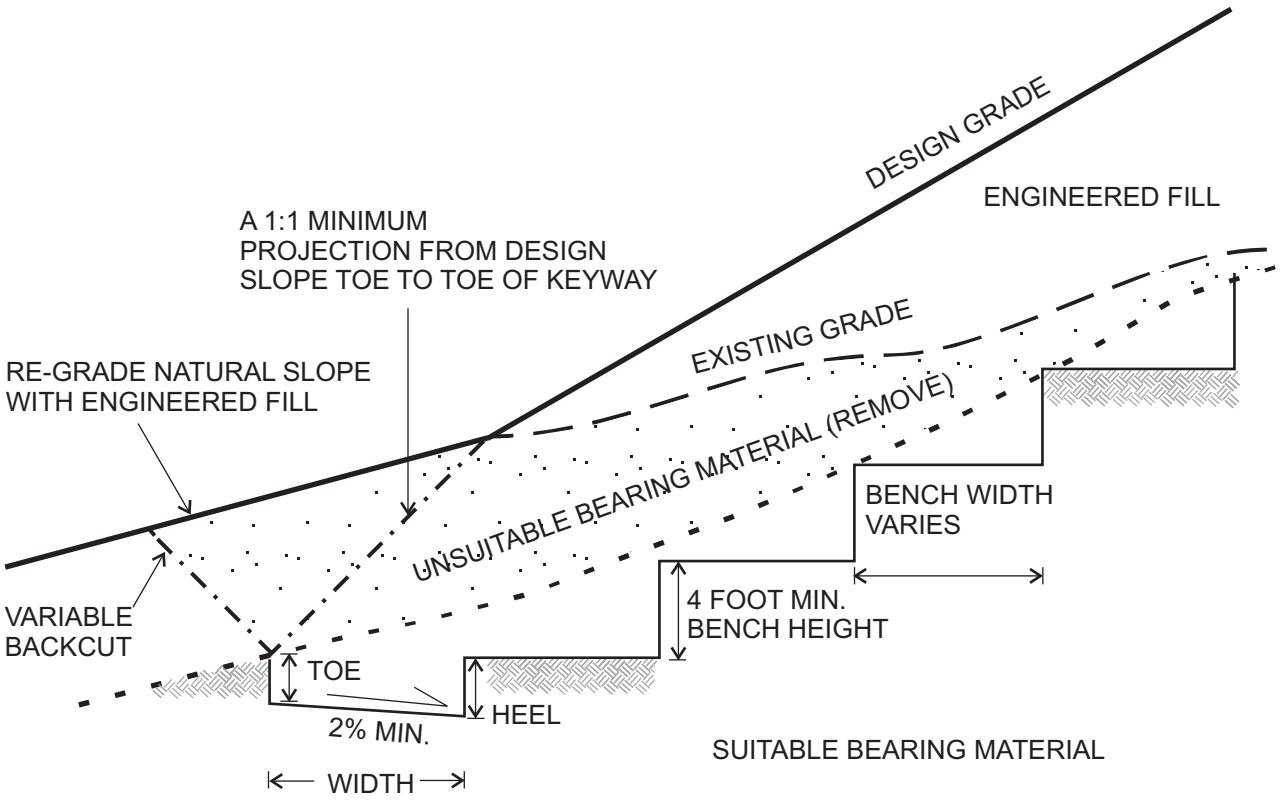
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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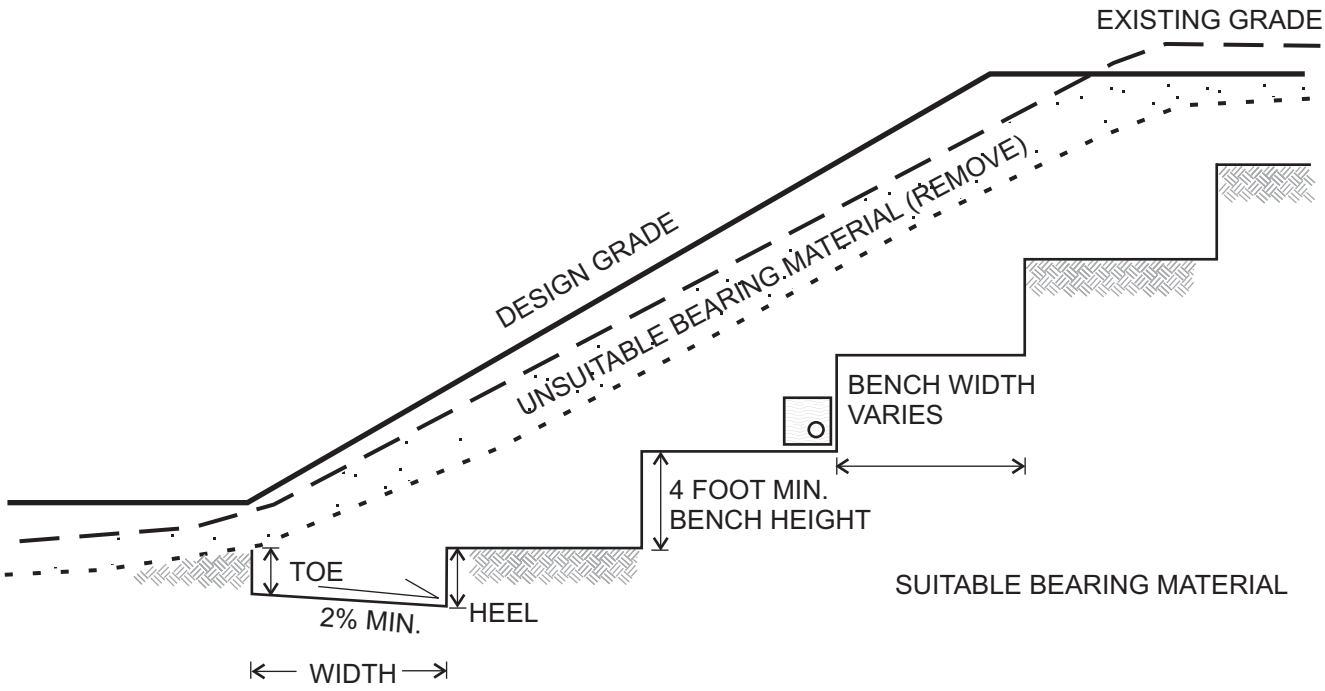
FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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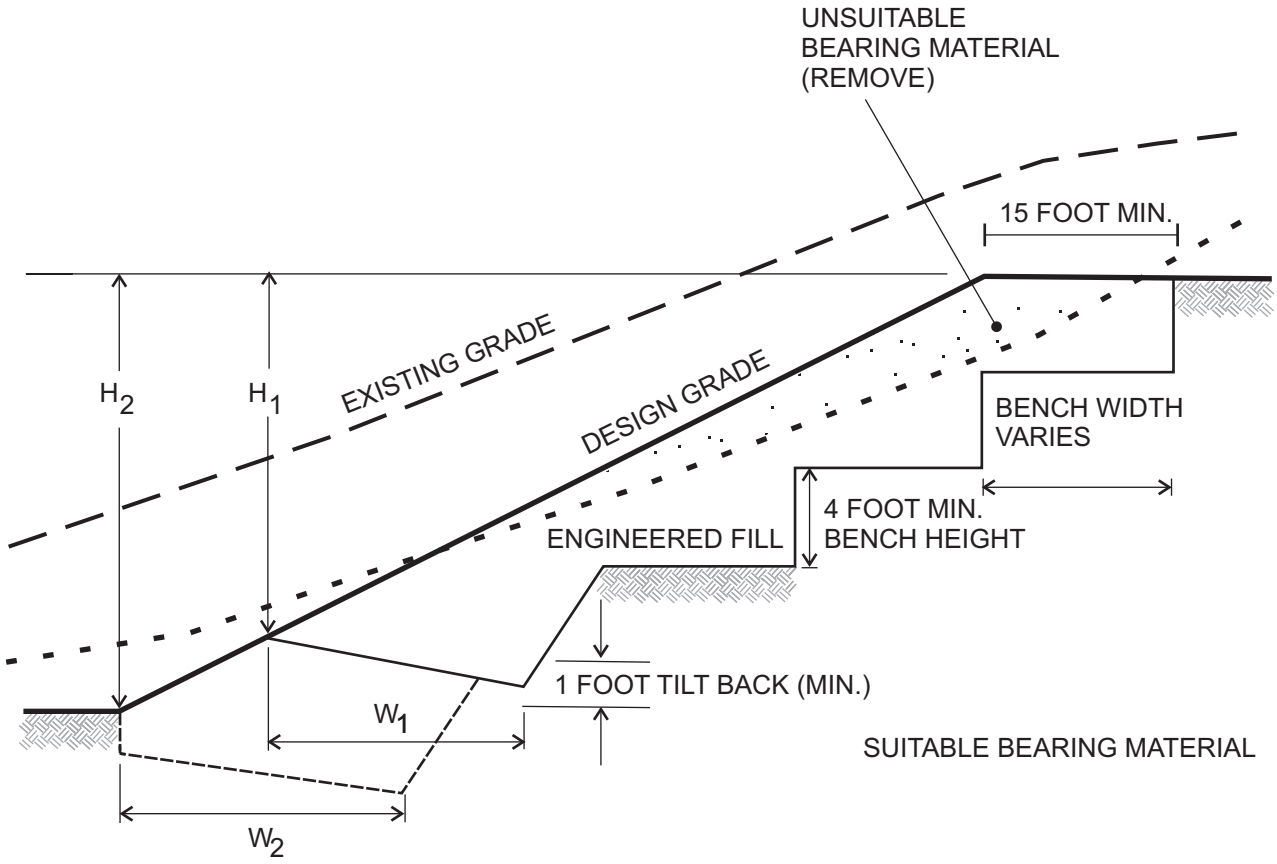
SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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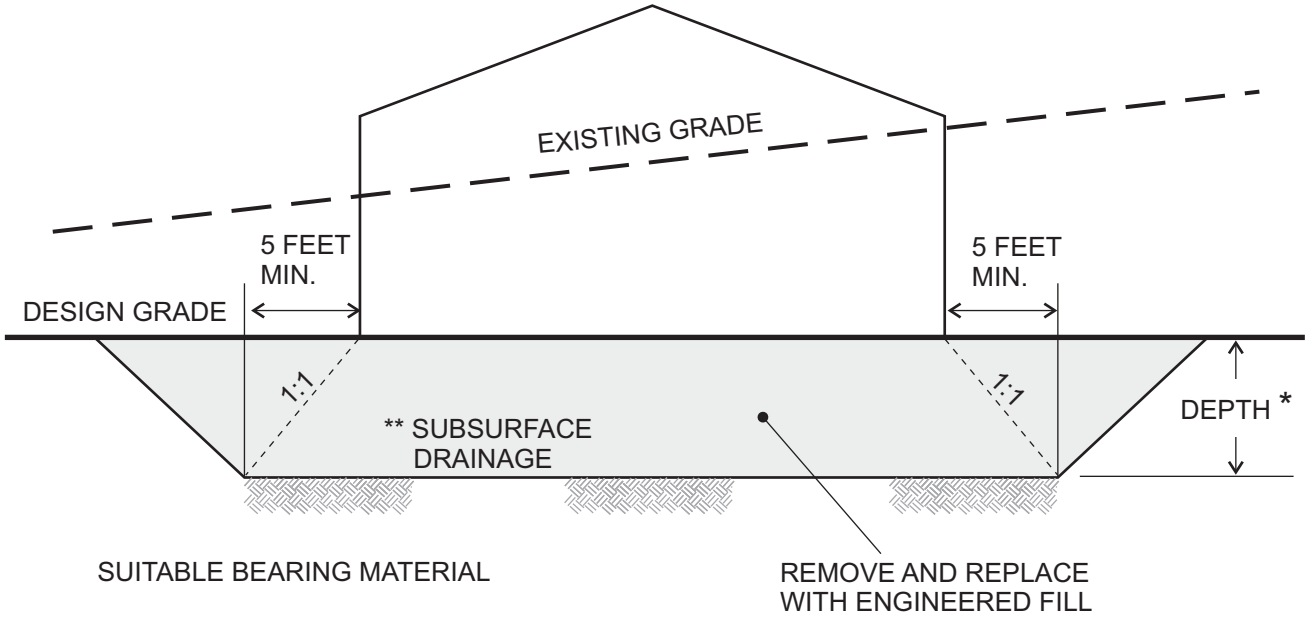
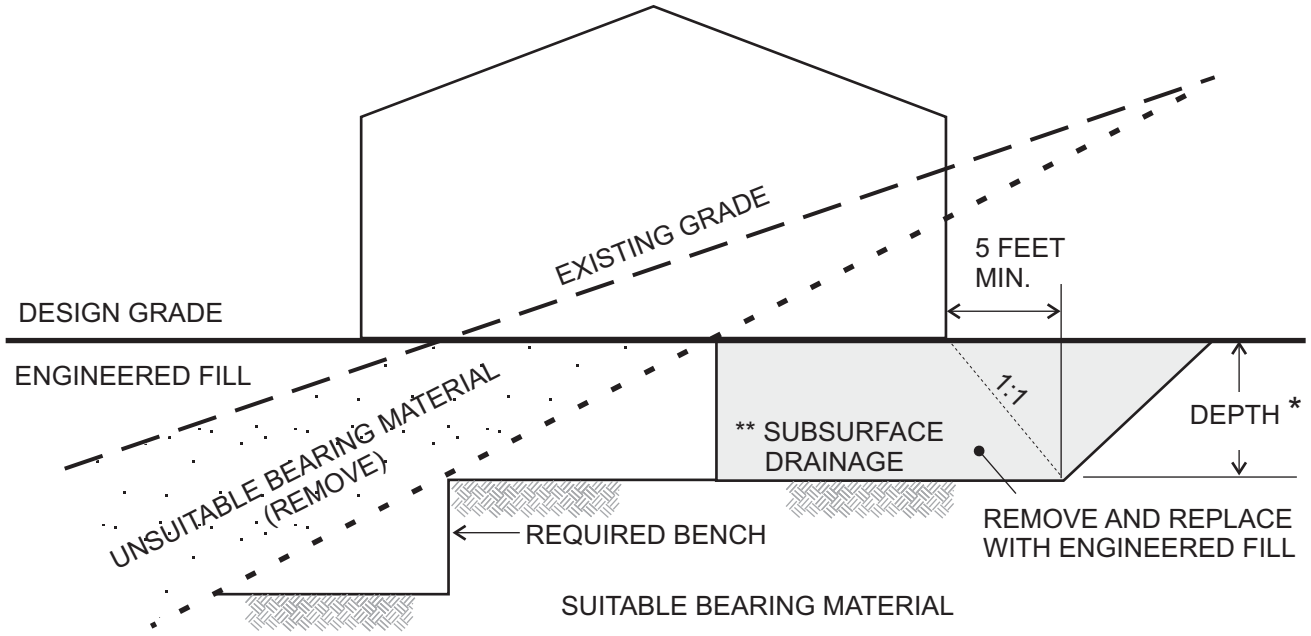
PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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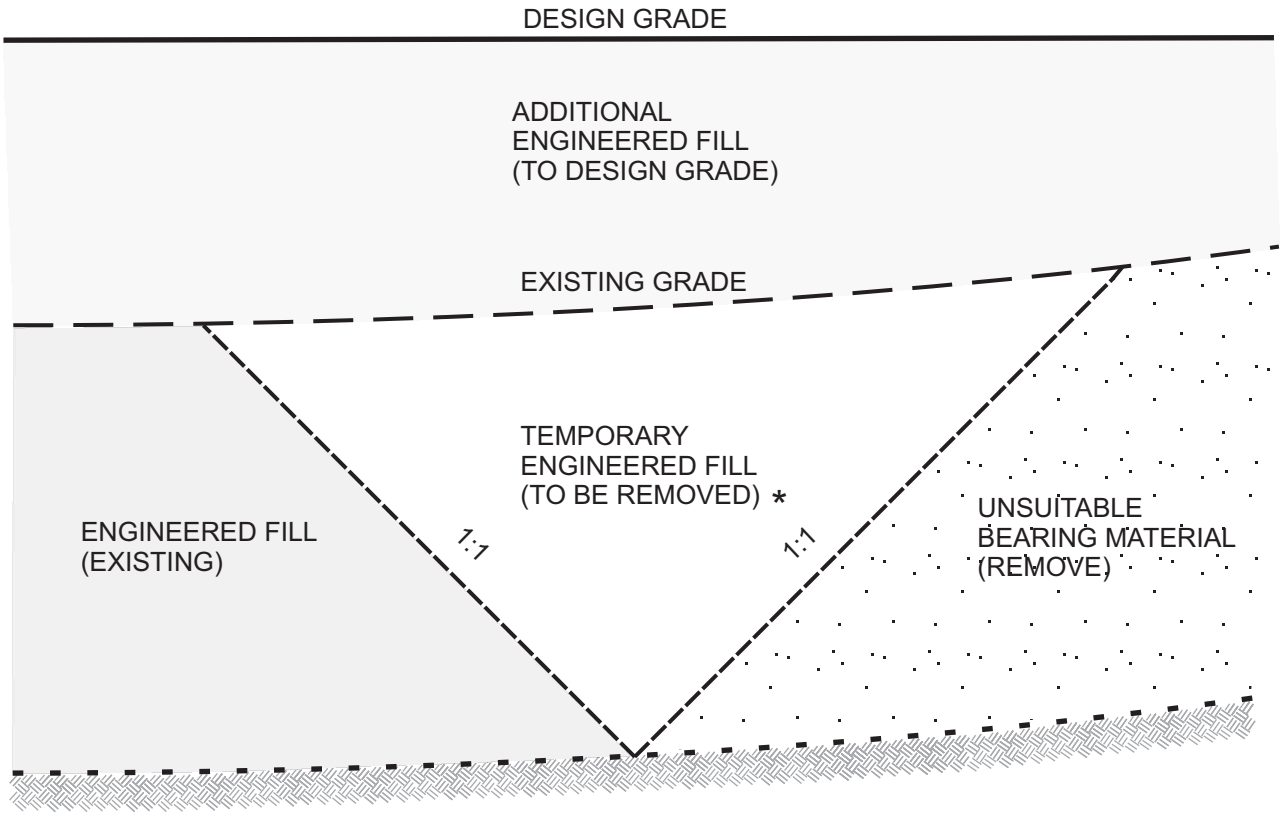
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

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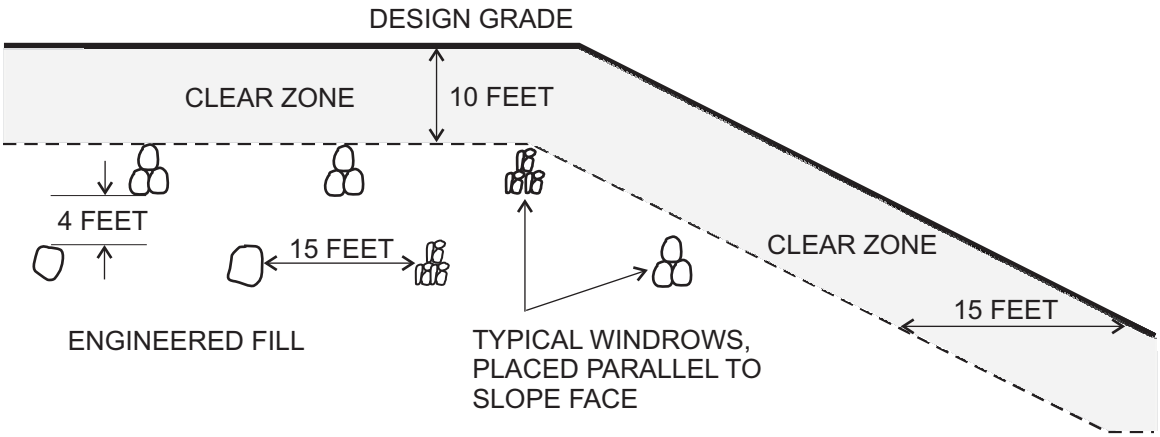
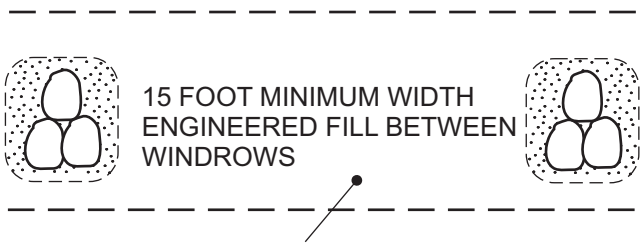
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

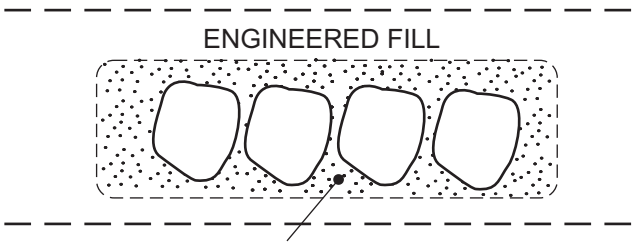
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

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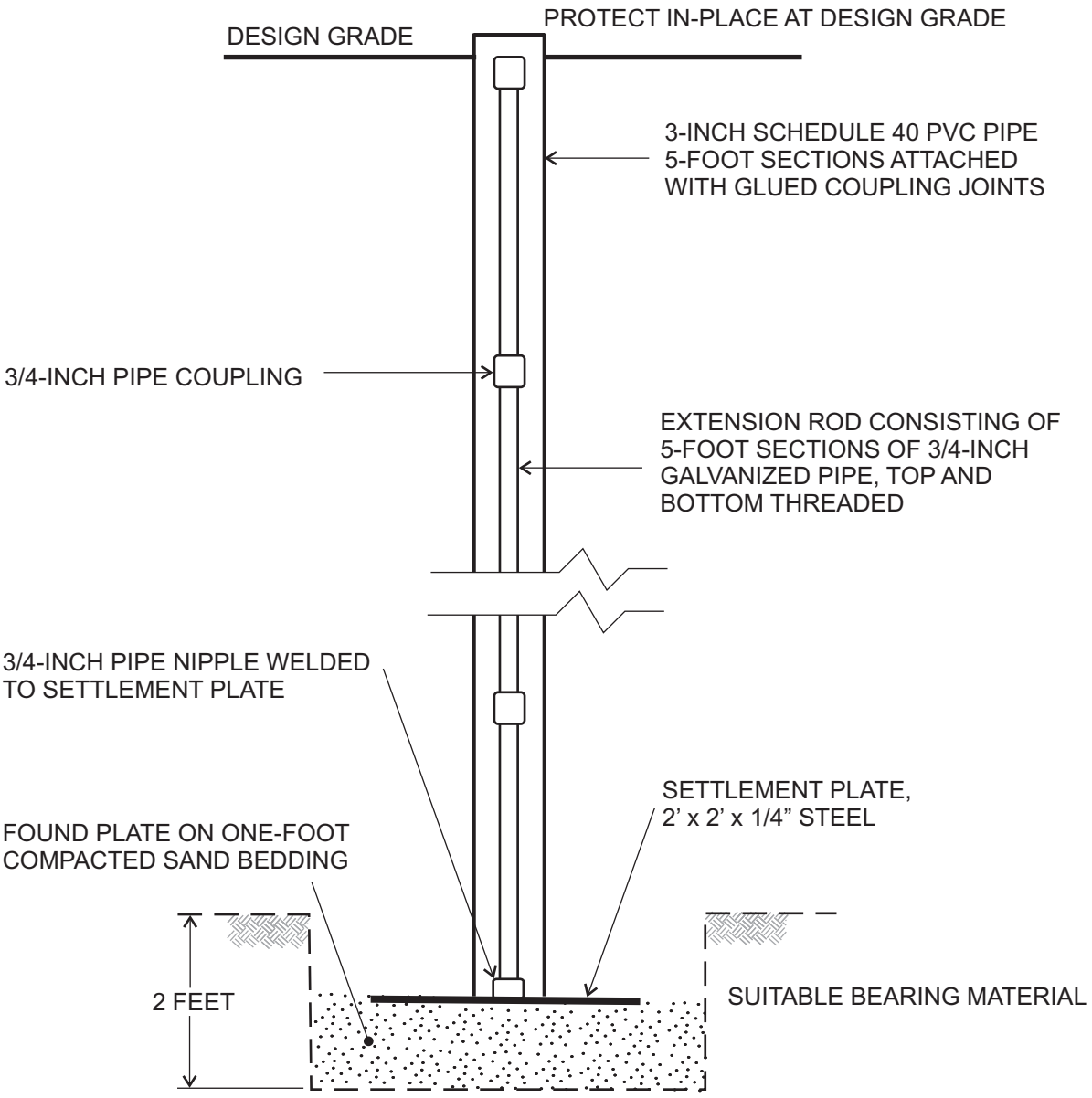
OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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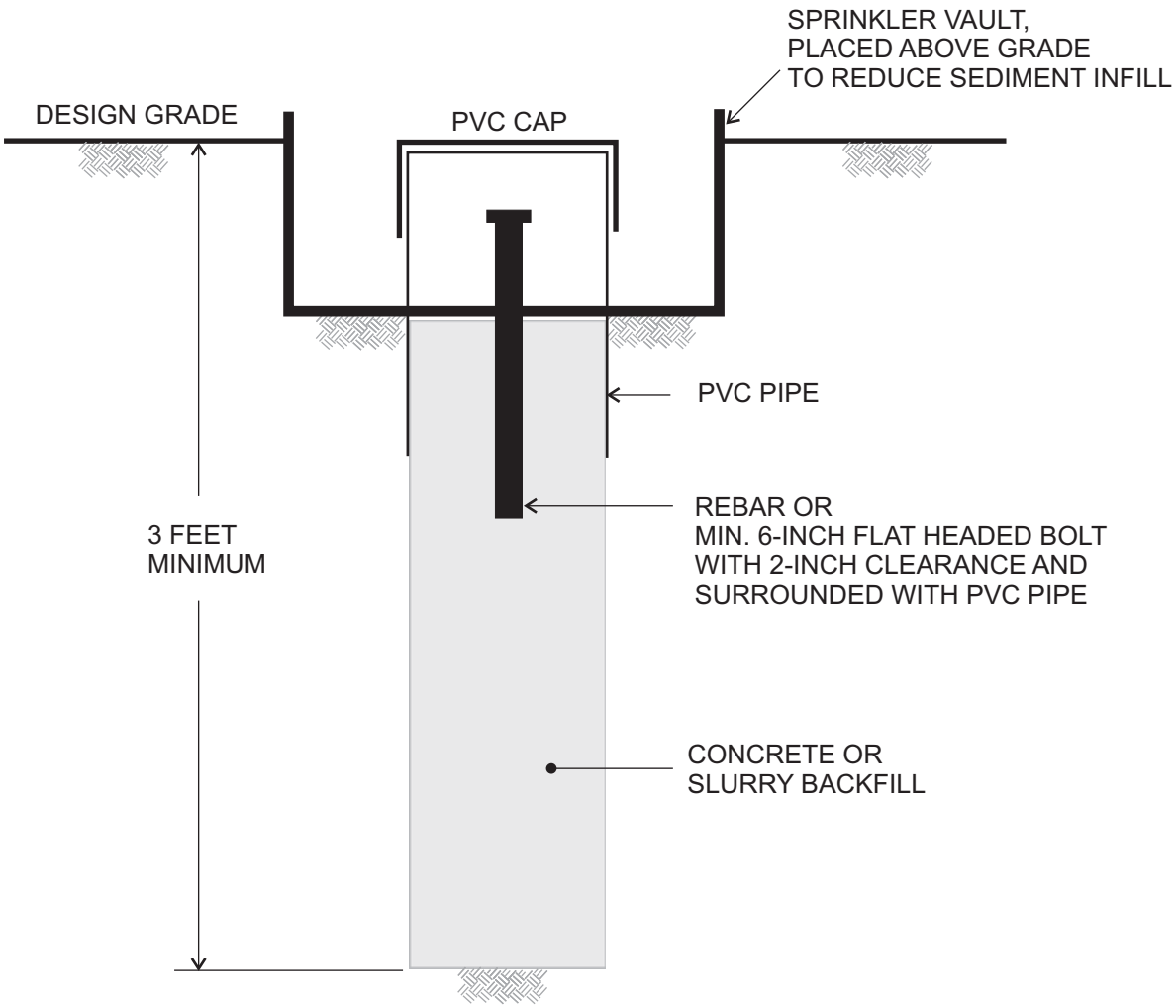
ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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SETTLEMENT MONUMENT

DETAIL 12

LEGEND

afu	ARTIFICAL FILL - UNDOCUMENTED
Qya	YOUNG ALLUVIUM (DESIGNATION FOR ALL HOLOCENE, ALLUVIUMS ENCOUNTERED ONSITE)
Qoa	OLDER ALLUVIUM
$Qvof_3$	VERY OLD ALLUVIAL-FAN DEPOSITS
Qlo	SEDIMENTARY DEPOSITS OF LIVE OAK CANYON
T-22	APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (AGS, 2020)
B-37	APPROXIMATE LOCATION OF EXPLORATORY BORING (PSE)
AGS-18	APPROXIMATE LOCATION OF EXPLORATORY BORING (AGS, 2020)
SCG-10	APPROXIMATE LOCATION OF EXPLORATORY BORING (SCG, 2020)
	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
15	ESTIMATED REMOVAL DEPTH (IN FEET)
O.X. 5	PROPOSED BUILDING OVEREXCAVATION DEPTH (IN FEET)
	POSSIBLE INFILTRATION AREAS TO BE VERIFIED BY TESTING
	PROPOSED KEYWAY
8	PROPOSED SUBDRAIN WITH SIZE IN INCHES

PARCEL "A"
LLA. 05-002
INST. NO. 2005-0324926 O.R.

B-81 B

0-25.0' Qal
25.0-36.0' Qoa
T.D.=36.0'
No Water
No Caving

Install Stub for Future Development?

PROJECT BOUNDARY

15X2X3 Keyway

B'

$Qvof_3$

O.X. 5

T-15

0-8.0' Qal
8.0-25.0' Qoa
T.D.=26.0
No Water

GRADING AVOIDANCE AREA, TYP.

AGS-1

0-4.0' Qal
4.0-9.5' $Qvof_3$
T.D.=9.5'
No Water
No Caving

Qal

afu

Install Stub for Future Development?

$Qvof_3$

EXISTING STRUCTURES TO BE REMOVED, TYP.

0-15.0' Qal
15.0-50.1' Qoa
T.D.=50.1'
No Water

AGS-17

EXISTING MISC. ITEMS TO BE REMOVED & DISPOSED

0.0-25.0' $Qvof_3$
T.D.=25.0'
No Water

SCG-2

T-1

0-6.5' Qal
6.5-11.0' $Qvof_3$
T.D.=11.0'
No Water
No Caving

EXISTING WALLS TO BE REMOVED

EXISTING STRUCTURES REMOVED

SCG-1

0-13.5' Qal
13.5-49.3' Qoa
T.D.=49.3'
No Water
No Caving

Install Subdrain in Future

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

GRADING AND PROPOSED FUTURE FREEWAY OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

15X2X3 Keyway

EXISTING 30" RCP

EXISTING 36" RCP

EXISTING 48" RCP

GRADING LIMITS

CALTRANS R/W & PROJECT BOUNDARY

40' ±

WRITTEN GRADING PERMIT CLEARANCE OR PERMITS REQUIRED FROM CALTRANS PRIOR TO START OF GRADING

15X2X3 Keyway

A A'

GRADING AND OFF-RAMP PER SEPARATE CALTRANS PLANS

INTERSTATE 10

GRADING LIMITS

APN 413-190-006

40' WIDE ROAD & UTILITY EASEMENT (WOODHOUSE RD.)

ROBERTS ROAD

Qlo

Qal

afu

EXISTING DIRT ROAD

CAUTION: EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING POLES AND POWER LINES TO BE REMOVED, TYP.

0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

0-2.0 Topsoil

R/W

SEE SHEET 12

SEE SHEET 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
3. PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE

EXISTING EASEMENT NOTES:

24. EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
    - GRANTED TO: RIVERSIDE COUNTY
    - PURPOSE: PUBLIC HIGHWAY AND PUBLIC UTILITIES
    - RECORDED: NOVEMBER 20, 1945, IN BOOK 714 PAGE 216 O.R.
    - AFFECTS: AS SET FORTH IN SAID DOCUMENT

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
	ENGINEER		REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

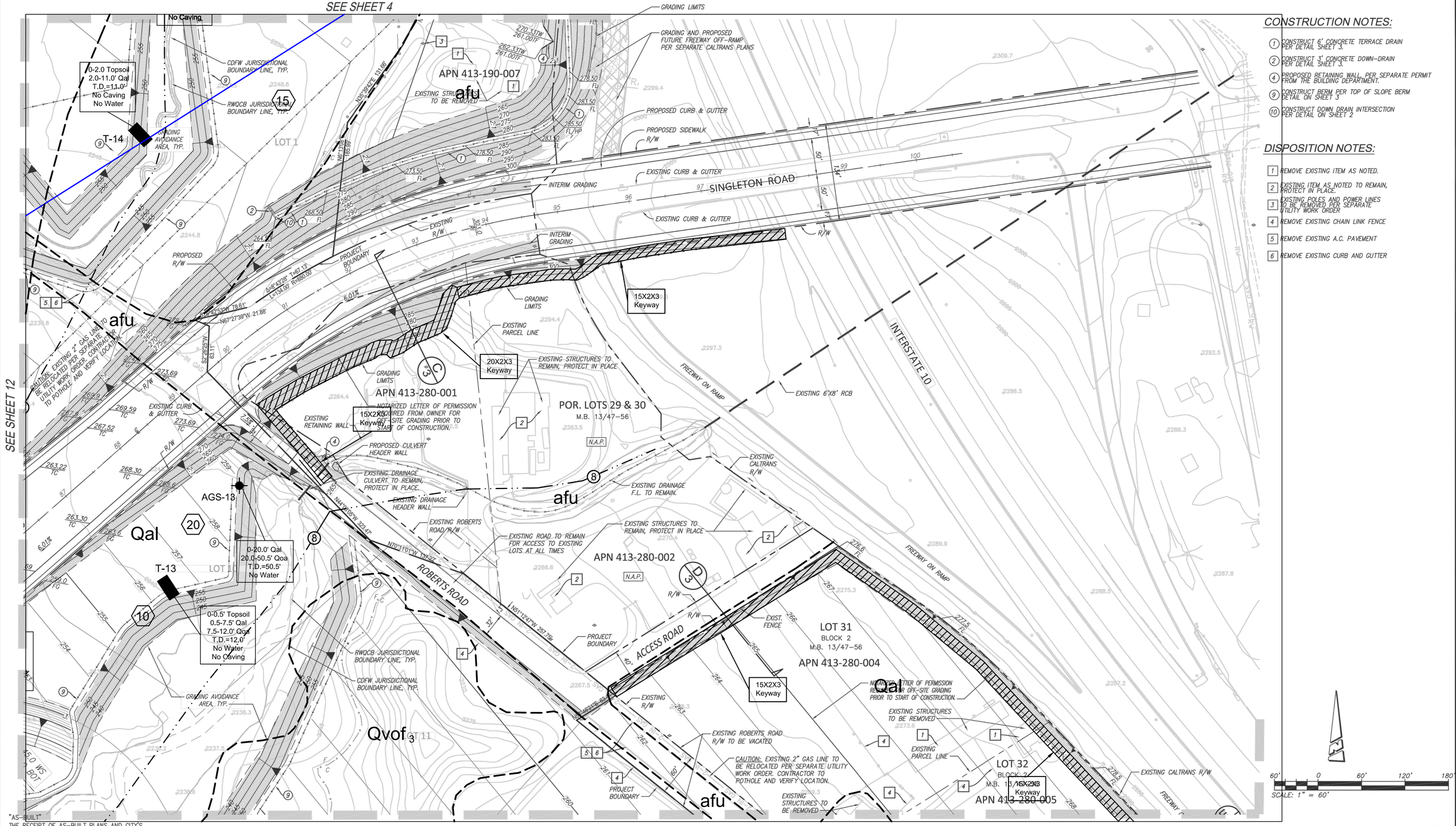
4 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg



CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
9. CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP: _____

See Plate 1 for Legend — PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM — ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

5 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:42am By: gilberto
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 5

SEE SHEET 11

SEE SHEET 7

SEE SHEET 9

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend — PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING WEST
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 28.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

6 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

Plotted: Dec 10, 2020 - 10:42am By: gherta
DWG: N:\01_169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

LOT 32
BLOCK 2
M.B. 13/47–56

APN 413-280-005

APN 413-280-006

APN 413-280-007

APN 413-280-008

EXISTING PARCEL LINE

PROJECT BOUNDARY

INTERSTATE 10

EXISTING 30" RCP

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

A.P.N.413-280-009

A.P.N.413-280-010

EXISTING CALTRANS R/W

EXISTING DOUBLE 48" CMP

EXISTING BORING PIT PER CROSSING I-10 PLANS PERMIT NO. 08-05-6-UU-1116

EXISTING 48" CMP

N64°25'37"W 396.38'

N.A.P.

EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 4" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING 2" GAS LINE TO BE RELOCATED PER / SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING COPPER DRIVE R/W TO BE VACATED

EXISTING ROBERTS ROAD R/W TO BE VACATED

EXISTING 2" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

EXISTING TELEPHONE LINE, PRIOR TO CONSTRUCTION CONTRACTOR TO VERIFY LOCATION.

EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

EXISTING DRAINAGE F.L. TO REMAIN, PROTECT IN PLACE.

LOT 18
PARCEL MAP 19207
P.M. 127/10–11

A.P.N.413-280-034

A.P.N.413-280-035

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS.

CAUTION: EXISTING 24" DIP (CLASS 300) ZONE 11 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

CAUTION: EXISTING 16" DIP (CLASS 300) ZONE 12 RECYCLED WATER LINE WITH 42" MIN. COVER PER RECYCLED WATER IMPROVEMENT PLANS FOR ROBERTS ROAD INFRASTRUCTURE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

EXISTING PARCEL LINE

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXIST. ROBERTS ROAD R/W TO BE VACATED

PROPOSED 30' PRIVATE ACCESS EASEMENT

EXISTING PARCEL LINE

PROTECT IN PLACE EXISTING UTILITIES WITHIN EXISTING EASEMENT

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

LOT 14

LOT 15

LOT 16

LOT 17

ROBERTS ROAD

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY

RWQCB JURISDICTIONAL BOUNDARY

CUT/FILL LINE

EXISTING 90' SCE 20.00' SDGE FORCE MAIN EASEMENT

PROJECT BOUNDARY

PARCEL 9
P.M. NO. 33105
P.M. 243/99–111

TRACT BOUNDARY

TRACT 32702

N36°55'25"W 170.0

N84°30'34"W 299.43

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" MIN. COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. NOTARIZED LETTER OF PERMISSION REQUIRED FROM SEWER AGENCY FOR GRADING OVER EXISTING SEWER PIPE PRIOR TO START OF CONSTRUCTION.

SEE SHEET 6

SEE SHEET 8

SEE SHEET 9

AGS-14

AGS-15

AGS-10

0-0.5' Topsoil
0.5-8.0' Qal
8.0-12.0' Qvof
T.D.=12.0'
No Water
No Caving

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

0-1.0' Topsoil
1.0-13.0' Qal
T.D.=13.0'
No Water
No Caving

0-0.5' Topsoil
0.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT
6. REMOVE EXISTING CURB AND GUTTER

60' 0 60' 120' 180'
SCALE: 1" = 60'

See Plate 1 for Legend PLATE 4

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID#

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

811 Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

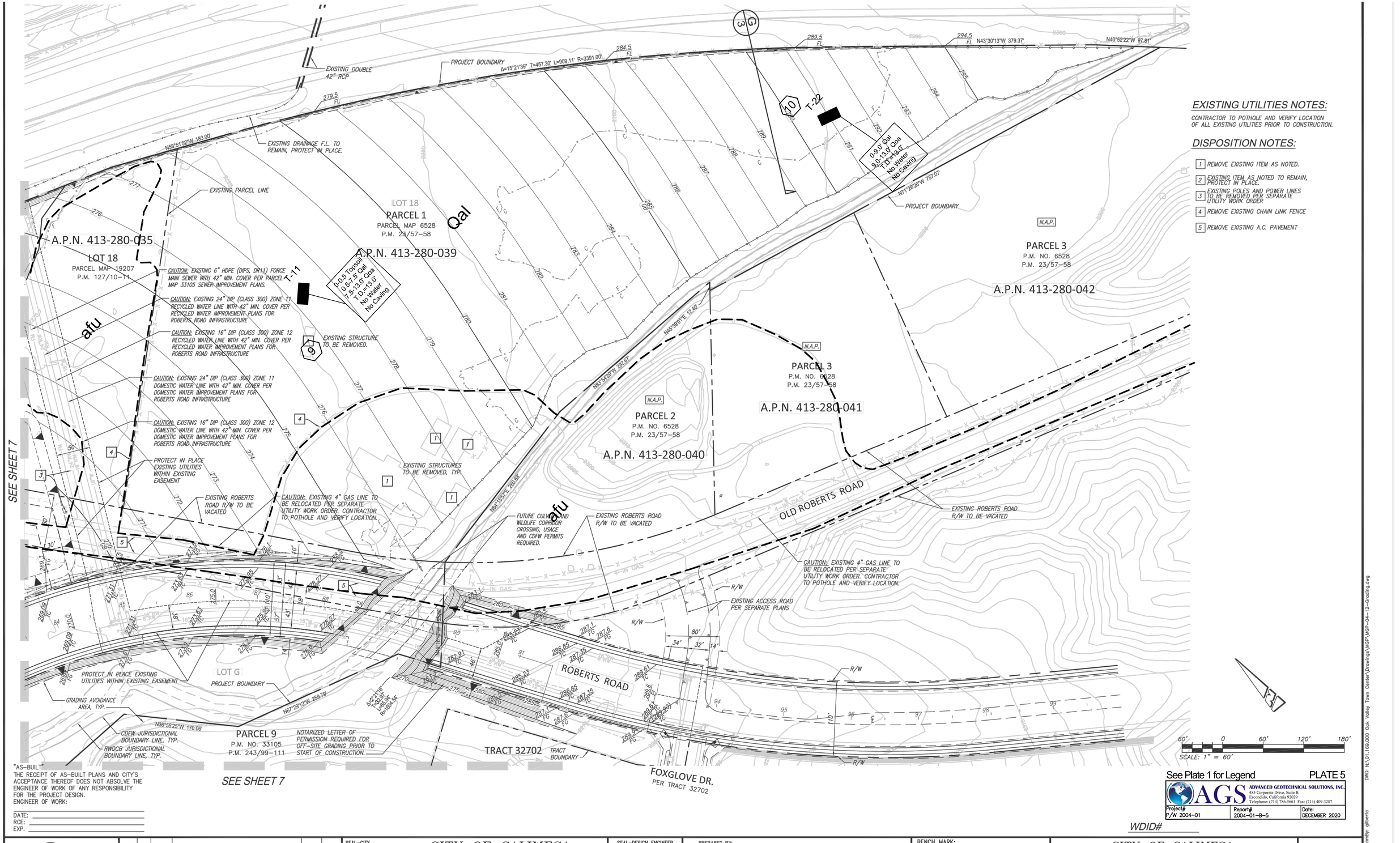
7 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 – 10:43am By: gilberta
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg



EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1. REMOVE EXISTING ITEM AS NOTED.
2. EXISTING ITEM AS NOTED TO REMAIN, PROTECT IN PLACE.
3. EXISTING POLES AND POWER LINES TO BE REMOVED PER SEPARATE UTILITY WORK ORDER
4. REMOVE EXISTING CHAIN LINK FENCE
5. REMOVE EXISTING A.C. PAVEMENT

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY

REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER

REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

PROACTIVE ENGINEERING WEST

GEORGE ALAN LENFESTEY — 12/10/20 — DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862

MASS GRADING PLAN SHEET

8 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:43am By: gilberto DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MSP-04-12-Grading.dwg

SEE SHEET 6

SEE SHEET 10

SEE SHEET 7

SCG-9
0-10.0' Qal
10.0-25.0' Qoa
T.D.=25.0'
No Water

T-17
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-5
0-4.0' Qya
4.0-26.0' Qoa
T.D.=26.0'
No Water

B-94
0-12' Qal
12-50.0' Qoa
T.D.=50.0'
No Water

T-8
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

AGS-15

AGS-10
0-10.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water

T-21
0-3.5' Qal
3.5-11.0' Qoa
T.D.=11.0'
No Water
No Caving

15X2X3 Keyway

15X2X3 Keyway

afu

EXISTING STRUCTURES TO BE REMOVED, TYP.

EXISTING STRUCTURES TO BE REMOVED, TYP.

45.0 WS
37.0 BOT

LOT 9
LOT C
LOT 3
LOT 15
LOT 16
LOT 5

Qal

Qal

Qal

ST4

ROBERTS ROAD

ROBERTS

PARCEL 2
LLA. 13-001
REC'D 06/06/13
INST. NO. 2013-0270260 O.R.

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 9
P.M. NO. 33105
P.M. 243/99-111

TRACT 32702
TRACT BOUNDARY

TRACT 32702
TRACT BOUNDARY

GRADING AVOIDANCE AREA, TYP.

PROJECT BOUNDARY

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

EXISTING PARCEL LIINE

PROJECT BOUNDARY

DEVELOPMENT BOUNDARY LINE

PROJECT BOUNDARY

CAUTION: EXISTING 6" HDPE (DIPS, DR11) FORCE MAIN SEWER WITH 42" COVER PER PARCEL MAP 33105 SEWER IMPROVEMENT PLANS. CONTRACTOR TO POTHOLE AND VERIFY.

EXISTING 20.00' FORCE MAIN EASEMENT

M

M'

N

N'

L=140.57'
T=94.17'
R=350.00'
N40°35'10"E 164.17'
N12°03'25"E 150.84'
N1°43'09"E 133.04'
N0°10'01"E 161.34'

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

1 REMOVE EXISTING ITEM AS NOTED.

4 REMOVE EXISTING CHAIN LINK FENCE

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend

PLATE 6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020

12/10/20
DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

9 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01\169.000 Oak Valley Town Center\Drawings\MGP\04-12-Grading.dwg

SEE SHEET 11

Qlo
CUT/FILL LINE
Qal
Qlo
SCG-5
0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water
0-26.5' Qlo
T.D.=26.5'
No Water
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
Qal
AGS-4
0-35.0' Qal
35.0-45.5' Qoa
T.D.=45.5'
No Water
PAD=223.9
afu
EXISTING STRUCTURES TO BE REMOVED, TYP.
SCG-9
SCG-7
0-8.5' Qal
8.5-55.0' Qoa
T.D.=55.0'
No Water
ST5
ST7
ST6
T-16
0-2.5' Topsoil
2.5-7.0' Qal
7.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving
LOT 4
SCG-6
0-25.0' Qoa ?
T.D.=25.0'
No Water
0-4.0' Qal
4.0-8.0' Qoa
8.0-12.0' Qya
T.D.=12.0'
No Water
No Caving
Qlo
TEMP. SEWER LIFT STATION PAD
PAD=186.0
T-4
Qal
0-18.0' Qal
10.0-26.5' Qoa
T.D.=26.5'
No Water
AGS-18
GRADING AVOIDANCE AREA, TYP.
0-8.5' Qal
8.5-25.0' Qoa
T.D.=25.0'
No Water
SCG-8
15X2X3 Keyway
PROJECT BOUNDARY
EXISTING 100' WIDE DRAINAGE, GRADING & SLOPES EASEMENT
Δ=67°29'06" T=801.59'
L=1413.40' R=1200.00'
C.L. 4' WIDE
NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF-SITE GRADING PRIOR TO START OF CONSTRUCTION.
0-7.0' Qal
7.0-51.5' Qoa
T.D.=51.6'
No Water
AGS-6
CDFW JURISDICTIONAL BOUNDARY LINE, TYP.
RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.
GRADING AVOIDANCE AREA, TYP.
PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

CONSTRUCTION NOTES:

(9) CONSTRUCT BERM PER TOP OF SLOPE BERM DETAIL ON SHEET 3

(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.

[4] REMOVE EXISTING CHAIN LINK FENCE

SEE SHEET 9

EXISTING EASEMENT NOTES:

(21) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: MARCH 9, 1971, INSTRUMENT NO. 23255 OF OFFICIAL RECORDS
AFFECTS: AS SET FORTH IN SAID DOCUMENT

(23) EASEMENT(s) FOR THE PURPOSES SHOWN BELOW & RIGHTS INCIDENTAL THERETO AS GRANTED IN A DOCUMENT
GRANTED TO: SUNCAL SUMMERWIND RANCH LLC
PURPOSE: DRAINAGE, GRADING & SLOPE EASEMENT
RECORDED: AUGUST 28, 2006, INSTRUMENT NO. 2006-0632646
AFFECTS: AS SET FORTH IN SAID DOCUMENT

S-BUILT"
E RECEIPT OF AS-BUILT PLANS AND CITY'S
CCEPTANCE THEREOF DOES NOT ABSOLVE THE
GINEER OF WORK OF ANY RESPONSIBILITY
R THE PROJECT DESIGN.
GINEER OF WORK:

TE: _____
E: _____
P. _____

See Plate 1 for Legend PLATE 7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

60' 0 60' 120' 180'
SCALE: 1" = 60'

WDID#

811 now what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS		COUNTY

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER MICHAEL THORNTON No. C44226 Exp. 6/30/21 CIVIL STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER GEORGE ALAN LENFESTEY No. 45920 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY DATE
R.C.E. 45920 EXP. 12-31-2020

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

10 OF 23 SHEETS

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto
DWG: N:\01.169.000 Oak Valley Town Center\Drawings\MGP-04-12-Grading.dwg

SEE SHEET 12

SEE SHEET 6

SEE SHEET 10

CONSTRUCTION NOTES:

(2) CONSTRUCT 3' CONCRETE DOWN-DRAIN PER DETAIL SHEET 3.
(3) PROPOSE UNDER-SIDEWALK DRAIN PER STREET IMPROVEMENTS PM 37862
(4) PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
(5) CONSTRUCT 3' CONCRETE V-DITCH PER DETAIL ON SHEET 3
(8) CONSTRUCT 3' CONCRETE BROW DITCH PER DETAIL ON SHEET 3
(9) CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
(13) INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

EXISTING UTILITIES NOTES:

CONTRACTOR TO POTHOLE AND VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

DISPOSITION NOTES:

[1] REMOVE EXISTING ITEM AS NOTED.
[4] REMOVE EXISTING CHAIN LINK FENCE

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

0-1.0' Topsoil
1.0-10.0' Qal
10.0-14.0' Qoa
T.D.=14.0'
No Water
No Caving

0-8.5' Qal
8.5-18.5' Qoa
18.5-24.0' Qlo
T.D.=24.0'
No Water

0-2.0' Topsoil
2.0-65.0' Qlo
T.D.=65.0'
No Water
Caving @ 5'

0-8.5' Qal
8.5-18.5' Qoa
18.5-50.0' Qlo
T.D.=50.0'
No Water

0-26.5' Qlo
T.D.=26.5'
No Water

0-30.0' Qal
30.0-56.5' Qoa
T.D.=56.5'
Seepage @
46.0-56.5'

0-11.5' Qal
T.D.=11.5'
Seepage @10'
Caving below 10

0-60.0' Qal
60.0-71.5' Qoa
T.D.=71.5'
Seepage
11.0-71.5'

0-6.5' afu
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Seepage @
15.0-42'
Caving @ 40'

Stabilize Saturated Removal Bottom

Install Subdrain for Future Development?

PARCEL 14
P.M. NO. 33105
P.M. 243/99-111

PARCEL 1
VACANT
RLC PHASE 1
INST. NO. 732045 O.R.

FUTURE SINGLETON ROAD EXTENSION

PROJECT BOUNDARY

EXISTING 100' WIDE DRAINAGE, ROADWAY & SLOPES EASEMENT

EXISTING STRUCTURES TO BE REMOVED, TYP.

GRADING AVOIDANCE AREA, TYP.

SCALE: 1" = 60'

"AS-BUILT"
THE RECEIPT OF AS-BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 2004-01 | Report# 2004-01-B-5 | Date: DECEMBER 2020

WDID# _____

Know what's below. Call before you dig.

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL-CITY
REGISTERED PROFESSIONAL ENGINEER
MICHAEL THORNTON
No. C44226
Exp. 6/30/21
CIVIL
STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR DATE

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
GEORGE ALAN LENFESTEY
No. 45920
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE, SUITE 200
MURRIETA, CA 92562
951-200-6840

GEORGE ALAN LENFESTEY
R.C.E. 45920 EXP. 12-31-2020
12/10/20 DATE

BENCH MARK:
DESCRIPTION: USGS - MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

PLAN No. _____

11 OF 23 SHEETS

NOT FOR CONSTRUCTION

Plotted: Dec 10, 2020 - 10:44am By: gilberto DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg

SEE SHEET 4

PARCEL 14
P.M. NO. 33105
P.M. 243/99–111

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

NOTARIZED LETTER OF PERMISSION REQUIRED FOR OFF–SITE GRADING PRIOR TO START OF CONSTRUCTION.

PROJECT BOUNDARY

CAUTION: EXISTING 1" GAS LINE TO BE RELOCATED PER SEPARATE UTILITY WORK ORDER. CONTRACTOR TO POTHOLE AND VERIFY LOCATION.

GRADING AVOIDANCE AREA, TYP.

CDFW JURISDICTIONAL BOUNDARY LINE, TYP.

RWQCB JURISDICTIONAL BOUNDARY LINE, TYP.

B-37
0-14.0' Qal
14.0-16.0' Qlo
T.D.=16.0'
No Water
No Caving

15X2X3 Keyway

AGS-8
0-9.0' Qal
9.0-26.3' Qoa
T.D.=26.3'
No Water

AGS-12
0-50.4' Qlo
T.D.=54.4'
No Water

T-3
0-1.0' Topsoil
1.0-8.0' Qal
8.0-14.0' Qlo
T.D.=14.0'
No Water
No Caving

T-19
0-0.5' Topsoil
0.5-6.5' Qal
6.5-11.0' Qlo
T.D.=11.0'
No Water
No Caving

T-18
PAD=251.9

AGS-2
0-10' Qal
10-25.5' Qlo
T.D.=25.5'
No Water

0-1.0' Topsoil
1.0-6.0' Qal
6.0-12.0' Qoa
T.D.=12.0'
No Water
No Caving

0-13.5' Qal
13.5-23.5' Qoa
23.5-48.9' Qlo
T.D.=48.9'
No Water

B-96
0-6.5 Topsoil
6.5-15.0' Qal
15.0-40.0' Qoa
T.D.=40.0'
Water @ 15to42'
Caving @ 40'

Qal
Qlo
Qoa
afu
Qvof 3

ST10
ST11
ST12
ST13
ST9

LOT 2
LOT A
LOT 7

ROBARTS ROAD
SINGLETON ROAD

O.X. 5

CONSTRUCTION NOTES:

1. CONSTRUCT 6' CONCRETE TERRACE DRAIN PER DETAIL SHEET 3.
2. CONSTRUCT 3' CONCRETE DOWN–DRAIN PER DETAIL SHEET 3.
4. PROPOSED RETAINING WALL, PER SEPARATE PERMIT FROM THE BUILDING DEPARTMENT.
5. CONSTRUCT 3' CONCRETE V–DITCH PER DETAIL ON SHEET 3
6. CONSTRUCT 12" DRAIN AND PIPE PER DETAIL ON SHEET 3
7. CONSTRUCT 6" THICK CONCRETE SPLASH WALL PER DETAIL ON SHEET 3
9. CONSTRUCT BERM PER TOP OF SLOPE BERM PER DETAIL ON SHEET 3
10. CONSTRUCT DOWN DRAIN INTERSECTION PER DETAIL ON SHEET 2
13. INSTALL RIPRAP AS SHOWN, SIZE PER PLAN

SEE SHEET 5

SEE SHEET 11

60' 0 60' 120' 180'
SCALE: 1" = 60'

"AS–BUILT"
THE RECEIPT OF AS–BUILT PLANS AND CITY'S ACCEPTANCE THEREOF DOES NOT ABSOLVE THE ENGINEER OF WORK OF ANY RESPONSIBILITY FOR THE PROJECT DESIGN.
ENGINEER OF WORK:

DATE: _____
RCE: _____
EXP. _____

See Plate 1 for Legend PLATE 9

WDID# _____

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004–01	2004–01–B–5	DECEMBER 2020

Know what's below. Call before you dig. 811

MARK	BY	DATE	DESCRIPTION	APPR.	DATE
ENGINEER			REVISIONS	COUNTY	

SEAL–CITY
REGISTERED PROFESSIONAL ENGINEER — MICHAEL THORNTON — No. C44226 Exp. 6/30/21 — CIVIL — STATE OF CALIFORNIA

CITY OF CALIMESA
PUBLIC WORKS DEPARTMENT

MICHAEL THORNTON P.E., CITY ENGINEER, RCE C44226 — DATE

MARGARET MONSON, PUBLIC WORKS DIRECTOR — DATE

SEAL–DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER — GEORGE ALAN LENFESTEY — No. 45920 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
PROACTIVE ENGINEERING CONSULTANTS WEST
25109 JEFFERSON AVE. SUITE 200
MURRIETA, CA 92562
951-200-6840
PROACTIVE ENGINEERING WEST

12/10/20
GEORGE ALAN LENFESTEY — DATE
R.C.E. 45920 EXP. 12–31–2020

BENCH MARK:
DESCRIPTION: USGS – MONUMENT "REST" BENCHMARK DISK SET ON TOP OF CONC. MONUMENT STAMPED "REST 1972" ON DESERT LAWN DR. ACROSS THE DRIVE FROM DESERT LAWN CEMETERY 25.3 FT. NORTHEAST OF THE DRIVE CENTERLINE 24.9 FT. SOUTHWEST OF THE SOUTHWEST EDGE OF THE SOUTHEAST BOUND LANES OF INTERSTATE HIGHWAY 10.
NAVD 29 DATUM ELEV. 2191.44

SCALE: AS NOTED

CITY OF CALIMESA
MASS GRADING PLANS PARCEL MAP 37862
MASS GRADING PLAN SHEET

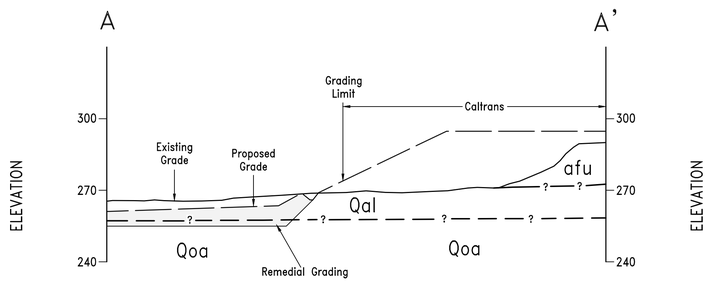
12 OF 23 SHEETS

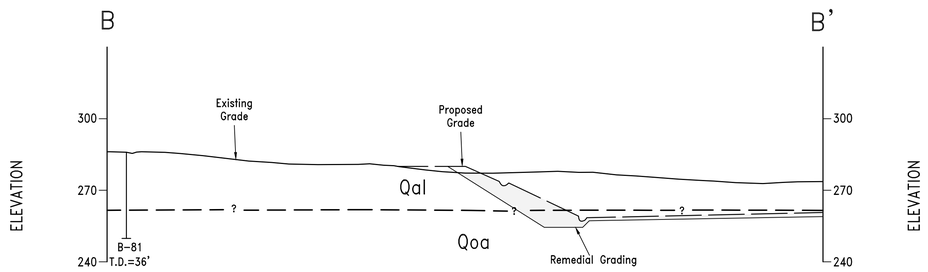
FOR: CITY OF CALIMESA PUBLIC WORKS DEPARTMENT

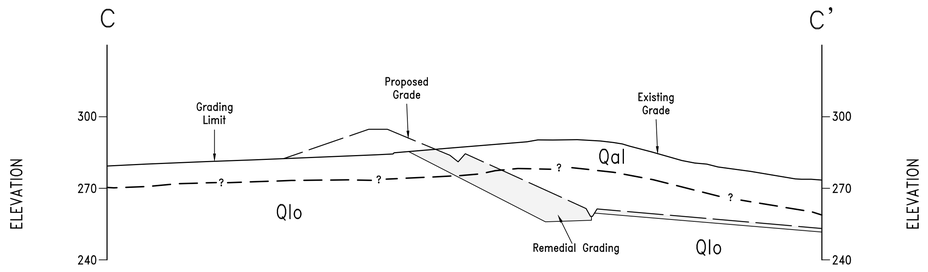
PLAN No. _____

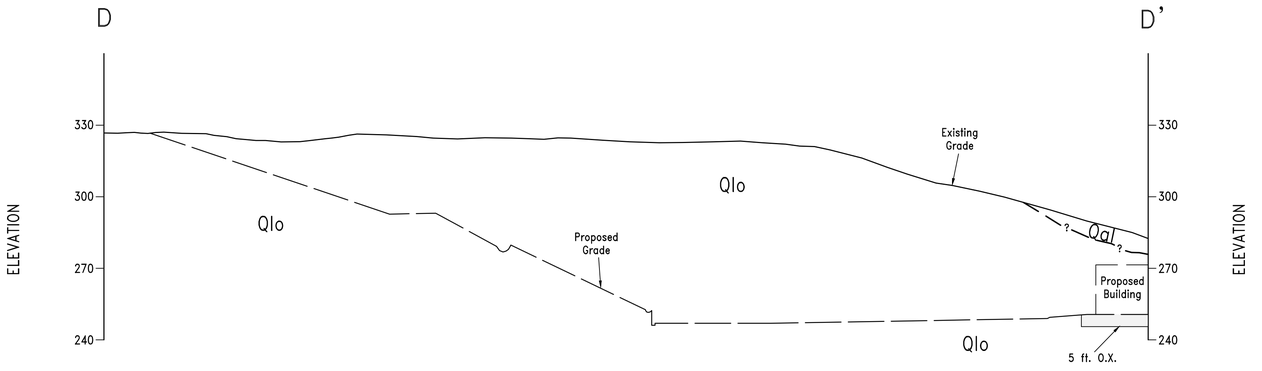
NOT FOR CONSTRUCTION

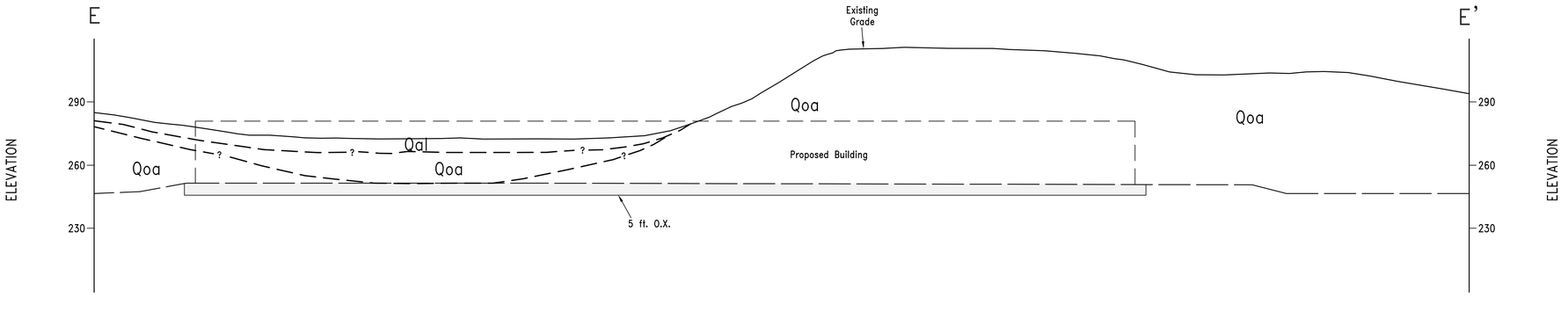
Plotted: Dec 10, 2020 – 10:45am By: gilberta
DWG: N:\01-169.000 Oak Valley Town Center\Drawings\MGP\MGP-04-12-Grading.dwg











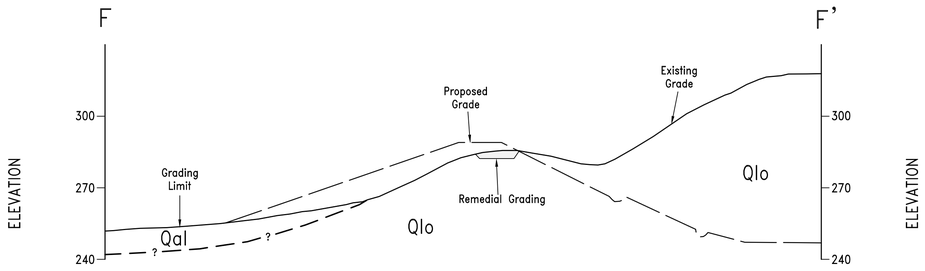
Scale: 1"=30'

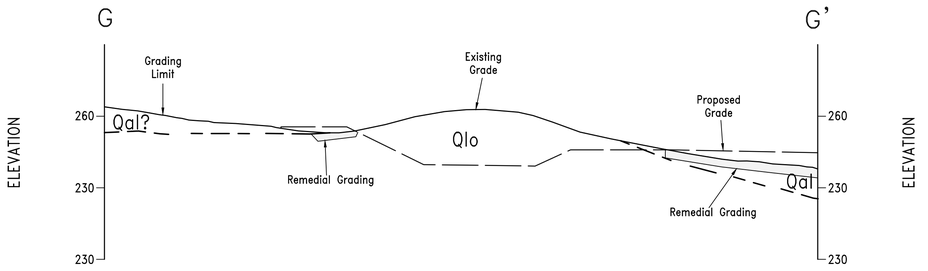
See Plate 1 for Legend

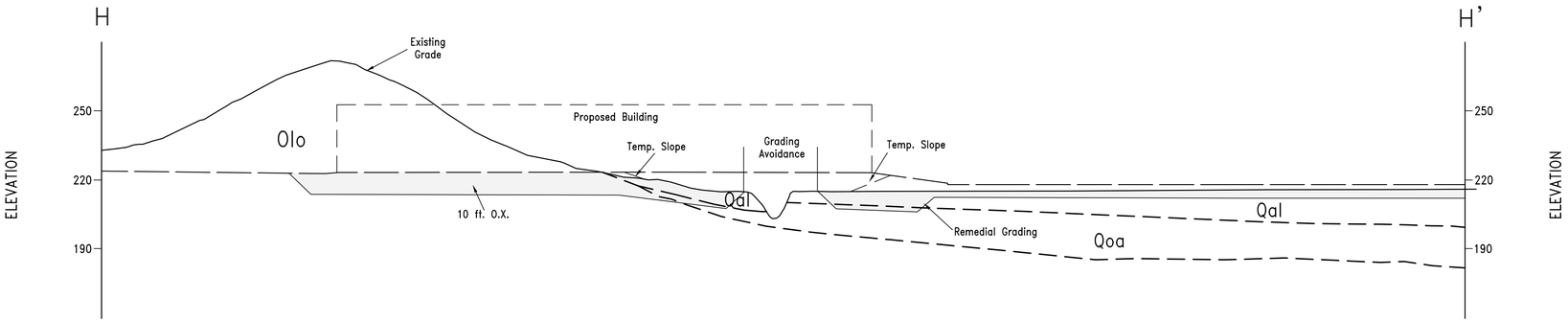
PLATE 10

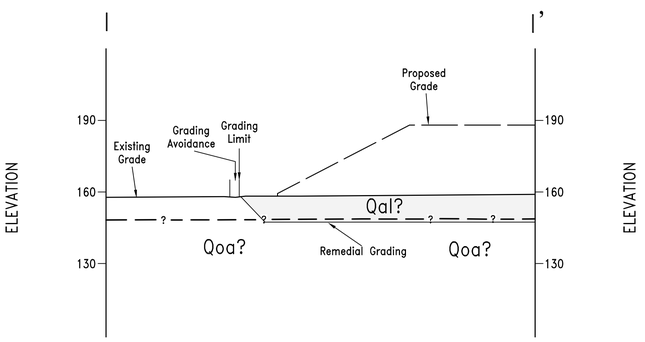
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

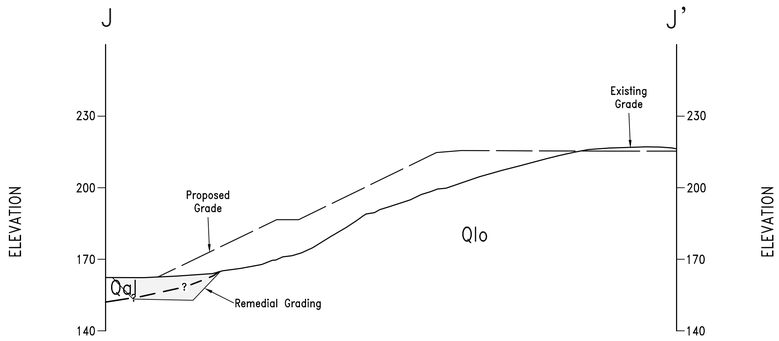
Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020











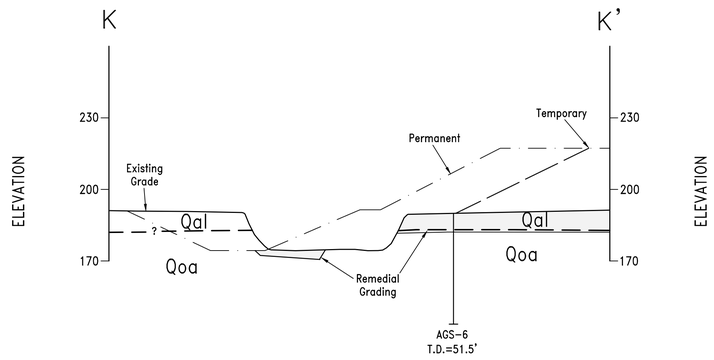
Scale: 1"=30'

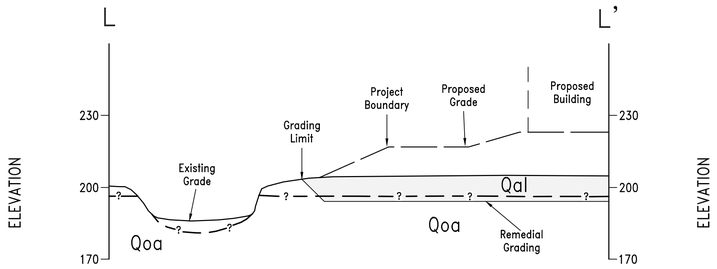
See Plate 1 for Legend

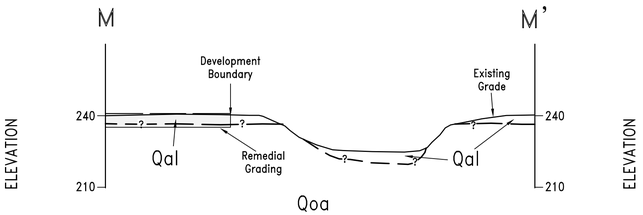
PLATE 11

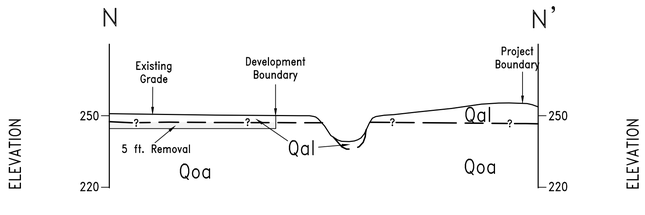
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020









Scale: 1"=30'

See Plate 1 for Legend PLATE 12

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 2004-01	2004-01-B-5	DECEMBER 2020

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 12/2/2021

Designed by: EP — Case No:

Company Project Number/Name: BCCOV - Parking Lot

BMP Identification

BMP NAME / ID: DMA P-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

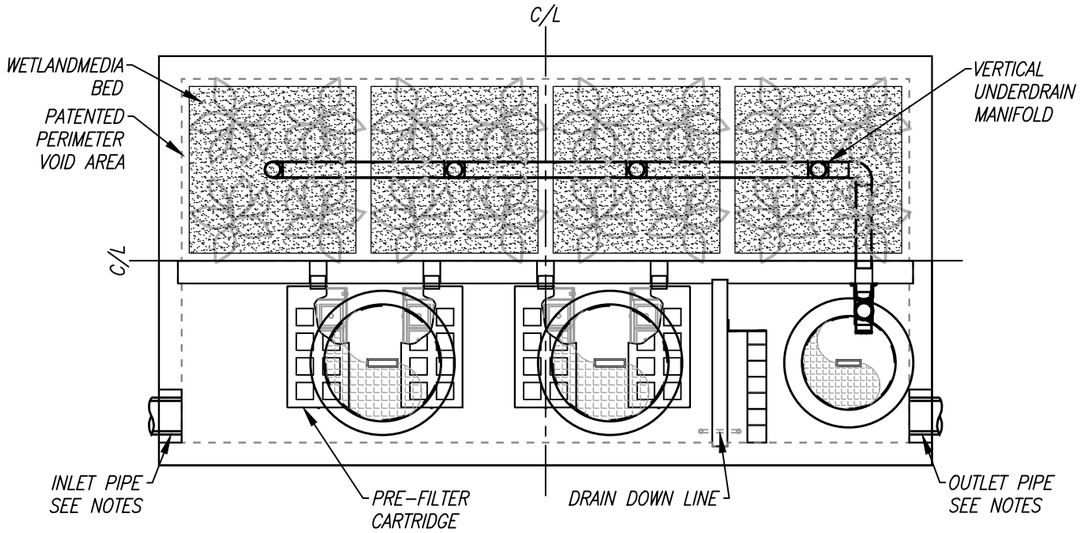
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

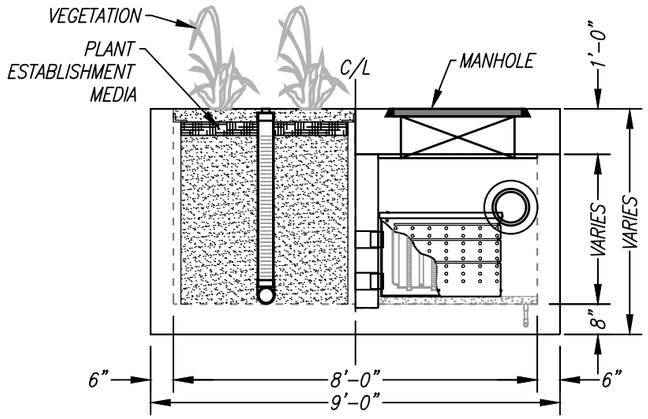
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
CONC	*297585*	*Concrete or Asphalt*	*1*	*0.89*	*265445.8*			
LS	*96720*	*Ornamental Landscaping*	*0.1*	*0.11046*	*10683.5*			

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.462	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			25
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



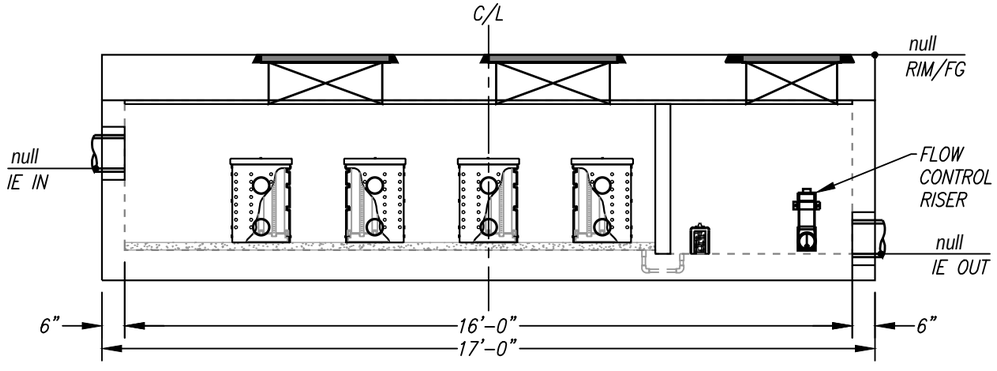
LEFT END VIEW

INSTALLATION NOTES

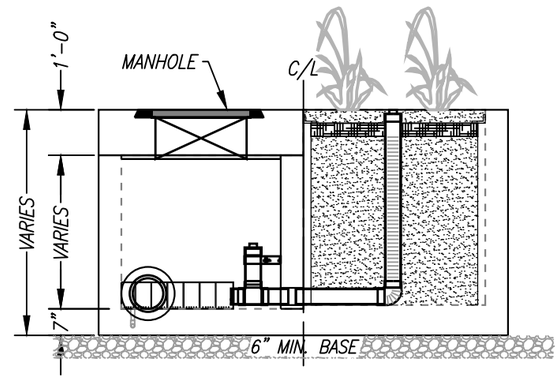
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

3 MWS VAULTS IN SERIES ARE PROPOSED TO TREAT A TOTAL OF 1.3 CFS

DMA P-1

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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Bio Clean
A Forterra Company

MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/23/19 10:LEF

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution



OVERVIEW

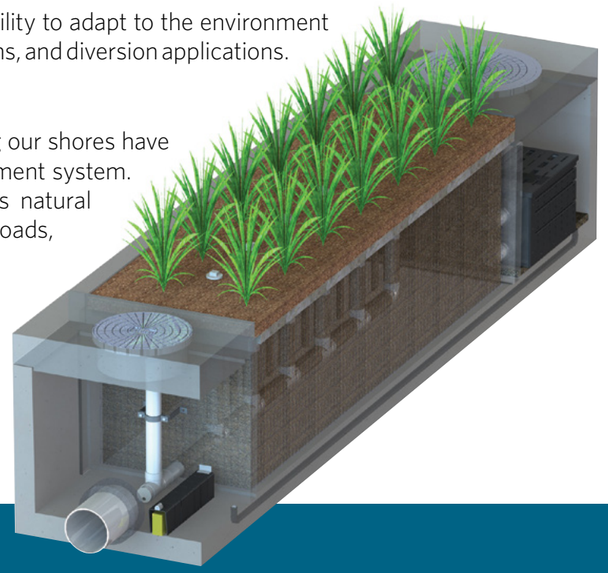
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

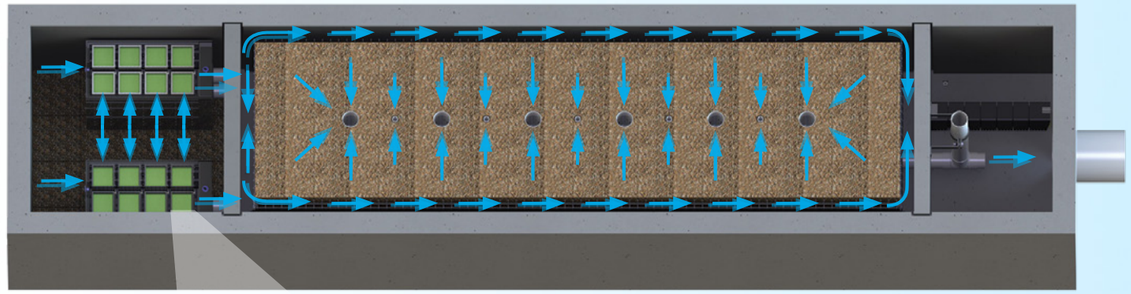


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



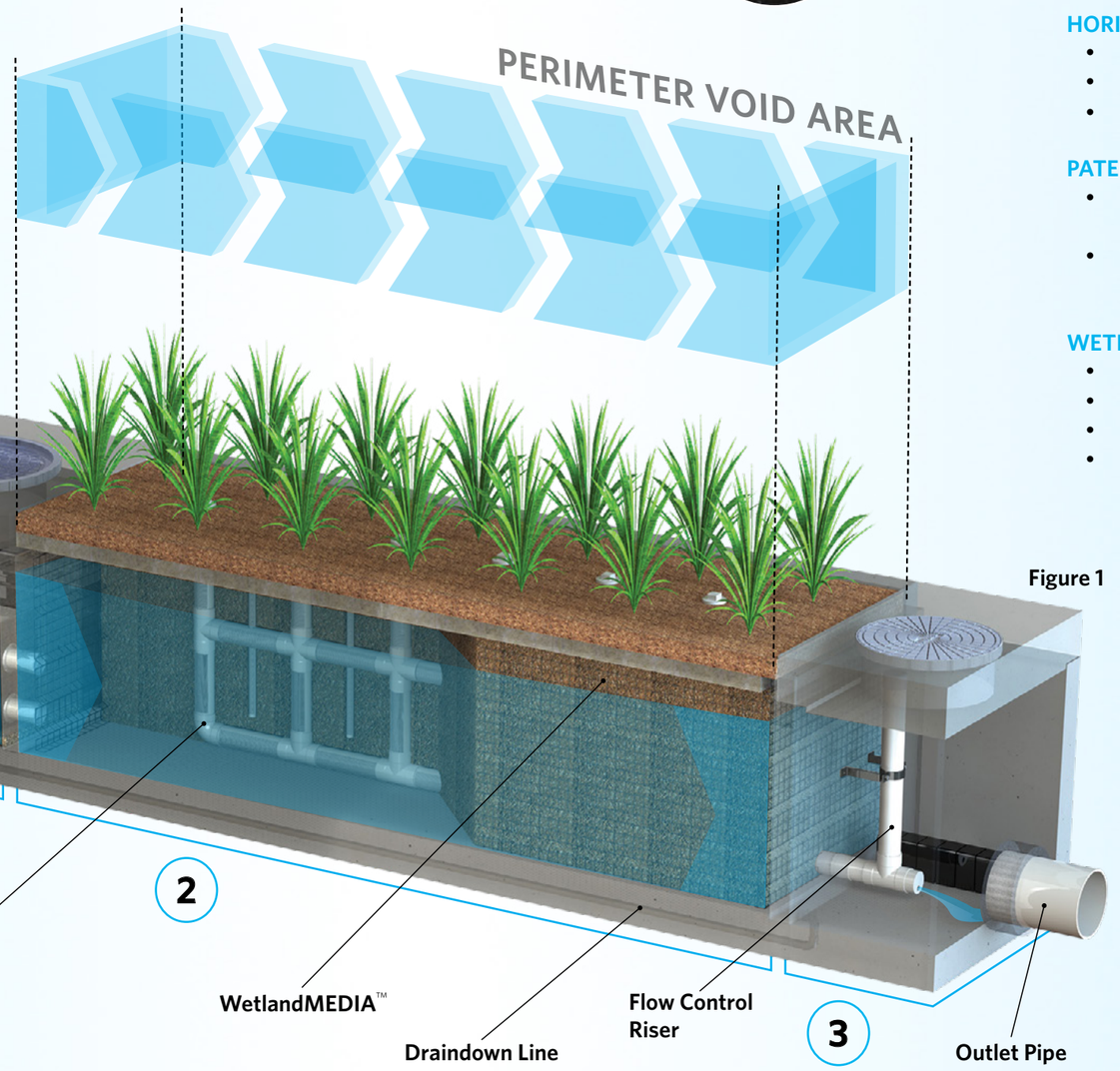


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

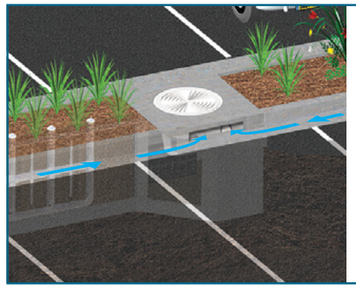
- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated





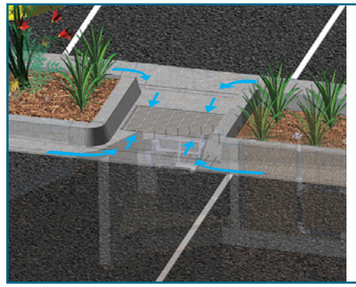
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



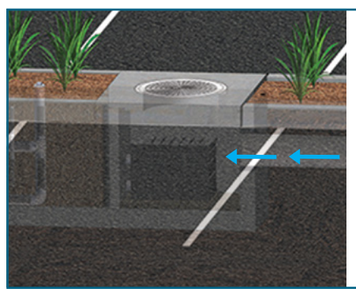
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

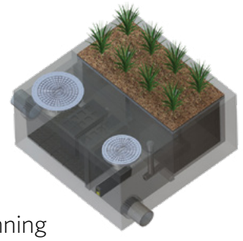


DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

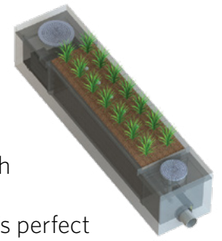
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

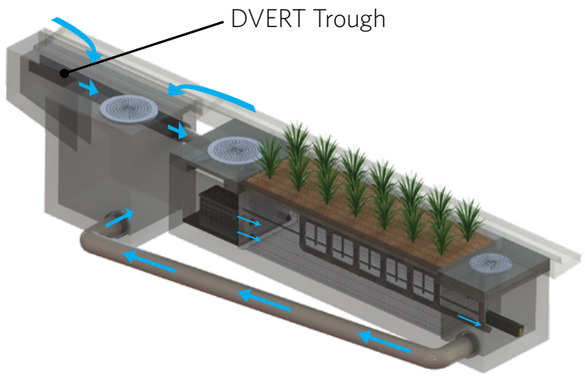
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



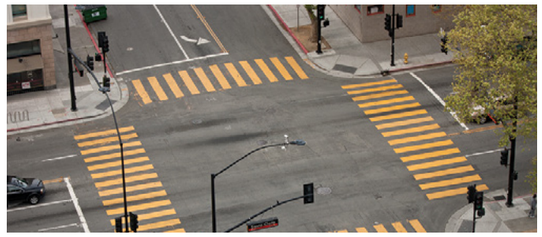
INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



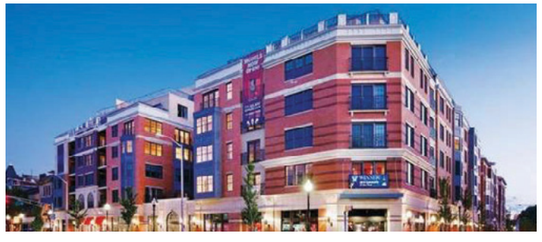
PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION



Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



Bio Clean
A Forterra Company

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01172020

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/24/21 File: EX2YRA1242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV AREA A1 EXISTING CONDITION
2-YEAR 24 HOUR STORM EVENT
21-0034
2021-11-22 EP

Drainage Area = 37.70(Ac.) = 0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.70(Ac.) = 0.059 Sq. Mi.
Length along longest watercourse = 3231.00(Ft.)
Length along longest watercourse measured to centroid = 1394.00(Ft.)
Length along longest watercourse = 0.612 Mi.
Length along longest watercourse measured to centroid = 0.264 Mi.
Difference in elevation = 45.30(Ft.)
Slope along watercourse = 74.0279 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.159 Hr.
Lag time = 9.54 Min.
25% of lag time = 2.38 Min.
40% of lag time = 3.82 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	2.40	90.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
37.70	6.20	233.74

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
37.700	86.20	0.000

Total Area Entered = 37.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

86.2	71.9	0.339	0.000	0.339	1.000	0.339
					Sum (F) =	0.339

Area averaged mean soil loss (F) (In/Hr) = 0.339
Minimum soil loss rate ((In/Hr)) = 0.170
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	52.421	4.579	1.740
2	0.167	104.842	23.119	8.784
3	0.250	157.263	37.515	14.254
4	0.333	209.684	13.955	5.302
5	0.417	262.105	8.053	3.060
6	0.500	314.526	5.188	1.971
7	0.583	366.947	3.309	1.257
8	0.667	419.368	1.927	0.732
9	0.750	471.789	0.794	0.302
10	0.833	524.210	0.520	0.197
11	0.917	576.631	0.358	0.136
12	1.000	629.052	0.374	0.142
13	1.083	681.473	0.212	0.080
14	1.167	733.894	0.098	0.037
			Sum = 100.000	Sum= 37.995

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.602)	0.017	0.002
2	0.17	0.07	0.019	(0.599)	0.017	0.002
3	0.25	0.07	0.019	(0.597)	0.017	0.002
4	0.33	0.10	0.029	(0.595)	0.026	0.003
5	0.42	0.10	0.029	(0.592)	0.026	0.003
6	0.50	0.10	0.029	(0.590)	0.026	0.003
7	0.58	0.10	0.029	(0.588)	0.026	0.003
8	0.67	0.10	0.029	(0.585)	0.026	0.003
9	0.75	0.10	0.029	(0.583)	0.026	0.003
10	0.83	0.13	0.038	(0.581)	0.035	0.004
11	0.92	0.13	0.038	(0.579)	0.035	0.004
12	1.00	0.13	0.038	(0.576)	0.035	0.004
13	1.08	0.10	0.029	(0.574)	0.026	0.003
14	1.17	0.10	0.029	(0.572)	0.026	0.003
15	1.25	0.10	0.029	(0.569)	0.026	0.003
16	1.33	0.10	0.029	(0.567)	0.026	0.003
17	1.42	0.10	0.029	(0.565)	0.026	0.003
18	1.50	0.10	0.029	(0.563)	0.026	0.003
19	1.58	0.10	0.029	(0.560)	0.026	0.003
20	1.67	0.10	0.029	(0.558)	0.026	0.003
21	1.75	0.10	0.029	(0.556)	0.026	0.003
22	1.83	0.13	0.038	(0.554)	0.035	0.004
23	1.92	0.13	0.038	(0.551)	0.035	0.004
24	2.00	0.13	0.038	(0.549)	0.035	0.004
25	2.08	0.13	0.038	(0.547)	0.035	0.004
26	2.17	0.13	0.038	(0.545)	0.035	0.004
27	2.25	0.13	0.038	(0.543)	0.035	0.004
28	2.33	0.13	0.038	(0.540)	0.035	0.004
29	2.42	0.13	0.038	(0.538)	0.035	0.004
30	2.50	0.13	0.038	(0.536)	0.035	0.004
31	2.58	0.17	0.048	(0.534)	0.043	0.005
32	2.67	0.17	0.048	(0.532)	0.043	0.005
33	2.75	0.17	0.048	(0.529)	0.043	0.005
34	2.83	0.17	0.048	(0.527)	0.043	0.005
35	2.92	0.17	0.048	(0.525)	0.043	0.005
36	3.00	0.17	0.048	(0.523)	0.043	0.005

37	3.08	0.17	0.048	(0.521)	0.043	0.005
38	3.17	0.17	0.048	(0.519)	0.043	0.005
39	3.25	0.17	0.048	(0.516)	0.043	0.005
40	3.33	0.17	0.048	(0.514)	0.043	0.005
41	3.42	0.17	0.048	(0.512)	0.043	0.005
42	3.50	0.17	0.048	(0.510)	0.043	0.005
43	3.58	0.17	0.048	(0.508)	0.043	0.005
44	3.67	0.17	0.048	(0.506)	0.043	0.005
45	3.75	0.17	0.048	(0.504)	0.043	0.005
46	3.83	0.20	0.058	(0.501)	0.052	0.006
47	3.92	0.20	0.058	(0.499)	0.052	0.006
48	4.00	0.20	0.058	(0.497)	0.052	0.006
49	4.08	0.20	0.058	(0.495)	0.052	0.006
50	4.17	0.20	0.058	(0.493)	0.052	0.006
51	4.25	0.20	0.058	(0.491)	0.052	0.006
52	4.33	0.23	0.067	(0.489)	0.060	0.007
53	4.42	0.23	0.067	(0.487)	0.060	0.007
54	4.50	0.23	0.067	(0.485)	0.060	0.007
55	4.58	0.23	0.067	(0.483)	0.060	0.007
56	4.67	0.23	0.067	(0.480)	0.060	0.007
57	4.75	0.23	0.067	(0.478)	0.060	0.007
58	4.83	0.27	0.077	(0.476)	0.069	0.008
59	4.92	0.27	0.077	(0.474)	0.069	0.008
60	5.00	0.27	0.077	(0.472)	0.069	0.008
61	5.08	0.20	0.058	(0.470)	0.052	0.006
62	5.17	0.20	0.058	(0.468)	0.052	0.006
63	5.25	0.20	0.058	(0.466)	0.052	0.006
64	5.33	0.23	0.067	(0.464)	0.060	0.007
65	5.42	0.23	0.067	(0.462)	0.060	0.007
66	5.50	0.23	0.067	(0.460)	0.060	0.007
67	5.58	0.27	0.077	(0.458)	0.069	0.008
68	5.67	0.27	0.077	(0.456)	0.069	0.008
69	5.75	0.27	0.077	(0.454)	0.069	0.008
70	5.83	0.27	0.077	(0.452)	0.069	0.008
71	5.92	0.27	0.077	(0.450)	0.069	0.008
72	6.00	0.27	0.077	(0.448)	0.069	0.008
73	6.08	0.30	0.086	(0.446)	0.078	0.009
74	6.17	0.30	0.086	(0.444)	0.078	0.009
75	6.25	0.30	0.086	(0.442)	0.078	0.009
76	6.33	0.30	0.086	(0.440)	0.078	0.009
77	6.42	0.30	0.086	(0.438)	0.078	0.009
78	6.50	0.30	0.086	(0.436)	0.078	0.009
79	6.58	0.33	0.096	(0.434)	0.086	0.010
80	6.67	0.33	0.096	(0.432)	0.086	0.010
81	6.75	0.33	0.096	(0.430)	0.086	0.010
82	6.83	0.33	0.096	(0.428)	0.086	0.010
83	6.92	0.33	0.096	(0.426)	0.086	0.010
84	7.00	0.33	0.096	(0.424)	0.086	0.010
85	7.08	0.33	0.096	(0.422)	0.086	0.010
86	7.17	0.33	0.096	(0.421)	0.086	0.010
87	7.25	0.33	0.096	(0.419)	0.086	0.010
88	7.33	0.37	0.106	(0.417)	0.095	0.011
89	7.42	0.37	0.106	(0.415)	0.095	0.011
90	7.50	0.37	0.106	(0.413)	0.095	0.011
91	7.58	0.40	0.115	(0.411)	0.104	0.012
92	7.67	0.40	0.115	(0.409)	0.104	0.012
93	7.75	0.40	0.115	(0.407)	0.104	0.012
94	7.83	0.43	0.125	(0.405)	0.112	0.012
95	7.92	0.43	0.125	(0.403)	0.112	0.012
96	8.00	0.43	0.125	(0.402)	0.112	0.012
97	8.08	0.50	0.144	(0.400)	0.130	0.014
98	8.17	0.50	0.144	(0.398)	0.130	0.014
99	8.25	0.50	0.144	(0.396)	0.130	0.014
100	8.33	0.50	0.144	(0.394)	0.130	0.014
101	8.42	0.50	0.144	(0.392)	0.130	0.014
102	8.50	0.50	0.144	(0.390)	0.130	0.014
103	8.58	0.53	0.154	(0.389)	0.138	0.015
104	8.67	0.53	0.154	(0.387)	0.138	0.015
105	8.75	0.53	0.154	(0.385)	0.138	0.015
106	8.83	0.57	0.163	(0.383)	0.147	0.016
107	8.92	0.57	0.163	(0.381)	0.147	0.016
108	9.00	0.57	0.163	(0.380)	0.147	0.016
109	9.08	0.63	0.182	(0.378)	0.164	0.018
110	9.17	0.63	0.182	(0.376)	0.164	0.018
111	9.25	0.63	0.182	(0.374)	0.164	0.018

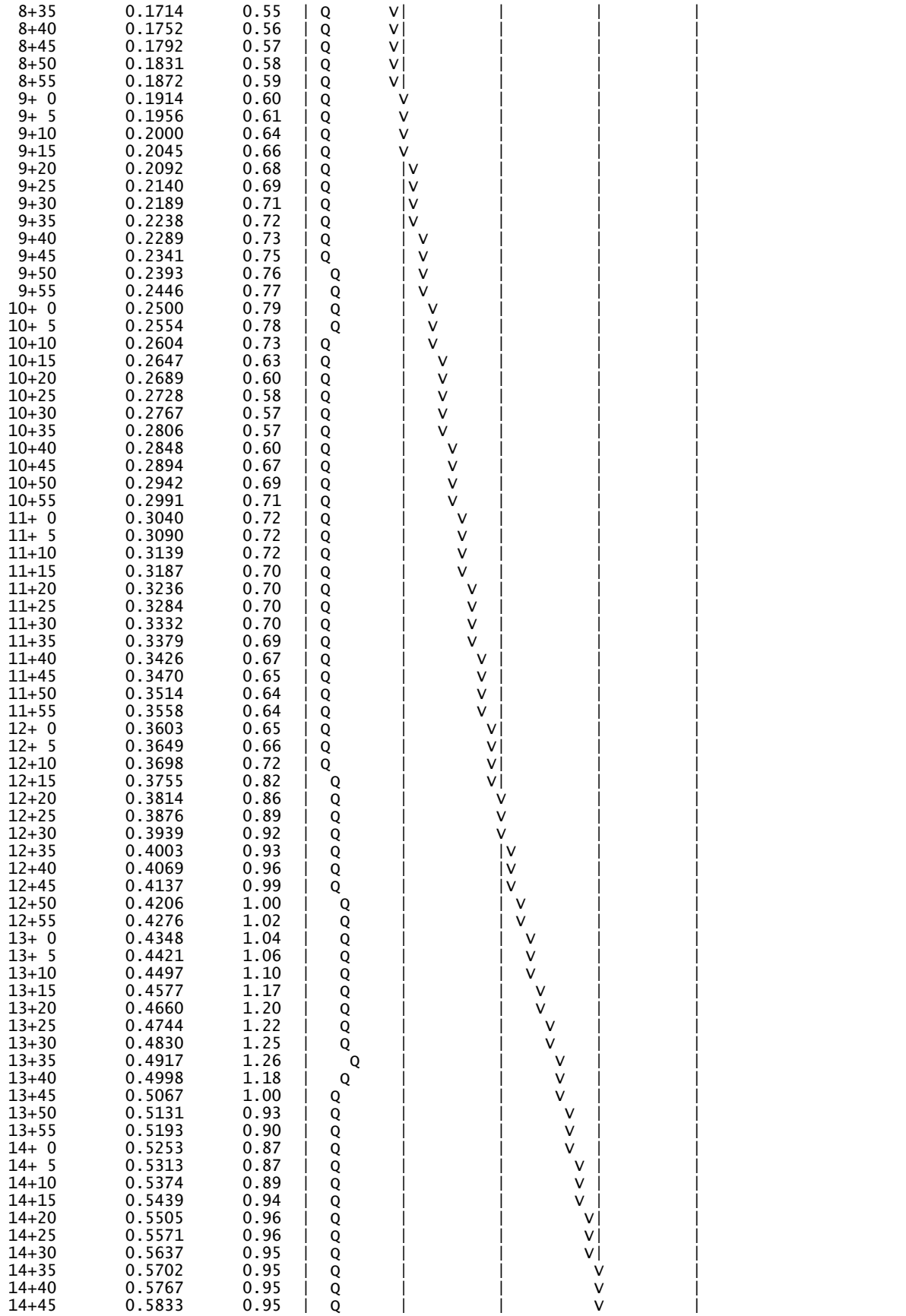
112	9.33	0.67	0.192	(0.372)	0.173	0.019
113	9.42	0.67	0.192	(0.371)	0.173	0.019
114	9.50	0.67	0.192	(0.369)	0.173	0.019
115	9.58	0.70	0.202	(0.367)	0.181	0.020
116	9.67	0.70	0.202	(0.365)	0.181	0.020
117	9.75	0.70	0.202	(0.364)	0.181	0.020
118	9.83	0.73	0.211	(0.362)	0.190	0.021
119	9.92	0.73	0.211	(0.360)	0.190	0.021
120	10.00	0.73	0.211	(0.358)	0.190	0.021
121	10.08	0.50	0.144	(0.357)	0.130	0.014
122	10.17	0.50	0.144	(0.355)	0.130	0.014
123	10.25	0.50	0.144	(0.353)	0.130	0.014
124	10.33	0.50	0.144	(0.351)	0.130	0.014
125	10.42	0.50	0.144	(0.350)	0.130	0.014
126	10.50	0.50	0.144	(0.348)	0.130	0.014
127	10.58	0.67	0.192	(0.346)	0.173	0.019
128	10.67	0.67	0.192	(0.345)	0.173	0.019
129	10.75	0.67	0.192	(0.343)	0.173	0.019
130	10.83	0.67	0.192	(0.341)	0.173	0.019
131	10.92	0.67	0.192	(0.340)	0.173	0.019
132	11.00	0.67	0.192	(0.338)	0.173	0.019
133	11.08	0.63	0.182	(0.336)	0.164	0.018
134	11.17	0.63	0.182	(0.335)	0.164	0.018
135	11.25	0.63	0.182	(0.333)	0.164	0.018
136	11.33	0.63	0.182	(0.331)	0.164	0.018
137	11.42	0.63	0.182	(0.330)	0.164	0.018
138	11.50	0.63	0.182	(0.328)	0.164	0.018
139	11.58	0.57	0.163	(0.326)	0.147	0.016
140	11.67	0.57	0.163	(0.325)	0.147	0.016
141	11.75	0.57	0.163	(0.323)	0.147	0.016
142	11.83	0.60	0.173	(0.322)	0.156	0.017
143	11.92	0.60	0.173	(0.320)	0.156	0.017
144	12.00	0.60	0.173	(0.318)	0.156	0.017
145	12.08	0.83	0.240	(0.317)	0.216	0.024
146	12.17	0.83	0.240	(0.315)	0.216	0.024
147	12.25	0.83	0.240	(0.314)	0.216	0.024
148	12.33	0.87	0.250	(0.312)	0.225	0.025
149	12.42	0.87	0.250	(0.310)	0.225	0.025
150	12.50	0.87	0.250	(0.309)	0.225	0.025
151	12.58	0.93	0.269	(0.307)	0.242	0.027
152	12.67	0.93	0.269	(0.306)	0.242	0.027
153	12.75	0.93	0.269	(0.304)	0.242	0.027
154	12.83	0.97	0.278	(0.303)	0.251	0.028
155	12.92	0.97	0.278	(0.301)	0.251	0.028
156	13.00	0.97	0.278	(0.300)	0.251	0.028
157	13.08	1.13	0.326	(0.298)	0.294	0.033
158	13.17	1.13	0.326	(0.297)	0.294	0.033
159	13.25	1.13	0.326	(0.295)	0.294	0.033
160	13.33	1.13	0.326	0.294	(0.294)	0.033
161	13.42	1.13	0.326	0.292	(0.294)	0.034
162	13.50	1.13	0.326	0.291	(0.294)	0.036
163	13.58	0.77	0.221	(0.289)	0.199	0.022
164	13.67	0.77	0.221	(0.288)	0.199	0.022
165	13.75	0.77	0.221	(0.286)	0.199	0.022
166	13.83	0.77	0.221	(0.285)	0.199	0.022
167	13.92	0.77	0.221	(0.283)	0.199	0.022
168	14.00	0.77	0.221	(0.282)	0.199	0.022
169	14.08	0.90	0.259	(0.280)	0.233	0.026
170	14.17	0.90	0.259	(0.279)	0.233	0.026
171	14.25	0.90	0.259	(0.278)	0.233	0.026
172	14.33	0.87	0.250	(0.276)	0.225	0.025
173	14.42	0.87	0.250	(0.275)	0.225	0.025
174	14.50	0.87	0.250	(0.273)	0.225	0.025
175	14.58	0.87	0.250	(0.272)	0.225	0.025
176	14.67	0.87	0.250	(0.271)	0.225	0.025
177	14.75	0.87	0.250	(0.269)	0.225	0.025
178	14.83	0.83	0.240	(0.268)	0.216	0.024
179	14.92	0.83	0.240	(0.266)	0.216	0.024
180	15.00	0.83	0.240	(0.265)	0.216	0.024
181	15.08	0.80	0.230	(0.264)	0.207	0.023
182	15.17	0.80	0.230	(0.262)	0.207	0.023
183	15.25	0.80	0.230	(0.261)	0.207	0.023
184	15.33	0.77	0.221	(0.260)	0.199	0.022
185	15.42	0.77	0.221	(0.258)	0.199	0.022
186	15.50	0.77	0.221	(0.257)	0.199	0.022

187	15.58	0.63	0.182	(0.256)	0.164	0.018
188	15.67	0.63	0.182	(0.254)	0.164	0.018
189	15.75	0.63	0.182	(0.253)	0.164	0.018
190	15.83	0.63	0.182	(0.252)	0.164	0.018
191	15.92	0.63	0.182	(0.250)	0.164	0.018
192	16.00	0.63	0.182	(0.249)	0.164	0.018
193	16.08	0.13	0.038	(0.248)	0.035	0.004
194	16.17	0.13	0.038	(0.247)	0.035	0.004
195	16.25	0.13	0.038	(0.245)	0.035	0.004
196	16.33	0.13	0.038	(0.244)	0.035	0.004
197	16.42	0.13	0.038	(0.243)	0.035	0.004
198	16.50	0.13	0.038	(0.242)	0.035	0.004
199	16.58	0.10	0.029	(0.240)	0.026	0.003
200	16.67	0.10	0.029	(0.239)	0.026	0.003
201	16.75	0.10	0.029	(0.238)	0.026	0.003
202	16.83	0.10	0.029	(0.237)	0.026	0.003
203	16.92	0.10	0.029	(0.236)	0.026	0.003
204	17.00	0.10	0.029	(0.234)	0.026	0.003
205	17.08	0.17	0.048	(0.233)	0.043	0.005
206	17.17	0.17	0.048	(0.232)	0.043	0.005
207	17.25	0.17	0.048	(0.231)	0.043	0.005
208	17.33	0.17	0.048	(0.230)	0.043	0.005
209	17.42	0.17	0.048	(0.229)	0.043	0.005
210	17.50	0.17	0.048	(0.227)	0.043	0.005
211	17.58	0.17	0.048	(0.226)	0.043	0.005
212	17.67	0.17	0.048	(0.225)	0.043	0.005
213	17.75	0.17	0.048	(0.224)	0.043	0.005
214	17.83	0.13	0.038	(0.223)	0.035	0.004
215	17.92	0.13	0.038	(0.222)	0.035	0.004
216	18.00	0.13	0.038	(0.221)	0.035	0.004
217	18.08	0.13	0.038	(0.220)	0.035	0.004
218	18.17	0.13	0.038	(0.219)	0.035	0.004
219	18.25	0.13	0.038	(0.217)	0.035	0.004
220	18.33	0.13	0.038	(0.216)	0.035	0.004
221	18.42	0.13	0.038	(0.215)	0.035	0.004
222	18.50	0.13	0.038	(0.214)	0.035	0.004
223	18.58	0.10	0.029	(0.213)	0.026	0.003
224	18.67	0.10	0.029	(0.212)	0.026	0.003
225	18.75	0.10	0.029	(0.211)	0.026	0.003
226	18.83	0.07	0.019	(0.210)	0.017	0.002
227	18.92	0.07	0.019	(0.209)	0.017	0.002
228	19.00	0.07	0.019	(0.208)	0.017	0.002
229	19.08	0.10	0.029	(0.207)	0.026	0.003
230	19.17	0.10	0.029	(0.206)	0.026	0.003
231	19.25	0.10	0.029	(0.205)	0.026	0.003
232	19.33	0.13	0.038	(0.204)	0.035	0.004
233	19.42	0.13	0.038	(0.203)	0.035	0.004
234	19.50	0.13	0.038	(0.202)	0.035	0.004
235	19.58	0.10	0.029	(0.202)	0.026	0.003
236	19.67	0.10	0.029	(0.201)	0.026	0.003
237	19.75	0.10	0.029	(0.200)	0.026	0.003
238	19.83	0.07	0.019	(0.199)	0.017	0.002
239	19.92	0.07	0.019	(0.198)	0.017	0.002
240	20.00	0.07	0.019	(0.197)	0.017	0.002
241	20.08	0.10	0.029	(0.196)	0.026	0.003
242	20.17	0.10	0.029	(0.195)	0.026	0.003
243	20.25	0.10	0.029	(0.194)	0.026	0.003
244	20.33	0.10	0.029	(0.194)	0.026	0.003
245	20.42	0.10	0.029	(0.193)	0.026	0.003
246	20.50	0.10	0.029	(0.192)	0.026	0.003
247	20.58	0.10	0.029	(0.191)	0.026	0.003
248	20.67	0.10	0.029	(0.190)	0.026	0.003
249	20.75	0.10	0.029	(0.190)	0.026	0.003
250	20.83	0.07	0.019	(0.189)	0.017	0.002
251	20.92	0.07	0.019	(0.188)	0.017	0.002
252	21.00	0.07	0.019	(0.187)	0.017	0.002
253	21.08	0.10	0.029	(0.187)	0.026	0.003
254	21.17	0.10	0.029	(0.186)	0.026	0.003
255	21.25	0.10	0.029	(0.185)	0.026	0.003
256	21.33	0.07	0.019	(0.184)	0.017	0.002
257	21.42	0.07	0.019	(0.184)	0.017	0.002
258	21.50	0.07	0.019	(0.183)	0.017	0.002
259	21.58	0.10	0.029	(0.182)	0.026	0.003
260	21.67	0.10	0.029	(0.182)	0.026	0.003
261	21.75	0.10	0.029	(0.181)	0.026	0.003

```
262  21.83     0.07      0.019       (  0.180)       0.017        0.002
263  21.92     0.07      0.019       (  0.180)       0.017        0.002
264  22.00     0.07      0.019       (  0.179)       0.017        0.002
265  22.08     0.10      0.029       (  0.179)       0.026        0.003
266  22.17     0.10      0.029       (  0.178)       0.026        0.003
267  22.25     0.10      0.029       (  0.177)       0.026        0.003
268  22.33     0.07      0.019       (  0.177)       0.017        0.002
269  22.42     0.07      0.019       (  0.176)       0.017        0.002
270  22.50     0.07      0.019       (  0.176)       0.017        0.002
271  22.58     0.07      0.019       (  0.175)       0.017        0.002
272  22.67     0.07      0.019       (  0.175)       0.017        0.002
273  22.75     0.07      0.019       (  0.174)       0.017        0.002
274  22.83     0.07      0.019       (  0.174)       0.017        0.002
275  22.92     0.07      0.019       (  0.173)       0.017        0.002
276  23.00     0.07      0.019       (  0.173)       0.017        0.002
277  23.08     0.07      0.019       (  0.173)       0.017        0.002
278  23.17     0.07      0.019       (  0.172)       0.017        0.002
279  23.25     0.07      0.019       (  0.172)       0.017        0.002
280  23.33     0.07      0.019       (  0.172)       0.017        0.002
281  23.42     0.07      0.019       (  0.171)       0.017        0.002
282  23.50     0.07      0.019       (  0.171)       0.017        0.002
283  23.58     0.07      0.019       (  0.171)       0.017        0.002
284  23.67     0.07      0.019       (  0.170)       0.017        0.002
285  23.75     0.07      0.019       (  0.170)       0.017        0.002
286  23.83     0.07      0.019       (  0.170)       0.017        0.002
287  23.92     0.07      0.019       (  0.170)       0.017        0.002
288  24.00     0.07      0.019       (  0.170)       0.017        0.002
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.9
      Flood volume = Effective rainfall      0.24(In)
       times area      37.7(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
      Total soil loss =      2.16(In)
      Total soil loss =     6.784(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       32896.4 Cubic Feet
      Total soil loss =      295521.8 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.264(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0005      0.05  Q         |         |         |         |
   0+20       0.0009      0.06  Q         |         |         |         |
   0+25       0.0014      0.07  Q         |         |         |         |
   0+30       0.0020      0.09  Q         |         |         |         |
   0+35       0.0027      0.10  Q         |         |         |         |
   0+40       0.0034      0.10  Q         |         |         |         |
   0+45       0.0042      0.11  Q         |         |         |         |
   0+50       0.0049      0.11  Q         |         |         |         |
   0+55       0.0057      0.12  Q         |         |         |         |
   1+ 0       0.0066      0.13  Q         |         |         |         |
   1+ 5       0.0076      0.14  Q         |         |         |         |
   1+10       0.0085      0.13  Q         |         |         |         |
   1+15       0.0093      0.12  Q         |         |         |         |
   1+20       0.0101      0.12  Q         |         |         |         |
   1+25       0.0109      0.11  Q         |         |         |         |
   1+30       0.0116      0.11  Q         |         |         |         |
   1+35       0.0124      0.11  Q         |         |         |         |
   1+40       0.0132      0.11  Q         |         |         |         |
   1+45       0.0139      0.11  Q         |         |         |         |
   1+50       0.0147      0.11  Q         |         |         |         |
   1+55       0.0155      0.12  Q         |         |         |         |
   2+ 0       0.0164      0.13  Q         |         |         |         |
   2+ 5       0.0174      0.14  Q         |         |         |         |
   2+10       0.0184      0.14  Q         |         |         |         |
   2+15       0.0193      0.14  QV        |         |         |         |
```

```
2+20       0.0203      0.14  QV        |         |         |         |
2+25       0.0213      0.15  QV        |         |         |         |
2+30       0.0223      0.15  QV        |         |         |         |
2+35       0.0233      0.15  QV        |         |         |         |
2+40       0.0244      0.16  QV        |         |         |         |
2+45       0.0256      0.17  QV        |         |         |         |
2+50       0.0268      0.17  QV        |         |         |         |
2+55       0.0280      0.18  QV        |         |         |         |
3+ 0       0.0293      0.18  QV        |         |         |         |
3+ 5       0.0305      0.18  QV        |         |         |         |
3+10       0.0317      0.18  QV        |         |         |         |
3+15       0.0330      0.18  QV        |         |         |         |
3+20       0.0343      0.18  QV        |         |         |         |
3+25       0.0355      0.18  QV        |         |         |         |
3+30       0.0368      0.18  QV        |         |         |         |
3+35       0.0380      0.18  Q V       |         |         |         |
3+40       0.0393      0.18  Q V       |         |         |         |
3+45       0.0405      0.18  Q V       |         |         |         |
3+50       0.0418      0.18  Q V       |         |         |         |
3+55       0.0431      0.19  Q V       |         |         |         |
4+ 0       0.0446      0.21  Q V       |         |         |         |
4+ 5       0.0460      0.21  Q V       |         |         |         |
4+10       0.0475      0.21  Q V       |         |         |         |
4+15       0.0490      0.22  Q V       |         |         |         |
4+20       0.0505      0.22  Q V       |         |         |         |
4+25       0.0521      0.23  Q V       |         |         |         |
4+30       0.0537      0.24  Q V       |         |         |         |
4+35       0.0554      0.25  Q V       |         |         |         |
4+40       0.0571      0.25  |Q V       |         |         |         |
4+45       0.0589      0.25  |Q V       |         |         |         |
4+50       0.0606      0.26  |Q V       |         |         |         |
4+55       0.0625      0.26  |Q V       |         |         |         |
5+ 0       0.0644      0.28  |Q V       |         |         |         |
5+ 5       0.0663      0.28  |Q V       |         |         |         |
5+10       0.0682      0.27  |Q V       |         |         |         |
5+15       0.0698      0.24  Q  V       |         |         |         |
5+20       0.0714      0.23  Q  V       |         |         |         |
5+25       0.0731      0.24  Q  V       |         |         |         |
5+30       0.0748      0.25  Q  V       |         |         |         |
5+35       0.0765      0.25  |Q  V       |         |         |         |
5+40       0.0783      0.26  |Q  V       |         |         |         |
5+45       0.0802      0.28  |Q  V       |         |         |         |
5+50       0.0822      0.28  |Q  V       |         |         |         |
5+55       0.0842      0.29  |Q  V       |         |         |         |
6+ 0       0.0862      0.29  |Q  V       |         |         |         |
6+ 5       0.0882      0.29  |Q  V       |         |         |         |
6+10       0.0902      0.30  |Q  V       |         |         |         |
6+15       0.0924      0.32  |Q  V       |         |         |         |
6+20       0.0946      0.32  |Q   V      |         |         |         |
6+25       0.0968      0.32  |Q   V      |         |         |         |
6+30       0.0991      0.33  |Q   V      |         |         |         |
6+35       0.1013      0.33  |Q   V      |         |         |         |
6+40       0.1037      0.34  |Q   V      |         |         |         |
6+45       0.1061      0.35  |Q   V      |         |         |         |
6+50       0.1085      0.36  |Q   V      |         |         |         |
6+55       0.1110      0.36  |Q   V      |         |         |         |
7+ 0       0.1135      0.36  |Q    V     |         |         |         |
7+ 5       0.1160      0.36  |Q    V     |         |         |         |
7+10       0.1185      0.36  |Q    V     |         |         |         |
7+15       0.1210      0.36  |Q    V     |         |         |         |
7+20       0.1236      0.37  |Q    V     |         |         |         |
7+25       0.1261      0.37  |Q    V     |         |         |         |
7+30       0.1288      0.39  |Q    V     |         |         |         |
7+35       0.1315      0.40  |Q    V     |         |         |         |
7+40       0.1343      0.41  |Q     V    |         |         |         |
7+45       0.1373      0.42  |Q     V    |         |         |         |
7+50       0.1402      0.43  |Q     V    |         |         |         |
7+55       0.1433      0.44  |Q     V    |         |         |         |
8+ 0       0.1464      0.46  |Q     V    |         |         |         |
8+ 5       0.1496      0.47  |Q     V    |         |         |         |
8+10       0.1530      0.49  |Q      V   |         |         |         |
8+15       0.1566      0.52  | Q     V   |         |         |         |
8+20       0.1602      0.53  | Q     V   |         |         |         |
8+25       0.1639      0.54  | Q     V   |         |         |         |
8+30       0.1677      0.54  | Q     V   |         |         |         |
```



```
14+50       0.5898      0.95  |  Q      |         |         |V        |
14+55       0.5963      0.94  |  Q      |         |         |V        |
15+ 0       0.6026      0.93  |  Q      |         |         |V        |
15+ 5       0.6090      0.92  |  Q      |         |         | V       |
15+10       0.6152      0.91  |  Q      |         |         | V       |
15+15       0.6213      0.89  |  Q      |         |         | V       |
15+20       0.6274      0.88  |  Q      |         |         |  V      |
15+25       0.6334      0.87  |  Q      |         |         |  V      |
15+30       0.6393      0.86  |  Q      |         |         |  V      |
15+35       0.6451      0.84  |  Q      |         |         |   V     |
15+40       0.6507      0.80  |  Q      |         |         |   V     |
15+45       0.6558      0.75  | Q       |         |         |   V     |
15+50       0.6608      0.73  | Q       |         |         |    V    |
15+55       0.6657      0.71  | Q       |         |         |    V    |
16+ 0       0.6706      0.71  | Q       |         |         |    V    |
16+ 5       0.6752      0.67  | Q       |         |         |    V    |
16+10       0.6790      0.55  | Q       |         |         |    V    |
16+15       0.6813      0.34  |Q        |         |         |     V   |
16+20       0.6831      0.26  |Q        |         |         |     V   |
16+25       0.6846      0.22  Q         |         |         |     V   |
16+30       0.6859      0.19  Q         |         |         |     V   |
16+35       0.6871      0.17  Q         |         |         |     V   |
16+40       0.6881      0.15  Q         |         |         |     V   |
16+45       0.6890      0.13  Q         |         |         |     V   |
16+50       0.6898      0.12  Q         |         |         |     V   |
16+55       0.6906      0.12  Q         |         |         |     V   |
17+ 0       0.6914      0.11  Q         |         |         |     V   |
17+ 5       0.6922      0.11  Q         |         |         |     V   |
17+10       0.6931      0.13  Q         |         |         |     V   |
17+15       0.6942      0.16  Q         |         |         |     V   |
17+20       0.6954      0.17  Q         |         |         |     V   |
17+25       0.6966      0.17  Q         |         |         |     V   |
17+30       0.6978      0.18  Q         |         |         |     V   |
17+35       0.6990      0.18  Q         |         |         |      V  |
17+40       0.7003      0.18  Q         |         |         |      V  |
17+45       0.7015      0.18  Q         |         |         |      V  |
17+50       0.7027      0.18  Q         |         |         |      V  |
17+55       0.7039      0.17  Q         |         |         |      V  |
18+ 0       0.7050      0.16  Q         |         |         |      V  |
18+ 5       0.7061      0.15  Q         |         |         |      V  |
18+10       0.7071      0.15  Q         |         |         |      V  |
18+15       0.7081      0.15  Q         |         |         |      V  |
18+20       0.7092      0.15  Q         |         |         |      V  |
18+25       0.7102      0.15  Q         |         |         |      V  |
18+30       0.7112      0.15  Q         |         |         |      V  |
18+35       0.7122      0.14  Q         |         |         |      V  |
18+40       0.7131      0.14  Q         |         |         |      V  |
18+45       0.7139      0.12  Q         |         |         |      V  |
18+50       0.7147      0.12  Q         |         |         |      V  |
18+55       0.7155      0.10  Q         |         |         |      V  |
19+ 0       0.7161      0.09  Q         |         |         |      V  |
19+ 5       0.7166      0.08  Q         |         |         |      V  |
19+10       0.7173      0.09  Q         |         |         |      V  |
19+15       0.7179      0.10  Q         |         |         |       V |
19+20       0.7187      0.11  Q         |         |         |       V |
19+25       0.7195      0.12  Q         |         |         |       V |
19+30       0.7204      0.13  Q         |         |         |       V |
19+35       0.7213      0.14  Q         |         |         |       V |
19+40       0.7222      0.13  Q         |         |         |       V |
19+45       0.7230      0.12  Q         |         |         |       V |
19+50       0.7238      0.11  Q         |         |         |       V |
19+55       0.7245      0.10  Q         |         |         |       V |
20+ 0       0.7251      0.09  Q         |         |         |       V |
20+ 5       0.7257      0.08  Q         |         |         |       V |
20+10       0.7263      0.09  Q         |         |         |       V |
20+15       0.7270      0.10  Q         |         |         |       V |
20+20       0.7277      0.10  Q         |         |         |       V |
20+25       0.7284      0.11  Q         |         |         |       V |
20+30       0.7292      0.11  Q         |         |         |       V |
20+35       0.7299      0.11  Q         |         |         |       V |
20+40       0.7307      0.11  Q         |         |         |       V |
20+45       0.7314      0.11  Q         |         |         |       V |
20+50       0.7322      0.11  Q         |         |         |       V |
20+55       0.7328      0.10  Q         |         |         |       V |
21+ 0       0.7334      0.09  Q         |         |         |       V |
```

21+ 5	0.7340	0.08	Q				V
21+10	0.7346	0.09	Q				V
21+15	0.7353	0.10	Q				V
21+20	0.7360	0.10	Q				V
21+25	0.7366	0.10	Q				V
21+30	0.7372	0.08	Q				V
21+35	0.7378	0.08	Q				V
21+40	0.7384	0.09	Q				V
21+45	0.7391	0.10	Q				V
21+50	0.7398	0.10	Q				V
21+55	0.7404	0.10	Q				V
22+ 0	0.7410	0.08	Q				V
22+ 5	0.7416	0.08	Q				V
22+10	0.7422	0.09	Q				V
22+15	0.7428	0.10	Q				V
22+20	0.7435	0.10	Q				V
22+25	0.7442	0.10	Q				V
22+30	0.7448	0.08	Q				V
22+35	0.7453	0.08	Q				V
22+40	0.7458	0.08	Q				V
22+45	0.7464	0.08	Q				V
22+50	0.7469	0.07	Q				V
22+55	0.7474	0.07	Q				V
23+ 0	0.7479	0.07	Q				V
23+ 5	0.7484	0.07	Q				V
23+10	0.7489	0.07	Q				V
23+15	0.7494	0.07	Q				V
23+20	0.7499	0.07	Q				V
23+25	0.7504	0.07	Q				V
23+30	0.7509	0.07	Q				V
23+35	0.7514	0.07	Q				V
23+40	0.7519	0.07	Q				V
23+45	0.7524	0.07	Q				V
23+50	0.7529	0.07	Q				V
23+55	0.7534	0.07	Q				V
24+ 0	0.7539	0.07	Q				V
24+ 5	0.7544	0.07	Q				V
24+10	0.7548	0.05	Q				V
24+15	0.7549	0.03	Q				V
24+20	0.7550	0.02	Q				V
24+25	0.7551	0.01	Q				V
24+30	0.7551	0.01	Q				V
24+35	0.7552	0.00	Q				V
24+40	0.7552	0.00	Q				V
24+45	0.7552	0.00	Q				V
24+50	0.7552	0.00	Q				V
24+55	0.7552	0.00	Q				V
25+ 0	0.7552	0.00	Q				V
25+ 5	0.7552	0.00	Q				V

PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/23/21 File: PROP2YR4P242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

BCCOV PARKING DEVELOPED CONDITION
2 YR 24 HR STORM EVENT
21-0034
2021-11-23 EP

Drainage Area = 9.20(Ac.) = 0.014 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 9.20(Ac.) = 0.014 Sq. Mi.
Length along longest watercourse = 3348.00(Ft.)
Length along longest watercourse measured to centroid = 2754.00(Ft.)
Length along longest watercourse = 0.634 Mi.
Length along longest watercourse measured to centroid = 0.522 Mi.
Difference in elevation = 37.50(Ft.)
Slope along watercourse = 59.1398 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.109 Hr.
Lag time = 6.53 Min.
25% of lag time = 1.63 Min.
40% of lag time = 2.61 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.20	2.40	22.08

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
9.20	6.20	57.04

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.200(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
9.200	56.00	0.680

Total Area Entered = 9.20(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

56.0	36.0	0.706	0.680	0.274	1.000	0.274
					Sum (F) =	0.274

Area averaged mean soil loss (F) (In/Hr) = 0.274
Minimum soil loss rate ((In/Hr)) = 0.137
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.350

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	76.519	8.325	0.772
2	0.167	153.038	46.099	4.274
3	0.250	229.558	25.979	2.409
4	0.333	306.077	10.137	0.940
5	0.417	382.596	5.291	0.491
6	0.500	459.115	2.287	0.212
7	0.583	535.634	0.823	0.076
8	0.667	612.154	0.549	0.051
9	0.750	688.673	0.392	0.036
10	0.833	765.192	0.118	0.011
			Sum = 100.000	Sum= 9.272

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.486)	0.007	0.012
2	0.17	0.07	0.019	(0.484)	0.007	0.012
3	0.25	0.07	0.019	(0.482)	0.007	0.012
4	0.33	0.10	0.029	(0.480)	0.010	0.019
5	0.42	0.10	0.029	(0.478)	0.010	0.019
6	0.50	0.10	0.029	(0.476)	0.010	0.019
7	0.58	0.10	0.029	(0.474)	0.010	0.019
8	0.67	0.10	0.029	(0.473)	0.010	0.019
9	0.75	0.10	0.029	(0.471)	0.010	0.019
10	0.83	0.13	0.038	(0.469)	0.013	0.025
11	0.92	0.13	0.038	(0.467)	0.013	0.025
12	1.00	0.13	0.038	(0.465)	0.013	0.025
13	1.08	0.10	0.029	(0.463)	0.010	0.019
14	1.17	0.10	0.029	(0.461)	0.010	0.019
15	1.25	0.10	0.029	(0.460)	0.010	0.019
16	1.33	0.10	0.029	(0.458)	0.010	0.019
17	1.42	0.10	0.029	(0.456)	0.010	0.019
18	1.50	0.10	0.029	(0.454)	0.010	0.019
19	1.58	0.10	0.029	(0.452)	0.010	0.019
20	1.67	0.10	0.029	(0.451)	0.010	0.019
21	1.75	0.10	0.029	(0.449)	0.010	0.019
22	1.83	0.13	0.038	(0.447)	0.013	0.025
23	1.92	0.13	0.038	(0.445)	0.013	0.025
24	2.00	0.13	0.038	(0.443)	0.013	0.025
25	2.08	0.13	0.038	(0.442)	0.013	0.025
26	2.17	0.13	0.038	(0.440)	0.013	0.025
27	2.25	0.13	0.038	(0.438)	0.013	0.025
28	2.33	0.13	0.038	(0.436)	0.013	0.025
29	2.42	0.13	0.038	(0.434)	0.013	0.025
30	2.50	0.13	0.038	(0.433)	0.013	0.025
31	2.58	0.17	0.048	(0.431)	0.017	0.031
32	2.67	0.17	0.048	(0.429)	0.017	0.031
33	2.75	0.17	0.048	(0.427)	0.017	0.031
34	2.83	0.17	0.048	(0.426)	0.017	0.031
35	2.92	0.17	0.048	(0.424)	0.017	0.031
36	3.00	0.17	0.048	(0.422)	0.017	0.031
37	3.08	0.17	0.048	(0.420)	0.017	0.031
38	3.17	0.17	0.048	(0.419)	0.017	0.031
39	3.25	0.17	0.048	(0.417)	0.017	0.031
40	3.33	0.17	0.048	(0.415)	0.017	0.031

41	3.42	0.17	0.048	(0.413)	0.017	0.031
42	3.50	0.17	0.048	(0.412)	0.017	0.031
43	3.58	0.17	0.048	(0.410)	0.017	0.031
44	3.67	0.17	0.048	(0.408)	0.017	0.031
45	3.75	0.17	0.048	(0.406)	0.017	0.031
46	3.83	0.20	0.058	(0.405)	0.020	0.037
47	3.92	0.20	0.058	(0.403)	0.020	0.037
48	4.00	0.20	0.058	(0.401)	0.020	0.037
49	4.08	0.20	0.058	(0.400)	0.020	0.037
50	4.17	0.20	0.058	(0.398)	0.020	0.037
51	4.25	0.20	0.058	(0.396)	0.020	0.037
52	4.33	0.23	0.067	(0.395)	0.024	0.044
53	4.42	0.23	0.067	(0.393)	0.024	0.044
54	4.50	0.23	0.067	(0.391)	0.024	0.044
55	4.58	0.23	0.067	(0.390)	0.024	0.044
56	4.67	0.23	0.067	(0.388)	0.024	0.044
57	4.75	0.23	0.067	(0.386)	0.024	0.044
58	4.83	0.27	0.077	(0.384)	0.027	0.050
59	4.92	0.27	0.077	(0.383)	0.027	0.050
60	5.00	0.27	0.077	(0.381)	0.027	0.050
61	5.08	0.20	0.058	(0.380)	0.020	0.037
62	5.17	0.20	0.058	(0.378)	0.020	0.037
63	5.25	0.20	0.058	(0.376)	0.020	0.037
64	5.33	0.23	0.067	(0.375)	0.024	0.044
65	5.42	0.23	0.067	(0.373)	0.024	0.044
66	5.50	0.23	0.067	(0.371)	0.024	0.044
67	5.58	0.27	0.077	(0.370)	0.027	0.050
68	5.67	0.27	0.077	(0.368)	0.027	0.050
69	5.75	0.27	0.077	(0.366)	0.027	0.050
70	5.83	0.27	0.077	(0.365)	0.027	0.050
71	5.92	0.27	0.077	(0.363)	0.027	0.050
72	6.00	0.27	0.077	(0.362)	0.027	0.050
73	6.08	0.30	0.086	(0.360)	0.030	0.056
74	6.17	0.30	0.086	(0.358)	0.030	0.056
75	6.25	0.30	0.086	(0.357)	0.030	0.056
76	6.33	0.30	0.086	(0.355)	0.030	0.056
77	6.42	0.30	0.086	(0.354)	0.030	0.056
78	6.50	0.30	0.086	(0.352)	0.030	0.056
79	6.58	0.33	0.096	(0.350)	0.034	0.062
80	6.67	0.33	0.096	(0.349)	0.034	0.062
81	6.75	0.33	0.096	(0.347)	0.034	0.062
82	6.83	0.33	0.096	(0.346)	0.034	0.062
83	6.92	0.33	0.096	(0.344)	0.034	0.062
84	7.00	0.33	0.096	(0.343)	0.034	0.062
85	7.08	0.33	0.096	(0.341)	0.034	0.062
86	7.17	0.33	0.096	(0.339)	0.034	0.062
87	7.25	0.33	0.096	(0.338)	0.034	0.062
88	7.33	0.37	0.106	(0.336)	0.037	0.069
89	7.42	0.37	0.106	(0.335)	0.037	0.069
90	7.50	0.37	0.106	(0.333)	0.037	0.069
91	7.58	0.40	0.115	(0.332)	0.040	0.075
92	7.67	0.40	0.115	(0.330)	0.040	0.075
93	7.75	0.40	0.115	(0.329)	0.040	0.075
94	7.83	0.43	0.125	(0.327)	0.044	0.081
95	7.92	0.43	0.125	(0.326)	0.044	0.081
96	8.00	0.43	0.125	(0.324)	0.044	0.081
97	8.08	0.50	0.144	(0.323)	0.050	0.094
98	8.17	0.50	0.144	(0.321)	0.050	0.094
99	8.25	0.50	0.144	(0.320)	0.050	0.094
100	8.33	0.50	0.144	(0.318)	0.050	0.094
101	8.42	0.50	0.144	(0.317)	0.050	0.094
102	8.50	0.50	0.144	(0.315)	0.050	0.094
103	8.58	0.53	0.154	(0.314)	0.054	0.100
104	8.67	0.53	0.154	(0.312)	0.054	0.100
105	8.75	0.53	0.154	(0.311)	0.054	0.100
106	8.83	0.57	0.163	(0.309)	0.057	0.106
107	8.92	0.57	0.163	(0.308)	0.057	0.106
108	9.00	0.57	0.163	(0.306)	0.057	0.106
109	9.08	0.63	0.182	(0.305)	0.064	0.119
110	9.17	0.63	0.182	(0.304)	0.064	0.119
111	9.25	0.63	0.182	(0.302)	0.064	0.119
112	9.33	0.67	0.192	(0.301)	0.067	0.125
113	9.42	0.67	0.192	(0.299)	0.067	0.125
114	9.50	0.67	0.192	(0.298)	0.067	0.125
115	9.58	0.70	0.202	(0.296)	0.071	0.131

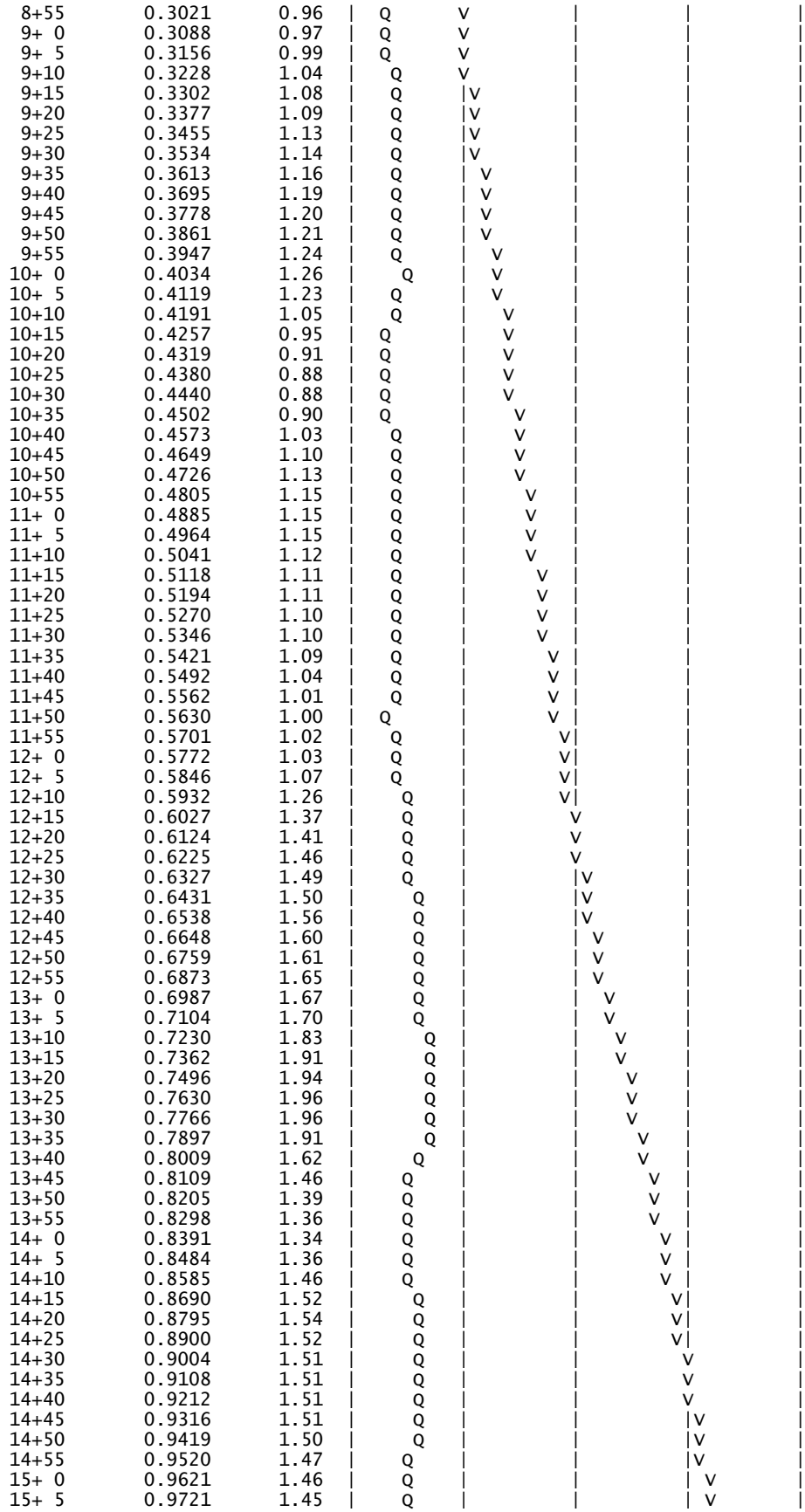
116	9.67	0.70	0.202	(0.295)	0.071	0.131
117	9.75	0.70	0.202	(0.293)	0.071	0.131
118	9.83	0.73	0.211	(0.292)	0.074	0.137
119	9.92	0.73	0.211	(0.291)	0.074	0.137
120	10.00	0.73	0.211	(0.289)	0.074	0.137
121	10.08	0.50	0.144	(0.288)	0.050	0.094
122	10.17	0.50	0.144	(0.286)	0.050	0.094
123	10.25	0.50	0.144	(0.285)	0.050	0.094
124	10.33	0.50	0.144	(0.284)	0.050	0.094
125	10.42	0.50	0.144	(0.282)	0.050	0.094
126	10.50	0.50	0.144	(0.281)	0.050	0.094
127	10.58	0.67	0.192	(0.280)	0.067	0.125
128	10.67	0.67	0.192	(0.278)	0.067	0.125
129	10.75	0.67	0.192	(0.277)	0.067	0.125
130	10.83	0.67	0.192	(0.275)	0.067	0.125
131	10.92	0.67	0.192	(0.274)	0.067	0.125
132	11.00	0.67	0.192	(0.273)	0.067	0.125
133	11.08	0.63	0.182	(0.271)	0.064	0.119
134	11.17	0.63	0.182	(0.270)	0.064	0.119
135	11.25	0.63	0.182	(0.269)	0.064	0.119
136	11.33	0.63	0.182	(0.267)	0.064	0.119
137	11.42	0.63	0.182	(0.266)	0.064	0.119
138	11.50	0.63	0.182	(0.265)	0.064	0.119
139	11.58	0.57	0.163	(0.263)	0.057	0.106
140	11.67	0.57	0.163	(0.262)	0.057	0.106
141	11.75	0.57	0.163	(0.261)	0.057	0.106
142	11.83	0.60	0.173	(0.260)	0.060	0.112
143	11.92	0.60	0.173	(0.258)	0.060	0.112
144	12.00	0.60	0.173	(0.257)	0.060	0.112
145	12.08	0.83	0.240	(0.256)	0.084	0.156
146	12.17	0.83	0.240	(0.254)	0.084	0.156
147	12.25	0.83	0.240	(0.253)	0.084	0.156
148	12.33	0.87	0.250	(0.252)	0.087	0.162
149	12.42	0.87	0.250	(0.251)	0.087	0.162
150	12.50	0.87	0.250	(0.249)	0.087	0.162
151	12.58	0.93	0.269	(0.248)	0.094	0.175
152	12.67	0.93	0.269	(0.247)	0.094	0.175
153	12.75	0.93	0.269	(0.246)	0.094	0.175
154	12.83	0.97	0.278	(0.244)	0.097	0.181
155	12.92	0.97	0.278	(0.243)	0.097	0.181
156	13.00	0.97	0.278	(0.242)	0.097	0.181
157	13.08	1.13	0.326	(0.241)	0.114	0.212
158	13.17	1.13	0.326	(0.239)	0.114	0.212
159	13.25	1.13	0.326	(0.238)	0.114	0.212
160	13.33	1.13	0.326	(0.237)	0.114	0.212
161	13.42	1.13	0.326	(0.236)	0.114	0.212
162	13.50	1.13	0.326	(0.235)	0.114	0.212
163	13.58	0.77	0.221	(0.233)	0.077	0.144
164	13.67	0.77	0.221	(0.232)	0.077	0.144
165	13.75	0.77	0.221	(0.231)	0.077	0.144
166	13.83	0.77	0.221	(0.230)	0.077	0.144
167	13.92	0.77	0.221	(0.229)	0.077	0.144
168	14.00	0.77	0.221	(0.228)	0.077	0.144
169	14.08	0.90	0.259	(0.226)	0.091	0.168
170	14.17	0.90	0.259	(0.225)	0.091	0.168
171	14.25	0.90	0.259	(0.224)	0.091	0.168
172	14.33	0.87	0.250	(0.223)	0.087	0.162
173	14.42	0.87	0.250	(0.222)	0.087	0.162
174	14.50	0.87	0.250	(0.221)	0.087	0.162
175	14.58	0.87	0.250	(0.220)	0.087	0.162
176	14.67	0.87	0.250	(0.218)	0.087	0.162
177	14.75	0.87	0.250	(0.217)	0.087	0.162
178	14.83	0.83	0.240	(0.216)	0.084	0.156
179	14.92	0.83	0.240	(0.215)	0.084	0.156
180	15.00	0.83	0.240	(0.214)	0.084	0.156
181	15.08	0.80	0.230	(0.213)	0.081	0.150
182	15.17	0.80	0.230	(0.212)	0.081	0.150
183	15.25	0.80	0.230	(0.211)	0.081	0.150
184	15.33	0.77	0.221	(0.210)	0.077	0.144
185	15.42	0.77	0.221	(0.209)	0.077	0.144
186	15.50	0.77	0.221	(0.207)	0.077	0.144
187	15.58	0.63	0.182	(0.206)	0.064	0.119
188	15.67	0.63	0.182	(0.205)	0.064	0.119
189	15.75	0.63	0.182	(0.204)	0.064	0.119
190	15.83	0.63	0.182	(0.203)	0.064	0.119

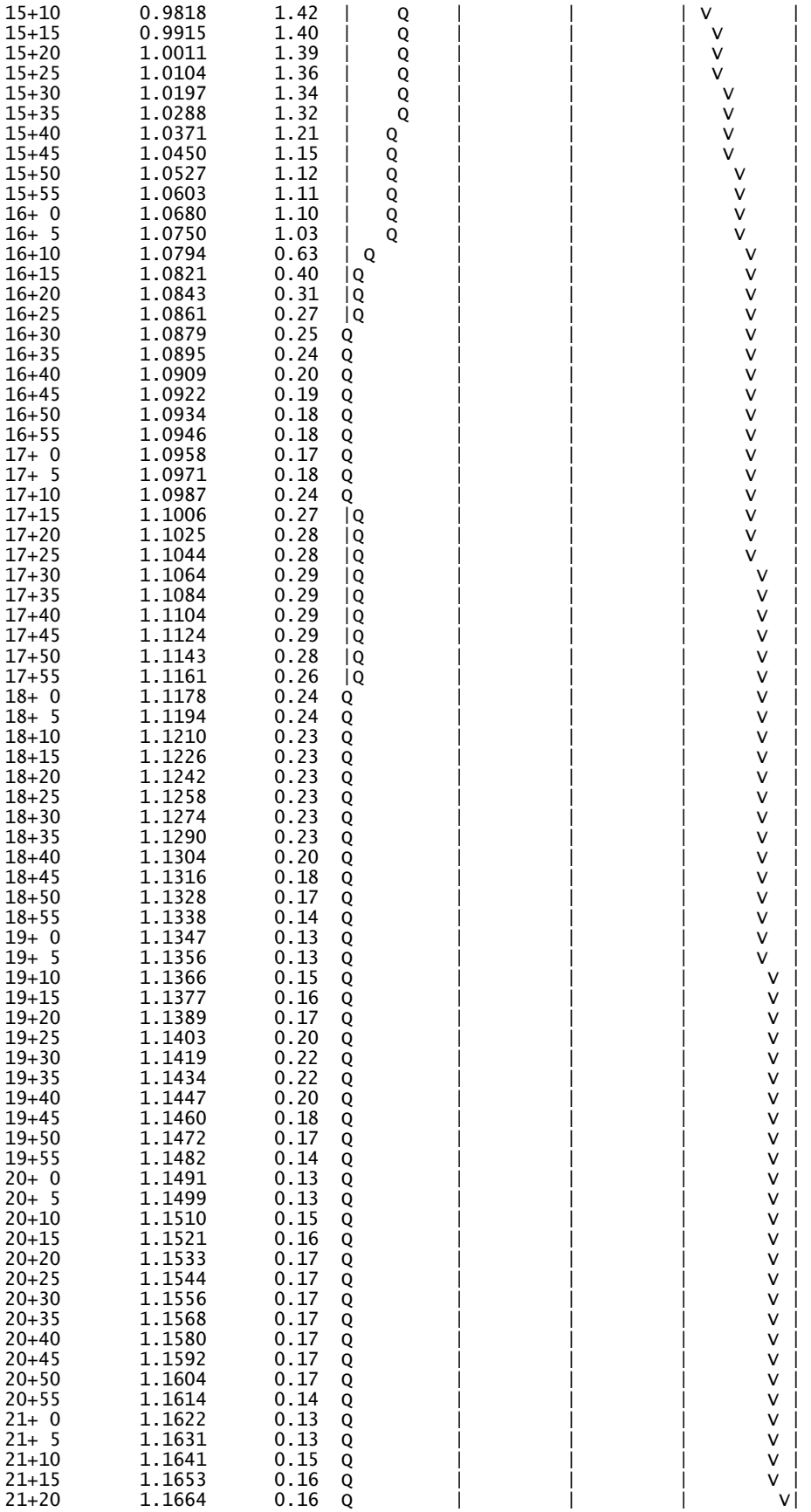
191	15.92	0.63	0.182	(0.202)	0.064	0.119
192	16.00	0.63	0.182	(0.201)	0.064	0.119
193	16.08	0.13	0.038	(0.200)	0.013	0.025
194	16.17	0.13	0.038	(0.199)	0.013	0.025
195	16.25	0.13	0.038	(0.198)	0.013	0.025
196	16.33	0.13	0.038	(0.197)	0.013	0.025
197	16.42	0.13	0.038	(0.196)	0.013	0.025
198	16.50	0.13	0.038	(0.195)	0.013	0.025
199	16.58	0.10	0.029	(0.194)	0.010	0.019
200	16.67	0.10	0.029	(0.193)	0.010	0.019
201	16.75	0.10	0.029	(0.192)	0.010	0.019
202	16.83	0.10	0.029	(0.191)	0.010	0.019
203	16.92	0.10	0.029	(0.190)	0.010	0.019
204	17.00	0.10	0.029	(0.189)	0.010	0.019
205	17.08	0.17	0.048	(0.188)	0.017	0.031
206	17.17	0.17	0.048	(0.187)	0.017	0.031
207	17.25	0.17	0.048	(0.186)	0.017	0.031
208	17.33	0.17	0.048	(0.185)	0.017	0.031
209	17.42	0.17	0.048	(0.185)	0.017	0.031
210	17.50	0.17	0.048	(0.184)	0.017	0.031
211	17.58	0.17	0.048	(0.183)	0.017	0.031
212	17.67	0.17	0.048	(0.182)	0.017	0.031
213	17.75	0.17	0.048	(0.181)	0.017	0.031
214	17.83	0.13	0.038	(0.180)	0.013	0.025
215	17.92	0.13	0.038	(0.179)	0.013	0.025
216	18.00	0.13	0.038	(0.178)	0.013	0.025
217	18.08	0.13	0.038	(0.177)	0.013	0.025
218	18.17	0.13	0.038	(0.176)	0.013	0.025
219	18.25	0.13	0.038	(0.176)	0.013	0.025
220	18.33	0.13	0.038	(0.175)	0.013	0.025
221	18.42	0.13	0.038	(0.174)	0.013	0.025
222	18.50	0.13	0.038	(0.173)	0.013	0.025
223	18.58	0.10	0.029	(0.172)	0.010	0.019
224	18.67	0.10	0.029	(0.171)	0.010	0.019
225	18.75	0.10	0.029	(0.171)	0.010	0.019
226	18.83	0.07	0.019	(0.170)	0.007	0.012
227	18.92	0.07	0.019	(0.169)	0.007	0.012
228	19.00	0.07	0.019	(0.168)	0.007	0.012
229	19.08	0.10	0.029	(0.167)	0.010	0.019
230	19.17	0.10	0.029	(0.167)	0.010	0.019
231	19.25	0.10	0.029	(0.166)	0.010	0.019
232	19.33	0.13	0.038	(0.165)	0.013	0.025
233	19.42	0.13	0.038	(0.164)	0.013	0.025
234	19.50	0.13	0.038	(0.163)	0.013	0.025
235	19.58	0.10	0.029	(0.163)	0.010	0.019
236	19.67	0.10	0.029	(0.162)	0.010	0.019
237	19.75	0.10	0.029	(0.161)	0.010	0.019
238	19.83	0.07	0.019	(0.160)	0.007	0.012
239	19.92	0.07	0.019	(0.160)	0.007	0.012
240	20.00	0.07	0.019	(0.159)	0.007	0.012
241	20.08	0.10	0.029	(0.158)	0.010	0.019
242	20.17	0.10	0.029	(0.158)	0.010	0.019
243	20.25	0.10	0.029	(0.157)	0.010	0.019
244	20.33	0.10	0.029	(0.156)	0.010	0.019
245	20.42	0.10	0.029	(0.156)	0.010	0.019
246	20.50	0.10	0.029	(0.155)	0.010	0.019
247	20.58	0.10	0.029	(0.154)	0.010	0.019
248	20.67	0.10	0.029	(0.154)	0.010	0.019
249	20.75	0.10	0.029	(0.153)	0.010	0.019
250	20.83	0.07	0.019	(0.152)	0.007	0.012
251	20.92	0.07	0.019	(0.152)	0.007	0.012
252	21.00	0.07	0.019	(0.151)	0.007	0.012
253	21.08	0.10	0.029	(0.151)	0.010	0.019
254	21.17	0.10	0.029	(0.150)	0.010	0.019
255	21.25	0.10	0.029	(0.149)	0.010	0.019
256	21.33	0.07	0.019	(0.149)	0.007	0.012
257	21.42	0.07	0.019	(0.148)	0.007	0.012
258	21.50	0.07	0.019	(0.148)	0.007	0.012
259	21.58	0.10	0.029	(0.147)	0.010	0.019
260	21.67	0.10	0.029	(0.147)	0.010	0.019
261	21.75	0.10	0.029	(0.146)	0.010	0.019
262	21.83	0.07	0.019	(0.146)	0.007	0.012
263	21.92	0.07	0.019	(0.145)	0.007	0.012
264	22.00	0.07	0.019	(0.145)	0.007	0.012
265	22.08	0.10	0.029	(0.144)	0.010	0.019

```
266  22.17     0.10      0.029       (  0.144)       0.010        0.019
267  22.25     0.10      0.029       (  0.143)       0.010        0.019
268  22.33     0.07      0.019       (  0.143)       0.007        0.012
269  22.42     0.07      0.019       (  0.142)       0.007        0.012
270  22.50     0.07      0.019       (  0.142)       0.007        0.012
271  22.58     0.07      0.019       (  0.142)       0.007        0.012
272  22.67     0.07      0.019       (  0.141)       0.007        0.012
273  22.75     0.07      0.019       (  0.141)       0.007        0.012
274  22.83     0.07      0.019       (  0.140)       0.007        0.012
275  22.92     0.07      0.019       (  0.140)       0.007        0.012
276  23.00     0.07      0.019       (  0.140)       0.007        0.012
277  23.08     0.07      0.019       (  0.139)       0.007        0.012
278  23.17     0.07      0.019       (  0.139)       0.007        0.012
279  23.25     0.07      0.019       (  0.139)       0.007        0.012
280  23.33     0.07      0.019       (  0.138)       0.007        0.012
281  23.42     0.07      0.019       (  0.138)       0.007        0.012
282  23.50     0.07      0.019       (  0.138)       0.007        0.012
283  23.58     0.07      0.019       (  0.138)       0.007        0.012
284  23.67     0.07      0.019       (  0.138)       0.007        0.012
285  23.75     0.07      0.019       (  0.137)       0.007        0.012
286  23.83     0.07      0.019       (  0.137)       0.007        0.012
287  23.92     0.07      0.019       (  0.137)       0.007        0.012
288  24.00     0.07      0.019       (  0.137)       0.007        0.012
               (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    18.7
      Flood volume = Effective rainfall      1.56(In)
       times area       9.2(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
      Total soil loss =      0.84(In)
      Total soil loss =     0.644(Ac.Ft)
      Total rainfall =      2.40(In)
      Flood volume =       52096.8 Cubic Feet
      Total soil loss =       28052.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.963(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0001      0.01  Q          |         |         |         |
  0+10       0.0005      0.06  Q          |         |         |         |
  0+15       0.0011      0.09  Q          |         |         |         |
  0+20       0.0019      0.11  Q          |         |         |         |
  0+25       0.0029      0.14  Q          |         |         |         |
  0+30       0.0040      0.16  Q          |         |         |         |
  0+35       0.0051      0.17  Q          |         |         |         |
  0+40       0.0063      0.17  Q          |         |         |         |
  0+45       0.0075      0.17  Q          |         |         |         |
  0+50       0.0087      0.18  Q          |         |         |         |
  0+55       0.0101      0.20  Q          |         |         |         |
  1+ 0       0.0116      0.22  Q          |         |         |         |
  1+ 5       0.0132      0.22  Q          |         |         |         |
  1+10       0.0145      0.20  Q          |         |         |         |
  1+15       0.0158      0.18  Q          |         |         |         |
  1+20       0.0170      0.18  Q          |         |         |         |
  1+25       0.0182      0.18  Q          |         |         |         |
  1+30       0.0194      0.17  Q          |         |         |         |
  1+35       0.0206      0.17  Q          |         |         |         |
  1+40       0.0218      0.17  Q          |         |         |         |
  1+45       0.0230      0.17  Q          |         |         |         |
  1+50       0.0243      0.18  Q          |         |         |         |
  1+55       0.0257      0.21  Q          |         |         |         |
  2+ 0       0.0272      0.22  Q          |         |         |         |
  2+ 5       0.0287      0.23  Q          |         |         |         |
  2+10       0.0303      0.23  QV         |         |         |         |
  2+15       0.0319      0.23  QV         |         |         |         |
  2+20       0.0335      0.23  QV         |         |         |         |
  2+25       0.0351      0.23  QV         |         |         |         |
  2+30       0.0367      0.23  QV         |         |         |         |
  2+35       0.0383      0.24  QV         |         |         |         |
```

2+40	0.0401	0.26	Q			
2+45	0.0420	0.28	Q			
2+50	0.0440	0.28	Q			
2+55	0.0460	0.29	Q			
3+ 0	0.0480	0.29	Q			
3+ 5	0.0500	0.29	Q			
3+10	0.0519	0.29	Q			
3+15	0.0539	0.29	Q			
3+20	0.0559	0.29	Q			
3+25	0.0579	0.29	Q			
3+30	0.0599	0.29	QV			
3+35	0.0619	0.29	QV			
3+40	0.0639	0.29	QV			
3+45	0.0659	0.29	QV			
3+50	0.0679	0.29	QV			
3+55	0.0701	0.32	QV			
4+ 0	0.0724	0.34	QV			
4+ 5	0.0748	0.34	QV			
4+10	0.0772	0.34	QV			
4+15	0.0796	0.35	QV			
4+20	0.0820	0.35	QV			
4+25	0.0846	0.38	QV			
4+30	0.0873	0.39	QV			
4+35	0.0901	0.40	Q V			
4+40	0.0928	0.40	Q V			
4+45	0.0956	0.40	Q V			
4+50	0.0984	0.41	Q V			
4+55	0.1014	0.44	Q V			
5+ 0	0.1045	0.45	Q V			
5+ 5	0.1076	0.45	Q V			
5+10	0.1104	0.40	Q V			
5+15	0.1129	0.37	Q V			
5+20	0.1154	0.36	Q V			
5+25	0.1180	0.38	Q V			
5+30	0.1208	0.40	Q V			
5+35	0.1236	0.41	Q V			
5+40	0.1266	0.43	Q V			
5+45	0.1297	0.45	Q V			
5+50	0.1328	0.46	Q V			
5+55	0.1360	0.46	Q V			
6+ 0	0.1392	0.46	Q V			
6+ 5	0.1424	0.47	Q V			
6+10	0.1458	0.49	Q V			
6+15	0.1493	0.51	Q V			
6+20	0.1529	0.52	Q V			
6+25	0.1564	0.52	Q V			
6+30	0.1600	0.52	Q V			
6+35	0.1636	0.53	Q V			
6+40	0.1674	0.55	Q V			
6+45	0.1713	0.57	Q V			
6+50	0.1753	0.57	Q V			
6+55	0.1792	0.58	Q V			
7+ 0	0.1832	0.58	Q V			
7+ 5	0.1872	0.58	Q V			
7+10	0.1912	0.58	Q V			
7+15	0.1952	0.58	Q V			
7+20	0.1992	0.58	Q V			
7+25	0.2034	0.61	Q V			
7+30	0.2077	0.63	Q V			
7+35	0.2121	0.64	Q V			
7+40	0.2167	0.67	Q V			
7+45	0.2214	0.68	Q V			
7+50	0.2262	0.69	Q V			
7+55	0.2311	0.72	Q V			
8+ 0	0.2362	0.74	Q V			
8+ 5	0.2414	0.76	Q V			
8+10	0.2470	0.81	Q V			
8+15	0.2529	0.84	Q V			
8+20	0.2588	0.86	Q V			
8+25	0.2647	0.86	Q V			
8+30	0.2707	0.87	Q V			
8+35	0.2767	0.87	Q V			
8+40	0.2829	0.90	Q V			
8+45	0.2892	0.91	Q V			
8+50	0.2955	0.93	Q V			





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  21+25       1.1673      0.14  Q          |          |          |         v|
  21+30       1.1682      0.13  Q          |          |          |         v|
  21+35       1.1691      0.13  Q          |          |          |         v|
  21+40       1.1701      0.15  Q          |          |          |         v|
  21+45       1.1712      0.16  Q          |          |          |         v|
  21+50       1.1724      0.16  Q          |          |          |         v|
  21+55       1.1733      0.14  Q          |          |          |         v|
  22+ 0       1.1742      0.13  Q          |          |          |         v|
  22+ 5       1.1751      0.13  Q          |          |          |         v|
  22+10       1.1761      0.15  Q          |          |          |         v|
  22+15       1.1772      0.16  Q          |          |          |         v|
  22+20       1.1783      0.16  Q          |          |          |         v|
  22+25       1.1793      0.14  Q          |          |          |         v|
  22+30       1.1802      0.13  Q          |          |          |         v|
  22+35       1.1810      0.12  Q          |          |          |         v|
  22+40       1.1818      0.12  Q          |          |          |         v|
  22+45       1.1826      0.12  Q          |          |          |         v|
  22+50       1.1834      0.12  Q          |          |          |         v|
  22+55       1.1842      0.12  Q          |          |          |         v|
  23+ 0       1.1850      0.12  Q          |          |          |         v|
  23+ 5       1.1858      0.12  Q          |          |          |         v|
  23+10       1.1866      0.12  Q          |          |          |         v|
  23+15       1.1874      0.12  Q          |          |          |         v|
  23+20       1.1882      0.12  Q          |          |          |         v|
  23+25       1.1890      0.12  Q          |          |          |         v|
  23+30       1.1898      0.12  Q          |          |          |         v|
  23+35       1.1906      0.12  Q          |          |          |         v|
  23+40       1.1914      0.12  Q          |          |          |         v|
  23+45       1.1922      0.12  Q          |          |          |         v|
  23+50       1.1930      0.12  Q          |          |          |         v|
  23+55       1.1938      0.12  Q          |          |          |         v|
  24+ 0       1.1946      0.12  Q          |          |          |         v|
  24+ 5       1.1953      0.11  Q          |          |          |         v|
  24+10       1.1957      0.05  Q          |          |          |         v|
  24+15       1.1958      0.02  Q          |          |          |         v|
  24+20       1.1959      0.01  Q          |          |          |         v|
  24+25       1.1960      0.00  Q          |          |          |         v|
  24+30       1.1960      0.00  Q          |          |          |         v|
  24+35       1.1960      0.00  Q          |          |          |         v|
  24+40       1.1960      0.00  Q          |          |          |         v|
  24+45       1.1960      0.00  Q          |          |          |         v|
-------------------------------------------------------------------------
```

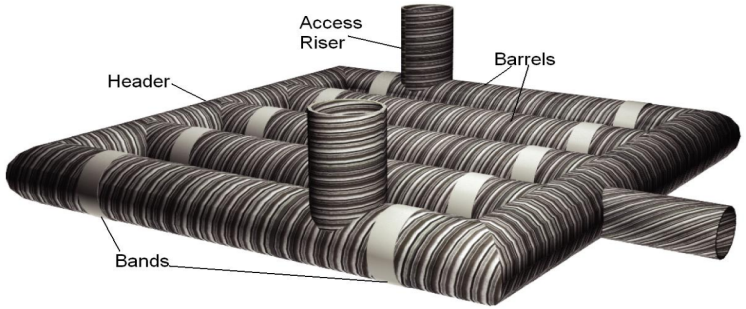
STAGE-STORAGE/OUTFLOW TABLES

DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings,
and pricing send completed worksheet to:
dyods@contech-cpi.com



Project Summary

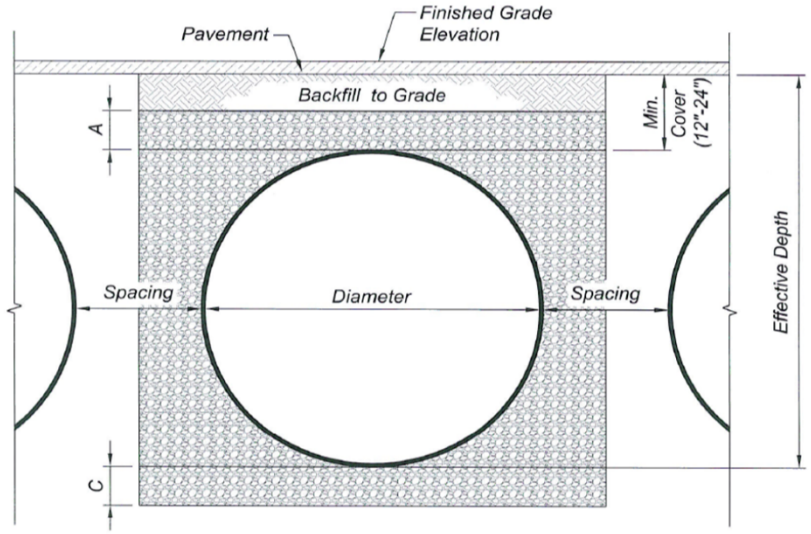
Date:	12/1/2021
Project Name:	BCCOV PARKING AREA 4
City / County:	Calimesa
State:	CA
Designed By:	EP
Company:	Albert A. Webb Associates
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	46,000
Limiting Width (ft):	100.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	96
Number Of Headers:	2
Spacing between Barrels (ft):	3.00
Stone Width Around Perimeter of System (ft):	1.5
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

50.27 ft^2 Pipe Area



System Sizing

Pipe Storage:	46,295	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	46,295	cf	100.6% Of Required Storage
Number of Barrels:	9	barrels	
Length per Barrel:	81.0	ft	
Length Per Header:	96.0	ft	
Rectangular Footprint (W x L):	99. ft x 100. ft		

CONTECH Materials

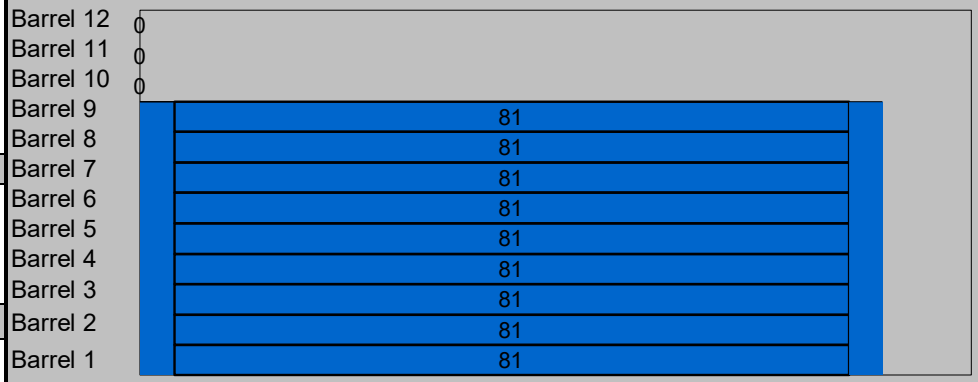
Total CMP Footage:	921	ft
Approximate Total Pieces:	44	pcs
Approximate Coupling Bands:	51	bands
Approximate Truckloads:	22	trucks

Construction Quantities**

Total Excavation:	3667	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	1952	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout



Barrel Footage (w/o headers)

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PARKING LOT CMP CHAMBERS P1 - Stage/Storage/Outflow Table

W.O.# 21-0034

Basin Information: CMP CHAMBERS

2-Year	ORIFICE
Q EXISTING	0.31
Opening (in)	1.5
# of Orifices	2
Area (sf)	0.0123
Opening (ft)	0.1250
Total Area (sf)	0.0245
G (ft/s^2)	32.2
Cd	0.66
Invert H (ft)	2.125

$Q_{ORIFICE}$= $Cd*Area*(2*G*H)^{0.5}$

Q_{WEIR}= $C*L*H^{3/2}$

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	2-Year Total Q (cfs)	Comments
1	2208	0	0.00	0.000			0.00	Bottom of Basin/Invert of 2-Yr Orifice
2	2208.063	**0.0625**	**150.59**	**0.003**	0			Middle of 2-Yr Orifice
3	**2208.5**	**0.5**	**1204.71**	**0.028**	**0.4375**	0.09	0.09	
4	2209	1	**3340.00**	**0.077**	**0.9375**	0.13	0.13	
5	**2209.5**	1.5	**6008.96**	**0.138**	**1.4375**	0.16	0.16	
6	2210	2	**9050.63**	**0.208**	**1.9375**	0.18	0.18	
7	**2210.5**	2.5	**12360.04**	**0.284**	**2.4375**	0.20	0.20	
8	2211	3	**15856.74**	**0.364**	**2.9375**	0.22	0.22	
9	**2211.5**	**3.5**	**19472.87**	**0.447**	**3.4375**	**0.24**	0.24	
10	2212	4	**23147.25**	**0.531**	**3.9375**	0.26	0.26	
11	**2212.5**	4.5	**26821.64**	**0.616**	**4.4375**	0.27	0.27	
12	2213	5	**30437.77**	**0.699**	**4.9375**	0.29	0.29	
13	**2213.5**	5.5	**33934.46**	**0.779**	**5.4375**	0.30	0.30	
14	2214	6	**37243.88**	**0.855**	**5.9375**	0.32	0.32	
15	**2214.5**	6.5	**40285.55**	**0.925**	**6.4375**	0.33	0.33	
16	2215	7	**42954.51**	**0.986**	**6.9375**	0.34	0.34	
17	**2215.5**	7.50	**45089.80**	**1.035**	**7.4375**	0.35	0.35	
18	2216	8	**46294.51**	**1.063**	**7.9375**	0.37	0.37	Top of chambers

BASIN ROUTING (2-YEAR, 24-HOUR STORM EVENT)

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 11/24/21

BCCOV PARKING LOT AREA 4
2 YR 24 HR STORM EVENT
21-0034
2021-12-02 EP

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROP2YR4P242.rte

**********HYDROGRAPH DATA**********

Number of intervals = 297
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.963 (CFS)
Total volume = 1.196 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 297
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.063	0.003	0.001	0.003	0.003
0.500	0.028	0.090	0.028	0.028
1.000	0.077	0.130	0.077	0.077
1.500	0.138	0.160	0.137	0.139
2.000	0.208	0.180	0.207	0.209
2.500	0.284	0.200	0.283	0.285
3.000	0.364	0.220	0.363	0.365
3.500	0.447	0.240	0.446	0.448
4.000	0.531	0.260	0.530	0.532
4.500	0.616	0.270	0.615	0.617
5.000	0.699	0.290	0.698	0.700
5.500	0.779	0.300	0.778	0.780
6.000	0.855	0.320	0.854	0.856
6.500	0.925	0.330	0.924	0.926
7.000	0.986	0.340	0.985	0.987
7.500	1.035	0.350	1.034	1.036
8.000	1.063	0.370	1.062	1.064

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.5	0.98	1.47	1.96	Depth (Ft.)
0.083	0.01	0.00	0.000	O	|	|	|	|	0.00
0.167	0.06	0.00	0.000	OI	|	|	|	|	0.01
0.250	0.09	0.00	0.001	OI	|	|	|	|	0.02
0.333	0.11	0.00	0.002	OI	|	|	|	|	0.03
0.417	0.14	0.00	0.002	O I	|	|	|	|	0.05
0.500	0.16	0.00	0.003	O I	|	|	|	|	0.07
0.583	0.17	0.01	0.005	O I	|	|	|	|	0.09
0.667	0.17	0.01	0.006	O I	|	|	|	|	0.11
0.750	0.17	0.01	0.007	O I	|	|	|	|	0.13
0.833	0.18	0.02	0.008	O I	|	|	|	|	0.15
0.917	0.20	0.02	0.009	O I	|	|	|	|	0.17
1.000	0.22	0.03	0.010	O I	|	|	|	|	0.19
1.083	0.22	0.03	0.012	O I	|	|	|	|	0.21
1.167	0.20	0.04	0.013	O I	|	|	|	|	0.23
1.250	0.18	0.04	0.014	O I	|	|	|	|	0.25
1.333	0.18	0.04	0.015	O I	|	|	|	|	0.27
1.417	0.18	0.05	0.016	O I	|	|	|	|	0.29
1.500	0.17	0.05	0.017	O I	|	|	|	|	0.30
1.583	0.17	0.05	0.017	O I	|	|	|	|	0.32
1.667	0.17	0.06	0.018	O I	|	|	|	|	0.33
1.750	0.17	0.06	0.019	O I	|	|	|	|	0.34
1.833	0.18	0.06	0.020	O I	|	|	|	|	0.36
1.917	0.21	0.06	0.021	|O I	|	|	|	|	0.37
2.000	0.22	0.07	0.022	|O I	|	|	|	|	0.39
2.083	0.23	0.07	0.023	|O I	|	|	|	|	0.41
2.167	0.23	0.08	0.024	|O I	|	|	|	|	0.43
2.250	0.23	0.08	0.025	|O I	|	|	|	|	0.45
2.333	0.23	0.08	0.026	|O I	|	|	|	|	0.46
2.417	0.23	0.09	0.027	|O I	|	|	|	|	0.48
2.500	0.23	0.09	0.028	|O I	|	|	|	|	0.50
2.583	0.24	0.09	0.029	|O I	|	|	|	|	0.51
2.667	0.26	0.09	0.030	|O I	|	|	|	|	0.52
2.750	0.28	0.09	0.031	|O I	|	|	|	|	0.53
2.833	0.28	0.09	0.033	|O I	|	|	|	|	0.55
2.917	0.29	0.09	0.034	|O I	|	|	|	|	0.56
3.000	0.29	0.10	0.035	|O I	|	|	|	|	0.57
3.083	0.29	0.10	0.037	|O I	|	|	|	|	0.59
3.167	0.29	0.10	0.038	|O I	|	|	|	|	0.60
3.250	0.29	0.10	0.039	|O I	|	|	|	|	0.61
3.333	0.29	0.10	0.040	|O I	|	|	|	|	0.63
3.417	0.29	0.10	0.042	|O I	|	|	|	|	0.64
3.500	0.29	0.10	0.043	|O I	|	|	|	|	0.65
3.583	0.29	0.10	0.044	|O I	|	|	|	|	0.67
3.667	0.29	0.10	0.046	|O I	|	|	|	|	0.68
3.750	0.29	0.11	0.047	|O I	|	|	|	|	0.69
3.833	0.29	0.11	0.048	|O I	|	|	|	|	0.71
3.917	0.32	0.11	0.050	|O I	|	|	|	|	0.72
4.000	0.34	0.11	0.051	|O I	|	|	|	|	0.74
4.083	0.34	0.11	0.053	|O I	|	|	|	|	0.75
4.167	0.34	0.11	0.054	|O I	|	|	|	|	0.77
4.250	0.35	0.11	0.056	|O I	|	|	|	|	0.78
4.333	0.35	0.11	0.058	|O I	|	|	|	|	0.80
4.417	0.38	0.12	0.059	|O I	|	|	|	|	0.82
4.500	0.39	0.12	0.061	|O I	|	|	|	|	0.84
4.583	0.40	0.12	0.063	|O I	|	|	|	|	0.86
4.667	0.40	0.12	0.065	|O I	|	|	|	|	0.88
4.750	0.40	0.12	0.067	|O I	|	|	|	|	0.90
4.833	0.41	0.12	0.069	| O I	|	|	|	|	0.92
4.917	0.44	0.13	0.071	| O I|	|	|	|	0.94
5.000	0.45	0.13	0.073	| O I|	|	|	|	0.96
5.083	0.45	0.13	0.075	| O I|	|	|	|	0.98
5.167	0.40	0.13	0.077	| O I |	|	|	|	1.00
5.250	0.37	0.13	0.079	| O I |	|	|	|	1.02
5.333	0.36	0.13	0.081	| O I |	|	|	|	1.03
5.417	0.38	0.13	0.082	| O I |	|	|	|	1.04
5.500	0.40	0.13	0.084	| O I |	|	|	|	1.06
5.583	0.41	0.13	0.086	| O I |	|	|	|	1.07
5.667	0.43	0.14	0.088	| O I|	|	|	|	1.09

5.750	0.45	0.14	0.090	o	I				1.11
5.833	0.46	0.14	0.092	o	I				1.12
5.917	0.46	0.14	0.094	o	I				1.14
6.000	0.46	0.14	0.097	o	I				1.16
6.083	0.47	0.14	0.099	o	I				1.18
6.167	0.49	0.14	0.101	o	I				1.20
6.250	0.51	0.14	0.104	o	I				1.22
6.333	0.52	0.14	0.106	o	I				1.24
6.417	0.52	0.15	0.109	o	I				1.26
6.500	0.52	0.15	0.111	o	I				1.28
6.583	0.53	0.15	0.114	o	I				1.30
6.667	0.55	0.15	0.117	o	I				1.32
6.750	0.57	0.15	0.119	o	I				1.35
6.833	0.57	0.15	0.122	o	I				1.37
6.917	0.58	0.15	0.125	o	I				1.40
7.000	0.58	0.16	0.128	o	I				1.42
7.083	0.58	0.16	0.131	o	I				1.44
7.167	0.58	0.16	0.134	o	I				1.47
7.250	0.58	0.16	0.137	o	I				1.49
7.333	0.58	0.16	0.140	o	I				1.51
7.417	0.61	0.16	0.143	o	I				1.53
7.500	0.63	0.16	0.146	o	I				1.56
7.583	0.64	0.16	0.149	o	I				1.58
7.667	0.67	0.16	0.152	o	I				1.60
7.750	0.68	0.17	0.156	o	I				1.63
7.833	0.69	0.17	0.160	o	I				1.65
7.917	0.72	0.17	0.163	o	I				1.68
8.000	0.74	0.17	0.167	o	I				1.71
8.083	0.76	0.17	0.171	o	I				1.74
8.167	0.81	0.17	0.175	o	I				1.77
8.250	0.84	0.17	0.180	o	I				1.80
8.333	0.86	0.17	0.185	o	I				1.83
8.417	0.86	0.17	0.189	o	I				1.87
8.500	0.87	0.18	0.194	o	I				1.90
8.583	0.87	0.18	0.199	o	I				1.93
8.667	0.90	0.18	0.204	o	I				1.97
8.750	0.91	0.18	0.209	o	I				2.00
8.833	0.93	0.18	0.214	o	I				2.04
8.917	0.96	0.18	0.219	o	I				2.07
9.000	0.97	0.18	0.224	o	I				2.11
9.083	0.99	0.19	0.230	o	I				2.14
9.167	1.04	0.19	0.236	o	I				2.18
9.250	1.08	0.19	0.242	o	I				2.22
9.333	1.09	0.19	0.248	o	I				2.26
9.417	1.13	0.19	0.254	o	I				2.30
9.500	1.14	0.19	0.261	o	I				2.35
9.583	1.16	0.20	0.267	o	I				2.39
9.667	1.19	0.20	0.274	o	I				2.43
9.750	1.20	0.20	0.281	o	I				2.48
9.833	1.21	0.20	0.288	o	I				2.52
9.917	1.24	0.20	0.295	o	I				2.57
10.000	1.26	0.20	0.302	o	I				2.61
10.083	1.23	0.21	0.309	o	I				2.66
10.167	1.05	0.21	0.316	o	I				2.70
10.250	0.95	0.21	0.321	o	I				2.73
10.333	0.91	0.21	0.326	o	I				2.76
10.417	0.88	0.21	0.331	o	I				2.79
10.500	0.88	0.21	0.335	o	I				2.82
10.583	0.90	0.21	0.340	o	I				2.85
10.667	1.03	0.22	0.345	o	I				2.88
10.750	1.10	0.22	0.351	o	I				2.92
10.833	1.13	0.22	0.357	o	I				2.96
10.917	1.15	0.22	0.363	o	I				3.00
11.000	1.15	0.22	0.370	o	I				3.04
11.083	1.15	0.22	0.376	o	I				3.07
11.167	1.12	0.22	0.383	o	I				3.11
11.250	1.11	0.23	0.389	o	I				3.15
11.333	1.11	0.23	0.395	o	I				3.19
11.417	1.10	0.23	0.401	o	I				3.22
11.500	1.10	0.23	0.407	o	I				3.26
11.583	1.09	0.23	0.413	o	I				3.29
11.667	1.04	0.23	0.418	o	I				3.33
11.750	1.01	0.23	0.424	o	I				3.36
11.833	1.00	0.24	0.429	o	I				3.39
11.917	1.02	0.24	0.434	o	I				3.42

12.000	1.03	0.24	0.440	O		I		3.46
12.083	1.07	0.24	0.446	O		I		3.49
12.167	1.26	0.24	0.452	O		I		3.53
12.250	1.37	0.24	0.459	O		I		3.57
12.333	1.41	0.24	0.467	O		I		3.62
12.417	1.46	0.25	0.475	O		I		3.67
12.500	1.49	0.25	0.484	O		I		3.72
12.583	1.50	0.25	0.492	O		I		3.77
12.667	1.56	0.25	0.501	O		I		3.82
12.750	1.60	0.26	0.510	O		I		3.88
12.833	1.61	0.26	0.520	O		I		3.93
12.917	1.65	0.26	0.529	O		I		3.99
13.000	1.67	0.26	0.539	O		I		4.05
13.083	1.70	0.26	0.548	O		I		4.10
13.167	1.83	0.26	0.559	O		I		4.16
13.250	1.91	0.26	0.570	O		I		4.23
13.333	1.94	0.27	0.581	O		I		4.30
13.417	1.96	0.27	0.593	O		I		4.36
13.500	1.96	0.27	0.605	O		I		4.43
13.583	1.91	0.27	0.616	O		I		4.50
13.667	1.62	0.27	0.626	O		I		4.56
13.750	1.46	0.27	0.635	O		I		4.61
13.833	1.39	0.28	0.643	O		I		4.66
13.917	1.36	0.28	0.651	O		I		4.71
14.000	1.34	0.28	0.658	O		I		4.75
14.083	1.36	0.28	0.665	O		I		4.80
14.167	1.46	0.28	0.673	O		I		4.84
14.250	1.52	0.29	0.681	O		I		4.89
14.333	1.54	0.29	0.690	O		I		4.94
14.417	1.52	0.29	0.698	O		I		5.00
14.500	1.51	0.29	0.707	O		I		5.05
14.583	1.51	0.29	0.715	O		I		5.10
14.667	1.51	0.29	0.724	O		I		5.15
14.750	1.51	0.29	0.732	O		I		5.21
14.833	1.50	0.30	0.740	O		I		5.26
14.917	1.47	0.30	0.748	O		I		5.31
15.000	1.46	0.30	0.757	O		I		5.36
15.083	1.45	0.30	0.765	O		I		5.41
15.167	1.42	0.30	0.772	O		I		5.46
15.250	1.40	0.30	0.780	O		I		5.51
15.333	1.39	0.30	0.788	O		I		5.56
15.417	1.36	0.30	0.795	O		I		5.60
15.500	1.34	0.31	0.802	O		I		5.65
15.583	1.32	0.31	0.809	O		I		5.70
15.667	1.21	0.31	0.816	O		I		5.74
15.750	1.15	0.31	0.822	O		I		5.78
15.833	1.12	0.31	0.827	O		I		5.82
15.917	1.11	0.31	0.833	O		I		5.85
16.000	1.10	0.32	0.838	O		I		5.89
16.083	1.03	0.32	0.844	O		I		5.92
16.167	0.63	0.32	0.847	O	I			5.95
16.250	0.40	0.32	0.848	OI				5.96
16.333	0.31	0.32	0.849	O				5.96
16.417	0.27	0.32	0.848	IO				5.96
16.500	0.25	0.32	0.848	IO				5.95
16.583	0.24	0.32	0.848	I O				5.95
16.667	0.20	0.32	0.847	I O				5.95
16.750	0.19	0.32	0.846	I O				5.94
16.833	0.18	0.32	0.845	I O				5.93
16.917	0.18	0.32	0.844	I O				5.93
17.000	0.17	0.32	0.843	I O				5.92
17.083	0.18	0.32	0.842	I O				5.92
17.167	0.24	0.32	0.841	I O				5.91
17.250	0.27	0.32	0.841	IO				5.91
17.333	0.28	0.32	0.841	IO				5.91
17.417	0.28	0.32	0.840	IO				5.90
17.500	0.29	0.32	0.840	IO				5.90
17.583	0.29	0.32	0.840	IO				5.90
17.667	0.29	0.32	0.840	IO				5.90
17.750	0.29	0.32	0.840	IO				5.90
17.833	0.28	0.32	0.840	IO				5.90
17.917	0.26	0.32	0.839	IO				5.90
18.000	0.24	0.32	0.839	I O				5.89
18.083	0.24	0.32	0.838	I O				5.89
18.167	0.23	0.32	0.838	I O				5.89

18.250	0.23	0.32	0.837	| I o |	|	|	|	5.88
18.333	0.23	0.32	0.837	| I o |	|	|	|	5.88
18.417	0.23	0.31	0.836	| I o |	|	|	|	5.87
18.500	0.23	0.31	0.835	| I o |	|	|	|	5.87
18.583	0.23	0.31	0.835	| I o |	|	|	|	5.87
18.667	0.20	0.31	0.834	| I o |	|	|	|	5.86
18.750	0.18	0.31	0.833	| I o |	|	|	|	5.86
18.833	0.17	0.31	0.832	| I o |	|	|	|	5.85
18.917	0.14	0.31	0.831	| I o |	|	|	|	5.84
19.000	0.13	0.31	0.830	| I o |	|	|	|	5.84
19.083	0.13	0.31	0.829	| I o |	|	|	|	5.83
19.167	0.15	0.31	0.828	| I o |	|	|	|	5.82
19.250	0.16	0.31	0.827	| I o |	|	|	|	5.81
19.333	0.17	0.31	0.826	| I o |	|	|	|	5.81
19.417	0.20	0.31	0.825	| I o |	|	|	|	5.80
19.500	0.22	0.31	0.824	| I o |	|	|	|	5.80
19.583	0.22	0.31	0.823	| I o |	|	|	|	5.79
19.667	0.20	0.31	0.823	| I o |	|	|	|	5.79
19.750	0.18	0.31	0.822	| I o |	|	|	|	5.78
19.833	0.17	0.31	0.821	| I o |	|	|	|	5.78
19.917	0.14	0.31	0.820	| I o |	|	|	|	5.77
20.000	0.13	0.31	0.819	| I o |	|	|	|	5.76
20.083	0.13	0.31	0.817	| I o |	|	|	|	5.75
20.167	0.15	0.31	0.816	| I o |	|	|	|	5.74
20.250	0.16	0.31	0.815	| I o |	|	|	|	5.74
20.333	0.17	0.31	0.814	| I o |	|	|	|	5.73
20.417	0.17	0.31	0.813	| I o |	|	|	|	5.73
20.500	0.17	0.31	0.812	| I o |	|	|	|	5.72
20.583	0.17	0.31	0.811	| I o |	|	|	|	5.71
20.667	0.17	0.31	0.810	| I o |	|	|	|	5.71
20.750	0.17	0.31	0.809	| I o |	|	|	|	5.70
20.833	0.17	0.31	0.809	| I o |	|	|	|	5.69
20.917	0.14	0.31	0.807	| I o |	|	|	|	5.69
21.000	0.13	0.31	0.806	| I o |	|	|	|	5.68
21.083	0.13	0.31	0.805	| I o |	|	|	|	5.67
21.167	0.15	0.31	0.804	| I o |	|	|	|	5.66
21.250	0.16	0.31	0.803	| I o |	|	|	|	5.66
21.333	0.16	0.31	0.802	| I o |	|	|	|	5.65
21.417	0.14	0.31	0.801	| I o |	|	|	|	5.64
21.500	0.13	0.31	0.800	| I o |	|	|	|	5.64
21.583	0.13	0.31	0.798	| I o |	|	|	|	5.63
21.667	0.15	0.30	0.797	| I o |	|	|	|	5.62
21.750	0.16	0.30	0.796	| I o |	|	|	|	5.61
21.833	0.16	0.30	0.795	| I o |	|	|	|	5.61
21.917	0.14	0.30	0.794	| I o |	|	|	|	5.60
22.000	0.13	0.30	0.793	| I o |	|	|	|	5.59
22.083	0.13	0.30	0.792	| I o |	|	|	|	5.58
22.167	0.15	0.30	0.791	| I o |	|	|	|	5.58
22.250	0.16	0.30	0.790	| I o |	|	|	|	5.57
22.333	0.16	0.30	0.789	| I o |	|	|	|	5.56
22.417	0.14	0.30	0.788	| I o |	|	|	|	5.56
22.500	0.13	0.30	0.786	| I o |	|	|	|	5.55
22.583	0.12	0.30	0.785	| I o |	|	|	|	5.54
22.667	0.12	0.30	0.784	| I o |	|	|	|	5.53
22.750	0.12	0.30	0.783	| I o |	|	|	|	5.52
22.833	0.12	0.30	0.781	| I o |	|	|	|	5.52
22.917	0.12	0.30	0.780	| I o |	|	|	|	5.51
23.000	0.12	0.30	0.779	| I o |	|	|	|	5.50
23.083	0.12	0.30	0.778	| I o |	|	|	|	5.49
23.167	0.12	0.30	0.776	| I o |	|	|	|	5.48
23.250	0.12	0.30	0.775	| I o |	|	|	|	5.48
23.333	0.12	0.30	0.774	| I o |	|	|	|	5.47
23.417	0.12	0.30	0.773	| I o |	|	|	|	5.46
23.500	0.12	0.30	0.771	| I o |	|	|	|	5.45
23.583	0.12	0.30	0.770	| I o |	|	|	|	5.44
23.667	0.12	0.30	0.769	| I o |	|	|	|	5.44
23.750	0.12	0.30	0.768	| I o |	|	|	|	5.43
23.833	0.12	0.30	0.766	| I o |	|	|	|	5.42
23.917	0.12	0.30	0.765	| I o |	|	|	|	5.41
24.000	0.12	0.30	0.764	| I o |	|	|	|	5.40
24.083	0.11	0.30	0.762	| I o |	|	|	|	5.40
24.167	0.05	0.30	0.761	| I o |	|	|	|	5.39
24.250	0.02	0.30	0.759	| I o |	|	|	|	5.38
24.333	0.01	0.30	0.757	| I o |	|	|	|	5.36
24.417	0.00	0.30	0.755	| I o |	|	|	|	5.35

24.500	0.00	0.30	0.753	I	o	|	|	|	|	5.34
24.583	0.00	0.30	0.751	I	o	|	|	|	|	5.33
24.667	0.00	0.30	0.749	I	o	|	|	|	|	5.31
24.750	0.00	0.30	0.747	I	o	|	|	|	|	5.30
24.833	0.00	0.30	0.745	I	o	|	|	|	|	5.29
24.917	0.00	0.30	0.743	I	o	|	|	|	|	5.28
25.000	0.00	0.30	0.741	I	o	|	|	|	|	5.26
25.083	0.00	0.30	0.739	I	o	|	|	|	|	5.25
25.167	0.00	0.29	0.737	I	o	|	|	|	|	5.24
25.250	0.00	0.29	0.735	I	o	|	|	|	|	5.22
25.333	0.00	0.29	0.733	I	o	|	|	|	|	5.21
25.417	0.00	0.29	0.731	I	o	|	|	|	|	5.20
25.500	0.00	0.29	0.729	I	o	|	|	|	|	5.19
25.583	0.00	0.29	0.727	I	o	|	|	|	|	5.17
25.667	0.00	0.29	0.725	I	o	|	|	|	|	5.16
25.750	0.00	0.29	0.723	I	o	|	|	|	|	5.15
25.833	0.00	0.29	0.721	I	o	|	|	|	|	5.14
25.917	0.00	0.29	0.719	I	o	|	|	|	|	5.12
26.000	0.00	0.29	0.717	I	o	|	|	|	|	5.11
26.083	0.00	0.29	0.715	I	o	|	|	|	|	5.10
26.167	0.00	0.29	0.713	I	o	|	|	|	|	5.09
26.250	0.00	0.29	0.711	I	o	|	|	|	|	5.07
26.333	0.00	0.29	0.709	I	o	|	|	|	|	5.06
26.417	0.00	0.29	0.707	I	o	|	|	|	|	5.05
26.500	0.00	0.29	0.705	I	o	|	|	|	|	5.04
26.583	0.00	0.29	0.703	I	o	|	|	|	|	5.02
26.667	0.00	0.29	0.701	I	o	|	|	|	|	5.01
26.750	0.00	0.29	0.699	I	o	|	|	|	|	5.00
26.833	0.00	0.29	0.697	I	o	|	|	|	|	4.99
26.917	0.00	0.29	0.695	I	o	|	|	|	|	4.97
27.000	0.00	0.29	0.693	I	o	|	|	|	|	4.96
27.083	0.00	0.29	0.691	I	o	|	|	|	|	4.95
27.167	0.00	0.29	0.689	I	o	|	|	|	|	4.94
27.250	0.00	0.29	0.687	I	o	|	|	|	|	4.93
27.333	0.00	0.29	0.685	I	o	|	|	|	|	4.91
27.417	0.00	0.29	0.683	I	o	|	|	|	|	4.90
27.500	0.00	0.29	0.681	I	o	|	|	|	|	4.89
27.583	0.00	0.29	0.679	I	o	|	|	|	|	4.88
27.667	0.00	0.28	0.677	I	o	|	|	|	|	4.87
27.750	0.00	0.28	0.675	I	o	|	|	|	|	4.86
27.833	0.00	0.28	0.673	I	o	|	|	|	|	4.84
27.917	0.00	0.28	0.671	I	o	|	|	|	|	4.83
28.000	0.00	0.28	0.669	I	o	|	|	|	|	4.82
28.083	0.00	0.28	0.667	I	o	|	|	|	|	4.81
28.167	0.00	0.28	0.665	I	o	|	|	|	|	4.80
28.250	0.00	0.28	0.663	I	o	|	|	|	|	4.79
28.333	0.00	0.28	0.661	I	o	|	|	|	|	4.77
28.417	0.00	0.28	0.659	I	o	|	|	|	|	4.76
28.500	0.00	0.28	0.658	I	o	|	|	|	|	4.75
28.583	0.00	0.28	0.656	I	o	|	|	|	|	4.74
28.667	0.00	0.28	0.654	I	o	|	|	|	|	4.73
28.750	0.00	0.28	0.652	I	o	|	|	|	|	4.72
28.833	0.00	0.28	0.650	I	o	|	|	|	|	4.70
28.917	0.00	0.28	0.648	I	o	|	|	|	|	4.69
29.000	0.00	0.28	0.646	I	o	|	|	|	|	4.68
29.083	0.00	0.28	0.644	I	o	|	|	|	|	4.67
29.167	0.00	0.28	0.642	I	o	|	|	|	|	4.66
29.250	0.00	0.28	0.640	I	o	|	|	|	|	4.65
29.333	0.00	0.28	0.638	I	o	|	|	|	|	4.63
29.417	0.00	0.27	0.636	I	o	|	|	|	|	4.62
29.500	0.00	0.27	0.635	I	o	|	|	|	|	4.61
29.583	0.00	0.27	0.633	I	o	|	|	|	|	4.60
29.667	0.00	0.27	0.631	I	o	|	|	|	|	4.59
29.750	0.00	0.27	0.629	I	o	|	|	|	|	4.58
29.833	0.00	0.27	0.627	I	o	|	|	|	|	4.57
29.917	0.00	0.27	0.625	I	o	|	|	|	|	4.56
30.000	0.00	0.27	0.623	I	o	|	|	|	|	4.54
30.083	0.00	0.27	0.621	I	o	|	|	|	|	4.53
30.167	0.00	0.27	0.620	I	o	|	|	|	|	4.52
30.250	0.00	0.27	0.618	I	o	|	|	|	|	4.51
30.333	0.00	0.27	0.616	I	o	|	|	|	|	4.50
30.417	0.00	0.27	0.614	I	o	|	|	|	|	4.49
30.500	0.00	0.27	0.612	I	o	|	|	|	|	4.48
30.583	0.00	0.27	0.610	I	o	|	|	|	|	4.47
30.667	0.00	0.27	0.608	I	o	|	|	|	|	4.46

30.750	0.00	0.27	0.607	I	O	|	|	|	|	4.44
30.833	0.00	0.27	0.605	I	O	|	|	|	|	4.43
30.917	0.00	0.27	0.603	I	O	|	|	|	|	4.42
31.000	0.00	0.27	0.601	I	O	|	|	|	|	4.41
31.083	0.00	0.27	0.599	I	O	|	|	|	|	4.40
31.167	0.00	0.27	0.597	I	O	|	|	|	|	4.39
31.250	0.00	0.27	0.595	I	O	|	|	|	|	4.38
31.333	0.00	0.27	0.594	I	O	|	|	|	|	4.37
31.417	0.00	0.27	0.592	I	O	|	|	|	|	4.36
31.500	0.00	0.27	0.590	I	O	|	|	|	|	4.35
31.583	0.00	0.27	0.588	I	O	|	|	|	|	4.34
31.667	0.00	0.27	0.586	I	O	|	|	|	|	4.33
31.750	0.00	0.27	0.584	I	O	|	|	|	|	4.31
31.833	0.00	0.27	0.583	I	O	|	|	|	|	4.30
31.917	0.00	0.27	0.581	I	O	|	|	|	|	4.29
32.000	0.00	0.27	0.579	I	O	|	|	|	|	4.28
32.083	0.00	0.27	0.577	I	O	|	|	|	|	4.27
32.167	0.00	0.27	0.575	I	O	|	|	|	|	4.26
32.250	0.00	0.26	0.573	I	O	|	|	|	|	4.25
32.333	0.00	0.26	0.572	I	O	|	|	|	|	4.24
32.417	0.00	0.26	0.570	I	O	|	|	|	|	4.23
32.500	0.00	0.26	0.568	I	O	|	|	|	|	4.22
32.583	0.00	0.26	0.566	I	O	|	|	|	|	4.21
32.667	0.00	0.26	0.564	I	O	|	|	|	|	4.20
32.750	0.00	0.26	0.563	I	O	|	|	|	|	4.19
32.833	0.00	0.26	0.561	I	O	|	|	|	|	4.17
32.917	0.00	0.26	0.559	I	O	|	|	|	|	4.16
33.000	0.00	0.26	0.557	I	O	|	|	|	|	4.15
33.083	0.00	0.26	0.555	I	O	|	|	|	|	4.14
33.167	0.00	0.26	0.553	I	O	|	|	|	|	4.13
33.250	0.00	0.26	0.552	I	O	|	|	|	|	4.12
33.333	0.00	0.26	0.550	I	O	|	|	|	|	4.11
33.417	0.00	0.26	0.548	I	O	|	|	|	|	4.10
33.500	0.00	0.26	0.546	I	O	|	|	|	|	4.09
33.583	0.00	0.26	0.544	I	O	|	|	|	|	4.08
33.667	0.00	0.26	0.543	I	O	|	|	|	|	4.07
33.750	0.00	0.26	0.541	I	O	|	|	|	|	4.06
33.833	0.00	0.26	0.539	I	O	|	|	|	|	4.05
33.917	0.00	0.26	0.537	I	O	|	|	|	|	4.04
34.000	0.00	0.26	0.535	I	O	|	|	|	|	4.03
34.083	0.00	0.26	0.534	I	O	|	|	|	|	4.02
34.167	0.00	0.26	0.532	I	O	|	|	|	|	4.01
34.250	0.00	0.26	0.530	I	O	|	|	|	|	3.99
34.333	0.00	0.26	0.528	I	O	|	|	|	|	3.98
34.417	0.00	0.26	0.527	I	O	|	|	|	|	3.97
34.500	0.00	0.26	0.525	I	O	|	|	|	|	3.96
34.583	0.00	0.26	0.523	I	O	|	|	|	|	3.95
34.667	0.00	0.26	0.521	I	O	|	|	|	|	3.94
34.750	0.00	0.26	0.519	I	O	|	|	|	|	3.93
34.833	0.00	0.26	0.518	I	O	|	|	|	|	3.92
34.917	0.00	0.26	0.516	I	O	|	|	|	|	3.91
35.000	0.00	0.26	0.514	I	O	|	|	|	|	3.90
35.083	0.00	0.26	0.512	I	O	|	|	|	|	3.89
35.167	0.00	0.26	0.511	I	O	|	|	|	|	3.88
35.250	0.00	0.25	0.509	I	O	|	|	|	|	3.87
35.333	0.00	0.25	0.507	I	O	|	|	|	|	3.86
35.417	0.00	0.25	0.505	I	O	|	|	|	|	3.85
35.500	0.00	0.25	0.504	I	O	|	|	|	|	3.84
35.583	0.00	0.25	0.502	I	O	|	|	|	|	3.83
35.667	0.00	0.25	0.500	I	O	|	|	|	|	3.82
35.750	0.00	0.25	0.498	I	O	|	|	|	|	3.81
35.833	0.00	0.25	0.497	I	O	|	|	|	|	3.80
35.917	0.00	0.25	0.495	I	O	|	|	|	|	3.79
36.000	0.00	0.25	0.493	I	O	|	|	|	|	3.77
36.083	0.00	0.25	0.491	I	O	|	|	|	|	3.76
36.167	0.00	0.25	0.490	I	O	|	|	|	|	3.75
36.250	0.00	0.25	0.488	I	O	|	|	|	|	3.74
36.333	0.00	0.25	0.486	I	O	|	|	|	|	3.73
36.417	0.00	0.25	0.485	I	O	|	|	|	|	3.72
36.500	0.00	0.25	0.483	I	O	|	|	|	|	3.71
36.583	0.00	0.25	0.481	I	O	|	|	|	|	3.70
36.667	0.00	0.25	0.479	I	O	|	|	|	|	3.69
36.750	0.00	0.25	0.478	I	O	|	|	|	|	3.68
36.833	0.00	0.25	0.476	I	O	|	|	|	|	3.67
36.917	0.00	0.25	0.474	I	O	|	|	|	|	3.66

37.000	0.00	0.25	0.473	I o	|	|	|	3.65
37.083	0.00	0.25	0.471	I o	|	|	|	3.64
37.167	0.00	0.25	0.469	I o	|	|	|	3.63
37.250	0.00	0.24	0.468	I o	|	|	|	3.62
37.333	0.00	0.24	0.466	I o	|	|	|	3.61
37.417	0.00	0.24	0.464	I o	|	|	|	3.60
37.500	0.00	0.24	0.463	I o	|	|	|	3.59
37.583	0.00	0.24	0.461	I o	|	|	|	3.58
37.667	0.00	0.24	0.459	I o	|	|	|	3.57
37.750	0.00	0.24	0.457	I o	|	|	|	3.56
37.833	0.00	0.24	0.456	I o	|	|	|	3.55
37.917	0.00	0.24	0.454	I o	|	|	|	3.54
38.000	0.00	0.24	0.452	I o	|	|	|	3.53
38.083	0.00	0.24	0.451	I o	|	|	|	3.52
38.167	0.00	0.24	0.449	I o	|	|	|	3.51
38.250	0.00	0.24	0.448	I o	|	|	|	3.50
38.333	0.00	0.24	0.446	I o	|	|	|	3.49
38.417	0.00	0.24	0.444	I o	|	|	|	3.48
38.500	0.00	0.24	0.443	I o	|	|	|	3.47
38.583	0.00	0.24	0.441	I o	|	|	|	3.46
38.667	0.00	0.24	0.439	I o	|	|	|	3.45
38.750	0.00	0.24	0.438	I o	|	|	|	3.44
38.833	0.00	0.24	0.436	I o	|	|	|	3.43
38.917	0.00	0.24	0.434	I o	|	|	|	3.42
39.000	0.00	0.24	0.433	I o	|	|	|	3.41
39.083	0.00	0.24	0.431	I o	|	|	|	3.40
39.167	0.00	0.24	0.429	I o	|	|	|	3.39
39.250	0.00	0.24	0.428	I o	|	|	|	3.38
39.333	0.00	0.24	0.426	I o	|	|	|	3.38
39.417	0.00	0.23	0.425	I o	|	|	|	3.37
39.500	0.00	0.23	0.423	I o	|	|	|	3.36
39.583	0.00	0.23	0.421	I o	|	|	|	3.35
39.667	0.00	0.23	0.420	I o	|	|	|	3.34
39.750	0.00	0.23	0.418	I o	|	|	|	3.33
39.833	0.00	0.23	0.417	I o	|	|	|	3.32
39.917	0.00	0.23	0.415	I o	|	|	|	3.31
40.000	0.00	0.23	0.413	I o	|	|	|	3.30
40.083	0.00	0.23	0.412	I o	|	|	|	3.29
40.167	0.00	0.23	0.410	I o	|	|	|	3.28
40.250	0.00	0.23	0.409	I o	|	|	|	3.27
40.333	0.00	0.23	0.407	I o	|	|	|	3.26
40.417	0.00	0.23	0.405	I o	|	|	|	3.25
40.500	0.00	0.23	0.404	I o	|	|	|	3.24
40.583	0.00	0.23	0.402	I o	|	|	|	3.23
40.667	0.00	0.23	0.401	I o	|	|	|	3.22
40.750	0.00	0.23	0.399	I o	|	|	|	3.21
40.833	0.00	0.23	0.398	I o	|	|	|	3.20
40.917	0.00	0.23	0.396	I o	|	|	|	3.19
41.000	0.00	0.23	0.394	I o	|	|	|	3.18
41.083	0.00	0.23	0.393	I o	|	|	|	3.17
41.167	0.00	0.23	0.391	I o	|	|	|	3.16
41.250	0.00	0.23	0.390	I o	|	|	|	3.15
41.333	0.00	0.23	0.388	I o	|	|	|	3.15
41.417	0.00	0.23	0.387	I o	|	|	|	3.14
41.500	0.00	0.23	0.385	I o	|	|	|	3.13
41.583	0.00	0.22	0.384	I o	|	|	|	3.12
41.667	0.00	0.22	0.382	I o	|	|	|	3.11
41.750	0.00	0.22	0.380	I o	|	|	|	3.10
41.833	0.00	0.22	0.379	I o	|	|	|	3.09
41.917	0.00	0.22	0.377	I o	|	|	|	3.08
42.000	0.00	0.22	0.376	I o	|	|	|	3.07
42.083	0.00	0.22	0.374	I o	|	|	|	3.06
42.167	0.00	0.22	0.373	I o	|	|	|	3.05
42.250	0.00	0.22	0.371	I o	|	|	|	3.04
42.333	0.00	0.22	0.370	I o	|	|	|	3.03
42.417	0.00	0.22	0.368	I o	|	|	|	3.03
42.500	0.00	0.22	0.367	I o	|	|	|	3.02
42.583	0.00	0.22	0.365	I o	|	|	|	3.01
42.667	0.00	0.22	0.364	I o	|	|	|	3.00
42.750	0.00	0.22	0.362	I o	|	|	|	2.99
42.833	0.00	0.22	0.361	I o	|	|	|	2.98
42.917	0.00	0.22	0.359	I o	|	|	|	2.97
43.000	0.00	0.22	0.358	I o	|	|	|	2.96
43.083	0.00	0.22	0.356	I o	|	|	|	2.95
43.167	0.00	0.22	0.355	I o	|	|	|	2.94

43.250	0.00	0.22	0.353	I	O	|	|	|	2.93
43.333	0.00	0.22	0.352	I	O	|	|	|	2.92
43.417	0.00	0.22	0.350	I	O	|	|	|	2.91
43.500	0.00	0.22	0.349	I	O	|	|	|	2.90
43.583	0.00	0.22	0.347	I	O	|	|	|	2.89
43.667	0.00	0.22	0.346	I	O	|	|	|	2.89
43.750	0.00	0.22	0.344	I	O	|	|	|	2.88
43.833	0.00	0.21	0.343	I	O	|	|	|	2.87
43.917	0.00	0.21	0.341	I	O	|	|	|	2.86
44.000	0.00	0.21	0.340	I	O	|	|	|	2.85
44.083	0.00	0.21	0.338	I	O	|	|	|	2.84
44.167	0.00	0.21	0.337	I	O	|	|	|	2.83
44.250	0.00	0.21	0.335	I	O	|	|	|	2.82
44.333	0.00	0.21	0.334	I	O	|	|	|	2.81
44.417	0.00	0.21	0.332	I	O	|	|	|	2.80
44.500	0.00	0.21	0.331	I	O	|	|	|	2.79
44.583	0.00	0.21	0.329	I	O	|	|	|	2.78
44.667	0.00	0.21	0.328	I	O	|	|	|	2.78
44.750	0.00	0.21	0.327	I	O	|	|	|	2.77
44.833	0.00	0.21	0.325	I	O	|	|	|	2.76
44.917	0.00	0.21	0.324	I	O	|	|	|	2.75
45.000	0.00	0.21	0.322	I	O	|	|	|	2.74
45.083	0.00	0.21	0.321	I	O	|	|	|	2.73
45.167	0.00	0.21	0.319	I	O	|	|	|	2.72
45.250	0.00	0.21	0.318	I	O	|	|	|	2.71
45.333	0.00	0.21	0.316	I	O	|	|	|	2.70
45.417	0.00	0.21	0.315	I	O	|	|	|	2.69
45.500	0.00	0.21	0.314	I	O	|	|	|	2.69
45.583	0.00	0.21	0.312	I	O	|	|	|	2.68
45.667	0.00	0.21	0.311	I	O	|	|	|	2.67
45.750	0.00	0.21	0.309	I	O	|	|	|	2.66
45.833	0.00	0.21	0.308	I	O	|	|	|	2.65
45.917	0.00	0.21	0.306	I	O	|	|	|	2.64
46.000	0.00	0.21	0.305	I	O	|	|	|	2.63
46.083	0.00	0.20	0.304	I	O	|	|	|	2.62
46.167	0.00	0.20	0.302	I	O	|	|	|	2.61
46.250	0.00	0.20	0.301	I	O	|	|	|	2.61
46.333	0.00	0.20	0.299	I	O	|	|	|	2.60
46.417	0.00	0.20	0.298	I	O	|	|	|	2.59
46.500	0.00	0.20	0.297	I	O	|	|	|	2.58
46.583	0.00	0.20	0.295	I	O	|	|	|	2.57
46.667	0.00	0.20	0.294	I	O	|	|	|	2.56
46.750	0.00	0.20	0.292	I	O	|	|	|	2.55
46.833	0.00	0.20	0.291	I	O	|	|	|	2.54
46.917	0.00	0.20	0.290	I	O	|	|	|	2.54
47.000	0.00	0.20	0.288	I	O	|	|	|	2.53
47.083	0.00	0.20	0.287	I	O	|	|	|	2.52
47.167	0.00	0.20	0.286	I	O	|	|	|	2.51
47.250	0.00	0.20	0.284	I	O	|	|	|	2.50
47.333	0.00	0.20	0.283	I	O	|	|	|	2.49
47.417	0.00	0.20	0.281	I	O	|	|	|	2.48
47.500	0.00	0.20	0.280	I	O	|	|	|	2.47
47.583	0.00	0.20	0.279	I	O	|	|	|	2.46
47.667	0.00	0.20	0.277	I	O	|	|	|	2.46
47.750	0.00	0.20	0.276	I	O	|	|	|	2.45
47.833	0.00	0.20	0.275	I	O	|	|	|	2.44
47.917	0.00	0.20	0.273	I	O	|	|	|	2.43
48.000	0.00	0.20	0.272	I	O	|	|	|	2.42
48.083	0.00	0.20	0.270	I	O	|	|	|	2.41
48.167	0.00	0.20	0.269	I	O	|	|	|	2.40
48.250	0.00	0.20	0.268	I	O	|	|	|	2.39
48.333	0.00	0.20	0.266	I	O	|	|	|	2.38
48.417	0.00	0.20	0.265	I	O	|	|	|	2.38
48.500	0.00	0.19	0.264	I	O	|	|	|	2.37
48.583	0.00	0.19	0.262	I	O	|	|	|	2.36
48.667	0.00	0.19	0.261	I	O	|	|	|	2.35
48.750	0.00	0.19	0.260	I	O	|	|	|	2.34
48.833	0.00	0.19	0.258	I	O	|	|	|	2.33
48.917	0.00	0.19	0.257	I	O	|	|	|	2.32
49.000	0.00	0.19	0.256	I	O	|	|	|	2.31
49.083	0.00	0.19	0.254	I	O	|	|	|	2.31
49.167	0.00	0.19	0.253	I	O	|	|	|	2.30
49.250	0.00	0.19	0.252	I	O	|	|	|	2.29
49.333	0.00	0.19	0.250	I	O	|	|	|	2.28
49.417	0.00	0.19	0.249	I	O	|	|	|	2.27

49.500	0.00	0.19	0.248	I o	|	|	|	2.26
49.583	0.00	0.19	0.247	I o	|	|	|	2.25
49.667	0.00	0.19	0.245	I o	|	|	|	2.24
49.750	0.00	0.19	0.244	I o	|	|	|	2.24
49.833	0.00	0.19	0.243	I o	|	|	|	2.23
49.917	0.00	0.19	0.241	I o	|	|	|	2.22
50.000	0.00	0.19	0.240	I o	|	|	|	2.21
50.083	0.00	0.19	0.239	I o	|	|	|	2.20
50.167	0.00	0.19	0.237	I o	|	|	|	2.19
50.250	0.00	0.19	0.236	I o	|	|	|	2.19
50.333	0.00	0.19	0.235	I o	|	|	|	2.18
50.417	0.00	0.19	0.234	I o	|	|	|	2.17
50.500	0.00	0.19	0.232	I o	|	|	|	2.16
50.583	0.00	0.19	0.231	I o	|	|	|	2.15
50.667	0.00	0.19	0.230	I o	|	|	|	2.14
50.750	0.00	0.19	0.228	I o	|	|	|	2.13
50.833	0.00	0.19	0.227	I o	|	|	|	2.13
50.917	0.00	0.18	0.226	I o	|	|	|	2.12
51.000	0.00	0.18	0.225	I o	|	|	|	2.11
51.083	0.00	0.18	0.223	I o	|	|	|	2.10
51.167	0.00	0.18	0.222	I o	|	|	|	2.09
51.250	0.00	0.18	0.221	I o	|	|	|	2.08
51.333	0.00	0.18	0.220	I o	|	|	|	2.08
51.417	0.00	0.18	0.218	I o	|	|	|	2.07
51.500	0.00	0.18	0.217	I o	|	|	|	2.06
51.583	0.00	0.18	0.216	I o	|	|	|	2.05
51.667	0.00	0.18	0.215	I o	|	|	|	2.04
51.750	0.00	0.18	0.213	I o	|	|	|	2.03
51.833	0.00	0.18	0.212	I o	|	|	|	2.03
51.917	0.00	0.18	0.211	I o	|	|	|	2.02
52.000	0.00	0.18	0.210	I o	|	|	|	2.01
52.083	0.00	0.18	0.208	I o	|	|	|	2.00
52.167	0.00	0.18	0.207	I o	|	|	|	1.99
52.250	0.00	0.18	0.206	I o	|	|	|	1.98
52.333	0.00	0.18	0.205	I o	|	|	|	1.98
52.417	0.00	0.18	0.203	I o	|	|	|	1.97
52.500	0.00	0.18	0.202	I o	|	|	|	1.96
52.583	0.00	0.18	0.201	I o	|	|	|	1.95
52.667	0.00	0.18	0.200	I o	|	|	|	1.94
52.750	0.00	0.18	0.198	I o	|	|	|	1.93
52.833	0.00	0.18	0.197	I o	|	|	|	1.92
52.917	0.00	0.18	0.196	I o	|	|	|	1.91
53.000	0.00	0.18	0.195	I o	|	|	|	1.91
53.083	0.00	0.18	0.194	I o	|	|	|	1.90
53.167	0.00	0.18	0.192	I o	|	|	|	1.89
53.250	0.00	0.18	0.191	I o	|	|	|	1.88
53.333	0.00	0.17	0.190	I o	|	|	|	1.87
53.417	0.00	0.17	0.189	I o	|	|	|	1.86
53.500	0.00	0.17	0.188	I o	|	|	|	1.85
53.583	0.00	0.17	0.186	I o	|	|	|	1.85
53.667	0.00	0.17	0.185	I o	|	|	|	1.84
53.750	0.00	0.17	0.184	I o	|	|	|	1.83
53.833	0.00	0.17	0.183	I o	|	|	|	1.82
53.917	0.00	0.17	0.182	I o	|	|	|	1.81
54.000	0.00	0.17	0.180	I o	|	|	|	1.80
54.083	0.00	0.17	0.179	I o	|	|	|	1.79
54.167	0.00	0.17	0.178	I o	|	|	|	1.79
54.250	0.00	0.17	0.177	I o	|	|	|	1.78
54.333	0.00	0.17	0.176	I o	|	|	|	1.77
54.417	0.00	0.17	0.175	I o	|	|	|	1.76
54.500	0.00	0.17	0.173	I o	|	|	|	1.75
54.583	0.00	0.17	0.172	I o	|	|	|	1.74
54.667	0.00	0.17	0.171	I o	|	|	|	1.74
54.750	0.00	0.17	0.170	I o	|	|	|	1.73
54.833	0.00	0.17	0.169	I o	|	|	|	1.72
54.917	0.00	0.17	0.168	I o	|	|	|	1.71
55.000	0.00	0.17	0.166	I o	|	|	|	1.70
55.083	0.00	0.17	0.165	I o	|	|	|	1.69
55.167	0.00	0.17	0.164	I o	|	|	|	1.69
55.250	0.00	0.17	0.163	I o	|	|	|	1.68
55.333	0.00	0.17	0.162	I o	|	|	|	1.67
55.417	0.00	0.17	0.161	I o	|	|	|	1.66
55.500	0.00	0.17	0.159	I o	|	|	|	1.65
55.583	0.00	0.17	0.158	I o	|	|	|	1.64
55.667	0.00	0.17	0.157	I o	|	|	|	1.64

55.750	0.00	0.17	0.156	I o	|	|	|	1.63
55.833	0.00	0.16	0.155	I o	|	|	|	1.62
55.917	0.00	0.16	0.154	I o	|	|	|	1.61
56.000	0.00	0.16	0.153	I o	|	|	|	1.60
56.083	0.00	0.16	0.151	I o	|	|	|	1.60
56.167	0.00	0.16	0.150	I o	|	|	|	1.59
56.250	0.00	0.16	0.149	I o	|	|	|	1.58
56.333	0.00	0.16	0.148	I o	|	|	|	1.57
56.417	0.00	0.16	0.147	I o	|	|	|	1.56
56.500	0.00	0.16	0.146	I o	|	|	|	1.56
56.583	0.00	0.16	0.145	I o	|	|	|	1.55
56.667	0.00	0.16	0.144	I o	|	|	|	1.54
56.750	0.00	0.16	0.143	I o	|	|	|	1.53
56.833	0.00	0.16	0.141	I o	|	|	|	1.52
56.917	0.00	0.16	0.140	I o	|	|	|	1.52
57.000	0.00	0.16	0.139	I o	|	|	|	1.51
57.083	0.00	0.16	0.138	I o	|	|	|	1.50
57.167	0.00	0.16	0.137	I o	|	|	|	1.49
57.250	0.00	0.16	0.136	I o	|	|	|	1.48
57.333	0.00	0.16	0.135	I o	|	|	|	1.47
57.417	0.00	0.16	0.134	I o	|	|	|	1.46
57.500	0.00	0.16	0.133	I o	|	|	|	1.46
57.583	0.00	0.16	0.132	I o	|	|	|	1.45
57.667	0.00	0.16	0.130	I o	|	|	|	1.44
57.750	0.00	0.16	0.129	I o	|	|	|	1.43
57.833	0.00	0.16	0.128	I o	|	|	|	1.42
57.917	0.00	0.15	0.127	I o	|	|	|	1.41
58.000	0.00	0.15	0.126	I o	|	|	|	1.40
58.083	0.00	0.15	0.125	I o	|	|	|	1.39
58.167	0.00	0.15	0.124	I o	|	|	|	1.39
58.250	0.00	0.15	0.123	I o	|	|	|	1.38
58.333	0.00	0.15	0.122	I o	|	|	|	1.37
58.417	0.00	0.15	0.121	I o	|	|	|	1.36
58.500	0.00	0.15	0.120	I o	|	|	|	1.35
58.583	0.00	0.15	0.119	I o	|	|	|	1.34
58.667	0.00	0.15	0.118	I o	|	|	|	1.33
58.750	0.00	0.15	0.117	I o	|	|	|	1.33
58.833	0.00	0.15	0.116	I o	|	|	|	1.32
58.917	0.00	0.15	0.115	I o	|	|	|	1.31
59.000	0.00	0.15	0.114	I o	|	|	|	1.30
59.083	0.00	0.15	0.113	I o	|	|	|	1.29
59.167	0.00	0.15	0.112	I o	|	|	|	1.28
59.250	0.00	0.15	0.111	I o	|	|	|	1.28
59.333	0.00	0.15	0.110	I o	|	|	|	1.27
59.417	0.00	0.15	0.109	I o	|	|	|	1.26
59.500	0.00	0.15	0.108	I o	|	|	|	1.25
59.583	0.00	0.14	0.107	I o	|	|	|	1.24
59.667	0.00	0.14	0.106	I o	|	|	|	1.23
59.750	0.00	0.14	0.105	I o	|	|	|	1.23
59.833	0.00	0.14	0.104	I o	|	|	|	1.22
59.917	0.00	0.14	0.103	I o	|	|	|	1.21
60.000	0.00	0.14	0.102	I o	|	|	|	1.20
60.083	0.00	0.14	0.101	I o	|	|	|	1.19
60.167	0.00	0.14	0.100	I o	|	|	|	1.19
60.250	0.00	0.14	0.099	I o	|	|	|	1.18
60.333	0.00	0.14	0.098	I o	|	|	|	1.17
60.417	0.00	0.14	0.097	I o	|	|	|	1.16
60.500	0.00	0.14	0.096	I o	|	|	|	1.15
60.583	0.00	0.14	0.095	I o	|	|	|	1.15
60.667	0.00	0.14	0.094	I o	|	|	|	1.14
60.750	0.00	0.14	0.093	I o	|	|	|	1.13
60.833	0.00	0.14	0.092	I o	|	|	|	1.12
60.917	0.00	0.14	0.091	I o	|	|	|	1.12
61.000	0.00	0.14	0.090	I o	|	|	|	1.11
61.083	0.00	0.14	0.089	I o	|	|	|	1.10
61.167	0.00	0.14	0.088	I o	|	|	|	1.09
61.250	0.00	0.14	0.087	I o	|	|	|	1.09
61.333	0.00	0.13	0.086	I o	|	|	|	1.08
61.417	0.00	0.13	0.086	I o	|	|	|	1.07
61.500	0.00	0.13	0.085	I o	|	|	|	1.06
61.583	0.00	0.13	0.084	I o	|	|	|	1.05
61.667	0.00	0.13	0.083	I o	|	|	|	1.05
61.750	0.00	0.13	0.082	I o	|	|	|	1.04
61.833	0.00	0.13	0.081	I o	|	|	|	1.03
61.917	0.00	0.13	0.080	I o	|	|	|	1.03

62.000	0.00	0.13	0.079	I O	|	|	|	1.02
62.083	0.00	0.13	0.078	I O	|	|	|	1.01
62.167	0.00	0.13	0.077	I O	|	|	|	1.00
62.250	0.00	0.13	0.076	I O	|	|	|	0.99
62.333	0.00	0.13	0.076	I O	|	|	|	0.99
62.417	0.00	0.13	0.075	I O	|	|	|	0.98
62.500	0.00	0.13	0.074	I O	|	|	|	0.97
62.583	0.00	0.13	0.073	I O	|	|	|	0.96
62.667	0.00	0.13	0.072	I O	|	|	|	0.95
62.750	0.00	0.13	0.071	I O	|	|	|	0.94
62.833	0.00	0.12	0.070	I O	|	|	|	0.93
62.917	0.00	0.12	0.069	I O	|	|	|	0.92
63.000	0.00	0.12	0.069	I O	|	|	|	0.91
63.083	0.00	0.12	0.068	IO	|	|	|	0.91
63.167	0.00	0.12	0.067	IO	|	|	|	0.90
63.250	0.00	0.12	0.066	IO	|	|	|	0.89
63.333	0.00	0.12	0.065	IO	|	|	|	0.88
63.417	0.00	0.12	0.064	IO	|	|	|	0.87
63.500	0.00	0.12	0.064	IO	|	|	|	0.86
63.583	0.00	0.12	0.063	IO	|	|	|	0.86
63.667	0.00	0.12	0.062	IO	|	|	|	0.85
63.750	0.00	0.12	0.061	IO	|	|	|	0.84
63.833	0.00	0.12	0.060	IO	|	|	|	0.83
63.917	0.00	0.12	0.060	IO	|	|	|	0.82
64.000	0.00	0.12	0.059	IO	|	|	|	0.81
64.083	0.00	0.11	0.058	IO	|	|	|	0.81
64.167	0.00	0.11	0.057	IO	|	|	|	0.80
64.250	0.00	0.11	0.056	IO	|	|	|	0.79
64.333	0.00	0.11	0.056	IO	|	|	|	0.78
64.417	0.00	0.11	0.055	IO	|	|	|	0.77
64.500	0.00	0.11	0.054	IO	|	|	|	0.77
64.583	0.00	0.11	0.053	IO	|	|	|	0.76
64.667	0.00	0.11	0.053	IO	|	|	|	0.75
64.750	0.00	0.11	0.052	IO	|	|	|	0.74
64.833	0.00	0.11	0.051	IO	|	|	|	0.74
64.917	0.00	0.11	0.050	IO	|	|	|	0.73
65.000	0.00	0.11	0.050	IO	|	|	|	0.72
65.083	0.00	0.11	0.049	IO	|	|	|	0.71
65.167	0.00	0.11	0.048	IO	|	|	|	0.71
65.250	0.00	0.11	0.047	IO	|	|	|	0.70
65.333	0.00	0.11	0.047	IO	|	|	|	0.69
65.417	0.00	0.10	0.046	IO	|	|	|	0.68
65.500	0.00	0.10	0.045	IO	|	|	|	0.68
65.583	0.00	0.10	0.044	IO	|	|	|	0.67
65.667	0.00	0.10	0.044	IO	|	|	|	0.66
65.750	0.00	0.10	0.043	IO	|	|	|	0.65
65.833	0.00	0.10	0.042	IO	|	|	|	0.65
65.917	0.00	0.10	0.042	IO	|	|	|	0.64
66.000	0.00	0.10	0.041	IO	|	|	|	0.63
66.083	0.00	0.10	0.040	IO	|	|	|	0.63
66.167	0.00	0.10	0.040	IO	|	|	|	0.62
66.250	0.00	0.10	0.039	IO	|	|	|	0.61
66.333	0.00	0.10	0.038	IO	|	|	|	0.60
66.417	0.00	0.10	0.038	IO	|	|	|	0.60
66.500	0.00	0.10	0.037	IO	|	|	|	0.59
66.583	0.00	0.10	0.036	IO	|	|	|	0.58
66.667	0.00	0.10	0.036	IO	|	|	|	0.58
66.750	0.00	0.10	0.035	IO	|	|	|	0.57
66.833	0.00	0.10	0.034	IO	|	|	|	0.56
66.917	0.00	0.09	0.034	IO	|	|	|	0.56
67.000	0.00	0.09	0.033	IO	|	|	|	0.55
67.083	0.00	0.09	0.032	IO	|	|	|	0.54
67.167	0.00	0.09	0.032	IO	|	|	|	0.54
67.250	0.00	0.09	0.031	IO	|	|	|	0.53
67.333	0.00	0.09	0.030	IO	|	|	|	0.52
67.417	0.00	0.09	0.030	IO	|	|	|	0.52
67.500	0.00	0.09	0.029	IO	|	|	|	0.51
67.583	0.00	0.09	0.028	IO	|	|	|	0.51
67.667	0.00	0.09	0.028	IO	|	|	|	0.50
67.750	0.00	0.09	0.027	IO	|	|	|	0.49
67.833	0.00	0.09	0.027	IO	|	|	|	0.48
67.917	0.00	0.08	0.026	IO	|	|	|	0.47
68.000	0.00	0.08	0.026	IO	|	|	|	0.46
68.083	0.00	0.08	0.025	IO	|	|	|	0.45
68.167	0.00	0.08	0.024	IO	|	|	|	0.44

68.250	0.00	0.08	0.024	IO	|	|	|	|	0.43
68.333	0.00	0.07	0.023	IO	|	|	|	|	0.42
68.417	0.00	0.07	0.023	IO	|	|	|	|	0.41
68.500	0.00	0.07	0.022	IO	|	|	|	|	0.40
68.583	0.00	0.07	0.022	IO	|	|	|	|	0.39
68.667	0.00	0.07	0.021	IO	|	|	|	|	0.39
68.750	0.00	0.07	0.021	IO	|	|	|	|	0.38
68.833	0.00	0.06	0.021	IO	|	|	|	|	0.37
68.917	0.00	0.06	0.020	IO	|	|	|	|	0.36
69.000	0.00	0.06	0.020	O	|	|	|	|	0.36
69.083	0.00	0.06	0.019	O	|	|	|	|	0.35
69.167	0.00	0.06	0.019	O	|	|	|	|	0.34
69.250	0.00	0.06	0.019	O	|	|	|	|	0.33
69.333	0.00	0.05	0.018	O	|	|	|	|	0.33
69.417	0.00	0.05	0.018	O	|	|	|	|	0.32
69.500	0.00	0.05	0.017	O	|	|	|	|	0.31
69.583	0.00	0.05	0.017	O	|	|	|	|	0.31
69.667	0.00	0.05	0.017	O	|	|	|	|	0.30
69.750	0.00	0.05	0.016	O	|	|	|	|	0.30
69.833	0.00	0.05	0.016	O	|	|	|	|	0.29
69.917	0.00	0.05	0.016	O	|	|	|	|	0.28
70.000	0.00	0.05	0.015	O	|	|	|	|	0.28
70.083	0.00	0.04	0.015	O	|	|	|	|	0.27
70.167	0.00	0.04	0.015	O	|	|	|	|	0.27
70.250	0.00	0.04	0.014	O	|	|	|	|	0.26
70.333	0.00	0.04	0.014	O	|	|	|	|	0.26
70.417	0.00	0.04	0.014	O	|	|	|	|	0.25
70.500	0.00	0.04	0.014	O	|	|	|	|	0.25
70.583	0.00	0.04	0.013	O	|	|	|	|	0.24
70.667	0.00	0.04	0.013	O	|	|	|	|	0.24
70.750	0.00	0.04	0.013	O	|	|	|	|	0.24
70.833	0.00	0.04	0.013	O	|	|	|	|	0.23
70.917	0.00	0.03	0.012	O	|	|	|	|	0.23
71.000	0.00	0.03	0.012	O	|	|	|	|	0.22
71.083	0.00	0.03	0.012	O	|	|	|	|	0.22
71.167	0.00	0.03	0.012	O	|	|	|	|	0.22
71.250	0.00	0.03	0.011	O	|	|	|	|	0.21
71.333	0.00	0.03	0.011	O	|	|	|	|	0.21
71.417	0.00	0.03	0.011	O	|	|	|	|	0.20
71.500	0.00	0.03	0.011	O	|	|	|	|	0.20
71.583	0.00	0.03	0.011	O	|	|	|	|	0.20
71.667	0.00	0.03	0.010	O	|	|	|	|	0.19
71.750	0.00	0.03	0.010	O	|	|	|	|	0.19
71.833	0.00	0.03	0.010	O	|	|	|	|	0.19
71.917	0.00	0.03	0.010	O	|	|	|	|	0.18
72.000	0.00	0.03	0.010	O	|	|	|	|	0.18
72.083	0.00	0.02	0.010	O	|	|	|	|	0.18
72.167	0.00	0.02	0.009	O	|	|	|	|	0.18
72.250	0.00	0.02	0.009	O	|	|	|	|	0.17
72.333	0.00	0.02	0.009	O	|	|	|	|	0.17
72.417	0.00	0.02	0.009	O	|	|	|	|	0.17
72.500	0.00	0.02	0.009	O	|	|	|	|	0.16
72.583	0.00	0.02	0.009	O	|	|	|	|	0.16
72.667	0.00	0.02	0.008	O	|	|	|	|	0.16
72.750	0.00	0.02	0.008	O	|	|	|	|	0.16
72.833	0.00	0.02	0.008	O	|	|	|	|	0.15
72.917	0.00	0.02	0.008	O	|	|	|	|	0.15
73.000	0.00	0.02	0.008	O	|	|	|	|	0.15
73.083	0.00	0.02	0.008	O	|	|	|	|	0.15
73.167	0.00	0.02	0.008	O	|	|	|	|	0.15
73.250	0.00	0.02	0.008	O	|	|	|	|	0.14
73.333	0.00	0.02	0.007	O	|	|	|	|	0.14
73.417	0.00	0.02	0.007	O	|	|	|	|	0.14
73.500	0.00	0.02	0.007	O	|	|	|	|	0.14
73.583	0.00	0.02	0.007	O	|	|	|	|	0.14
73.667	0.00	0.02	0.007	O	|	|	|	|	0.13
73.750	0.00	0.01	0.007	O	|	|	|	|	0.13
73.833	0.00	0.01	0.007	O	|	|	|	|	0.13
73.917	0.00	0.01	0.007	O	|	|	|	|	0.13
74.000	0.00	0.01	0.007	O	|	|	|	|	0.13
74.083	0.00	0.01	0.007	O	|	|	|	|	0.12
74.167	0.00	0.01	0.006	O	|	|	|	|	0.12
74.250	0.00	0.01	0.006	O	|	|	|	|	0.12
74.333	0.00	0.01	0.006	O	|	|	|	|	0.12
74.417	0.00	0.01	0.006	O	|	|	|	|	0.12

74.500	0.00	0.01	0.006	o	|	|	|	|	0.12
74.583	0.00	0.01	0.006	o	|	|	|	|	0.12
74.667	0.00	0.01	0.006	o	|	|	|	|	0.11
74.750	0.00	0.01	0.006	o	|	|	|	|	0.11
74.833	0.00	0.01	0.006	o	|	|	|	|	0.11
74.917	0.00	0.01	0.006	o	|	|	|	|	0.11
75.000	0.00	0.01	0.006	o	|	|	|	|	0.11
75.083	0.00	0.01	0.006	o	|	|	|	|	0.11
75.167	0.00	0.01	0.005	o	|	|	|	|	0.11
75.250	0.00	0.01	0.005	o	|	|	|	|	0.11
75.333	0.00	0.01	0.005	o	|	|	|	|	0.10
75.417	0.00	0.01	0.005	o	|	|	|	|	0.10
75.500	0.00	0.01	0.005	o	|	|	|	|	0.10
75.583	0.00	0.01	0.005	o	|	|	|	|	0.10
75.667	0.00	0.01	0.005	o	|	|	|	|	0.10
75.750	0.00	0.01	0.005	o	|	|	|	|	0.10
75.833	0.00	0.01	0.005	o	|	|	|	|	0.10
75.917	0.00	0.01	0.005	o	|	|	|	|	0.10
76.000	0.00	0.01	0.005	o	|	|	|	|	0.10
76.083	0.00	0.01	0.005	o	|	|	|	|	0.10
76.167	0.00	0.01	0.005	o	|	|	|	|	0.09
76.250	0.00	0.01	0.005	o	|	|	|	|	0.09
76.333	0.00	0.01	0.005	o	|	|	|	|	0.09
76.417	0.00	0.01	0.005	o	|	|	|	|	0.09
76.500	0.00	0.01	0.005	o	|	|	|	|	0.09
76.583	0.00	0.01	0.005	o	|	|	|	|	0.09
76.667	0.00	0.01	0.005	o	|	|	|	|	0.09
76.750	0.00	0.01	0.004	o	|	|	|	|	0.09
76.833	0.00	0.01	0.004	o	|	|	|	|	0.09
76.917	0.00	0.01	0.004	o	|	|	|	|	0.09
77.000	0.00	0.01	0.004	o	|	|	|	|	0.09
77.083	0.00	0.01	0.004	o	|	|	|	|	0.09
77.167	0.00	0.01	0.004	o	|	|	|	|	0.08
77.250	0.00	0.01	0.004	o	|	|	|	|	0.08
77.333	0.00	0.01	0.004	o	|	|	|	|	0.08
77.417	0.00	0.01	0.004	o	|	|	|	|	0.08
77.500	0.00	0.00	0.004	o	|	|	|	|	0.08
77.583	0.00	0.00	0.004	o	|	|	|	|	0.08
77.667	0.00	0.00	0.004	o	|	|	|	|	0.08
77.750	0.00	0.00	0.004	o	|	|	|	|	0.08
77.833	0.00	0.00	0.004	o	|	|	|	|	0.08
77.917	0.00	0.00	0.004	o	|	|	|	|	0.08
78.000	0.00	0.00	0.004	o	|	|	|	|	0.08
78.083	0.00	0.00	0.004	o	|	|	|	|	0.08
78.167	0.00	0.00	0.004	o	|	|	|	|	0.08
78.250	0.00	0.00	0.004	o	|	|	|	|	0.08
78.333	0.00	0.00	0.004	o	|	|	|	|	0.08
78.417	0.00	0.00	0.004	o	|	|	|	|	0.08
78.500	0.00	0.00	0.004	o	|	|	|	|	0.08
78.583	0.00	0.00	0.004	o	|	|	|	|	0.08
78.667	0.00	0.00	0.004	o	|	|	|	|	0.08
78.750	0.00	0.00	0.004	o	|	|	|	|	0.07
78.833	0.00	0.00	0.004	o	|	|	|	|	0.07
78.917	0.00	0.00	0.004	o	|	|	|	|	0.07
79.000	0.00	0.00	0.004	o	|	|	|	|	0.07
79.083	0.00	0.00	0.004	o	|	|	|	|	0.07
79.167	0.00	0.00	0.004	o	|	|	|	|	0.07
79.250	0.00	0.00	0.004	o	|	|	|	|	0.07
79.333	0.00	0.00	0.004	o	|	|	|	|	0.07
79.417	0.00	0.00	0.004	o	|	|	|	|	0.07
79.500	0.00	0.00	0.003	o	|	|	|	|	0.07
79.583	0.00	0.00	0.003	o	|	|	|	|	0.07
79.667	0.00	0.00	0.003	o	|	|	|	|	0.07
79.750	0.00	0.00	0.003	o	|	|	|	|	0.07
79.833	0.00	0.00	0.003	o	|	|	|	|	0.07
79.917	0.00	0.00	0.003	o	|	|	|	|	0.07
80.000	0.00	0.00	0.003	o	|	|	|	|	0.07
80.083	0.00	0.00	0.003	o	|	|	|	|	0.07
80.167	0.00	0.00	0.003	o	|	|	|	|	0.07
80.250	0.00	0.00	0.003	o	|	|	|	|	0.07
80.333	0.00	0.00	0.003	o	|	|	|	|	0.07
80.417	0.00	0.00	0.003	o	|	|	|	|	0.07
80.500	0.00	0.00	0.003	o	|	|	|	|	0.07
80.583	0.00	0.00	0.003	o	|	|	|	|	0.07
80.667	0.00	0.00	0.003	o	|	|	|	|	0.07

80.750	0.00	0.00	0.003	o	|	|	|	0.07
80.833	0.00	0.00	0.003	o	|	|	|	0.07
80.917	0.00	0.00	0.003	o	|	|	|	0.07
81.000	0.00	0.00	0.003	o	|	|	|	0.07
81.083	0.00	0.00	0.003	o	|	|	|	0.07
81.167	0.00	0.00	0.003	o	|	|	|	0.07
81.250	0.00	0.00	0.003	o	|	|	|	0.07
81.333	0.00	0.00	0.003	o	|	|	|	0.07
81.417	0.00	0.00	0.003	o	|	|	|	0.07
81.500	0.00	0.00	0.003	o	|	|	|	0.07
81.583	0.00	0.00	0.003	o	|	|	|	0.07
81.667	0.00	0.00	0.003	o	|	|	|	0.07
81.750	0.00	0.00	0.003	o	|	|	|	0.07
81.833	0.00	0.00	0.003	o	|	|	|	0.06
81.917	0.00	0.00	0.003	o	|	|	|	0.06
82.000	0.00	0.00	0.003	o	|	|	|	0.06
82.083	0.00	0.00	0.003	o	|	|	|	0.06
82.167	0.00	0.00	0.003	o	|	|	|	0.06
82.250	0.00	0.00	0.003	o	|	|	|	0.06
82.333	0.00	0.00	0.003	o	|	|	|	0.06
82.417	0.00	0.00	0.003	o	|	|	|	0.06
82.500	0.00	0.00	0.003	o	|	|	|	0.06
82.583	0.00	0.00	0.003	o	|	|	|	0.06
82.667	0.00	0.00	0.003	o	|	|	|	0.06
82.750	0.00	0.00	0.003	o	|	|	|	0.06
82.833	0.00	0.00	0.003	o	|	|	|	0.06
82.917	0.00	0.00	0.003	o	|	|	|	0.06
83.000	0.00	0.00	0.003	o	|	|	|	0.06

Remaining water in basin = 0.00 (Ac.Ft)

**********HYDROGRAPH DATA**********

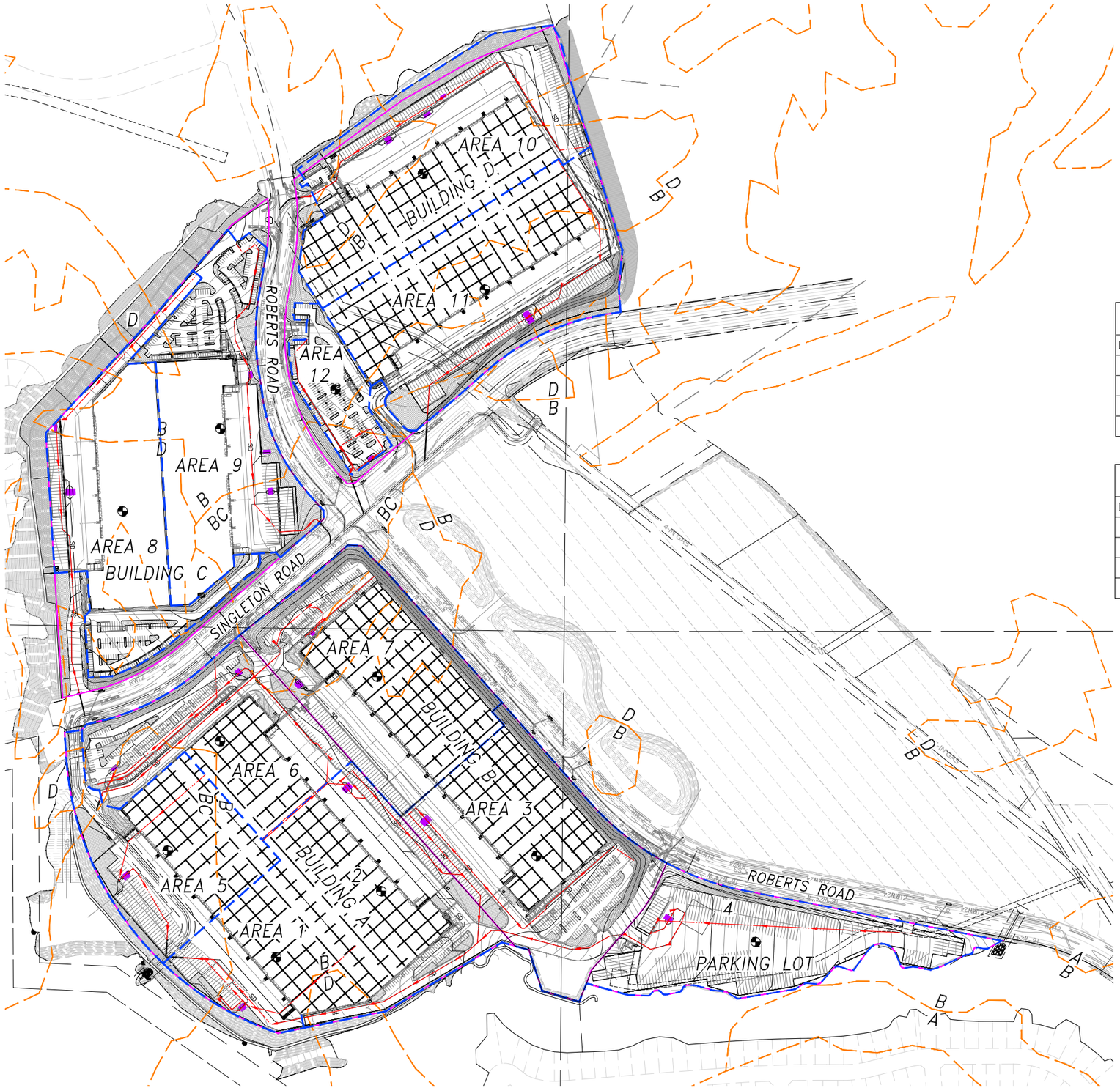
Number of intervals = 996
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.318 (CFS)
Total volume = 1.193 (Ac.Ft)

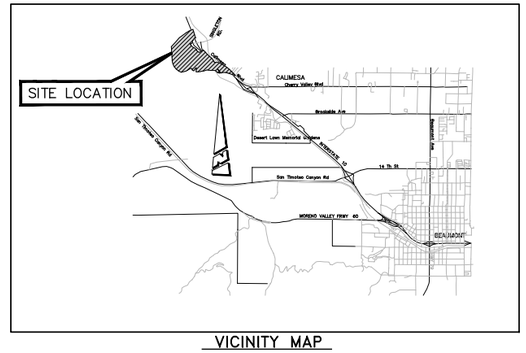
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

UNIT HYDROGRAPH HYDROLOGY MAP





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

PROPOSED AREAS						
DRAINAGE AREA	1	2	3	4	5	6
TOTAL AREA	6.8 AC	9.5 AC	12.3 AC	9.2 AC	8.1 AC	9.0 AC
L_T	1116 Ft	2462 Ft	2287 Ft	3348 Ft	899 Ft	1634 Ft
L_{CA}	860 Ft	2251 Ft	2251 Ft	2754 Ft	602 Ft	512 Ft
ΔH	6.5 Ft	6.50 Ft	9.30 Ft	37.50 Ft	6.50	3.70 Ft

PROPOSED AREAS						
DRAINAGE AREA	7	8	9	10	11	12
TOTAL AREA	12.5 AC	11.2 AC	12.1 AC	14.1 AC	14.1 AC	2.9 AC
L_T	1378 Ft	1821 Ft	1395 Ft	1473 Ft	1370 Ft	621 Ft
L_{CA}	1136 Ft	683 Ft	552 Ft	540 Ft	486 Ft	341 Ft
ΔH	3.3 Ft	29.30 Ft	18 Ft	7 Ft	2.80 Ft	9 Ft

LEGEND

NODE / ELEV – NODE NUMBER / ELEVATION (FT)

AC / FT – AREA (AC) / LENGTH (FT)

– DRAINAGE AREA BOUNDARY (PROPOSED)

– FLOWLINE (PROPOSED)

– PROJECT BOUNDARY

– NRCS SOIL BOUNDARY

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N W WEBB E S

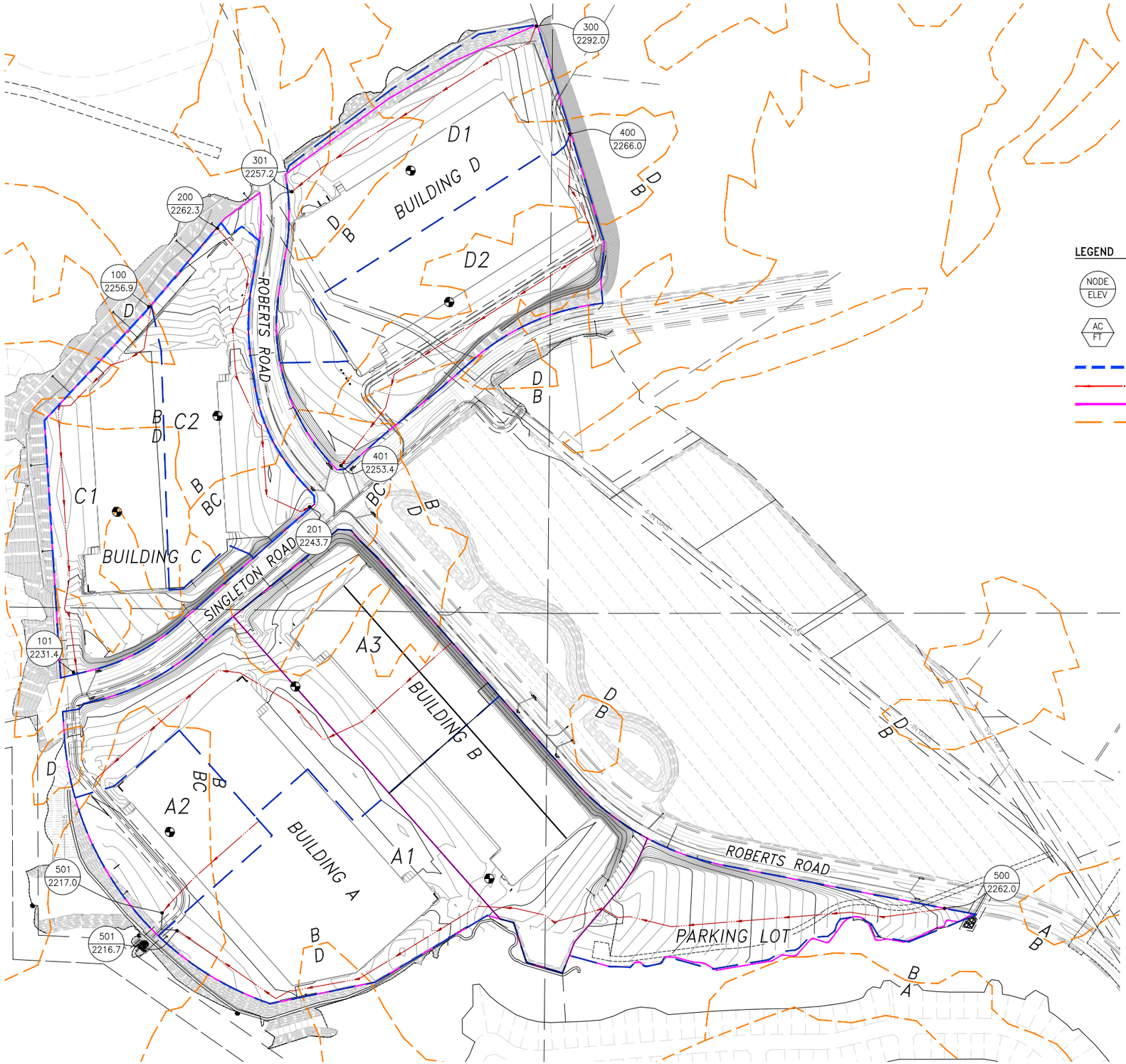
1" = 200'
200 0 200 400 600

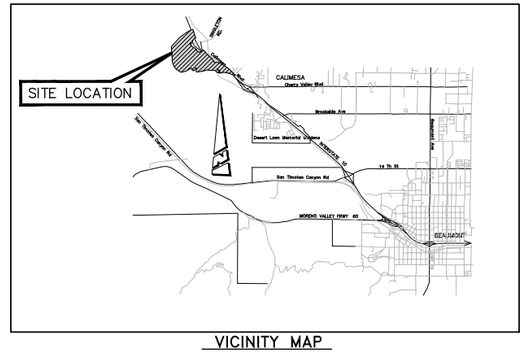
CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
PRELIMINARY PROPOSED UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	ALBERT A. WEBB ASSOCIATES	W.O. 21-0034
DATE:	12/14/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	SHEET 1
DESIGNED:	EP		OF 1 SHEETS
CHECKED:	BJV		DWG. NO.
PLN CK REF:			
F.B.			

H:\2021\21-0034\DRAINAGE\PHYD\DWG FOLDER\21-0034 PRELIM UH MAP 2021-11-23.DWG 12/6/2021 4:30:41 PM





VICINITY MAP
N.T.S.
T2S, R2W, SECTION 23,24,25,26

LEGEND

NODE / ELEV	– NODE NUMBER – ELEVATION (FT)
AC / FT	– AREA (AC) – LENGTH (FT)
	– DRAINAGE AREA BOUNDARY
	– FLOWLINE (PROPOSED)
	– PROJECT BOUNDARY
	– NRCS SOIL BOUNDARY

EXISTING AREAS			
DRAINAGE AREA	A1	A2	A3
TOTAL AREA	37.7 AC	7.5 AC	21.7 AC
L_T	3231 Ft	526 Ft	1790 Ft
L_{CA}	1394 Ft	234 Ft	939 Ft
ΔH	45.0 Ft	7 Ft	23 Ft

EXISTING AREAS		
DRAINAGE AREA	C1	C2
TOTAL AREA	13.2 AC	11.8 AC
L_T	1645 Ft	1321 Ft
L_{CA}	629 Ft	574 Ft
ΔH	25.0 Ft	19 Ft

EXISTING AREAS		
DRAINAGE AREA	D1	D2
TOTAL AREA	15.8 AC	16.9 AC
L_T	1174 Ft	1828 Ft
L_{CA}	440 Ft	756 Ft
ΔH	35.0 Ft	13 Ft

GENERAL NOTES:

1. OVERALL BLCOV PROJECT AREA WILL BE MASS GRADED AND BACKBONE IMPROVEMENTS WILL BE CONSTRUCTED PRIOR TO ANY CONSTRUCTION COMMENCING FOR THE BUILDING A, BUILDING B, BUILDING C, BUILDING D, OR PARKING LOT PROJECTS.
2. EXISTING CONTOURS SHOWN IN EXHIBITS ARE TAKEN FROM THE MASS GRADING PLAN FOR PARCEL MAP 37862.

N
W WEBB E
S

1" = 200'
200 0 200 400 600

CITY OF CALIMESA, COUNTY OF RIVERSIDE
BIRTCHER COMMERCE CENTER OAK VALLEY

INDUSTRIAL DEVELOPMENT
DEVELOPED CONDITION
EXISTING UNIT HYDROGRAPH EXHIBIT

SCALE:	1" = 200'	W.O.	21-0034
DATE:	12/14/2020	SHEET	1
DESIGNED:	EP	OF	1 SHEETS
CHECKED:	BJV	DWG. NO.	
PLN CK REF:			
F.B.			

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be provided during Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be provided during Final Engineering