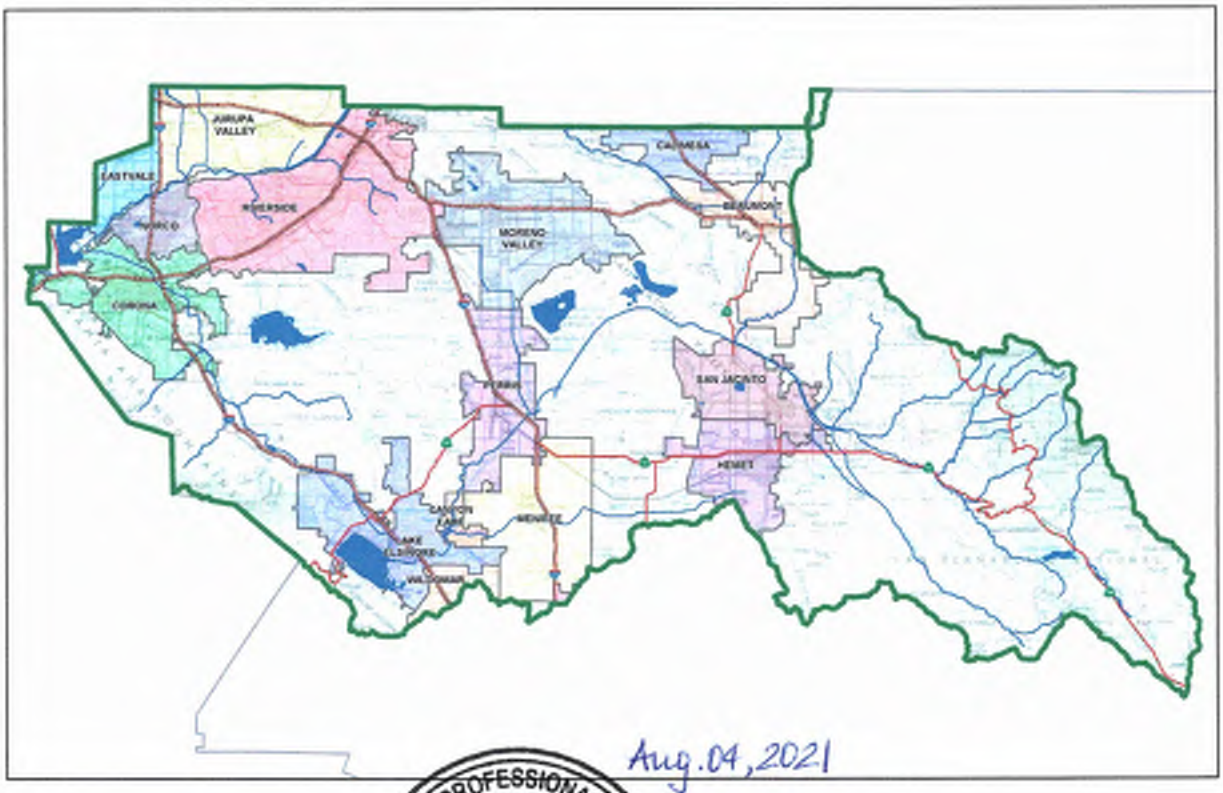
Project Specific Water Quality Management Plan

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

Project Title: REDLANDS BLVD AND HEMLOCK AVE – INDEPENDENT PLAZA

Development No: PEN18-0038

Design Review/Case No: LWQ21-0015



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LICENSED PROFESSIONAL ENGINEER
MARIELA S. ANGUELOV
C 75563
CIVIL
STATE OF CALIFORNIA

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Contact Information:

Prepared for:
Chandresh Ravaliya
ANTHEM ENERGY, LLC
2640 Camino Del Sol
Fullerton, CA 92833
Phone: (909) 562-6388

Prepared by:
Mariela Anguelov, PE, CPSWQ
Vice President – Director of Engineering
Winchester Associates, Inc.
23640 Tower Street, Suite 3
Moreno Valley, CA 92555
Phone: (951) 924-5425

OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for ANTHEM ENERGY, LLC by WINCHESTER ASSOCIATE, Inc for the REDLANDS BLVD AND HEMLOCK AVE PLAZA project.

This WQMP is intended to comply with the requirements of City of Moreno Valley for Ordinance No. 827 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 City of Moreno Valley Water Quality Ordinance (Municipal Code Section 8.10).

"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
Chandresh Ravaliya	President
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
Mariela Anguelov	Vice President – Director of Engineering
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure: C75563

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: 9

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 9
Table C.1 DMA Classifications 12
Table C.2 Type 'A', Self-Treating Areas 12
Table C.3 Type 'B', Self-Retaining Areas 13
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 28
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 ..... - 36 -

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Commercial
Planning Area:	N/A
Community Name:	N/A
Development Name:	PEN18-0038/ LWQ21-0015
PROJECT LOCATION	
Latitude & Longitude (DMS): Latitude 33.941667°/ Longitude -117.158333°	
Project Watershed and Sub-Watershed: Santa Ana Rivers Watershed; San Jacinto Valley Sub-Watershed	
Gross Acres: 7.94 ac Net Acres: 6.65 ac APN(s): 488-310-012	
Map Book and Page No.: Map book 11, pages 10 Records of San Bernardino County, California	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Gas/Commercial
Proposed or Potential SIC Code(s)	5541
Area of Impervious Project Footprint (SF) (total project area – on-site and off-site)	364,560 SF
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	146,825 SF
On-site	79,305 SF
Off-site	67,520 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 Footprint (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)	Soil type B
What is the Water Quality Design Storm Depth for the project?	0.69

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In N/Aaddition, 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
- BMP Locations (Lat/Long)

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.

Project Description

The proposed project will consist of a gas station, fast food eatery, associated improvements, and undisturbed open spaces on 6.67 ac. The project site is a roughly L-shaped parcel located at the southwest corner of Redlands Boulevard and Hemlock Avenue in the city of Moreno Valley. The topography of the site is generally planar with a gentle fall to the southeast. The project is a portion of Sections 2, T. 3S., R. 3W, SBM.
During the post-developed conditions the drainage pattern will be very similar. The northerly offsite stormwater runoff will be intercepted northerly of Hemlock avenue and through a proposed 54" RCP portion of MDP Line F-15 will be conveyed and discharged into the existing concrete drainage ditch. Stormwater runoff accumulated from the westerly offsite and the undeveloped onsite areas will flow westerly to the southeast property corner, where will be intercepted by the existing storm drain inlet and discharged into the existing concrete drainage ditch along Redlands Blvd. The stormwater runoff accumulated from the developed area intercepted by a system of storm drain inlets and through a proposed 18" RCP storm drain will be discharged into the existing concrete drainage ditch along Redlands Boulevard.

First flush and dry weather nuisance flows shall be routed through proposed structural LID BMPs located along the easterly property line and underground detention/infiltration chambers (I_{inf} = 2.5 in/h). Pre-treatment unit shall be installed upstream of underground chambers (CDS Hydrodynamic Separator by Contech or equivalent). All DMAs are treated to the maximum extent practicable as follow:

1. *DMA 1, DMA Off-Site 1, and DMA Off-Site 3 will be treat by detention/infiltration Stormtech MC-3500 Chambers or equivalent. Proposed are 80 chambers (5 rows X 16 chambers).*
2. *DMA 2 and DMA Off-Site 2 will be treated by Bio 1 (bioretention w/underdrain).*
3. *DMA Off-Site 4 will be treated by Bio 2 (bioretention w/underdrain).*
4. *DMA SR 1 is a self- retaining area.*
5. *DMA SR 2 drains to the self-retaining DMA SR 1.*
6. *DMA OS 1, DMA LS 1, and DMA LS 2 are self-treating areas.*

The project site location is identified on the City of Moreno Valley Watershed Boundaries map (dated May 23, 2017) as a project that must mitigate for hydromodification impact. Preliminary analysis shows that the incorporated throughout the project site LID principles, BMPs, and detention/infiltration chambers provide the required volume needed to mitigate the HCOC (2 year – 24 hour). For calcs see Appendix 7. Further analysis will be performed during the final design phase.

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 per	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River (Reach 3)	None	AGR, GWR, REC1, REC2, WARM, WILD, MUN	Not a water body classified as RARE
Canyon Lake (Aka: San Jacinto River Reach 2)	Nutrients	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
San Jacinto River (Reach 1)	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
Lake Elsinore	Nutrients, Organic Enrichments/Low Dissolved Oxygen, PCBs, Unknown Toxicity, DDT	REC1, REC2, WARM, WILD, MUN	Not a water body classified as RARE
Temescal Creek (Reach 6)	None	GWR, REC1, REC2,WARM, WILD, MUN	Not a water body classified as RARE
Temescal Creek (Reach 5)	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE, MUN	22 miles
Temescal Creek (Reach 4)	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE	28 miles
Temescal Creek (Reach 3) – Lee Lake	None	AGR, IND, GWR, REC1, REC2, WARM, WILD, MUN	Not a water body classified as RARE
Temescal Creek (Reach 2)	None	AGR, IND, GWR, REC1, REC2, WARM, WILD, MUN	Not a water body classified as RARE
Temescal Creek (Reach 1)	None	REC1, REC2, WARM, WILD	Not a water body classified as RARE
Santa Ana River (Reach 3)	Copper, Lead, Indicator Bacteria	AGR, GWR, REC1,REC2, WARM, WILD, RARE, MUN	47 miles
Prado Basin Management Zone	pH	REC1,REC2, WARM, WILD, RARE, MUN	49 miles
Santa Ana River (Reach 2)	Indicator Bacteria,	AGR, GWR, REC1,REC2, WARM, WILD, RARE, MUN	68 miles
Santa Ana River (Reach 1)	None	REC1,REC2, WARM, WILD, MUN	Not a water body classified as RARE
Tidal Prism of Santa Ana River (to within 1000' of Victoria Street) and Newport Slough	None	REC1,REC2, COMM, WILD, RARE, MAR, MUN	77 miles
Pacific Ocean Nearshore Zone	None	IND, NAV, REC1,REC2, COMM, WILD, RARE, SPWN, MAR, SHEL, MUN	78 miles
Pacific Ocean Offshore Zone	None	IND, NAV, REC1,REC2, COMM, WILD, RARE, SPWN, MAR, MUN	80 miles

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 Moreno Valley Grading Permit City of Moreno Valley Building 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.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

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?

Yes - During the post-developed condition the drainage patterns of the project site will remain the same.

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

*No - There is **no** existing vegetation on the area that is going to be developed.*

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

No - The site was previously graded, therefore the natural infiltration capacity was previously compromised.

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

Yes – The proposed commercial development (gas station and retail store) was designed to meet the min number of parking spaces required per 2019 CBC. An impervious sidewalk was proposed along only one side of the building.

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

Yes - All roof drains shall be directed to landscaped areas where it is feasible. The site will be precisely graded in the way that the impervious sidewalks drain toward pervious areas where it is feasible.

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)[12]	Area (Sq. Ft.)	DMA Type
DMA 1	Concrete, Ornamental Landscape	78,320	Type "D"
DMA 2	Roof, Ornamental Landscape	23,775	Type "D"
DMA OS 1	Natural	176,240	Type "A"
DMA LS 1	Ornamental Landscape	3,970	Type "A"
DMA LS 2	Ornamental Landscape	4,300	Type "A"
DMA Off-Site 1	Asphalt/Concrete, Ornamental Landscape, Decomposed Granite	12,500	Type "D"
DMA Off-Site 2	Asphalt/Concrete, Ornamental Landscape, Decomposed Granite	36,455	Type "D"
DMA Off-Site 3	Asphalt/Concrete	15,535	Type "D"
DMA Off-Site 4	Asphalt/Concrete	4,670	Type "D"
DMA Off-Site SR 1	Gravel	2,935	Type "B"
DMA Off-Site SR 2	Asphalt	5,860	Type "C"

[2]*If multi-surface provide back-up*

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA OS 1	176,240	Left in natural state	none
DMA LS 1	3,970	Ornamental Landscape	Dripping / Sprinkles
DMA LS 2	4,300	Ornamental Landscape	Dripping / Sprinkles

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]
DMA Off-Site SR 1	GRAVEL	2,935	0.69	**DMA Off-Site SR 2**	5860	2.1

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

The retention depth of the proposed 6" layer of ¾" gravel is: 40% voids x 6" gravel depth= ***2.4"****, which exceeds the retention depths of* ***2.1"*** *required for DMA off-Site SR 1.*

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

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Impervious fraction [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
DMA Off-Site SR 2	5,860	AC	1	5,860	**DMA Off-Site SR 1**	2,935	1.99<2

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

DMA Name or ID	BMP Name or ID
DMA 1	Infiltration Chambers
DMA 2	Bio 1 - Bioretention BMP w/underdrain
DMA Off-Site 1	Infiltration Chambers
DMA Off-Site 2	Bio 1 - Bioretention BMP w/underdrain
DMA Off-Site 3	Infiltration Chambers
DMA Off-Site 4	Bio 2 - Bioretention BMP w/underdrain

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; proceed to section D.3

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:		
…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:		

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 none 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: 4825 sf + 17965 sf = 22790 sf = 0.52 AC (DMA 1 & DMA 2)

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

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: 73495 sf + 5130 sf = 78625 sf = 1.80 AC (DMA 1 & DMA 2)

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: 1.27

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: 1.27 x 1.80 ac = 2.29 AC

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)
2.29 AC	0.52 AC

*The project is **not feasible** for harvesting stormwater runoff for irrigation use.*

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: 6

Project Type: Commercial

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: 0.12 AC (roofs)

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

Enter your TUTIA factor: 148

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: 148 x 0.12 = 18

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)
18	6

*The project is **not feasible** for harvesting stormwater runoff for toilet use.*

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 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: 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 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 projected average daily use (Step 1) to the minimum required non-potable use (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 per Section 3.4.2 of the WQMP Guidance Document.

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 1	☒	☐	☐	☐	☐
DMA 2	☐	☐	☒	☐	☐
DMA Off-Site 1	☒	☐	☐	☐	☐
DMA Off-Site 2	☐	☐	☒	☐	☐
DMA Off-Site 3	☒	☐	☐	☐	☐
DMA Off-Site 4	☐	☐	☒	☐	☐

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.

LID BMPs are feasible for DMA 1 & DMA 2, DMA Off-Site 1, 2, 3, and 4.

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**	***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]			
***DMA** Off-Site 1 AC/conc Pvmt*	8100	ac/conc	1	0.89	7225.2	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
***DMA** Off-Site 1 LDSCP*	1275	ornamental landscape	0.1	0.11	140.8			
***DMA** Off-Site 1 DG trail*	3125	dg	0.4	0.28	874.1			
***DMA 1** AC pvmt*	73495	ac/conc	1	0.89	65557.5			
***DMA 1** LDSCP*	4825	ornamental landscape	0.1	0.11	533			
***DMA** Off-Site 3 AC Pvmt*	15535	ac/conc	1	0.89	13857.2			
	A_T = Σ[A] 106355				Σ= [D] 88187.8	[E] 0.69	$[F] = \frac{[D]x[E]}{12}$ 5070.8	[G] 5140

[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

Table D.4 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	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
***DMA** Off-Site 2 Ac/Conc Pvmt*	33665	ac/conc	1	0.89	30029.2	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
***DMA** Off-Site 2 LDSCP*	2790	ornamental landscape	0.1	0.11	308.2			
***DMA 2** Conc Path*	680	ac/conc	1	0.89	606.6			
***DMA 2** Roof*	5130	roofs	1	0.89	4576			
***DMA 2** LDSCP*	17965	ornamental landscape	0.1	0.11	1984.4			
	$A_T = \Sigma[A]$ 60230				$\Sigma=$ [D] 37504.4	[E] 0.69	$[F] = \frac{[D]x[E]}{12}$ 2156.5	[G] 2500

Table D.5 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	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
***DMA** Off-Site 4 AC/conc pvmt*	4360	ac/conc	1	0.89	3889.1	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
***DMA** Off-Site 4 LDSCP*	310	Ornam landscape	0.1	0.11	34.2			
	$A_T = \Sigma[A]$ 4670				$\Sigma=$ [D] 3923.3	[E] 0.69	$[F] = \frac{[D]x[E]}{12}$ 225.6	[G] 229.5

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.

E.1 Identify Pollutants of Concern

N/A- 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 E (including all tables) is not required to be completed.

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 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	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	
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 for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] 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]
N/A		

[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	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

[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 Susceptibility 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.

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	● Stencil inlet structures per City of Moreno Valley Std. MVFE-300B-0, Note 13.	● 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" provided in Appendix 10: Educational Materials. ● Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drain."
Need for future indoor & structural pest control	● Incorporate building design features that discourage entry of pests: ● For Foundations and Slabs: use corrosion resistant, pest-resistant mesh on crawl space vents: foundation vents should be at least 6 inches above finish ground level; pour concrete patios as part of the main slabs to minimize entry of pests via joints; if slab joints are necessary, consider termite barriers; use epoxy sealants, or mesh barriers, or sand barriers for utility breaks. ● For Siding: use non-wood siding options; use high quality caulks and sealants; siding and stucco should begin at least six inches above soil level. ● For Lighting: use bird-resistant light fixtures. ● Use gutters with downspouts; use flap valves or mesh on downspouts to prevent rodents from entering downspouts. ● Use metal mesh to prevent animal access under sheds, decks, and porches.	● Provide Integrated Pest Management information to owners, lessees, and operators. Provided "Pest Prevention by Design" Guidelines in Appendix 10.
Landscape/ Outdoor Pesticide Use	Final landscape plans will accomplish all of the following. ● 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 strormwater, specify plants that are tolerant of saturated soil conditions. ● Consider using pest-resistant plants, especially adjacent to hardscape.	● Maintain landscaping using minimum or no pesticides. ● See applicable operational BMPs in "What you should know for…Landscape and Gardening" provided in Appendix 10: Educational Materials. ● Provide IPM information to new owners, lessees, and operators.

	● To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, are movement, ecological consistency, and plant interactions.	
Food service	Will be included in F-WQMP	Will be included in F-WQMP
Refuse area	● Outdoors Waste and Recycling enclosures with masonry walls and roofs will be constructed per City of Moreno Valley standards and architectural plans. ● Signs "Do not dump hazardous materials here" or similar will be posted on or near the bins. ● Outdoors trash receptacles will be provided at the common open space areas.	● Provide adequate number of trash receptacles and bins. ● Inspect receptacles and bins regularly; repair or replace leaky receptacles and bins. Keep bins covered. ● Prohibit/ prevent dumping of liquid or hazardous waste. 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, "Waste Handling and Disposal" provided in Appendix 10.
Vehicle and equipment cleaning	● Car wash area is not proposed on-site Car washing shall be **prohibited**.	n/a
Vehicle/Equipment Repair and Maintenance	● Vehicle equipment repair and maintenance indoors and outdoors shall be **prohibited**.	n/a
Fire Sprinkler Test Water	● Fire sprinkler water shall drain to the sanitary sewer.	● See Fact Sheet SC-41, "Building and Grounds Maintenance" provided in Appendix 10.
Miscellaneous Drain Roofing, Gutters and Trim - condensate drain lines - rooftop equipment -roofing, gutters, and trim	● Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. ● Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ● Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
Plazas, sidewalks, and parking lots.		● Sweep 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.

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 - Interim Condition

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
Infiltration Chambers	Underground Infiltration Chambers	Conceptual Grading Plan	33.941667°/ -117.158333°
Bio 1	North of Redlands Blvd entrance/exit	Conceptual Grading Plan	33.941667°/ -117.158333°
Bio 2	South of Redlands Blvd entrance/exit	Conceptual Grading Plan	33.941667°/ -117.158333°

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 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: *Operation, Maintenance and Funding will be provided by Anthem Energy, LLC (development's owner)*

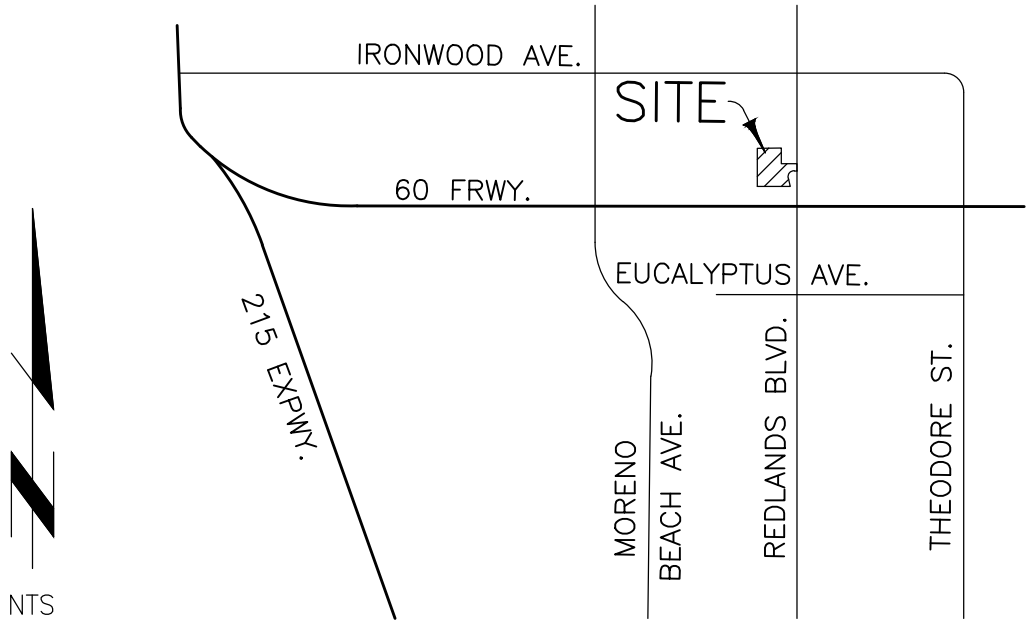
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ 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.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



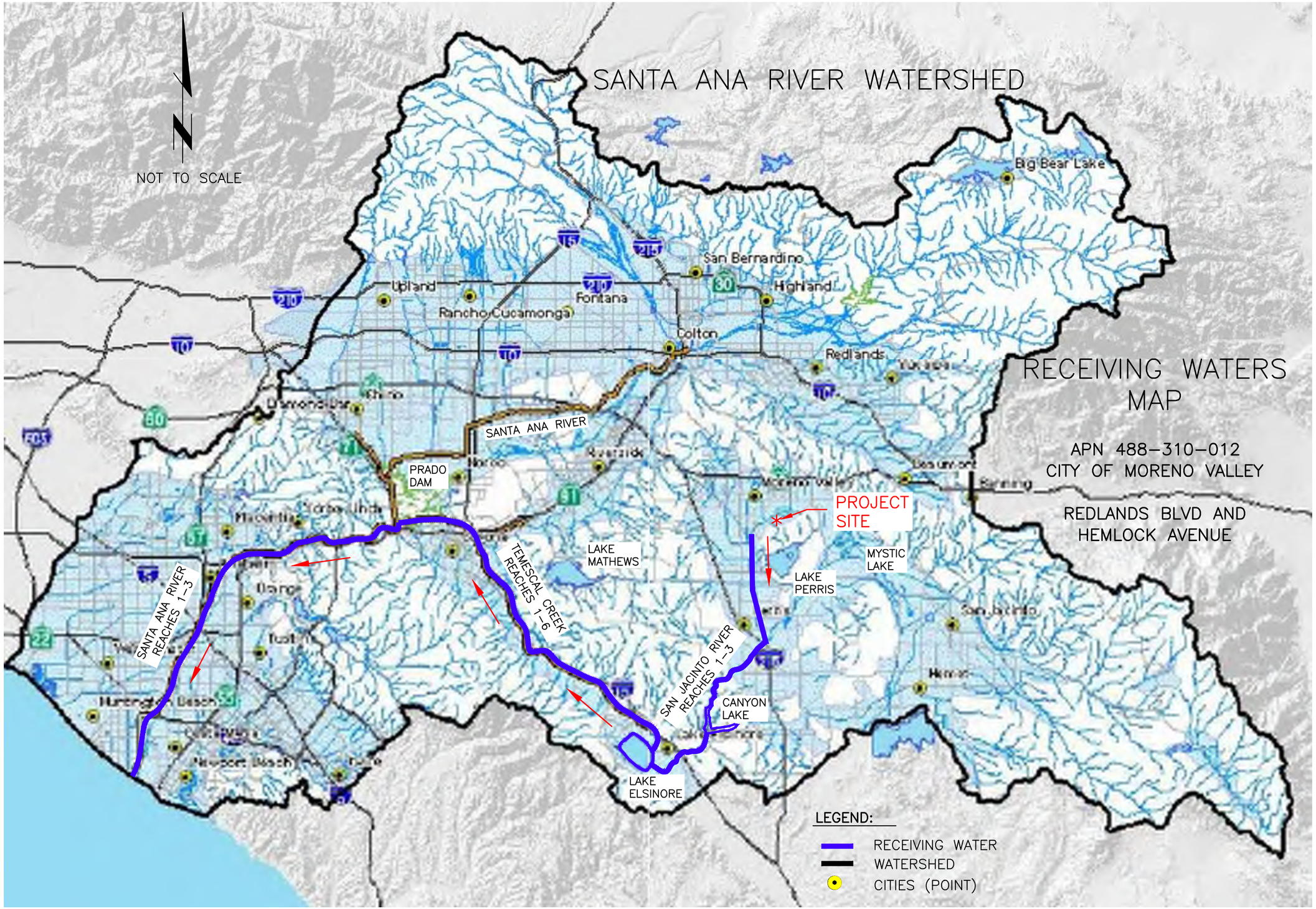
LOCATION MAP

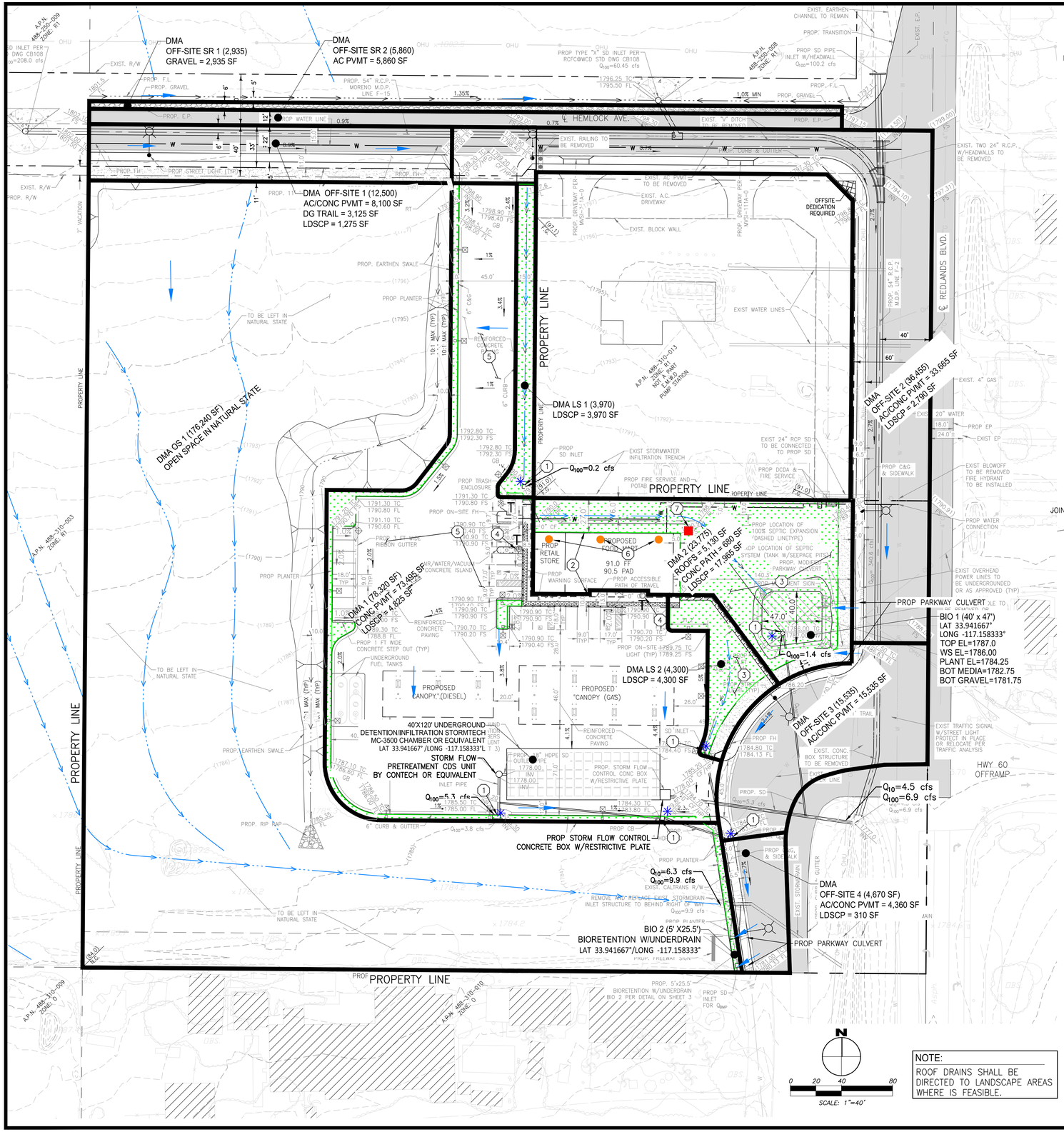
T. 3S., R. 3W, SECTION 2 SBB&M
THOMAS BROS. MAPS: PAGE 718 F-2, E-2

RECEIVING WATERS MAP

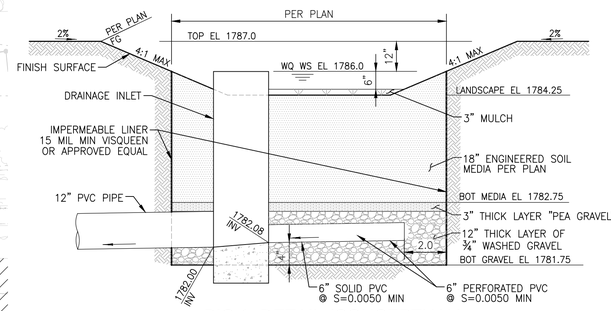
APN 488-310-012
CITY OF MORENO VALLEY

REDLANDS BLVD AND
HEMLOCK AVENUE



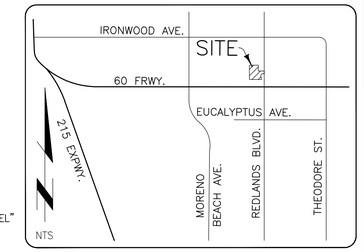


NOTE:
ROOF DRAINS SHALL BE DIRECTED TO LANDSCAPE AREAS WHERE IS FEASIBLE.



BIO 1 DETAIL (CONCEPTUAL)

NTS



VICINITY MAP

T. 3S., R. 3W, SECTION 2 SBB&M
THOMAS BROS. MAPS: PAGE 718 F–2, E–2
NTS

BIORETENTION CLEAN-OUTS:

INSTALL 6" CLEAN–OUTS EVERY 50' FT OF UNDERDRAIN LATERAL, AT THE COLLECTOR DRAIN LINE CONNECTION, AND AT ANY BENDS.

EACH CLEAN–OUT SHALL BE EXTENDED 6" ABOVE THE MEDIA AND SHALL HAVE A LOCKABLE SCREW CAP.

INSPECT MONTHLY, OR AS NEEDED AFTER STORM EVENTS. MAINTAIN IF NEEDED.

ENGINEERED SOIL MEDIA NOTE:

ENGINEERED SOIL MEDIA SHALL COMPRISED OF: 15% ORGANIC COMPONENT (NITROGEN STABILIZED COMPOST) AND 85% MINERAL COMPONENT (SEE TABLE BELOW), BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.

MINERAL COMPONENT RANGE REQUIREMENTS:

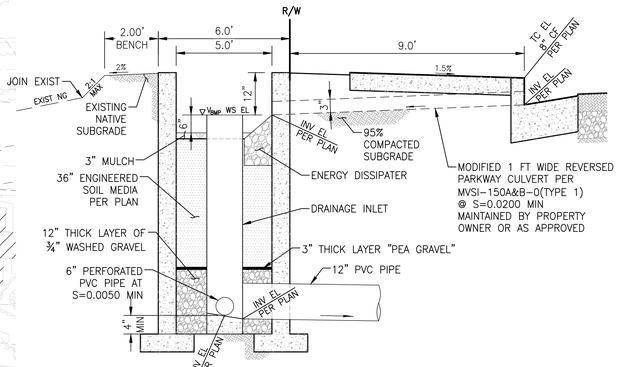
PERCENTAGE RANGE	COMPONENT
70–80	SAND
15–20	SILT
5–10	CLAY

PROJECT AREAS:

TOTAL PROJECT SITE AREA (NET):	286,605 SF
IMPERVIOUS AREA PROPOSED:	79,305 SF
PERVIOUS AREA:	207,300 SF

OFF-SITE ROAD IMPROVEMENTS AREAS:

TOTAL OFF–SITE AREA:	77,955 SF
IMPERVIOUS AREA PROPOSED:	67,520 SF
PERVIOUS AREA PROPOSED:	10,435 SF



BIO 2 DETAIL (CONCEPTUAL)

NTS

LEGEND

- PROPERTY LINE
- RIGHT OF WAY
- EASEMENT
- EXISTING BLOCK WALL
- DAYLIGHT LINE
- PROPOSED CONTOUR
- RETAINING WALL
- GRADING LIMITS
- EXISTING CONTOUR
- 3 FT WIDE RIBBON GUTTER
- FLOWLINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- EXISTING SEWER LINE
- EXISTING WATER LINE
- EXISTING UTILITIES
- EXISTING STREET LIGHT
- PROPOSED STREET LIGHT
- TRASH ENCLOSURE
- EXISTING POWER POLES
- EXISTING MANHOLES
- STREET GRADE
- FENCE
- DMA OFFSITE REMOVE & REPLACE EXIST OR INSTALL NEW PAVEMENT
- CONCRETE
- LANDSCAPE AREA
- No 2 BACKING CLASS RIP–RAP DISSIPATER PER PLAN
- ROOF DRAIN/ DOWNSPOUT
- STENCIL INLET STRUCTURE
- TRASH RECEPTACLE
- SANITARY SEPTIC SYSTEM

PERMANENT SOURCE CONTROL BMPs NOTES:

1. STENCIL STORM DRAIN INLET STRUCTURE PER CITY OF MORENO VALLEY STD MVFE–300B–0, NOTE 13.
2. INCORPORATE BUILDING DESIGN FEATURES THAT DISCOURAGE ENTRY OF PESTS. APPLICABLE FOR ALL BUILDINGS.
3. DESIGN LANDSCAPING TO MINIMIZE IRRIGATION AND RUNOFF, TO MINIMIZE THE USE OF FERTILIZER AND PESTICIDES. APPLICABLE FOR ALL LANDSCAPED AREAS.
4. TRASH ENCLOSURES AND TRASH RECEPTACLES PER PLAN.
5. SWEEP DRIVEWAYS AND PARKING STALLS REGULARLY.
6. ROOFTOP EQUIPMENT AND CONDENSATE DRAIN LINES.
7. FIRE SPRINKLER TEST WATER AND SANITARY SEWER WATER DRAIN TO A PRIVATE SEPTIC SYSTEM.

SEAL
REGISTERED PROFESSIONAL ENGINEER MARIELA ANGUELOV No. C 75563 CIVIL STATE OF CALIFORNIA

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA. 92553 (951) 924–5425

UNDER THE SUPERVISION OF:

MARIELA ANGUELOV RCE #75563 DATE

CITY OF MORENO VALLEY

APN 488–310–012

INDEPENDENT PLAZA
REDLANDS BLVD AND HEMLOCK AVE

P–WQMP SITE PLAN

DATE OF PLAN PREPARATION: 08–03–2021

ACCT. NO.

SHEET 1 OF 2

CITY I. D. NO.
LWQ21–0015

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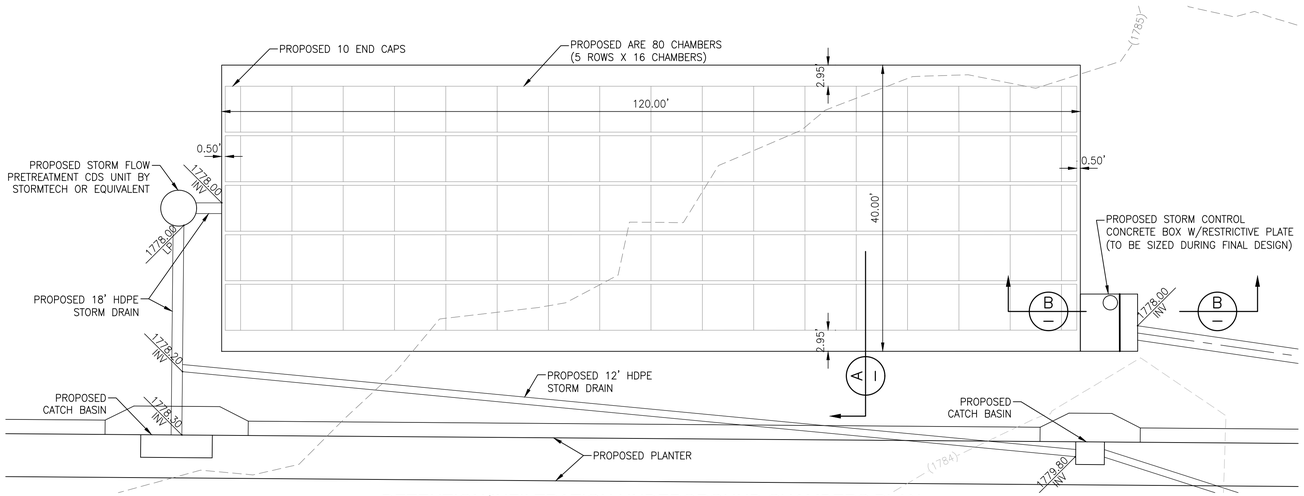
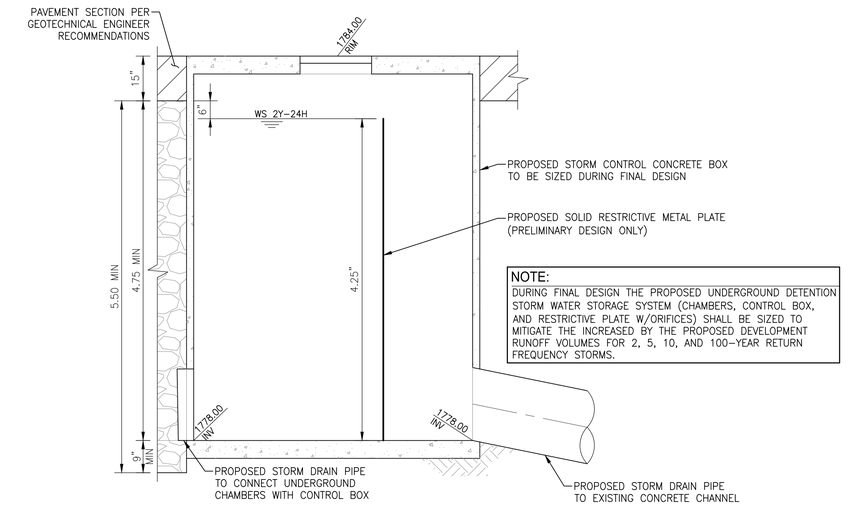


DETENTION/INFILTRATION UNDERGROUND CHAMBERS PLAN
STORMTECH MC-3500 CHAMBER OR EQUIVALENT

SCALE: 1" = 10'

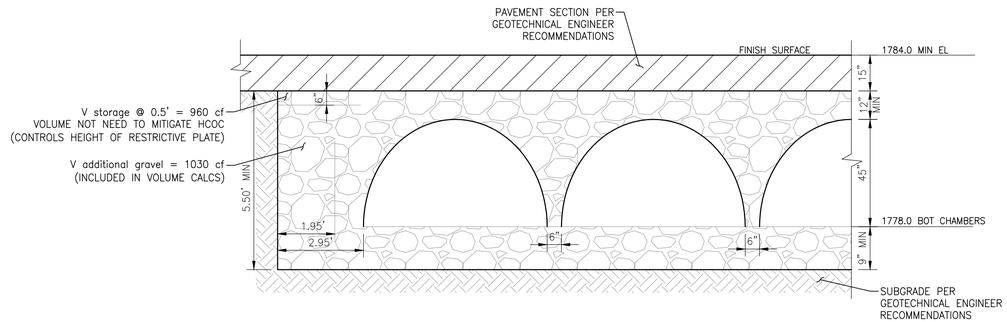


NOTE:
DURING FINAL DESIGN THE PROPOSED UNDERGROUND DETENTION STORM WATER STORAGE SYSTEM (CHAMBERS, CONTROL BOX, AND RESTRICTIVE PLATE W/ORIFICES) SHALL BE SIZED TO MITIGATE THE INCREASED BY THE PROPOSED DEVELOPMENT RUNOFF VOLUMES FOR 2, 5, 10, AND 100-YEAR RETURN FREQUENCY STORMS.

PROPOSED STORM CONTROL CONCRETE BOX SECTION
(CONCEPTUAL DESIGN)

NTS

B



DETENTION/INFILTRATION UNDERGROUND CHAMBERS SECTION
STORMTECH MC-3500 CHAMBER OR EQUIVALENT

NTS

A

CONCEPTUAL UNDERGROUND STORAGE SYSTEM CAPACITY (MIN DIMENSIONS: 40 lf x 120 lf)

1. PROPOSED ARE 80 CHAMBERS (5 ROWS X 16 CHAMBERS = 80) and 10 END CAPS

2. PROPOSED MIN STORAGE VOLUME IS 14450 cf
   - V chamber = 175 cf W/9" STONE LAYER = 175 x 80 = 14000 cf
   - V end cap = 45 cf W/9" STONE LAYER = 45 x 10 = 450 cf
   - V additional gravel = (120' x (2x1.95') x 5.5') x 40% = 2574 sf x 40% = 1030 cf
   - V storage at 5.5' depth = 14000 + 450 + 1030 = 15480 cf
   - V storage at 5.0' depth = 15480 - ((120'x40'x0.5') x 40%) = 15480 - 960 = 14520 cf

DURING POST DEVELOPED CONDITION THE 2 YEAR 24 HOUR STORM EVENT FLOOD VOLUME IS 14500 cf, THEREFOR EVEN IF WE DO NOT TAKE INTO CONSIDERATION ANY INFILTRATION AND FLOW DISCHARGE THE PROPOSED UNDERGROUND STORAGE (14530 cf) IS SUFFICIENT TO MEET THE HCOC MITIGATION.

3. At 2.5 in/h INFILTRATION RATE THE DESIGNED V_{BMP} = 5070 cf WILL INFILTRATE WITHIN 13 hours.
   5070/(40 x 120 x 0.4 x 2.5/12) = 5070/400 = 12.7 hours

SEAL

REGISTERED PROFESSIONAL ENGINEER
MARIELA ANGUELOV
No. C 75563
CIVIL
STATE OF CALIFORNIA

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA. 92553 (951) 924-5425

UNDER THE SUPERVISION OF:

MARIELA ANGUELOV
RCE #75563

DATE

CITY OF MORENO VALLEY

APN 488-310-012
INDEPENDENT PLAZA
REDLANDS BLVD AND HEMLOCK AVE

P-WQMP SITE PLAN

DATE OF PLAN PREPARATION: 08-03-2021

ACCT. NO.

SHEET 2 OF 2

CITY I. D. NO.
LWQ21-0015

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Appendix 2: Construction Plans

Grading, Drainage, and Landscape Plan

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

CONCEPTUAL GRADING PLAN FOR A.P.N. 488-310-012

LEGAL DESCRIPTION

LOT 1 IN BLOCK 30 OF MAP NO. 1 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO., IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 11 PAGE 10 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA, TOGETHER WITH THOSE PORTIONS OF HEMLOCK AVENUE AND REDLANDS BOULEVARD WITHIN SAID BLOCK LYING EASTERLY OF THE NORTHERLY PROLONGATION OF THE WEST LINE OF SAID LOT AND NORTHERLY OF THE EASTERLY PROLONGATION OF THE SOUTH LINE OF SAID LOT.

EXCEPT THOSE PORTIONS OF LOT 1 AND OF REDLANDS BOULEVARD IN SAID BLOCK DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTH LINE OF SAID LOT 1, WITH THE WEST LINE OF REDLANDS BOULEVARD, 120 FEET WIDE AS SHOWN ON SAID MAP; THENCE ALONG SAID SOUTH LINE SOUTH 89°51'40" WEST, 83.78 FEET; THENCE NORTH 9°26'38" WEST, 122.31 FEET; THENCE NORTHERLY 182.01 FEET ALONG A TANGENT CURVE, CONCAVE SOUTHEASTERLY WITH A RADIUS OF 105 FEET, THROUGH AND ANGLE OF 99°18'57" TO A POINT ON SAID WEST LINE OF REDLANDS BOULEVARD, DISTANT ALONG SAID WEST LINE NORTH 0°07'41" WEST 243.28 FEET FROM THE POINT OF BEGINNING; THENCE NORTH 89°52'19" EAST 60.00 FEET TO THE CENTER LINE OF SAID REDLANDS BOULEVARD; THENCE SOUTH 0° 07'41" EAST 243.28 FEET ON SAID CENTERLINE; THENCE SOUTH 89°52'19" WEST 60.00 FEET TO THE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM, THAT PORTION OF SAID LAND, DESCRIBED AS FOLLOWS:

COMMENCING AT THE CENTERLINE INTERSECTION OF HEMLOCK AVENUE AND REDLANDS BOULEVARD AS SHOWN ON PARCEL MAP NO. 9355, FILED IN BOOK 47, PAGE 39 OF PARCEL MAPS, RECORDS OF SAID RIVERSIDE COUNTY;

THENCE SOUTH 89°52'19" WEST, ALONG SAID CENTERLINE OF HEMLOCK AVENUE, A DISTANCE OF 60.00 FEET TO THE INTERSECTION WITH WITH THE NORTHERLY PROLONGATION OF THE WESTERLY RIGHT OF WAY OF SAID REDLANDS BOULEVARD AND THE TRUE POINT OF BEGINNING;

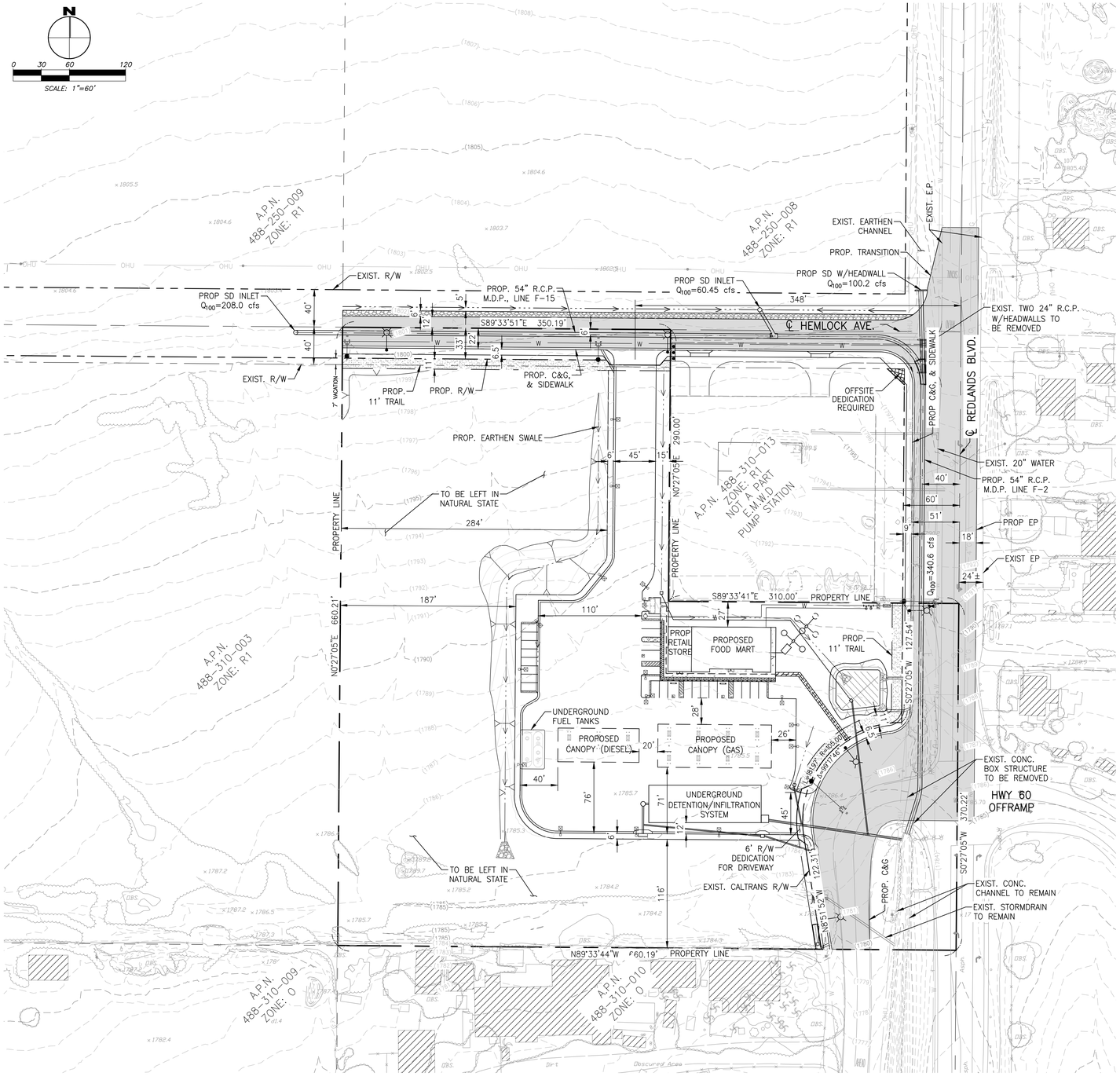
THENCE SOUTH 0°07'41" EAST, ALONG SAID PROLONGATION AND WESTERLY RIGHT OF WAY, A DISTANCE OF 290.00 FEET;

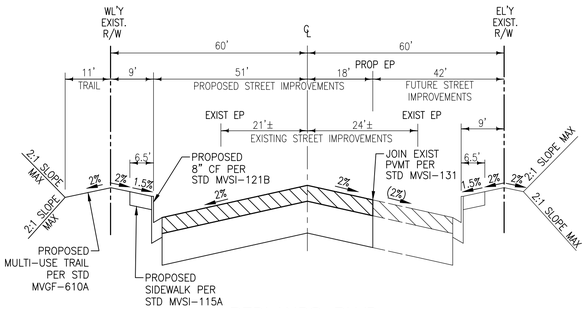
THENCE LEAVING SAID RIGHT OF WAY, AND PARALLEL WITH SAID CENTERLINE OF HEMLOCK AVENUE SOUTH 89°52'19" WEST, A DISTANCE OF 250.00 FEET;

THENCE PARALLEL WITH SAID WESTERLY RIGHT OF WAY, NORTH 0°07'41" WEST, A DISTANCE OF 290.00 FEET TO SAID CENTERLINE OF HEMLOCK AVENUE;

THENCE NORTH 89°52'19" EAST, ALONG SAID CENTERLINE OF HEMLOCK AVENUE, A DISTANCE OF 250.00 FEET TO THE TRUE POINT OF BEGINNING.

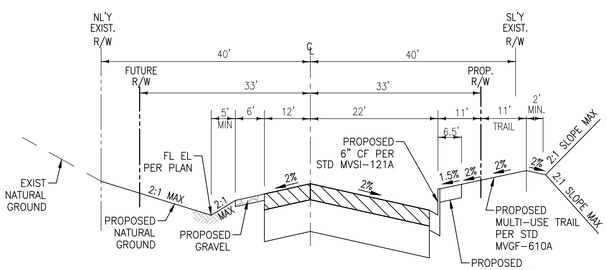
A.P.N. 488-310-012





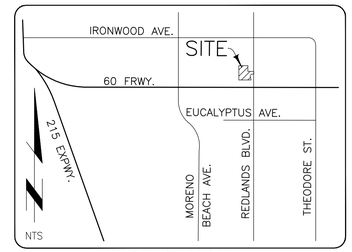
REDLANDS BLVD.

TYPICAL SECTION
MODIFIED MAJOR ARTERIAL STREET
(MODIFIED STD MVSI-102A)
NTS



HEMLOCK AVE.

TYPICAL SECTION
COLLECTOR STREET
(MODIFIED STD MVSI-106B)
NTS



VICINITY MAP
N.T.S.

GENERAL NOTES

OWNER/APPLICANT

ANTHEM ENERGY, LLC
CONTACT: CHANDRESH RAVALIYA
2640 CAMINO DEL SOL
FULLERTON, CA 92833
PHONE: (909) 562-6388
CRAVALIYA@GMAIL.COM

ENGINEER

WINCHESTER ASSOCIATES, INC.
DAVID J. SLAWSON
23640 TOWER STREET, SUITE 3
PO BOX 280
MORENO VALLEY, CA. 92556-0280
PHONE: (951) 924-5425
SLAWSON@WAI-ENG.COM

ASSESSOR'S PARCEL No.

488-310-012

LAND USE AND ZONING

CURRENT GENERAL PLAN	R1
CURRENT ZONING	R1
PROPOSED ZONING	CC
EXISTING USE	OS
PROPOSED LAND USE	GAS/COMMERCIAL

AREA AND DENSITY

GROSS ACREAGE	7.11 ACRES
NET ACREAGE	6.67 ACRES

FLOOD HAZARD

THE SUBJECT TRACT IS WITHIN THE 500 YEAR FLOOD PLAIN, ZONE X. FEMA FLOOD INSURANCE PANEL NO. 065074 0030 B.

THOMAS BROTHERS GUIDE

PAGE 718 F-2, E-2

TOPOGRAPHY

OBTAINED FROM AERIAL SURVEY CONDUCTED INLAND AERIAL SURVEYS, INC. ON 5-4-2016.

SCHOOL

MORENO VALLEY UNIFIED SCHOOL DISTRICT

PUBLIC UTILITIES

WATER
EASTERN MUNICIPAL WATER DISTRICT (951) 928-3777
2270 TRUMBLE RD., PERRIS, CA 92572

ELECTRICITY
MORENO VALLEY ELECTRIC UTILITY (951) 413-3500
14331 FREDERICK ST., SUITE 2
MORENO VALLEY, CA 92553

GAS
SOUTHERN CALIFORNIA GAS COMPANY (800) 427-2200
4495 HOWARD AVE., RIVERSIDE, CA 91756

TELEPHONE
VERIZON (951) 748-6656

SEWER
PRIVATE SEPTIC SYSTEM

EARTHWORK ESTIMATE (RAW)

EXCAVATION	20,000 C.Y.
EMBANKMENT	16,000 C.Y.

DAVID J. SLAWSON PLS 4724

DATE OF PREPARATION: JULY 09, 2021

PREPARED BY:

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA 92556-0280
PH: (951) 924-5425

PEN18-0038 | SHEET 1 OF 3

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IN THE CITY OF MORENO VALLEY
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

CONCEPTUAL GRADING PLAN FOR A.P.N. 488-310-012

ABBREVIATIONS

(X.X)	– EXISTING GROUND ELEVATION	N	– NORTH
@	– AT	NG	– NATURAL GROUND
&	– AND	NTS	– NOT TO SCALE
AC	– ASPHALT CONCRETE	PCC	– PLAIN CEMENT CONCRETE
AB	– AGGREGATE BASE	PE	– PAD ELEVATION
BSW	– BACK OF SIDEWALK	PL	– PROPERTY LINE
CAB	– CRUSHED AGGREGATE BASE	PP	– POWER POLE
CF	– CURB FACE	PVMT	– PAVEMENT
CL	– CENTERLINE	PUE	– PUBLIC UTILITY EASEMENT
CLF	– CHAIN LINK FENCE	RCP	– REINFORCED CONCRETE PIPE
CONC	– CONCRETE	RT	– RIGHT
CONST	– CONSTRUCT	R/W	– RIGHT OF WAY
C&G	– CURB AND GUTTER	SAN	– EXISTING SEWER LINE
DWG	– DRAWING	S	– SOUTH
DWY	– DRIVEWAY	SF	– SQUARE FEET
E	– EAST	SD	– STORM DRAIN LINE
EL	– ELEVATION	ST	– STREET
EP	– EDGE OF PAVEMENT	STD	– STANDARD
EXIST	– EXISTING	SW	– SIDEWALK
FG	– FINISH GRADE	SWR	– SEWER LINE
FF	– FINISH FLOOR	TC	– TOP OF CURB
FL	– FLOW LINE	TG	– TOP OF GRADE
FS	– FINISH SURFACE	TF	– TOP OF FOOTING
GFF	– GARAGE FINISH FLOOR	TYP	– TYPICAL
HP	– HIGH POINT	TP	– TOP OF PAVEMENT
HOA	– HOMEOWNER ASSOCIATION	TW	– TOP OF WAL
INV	– INVERT	W	– WATER LINE
LF	– LINEAR FEET	W	– WEST
LP	– LOW POINT	W/	– WITH
MH	– MANHOLE	WTR	– WATER LINE
MIN	– MINIMUM	X:1	– SLOPE OF ONE FOOT MEASURED VERTICALLY FOR EVERY "X" FEET MEASURED HORIZONTALLY
No.	– NUMBER		
%	– PERCENT		

LEGEND

- PROPERTY LINE
- RIGHT OF WAY
- EASEMENT
- EXISTING BLOCK WALL
- DAYLIGHT LINE
- XX PROPOSED CONTOUR
- RETAINING WALL
- GRADING LIMITS
- (XX) EXISTING CONTOUR
- 3 FT WIDE RIBBON GUTTER
- PROPOSED FLOWLINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING UTILITIES
- EXISTING STREET LIGHT
- PROPOSED STREET LIGHT
- PROPOSED ON–SITE LIGHT
- TRASH ENCLOSURE
- EXISTING POWER POLES
- X% STREET GRADE
- EXISTING FENCE
- PROPOSED CATCH BASIN
- FH PROPOSED ON–SITE FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- AC PAVING
- CONCRETE WALKWAY
- WARNING SURFACE
- RIP–RAP DISSIPATER OR GRAVEL STRIP NORTH OF HEMLOCK AVE CL
- 4 FT WIDE ACCESSIBLE PATH OF TRAVEL W/ 5.0% MAX SLOPE IN THE DIRECTION OF TRAVEL AND 2% MAX CROSS SLOPE
- ACCESSIBLE PATH OF TRAVEL
- 1 FT WIDE CONCRETE STEP OUT
- VAN ACCESSIBLE PARKING SPACE W/ACCESS AISLE AND 2.0% MAX SLOPE AT EACH DIRECTION

NOTE:

EXACT LOCATION AND SEPARATION OF PROPOSED SEPTIC SYSTEM AND WATER LINES TO BE DETERMINED PER LATEST CALIFORNIA CODE OF REGULATIONS.

SEE SHEET 3

PREPARED BY:

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA 92556-0280
PH: (951) 924-5425

DAVID J. SLAWSON
PLS 4724

DATE OF PREPARATION: JULY 09, 2021

PEN18-0038

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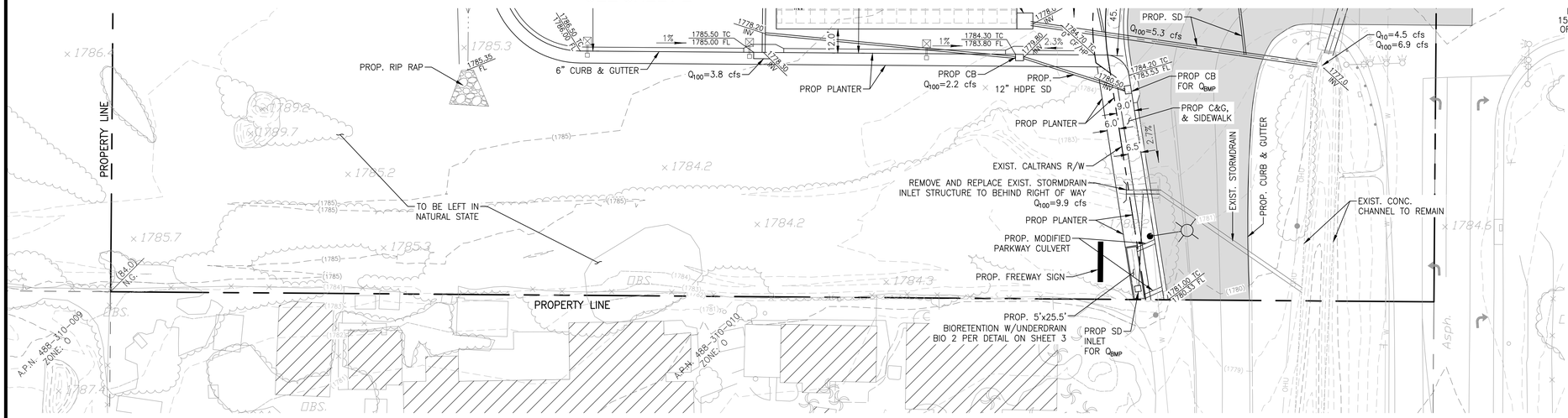
IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

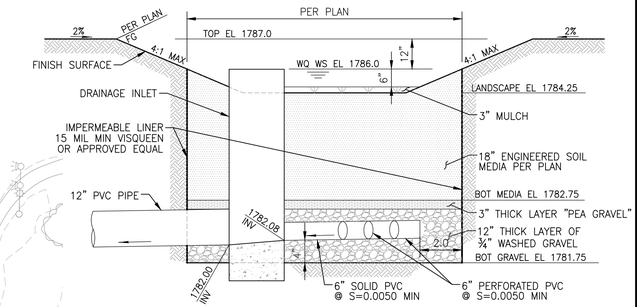
CONCEPTUAL GRADING PLAN FOR A.P.N. 488-310-012

N

0 15 30 60

SCALE: 1"=30'





BIO 1 DETAIL (CONCEPTUAL)

NTS

BIORETENTION CLEAN-OUTS:

INSTALL 6" CLEAN-OUTS EVERY 50 FT OF UNDERDRAIN LATERAL, AT THE COLLECTOR DRAIN LINE CONNECTION, AND AT ANY BENDS.

EACH CLEAN-OUT SHALL BE EXTENDED 6" ABOVE THE MEDIA AND SHALL HAVE A LOCKABLE SCREW CAP.

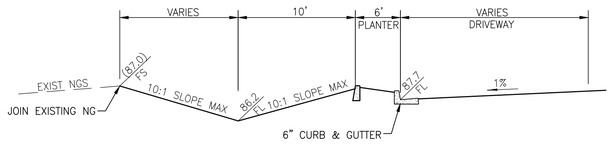
INSPECT MONTHLY, OR AS NEEDED AFTER STORM EVENTS. MAINTAIN IF NEEDED.

ENGINEERED SOIL MEDIA NOTE:

ENGINEERED SOIL MEDIA SHALL COMPRISED OF: 15% ORGANIC COMPONENT (NITROGEN STABILIZED COMPOST) AND 85% MINERAL COMPONENT (SEE TABLE BELOW), BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.

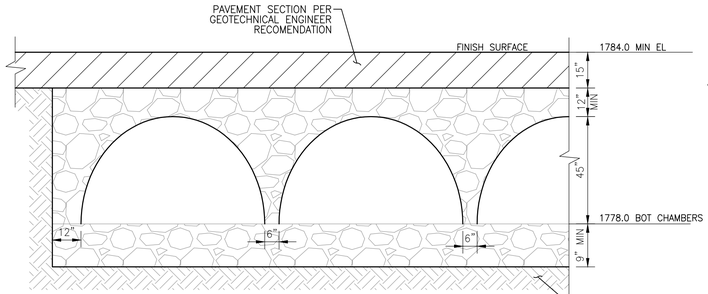
MINERAL COMPONENT RANGE REQUIREMENTS:

PERCENTAGE RANGE	COMPONENT
70-80	SAND
15-20	SILT
5-10	CLAY



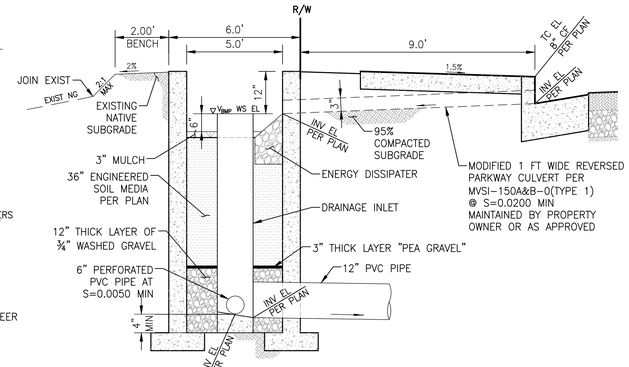
SECTION A (A/1)

NTS



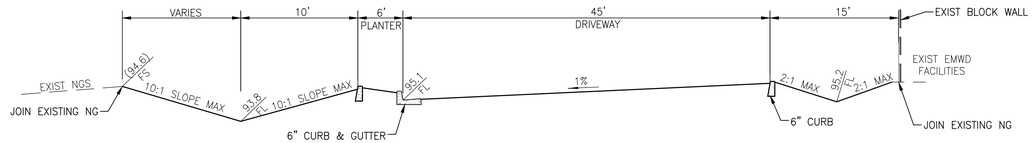
DETENTION/INFILTRATION UNDERGROUND CHAMBERS
STORMTECH MC-3500 CHAMBER OR EQUIVALENT
DETAIL

NTS



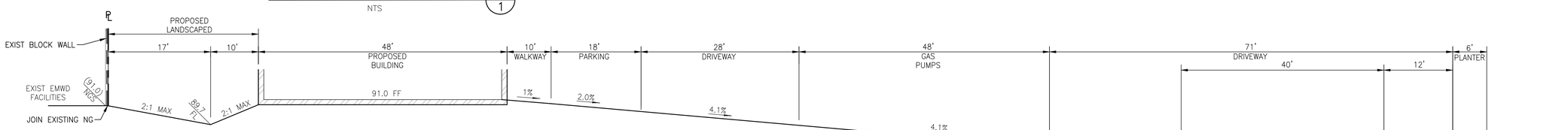
BIO 2 DETAIL (CONCEPTUAL)

NTS



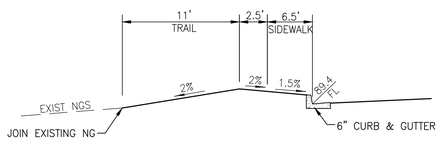
SECTION B (B/1)

NTS



SECTION C (C/1)

NTS



SECTION D (D/1)

NTS

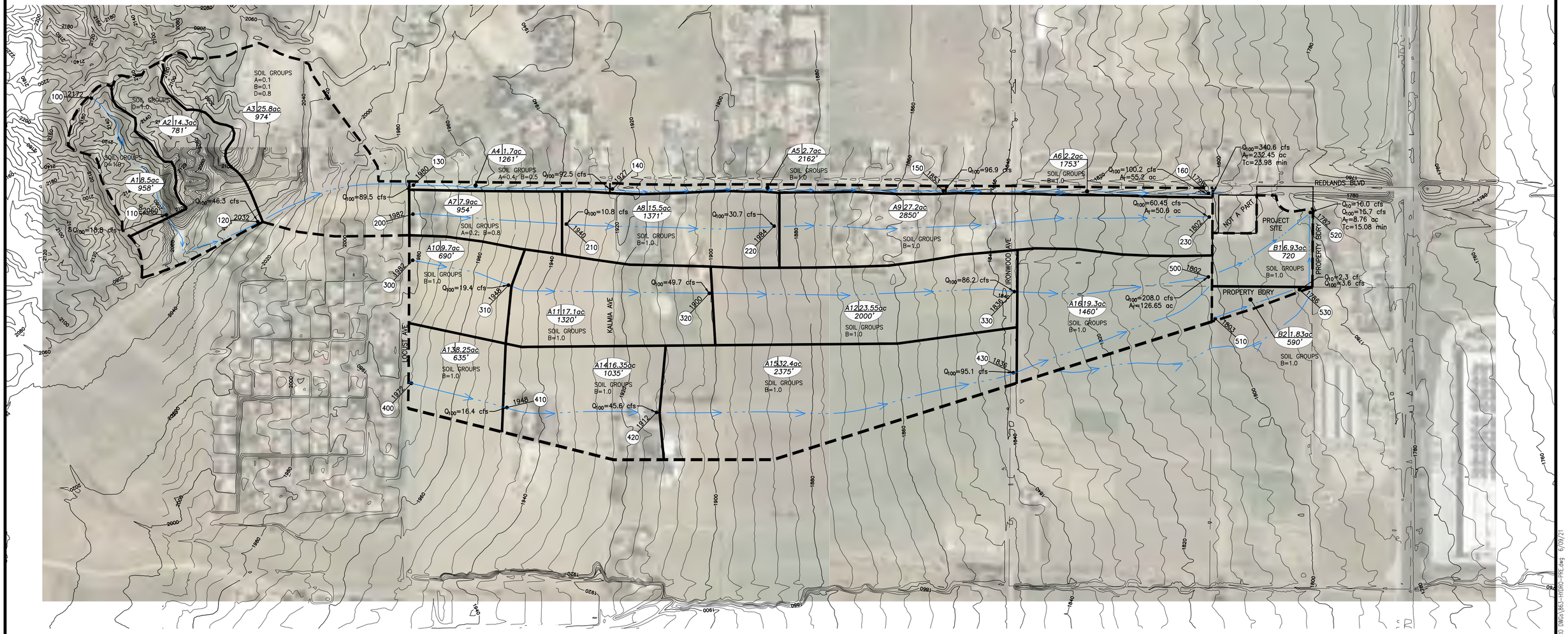
PREPARED BY:

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA 92556-0280
PH: (951) 924-5425

DAVID J. SLAWSON PLS 4724

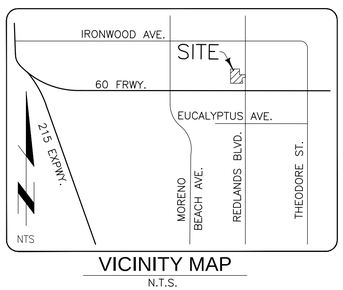
DATE OF PREPARATION: JULY 09, 2021

PEN18-0038

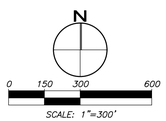


LEGEND:

- SUB. AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- 1 / 98.2 — NODE / ELEVATION
- D9 10ac / 415' — HYDROLOGY SUBAREA/ACREAGE / WATER COURSE LENGTH



VICINITY MAP
N.T.S.



SEAL

REGISTERED PROFESSIONAL ENGINEER
MARIELA ANGUELOV
No. C 75563
CIVIL
STATE OF CALIFORNIA

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA. 92553 (951) 924-5425

UNDER THE SUPERVISION OF:

MARIELA ANGUELOV — DATE

CITY OF MORENO VALLEY

APN 488-310-012
REDLANDS BLVD AND HEMLOCK AVE PLAZA
HYDROLOGY MAP
PRE-DEVELOPED CONDITIONS

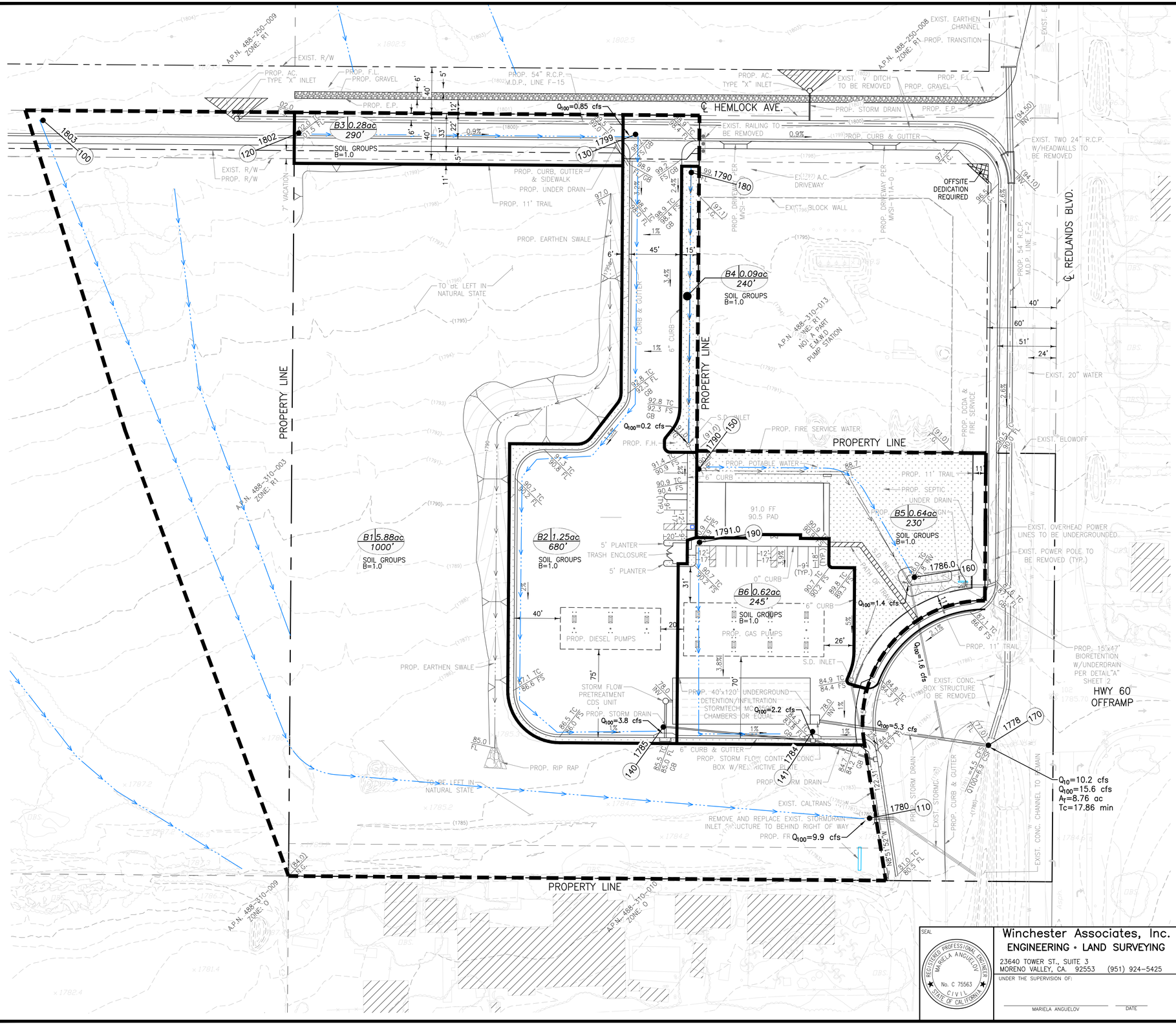
DATE OF PLAN PREPARATION: 06-06-2021

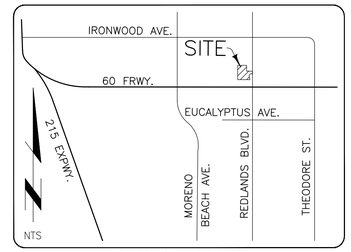
ACCT. NO.

SHEET 1 OF 3

CITY I. D. NO.
LST21-0032

C:\Users\mariela anguelov\Documents\WA-Jobs\863 Chandresh\04 PRELIMINARY DESIGN\HYD\P-HYD\01 HYDRO DWGS\863-HYDRO-PRE.dwg 6/09/21





VICINITY MAP
N.T.S.

LEGEND:

- SUB. AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- 1 / 98.2 — NODE / ELEVATION
- D9 10ac / 415' — HYDROLOGY SUBAREA/ACREAGE / WATER COURSE LENGTH

N

0 20 40 80

SCALE: 1"=40'

SEAL

REGISTERED PROFESSIONAL ENGINEER MARIELA ANGUELOV No. C 75563 CIVIL STATE OF CALIFORNIA

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
MORENO VALLEY, CA. 92553 (951) 924-5425

UNDER THE SUPERVISION OF:

MARIELA ANGUELOV DATE

CITY OF MORENO VALLEY

APN 488-310-012

INDEPENDENT PLAZA (INTERIM SITE PLAN)

REDLANDS BLVD AND HEMLOCK AVE

HYDROLOGY MAP POST

POST-DEVELOPED CONDITIONS

DATE OF PLAN PREPARATION: 04-08-2021

ACCT. NO.

SHEET 2 OF 3

CITY I. D. NO. LST21-0032

C:\Users\mariela anguelov\Documents\WA-Jobs\863 Chandresh\04 PRELIMINARY DESIGN\HYD-HWY\01 HYDRO DWGs\863-HYDRO-POST-INTERIM.dwg 4/15/21

Matchline: See this Sheet - Left

Matchline: See this Sheet - Right

Water Efficient Landscape Worksheet

Enter the information as type-in values or select cells only. Results appear in Yellow or Red highlighted cells below.

Site Information

Project Name: →	Independent
Project Location: →	Moreno Valley, CA
Site Type: →	Commercial
Annual Eto (inches/yr): →	56.4
Allowed ETAF	0.45

Hydrozone or Planting Description	Plant Factor (PF)		Irrigation Method	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (sqft.)	ETAF x Area	Estimated Total Water Use (gal./yr.)
Regular Landscape Areas:								
1	0.3	Low	Drip	0.81	0.4	4,590	1,700	59,446
2	0.3	Low	Tree Drip Ring	0.81	0.4	10	4	130
3	0.3	Low	Drip	0.81	0.4	3,247	1,203	42,052
4	0.3	Low	Tree Drip Ring	0.81	0.4	10	4	130
5	0.3	Low	Tree Drip Ring	0.81	0.4	10	4	130
6	0.3	Low	Drip	0.81	0.4	3,291	1,337	46,734
7	0.3	Low	Drip	0.81	0.4	4,420	1,637	57,240
8	0.3	Low	Drip	0.81	0.4	3,966	1,469	51,364
9	0.3	Low	Tree Drip Ring	0.81	0.4	10	4	130
10	0.3	Low	Tree Drip Ring	0.81	0.4	10	4	130
11	0.3	Low	Drip	0.81	0.4	3,420	1,267	44,294
12	0.3	Low	Drip	0.81	0.4	3,291	1,215	42,450
					SUBTOTAL →	22,093	8,182	286,133
Special Landscape Areas								
N/A							0	0
					SUBTOTAL →	0	0	0
					Estimated Total Water Use (ETWU) →			286,133
					Maximum Allowed Water Allowance (MAWA) →			347,655

ETAF Calculations	
Regular Landscape Areas:	
Total ETAF x Area	8,182
Total Area	22,093
Average ETAF	0.37
All Landscape Areas:	
Total ETAF x Area	8,182
Total Area	22,093
Sitewide ETAF	0.37

Notes:

**Calculator developed to meet code effective Dec. 1, 2015*

** Adapted from California Code of Regulations Title 23, Division 2, Chapter 2.7: Model Water Efficient Landscape Ordinance*

Final plans will include drip irrigation, smart irrigation controller, and plant materials with low-water requirements. (hydrozones).

TREE & PLANT LEGEND

	NAME	SIZE	QTY	Water Use
	Acacia baileyana / Bailey Acacia	*15 Gal*	*27*	*Low*
	Agonis flexuosa / Peppermint Tree	*24" box*	*9*	*Low*
	Brahea edulis / Guadalupe Palm	*8' BTH*	*35*	*Low*
	Quercus engelmannii / Engelmann Oak	*15 Gal*	*11*	*Low*
	Anigozanthos 'Harmony' / Red-Yellow Kangaroo Paw	*5 Gal*	*45*	*Low*
	Berberis 'Compacta' / Dwarf Coral Hedge Barberry	*5 Gal*	*6*	*Medium*

Caesalpinia mexicana/ Mexican Bird of Paradise	*5 Gal*	*12*	*Low*	
Calliandra 'Sierra Star'/ Red Fairy Duster	*5 Gal*	*94*	*Low*	
Dasylirion wheeleri / Spoon Yucca	*5 Gal*	*101*	*Low*	
Macfadyena unguis-cati/ Cat's Claw Creeper	*1 Gal*	*8*	*Low*	
Calylophus berlandieri/ Sundrops	*1 Gal*	*30" O.C*	*Low*	
Festuca 'Siskiyou Blue'/ Siskiyou Blue Fescue	*1 Gal*	*2' O.C.*	*Low*	
Juncus patens / California Gray Rush	*1 Gal*	*2' O.C.*	*Low*	
Phyla nodiflora 'Kurapia' / Kurapia	*Plugs*	*3' O.C.*	*Low*	
Leymus condensatus / Canyon Prince Wild Rye	*1 Gal*	*3' O.C.*	*Low*	
Muhlenbergia capillaris / Hairy Awn Muhly	*1 Gal*	*3' O.C.*	*Low*	
Pennisetum 'Rubrum' / Red Fountain Grass	*1 Gal*	*5' O.C.*	*Low*	

N

0 10 20 40

Scale: 1" = 20'

arcadia studio
landscape architecture
202 East Cota Street
Santa Barbara, CA 93101
tel 805.962.9055
fax 805.962.5658
arcadiastudio.com

REGISTERED LANDSCAPE ARCHITECT
DEBRA TATE EICHELBERGER
No. 3513
EXP. 10.31.22
STATE OF CALIFORNIA

Revisions

INDEPENDENT

Redlands Blvd & Hemlock Ave
Moreno Valley, CA
92555

PRELIMINARY LANDSCAPE PLAN

Issue
Issue

Date	Job Number
06.24.2021	21.044
Drawn By	Checked by
MG	BC
Sheet -	of # -

PL-1

Drawing Name: \\ARCADIA\Projects\2021 Projects\21.044 A&S Redlands_Hemlock\21.044 Cad\21.044 In Progress\A&S Redlands\sheets\Preliminary Landscape Plan\PL-1 Preliminary Landscape Plan.dwg Plot date: 2021-06-29 6:07 PM

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

- **Infiltration Feasibility Investigation (Dated: November 12, 2020)**
- **Preliminary Geotechnical Investigation (Dated: August 09, 2017)**

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

INFILTRATION FEASIBILITY INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT
APN 488-310-012
MORENO VALLEY, CALIFORNIA

PROJECT NO. 13358.11
NOVEMBER 12, 2020

Prepared For:

Anthem Oil, Inc.
2640 Camino Del Sol
Fullerton, California 92833

Attention: Mr. Chandresh Ravaliya

November 12, 2020

Anthem Oil, Inc.
2640 Camino Del Sol
Fullerton, California 92833

Project No. 13358.11

Attention : Mr. Chandresh Ravaliya

Subject: Infiltration Feasibility Investigation, Proposed Commercial Development, APN 488-310-012, Moreno Valley, California.

LOR Geotechnical Group, Inc., is pleased to present this report summarizing the results of our double-ring infiltrometer tests recently conducted within the proposed commercial development located at APN 488-310-012. The conceptual grading plan for this project indicates the construction of an approximate 4,000 square foot detention/retention system and infiltration area (Winchester Associates, Inc., 2020). The purpose of this investigation was to test and report the results of the infiltration characteristics of the soils underlying the proposed infiltration area.

PROJECT CONSIDERATIONS

Information provided to this firm indicates that the southeastern portion of the site will be used for the infiltration of onsite runoff waters. The location of the proposed system is indicated on the plan provided (Winchester Associates, Inc., 2020). A depth of 11 feet was provided for the bottom of the system. This firm previously conducted a preliminary geotechnical investigation which included shallow infiltration testing in 2017. Our previous investigation included advancing 6 exploratory borings to depths of approximately 21.5 to 51.5 feet and excavating 4 exploratory trenches to depths of approximately 14 to 14.5 feet. In brief summary, removals of the upper 5 to 7 feet due to hydro-collapsible soils was recommended. Due to this condition, infiltration within the upper 7 feet was not recommended. At that time, 2 infiltration tests were conducted at a depth of approximately 3 feet.

The location of the project area as it lies within its regional setting is indicated on the Index Map, Enclosure A-1, located in Appendix A.

SUBSURFACE CONDITIONS

Subsurface conditions were explored by excavating an exploratory trench to a depth of approximately 15 feet within the area currently proposed for infiltration.

The conditions encountered were logged by a geologist from this firm. Our exploratory trench indicated that the site is underlain by alluvial materials which are locally covered by a 1-foot layer of fill/topsoil. The alluvial materials encountered were noted to generally consist of a variable thickness of silty sand and well graded sand with gravel. Our preliminary geotechnical investigation indicates similar soil conditions, however, the alluvial materials encountered also consisted of sandy silt and poorly graded sand with silt (LOR, 2017). The details of our investigation are shown on the trench log presented as Enclosure B-1, located in Appendix B. For reference, boring logs B-2 and B-6 from our previous investigation are also included as Enclosures B-2 and B-3, located in Appendix B.

Groundwater was not encountered in our exploratory trench as advanced to a depth of approximately 15 feet. Based on information gathered from our preliminary geotechnical investigation, groundwater is anticipated to lie on the order of 200 feet beneath the site (LOR, 2017).

INFILTRATION TESTING AND TEST RESULTS

A total of 2 double ring infiltration tests were conducted at the requested locations approximately illustrated on the enclosed Site Plan, Enclosure A-2, located in Appendix A. The testing was conducted at the bottom of the proposed system at a depth of approximately 11 feet below the existing ground surface as requested.

A 12-inch diameter steel casing (ring) was installed within the center of each test location, with a 24-inch diameter steel ring centered around it. Each ring was imbedded approximately 3 inches. These rings extended approximately 17 inches above the bottom of each test location. Each test location was tested immediately after the rings were installed by filling both the inside and outside rings and maintaining a water level to a depth of approximately 2 inches above the ground surface. Water was then metered into the test hole to maintain this water level within both rings. The volume of water used in a given time period was recorded at various time intervals to establish the infiltration rate of water within the inner ring.

The infiltration rate is measured as the drop in water level compared to the permeability of the bottom surface area soils in the bottom of the test hole. If a ring is not used, the water column in the test hole is allowed to seep into both the bottom and sidewalls of the hole, for which the drop in water level must be corrected and reduced for the volume of water seeping into the sidewall and for the diameter of the test hole. As described above, the tests described herein were conducted using a 12-inch diameter inner ring and 24-inch diameter outer ring.

The test holes were found to have the following measured clear water infiltration rates:

Infiltration Test No.	Depth (ft.)*	Clear Water Infiltration Rate** (inches/hour)
DRI-3	11	2.5
DRI-4	11	2.5

* below existing ground surface
** average of final 4 readings rounded to the nearest tenth

The results of our double ring infiltrometer tests are attached as Enclosures C-1 and C-2, located in Appendix C.

CONCLUSIONS

Based upon our field investigation and infiltration test data, infiltration appears feasible at the locations and depths tested. An average clear water absorption rate of 2.5 inches per hour appears to be applicable for the planned infiltration area to be placed at 11 feet in the locations tested. An appropriate factor of safety should be applied as stated within the Riverside County Flood Control and Water Conservation District Design Handbook for Low Impact Development Best Management Practices (2011).

To ensure continued infiltration capability of the infiltration area, a program to maintain the facility should be considered. This program should include periodic removal of accumulated materials, which can slow the infiltration and decrease the water quality. Materials to be removed from the basin areas typically consist of litter, dead plant matter, and soil fines (silts and clays). Proper maintenance of the system is critical. A maintenance program should be prepared and properly executed. At a minimum, the program should be as outlined in the Riverside County Flood Control and Water Conservation District Design Handbook for Low Impact Development Best Management Practices (2011).

The program should also incorporate the recommendations contained within this report, recommendations from our preliminary geotechnical report (LOR, 2017), and any other jurisdictional agency requirements. As noted within our previous report (LOR, 2017), infiltration is not recommended within the upper 7 feet of on-site soil.

Should you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.

John P. Leuer, GE 2030
President

CP:AAT:JPL/ss

Distribution: Addressee (2) and via email cravaliya@gmail.com
David Slawson via email slawson@wai-eng.com

Appendices:
Appendix A: Index Map and Site Plan
Appendix B: Trench/Boring Logs
Appendix C: Double Ring Infiltrometer Test Data

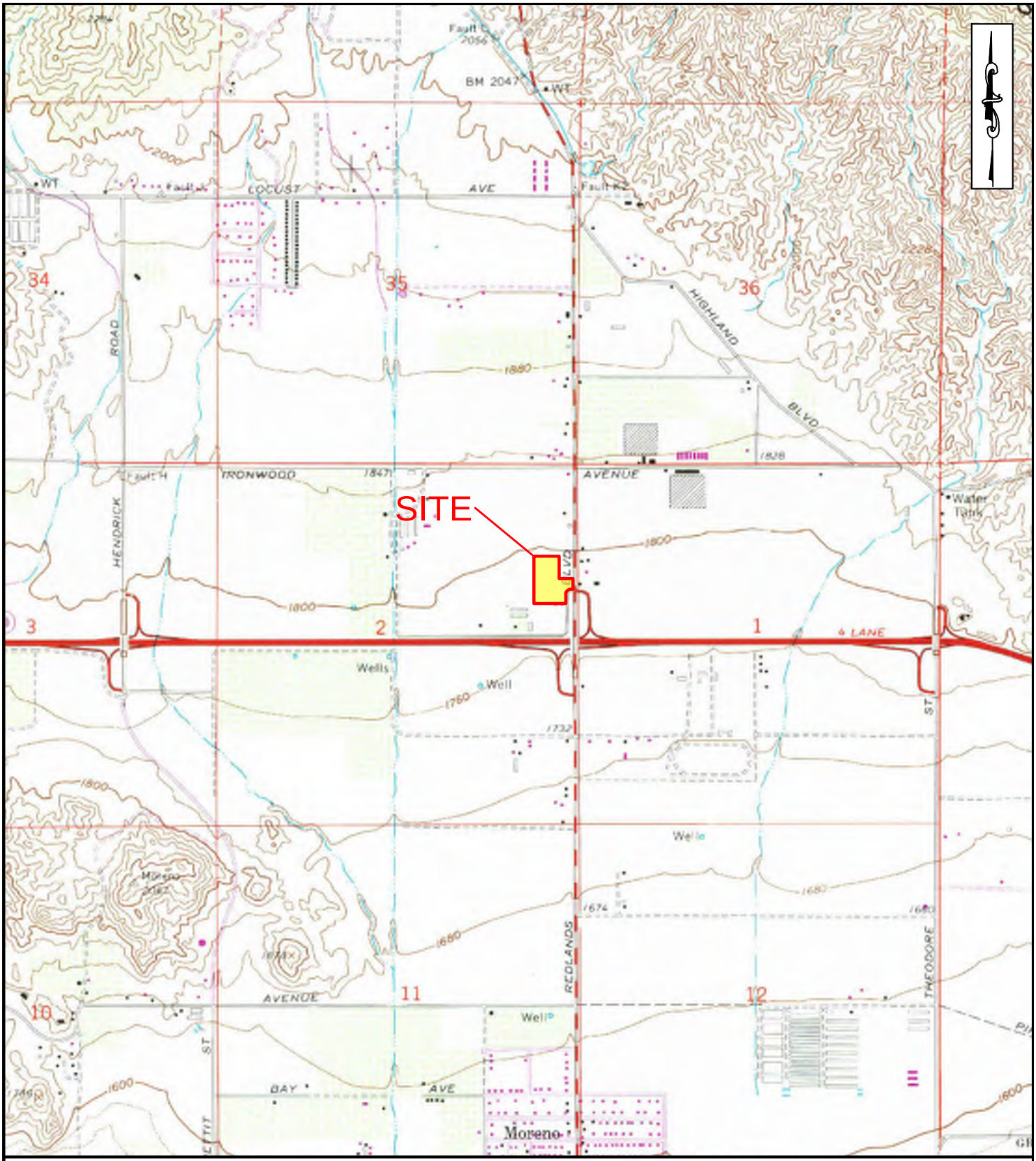
REFERENCES

California Department of Water Resources, 2020, http://wdl.water.ca.gov/waterdatalibrary.

LOR Geotechnical Group, Inc., 2017, Preliminary Geotechnical Investigation, Proposed Commercial Development, Assessor's Parcel Number 488-310-012, Northwest Corner of Spruce Avenue and Redlands Boulevard, Moreno Valley, California, Project No. 13358.1, dated August 9, 2017.

Riverside County Flood Control and Water Conservation District, 2011, Design Handbook for Low Impact Development Best Management Practices, revised September 2011.

Winchester Associates, Inc., 2020, Conceptual Grading Plan for A.P.N. 488-310-012, in the City of Moreno Valley, County of Riverside, State of California, dated August 18, 2020.



INDEX MAP

PROJECT:	APN 488-310-012, MORENO VALLEY, CALIFORNIA	**PROJECT NO:**	13558.11
CLIENT:	ANTHEM OIL, INC.	**ENCLOSURE:**	A-1
LOR Geotechnical Group, Inc.		**DATE:**	NOVEMBER 2020
		SCALE:	1" ≈ 2000'

LEGAL DESCRIPTION

LOT 1 IN BLOCK 20 OF MAP NO. 1 OF RIVERSIDE AND ALESSANDRO DEVELOPMENT CO., IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 11 PAGE 10 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA, TOGETHER WITH THOSE PORTIONS OF HEMLOCK AVENUE AND REDLANDS BOULEVARD WITHIN SAID BLOCK LYING EASTERLY OF THE NORTHERLY PROLONGATION OF THE WEST LINE OF SAID LOT AND NORTHERLY OF THE EASTERLY PROLONGATION OF THE SOUTH LINE OF SAID LOT.

EXCEPT THOSE PORTIONS OF LOT 1 AND OF REDLANDS BOULEVARD IN SAID BLOCK DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTH LINE OF SAID LOT 1, WITH THE WEST LINE OF REDLANDS BOULEVARD, 120 FEET WIDE AS SHOWN ON SAID MAP; THENCE ALONG SAID SOUTH LINE SOUTH 89°51'42" WEST, 83.78 FEET; THENCE NORTH 9°26'38" WEST, 122.31 FEET; THENCE NORTHERLY 182.01 FEET ALONG A TANGENT CURVE, CONCAVE SOUTHEASTERLY WITH A RADIUS OF 105 FEET, THROUGH AND ANGLE OF 99°18'37" TO A POINT ON SAID WEST LINE OF REDLANDS BOULEVARD, DISTANT ALONG SAID WEST LINE NORTH 0°07'41" WEST 243.28 FEET FROM THE POINT OF BEGINNING; THENCE NORTH 89°52'19" EAST 93.00 FEET TO THE CENTER LINE OF SAID REDLANDS BOULEVARD; THENCE SOUTH 0°07'41" EAST 243.28 FEET ON SAID CENTERLINE; THENCE SOUTH 89°52'19" WEST 60.00 FEET TO THE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM, THAT PORTION OF SAID LAND, DESCRIBED AS FOLLOWS:

COMMENCING AT THE CENTERLINE INTERSECTION OF HEMLOCK AVENUE AND REDLANDS BOULEVARD AS SHOWN ON PARCEL MAP NO. 3355, FILED IN BOOK 47, PAGE 33 OF PARCEL MAPS, RECORDS OF SAID RIVERSIDE COUNTY;

THENCE SOUTH 89°52'19" WEST, ALONG SAID CENTERLINE OF HEMLOCK AVENUE, A DISTANCE OF 60.00 FEET TO THE INTERSECTION WITH WITH THE NORTHERLY PROLONGATION OF THE WESTERLY RIGHT OF WAY OF SAID REDLANDS BOULEVARD AND THE TRUE POINT OF BEGINNING;

THENCE SOUTH 0°07'41" EAST, ALONG SAID PROLONGATION AND WESTERLY RIGHT OF WAY, A DISTANCE OF 290.00 FEET;

THENCE LEAVING SAID RIGHT OF WAY, AND PARALLEL WITH SAID CENTERLINE OF HEMLOCK AVENUE SOUTH 89°52'19" WEST, A DISTANCE OF 250.00 FEET;

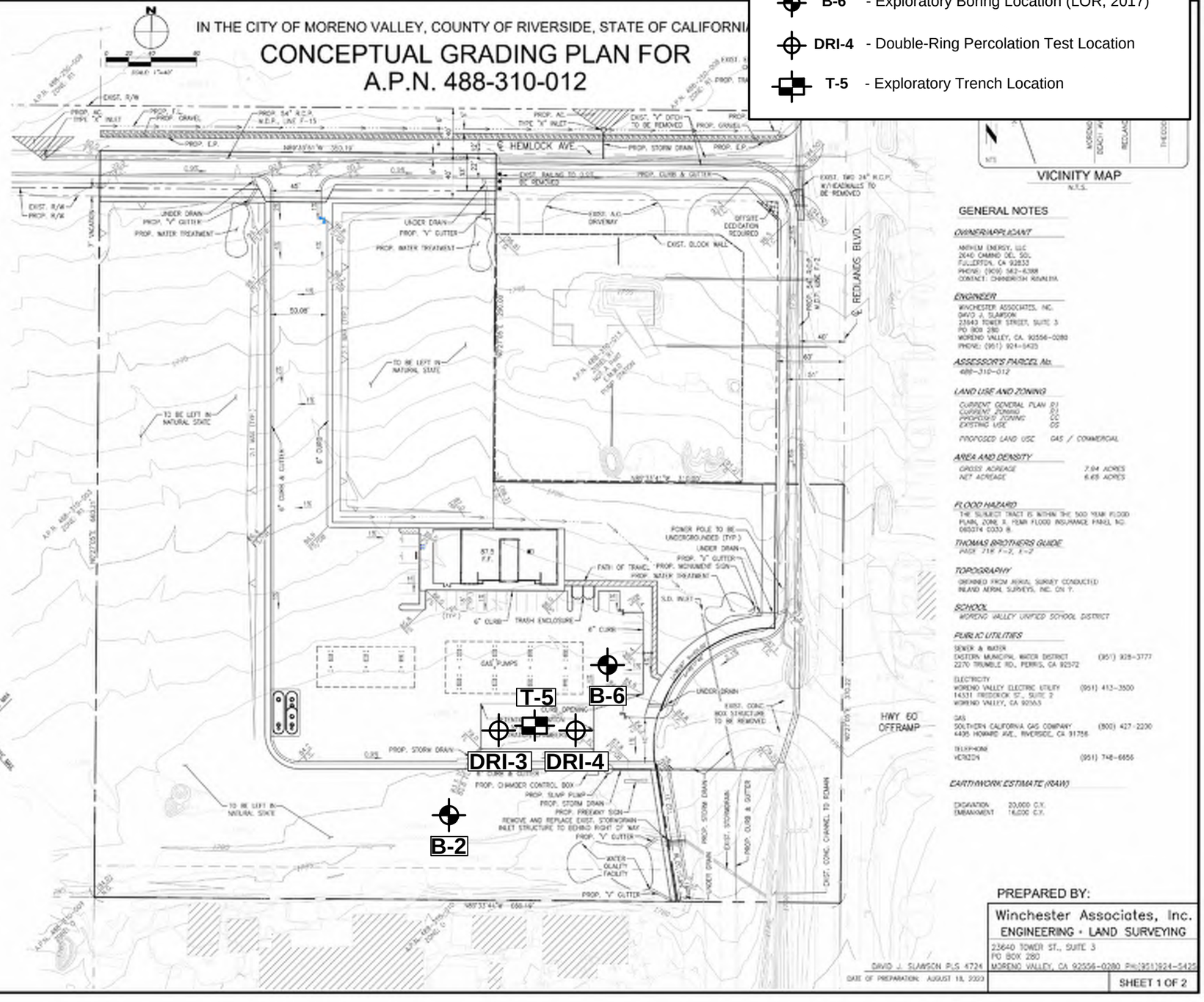
THENCE PARALLEL WITH SAID WESTERLY RIGHT OF WAY, NORTH 0°07'41" WEST, A DISTANCE OF 290.00 FEET TO SAID CENTERLINE OF HEMLOCK AVENUE;

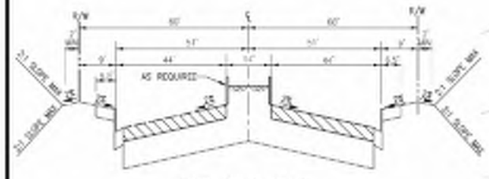
THENCE NORTH 89°52'19" EAST, ALONG SAID CENTERLINE OF HEMLOCK AVENUE, A DISTANCE OF 250.00 FEET TO THE TRUE POINT OF BEGINNING.

A.P.N. 488-310-012

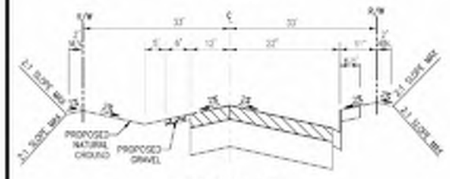
IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

CONCEPTUAL GRADING PLAN FOR A.P.N. 488-310-012





REDLANDS BLVD.
TYPICAL SECTION
N.T.S.



HEMLOCK AVE.
TYPICAL SECTION
N.T.S.

Legend

(Locations Approximate)

Map Symbols

- **B-6** - Exploratory Boring Location (LOR, 2017)
- **DRI-4** - Double-Ring Percolation Test Location
- **T-5** - Exploratory Trench Location

VICINITY MAP
N.T.S.

GENERAL NOTES

OWNER/APPLICANT

ANTHEM ENERGY, LLC
2640 CHAINO DEL SOL
FULLERTON, CA 92833
PHONE: (909) 562-6388
CONTACT: CHANDRISH RAVALIA

ENGINEER

WINCHESTER ASSOCIATES, INC.
DAVID J. SLAWSON
23640 TOWER STREET, SUITE 3
PO BOX 280
MORENO VALLEY, CA. 92556-0280
PHONE: (951) 924-5425

ASSESSOR'S PARCEL No.

488-310-012

LAND USE AND ZONING

CURRENT GENERAL PLAN	CI
CURRENT ZONING	CG
PROPOSED ZONING	CG
EXISTING USE	CG

PROPOSED LAND USE: GAS / COMMERCIAL

AREA AND DENSITY

GROSS ACREAGE	7.84 ACRES
NET ACREAGE	6.65 ACRES

FLOOD HAZARD

THE SUBJECT TRACT IS WITHIN THE 500 YEAR FLOOD PLAIN, ZONE X, FEMA FLOOD INSURANCE PANEL NO. 06037A 0030 B.

THOMAS BROTHERS GUIDE

PAGE 718 F-2, F-3

TOPOGRAPHY

OBTAINED FROM AERIAL SURVEY CONDUCTED INLAND AERIAL SURVEYS, INC. ON ?.

SCHOOL

MORENO VALLEY UNIFIED SCHOOL DISTRICT

PUBLIC UTILITIES

SEWER & WATER
EASTERN MUNICIPAL WATER DISTRICT (951) 928-3777
2270 TRUMBLE RD., PERRIS, CA 92572

ELECTRICITY
MORENO VALLEY ELECTRIC UTILITY (951) 413-3500
14331 FREDERICK ST., SUITE 2
MORENO VALLEY, CA 92553

GAS
SOUTHERN CALIFORNIA GAS COMPANY (800) 427-2200
4495 HOWARD AVE., RIVERSIDE, CA 91758

TELEPHONE
VERIZON (951) 748-6656

EARTHWORK ESTIMATE (RAW)

EXCAVATION	20,000 C.Y.
EMBANKMENT	16,000 C.Y.

PREPARED BY:

Winchester Associates, Inc.
ENGINEERING • LAND SURVEYING
23640 TOWER ST., SUITE 3
PO BOX 280
MORENO VALLEY, CA 92556-0280 PH:(951)924-5425

DAVID J. SLAWSON PLS 4724
DATE OF PREPARATION: AUGUST 18, 2020

SHEET 1 OF 2

SITE PLAN

APN 488-310-012, MORENO VALLEY, CALIFORNIA

PROJECT NO:	13358.11
ENCLOSURE:	A-2
DATE:	NOVEMBER 2020
SCALE:	1" ≈ 100'

PROJECT:

CLIENT: ANTHEM OIL, INC.

LOR Geotechnical Group, Inc.

LOG OF TRENCH T-5

DEPTH IN FEET	TEST DATA	LITHOLOGY	U.S.C.S.	DESCRIPTION
0			SM	**@ 0 feet, FILL/TOPSOIL: SILTY SAND, trace gravel (to 1/2"), approximately 10% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 25% silty fines, light brown, loose.** **@ 1 foot, ALLUVIUM: SILTY SAND, trace gravel (to 1/2"), approximately 5% coarse grained sand, 30% medium grained sand, 40% fine grained sand, 25% silty fines, light brown, dry, some pinhole and slightly larger porosity.** **@ 3 feet, becomes slightly more dense, slight increase in moisture, remains porous, some root hairs, slightly sandier.**
5				
10			SW	**@ 11 feet, WELL GRADED SAND with GRAVEL, approximately 20% gravel (to 1 1/2"), approximately 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 5% silty fines, gray, dry.**
15				**END TRENCH @ 15'** **Fill to 1'** **No caving** **No groundwater** **No bedrock**

PROJECT:	**Proposed Commercial Development**	PROJECT NUMBER:	**13358.11**
CLIENT:	**Anthem Oil, Inc.**	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	**November 2, 2020**
		EQUIPMENT:	**Case 580N**
		BUCKET W.: **30"**	ENCLOSURE: **B-1**

LOG OF BORING B-2

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0	4		8.5		113.6			SM	@ 0 feet, FILL/TOPSOIL: SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 50% fine grained sand, 25% silty fines, tan, dry, loose.
5	3		7.5		99.8			ML SM	@ 5 feet, ALLUVIUM: SILTY SAND/SANDY SILT, trace gravel to 1/2", approximately 5% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 50% silty fines, yellow brown, damp.
	9		6.1		120.3			SM	@ 7 feet, SILTY SAND, approximately 10% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 40% silty fines, red brown, damp.
10	15		2.8		115.3			SP SM	@ 10 feet, POORLY GRADED SAND with SILT, approximately 15% coarse grained sand, 25% medium grained sand, 50% fine grained sand, 10% silty fines, yellow brown, dry.
	47		1.7		122.4			SW	@ 12 feet, WELL GRADED SAND, approximately 25% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 5% silty fines, yellow brown, dry.
15	53		1.5		123.0				
20	36		8.7		123.5			ML	@ 20 feet, SANDY SILT, approximately 10% medium grained sand, 25% fine grained sand, 65% silty fines, red brown, damp, some thin calcite stringers.
									END OF BORING Fill to 2' No groundwater No bedrock
25									

PROJECT:	**Proposed Commercial Development**	PROJECT NUMBER:	**13358.1**
CLIENT:	**Anthem Oil, Inc.**	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**July 13, 2017**
		EQUIPMENT:	**Mobile B61**
		HOLE DIA.: **8"**	ENCLOSURE: **B-2**

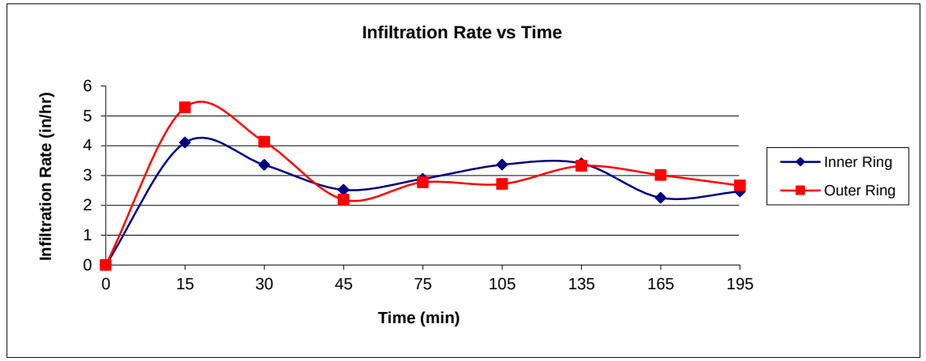
LOG OF BORING B-6

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0								SM	@ 0 feet, FILL/TOPSOIL: SILTY SAND, approximately 10% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 35% silty fines, tan, dry, loose.
	8		4.1		98.9			ML	@ 2 feet, ALLUVIUM: SANDY SILT, approximately 15% medium grained sand, 20% fine grained sand, 65% silty fines, yellow brown, dry, some pinhole and slighlty larger porosity, trace roothairs.
5	9		5.9		116.1				@ 5 feet, contains thin calcite stringers, no roothairs.
	7	2	8.1		102.8			SM	@ 7 feet, SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 5% medium grained, 70% fine grained sand, 20% silty fines, yellow brown, damp.
10	9		9.3		100.8				@ 10 feet, becomes slightly coarser grained.
	8	2	10.4		97.2				@ 12 feet, becomes red brown.
15	15		7.9		118.6				@ 15 feet, SILTY SAND, approximately 5% coarse grained sand, 20% medium grained, 45% fine grained sand, 30% silty fines with trace clay, red brown, moist.
20	27		4.8		116.4				END OF BORING Fill to 2' No groundwater No bedrock
25									

PROJECT:	**Proposed Commercial Development**	PROJECT NUMBER:	**13358.1**
CLIENT:	**Anthem Oil, Inc.**	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**July 13, 2017**
		EQUIPMENT:	**Mobile B61**
		HOLE DIA.: **8"**	ENCLOSURE: **B-3**

DOUBLE RING INFILTROMETER TEST DATA

Project:	APN 488-310-012	**Client:**	Anthem Oil, Inc.
Project No.:	13358.11	**Test Date:**	November 3, 2020
Soil Classification:	(SM) Silty sand	**Test Hole No.:**	DRI-3
Depth of Test Hole:	11.0 ft.	**Test Hole Diameter:**	12 in. inner, 24 in. annular
Liquid Used:	Tap Water	**Date Excavated:**	November 2, 2020
Area of Rings:	Inner = 0.785 ft^2 , Annular 2.36 ft^2	**pH:**	7.8
Tested By:	Andrew L.	**Depth of Water in Rings:**	2.0 in.
Liquid Level Maintained Using:	Vacuum Seal	**Ring Penetration:**	3.0 in.
Depth to Water Table:	200 ft.		

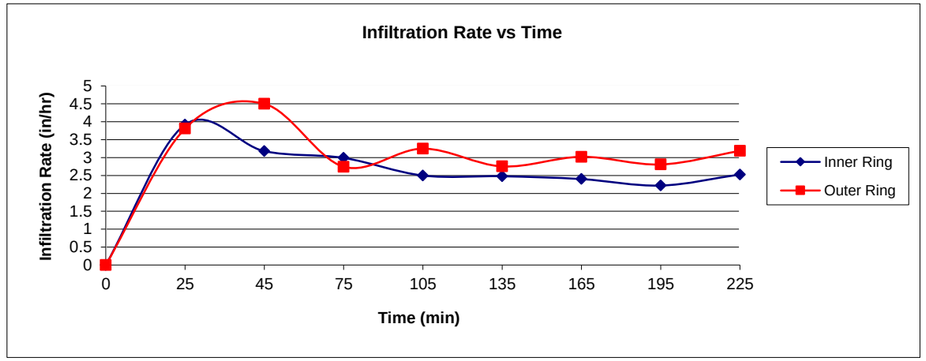


TEST PERIOD

TRIAL NO.	INNER				ANNULAR SPACE			WATER USED (lbs.)		WATER USED (gal)		INFILTRATION RATE (gal/sf.day)		INFILTRATION RATE (in/hr)		LIQUID TEMP (°F)	REMARKS
	TIME		TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	TIME	TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	inner	annular space	inner	annular space	inner	annular space	inner	annular space		
1	S	9:05	15	15	9:05	15	15	4.17	16.13	0.501	1.936	61.2	78.8	4.1	5.3	64	
	E	9:20			9:20											64	
2	S	9:20	15	30	9:20	15	30	3.41	12.62	0.409	1.515	50.1	61.6	3.4	4.1	64	
	E	9:35			9:35											66	
3	S	9:35	15	45	9:35	15	45	2.56	6.69	0.307	0.803	37.6	32.7	2.5	2.2	66	
	E	9:50			9:50											66	
4	S	9:53	30	75	9:53	30	75	5.87	16.95	0.705	2.035	43.1	41.4	2.9	2.8	66	outer refilled
	E	10:23			10:23											68	
5	S	10:23	30	105	10:23	30	105	6.83	16.57	0.820	1.989	50.1	40.5	3.4	2.7	68	
	E	10:53			10:53											68	
6	S	10:55	30	135	10:55	30	135	6.92	20.29	0.831	2.436	50.8	49.5	3.4	3.3	68	outer refilled
	E	11:25			11:25											69	
7	S	11:25	30	165	11:25	30	165	4.58	18.42	0.550	2.211	33.6	45.0	2.3	3.0	69	
	E	11:55			11:55											69	
8	S	12:00	30	195	12:00	30	195	5.01	16.27	0.601	1.953	36.8	39.7	2.5	2.7	70	inner/outer refilled
	E	12:30			12:30											70	
9	S	12:30	30	225	12:30	30	225	5.47	19.85	0.657	2.383	40.2	48.5	2.7	3.2	70	
	E	13:00			13:00											71	
10	S	13:04	30	255	13:04	30	255	5.42	17.57	0.651	2.109	39.8	42.9	2.7	2.9	71	outer refilled
	E	13:34			13:34											71	
11	S	13:34	30	285	13:34	30	285	3.86	17.67	0.463	2.121	28.3	43.1	1.9	2.9	71	
	E	14:04			14:04											72	

DOUBLE RING INFILTROMETER TEST DATA

Project:	APN 488-310-012	**Client:**	Anthem Oil, Inc.
Project No.:	13358.11	**Test Date:**	November 3, 2020
Soil Classification:	(SM) Silty sand	**Test Hole No.:**	DRI-4
Depth of Test Hole:	11.0 ft.	**Test Hole Diameter:**	12 in. inner, 24 in. annular
Liquid Used:	Tap Water	**Date Excavated:**	November 2, 2020
Area of Rings:	Inner = 0.785 ft^2 , Annular 2.36 ft^2	**pH:**	7.8
Tested By:	Andrew L.	**Depth of Water in Rings:**	2.0 in.
Liquid Level Maintained Using:	Vacuum Seal	**Ring Penetration:**	3.0 in.
Depth to Water Table:	200 ft.		



TEST PERIOD

TRIAL NO.	INNER				ANNULAR SPACE			WATER USED (lbs.)		WATER USED (gal)		INFILTRATION RATE (gal/sf.day)		INFILTRATION RATE (in/hr)		LIQUID TEMP (°F)	REMARKS
	TIME		TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	TIME	TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	inner	annular space	inner	annular space	inner	annular space	inner	annular space		
1	S	9:30	25	25	9:30	25	25	6.64	19.40	0.797	2.329	58.5	56.8	3.9	3.8	64	
	E	9:55			9:55											64	
2	S	9:55	20	45	9:55	20	45	4.31	18.34	0.517	2.202	47.5	67.2	3.2	4.5	64	
	E	10:15			10:15											66	
3	S	10:19	30	75	10:19	30	75	6.08	16.77	0.730	2.013	44.6	40.9	3.0	2.7	66	
	E	10:49			10:49											66	outer refilled
4	S	10:49	30	105	10:49	30	105	5.08	19.86	0.610	2.384	37.3	48.5	2.5	3.2	66	
	E	11:19			11:19											68	
5	S	11:24	30	135	11:24	30	135	5.04	16.83	0.605	2.020	37.0	41.1	2.5	2.8	68	
	E	11:54			11:54											68	outer refilled
6	S	11:54	30	165	11:54	30	165	4.88	18.47	0.586	2.217	35.8	45.1	2.4	3.0	68	
	E	12:24			12:24											69	
7	S	12:27	30	195	12:27	30	195	4.51	17.16	0.541	2.060	33.1	41.9	2.2	2.8	69	
	E	12:57			12:57											69	outer refilled
8	S	13:00	30	225	13:00	30	225	5.14	19.48	0.617	2.339	37.7	47.6	2.5	3.2	70	
	E	13:30			13:30											70	inner refilled
9	S	13:33	30	255	13:33	30	255	5.66	16.68	0.679	2.002	41.5	40.7	2.8	2.7	70	
	E	14:03			14:03											71	outer refilled

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT
ASSESSOR'S PARCEL NUMBER 488-310-012
NORTHWEST CORNER OF SPRUCE AVENUE
AND REDLANDS BOULEVARD
MORENO VALLEY, CALIFORNIA

PROJECT NO. 13358.1
AUGUST 9, 2017

Prepared For:

Anthem Oil, Inc.
2640 Camino Del Sol
Fullerton, California 92833

Attention: Mr. Chandresh Ravaliya

6121 Quail Valley Court ▲ Riverside, CA 92507 ▲ (951) 653-1760 ▲ (951) 653-1741 (Fax) ▲ www.lorgeo.com

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

August 9, 2017

Anthem Oil, Inc.
2640 Camino Del Sol
Fullerton, California 92833

Project No. 13358.1

Attention: Mr. Chandresh Ravaliya

Subject: Preliminary Geotechnical Investigation, Proposed Commercial Development, Assessor's Parcel Number 488-310-012, Northwest Corner of Spruce Avenue and Redlands Boulevard, Moreno Valley, California.

LOR Geotechnical Group, Inc. is pleased to present this report summarizing our geotechnical investigation for the proposed retail structures and associated improvements to be located at the northwest corner of Spruce Avenue and Redlands Boulevard in the City of Moreno Valley.

In summary, it is our opinion that the site can be developed from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction. The following summary reviews some of the important elements of the project, however, this summary should not be solely relied upon.

To provide adequate support for the proposed structures, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. All undocumented fill material and all loose older alluvial materials should be removed from areas to receive engineered compacted fill and settlement prone improvements, (ie, flatwork, pavements, canopies, etc.). The data developed during this investigation indicates that removals of approximately 5 to 7 feet below existing grades within currently planned structural areas will be required.

The on-site soils were tested and found to have a very low expansion potential. Soluble sulfate content testing of the on-site soils found them to have negligible soluble sulfate content. The on-site soils were found to have a poor R-value quality.

LOR Geotechnical Group, Inc.

TABLE OF CONTENTS

Page No.

INTRODUCTION 1

PROJECT CONSIDERATIONS 2

EXISTING SITE CONDITIONS 2

SUBSURFACE FIELD INVESTIGATION 2

LABORATORY TESTING PROGRAM 3

GEOLOGIC CONDITIONS 3
- Site Geologic Conditions 4
- Surficial Deposits 4
- Fill/Top Soil 4
- Alluvium 4
- Groundwater Hydrology 5
- Mass Movement 5
- Faulting 6
- Historical Seismicity 7
- Secondary Seismic Hazards 8
  - Liquefaction 8
  - Seiches/Tsunamis 8
  - Flooding (Water Storage Facility Failure) 8
  - Seismically-Induced Landsliding 8
  - Rockfalls 8
  - Seismically-Induced Settlement 8

SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2016) 9
- CBC Earthquake Design Summary 9

INFILTRATION TESTING AND TEST RESULTS 10

CONCLUSIONS 11
- Foundation Support 12
- Geologic Mitigations 12
- Seismicity 12

RECOMMENDATIONS 13
- General Site Grading 13
- Initial Site Preparation 14
- Preparation of Fill Areas 14
- Preparation of Foundation Areas 15
- Engineered Compacted Fill 15
- Short Term Excavations 16
- Soil Expansiveness 16
- Foundation Design 17
- Settlement 18

TABLE OF CONTENTS

Slabs-On-Grade 18
Exterior Flatwork 18
Wall Pressures 19
Preliminary Pavement Design 20
Sulfate Protection 21
Infiltration 21
Construction Monitoring 22

TIME LIMITATIONS 23

LIMITATIONS 23

CLOSURE 24

REFERENCES 25

APPENDICES

Appendix A - Index Map, Plate, Regional Geologic Map, and Historical Seismicity Maps

Appendix B - Field Investigation Program and Boring and Trench Logs

Appendix C - Laboratory Testing and Test Results

Appendix D - Infiltration Test Results

INTRODUCTION

During July and August of 2017, a Preliminary Geotechnical Investigation was performed by LOR Geotechnical Group, Inc. for the proposed commercial development of Assessor's Parcel Number 488-310-012, located at the northwest corner of Spruce Avenue and Redlands Boulevard in the City of Moreno Valley, California. The purpose of this investigation was to provide a technical evaluation of the geologic setting of the site and to provide geotechnical design recommendations for the proposed residential type development. The scope of our services included:

- Review of available pertinent geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Geologic field reconnaissance mapping to verify the aerial distribution of earth units and significance of surficial features as compiled from documents, literature and reports reviewed,
- A subsurface field investigation to determine the physical soil conditions pertinent to the proposed development;
- Infiltration testing via the double ring infiltrometer test method for the feasibility and design of infiltration systems;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of geotechnical recommendations for site grading and foundation design; and
- Preparation of this report summarizing our findings, and providing conclusions and recommendations for site development.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1, within Appendix A.

To orient our investigation at the site, you provided us with a Site Plan of the site. The proposed development is shown on this map. A copy of this map was utilized as a base for our investigation and is shown on Enclosure A-2, within Appendix A.

PROJECT CONSIDERATIONS

Information furnished to this firm indicates the proposed project will consist of the construction of gas station, truck stop, fast food restaurants, office space, and the associated improvements on the 6.76 ± acre site.

Based on the topography of the site and adjacent properties, grading will most likely incorporate cuts and fills on the order of a few feet. Although the type of construction for the buildings has not yet been stated, it will most likely consist of wood frame and stucco, one story structures. Light to moderate foundation loads are associated with such structures.

EXISTING SITE CONDITIONS

The subject site is a roughly 'L'-shaped parcel comprising approximately 6.76 acres located at the northwest corner of Spruce Avenue and Redlands Boulevard, in the City of Moreno Valley, California. The topography of the site is generally planar with a gentle fall to the south.

At the time of our investigation the subject site was vacant of structures. Some minor wind blown trash was present. Power poles were present along the north and east site boundaries. Hemlock Avenue, not yet existing, bounds the site on the north with vacant land beyond. Vacant land lies adjacent the site on the west. An Eastern Municipal Water District pump station lies to the east of the northern half of the site. The remainder of the eastern half of the site is bound by Redlands Boulevard and Spruce Avenue, a two lane paved roadway. Further east, large lot residential properties are present. South of the site lies a horse ranch.

SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on July 13 and 21, 2017 and consisted of drilling 6 exploratory borings with a truck-mounted Mobile B61B drill rig equipped with 8-inch diameter hollow stem augers and excavating 4 exploratory test pits using a rubber tire backhoe equipped with an 18-inch bucket. The borings were extended to depths ranging from approximately 21.5 feet to 51.5 feet below the existing ground surface. The test pits were excavated to depths of approximately 14 to 14.5 feet below the existing ground surface. The approximate locations of our

exploratory borings and trenches are presented on the enclosed Plate, Enclosure A-2, within Appendix A.

Logs of the subsurface conditions encountered in the exploratory borings were created by a geologist from this firm. Bulk samples of the encountered materials were obtained and returned to our geotechnical laboratory in sealed containers for further testing and evaluation. Relatively undisturbed samples were obtained at maximum intervals of 5 feet and returned to our geotechnical laboratory in sealed containers for further testing and evaluation.

The subsurface conditions encountered in the exploratory trenches were logged by a geologist from this firm. In-place density determinations were conducted at selected levels within the trenches utilizing the Nuclear Gauge Method (ASTM D 2922). Bulk samples were obtained at selected intervals and returned to our geotechnical laboratory in sealed containers for further testing and evaluation.

A detailed description of the subsurface field exploration program and boring and trench logs are presented in Appendix B.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to laboratory testing to evaluate their physical and engineering properties. Laboratory testing included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, expansion index, consolidation, sieve analysis, sand equivalent, R-value, and soluble sulfate content. A detailed description of the laboratory testing program and the test results are presented in Appendix C.

GEOLOGIC CONDITIONS

The subject site is situated along the northeastern end of Moreno Valley that lies just south of the junction of the Box Springs Mountains and the hills of the Badlands. This area is located within the northeastern portion of the Peninsular Ranges Geomorphic Province of southern California. This province incorporates several northwest trending mountain ranges, such as the Santa Ana and San Jacinto Mountains, which extend from the Transverse Ranges Geomorphic Province, northeast of Los Angeles, into the Baja California Peninsula. Lying in between these small ranges are a series of valleys

and basins, such as the Perris Plain. The Perris Plain is composed of rocks of the Peninsular Ranges batholith, a very large mass composed primarily of batholithic crystalline igneous rocks, with lesser amounts of metasedimentary and metavolcanic rocks which predate the intrusion of the batholith, such as the hills of the Box Springs Mountains to the north of the site. These rocks actually consist of numerous separate plutonic intrusions which range in composition from gabbro to granite, with tonalite the predominate lithology. Erosion of the hills has resulted in the covering of a thin to thick veneer of various ages of alluvial fan materials across the flank of the hills and out into the adjoining valley floor to the south. The current drainage pattern of the northeastern section of Moreno Valley flows to the south, then turns to the southwest where southward flow is blocked by Mount Russell. This pattern has eroded off some of the older alluvial fan materials and subsequently deposited various amounts of relatively younger, unconsolidated alluvial sediments along the lower reaches of the valley.

The interior of the Perris Plain is considered to be relatively stable with few known active faults. However, this plain is bounded by active faults. These include the Elsinore fault zone on the west, the San Jacinto fault zone on the northeast, the San Andreas fault zone on the north, and the Agua-Tibia fault zone on the south. As the subject site is located near the northeastern margin of Perris Plain, the San Jacinto fault is the closest known active fault in relation to the site. At its closest approach, the San Jacinto fault is located approximately 0.9 kilometers (0.6 miles) northeast from the site. A complete listing of the distances to known active faults in relation to the site is given in the Faulting section of this report.

The site is shown within the regional geologic setting as mapped by the U.S.G.S. on the enclosed Regional Geologic Map, Enclosure A-3, within Appendix A.

Site Geologic Conditions

As observed during this investigation, the subject site is underlain by fill/topsoil overlying native alluvial materials. These units are described in further detail in the following sections:

Surficial Deposits

Fill/Topsoil: The surface of the site contained a layer of materials which have been altered in some manner. These materials were noted to generally consist of silty sand which was tan, dry, and in a loose state. These units were noted to generally be on the order of two feet in thickness with a local area noted to be 5 feet in thickness.

Alluvium: Underlying the surficial materials, natural units of alluvium were encountered. These units consisted of primarily of silty sand to sandy silt with minor units of well and poorly graded sand, sandy clay, and clayey sand beneath approximately 10 feet. Typically, the fine grained alluvial materials were yellow brown to red brown in color while the sandier units were yellow brown to white. Typically, the alluvial units were dry to damp. Some pinhole porosity and secondary calcite was present within the finer grained units within the upper portions. Based on the results of the equivalent SPT blow counts, it was noted that the alluvial materials were in loose/soft to medium dense/medium within the upper 10 to 12 feet, becoming medium dense/stiff to dense/hard beneath. Consolidation testing was conducted on representative in-place samples at depths of 5, 7, 10 and 12 feet. Testing indicates a potential for hydroconsolidation of the materials at a depth of 5 feet. Samples tested beneath this depth are considered to have normal hydroconsolidation characteristics. Hydroconsolidation is the unfavorable collapse of soil under a relatively normal load upon the introduction of water. The samples tested are indicative of relatively low density, porous, dry alluvial units.

A detailed description of the subsurface soil conditions as encountered within our exploratory borings is presented on the Boring Logs within Appendix B.

Groundwater Hydrology

Groundwater was not encountered in any of our exploratory borings as advanced to a maximum depth of approximately 51.5 feet, nor was any groundwater seepage observed during our site reconnaissance on the subject site.

Records for nearby wells which were readily available from the State of California Department of Water Resources online database (DWR, 2017) and the Western Municipal Water District Cooperative Well Measurement Program (WMWD, 2016) were reviewed as a part of this investigation.

According to the State of California Department for Water resources online database, the nearest wells are EMWD12047 and EMWD14352 located approximately 0.8 kilometers (0.5 miles) to the southwest of the site. Data for these wells was present from November of 2011 through April of 2016. Groundwater levels ranged from depths of approximately 197 to 220 feet during that time. A measuring point elevation of 1,791 and 1,786 feet above mean sea level, respectively, was provided.

A review of the Cooperative Well Measuring Program, Fall 2015 database identified 4 wells nearby the site (03S/03S-02L001S,-02L002S, -02L001R, and -02L002R). These wells lie approximately 0.4 miles to the southwest. Data was available from November of 2004 to April of 2015. The depth of the water in the wells from this time period was approximately 200 feet. Measuring point elevations ranged from 1,774 to 1,791 feet above mean sea level.

Based on the information above, groundwater is anticipated to lie on the order of 200 feet beneath the site.

Mass Movement

The majority of the site lies on a relatively flat surface. The occurrence of mass movement failures such as landslides, rockfalls, or debris flows within such areas are generally not considered common and no evidence of mass movement was observed on the site.

Faulting

No active or potentially active faults are known to exist at or project into the subject site, nor was any evidence of faulting or lineaments noted during our field investigation of the site. In addition, the site does not lie within a current State of California Earthquake Fault Zone (Hart, 1997) nor within a County of Riverside Fault Zone (TLMA, 2017).

As previously mentioned, the closest known fault with a well documented location is the San Jacinto fault, located approximately 0.9 kilometers (0.6 miles) to the northeast. Other active earthquake faults in the region include the San Andreas fault located approximately 18 kilometers (11 miles) to the northeast, the Elsinore fault located approximately 34.5 kilometers (21.5 miles) to the southwest, and the

Cucamonga fault located approximately 37 kilometers (23 miles) to the north-northwest.

The San Jacinto fault zone is a sub-parallel branch of the San Andreas fault zone, extending from the northwestern San Bernardino area, southward into the El Centro region. This fault has been active in recent times with several large magnitude events. It is believed that the San Jacinto fault is capable of producing an earthquake magnitude on the order of 6.5 or larger.

The San Andreas fault is considered to be the major tectonic feature of California, separating the Pacific Plate and the North American Plate. While estimates vary, the San Andreas fault is generally thought to have an average slip rate on the order of 24mm/yr and capable of generating large magnitude events on the order of 7.5.

The Elsinore fault zone is one of the largest in southern California. At its northern end it splays into two segments and at its southern end it is cut by the Yuba Wells fault. The primary sense of slip along the Elsinore fault is right lateral strike-slip. It is believed that the Elsinore fault zone is capable of producing an earthquake magnitude on the order of 6.5 to 7.5.

The Cucamonga fault is considered to be part of the Sierra Madre fault system which marks the southern boundary of the San Gabriel Mountains. This is a north dipping thrust fault which is believed to be responsible for the uplift of the San Gabriel Mountains. It is believed that the Cucamonga fault is capable of producing an earthquake magnitude on the order of 7.0.

Current standards of practice have included a discussion of all potential earthquake sources within a 100 kilometer (62 mile) radius. However, while there are other large earthquake faults within a 100 kilometer (62-mile) radius of the site, none of these are considered as relevant to the site as the faults described above, due to their greater distance and/or smaller anticipated magnitudes.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region, a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search

program by EPI Software, Inc. (Reeder, 2000) This program conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto an overlay map of known faults. For this investigation the database of seismic events utilized by the EPI program was obtained from the Southern California Seismic Network (SCSN) available from the Southern California Earthquake Center. At the time of our search the data base contained data from January 1, 1932 through December 31, 2010.

In our first search, the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As depicted on Enclosure A-4, within Appendix A, the site lies within a relatively active region associated with the San Jacinto and San Andreas faults trending southeast to northwest. Of these events, the closest was a magnitude 4.1 located approximately 7 kilometers (4.5 miles) north of the site.

In the second search, the micro seismicity of the area lying within a 10 kilometer (6.2 miles) radius of the site was examined by selecting an epicenter map listing events on the order of 0.0 and greater since 1977. In addition, only the "A" events, or most accurate events were selected. Caltech indicates the accuracy of the "A" events to be approximately 1 kilometer. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the events to the last 40 ± years on the detail map is to enhance the accuracy of the map. Events recorded prior the mid 1970's are generally considered to be less accurate due to advancements in technology. As depicted on this map, Enclosure A-5, the nearby San Jacinto fault appears to be the source of numerous events.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring in the region around the subject site, predominately associated with the presence of the faults described within. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seismic-induced settlement, seiches and tsunamis, earthquake induced flooding, landsliding, and rockfalls.

Liquefaction: The potential for liquefaction generally occurs during strong ground shaking within loose, granular sediments where the groundwater is usually less than 50 feet. As the depth to groundwater is on the order of 50 plus feet, the potential for liquefaction is considered nil.

Seiches/Tsunamis: The potential for the site to be affected by a seiche or tsunami (earthquake generated wave) is considered nil due to absence of any large bodies of water very near the site.

Flooding (Water Storage Facility Failure): There are no large water storage facilities located on or near the site which could possibly rupture during in earthquake and effect the site by flooding.

Seismically-Induced Landsliding: Due to the low relief of the site and surrounding region, the potential for landslides to occur at the site is considered nil.

Rockfalls. No large, exposed, loose or unrooted boulders are present above the site that could affect the integrity of the site.

Seismically-Induced Settlement: Settlement generally occurs within areas of loose, granular soils with relatively low density. Because the site is underlain by relatively dense alluvium at depth and grading of the site will remove any undocumented fill soils and any near surface loose alluvial soils, the potential for settlement is considered nil.

SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2016)

Section 1613 of Chapter 16 of the 2016 California Building Code (CBC) contains the procedures and definitions for the calculations of the earthquake loads on structures and non structural components that are permanently attached to structures and their supports and attachments.

It should be noted that the classification of use and occupancy of all proposed structures at the site, and thus design requirements, shall be the responsibility of the structural engineer and the building official.

CBC Earthquake Design Summary

The following earthquake design criteria have been formulated for the site utilizing the source referenced above.

However, these values should be reviewed by the building official (Risk Category) and structural engineer and the final design should be performed by a qualified structural engineer familiar with the region.

CBC 2016 SEISMIC DESIGN SUMMARY* Site Location (USGS WGS84) 33.9419, -117.1581, Risk Category III	
Site Class Definition Chapter 20 ASCE 7	D
S_s Mapped Spectral Response Acceleration at 0.2s Period, (Figure 1613.3.1(1))	2.431
S_1 Mapped Spectral Response Acceleration at 1s Period, (Figure 1613.3.3(2))	1.113
F_a Short Period Site Coefficient at 0.2s Period, (Table 1613.3.3(1))	1.0
F_v Long Period Site Coefficient at 1s Period, (Table 1613.3.3(2))	1.5
S_{MS} Adjusted Spectral Response Acceleration at 0.2s Period, (eq .16-37)	2.431
S_{M1} Adjusted Spectral Response Acceleration at 1s Period, (eq .16-38)	1.670
S_{DS} Design Spectral Response Acceleration at 0.2s Period, (eq .16-39)	1.620
S_{D1} Design Spectral Response Acceleration at 1s Period, (eq .16-40)	1.113
Seismic Design Category - Short Period (Table 1613.3.5(1))	E
Seismic Design Category - Long Period (Table 1613.3.5(2))	E
*Values obtained from U.S.G.S. online U.S. Seismic Design Maps tool	

INFILTRATION TESTING AND TEST RESULTS

Two double ring infiltration tests were conducted at the approximate locations illustrated on Enclosure A-2. Test pits were excavated to a depth of approximately 6 feet, as requested. A 12-inch diameter casing was installed within the center of the

test location with a 24-inch diameter casing centered around it. Each casing was imbedded to a depth approximately 5 inches. These liners extended approximately 15-inches above the bottom of the test location. The test locations were tested immediately after the casings were installed by filling both the inside and outside casings and maintaining a water level to a height of approximately 1 to 1.5-inches.

The testing procedure was as follows:

Both the inside and outside area of the casings were filled with water to a level of approximately 1 to 1.5-inches above the ground surface. Water was then metered to maintain this water level within both rings. The volume of water use in a given time period was recorded at various time intervals to establish the infiltration rate of the inner ring. See the attached Infiltration Test Data sheets, Enclosures D-1 and D-2 within Appendix D for the test information and measurements.

The infiltration rate is measured as the drop in water level compared to the permeability of the bottom surface area soils in the bottom of the test hole. If casing is not used, the water column in the test hole is allowed to seep into both the bottom and sidewalls of the hole, for which the drop in water level must be corrected and reduced for the volume of water seeping into the sidewall and for the diameter of the test hole. As described above, the tests described herein were conducted using a 12-inch diameter inner casing and 24-inch diameter outer casing.

The test holes were found to have the following measured clear water infiltration rates:

Infiltration Test No.	Depth (ft.)	Clear Water Infiltration Rate*	
		gal/sf/day	in/hr
DRI-1	3	27.6	1.8
DRI-2	3	17.1	1.1
* average of final two readings			

The clear water percolation rates obtained in our test locations were 1.1 and 1.8 inches per hour.

The borings placed during this evaluation in the general area proposed for infiltration indicates that the subsurface soils generally consists of silty sand within the tests at a depth of 6 feet. No groundwater was encountered as explored to a maximum depth of approximately 51.5 feet within Boring B-1.

CONCLUSIONS

This investigation provides a broad overview of the geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc. that the proposed development is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction.

The subsurface conditions encountered in our exploratory borings and trenches are indicative of the locations explored. The subsurface conditions presented here are not to be construed as being present the same everywhere on the site. If conditions are encountered during the construction of the project which differ significantly from those presented in this report. This firm should be notified immediately so we may assess the impact to the recommendations provided.

Foundation Support

Based upon the field investigation and test data, it is our opinion that the existing fills and the upper native soils, will not, in their present condition, provide uniform and/or adequate support for the proposed structures. Our equivalent Standard Penetration Test (SPT) data indicated variable in-situ conditions of the existing fills and upper native soils, typically ranging from loose to medium dense and dense states. In addition, our consolidation testing indicates a potential for hydroconsolidation of the materials to a depth of 5 to 7 feet. This condition could cause unacceptable differential and/or overall settlements upon application of the anticipated foundation loads and other site improvements. Therefore, in order to provide adequate support for the proposed improvements, we recommend that a compacted fill mat be constructed beneath footings and slabs. This compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. In addition, the construction of this compacted fill mat will allow for the removal of the existing unsuitable earth materials within the building pad and

other site improvement areas. Conventional foundation systems using either individual spread footings and/or continuous wall footings will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

Geologic Mitigations

No special mitigation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

Seismicity

Seismic ground rupture is generally considered most likely to occur along pre-existing active faults. Since no known faults are known to exist at, or project into the site, the probability of ground surface rupture occurring at the site is considered nil.

Due to the site's close proximity to the San Jacinto fault zone, as described above, it is reasonable to expect a strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant than the San Jacinto fault zone from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the California Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson, 1992).

RECOMMENDATIONS

No special mitigation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

General Site Grading

It is imperative that no clearing and/or grading operations be performed without the presence of a qualified geotechnical engineer. An on-site, pre-job meeting with the owner/developer, the contractor, and geotechnical engineer, and jurisdictional agency should occur prior to all grading related operations. Operations undertaken at the site without the geotechnical engineer present may result in exclusions of affected areas from the final compaction report for the project.

Grading of the subject site should be performed in accordance with the following recommendations as well as applicable portions of the California Building Code, and/or applicable local ordinances.

All areas to be graded should be stripped of significant vegetation and other deleterious materials. These materials should not be incorporated within engineered compacted fill. It is our recommendation that any existing fills that may be present be removed and replaced with engineered compacted fill.

Any uncontrolled fills encountered during site preparation should be completely removed, cleaned of significant deleterious materials, and may then be reused as compacted fill. Uncontrolled fills were identified at the site during this study and these will be encountered within the grading areas. Areas of deeper fill than that identified may be present locally, primarily in areas of any previous development.

It is our recommendation that all existing uncontrolled and/or undocumented fills, buried obstructions, under any proposed flatwork and paved areas should be removed and replaced with engineered compacted fill. If this is not done, premature structural distress (settlement) of the flatwork and pavement may occur.

Cavities created by removal of subsurface obstructions should be thoroughly cleaned of loose soil, organic matter and other deleterious materials, shaped to provide access for construction equipment, and backfilled as recommended in the following Engineered Compacted Fill section of this report.

Initial Site Preparation

All existing fill and the upper portions of the alluvial materials should be removed from areas to receive engineered compacted fill and/or supporting site improvements that are sensitive to settlement, (ie, flatwork, pavements, canopies, etc.). The data developed during this investigation indicates that removals on the order of 5 to 7 feet will be required across the site to encounter competent alluvial materials. Removals should expose alluvial materials with a relative in-situ compaction of at least 83 percent and/or an in-situ saturation of at least 75 percent. The actual depths of removal should be verified during the grading operation by observation and in-place density testing.

Preparation of Fill Areas

Prior to placing fill, the surfaces of all areas to receive fill should be scarified to a depth of at least 12 inches. The scarified soil should be brought to near optimum moisture content and recompacted to a relative compaction of at least 90 percent (ASTM D 1557).

Preparation of Foundation Areas

All footings should rest entirely upon a minimum of 24 inches of properly compacted fill material placed over competent native soils. In areas where the required fill thickness is not accomplished by the removal of the existing fil and loose native soils, the footing areas should be further subexcavated to a depth of at least 24 inches below the proposed footing base grade, with the subexcavation extending at least 5 feet beyond the footing lines. Where removals in excess of 5 feet deep are required, the removal areas should extend laterally at a 1:1 ratio. The bottom of this excavation should then be scarified to a depth of at least 12 inches, brought to near optimum moisture content, and recompacted to at least 90 percent relative compaction (ASTM D 1557) prior to refilling the excavation to grade as properly compacted fill.

Engineered Compacted Fill

All fill materials should be free from organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills.

If required, import fill should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use.

Fill should be spread in maximum 8-inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557. The upper 12 inches of areas to be paved should be compacted to at least 95 percent (ASTM D 1557).

Based upon the relative compaction of the near surface fill and alluvial soils determined during this investigation and the relative compaction anticipated for compacted fill soil, we estimate a compaction shrinkage factor of approximately 20 to 25 percent. Therefore, 1.20 to 1.25 cubic yards of in-place materials would be necessary to yield one cubic yard of properly compacted fill material. The volume used in calculations should include the processed bottom. These values are for estimating purposes only, and are exclusive of losses due to stripping or the removal of subsurface obstructions. These values may vary due to differing conditions within the project boundaries and the limitations of this investigation. Shrinkage/bulkage should be monitored during construction. If percentages vary, provisions should be made to revise final grades or adjust quantities of borrow or export.

Careful evaluation of on-site soils and any import fill for their expansion potential should be conducted during the grading operation.

Short Term Excavations

Following the California Occupational and Safety Health Act (CAL-OSHA) requirements, excavations 5 feet deep and greater should be sloped or shored. All excavations and shoring should conform to CAL-OSHA requirements.

Short-term excavation 5 feet deep and greater shall conform to Title 8 of the California Code of Regulations, Construction Safety Orders, Section 1504 and 1539 through 1547. Based on our exploratory borings, it appears that the alluvial soils can be classified as Type C soils. These are the predominant types of soil and rock on the project and all short-term excavation should be based on these types of soil. Deviation from the standard short-term slopes are permitted using option 4, Design by a Registered Professional Engineer (Section 1541.1).

Short-term slope construction and maintenance are the responsibility of the contractor, and should be a consideration of his methods of operation and the actual soil conditions encountered.

Soil Expansiveness

The materials encountered during this investigation were tested and found to have a very low expansion potential. Therefore, specialized construction procedures to specifically resist expansive soil activity are not anticipated at this time. In order to verify this, additional evaluation of on-site and imported soils for their expansion potential should be conducted following completion of the grading operation.

Foundation Design

If the site is prepared as recommended, the proposed structures may be safely founded on conventional spread foundations, either individual spread footings and/or continuous wall footings, bearing either on a minimum of 24 inches of engineered compacted fill or bearing entirely on competent native materials. All foundations should have a minimum width of 12 inches and should be established a minimum of 12 inches below lowest adjacent grade.

For the minimum width and depth, spread foundations may be designed using an allowable bearing pressure of 1,500 psf. This bearing pressure may be increased by 300 psf for each additional foot of width or depth, up to a maximum of 3,000 psf. For example, a footing 2 feet wide and embedded 3 feet will have an allowable bearing pressure of 2,700 psf.

The above values are net pressures; therefore, the weight of the foundations and the backfill over the foundations may be neglected when computing dead loads. The values apply to the maximum edge pressure for foundations subjected to eccentric loads or overturning. The recommended pressures apply for the total of dead plus frequently applied live loads, and incorporate a factor of safety of at least 3.0. The allowable bearing pressures may be increased by one-third for temporary wind or seismic loading. The resultant of the combined vertical and lateral seismic loads should act within the middle one-third of the footing width. The maximum calculated edge pressure under the toe of foundations subjected to eccentric loads or overturning

should not exceed the increased allowable pressure. Buildings should be setback from slopes as detailed on the California Building Code.

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footings bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of 400 pounds per square foot per foot of depth. Base friction may be computed at 0.45 times the normal load. Base friction and passive earth pressure may be combined without reduction. These values are for dead load plus live load and may be increased by 1/3 for wind or seismic.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Slabs-On-Grade

To provide adequate support, after conducting the removals discussed above, concrete slabs-on-grade should bear on a minimum of 24 inches of compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Slabs to receive moisture sensitive coverings should be provided with a moisture vapor barrier. This barrier may consist of an impermeable membrane. Two inches of sand over the membrane will reduce punctures and aid in obtaining a satisfactory concrete cure. The sand should be moistened just prior to placing of concrete.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Exterior Flatwork

To provide adequate support, after conducting the removals discussed above, exterior flatwork improvements should rest on a minimum of 12 inches of soil compacted to at least 90 percent (ASTM D 1557).

Flatwork surface should be sloped a minimum of 1 percent away from buildings and slopes, to approved drainage structures.

Wall Pressures

The design of footings for retaining walls should be performed in accordance with the recommendations described earlier within under Preparation of Foundation Areas and Foundation Design. For design of retaining wall footings, the resultant of the applied loads should act in the middle one-third of the footing, and the maximum edge pressure should not exceed the basic allowable value without increase.

For design of retaining walls unrestrained against movement at the top, we recommend an equivalent fluid pressure of 40 pounds per cubic foot (pcf) be used. This assumes level backfill consisting of recompacted, non-expansive, native soils placed against the structures and within the back cut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

Retaining walls subject to uniform surcharge loads within a horizontal distance behind the structure equal to the structural height should be designed to resist additional lateral loads equal to 0.3 times the surcharge load. Any isolated or line loads from adjacent foundations or vehicular loading will impose additional wall loads and should be considered individually.

To avoid over stressing or excessive tilting during placement of backfill behind walls, heavy compaction equipment should not be allowed within the zone delineated by a 45 degree line extending from the base of the wall to the fill surface. The backfill directly behind the walls should be compacted using light equipment such as hand operated vibrating plates and rollers. No material larger than 3 inches in diameter should be placed in direct contact with the wall.

Wall pressures should be verified prior to construction, when the actual backfill materials and conditions have been determined. Recommended pressures are applicable only to level, properly drained, non-expansive backfill with no additional surcharge loadings. If inclined backfills are proposed, this firm should be contacted to develop appropriate active earth pressure parameters. Toe bearing pressure for non-structural walls on soils, not prepared as described earlier under Preparation of Foundation Areas, should not exceed California Building Code values, (CBC Table 18-1-A).

Preliminary Pavement Design

Testing and design for preliminary on-site pavement was conducted in accordance with the California Highway Design Manual. Based upon our preliminary sampling and testing, and upon Traffic Indices generally associated with similar projects, it appears that the structural sections tabulated below should provide satisfactory pavements for the subject improvements:

TYPE OF TRAFFIC	TRAFFIC INDEX (T.I.)	DESIGN R-VALUE	PRELIMINARY SECTION
Light Vehicle and Incidental Truck Traffic	5.0	10	0.25' AC/0.75' AB or 0.42' JPCP/0.35' AB
Light Vehicle and Minor Truck Traffic	6.0	10	0.25' AC/1.05' AB or 0.50' JPCP/0.50' AB *
Truck Traffic	8.0	10	0.40' AC/1.35' AB 0.58'JPCP/0.50' AB**

AC - Asphalt Concrete
AB - Class 2 Aggregate Base
JPCP - Jointed Plain Concrete Pavement with MR ≥ 625 psi
* Average Daily Truck Traffic (ADTT) = 100 tractor trailer units with one or more trailers
** Average Daily Truck Traffic (ADTT) = 300 tractor trailer units with one or more trailers

The above structural section is predicated upon the removals discussed within and upon 90 percent relative compaction (ASTM 1557) of all utility trench backfills and 95 percent relative compaction (ASTM 1557) of the upper 12 inches of street

subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

In areas of the pavement which will receive high abrasion loads due to start-ups and stops, or where trucks will move on a tight turning radius, consideration should be given to installing concrete pads. Such pads should be a minimum of 0.5 foot thick concrete, with a 0.35 foot thick aggregate base. Concrete pads are also recommended in areas adjacent to trash storage areas where heavier loads will occur due to operation of trucks lifting trash dumpsters.

Transverse joints should be sawcut in the pavement at approximately 12 to 15-foot intervals within 4 to 6 hours of concrete placement, or preferably sooner. Sawcut depth should be equal to approximately one quarter of slab thickness. Construction joints should be constructed such that adjacent sections butt directly against each other and are keyed into each other. Parallel pavement sections should also be keyed into each other.

The above pavement designs were based upon the results of preliminary sampling and testing, and should be verified by additional sampling and testing when the actual subgrade soils are exposed.

Sulfate Protection

The results of the soluble sulfate tests conducted on selected subgrade soils expected to be encountered at foundation levels are presented on Enclosure C.

Based on the test results, it appears that there is a negligible sulfate exposure to concrete elements in contact with the on site soils per the 2016 California Building Code. Therefore, no specific recommendations are given for concrete elements to be in contact with the on site soils.

Infiltration

Based upon our field investigation and infiltration test data, a clear water absorption rate of 1.1 inches per hour appears to be applicable for the planned infiltration areas to be placed at a depth of 6 feet in the locations tested. However, due to the hydroconsolidation potential of the on-site alluvium within the upper 5 to 7 feet,

infiltration should not occur within the upper 7 feet. An appropriate factor of safety should be applied as stated within the Riverside County Flood Control and Water Conservation District Design Handbook for Low Impact Development Best Management Practices (2011).

To ensure continued infiltration capability of the infiltration area, a program to maintain the facility should be considered. This program should include periodic removal of accumulated materials, which can slow the infiltration and decrease the water quality. Materials to be removed from the basin areas typically consist of litter, dead plant matter, and soil fines (silts and clays). Proper maintenance of the system is critical. A maintenance program should be prepared and properly executed. At a minimum, the program should be as outlined in the Riverside County Flood Control and Water Conservation District Design Handbook for Low Impact Development Best Management Practices (2011).

The program should also incorporate the recommendations contained within this report and any other jurisdictional agency requirements.

Systems should be constructed at a depth of at least 7 feet.

Systems should be set back at least 10 feet from foundations and walls.

Any geotextile filter fabric utilized should consist of such that it prevents soil piping but has greater permeability than the existing soil.

During site development, care should be taken to not disturb the area(s) proposed for infiltration as changes in the soil structure could occur resulting in a change of the soil infiltration characteristics.

Construction Monitoring

Post investigative services are an important and necessary continuation of this investigation. Project plans and specifications should be reviewed by this firm prior to construction to confirm that the intent of the recommendations presented herein have been incorporated into the design. Testing for on-site pavement design should be performed after the site is rough graded. In addition, additional expansion index testing

should be conducted in order to evaluate the impact, if any, to the site development as proposed.

During construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. Items requiring observation and testing include, but are not necessarily limited to, the following

1. Site preparation-stripping and removals.

2. Excavations, including approval of the bottom of excavation prior to backfilling.

3. Scarifying and recompacting prior to fill placement.

4. Subgrade preparation for pavements and slabs-on-grade.

5. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Governmental Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a significant amount of time without a review by LOR Geotechnical Group, Inc. verifying the suitability of the conclusions and recommendations.

LIMITATIONS

This report contains geotechnical conclusions and recommendations developed solely for use by Anthem Oil, Inc., and their designates for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other

parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations, and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc. provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

CLOSURE

It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins.

Should you have any questions regarding this report, please do not hesitate to contact this office at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.

Andrew A. Tardie
Staff Geologist

John P. Leuer, GE 2030
President

Robert M Markoff, CEG 2073
Engineering Geologist

AAT:RMM:JPL:ss

Distribution: Addressee (4) and via email cravaliya@gmail.com

REGISTERED PROFESSIONAL ENGINEER
JOHN P. LEUER
NO. 2030
EXPIRATION DATE
09/30/19
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
ROBERT M. MARKOFF
No. 2073
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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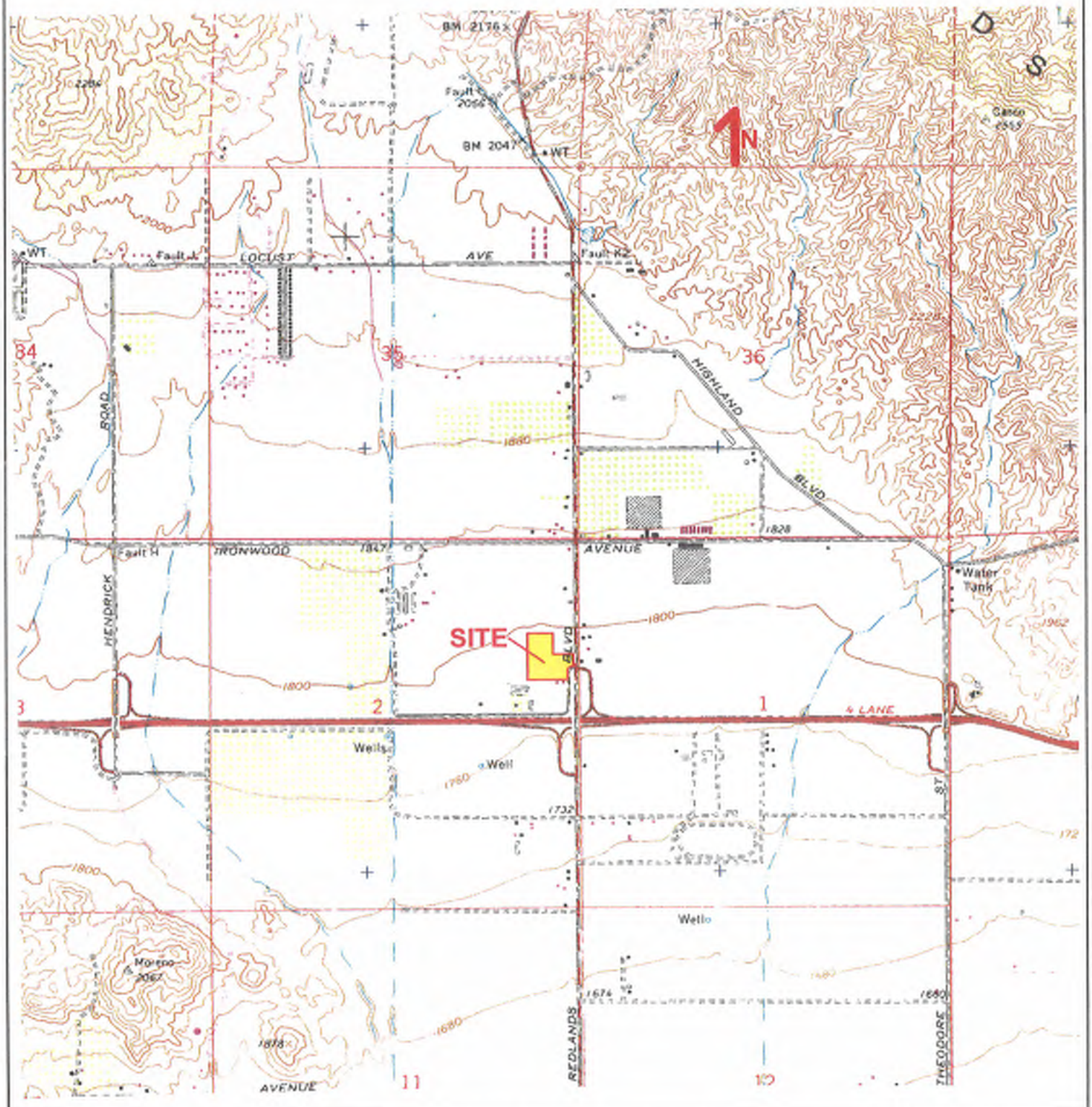
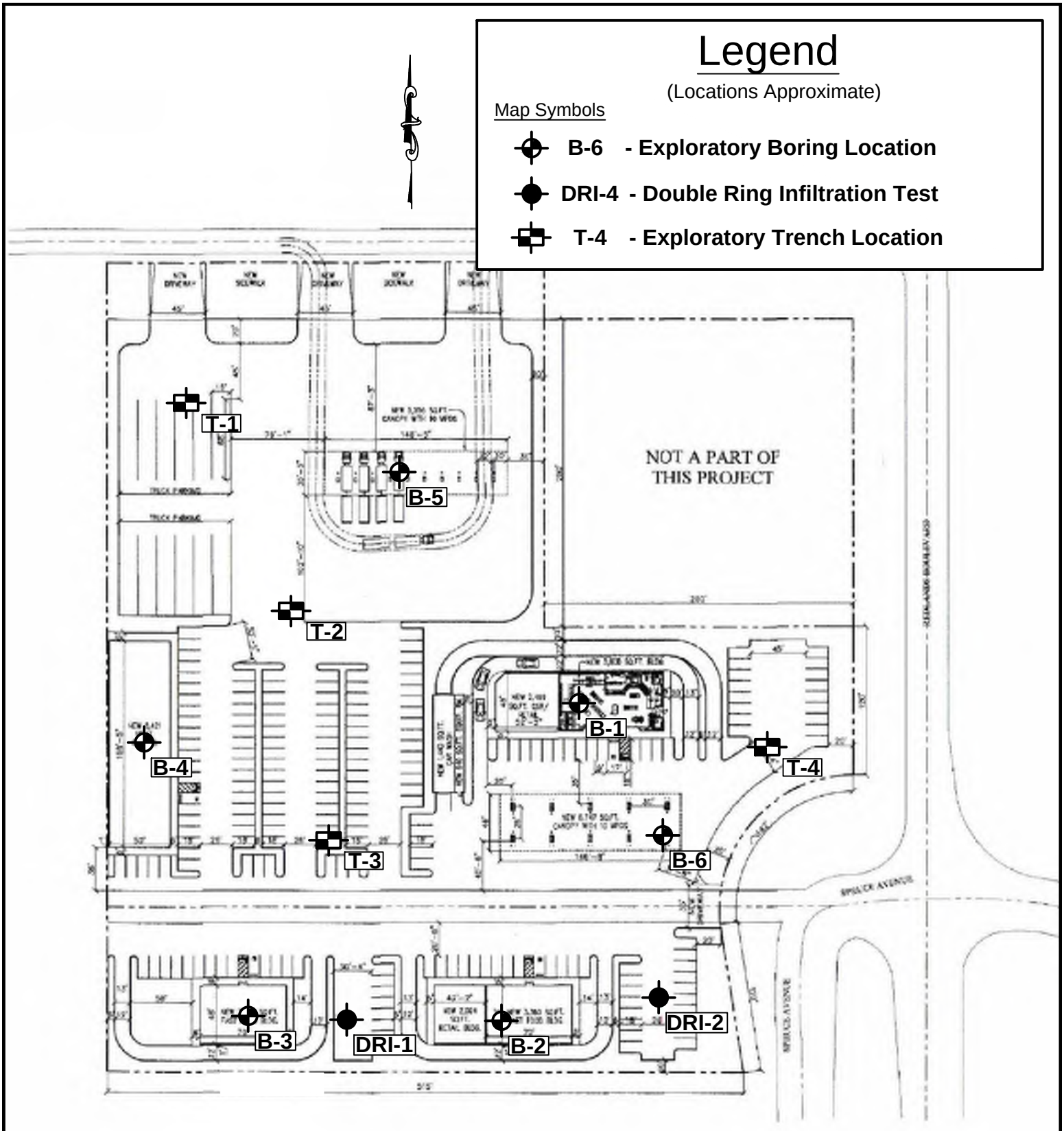
APPENDIX A

Index Map, Plate, and Regional Geologic Map,



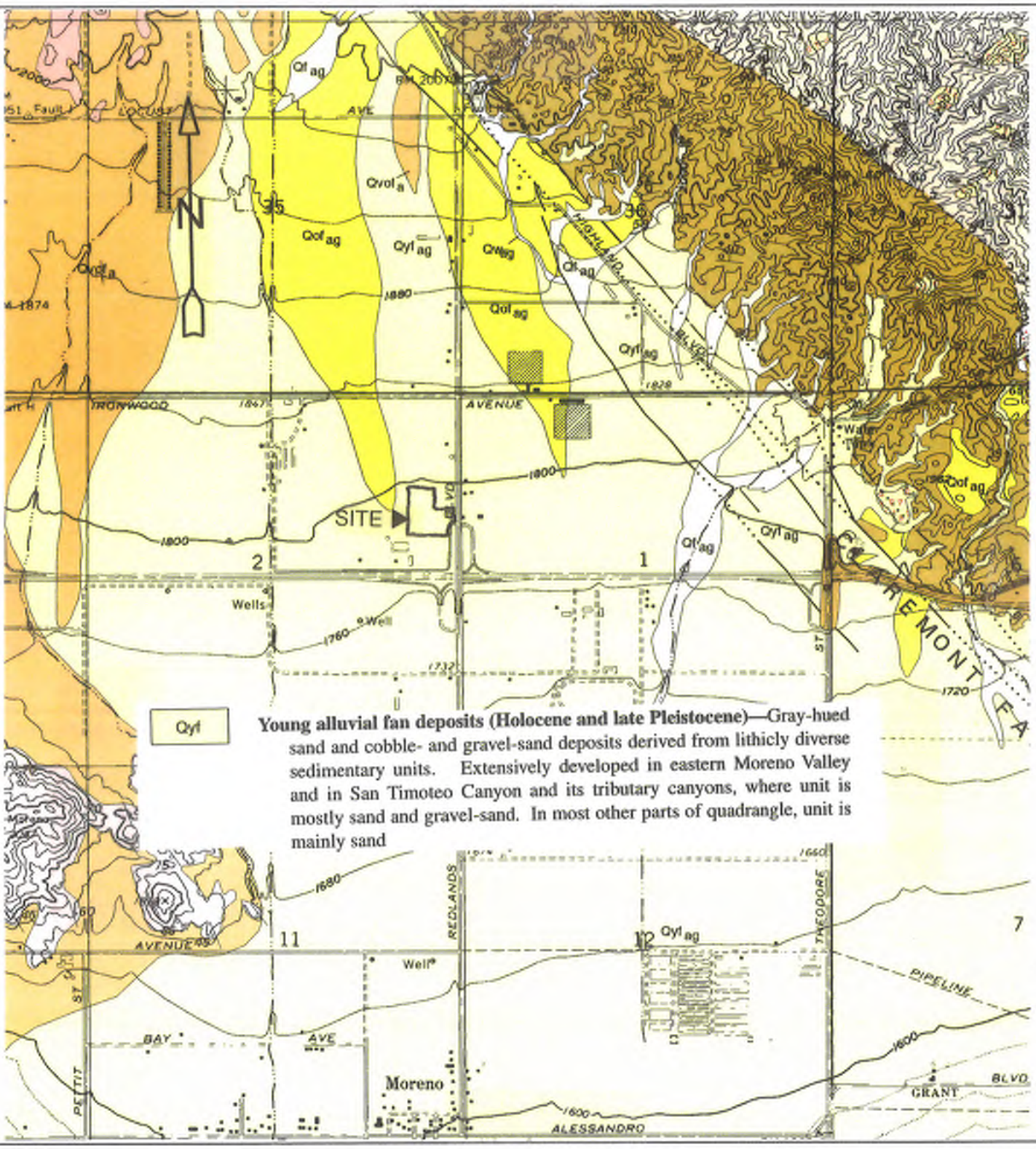
INDEX MAP

PROJECT:	NWC SPRUCE AVE. AND REDLANDS BLVD., MORENO VALLEY, CA	PROJECT NO.:	13358.1
CLIENT:	ANTHEM OIL, INC.	ENCLOSURE:	A-1
LOR Geotechnical Group, Inc.		DATE:	JULY 2017
		SCALE:	1"=2,000'



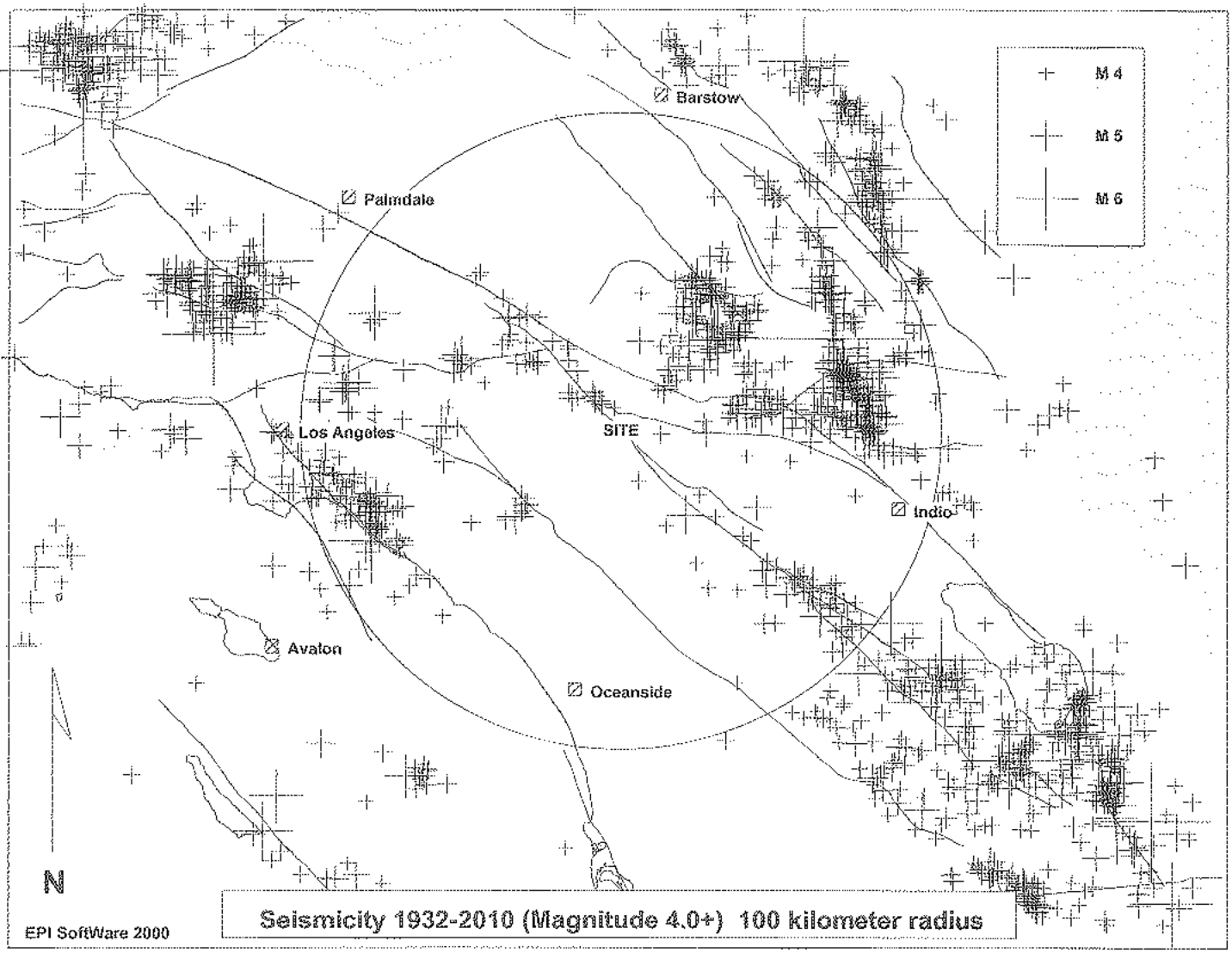
PLATE

PROJECT:	NWC SPRUCE AVE. & REDLANDS BLVD., MORENO VALLEY, CALIFORNIA	**PROJECT NO:**	13358.1
CLIENT:	ANTHEM OIL	**ENCLOSURE:**	A-2
LOR Geotechnical Group, Inc.		**DATE:**	JULY 2017
		SCALE:	1" ≈ 100'



REGIONAL GEOLOGIC MAP (MORTON and MATTI, 2011)

PROJECT:	NWC SPRUCE AVE. AND REDLANDS BLVD., MORENO VALLEY, CA	PROJECT NO.:	13358.1
CLIENT:	ANTHEM OIL, INC.	ENCLOSURE:	A-3
LOR Geotechnical Group, Inc.		DATE:	JULY 2017
		SCALE:	1"=2,000'



SITE LOCATION: 33.9419 LAT. -117.1581 LONG.

MINIMUM LOCATION QUALITY: C

TOTAL # OF EVENTS ON PLOT: 1517

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 605

0 50 100
KILOMETERS

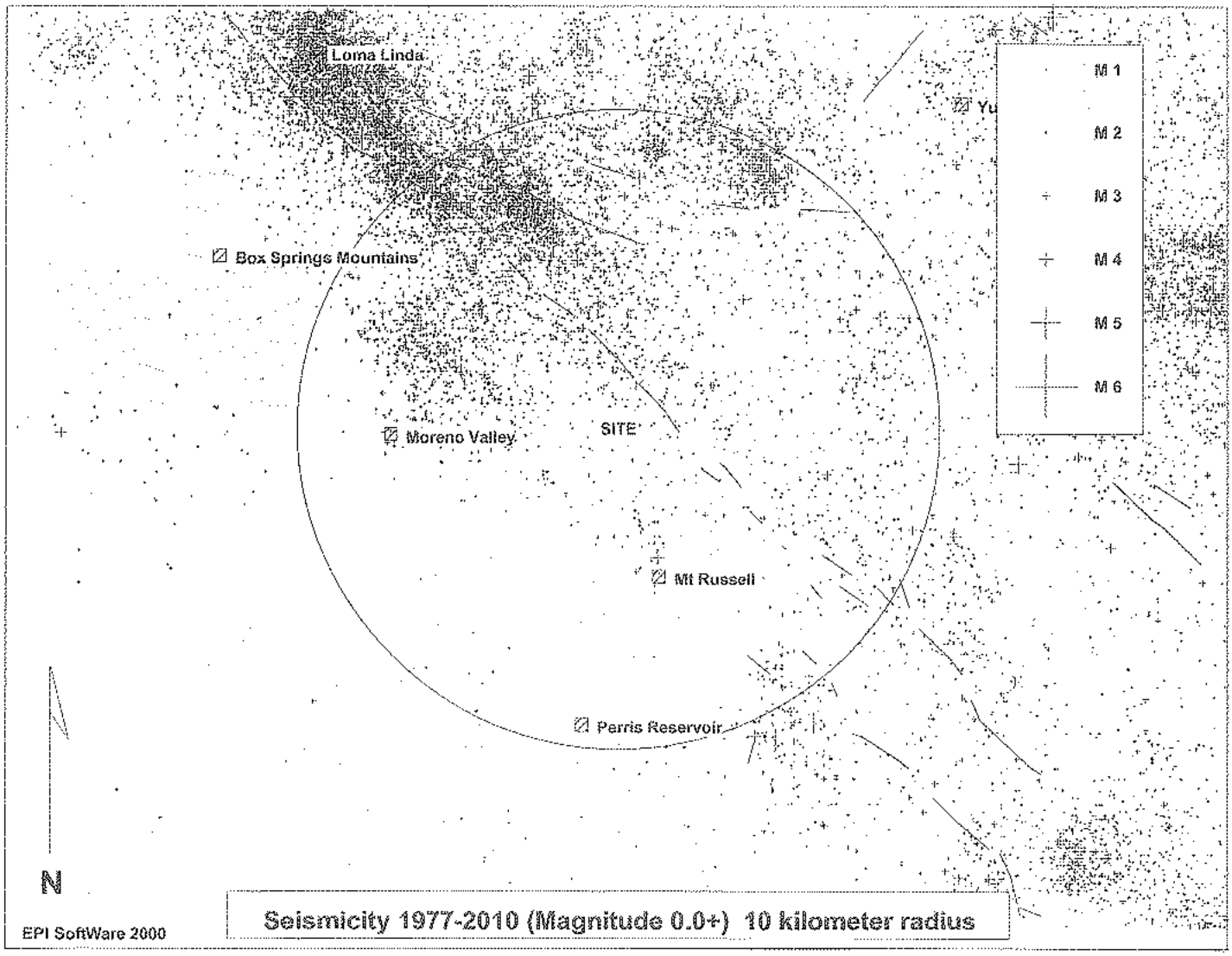
MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

4.0- 4.9 : 544
5.0- 5.9 : 56
6.0- 6.9 : 4
7.0- 7.9 : 1
8.0- 8.9 : 0

CLOSEST EVENT: 4.1 ON SATURDAY, FEBRUARY 13, 201(LOCATED APPROX. 7 KILOMETERS NORTH OF THE SITE

LARGEST 5 EVENTS:

7.3 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 72 KILOMETERS NORTHEAST OF THE SITE
6.4 ON SATURDAY, MARCH 11, 193(LOCATED APPROX. 85 KILOMETERS SOUTHWEST OF THE SITE
6.3 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 42 KILOMETERS NORTHEAST OF THE SITE
6.1 ON THURSDAY, APRIL 23, 1992 LOCATED APPROX. 77 KILOMETERS EAST OF THE SITE
6.0 ON SATURDAY, DECEMBER 04, 194(LOCATED APPROX. 76 KILOMETERS EAST OF THE SITE



SITE LOCATION: 33.9419 LAT. -117.1581 LONG.

MINIMUM LOCATION QUALITY: A

TOTAL # OF EVENTS ON PLOT: 14363

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 5208

0 5 10
KILOMETERS

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

0.0- .9 : 592
1.0- 1.9 : 3860
2.0- 2.9 : 693
3.0- 3.9 : 42
4.0- 4.9 : 1
5.0- 5.9 : 0
6.0- 6.9 : 0
7.0- 7.9 : 0
8.0- 8.9 : 0

CLOSEST EVENT: 1.0 ON FRIDAY, MARCH 04, 1994 LOCATED APPROX. .2 KILOMETER OF THE SITE

LARGEST 5 EVENTS:

4.1 ON SATURDAY, FEBRUARY 13, 201(LOCATED APPROX. 7 KILOMETERS NORTH OF THE SITE
3.8 ON THURSDAY, SEPTEMBER 12, 199(LOCATED APPROX. 4 KILOMETERS SOUTH OF THE SITE
3.8 ON SATURDAY, MARCH 20, 199(LOCATED APPROX. 9 KILOMETERS NORTHWEST OF THE SITE
3.7 ON WEDNESDAY, NOVEMBER 18, 199(LOCATED APPROX. 8 KILOMETERS NORTHEAST OF THE SITE
3.6 ON FRIDAY, FEBRUARY 19, 201(LOCATED APPROX. 8 KILOMETERS NORTH OF THE SITE

APPENDIX B

Field Investigation Program and Boring Logs

APPENDIX B
FIELD INVESTIGATION

Subsurface Exploration

The site was investigated on July 13 and 21, 2017 and consisted of drilling 6 exploratory borings with a truck-mounted Mobile B61B drill rig equipped with 8-inch diameter hollow stem augers and excavating 4 exploratory test pits using a rubber tire backhoe equipped with an 18-inch bucket. The borings were extended to depths ranging from approximately 21.5 feet to 51.5 feet below the existing ground surface. The test pits were excavated to depths of approximately 14 to 14.5 feet below the existing ground surface. The approximate locations of our exploratory borings and trenches are presented on the enclosed Plate, Enclosure A-2, within Appendix A.

The drilling exploration was conducted using a truck mounted Mobile B61B drill rig equipped with 8-inch diameter hollow stem augers. The soils were continuously logged by a staff geologist from this firm who inspected the site, created detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50-inch inside diameter and 3.00-inch outside diameter, from the ground surface to the maximum depths attained. The sampler was driven by a 140-pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches was recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), inner diameter of the hollow stem auger (3.75 in), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures (N60) which are included in the boring logs, Enclosures B-1 through B-6.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to our geotechnical laboratory.

The test pit exploration was conducted using a CAT 420E backhoe with an 18-inch bucket. The soils were continuously logged by a geologist from this firm who visually inspected the site, maintained detailed logs of the trenches, obtained disturbed soil

samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

In-place density determinations were conducted at selected levels within the trenches utilizing the Nuclear Gauge Method, in accordance with the standard ASTM D 2922. Disturbed soil samples were obtained at soil changes and other selected levels within the trenches. The samples were placed in sealed containers for transport to our geotechnical laboratory.

All samples obtained were taken to our geotechnical laboratory for storage and testing. Detailed logs of the borings and trenches are presented on the enclosed Boring Logs, Enclosures B-1 through B-10. A Boring/Trench Log Legend is presented on Enclosure B-i. A Soil Classification Chart is presented on Enclosure B-ii.

CONSISTENCY OF SOIL

SANDS

SPT BLOWS	CONSISTENCY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Over 50	Very Dense

COHESIVE SOILS

SPT BLOWS	CONSISTENCY
0-2	Very Soft
2-4	Soft
4-8	Medium
8-15	Stiff
15-30	Very Stiff
30-60	Hard
Over 60	Very Hard

SAMPLE KEY

Symbol	Description
	INDICATES CALIFORNIA SPLIT SPOON SOIL SAMPLE
	INDICATES BULK SAMPLE
	INDICATES SAND CONE OR NUCLEAR DENSITY TEST
	INDICATES STANDARD PENETRATION TEST (SPT) SOIL SAMPLE

TYPES OF LABORATORY TESTS

1	Atterberg Limits
2	Consolidation
3	Direct Shear (undisturbed or remolded)
4	Expansion Index
5	Hydrometer
6	Organic Content
7	Proctor (4", 6", or Cal216)
8	R-value
9	Sand Equivalent
10	Sieve Analysis
11	Soluble Sulfate Content
12	Swell
13	Wash 200 Sieve

BORING LOG LEGEND

PROJECT:	NWC SPRUCE AVE. AND REDLANDS BLVD., MORENO VALLEY, CA	PROJECT NO.:	13358.1
CLIENT:	ANTHEM OIL, INC.	ENCLOSURE:	B-i
LOR Geotechnical Group, Inc.		DATE:	JULY 2017

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS. MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS. MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS. MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS. MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS. LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS. LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" No. 4 No. 10 No. 40 200

(U.S. STANDARD SIEVE SIZE)

SOIL CLASSIFICATION CHART

PROJECT:	NWC SPRUCE AVE. AND REDLANDS BLVD., MORENO VALLEY, CA	PROJECT NO.:	13358.1
CLIENT:	ANTHEM OIL, INC.	ENCLOSURE:	B-ii
LOR Geotechnical Group, Inc.		DATE:	JULY 2017

LOG OF BORING B-1

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0								SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 40% silty fines, tan, dry, loose.
	7		5.9		108.9			ML	@ 2 feet, ALLUVIUM:SANDY SILT, trace gravel to 2", approximately 5% coarse grained sand, 10% medium grained sand, 25% fine grained sand, 60% silty fines, light yellow brown, dry, some thin calcite stringers.
5	9		5.6		113.0				
	9		5.0		110.5			SM	@ 5 feet, becomes slightly coarser grained, some roothairs, thin calcite stringers remain.
10	12		6.4		109.0				@ 7 feet, SILTY SAND, approximately 10% coarse grained sand, 20% medium grained sand, 45% fine grained sand, 25% silty fines, light yellow brown, dry to damp.
	19		3.3		104.0			SP SM	@ 12 feet, POORLY GRADED SAND with SILT, approximatley 90% fine grained sand, 10% silty fines, white, damp.
15	17		9.1		103.6				
20	16		7.0		110.0			SM	@ 20 feet, SILTY SAND, approximately 10% coarse grained sand, 30% medium grained sand, 35% fine grained sand, 25% silty fines, light red brown, damp.
25	25		9.5		119.6			ML SM	@ 25 feet, SILTY SAND/SANDY SILT, approximately 50% fine grained sand, 50% silty fines, light yellow brown, damp.
30	38		9.4		118.8			SC	@ 30 feet, CLAYEY SAND, approximately 15% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 30% clayey fines of low plasticity, red brown, damp, abundant secondary calcite.
35	33		8.2		118.7			ML	@ 35 feet, SANDY SILT, approximately 15% medium grained sand, 20% fine grained sand, 65% silty fines, light red brown, damp, some pinhole porosity, some secondary calcite as nodules.
40	48		6.4		117.8				@ 40 feet, SANDY SILT, approximately 20% fine grained sand, 80% silty fines, brown, damp, some thin calcite stringers.
45	58		5.5		121.9				@ 45 feet, becomes slighlty sandier.
50	52		10.5		122.2			CL	@ 50 feet, LEAN CLAY with SAND, approximately 15% medium grained sand, 25% fine grained sand, 60% clayey fines of low plasticity, red brown, damp, abundant calcite stringers.
55									END OF BORING
60									Fill to 2' No groundwater No bedrock

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-1

LOG OF BORING B-2

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	4		8.5	113.6			SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 50% fine grained sand, 25% silty fines, tan, dry, loose.
5	3		7.5	99.8			ML SM	@ 5 feet, ALLUVIUM:SILTY SAND/SANDY SILT, trace gravel to 1/2", approximately 5% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 50% silty fines, yellow brown, damp.
	9		6.1	120.3			SM	@ 7 feet, SILTY SAND, approximately 10% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 40% silty fines, red brown, damp.
10	15		2.8	115.3			SP SM	@ 10 feet, POORLY GRADED SAND with SILT, approximately 15% coarse grained sand, 25% medium grained sand, 50% fine grained sand, 10% silty fines, yellow brown, dry.
	47		1.7	122.4			SW	@ 12 feet, WELL GRADED SAND, approximately 25% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 5% silty fines, yellow brown, dry.
15	53		1.5	123.0				
20	36		8.7	123.5			ML	@ 20 feet, SANDY SILT, approximately 10% medium grained sand, 25% fine grained sand, 65% silty fines, red brown, damp, some thin calcite stringers.
								END OF BORING
25								Fill to 2'
								No groundwater
30								No bedrock

TEST DATA

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-2

LOG OF BORING B-3

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0								SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 10% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 35% silty fines, tan, dry, loose.
	5		9.7		101.3			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 5% medium grained sand, 10% fine grained sand, 85% silty fines, yellow brown, damp, some pinhole porosity, some thin calcite stringers.
5	8		8.9		101.9				
	7	2	9.1		100.9				
10	9	2	9.0		113.0				
	13		6.3		108.8			SM	@ 12 feet, SILTY SAND, approximately 15% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 25% silty fines, red brown, damp.
15	26		6.1		122.2				
20	17		4.3		107.6			SP	@ 20 feet, POORLY GRADED SAND, trace gravel to 1/2" approximately 20% coarse grained sand, 30% medium grained sand, 45% fine grained sand, 5% silty fines, yellow brown, dry.
25	31		6.2		109.2			SM	@ 25 feet, SILTY SAND, approximately 85% fine grained sand, 15% silty fines, yellow brown, dry.
									END OF BORING Fill to 2' No groundwater No bedrock
30									

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-3

LOG OF BORING B-4

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0								SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 65% fine grained sand, 30% silty fines, tan, dry, loose.
	8		5.4		108.3			ML	@ 2 feet, ALLUVIUM:SANDY SILT, aproximately 10% medium grained sand, 35% fine grained sand, 55% silty fines, yellow brown, dry, trace pinhole porosity, abundant thin calcite stringers.
5	6	2	6.9		97.6				@ 5 feet, slight increase in porosity diameter.
	10		9.5		116.3				@ 7 feet, slight decrease in porosity diameter to pinhole.
10	12		9.2		107.8				@ 10 feet, trace pinhole porosity, trace thin calcite stringers, slightly finer grained, damp.
15	38		5.9		123.4				@ 15 feet, porosity no longer visible, red brown, dry.
20	42		0.9		110.4			SP	@ 20 feet, POORLY GRADED SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 25% medium grained sand, 55% fine grained sand, 5% silty fines, white, dry.
									END OF BORING
25									Fill to 2' No groundwater No bedrock
30									

TEST DATA

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-4

LOG OF BORING B-5

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0								SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 25% silty fines, tan, dry, loose.
	4		5.0		103.4			ML SM	@ 2 feet, ALLUVIUM:SILTY SAND/SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 50% silty fines, yellow brown, dry, abundant pinhole and slightly larger porosity.
5	5		5.8		107.7			SM	@ 5 feet, SILTY SAND, approximately 20% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 20% silty fines, yellow brown, dry.
	13		2.9		113.2				
10	11		7.1		105.4			ML	@ 10 feet, SANDY SILT, approximately 15% fine grained sand, 85% silty fines, tan, dry.
	13		3.0		102.6			SP	@ 13 feet, POORLY GRADED SAND, approximately 5% coarse grained sand, 25% medium grained sand, 65% fine grained sand, 5% silty fines, white, dry.
15	17		8.4		121.5			SM	@ 15 feet, SILTY SAND, approximately 10% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 35% silty fines with trace clay, red brown, damp.
20	29		4.3		115.7			SP SM	@ 20 feet, POORLY GRADED SAND with SILT, approximately 90% fine grained sand, 10% silty fines, yellow brown, dry to damp.
									END OF BORING
25									Fill to 2'
									No groundwater
30									No bedrock

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-5

LOG OF BORING B-6

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0								SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 10% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 35% silty fines, tan, dry, loose.
	8		4.1		98.9			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 15% medium grained sand, 20% fine grained sand, 65% silty fines, yellow brown, dry, some pinhole and slighlty larger porosity, trace roothairs.
5	9		5.9		116.1				@ 5 feet, contains thin calcite stringers, no roothairs.
	7	2	8.1		102.8			SM	@ 7 feet, SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 5% medium grained, 70% fine grained sand, 20% silty fines, yellow brown, damp.
10	9		9.3		100.8				@ 10 feet, becomes slightly coarser grained.
	8	2	10.4		97.2				@ 12 feet, becomes red brown.
15	15		7.9		118.6				@ 15 feet, SILTY SAND, approximately 5% coarse grained sand, 20% medium grained, 45% fine grained sand, 30% silty fines with trace clay, red brown, moist.
20	27		4.8		116.4				END OF BORING Fill to 2' No groundwater No bedrock
25									
30									

TEST DATA

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	July 13, 2017
		EQUIPMENT:	Mobile B61
		HOLE DIA.: 8"	ENCLOSURE: B-6

LOG OF TRENCH T-1

DEPTH IN FEET	LABORATORY TESTS		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
				TEST DATA					
0				0.8				SM	@ 0 feet, FILL/TOPSOIL SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 40% fine grained sand, 35% silty fines, tan, dry, loose.
	3, 4, 7		71	4.5	92.5			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 65% silty fines, yellow brown, dry, abundant pinhole porosity, roothairs, massive.
									@ 3 feet, some porosity slightly larger than pinhole.
			70	7.8	90.9				@ 4 feet, slight increase in moisture content, some secondary calcite.
5									@ 5 feet, roothairs, porosity no longer visible.
								SM	@ 9 feet, SILTY SAND, approximately 10% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 35% silty fines, red brown, dry.
10									
15									END OF TRENCH Fill to 2' No caving No groundwater No bedrock

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	July 21, 2017
		EQUIPMENT:	CAT 420E
		BUCKET W.: 36"	ENCLOSURE: B-7

LOG OF TRENCH T-2

DEPTH IN FEET	TEST DATA: LABORATORY TESTS		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	9, 10, 11			0.5				SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 50% fine grained sand, 35% silty fines, tan, dry, loose.
			72	3.0	93.8			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 20% fine grained sand, 55% silty fines, yellow brown, dry, pinhole and slighlty porosity, roothairs, massive.
5			73	7.0	95.1				@ 4 feet, roothairs no longer present, pinhole porosity remains, slight increase in moisture.
10									@ 12 feet, becomes red brown, damp, abundant pinhole porosity and thin calcite stringers.
15									END OF TRENCH Fill to 2' No caving No groundwater No bedrock

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	July 21, 2017
		EQUIPMENT:	CAT 420E
		BUCKET W.: 36"	ENCLOSURE: B-8

LOG OF TRENCH T-3

DEPTH IN FEET	LABORATORY TESTS		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0				0.1				SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 35% silty fines, tan, dry, loose.
			70	3.5	91.0			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 5% coarse grained sand, 10% medium grained sand, 25% fine grained sand, 60% silty fines, yellow brown, dry, abundant pinhole porosity, some roothairs, massive.
5	7		74	7.0	95.5				@ 4 feet, slight decrease in porosity, slight increase in moisture.
10									@ 12 feet, becomes red brown, damp, some pinhole porosity and secondary calcite.
15									END OF TRENCH Fill to 2' No caving No groundwater No bedrock

TEST DATA

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	July 21, 2017
		EQUIPMENT:	CAT 420E
		BUCKET W.: 36"	ENCLOSURE: B-9

LOG OF TRENCH T-4

DEPTH IN FEET	LABORATORY TESTS		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	8, 9, 10, 14			0.1				SM	@ 0 feet, FILL/TOPSOIL:SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 45% silty fines, tan, dry, loose.
			73	4.3	94.3			ML	@ 2 feet, ALLUVIUM:SANDY SILT, approximately 5% coarse grained sand, 10% medium grained sand, 30% fine grained sand, 55% silty fines, yellow brown, dry, some porosity and roothairs, massive.
5			75	4.2	96.8				@ 5 feet, slight increase in moisture.
								SM	@ 8 feet, SILTY SAND, approximately 25% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 15% silty fines, yellow brown, dry, caving.
10									@ 12 feet, trace fine gravel.
15									END OF TRENCH Fill to 2' Caving from 8 to 14.5' No groundwater No bedrock

PROJECT:	Proposed Commercial Development	PROJECT NUMBER:	13358.1
CLIENT:	Anthem Oil, Inc.	ELEVATION:	
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	July 21, 2017
		EQUIPMENT:	CAT 420E
		BUCKET W.: 36"	ENCLOSURE: B-10

APPENDIX C

Laboratory Testing Program and Test Results

APPENDIX C
LABORATORY TESTING

General

Selected soil samples obtained from the borings were tested in our geotechnical laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. Laboratory testing included, in-place moisture content and density, laboratory compaction, direct shear, expansion index, consolidation, sieve analysis, sand equivalent, R-value, and soluble sulfate content. Descriptions of the laboratory tests are presented in the following paragraphs:

Moisture-Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, in accordance with ASTM D 2216, and ASTM D 2937 and the results are shown on our boring logs, Enclosures B-1 through B-4, for convenient correlation with the soil profile.

Laboratory Compaction

Selected soil samples were tested in the laboratory to determine compaction characteristics using the ASTM D 1557 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Trench Number	Sample Depth (feet)	Soil Description (U.S.C.S.)	Maximum Dry Density (pcf)	Optimum Moisture Content (percent)
T-1	2-3	(ML) Sandy Silt	130.0	10.0
T-3	4-5	(ML) Sandy Silt	129.5	9.0

Direct Shear Tests

Shear tests are performed with a direct shear machines in general accordance with ASTM D 3080 at a constant rate-of-strain (usually 0.04 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength

Parameters, angle of internal friction and cohesion. Samples are tested in a remolded condition (90 percent per ASTM D 1557) and soaked, according to conditions expected in the field.

The results of the sheared tests are presented in the following table:

DIRECT SHEAR TESTS				
Trench Number	Sample Depth (feet)	Soil Description (U.S.C.S.)	Angle of Internal Friction (degrees)	Apparent Cohesion (psf)
T-1	2-3	(ML) Sandy Silt	23	500

Expansion Index Test

Remolded samples are tested to determine their expansion potential in accordance with the Expansion Index (EI) test. The test is performed in accordance with the Uniform Building Code Standard 18-2. The test results are presented on the following table:

EXPANSION INDEX TEST				
Trench Number	Sample Depth (feet)	Material Description (U.S.C.S)	Expansion Index (EI)	Expansion Potential
T-1	2-3	(ML) Sandy Silt	15	Very Low
Expansion Index:	0-20 Very Low	21-50 Low	51-90 Medium	91-130 High

Consolidation Tests

The apparatus used for the consolidation tests (odometer) is designed to test a one-inch high portion of the undisturbed soil sample as contained in a sample ring. Porous stones and filler paper are placed in contact with the top and bottom of the specimen to permit the addition or release of water. Loads are applied to the test specimen in specified increments, and the resulting axial deformations are recorded. The results are plotted as log of axial pressure versus consolidation or compression, expressed as strain or sample height.

Samples are tested at field and greater-than field moisture contents. The results are shown on Enclosures C-1 through C-5.

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the sieve analysis are presented graphically on Enclosure C-6.

Sand Equivalent

The sand equivalent of selected soils were evaluated using the California Sand Equivalent Test Method, Caltrans Number 217. The results of the sand equivalent tests are presented with the grain size distribution analysis on Enclosure C-6.

R-Value Test

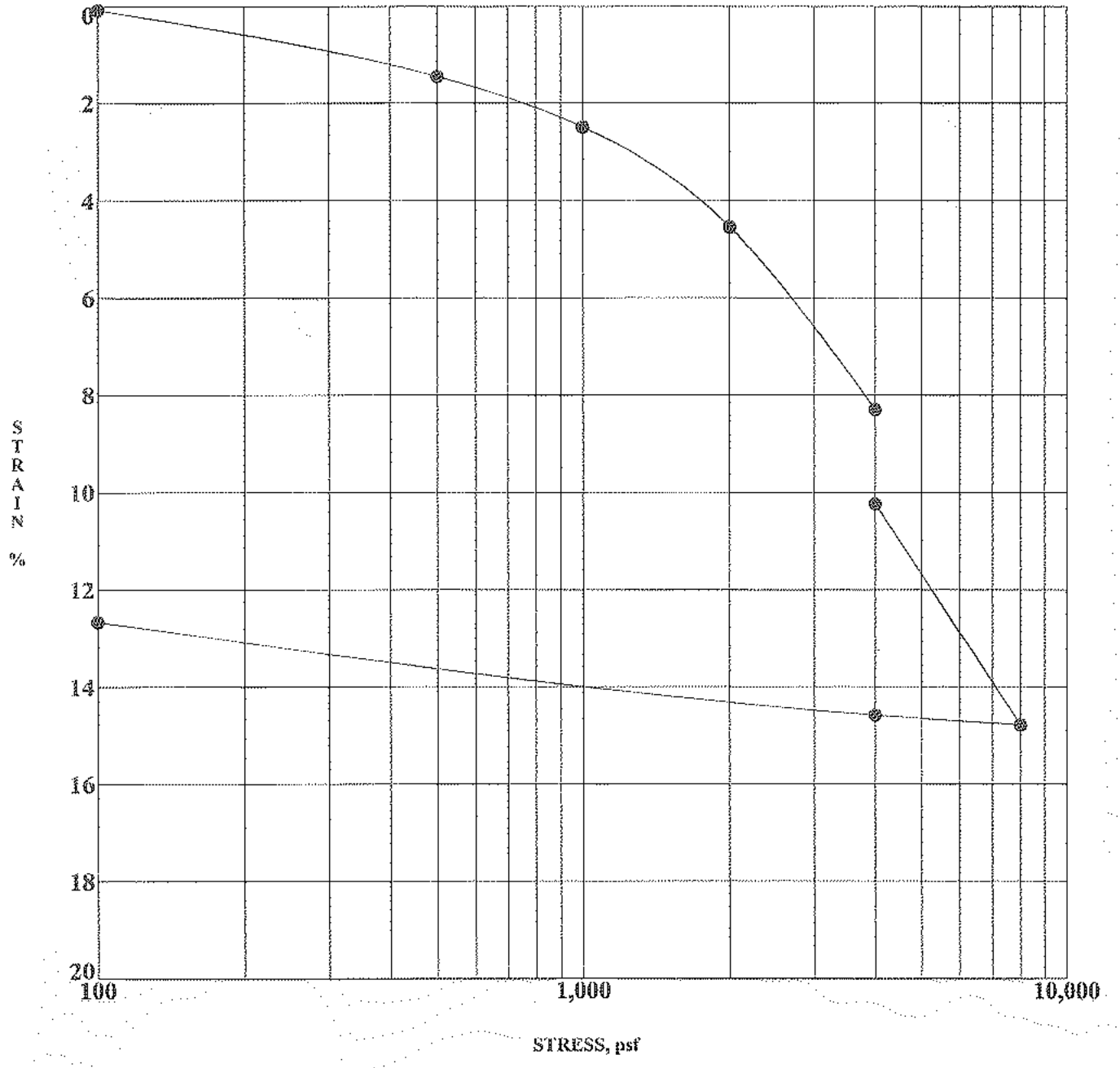
Soil samples were obtained at probable pavement subgrade level and sieve analysis and sand equivalent tests were conducted. A selected soil sample was tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the sieve analysis, sand equivalent, and R-value tests are presented on Enclosure C-6.

Soluble Sulfate Content Tests

The soluble sulfate content of selected subgrade soils was evaluated. The concentration of soluble sulfates in the soils was determined by measuring the optical density of a barium sulfate precipitate. The precipitate results from a reaction of barium chloride with water extractions from the soil samples. The measured optical

density is correlated with readings on precipitates of known sulfate concentrations. The test results are presented on the following table:

SOLUBLE SULFATE CONTENT TESTS			
Trench Number	Sample Depth (feet)	Soil Description (U.S.C.S)	Sulfate Content (percent by weight)
T-1	2-3	(ML) Sandy Silt	< 0.005
T-3	4-5	(ML) Sandy Silt	< 0.005



Specimen I.D.		Classification	DD	MC%
◉ B-3	@ 7 ft	(ML) Sandy Silt	97	9

PROJECT *Proposed Commercial Development*

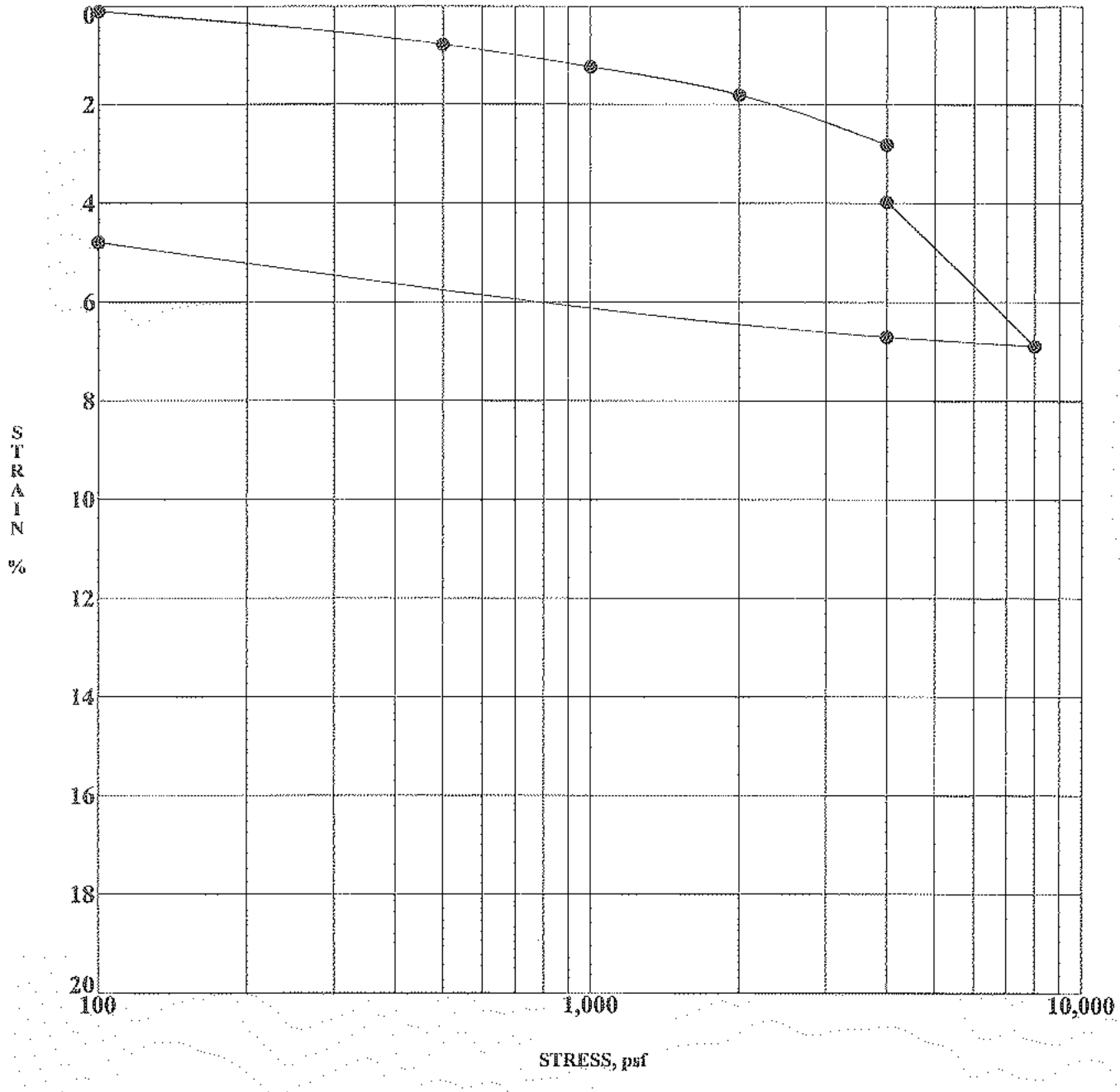
PROJECT NO. *13358.1*

DATE *8/8/17*

CONSOLIDATION TEST

LOR Geotechnical Group, Inc.

ENCLOSURE C-1



	Specimen I.D.		Classification	DD	MC%
◉	B-3	@ 10 ft	(ML) Sandy Silt	104	9

PROJECT *Proposed Commercial Development*

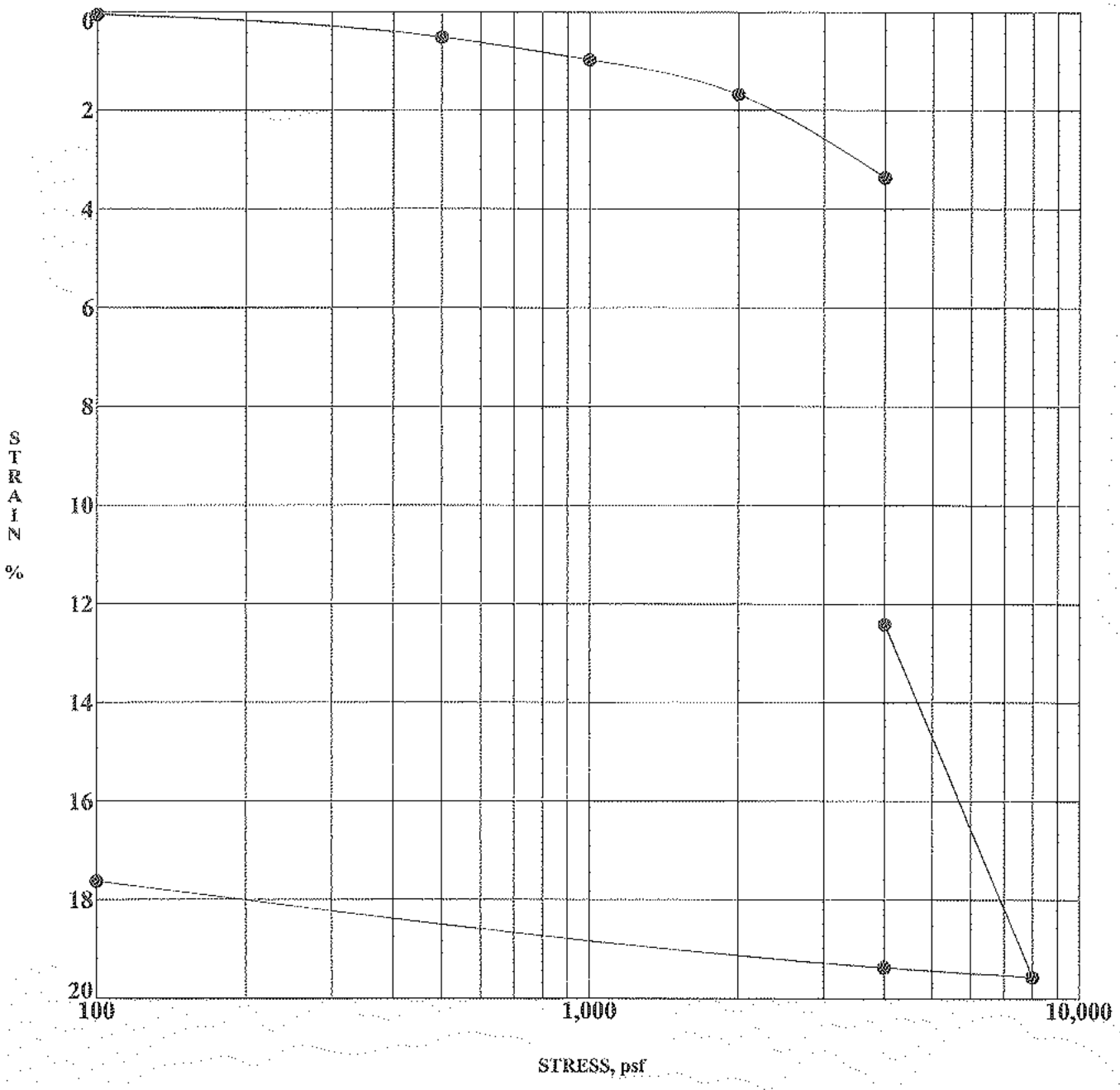
PROJECT NO. *13358.1*

DATE *8/8/17*

CONSOLIDATION TEST

LOR Geotechnical Group, Inc.

ENCLOSURE C-2



Specimen I.D.	Classification	DD	MC%
◉ B-4 @ 5 ft	(SM) Silty Sand	92	7

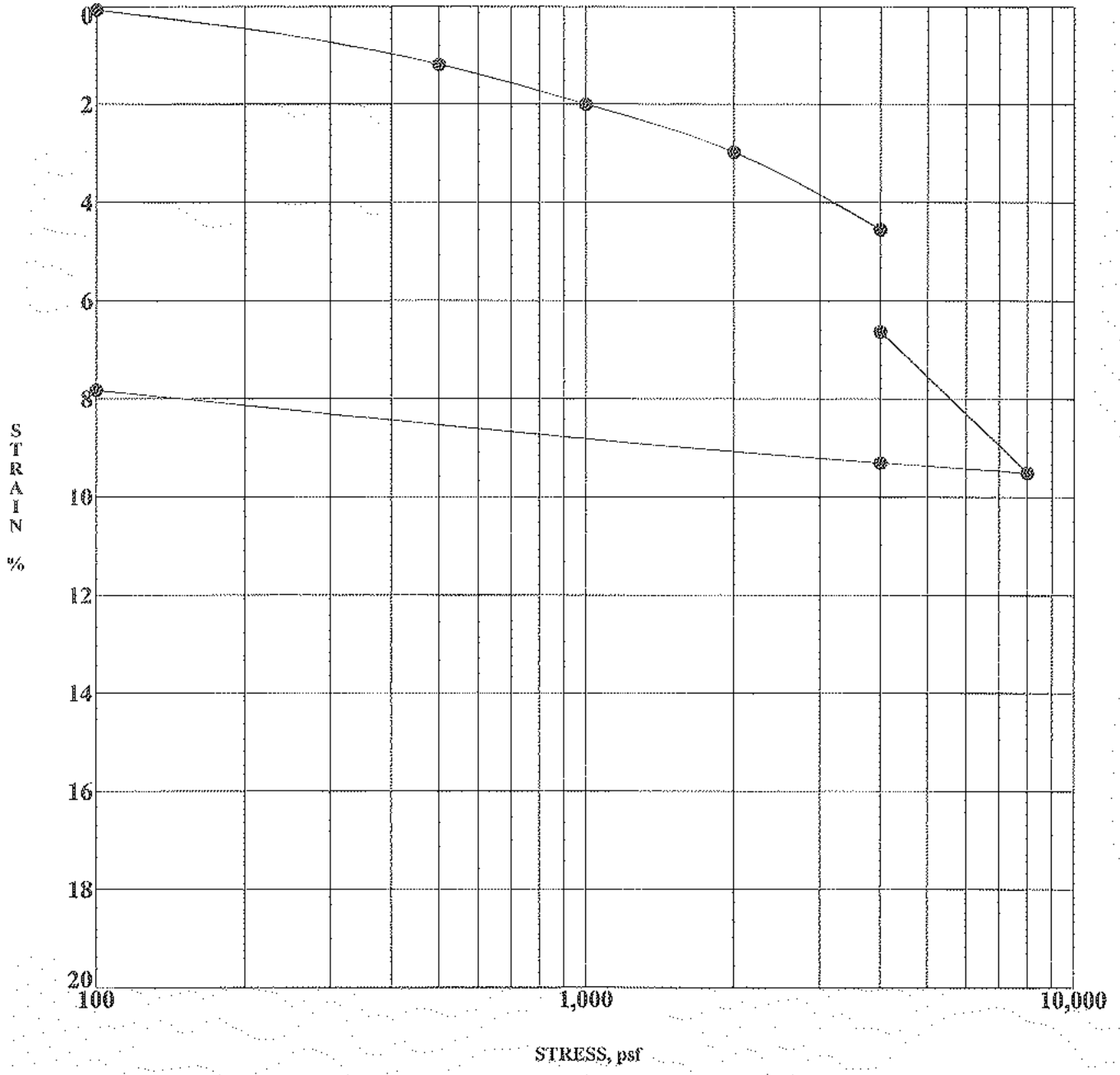
PROJECT *Proposed Commercial Development*

PROJECT NO. *13358.1*

DATE *8/8/17*

CONSOLIDATION TEST
LOR Geotechnical Group, Inc.

ENCLOSURE C-3



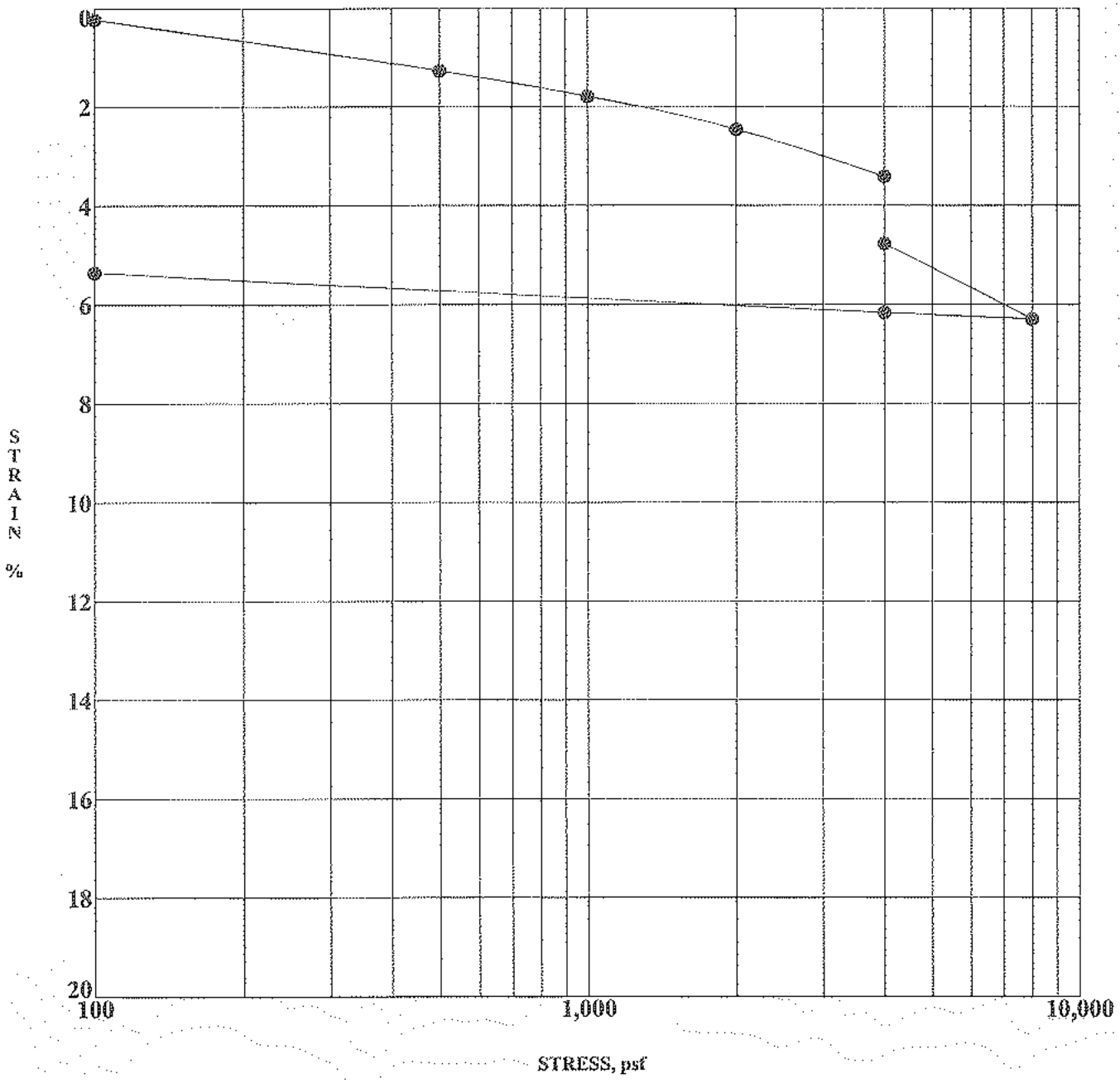
	Specimen I.D.	Classification	DD	MC%
⊗	B-6 @ 7 ft	(SM) Silty Sand	102	8

PROJECT *Proposed Commercial Development* **PROJECT NO.** *13358.1*

DATE *8/8/17*

CONSOLIDATION TEST
LOR Geotechnical Group, Inc.

ENCLOSURE C-4



	Specimen I.D.		Classification	DD	MC%
●	B-6	@ 12 ft	(SM) Silty Sand	94	10

PROJECT *Proposed Commercial Development*

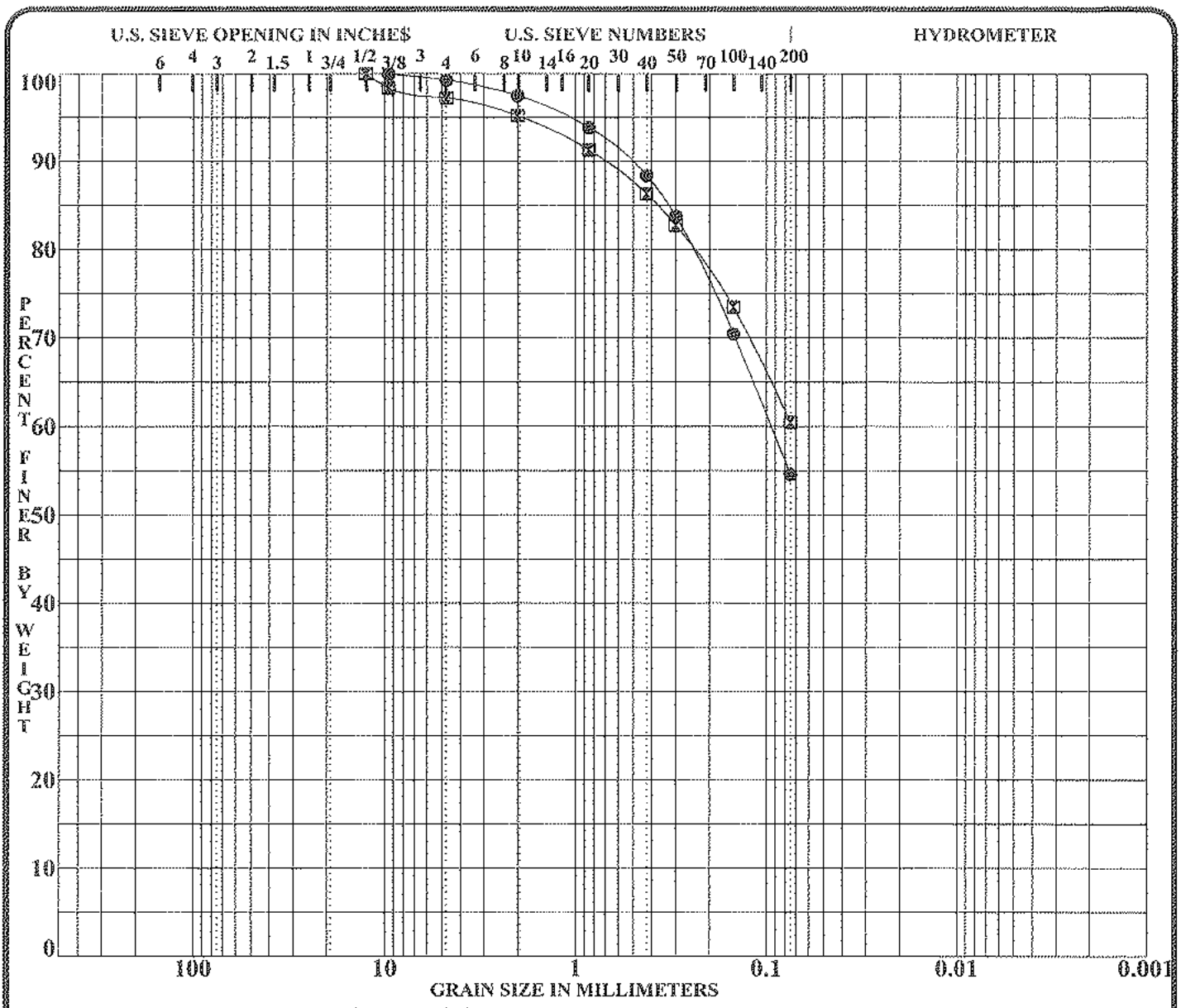
PROJECT NO. *13358.1*

DATE *8/8/17*

CONSOLIDATION TEST

LOR Geotechnical Group, Inc.

ENCLOSURE C-5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Soil Classification	SE	RV	PL	PI	Cc	Cu
T-2	@ 0-3 ft	(ML) Sandy Silt	9	--				
T-4	@ 0-3 ft	(ML) Sandy Silt	7	10				

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
T-2	@ 0-3 ft	9.50	0.09			0.7	44.7	54.6	
T-4	@ 0-3 ft	12.50				2.8	36.8	60.5	

PROJECT *Proposed Commercial Development*

PROJECT NO. *13358.1*

DATE *8/8/17*

GRADATION CURVES
LOR Geotechnical Group, Inc.

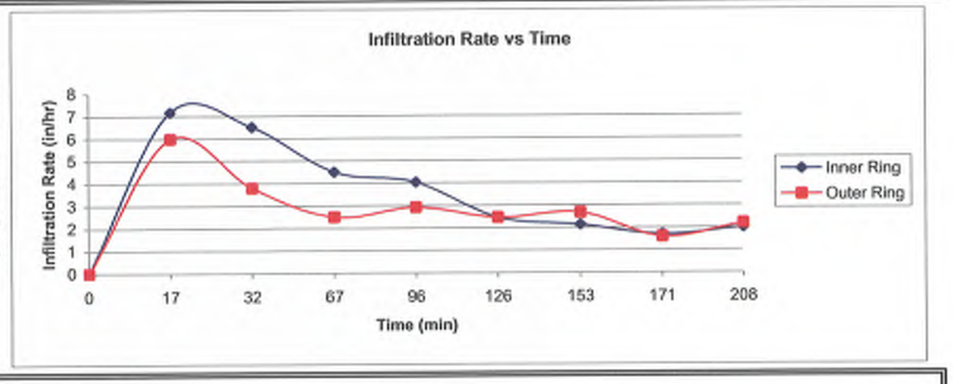
ENCLOSURE C-6

APPENDIX D

Infiltration Test Results

DOUBLE RING INFILTROMETER TEST DATA

Project:	Anthem Oil	**Test Date:**	July 21, 2017
Project No.:	13358.1	**Test Hole No.:**	DRI-1
Soil Classification:	(SM) Silty Sand	**Test Hole Diameter:**	12 in. inner, 24 in. annular
Depth of Test Hole:	6 ft	**Date Excavated:**	July 21, 2017
Liquid Used:	Tap Water	**pH:**	7.8
Area of Rings:	Inner = 0.785 ft^2 , Annular 2.36 ft^2	**Depth of Water in Rings:**	1.5 in
Tested By:	A.L.	**Ring Penetration:**	4 in
Liquid Level Maintained Using:	Vacuum Seal		
Depth to Water Table:	~ 200 ft		

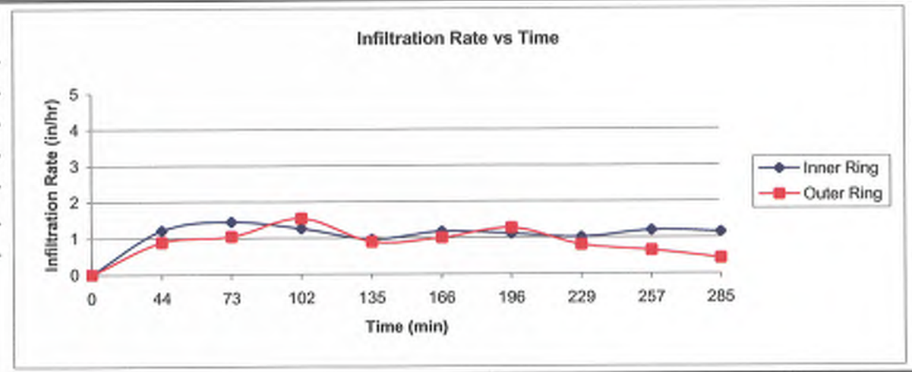


TEST PERIOD

TRIAL NO.	INNER				ANNULAR SPACE			WATER USED (lbs.)		WATER USED (gal)		INFILTRATION RATE (gal/sf.day)		INFILTRATION RATE (in/hr)		LIQUID TEMP (°F)	REMARKS
	TIME		TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	TIME	TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	inner	annular space	inner	annular space	inner	annular space	inner	annular space		
1	S	11:08	17	17	11:08	17	17	8.27	20.78	0.993	2.495	107.1	89.5	7.2	6.0	82	
	E	11:25			11:25											82	
2	S	11:25	15	32	11:25	15	32	6.62	11.61	0.795	1.394	97.2	56.7	6.5	3.8	82	
	E	11:40			11:40											82	
3	S	11:40	35	67	11:40	35	67	10.69	17.82	1.283	2.139	67.3	37.3	4.5	2.5	83	
	E	12:15			12:15											83	
4	S	12:15	29	96	12:15	29	96	7.96	17.28	0.956	2.074	60.4	43.6	4.0	2.9	84	
	E	12:44			12:44											84	
5	S	12:55	30	126	12:55	30	126	5.01	15.09	0.601	1.812	36.8	36.8	2.5	2.5	85	refilled both
	E	13:25			13:25											85	
6	S	13:25	27	153	13:25	27	153	3.92	14.74	0.471	1.770	32.0	40.0	2.1	2.7	85	
	E	13:52			13:52											85	
7	S	13:52	18	171	13:52	18	171	2.08	5.85	0.250	0.702	25.4	23.8	1.7	1.6	86	
	E	14:10			14:10											86	
8	S	14:10	37	208	14:10	37	208	5.03	16.60	0.604	1.993	29.9	32.9	2.0	2.2	86	
	E	14:47			14:47											86	

DOUBLE RING INFILTROMETER TEST DATA

Project:	Anthem Oil	**Test Date:**	July 21, 2017
Project No.:	13358.1	**Test Hole No.:**	DRI-2
Soil Classification:	(SM) Silty Sand	**Test Hole Diameter:**	12 in. inner, 24 in. annular
Depth of Test Hole:	6 ft	**Date Excavated:**	July 21, 2017
Liquid Used:	Tap Water	**pH:**	7.8
Area of Rings:	Inner = 0.785 ft^2 , Annular 2.36 ft^2	**Depth of Water in Rings:**	1 in
Tested By:	A.L.	**Ring Penetration:**	4 in
Liquid Level Maintained Using:	Vacuum Seal		
Depth to Water Table:	~ 200 ft		



TEST PERIOD

TRIAL NO.	INNER				ANNULAR SPACE			WATER USED (lbs.)		WATER USED (gal)		INFILTRATION RATE (gal/sf.day)		INFILTRATION RATE (in/hr)		LIQUID TEMP (°F)	REMARKS
	TIME		TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	TIME	TIME INTERVAL (minutes)	TOTAL ELASPED TIME (minutes)	inner	annular space	inner	annular space	inner	annular space	innner	annular space		
1	S	10:14	44	44	10:14	44	44	3.63	7.95	0.436	0.954	18.2	13.2	1.2	0.9	81	
	E	10:58			10:58											81	
2	S	10:58	29	73	10:58	29	73	2.86	6.19	0.343	0.743	21.7	15.6	1.5	1.0	81	
	E	11:27			11:27											82	
3	S	11:27	29	102	11:27	29	102	2.49	9.15	0.299	1.098	18.9	23.1	1.3	1.5	82	
	E	11:56			11:56											82	
4	S	11:56	33	135	11:56	33	135	2.16	6.03	0.259	0.724	14.4	13.4	1.0	0.9	83	
	E	12:29			12:29											83	
5	S	12:29	31	166	12:29	31	166	2.47	6.35	0.297	0.762	17.5	15.0	1.2	1.0	83	
	E	13:00			13:00											84	
6	S	13:00	30	196	13:00	30	196	2.27	7.81	0.273	0.938	16.7	19.1	1.1	1.3	84	
	E	13:30			13:30											84	
7	S	13:30	33	229	13:30	33	229	2.27	5.43	0.273	0.652	15.1	12.1	1.0	0.8	85	
	E	14:03			14:03											85	
8	S	14:03	28	257	14:03	28	257	2.27	3.66	0.273	0.439	17.9	9.6	1.2	0.6	86	
	E	14:31			14:31											86	
9	S	14:31	28	285	14:31	28	285	2.18	2.44	0.262	0.293	17.1	6.4	1.1	0.4	86	
	E	14:59			14:59											86	

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Not Applicable

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Not Applicable

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{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: WAI
Designed by: MSA
Company Project Number/Name: Job # 863
Date: 4/6/2021
Case No: LWQ20-0024

BMP Identification

BMP NAME / ID: Underground Infiltration Chambers

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.69 inches

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	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
DMA OFF-SITE 1 AC/CONC PVMT	8100	Concrete or Asphalt	1	0.89	7225.2			
DMA OFF-SITE 1 LDSCP	1275	Ornamental Landscaping	0.1	0.11	140.8			
DMA OFF-SITE 1 DG TRAIL	3125	Decomposed Granite	0.4	0.28	874.1			
DMA 1 AC PVMT	73,495	Concrete or Asphalt	1	0.89	65557.5			
DMA 1 LDSCP	4825	Ornamental Landscaping	0.1	0.11	533			
DMA OFF-SITE 3 AC PVMT	15535	Concrete or Asphalt	1	0.89	13857.2			
	106355	Total			88187.8	0.69	5070.8	5140

Notes:

Infiltration Trench - Design Procedure	BMP ID: Inf Chamber	Legend:	Required Entries / Calculated Cells

Company Name:	WAI	Date:	4/6/2021
Designed by:	MSA	County/City Case No.:	LWQ20-0024

Design Volume

Enter the area tributary to this feature, Max = 10 acres	A_t =	2	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	5,070	ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter Infiltration rate	I =	2.5	in/hr
Enter Factor of Safety, FS (unitless)	FS =	3	
Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook			
	n =	40	%
Calculate D_1. $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$	D_1 =	12.50	ft
Enter depth to historic high groundwater mark (measured from finished grade)		20	ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)		20	ft
D_2 is the smaller of: Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft	D_2 =	9.0	ft
D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet.	D_{MAX} =	8.0	ft

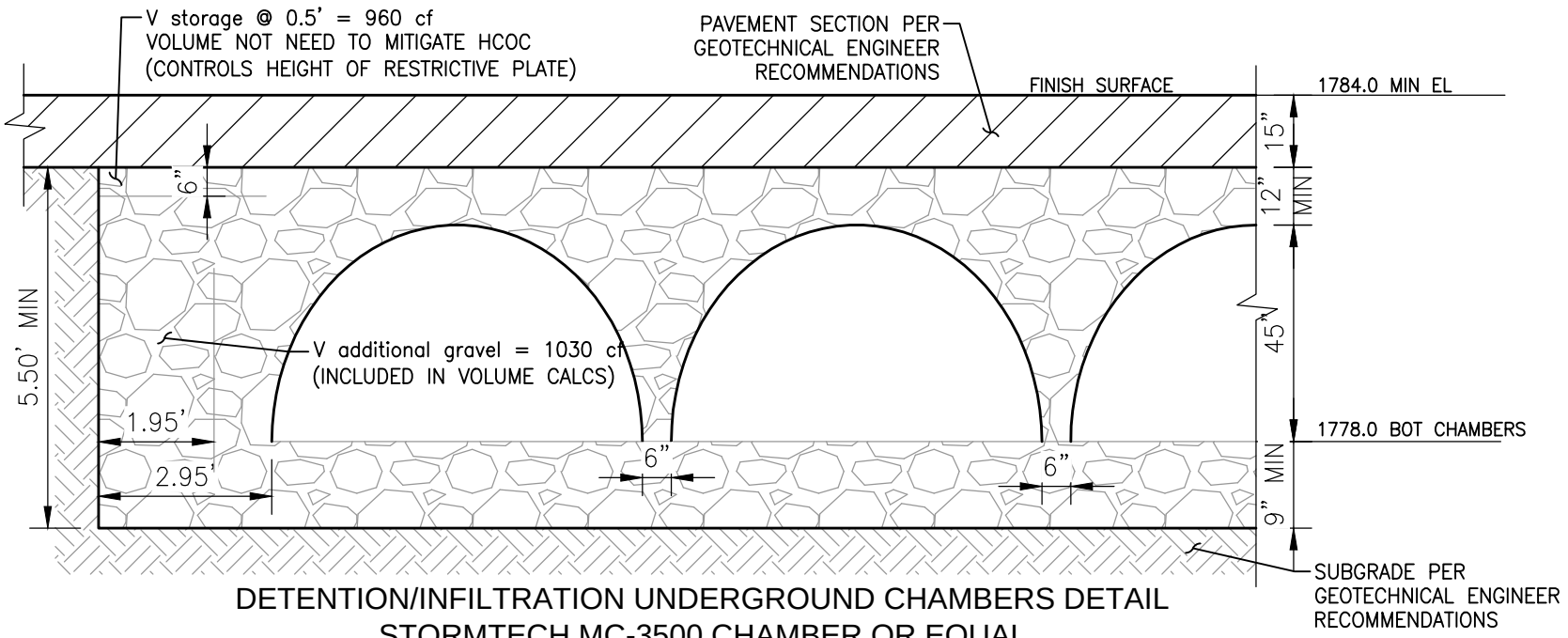
Trench Sizing

Enter proposed reservoir layer depth D_R, must be ≤ D_{MAX}	D_R =	3.00	ft
Calculate the design depth of water, d_W			
Design $d_W = (D_R) \times (n/100)$	Design d_W =	1.20	ft
Minimum Surface Area, A_S $A_S = \frac{V_{BMP}}{d_W}$	A_S =	4,225	ft^2
Proposed Design Surface Area	A_D =	4,284	ft^2
Minimum Width = D_R + 1 foot pea gravel		4.00	ft
Sediment Control Provided? (Use pulldown)		Yes	
Geotechnical report attached? (Use pulldown)		Yes	

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Notes: StormTech MC-3500 Detention/Infiltration chambers

Dimentions - 36' X 119' (5 rows X 16 chamber segments)



DETENTION/INFILTRATION UNDERGROUND CHAMBERS DETAIL
STORMTECH MC-3500 CHAMBER OR EQUAL

NTS

CONCEPTUAL UNDERGROUND STORAGE SYSTEM CAPACITY (MIN DIMENSIONS: 40 lf x 120 lf)

1. PROPOSED ARE 80 CHAMBERS (5 ROWS X 16 CHAMBERS = 80) and 10 END CAPS

2. PROPOSED MIN STORAGE VOLUME IS 14450 cf
   V chamber = 175 cf W/9" STONE LAYER = 175 x 80 = 14000 cf
   V end cap = 45 cf W/9" STONE LAYER = 45 x 10 = 450 cf
   V additional gravel = (120' x (2x1.95') x 5.5') x 40% = 2574 sf x 40% = 1030 cf
   V storage at 5.5' depth = 14000 + 450 + 1030 = 15480 cf
   V storage at 5.0' depth = 15480 – ((120'x40'x0.5') x 40%) = 15480 – 960 = 14520 cf

DURING POST DEVELOPED CONDITION THE 2 YEAR 24 HOUR STORM EVENT FLOOD VOLUME IS 14500 cf, THEREFOR EVEN IF WE DO NOT TAKE INTO CONSIDERATION ANY INFILTRATION AND FLOW DISCHARGE THE PROPOSED UNDERGROUND STORAGE (14530 cf) IS SUFFICIENT TO MEET THE HCOC MITIGATION.

3. At 2.5 in/h INFILTRATION RATE THE DESIGNED V_{BMP} = 5070 cf WILL INFILTRATE WITHIN 13 hours.
   5070/(40 x 120 x 0.4 x 2.5/12) = 5070/400 = 12.7 hours

Santa Ana Watershed - BMP Design Volume, V_{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 WAI | Date 6/6/2021
Designed by MSA | Case No LWQ21-0015
Company Project Number/Name Job # 863

BMP Identification

BMP NAME / ID Bio 1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.69 inches

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	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA Off-Site 2 AC/CONC PVMT	*33665*	*Concrete or Asphalt*	*1*	*0.89*	*30029.2*			
DMA Off-Site 2 LDSCP	*2790*	*Ornamental Landscaping*	*0.1*	*0.11*	*308.2*			
DMA 2 CONC PATH	*680*	*Concrete or Asphalt*	*1*	*0.89*	*606.6*			
DMA 2 ROOF	*5130*	*Roofs*	*1*	*0.89*	*4576*			
DMA 2 LDSCP	*17965*	*Ornamental Landscaping*	*0.1*	*0.11*	*1984.4*			
	60230	***Total***			**37504.4**	**0.69**	***2156.5***	***2500***

Notes:

Bioretention Facility - Design Procedure	BMP ID: Bio 1	Legend:	Required Entries / Calculated Cells

Company Name:	WAI	Date:	6/6/2021
Designed by:	MSA	County/City Case No.:	LWQ21-0015

Design Volume

Enter the area tributary to this feature	A_T=	1.4	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	2,156	ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	40.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.33	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,619	ft^2
Proposed Surface Area	A=	1,880	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.5	%
6" Check Dam Spacing		0	feet
Describe Vegetation:			

Notes: Dimentions - 40' x 47'

Santa Ana Watershed - BMP Design Volume, V_{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	WAI	Date	4/6/2021
Designed by	MSA	Case No	LWQ20-0024
Company Project Number/Name	Job # 863		

BMP Identification

BMP NAME / ID: Filterra Bioscape Open Top Planter

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.69 inches

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	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA Off-Site 4 AC/CONC PVMT	*4360*	*Concrete or Asphalt*	*1*	*0.89*	*3889.1*			
DMA Off-Site 4 LDSCP	*310*	*Ornamental Landscaping*	*0.1*	*0.11*	*34.2*			
	4670	***Total***			**3923.3**	**0.69**	***225.6***	***229.5***

Notes:

Bioretention Facility - Design Procedure	BMP ID: Bio 2	Legend:	Required Entries / Calculated Cells

Company Name:	WAI	Date:	6/6/2021
Designed by:	MSA	County/City Case No.:	LWQ20-0024

Design Volume

Enter the area tributary to this feature	A_T=	0.11	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	226	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	5.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	126	ft^2
Proposed Surface Area	A=	128	ft^2
Minimum Required Length of Bioretention Facility, L	L =	25.2	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes: Dimentions - 5' x 25.5'

STORMTECH MC-3500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.

STORMTECH MC-3500 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
90" x 77" x 45"
2,286 mm x 1,956 mm x 1,143 mm

Chamber Storage
109.9 ft³ (3.11 m³)

Min. Installed Storage*
175.0 ft³ (4.96 m³)

Weight
134 lbs (60.8 kg)

Shipping
15 chambers/pallet
7 end caps/pallet
7 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-3500 END CAP
(not to scale)

Nominal End Cap Specifications

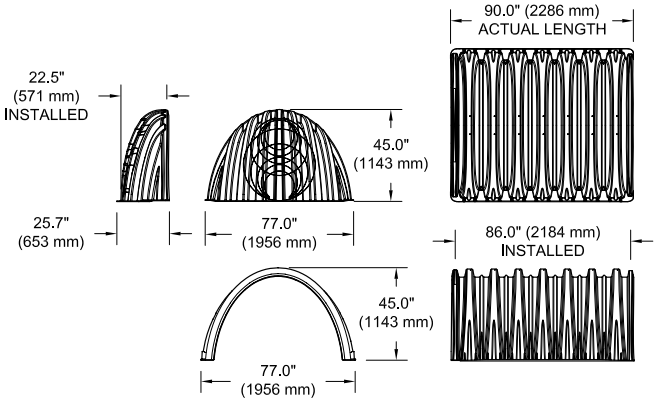
Size (L x W x H)
26.5" x 71" x 45.1"
673 mm x 1,803 mm x 1,145 mm

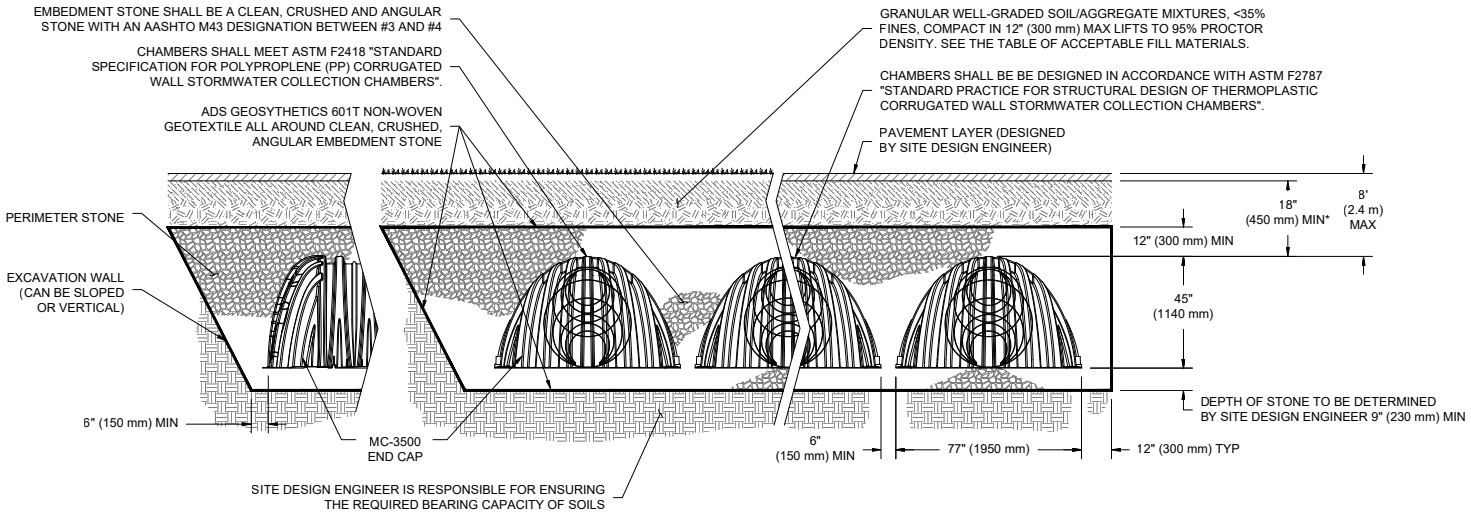
End Cap Storage
14.9 ft³ (0.42 m³)

Min. Installed Storage*
45.1ft³ (1.28 m³)

Weight
49 lbs (22.2 kg)

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone perimeter, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

MC-3500 CHAMBER SPECIFICATION

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-3500 Chamber	109.9 (3.11)	175.0 (4.96)	179.9 (5.09)	184.9 (5.24)	189.9 (5.38)
MC-3500 End Cap	14.9 (.42)	45.1 (1.28)	46.6 (1.32)	48.3 (1.37)	49.9 (1.41)

Note: Assumes 6" (150 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-3500 Chamber	8.5 (6.0)	9.1 (6.5)	9.7 (6.9)	10.4 (7.4)
MC-3500 End Cap	3.9 (2.8)	4.1 (2.9)	4.3 (3.1)	4.5 (3.2)
METRIC KILOGRAMS (m³)	**230 mm**	**300 mm**	**375 mm**	**450 mm**
MC-3500 Chamber	7711 (4.6)	8255 (5.0)	8800 (5.3)	9435 (5.7)
MC-3500 End Cap	3538 (2.1)	3719 (2.2)	3901 (2.4)	4082 (2.5)

Note: Assumes 12" (300 mm) of stone above and 6" (150 mm) row spacing and 6" (150 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-3500 Chamber	11.9 (9.1)	12.4 (9.5)	12.8(9.8)	13.3 (10.2)
MC-3500 End Cap	4.0 (3.1)	4.1 (3.2)	4.3 (3.3)	4.4 (3.4)

Note: Assumes 6" (150 mm) of separation between chamber rows and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.

Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech MC-3500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

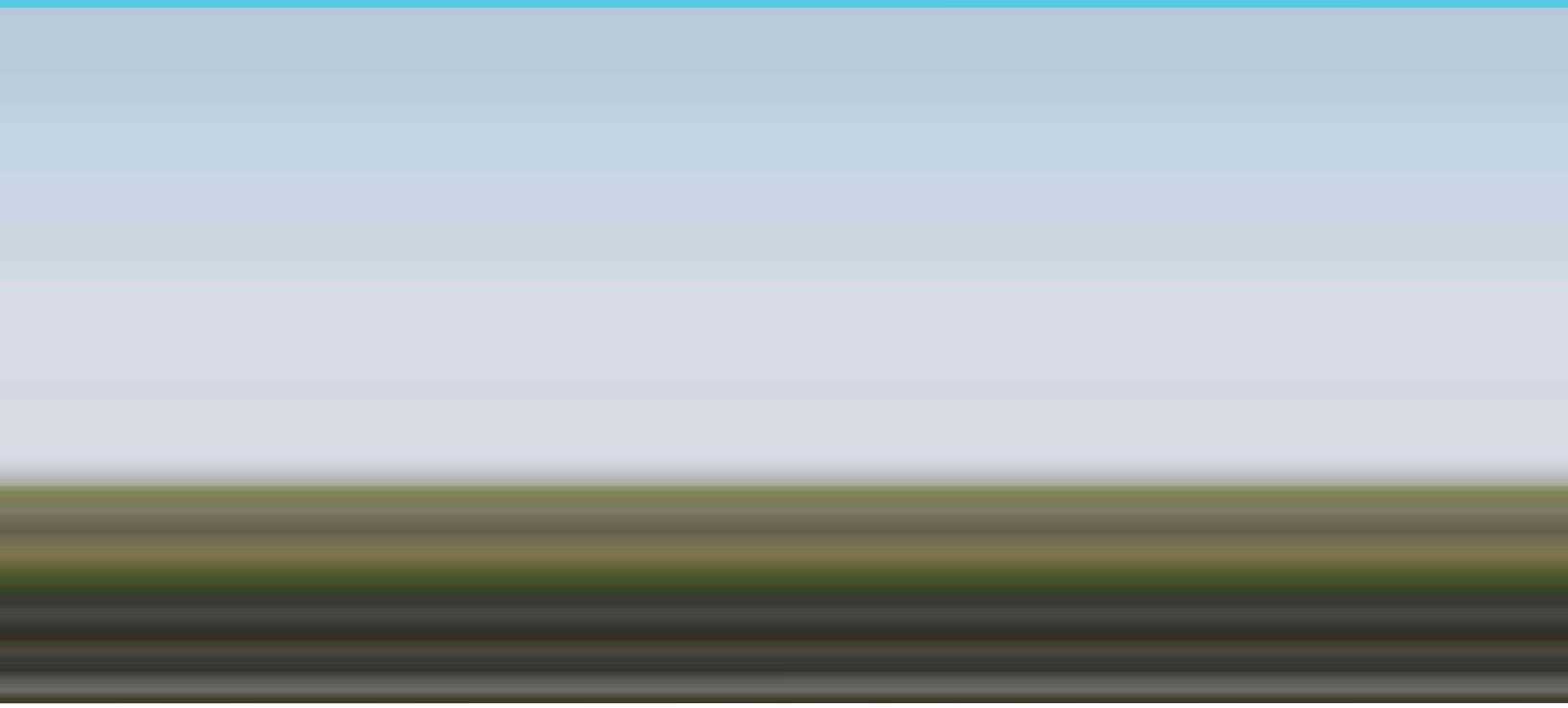
*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS®*

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

CONTECH®
ENGINEERED SOLUTIONS

CDS®
Hydrodynamic Separator

The experts you need to solve your stormwater management challenges



Contech is the leader in stormwater management solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Unique screening technology for stormwater runoff – CDS®

The CDS hydrodynamic separator uses swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff.

At the heart of the CDS system is a unique screening technology used to capture and retain trash and debris. The screen face is louvered so that it is smooth in the downstream direction. The effect created is called “Continuous Deflective Separation.” The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder. This results in a screen that is self-cleaning and provides 100% removal of floatables and neutrally buoyant material debris 4.7 mm or larger, without blinding.

CDS is used to meet trash Total Maximum Daily Load (TMDL) requirements, for stormwater quality control, inlet and outlet pollution control, and as pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and a variety of green infrastructure practices.

CDS® Features and Benefits

FEATURE	BENEFIT
Captures and retains 100% of floatables and neutrally buoyant debris 4.7mm or larger	Superior pollutant removal
Self-cleaning screen	Ease of maintenance
Isolated storage sump eliminates scour potential	Excellent pollutant retention
Internal bypass	Eliminates the need for additional structures
Multiple pipe inlets and 90-180º angles	Design flexibility
Clear access to sump and stored pollutants	Fast, easy maintenance

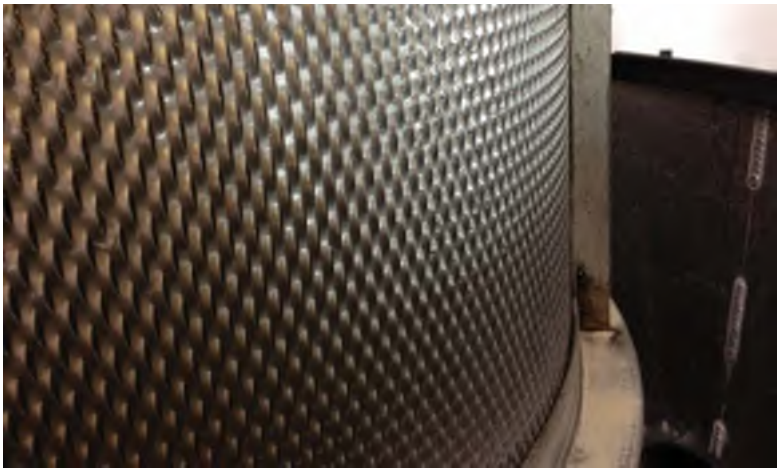
APPLICATION TIPS

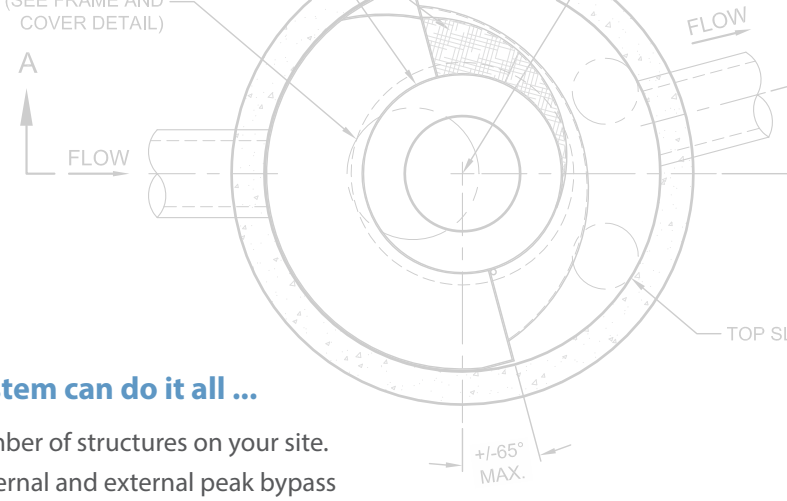
- Because of its internal peak bypass weirs, CDS systems can provide cost savings by eliminating the need for additional structures.
- Pretreating detention, infiltration, and green infrastructure practices with CDS can protect downstream structures and provide for easy maintenance.
- The CDS an ideal solution for retrofit applications due to its compact footprint and configuration flexibility.

The CDS® Screen

A fundamentally different approach to trash control ...

Traditional approaches to trash control typically involve "direct screening" that can easily become clogged, as trash is pinned to the screen as water passes through. Clogged screens can lead to flooding as water backs up. The design of the CDS screen is fundamentally different. Flow is introduced to the screen face which is louvered so that it is smooth in the downstream direction. The effect created is called "Continuous Deflective Separation." The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder.

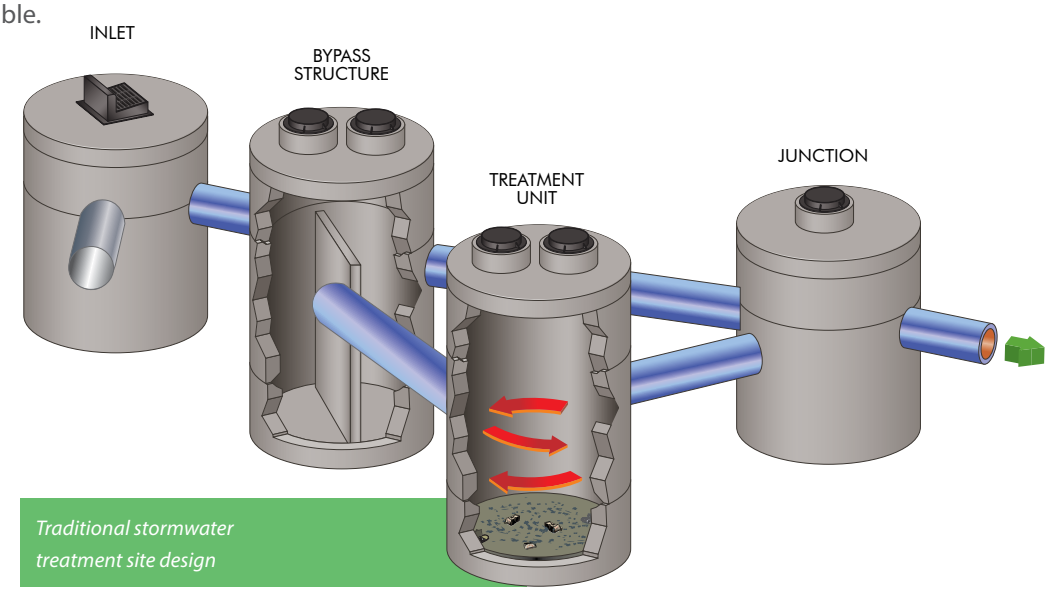




CDS® Design Configuration

Why use traditional stormwater design when ONE system can do it all ...

The CDS effectively treats stormwater runoff while reducing the number of structures on your site. Inline, offline, grate inlet, and drop inlet configurations available. Internal and external peak bypass options also available.

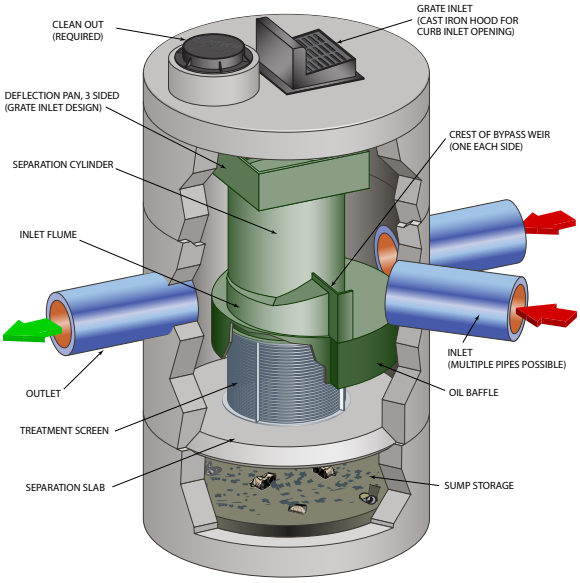


Traditional stormwater treatment site design

A Traditional Stormwater Treatment Site Design would require several structures on your site. With CDS, one system can do it all!

CDS® Advantages

- Grate inlet option available
- Internal bypass weir
- Accepts multiple inlets at a variety of angles
- Advanced hydrodynamic separator
- Captures and retains 100% of floatables and neutrally buoyant debris 4.7 mm or larger
- Indirect screening capability keeps screen from clogging
- Retention of all captured pollutants, even at high flows
- Performance verified by NJCAT, WA Ecology, and ETV Canada



Learn More:
www.ContechES.com/cds

CDS® Applications

CDS is commonly used in the following stormwater applications:

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal
- Urban retrofit and redevelopment
- Inlet and outlet protection
- Pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and Low Impact Development designs

CDS® provides trash control

CDS® pretreats a bioswale

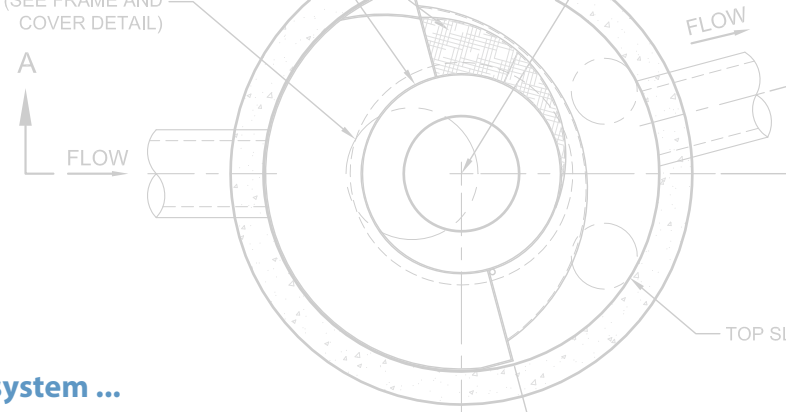
Select CDS® Certifications and Verifications

CDS has been verified by some of the most stringent stormwater technology evaluation organizations in North America, including:

- Washington State Department of Ecology (GULD) - Pretreatment
- New Jersey Department of Environmental Protection (NJDEP)
- Canadian Environmental Technology Verification (ETV)
- California Statewide Trash Amendments Full Capture System Certified*

**The CDS System has been certified by the California State Water Resources Control Board as a Full Capture System provided that it is sized to treat the peak flow rate from the region specific 1-year, 1-hour design storm, or the peak flow capacity of the corresponding storm drain, whichever is less.*

Save time, space and money with CDS



CDS® Maintenance

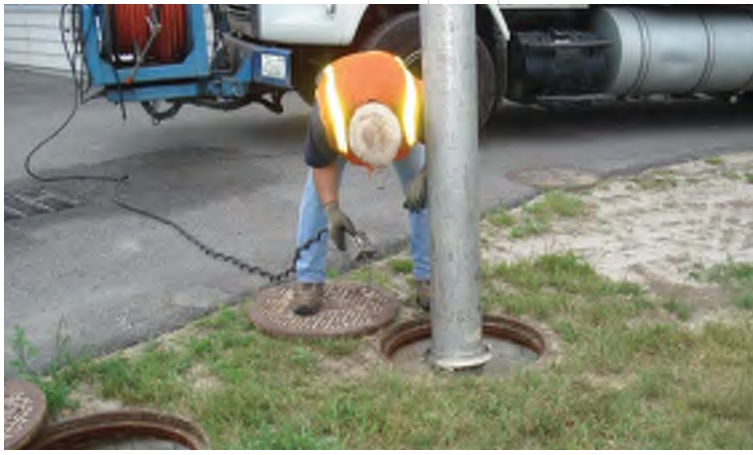
Select a cost-effective and easy-to-access treatment system ...

Systems vary in their maintenance needs, and the selection of a cost-effective and easy-to-access treatment system can mean a huge difference in maintenance expenses for years to come.

A CDS unit is designed to minimize maintenance and make it as easy and inexpensive as possible to keep our systems working properly.

INSPECTION

Inspection is the key to effective maintenance. Pollutant deposition and transport may vary from year to year and site to site. Semi-annual inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed more frequently where site conditions may cause rapid accumulation of pollutants.



Most CDS® units can easily be cleaned within thirty minutes.

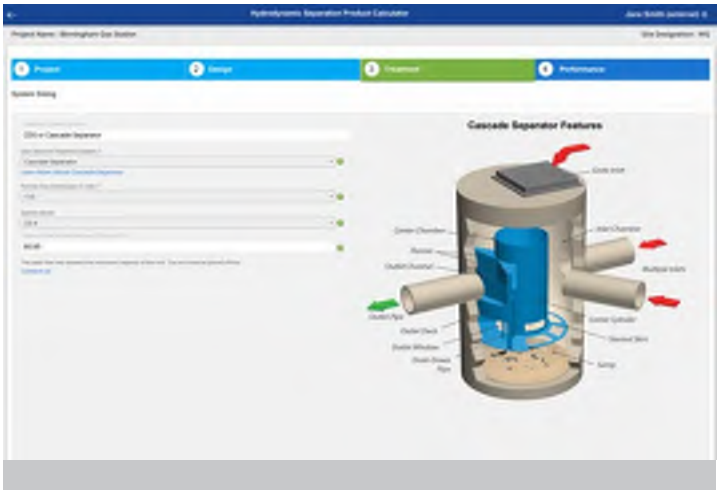
RECOMMENDATIONS FOR CDS MAINTENANCE

The recommended cleanout of solids within the CDS unit's sump should occur at 75% of the sump capacity. Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber and sump, and another allows inspection and cleanout of sediment captured and retained behind the screen. A vacuum truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30 minutes for most installations.

Design Your Own Hydrodynamic Separator (DYOHDS™)

Quickly prepare designs for estimates and project meetings ...

- Multiple sizing methods available.
- Site-specific questions ensure the selected unit will comply with site constraints.
- Multiple treatment options may be available based on regulations and site parameters.
- Follow up reports contain a site-specific design, sizing summary, standard detail, and specification.



Learn More:
www.ContechES.com/dyohds

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PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

CITY OF MORENO VALLEY
WATERSHED BOUNDARIES

PROJECT SITE
APN 488-310-012

SANTA ANA RIVER WATERSHED
SAN JACINTO VALLEY WATERSHED
MYSTIC LAKE WATERSHED

Pigeon Pass Dam

MORENO VALLEY
RIVERSIDE
PERRIS
CALIMESA
BEAUMONT
LAKE PERRIS

Delineation Type
- Controlled Release Point
- Engineered, Fully Hardened, and Maintained
- Engineered, Partially Hardened, and Maintained
- Engineered, Earthen, and Maintained
- Not Engineered and Earthen
- Natural

Watercourse Susceptibility Type
- Not Susceptible
- Potentially Susceptible
- Mitigation May Be Required
- Mitigation Not Required
- Watershed Boundary

- Waterbodies
- Roads
- Highways
- City Boundaries
- March Air Reserve Base

N

0 5,000 10,000 Feet

The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy.Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

City of Moreno Valley Geographic Information in:
State Plane NAD 83 California Zone 6 Feet
T:\Divisions\NPDES\2017\MXD
\MVWatershedAllLayers_052317E_v1.mxd
May 23, 2017

MORENO VALLEY
WHERE DREAMS SOAR

UNIT HYDROGRAPH SUMMARY TABLE

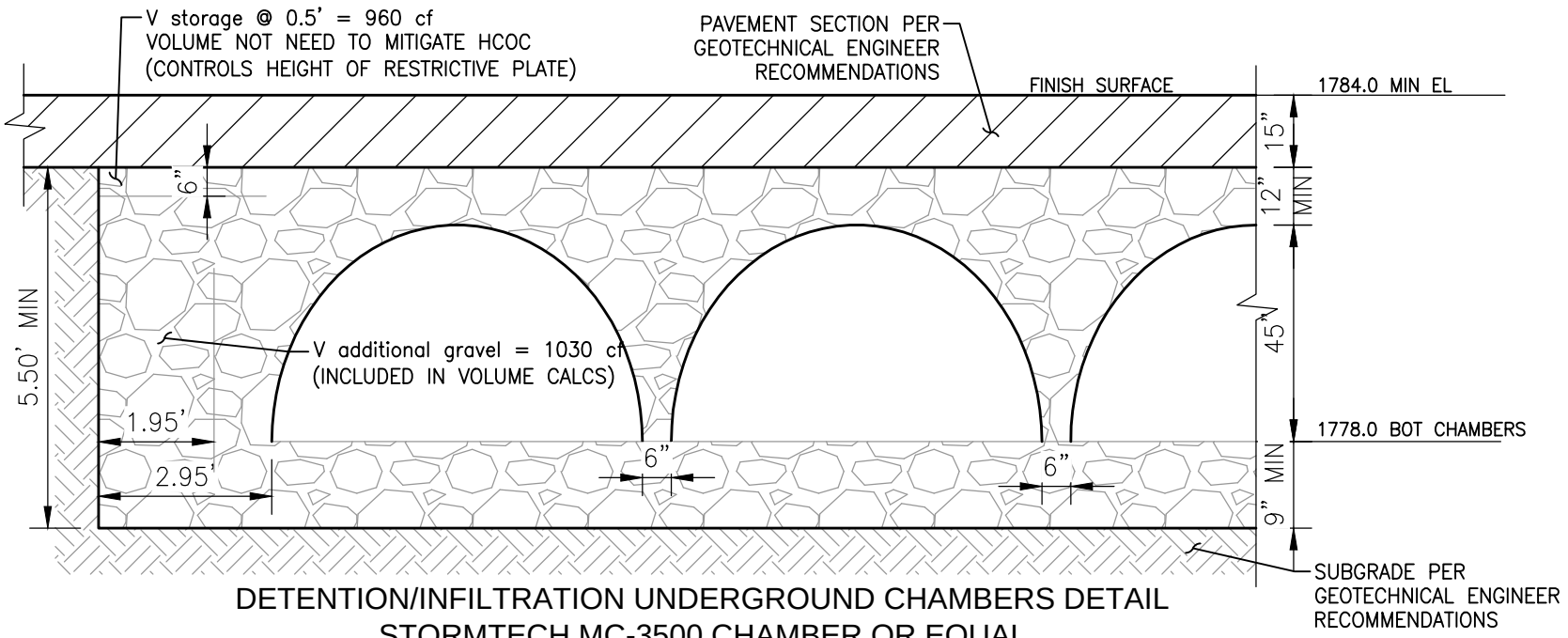
INDEPENDENT PLAZA (APN 488-310-012), REDLANDS BOULEVARD AND HEMLOCK AVENUE
CITY OF MORENO VALLEY

7/9/2021

Table

STORM	DURATIO	UNIT HYDROGRAPH RESULTS				BASIN
		PRE-DEV CONDITIONS		POST-DEV CONDITIONS		
		Flood Volume	Peak Flow	Flood Volume	Peak Flow	Basin Volume
		CF	CFS	CF	CFS	Req'd (CF)
	1-HOUR					
	3-HOUR					
	6-HOUR					
2-YEAR	24-HOUR	1986	0.08	14500.0	0.6	

The proposed infiltration chamber storage is 14520 cf > 14500 cf (2 y-24 h),
therefor even if we do not take into consideration any infiltration or flow discharge
the proposed underground storage is sufficient to meet the HCOC mitigation.



DETENTION/INFILTRATION UNDERGROUND CHAMBERS DETAIL
STORMTECH MC-3500 CHAMBER OR EQUAL

NTS

CONCEPTUAL UNDERGROUND STORAGE SYSTEM CAPACITY (MIN DIMENSIONS: 40 lf x 120 lf)

1. PROPOSED ARE 80 CHAMBERS (5 ROWS X 16 CHAMBERS = 80) and 10 END CAPS

2. PROPOSED MIN STORAGE VOLUME IS 14450 cf
   V chamber = 175 cf W/9" STONE LAYER = 175 x 80 = 14000 cf
   V end cap = 45 cf W/9" STONE LAYER = 45 x 10 = 450 cf
   V additional gravel = (120' x (2x1.95') x 5.5') x 40% = 2574 sf x 40% = 1030 cf
   V storage at 5.5' depth = 14000 + 450 + 1030 = 15480 cf
   V storage at 5.0' depth = 15480 – ((120'x40'x0.5') x 40%) = 15480 – 960 = 14520 cf

DURING POST DEVELOPED CONDITION THE 2 YEAR 24 HOUR STORM EVENT FLOOD VOLUME IS 14500 cf, THEREFOR EVEN IF WE DO NOT TAKE INTO CONSIDERATION ANY INFILTRATION AND FLOW DISCHARGE THE PROPOSED UNDERGROUND STORAGE (14530 cf) IS SUFFICIENT TO MEET THE HCOC MITIGATION.

3. At 2.5 in/h INFILTRATION RATE THE DESIGNED V_{BMP} = 5070 cf WILL INFILTRATE WITHIN 13 hours.
   5070/(40 x 120 x 0.4 x 2.5/12) = 5070/400 = 12.7 hours

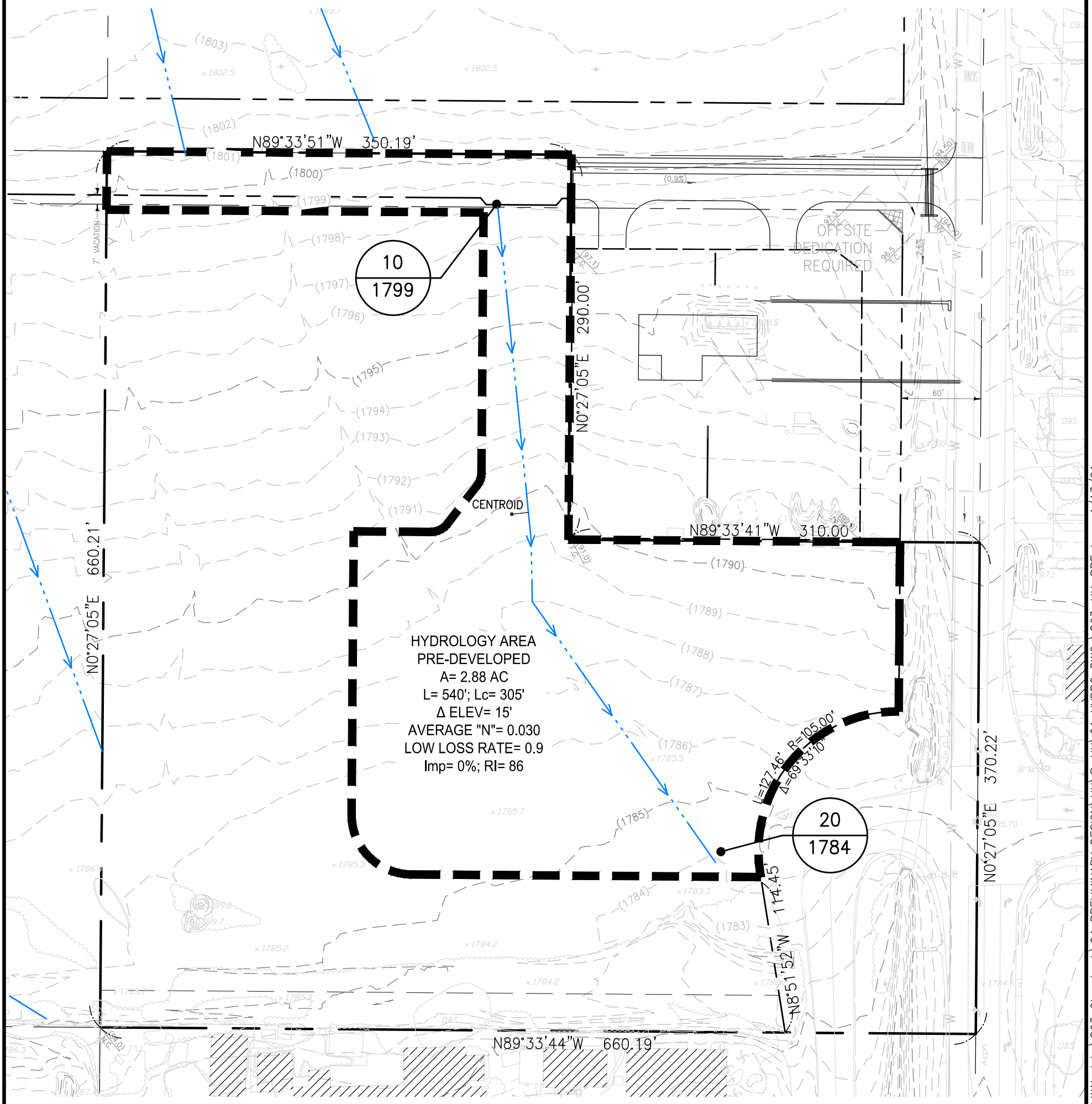
EXHIBIT

INDEPENDENT PLAZA
PRE-DEVELOPED CONDITIONS
UNIT HYDROGRAPH MAP

WINCHESTER ASSOCIATES, INC. APRIL 2021

N

NOT TO SCALE



LEGEND:

DRAINAGE AREA BOUNDARY

NODE
ELEV

C:\Users\mariela anguelov\Documents\WAI-Jobs\863 Chandresh\04 PRELIMINARY DESIGN\HH\P-HH\01 HYDRO DWGs\863-UH-PRE.dwg 4/13/21

Pre-developed conditions
2 year 24 hour

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/09/21 File: 863pre242.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6311

 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format

Independent Plaza, MV
Pre-developed conditions
2 year
(Job 863)

Drainage Area = 2.88(Ac.) = 0.004 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.88(Ac.) = 0.004 Sq. Mi.
Length along longest watercourse = 540.00(Ft.)
Length along longest watercourse measured to centroid = 305.00(Ft.)
Length along longest watercourse = 0.102 Mi.
Length along longest watercourse measured to centroid = 0.058 Mi.
Difference in elevation = 15.00(Ft.)
Slope along watercourse = 146.6667 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.040 Hr.
Lag time = 2.38 Min.
25% of lag time = 0.60 Min.
40% of lag time = 0.95 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]
2.88	1.90	5.47

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.88	4.50	12.96

STORM EVENT (YEAR) = 2.00

Area Averaged 2-Year Rainfall = 1.900(In)
Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.880	86.00	0.000

Total Area Entered = 2.88(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
86.0	71.6	0.343	0.000	0.343	1.000	0.343
					Sum (F) =	0.343

Area averaged mean soil loss (F) (In/Hr) = 0.343
Minimum soil loss rate ((In/Hr)) = 0.172
(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
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	209.869	45.056	1.308
2	0.167	419.737	42.685	1.239
3	0.250	629.606	8.406	0.244
4	0.333	839.474	3.853	0.112
		Sum = 100.000	Sum=	2.902

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	0.015	(0.608)	0.014	0.002
2	0.17	0.07	0.015	(0.606)	0.014	0.002
3	0.25	0.07	0.015	(0.604)	0.014	0.002
4	0.33	0.10	0.023	(0.601)	0.021	0.002
5	0.42	0.10	0.023	(0.599)	0.021	0.002
6	0.50	0.10	0.023	(0.597)	0.021	0.002
7	0.58	0.10	0.023	(0.594)	0.021	0.002
8	0.67	0.10	0.023	(0.592)	0.021	0.002
9	0.75	0.10	0.023	(0.590)	0.021	0.002
10	0.83	0.13	0.030	(0.587)	0.027	0.003
11	0.92	0.13	0.030	(0.585)	0.027	0.003
12	1.00	0.13	0.030	(0.583)	0.027	0.003
13	1.08	0.10	0.023	(0.580)	0.021	0.002
14	1.17	0.10	0.023	(0.578)	0.021	0.002
15	1.25	0.10	0.023	(0.576)	0.021	0.002
16	1.33	0.10	0.023	(0.573)	0.021	0.002
17	1.42	0.10	0.023	(0.571)	0.021	0.002
18	1.50	0.10	0.023	(0.569)	0.021	0.002
19	1.58	0.10	0.023	(0.567)	0.021	0.002

20	1.67	0.10	0.023	(0.564)	0.021	0.002
21	1.75	0.10	0.023	(0.562)	0.021	0.002
22	1.83	0.13	0.030	(0.560)	0.027	0.003
23	1.92	0.13	0.030	(0.558)	0.027	0.003
24	2.00	0.13	0.030	(0.555)	0.027	0.003
25	2.08	0.13	0.030	(0.553)	0.027	0.003
26	2.17	0.13	0.030	(0.551)	0.027	0.003
27	2.25	0.13	0.030	(0.549)	0.027	0.003
28	2.33	0.13	0.030	(0.546)	0.027	0.003
29	2.42	0.13	0.030	(0.544)	0.027	0.003
30	2.50	0.13	0.030	(0.542)	0.027	0.003
31	2.58	0.17	0.038	(0.540)	0.034	0.004
32	2.67	0.17	0.038	(0.537)	0.034	0.004
33	2.75	0.17	0.038	(0.535)	0.034	0.004
34	2.83	0.17	0.038	(0.533)	0.034	0.004
35	2.92	0.17	0.038	(0.531)	0.034	0.004
36	3.00	0.17	0.038	(0.529)	0.034	0.004
37	3.08	0.17	0.038	(0.526)	0.034	0.004
38	3.17	0.17	0.038	(0.524)	0.034	0.004
39	3.25	0.17	0.038	(0.522)	0.034	0.004
40	3.33	0.17	0.038	(0.520)	0.034	0.004
41	3.42	0.17	0.038	(0.518)	0.034	0.004
42	3.50	0.17	0.038	(0.516)	0.034	0.004
43	3.58	0.17	0.038	(0.513)	0.034	0.004
44	3.67	0.17	0.038	(0.511)	0.034	0.004
45	3.75	0.17	0.038	(0.509)	0.034	0.004
46	3.83	0.20	0.046	(0.507)	0.041	0.005
47	3.92	0.20	0.046	(0.505)	0.041	0.005
48	4.00	0.20	0.046	(0.503)	0.041	0.005
49	4.08	0.20	0.046	(0.501)	0.041	0.005
50	4.17	0.20	0.046	(0.498)	0.041	0.005
51	4.25	0.20	0.046	(0.496)	0.041	0.005
52	4.33	0.23	0.053	(0.494)	0.048	0.005
53	4.42	0.23	0.053	(0.492)	0.048	0.005
54	4.50	0.23	0.053	(0.490)	0.048	0.005
55	4.58	0.23	0.053	(0.488)	0.048	0.005
56	4.67	0.23	0.053	(0.486)	0.048	0.005
57	4.75	0.23	0.053	(0.484)	0.048	0.005
58	4.83	0.27	0.061	(0.482)	0.055	0.006
59	4.92	0.27	0.061	(0.480)	0.055	0.006
60	5.00	0.27	0.061	(0.477)	0.055	0.006
61	5.08	0.20	0.046	(0.475)	0.041	0.005
62	5.17	0.20	0.046	(0.473)	0.041	0.005
63	5.25	0.20	0.046	(0.471)	0.041	0.005
64	5.33	0.23	0.053	(0.469)	0.048	0.005
65	5.42	0.23	0.053	(0.467)	0.048	0.005
66	5.50	0.23	0.053	(0.465)	0.048	0.005
67	5.58	0.27	0.061	(0.463)	0.055	0.006
68	5.67	0.27	0.061	(0.461)	0.055	0.006
69	5.75	0.27	0.061	(0.459)	0.055	0.006
70	5.83	0.27	0.061	(0.457)	0.055	0.006
71	5.92	0.27	0.061	(0.455)	0.055	0.006
72	6.00	0.27	0.061	(0.453)	0.055	0.006
73	6.08	0.30	0.068	(0.451)	0.062	0.007
74	6.17	0.30	0.068	(0.449)	0.062	0.007
75	6.25	0.30	0.068	(0.447)	0.062	0.007
76	6.33	0.30	0.068	(0.445)	0.062	0.007
77	6.42	0.30	0.068	(0.443)	0.062	0.007
78	6.50	0.30	0.068	(0.441)	0.062	0.007
79	6.58	0.33	0.076	(0.439)	0.068	0.008
80	6.67	0.33	0.076	(0.437)	0.068	0.008
81	6.75	0.33	0.076	(0.435)	0.068	0.008
82	6.83	0.33	0.076	(0.433)	0.068	0.008

83	6.92	0.33	0.076	(0.431)	0.068	0.008
84	7.00	0.33	0.076	(0.429)	0.068	0.008
85	7.08	0.33	0.076	(0.427)	0.068	0.008
86	7.17	0.33	0.076	(0.425)	0.068	0.008
87	7.25	0.33	0.076	(0.423)	0.068	0.008
88	7.33	0.37	0.084	(0.421)	0.075	0.008
89	7.42	0.37	0.084	(0.419)	0.075	0.008
90	7.50	0.37	0.084	(0.417)	0.075	0.008
91	7.58	0.40	0.091	(0.416)	0.082	0.009
92	7.67	0.40	0.091	(0.414)	0.082	0.009
93	7.75	0.40	0.091	(0.412)	0.082	0.009
94	7.83	0.43	0.099	(0.410)	0.089	0.010
95	7.92	0.43	0.099	(0.408)	0.089	0.010
96	8.00	0.43	0.099	(0.406)	0.089	0.010
97	8.08	0.50	0.114	(0.404)	0.103	0.011
98	8.17	0.50	0.114	(0.402)	0.103	0.011
99	8.25	0.50	0.114	(0.400)	0.103	0.011
100	8.33	0.50	0.114	(0.399)	0.103	0.011
101	8.42	0.50	0.114	(0.397)	0.103	0.011
102	8.50	0.50	0.114	(0.395)	0.103	0.011
103	8.58	0.53	0.122	(0.393)	0.109	0.012
104	8.67	0.53	0.122	(0.391)	0.109	0.012
105	8.75	0.53	0.122	(0.389)	0.109	0.012
106	8.83	0.57	0.129	(0.387)	0.116	0.013
107	8.92	0.57	0.129	(0.386)	0.116	0.013
108	9.00	0.57	0.129	(0.384)	0.116	0.013
109	9.08	0.63	0.144	(0.382)	0.130	0.014
110	9.17	0.63	0.144	(0.380)	0.130	0.014
111	9.25	0.63	0.144	(0.378)	0.130	0.014
112	9.33	0.67	0.152	(0.377)	0.137	0.015
113	9.42	0.67	0.152	(0.375)	0.137	0.015
114	9.50	0.67	0.152	(0.373)	0.137	0.015
115	9.58	0.70	0.160	(0.371)	0.144	0.016
116	9.67	0.70	0.160	(0.369)	0.144	0.016
117	9.75	0.70	0.160	(0.368)	0.144	0.016
118	9.83	0.73	0.167	(0.366)	0.150	0.017
119	9.92	0.73	0.167	(0.364)	0.150	0.017
120	10.00	0.73	0.167	(0.362)	0.150	0.017
121	10.08	0.50	0.114	(0.361)	0.103	0.011
122	10.17	0.50	0.114	(0.359)	0.103	0.011
123	10.25	0.50	0.114	(0.357)	0.103	0.011
124	10.33	0.50	0.114	(0.355)	0.103	0.011
125	10.42	0.50	0.114	(0.354)	0.103	0.011
126	10.50	0.50	0.114	(0.352)	0.103	0.011
127	10.58	0.67	0.152	(0.350)	0.137	0.015
128	10.67	0.67	0.152	(0.348)	0.137	0.015
129	10.75	0.67	0.152	(0.347)	0.137	0.015
130	10.83	0.67	0.152	(0.345)	0.137	0.015
131	10.92	0.67	0.152	(0.343)	0.137	0.015
132	11.00	0.67	0.152	(0.342)	0.137	0.015
133	11.08	0.63	0.144	(0.340)	0.130	0.014
134	11.17	0.63	0.144	(0.338)	0.130	0.014
135	11.25	0.63	0.144	(0.337)	0.130	0.014
136	11.33	0.63	0.144	(0.335)	0.130	0.014
137	11.42	0.63	0.144	(0.333)	0.130	0.014
138	11.50	0.63	0.144	(0.332)	0.130	0.014
139	11.58	0.57	0.129	(0.330)	0.116	0.013
140	11.67	0.57	0.129	(0.328)	0.116	0.013
141	11.75	0.57	0.129	(0.327)	0.116	0.013
142	11.83	0.60	0.137	(0.325)	0.123	0.014
143	11.92	0.60	0.137	(0.324)	0.123	0.014
144	12.00	0.60	0.137	(0.322)	0.123	0.014
145	12.08	0.83	0.190	(0.320)	0.171	0.019

146	12.17	0.83	0.190	(0.319)	0.171	0.019
147	12.25	0.83	0.190	(0.317)	0.171	0.019
148	12.33	0.87	0.198	(0.316)	0.178	0.020
149	12.42	0.87	0.198	(0.314)	0.178	0.020
150	12.50	0.87	0.198	(0.312)	0.178	0.020
151	12.58	0.93	0.213	(0.311)	0.192	0.021
152	12.67	0.93	0.213	(0.309)	0.192	0.021
153	12.75	0.93	0.213	(0.308)	0.192	0.021
154	12.83	0.97	0.220	(0.306)	0.198	0.022
155	12.92	0.97	0.220	(0.305)	0.198	0.022
156	13.00	0.97	0.220	(0.303)	0.198	0.022
157	13.08	1.13	0.258	(0.301)	0.233	0.026
158	13.17	1.13	0.258	(0.300)	0.233	0.026
159	13.25	1.13	0.258	(0.298)	0.233	0.026
160	13.33	1.13	0.258	(0.297)	0.233	0.026
161	13.42	1.13	0.258	(0.295)	0.233	0.026
162	13.50	1.13	0.258	(0.294)	0.233	0.026
163	13.58	0.77	0.175	(0.292)	0.157	0.017
164	13.67	0.77	0.175	(0.291)	0.157	0.017
165	13.75	0.77	0.175	(0.289)	0.157	0.017
166	13.83	0.77	0.175	(0.288)	0.157	0.017
167	13.92	0.77	0.175	(0.286)	0.157	0.017
168	14.00	0.77	0.175	(0.285)	0.157	0.017
169	14.08	0.90	0.205	(0.284)	0.185	0.021
170	14.17	0.90	0.205	(0.282)	0.185	0.021
171	14.25	0.90	0.205	(0.281)	0.185	0.021
172	14.33	0.87	0.198	(0.279)	0.178	0.020
173	14.42	0.87	0.198	(0.278)	0.178	0.020
174	14.50	0.87	0.198	(0.276)	0.178	0.020
175	14.58	0.87	0.198	(0.275)	0.178	0.020
176	14.67	0.87	0.198	(0.274)	0.178	0.020
177	14.75	0.87	0.198	(0.272)	0.178	0.020
178	14.83	0.83	0.190	(0.271)	0.171	0.019
179	14.92	0.83	0.190	(0.269)	0.171	0.019
180	15.00	0.83	0.190	(0.268)	0.171	0.019
181	15.08	0.80	0.182	(0.267)	0.164	0.018
182	15.17	0.80	0.182	(0.265)	0.164	0.018
183	15.25	0.80	0.182	(0.264)	0.164	0.018
184	15.33	0.77	0.175	(0.263)	0.157	0.017
185	15.42	0.77	0.175	(0.261)	0.157	0.017
186	15.50	0.77	0.175	(0.260)	0.157	0.017
187	15.58	0.63	0.144	(0.259)	0.130	0.014
188	15.67	0.63	0.144	(0.257)	0.130	0.014
189	15.75	0.63	0.144	(0.256)	0.130	0.014
190	15.83	0.63	0.144	(0.255)	0.130	0.014
191	15.92	0.63	0.144	(0.253)	0.130	0.014
192	16.00	0.63	0.144	(0.252)	0.130	0.014
193	16.08	0.13	0.030	(0.251)	0.027	0.003
194	16.17	0.13	0.030	(0.249)	0.027	0.003
195	16.25	0.13	0.030	(0.248)	0.027	0.003
196	16.33	0.13	0.030	(0.247)	0.027	0.003
197	16.42	0.13	0.030	(0.246)	0.027	0.003
198	16.50	0.13	0.030	(0.244)	0.027	0.003
199	16.58	0.10	0.023	(0.243)	0.021	0.002
200	16.67	0.10	0.023	(0.242)	0.021	0.002
201	16.75	0.10	0.023	(0.241)	0.021	0.002
202	16.83	0.10	0.023	(0.239)	0.021	0.002
203	16.92	0.10	0.023	(0.238)	0.021	0.002
204	17.00	0.10	0.023	(0.237)	0.021	0.002
205	17.08	0.17	0.038	(0.236)	0.034	0.004
206	17.17	0.17	0.038	(0.235)	0.034	0.004
207	17.25	0.17	0.038	(0.233)	0.034	0.004
208	17.33	0.17	0.038	(0.232)	0.034	0.004

209	17.42	0.17	0.038	(0.231)	0.034	0.004
210	17.50	0.17	0.038	(0.230)	0.034	0.004
211	17.58	0.17	0.038	(0.229)	0.034	0.004
212	17.67	0.17	0.038	(0.228)	0.034	0.004
213	17.75	0.17	0.038	(0.227)	0.034	0.004
214	17.83	0.13	0.030	(0.225)	0.027	0.003
215	17.92	0.13	0.030	(0.224)	0.027	0.003
216	18.00	0.13	0.030	(0.223)	0.027	0.003
217	18.08	0.13	0.030	(0.222)	0.027	0.003
218	18.17	0.13	0.030	(0.221)	0.027	0.003
219	18.25	0.13	0.030	(0.220)	0.027	0.003
220	18.33	0.13	0.030	(0.219)	0.027	0.003
221	18.42	0.13	0.030	(0.218)	0.027	0.003
222	18.50	0.13	0.030	(0.217)	0.027	0.003
223	18.58	0.10	0.023	(0.216)	0.021	0.002
224	18.67	0.10	0.023	(0.215)	0.021	0.002
225	18.75	0.10	0.023	(0.214)	0.021	0.002
226	18.83	0.07	0.015	(0.213)	0.014	0.002
227	18.92	0.07	0.015	(0.212)	0.014	0.002
228	19.00	0.07	0.015	(0.211)	0.014	0.002
229	19.08	0.10	0.023	(0.210)	0.021	0.002
230	19.17	0.10	0.023	(0.209)	0.021	0.002
231	19.25	0.10	0.023	(0.208)	0.021	0.002
232	19.33	0.13	0.030	(0.207)	0.027	0.003
233	19.42	0.13	0.030	(0.206)	0.027	0.003
234	19.50	0.13	0.030	(0.205)	0.027	0.003
235	19.58	0.10	0.023	(0.204)	0.021	0.002
236	19.67	0.10	0.023	(0.203)	0.021	0.002
237	19.75	0.10	0.023	(0.202)	0.021	0.002
238	19.83	0.07	0.015	(0.201)	0.014	0.002
239	19.92	0.07	0.015	(0.200)	0.014	0.002
240	20.00	0.07	0.015	(0.199)	0.014	0.002
241	20.08	0.10	0.023	(0.198)	0.021	0.002
242	20.17	0.10	0.023	(0.197)	0.021	0.002
243	20.25	0.10	0.023	(0.197)	0.021	0.002
244	20.33	0.10	0.023	(0.196)	0.021	0.002
245	20.42	0.10	0.023	(0.195)	0.021	0.002
246	20.50	0.10	0.023	(0.194)	0.021	0.002
247	20.58	0.10	0.023	(0.193)	0.021	0.002
248	20.67	0.10	0.023	(0.192)	0.021	0.002
249	20.75	0.10	0.023	(0.192)	0.021	0.002
250	20.83	0.07	0.015	(0.191)	0.014	0.002
251	20.92	0.07	0.015	(0.190)	0.014	0.002
252	21.00	0.07	0.015	(0.189)	0.014	0.002
253	21.08	0.10	0.023	(0.189)	0.021	0.002
254	21.17	0.10	0.023	(0.188)	0.021	0.002
255	21.25	0.10	0.023	(0.187)	0.021	0.002
256	21.33	0.07	0.015	(0.186)	0.014	0.002
257	21.42	0.07	0.015	(0.186)	0.014	0.002
258	21.50	0.07	0.015	(0.185)	0.014	0.002
259	21.58	0.10	0.023	(0.184)	0.021	0.002
260	21.67	0.10	0.023	(0.184)	0.021	0.002
261	21.75	0.10	0.023	(0.183)	0.021	0.002
262	21.83	0.07	0.015	(0.182)	0.014	0.002
263	21.92	0.07	0.015	(0.182)	0.014	0.002
264	22.00	0.07	0.015	(0.181)	0.014	0.002
265	22.08	0.10	0.023	(0.181)	0.021	0.002
266	22.17	0.10	0.023	(0.180)	0.021	0.002
267	22.25	0.10	0.023	(0.179)	0.021	0.002
268	22.33	0.07	0.015	(0.179)	0.014	0.002
269	22.42	0.07	0.015	(0.178)	0.014	0.002
270	22.50	0.07	0.015	(0.178)	0.014	0.002
271	22.58	0.07	0.015	(0.177)	0.014	0.002

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272  22.67     0.07      0.015       (  0.177)       0.014        0.002
273  22.75     0.07      0.015       (  0.176)       0.014        0.002
274  22.83     0.07      0.015       (  0.176)       0.014        0.002
275  22.92     0.07      0.015       (  0.175)       0.014        0.002
276  23.00     0.07      0.015       (  0.175)       0.014        0.002
277  23.08     0.07      0.015       (  0.175)       0.014        0.002
278  23.17     0.07      0.015       (  0.174)       0.014        0.002
279  23.25     0.07      0.015       (  0.174)       0.014        0.002
280  23.33     0.07      0.015       (  0.173)       0.014        0.002
281  23.42     0.07      0.015       (  0.173)       0.014        0.002
282  23.50     0.07      0.015       (  0.173)       0.014        0.002
283  23.58     0.07      0.015       (  0.173)       0.014        0.002
284  23.67     0.07      0.015       (  0.172)       0.014        0.002
285  23.75     0.07      0.015       (  0.172)       0.014        0.002
286  23.83     0.07      0.015       (  0.172)       0.014        0.002
287  23.92     0.07      0.015       (  0.172)       0.014        0.002
288  24.00     0.07      0.015       (  0.172)       0.014        0.002
            (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     2.3
      Flood volume = Effective rainfall      0.19(In)
       times area       2.9(Ac.)/[(In)/(Ft.)] =       0.0(Ac.Ft)
      Total soil loss =      1.71(In)
      Total soil loss =     0.410(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =        1986.3 Cubic Feet
      Total soil loss =       17876.9 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.075(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       0.0000      0.00  Q         |         |         |         |
   0+15       0.0001      0.00  Q         |         |         |         |
   0+20       0.0001      0.01  Q         |         |         |         |
   0+25       0.0002      0.01  Q         |         |         |         |
   0+30       0.0002      0.01  Q         |         |         |         |
   0+35       0.0002      0.01  Q         |         |         |         |
   0+40       0.0003      0.01  Q         |         |         |         |
   0+45       0.0003      0.01  Q         |         |         |         |
   0+50       0.0004      0.01  Q         |         |         |         |
   0+55       0.0004      0.01  Q         |         |         |         |
   1+ 0       0.0005      0.01  Q         |         |         |         |
   1+ 5       0.0006      0.01  Q         |         |         |         |
   1+10       0.0006      0.01  Q         |         |         |         |
   1+15       0.0007      0.01  Q         |         |         |         |
   1+20       0.0007      0.01  Q         |         |         |         |
   1+25       0.0007      0.01  Q         |         |         |         |
   1+30       0.0008      0.01  Q         |         |         |         |
   1+35       0.0008      0.01  Q         |         |         |         |
   1+40       0.0009      0.01  Q         |         |         |         |
   1+45       0.0009      0.01  Q         |         |         |         |
   1+50       0.0010      0.01  Q         |         |         |         |
   1+55       0.0010      0.01  Q         |         |         |         |
   2+ 0       0.0011      0.01  Q         |         |         |         |
   2+ 5       0.0012      0.01  QV        |         |         |         |
```

2+10	0.0012	0.01	QV	|	|	|	|
2+15	0.0013	0.01	QV	|	|	|	|
2+20	0.0013	0.01	QV	|	|	|	|
2+25	0.0014	0.01	QV	|	|	|	|
2+30	0.0015	0.01	QV	|	|	|	|
2+35	0.0015	0.01	QV	|	|	|	|
2+40	0.0016	0.01	QV	|	|	|	|
2+45	0.0017	0.01	QV	|	|	|	|
2+50	0.0018	0.01	QV	|	|	|	|
2+55	0.0018	0.01	QV	|	|	|	|
3+ 0	0.0019	0.01	QV	|	|	|	|
3+ 5	0.0020	0.01	QV	|	|	|	|
3+10	0.0021	0.01	QV	|	|	|	|
3+15	0.0021	0.01	QV	|	|	|	|
3+20	0.0022	0.01	QV	|	|	|	|
3+25	0.0023	0.01	Q V	|	|	|	|
3+30	0.0024	0.01	Q V	|	|	|	|
3+35	0.0024	0.01	Q V	|	|	|	|
3+40	0.0025	0.01	Q V	|	|	|	|
3+45	0.0026	0.01	Q V	|	|	|	|
3+50	0.0027	0.01	Q V	|	|	|	|
3+55	0.0028	0.01	Q V	|	|	|	|
4+ 0	0.0029	0.01	Q V	|	|	|	|
4+ 5	0.0029	0.01	Q V	|	|	|	|
4+10	0.0030	0.01	Q V	|	|	|	|
4+15	0.0031	0.01	Q V	|	|	|	|
4+20	0.0032	0.01	Q V	|	|	|	|
4+25	0.0033	0.02	Q V	|	|	|	|
4+30	0.0034	0.02	Q V	|	|	|	|
4+35	0.0035	0.02	Q V	|	|	|	|
4+40	0.0036	0.02	Q V	|	|	|	|
4+45	0.0038	0.02	Q V	|	|	|	|
4+50	0.0039	0.02	Q V	|	|	|	|
4+55	0.0040	0.02	Q V	|	|	|	|
5+ 0	0.0041	0.02	Q V	|	|	|	|
5+ 5	0.0042	0.02	Q V	|	|	|	|
5+10	0.0043	0.01	Q V	|	|	|	|
5+15	0.0044	0.01	Q V	|	|	|	|
5+20	0.0045	0.01	Q V	|	|	|	|
5+25	0.0046	0.02	Q V	|	|	|	|
5+30	0.0047	0.02	Q V	|	|	|	|
5+35	0.0048	0.02	Q V	|	|	|	|
5+40	0.0049	0.02	Q V	|	|	|	|
5+45	0.0051	0.02	Q V	|	|	|	|
5+50	0.0052	0.02	Q V	|	|	|	|
5+55	0.0053	0.02	Q V	|	|	|	|
6+ 0	0.0054	0.02	Q V	|	|	|	|
6+ 5	0.0056	0.02	Q V	|	|	|	|
6+10	0.0057	0.02	Q V	|	|	|	|
6+15	0.0058	0.02	Q V	|	|	|	|
6+20	0.0060	0.02	Q V	|	|	|	|
6+25	0.0061	0.02	Q V	|	|	|	|
6+30	0.0062	0.02	Q V	|	|	|	|
6+35	0.0064	0.02	Q V	|	|	|	|
6+40	0.0065	0.02	Q V	|	|	|	|
6+45	0.0067	0.02	Q V	|	|	|	|
6+50	0.0068	0.02	Q V	|	|	|	|
6+55	0.0070	0.02	Q V	|	|	|	|
7+ 0	0.0071	0.02	Q V	|	|	|	|
7+ 5	0.0073	0.02	Q V	|	|	|	|
7+10	0.0074	0.02	Q V	|	|	|	|
7+15	0.0076	0.02	Q V	|	|	|	|
7+20	0.0078	0.02	Q V	|	|	|	|

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 7+25       0.0079      0.02  Q     V   |          |          |          |
 7+30       0.0081      0.02  Q      V  |          |          |          |
 7+35       0.0083      0.03  Q      V  |          |          |          |
 7+40       0.0084      0.03  Q      V  |          |          |          |
 7+45       0.0086      0.03  Q      V  |          |          |          |
 7+50       0.0088      0.03  Q      V  |          |          |          |
 7+55       0.0090      0.03  Q      V  |          |          |          |
 8+ 0       0.0092      0.03  Q       V |          |          |          |
 8+ 5       0.0094      0.03  Q       V |          |          |          |
 8+10       0.0096      0.03  Q       V |          |          |          |
 8+15       0.0099      0.03  Q       V |          |          |          |
 8+20       0.0101      0.03  Q       V |          |          |          |
 8+25       0.0103      0.03  Q        V|          |          |          |
 8+30       0.0106      0.03  Q        V|          |          |          |
 8+35       0.0108      0.03  Q        V|          |          |          |
 8+40       0.0110      0.04  Q        V|          |          |          |
 8+45       0.0113      0.04  Q        V|          |          |          |
 8+50       0.0115      0.04  Q         V          |          |          |
 8+55       0.0118      0.04  Q         V          |          |          |
 9+ 0       0.0120      0.04  Q         V          |          |          |
 9+ 5       0.0123      0.04  Q         V          |          |          |
 9+10       0.0126      0.04  Q         |V         |          |          |
 9+15       0.0129      0.04  Q         |V         |          |          |
 9+20       0.0132      0.04  Q         |V         |          |          |
 9+25       0.0135      0.04  Q         |V         |          |          |
 9+30       0.0138      0.04  Q         | V        |          |          |
 9+35       0.0141      0.05  Q         | V        |          |          |
 9+40       0.0144      0.05  Q         | V        |          |          |
 9+45       0.0147      0.05  Q         | V        |          |          |
 9+50       0.0151      0.05  Q         |  V       |          |          |
 9+55       0.0154      0.05  Q         |  V       |          |          |
10+ 0       0.0157      0.05  Q         |  V       |          |          |
10+ 5       0.0160      0.04  Q         |   V      |          |          |
10+10       0.0162      0.03  Q         |   V      |          |          |
10+15       0.0165      0.03  Q         |   V      |          |          |
10+20       0.0167      0.03  Q         |   V      |          |          |
10+25       0.0169      0.03  Q         |   V      |          |          |
10+30       0.0172      0.03  Q         |    V     |          |          |
10+35       0.0174      0.04  Q         |    V     |          |          |
10+40       0.0177      0.04  Q         |    V     |          |          |
10+45       0.0180      0.04  Q         |    V     |          |          |
10+50       0.0183      0.04  Q         |     V    |          |          |
10+55       0.0186      0.04  Q         |     V    |          |          |
11+ 0       0.0189      0.04  Q         |     V    |          |          |
11+ 5       0.0192      0.04  Q         |     V    |          |          |
11+10       0.0195      0.04  Q         |      V   |          |          |
11+15       0.0198      0.04  Q         |      V   |          |          |
11+20       0.0201      0.04  Q         |      V   |          |          |
11+25       0.0204      0.04  Q         |      V   |          |          |
11+30       0.0207      0.04  Q         |       V  |          |          |
11+35       0.0210      0.04  Q         |       V  |          |          |
11+40       0.0212      0.04  Q         |       V  |          |          |
11+45       0.0215      0.04  Q         |       V  |          |          |
11+50       0.0217      0.04  Q         |        V|          |          |
11+55       0.0220      0.04  Q         |        V|          |          |
12+ 0       0.0223      0.04  Q         |        V|          |          |
12+ 5       0.0226      0.05  Q         |        V|          |          |
12+10       0.0230      0.05  Q         |         V          |          |
12+15       0.0234      0.05  Q         |         V          |          |
12+20       0.0237      0.06  Q         |         V          |          |
12+25       0.0241      0.06  Q         |         |V         |          |
12+30       0.0245      0.06  Q         |         |V         |          |
12+35       0.0249      0.06  Q         |         |V         |          |
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12+40       0.0254      0.06  Q         |          | V       |          |
12+45       0.0258      0.06  Q         |          | V       |          |
12+50       0.0262      0.06  Q         |          | V       |          |
12+55       0.0267      0.06  Q         |          |  V      |          |
13+ 0       0.0271      0.06  Q         |          |  V      |          |
13+ 5       0.0276      0.07  Q         |          |   V     |          |
13+10       0.0281      0.07  Q         |          |   V     |          |
13+15       0.0286      0.07  Q         |          |    V    |          |
13+20       0.0291      0.08  Q         |          |    V    |          |
13+25       0.0296      0.08  Q         |          |    V    |          |
13+30       0.0301      0.08  Q         |          |     V   |          |
13+35       0.0306      0.06  Q         |          |     V   |          |
13+40       0.0310      0.05  Q         |          |      V  |          |
13+45       0.0313      0.05  Q         |          |      V  |          |
13+50       0.0317      0.05  Q         |          |      V  |          |
13+55       0.0320      0.05  Q         |          |       V |          |
14+ 0       0.0324      0.05  Q         |          |       V |          |
14+ 5       0.0327      0.05  Q         |          |       V |          |
14+10       0.0331      0.06  Q         |          |        V|          |
14+15       0.0335      0.06  Q         |          |        V|          |
14+20       0.0339      0.06  Q         |          |        V|          |
14+25       0.0343      0.06  Q         |          |         V          |
14+30       0.0347      0.06  Q         |          |         V          |
14+35       0.0351      0.06  Q         |          |         V          |
14+40       0.0355      0.06  Q         |          |         |V         |
14+45       0.0359      0.06  Q         |          |         |V         |
14+50       0.0363      0.06  Q         |          |         |V         |
14+55       0.0367      0.06  Q         |          |         | V        |
15+ 0       0.0371      0.06  Q         |          |         | V        |
15+ 5       0.0374      0.05  Q         |          |         | V        |
15+10       0.0378      0.05  Q         |          |         |  V       |
15+15       0.0382      0.05  Q         |          |         |  V       |
15+20       0.0385      0.05  Q         |          |         |  V       |
15+25       0.0389      0.05  Q         |          |         |   V      |
15+30       0.0392      0.05  Q         |          |         |   V      |
15+35       0.0396      0.05  Q         |          |         |   V      |
15+40       0.0399      0.04  Q         |          |         |   V      |
15+45       0.0402      0.04  Q         |          |         |    V     |
15+50       0.0404      0.04  Q         |          |         |    V     |
15+55       0.0407      0.04  Q         |          |         |    V     |
16+ 0       0.0410      0.04  Q         |          |         |    V     |
16+ 5       0.0412      0.03  Q         |          |         |     V    |
16+10       0.0413      0.01  Q         |          |         |     V    |
16+15       0.0414      0.01  Q         |          |         |     V    |
16+20       0.0414      0.01  Q         |          |         |     V    |
16+25       0.0415      0.01  Q         |          |         |     V    |
16+30       0.0415      0.01  Q         |          |         |     V    |
16+35       0.0416      0.01  Q         |          |         |     V    |
16+40       0.0416      0.01  Q         |          |         |     V    |
16+45       0.0417      0.01  Q         |          |         |     V    |
16+50       0.0417      0.01  Q         |          |         |     V    |
16+55       0.0418      0.01  Q         |          |         |     V    |
17+ 0       0.0418      0.01  Q         |          |         |     V    |
17+ 5       0.0419      0.01  Q         |          |         |     V    |
17+10       0.0420      0.01  Q         |          |         |     V    |
17+15       0.0420      0.01  Q         |          |         |     V    |
17+20       0.0421      0.01  Q         |          |         |     V    |
17+25       0.0422      0.01  Q         |          |         |      V   |
17+30       0.0423      0.01  Q         |          |         |      V   |
17+35       0.0423      0.01  Q         |          |         |      V   |
17+40       0.0424      0.01  Q         |          |         |      V   |
17+45       0.0425      0.01  Q         |          |         |      V   |
17+50       0.0426      0.01  Q         |          |         |      V   |
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17+55	0.0426	0.01	Q	|	|	|	V |
18+ 0	0.0427	0.01	Q	|	|	|	V |
18+ 5	0.0427	0.01	Q	|	|	|	V |
18+10	0.0428	0.01	Q	|	|	|	V |
18+15	0.0429	0.01	Q	|	|	|	V |
18+20	0.0429	0.01	Q	|	|	|	V |
18+25	0.0430	0.01	Q	|	|	|	V |
18+30	0.0430	0.01	Q	|	|	|	V |
18+35	0.0431	0.01	Q	|	|	|	V |
18+40	0.0431	0.01	Q	|	|	|	V |
18+45	0.0432	0.01	Q	|	|	|	V |
18+50	0.0432	0.01	Q	|	|	|	V |
18+55	0.0433	0.00	Q	|	|	|	V |
19+ 0	0.0433	0.00	Q	|	|	|	V |
19+ 5	0.0433	0.01	Q	|	|	|	V |
19+10	0.0434	0.01	Q	|	|	|	V |
19+15	0.0434	0.01	Q	|	|	|	V |
19+20	0.0435	0.01	Q	|	|	|	V |
19+25	0.0435	0.01	Q	|	|	|	V |
19+30	0.0436	0.01	Q	|	|	|	V |
19+35	0.0436	0.01	Q	|	|	|	V |
19+40	0.0437	0.01	Q	|	|	|	V |
19+45	0.0437	0.01	Q	|	|	|	V |
19+50	0.0438	0.01	Q	|	|	|	V |
19+55	0.0438	0.00	Q	|	|	|	V |
20+ 0	0.0438	0.00	Q	|	|	|	V |
20+ 5	0.0439	0.01	Q	|	|	|	V |
20+10	0.0439	0.01	Q	|	|	|	V |
20+15	0.0440	0.01	Q	|	|	|	V |
20+20	0.0440	0.01	Q	|	|	|	V |
20+25	0.0441	0.01	Q	|	|	|	V |
20+30	0.0441	0.01	Q	|	|	|	V |
20+35	0.0442	0.01	Q	|	|	|	V |
20+40	0.0442	0.01	Q	|	|	|	V |
20+45	0.0442	0.01	Q	|	|	|	V |
20+50	0.0443	0.01	Q	|	|	|	V |
20+55	0.0443	0.00	Q	|	|	|	V |
21+ 0	0.0443	0.00	Q	|	|	|	V |
21+ 5	0.0444	0.01	Q	|	|	|	V |
21+10	0.0444	0.01	Q	|	|	|	V |
21+15	0.0445	0.01	Q	|	|	|	V|
21+20	0.0445	0.01	Q	|	|	|	V|
21+25	0.0445	0.00	Q	|	|	|	V|
21+30	0.0446	0.00	Q	|	|	|	V|
21+35	0.0446	0.01	Q	|	|	|	V|
21+40	0.0447	0.01	Q	|	|	|	V|
21+45	0.0447	0.01	Q	|	|	|	V|
21+50	0.0447	0.01	Q	|	|	|	V|
21+55	0.0448	0.00	Q	|	|	|	V|
22+ 0	0.0448	0.00	Q	|	|	|	V|
22+ 5	0.0448	0.01	Q	|	|	|	V|
22+10	0.0449	0.01	Q	|	|	|	V|
22+15	0.0449	0.01	Q	|	|	|	V|
22+20	0.0450	0.01	Q	|	|	|	V|
22+25	0.0450	0.00	Q	|	|	|	V|
22+30	0.0450	0.00	Q	|	|	|	V|
22+35	0.0451	0.00	Q	|	|	|	V|
22+40	0.0451	0.00	Q	|	|	|	V|
22+45	0.0451	0.00	Q	|	|	|	V|
22+50	0.0452	0.00	Q	|	|	|	V|
22+55	0.0452	0.00	Q	|	|	|	V|
23+ 0	0.0452	0.00	Q	|	|	|	V|
23+ 5	0.0452	0.00	Q	|	|	|	V|

23+10	0.0453	0.00	Q	|	|	|	V|
23+15	0.0453	0.00	Q	|	|	|	V|
23+20	0.0453	0.00	Q	|	|	|	V|
23+25	0.0454	0.00	Q	|	|	|	V|
23+30	0.0454	0.00	Q	|	|	|	V|
23+35	0.0454	0.00	Q	|	|	|	V|
23+40	0.0455	0.00	Q	|	|	|	V|
23+45	0.0455	0.00	Q	|	|	|	V|
23+50	0.0455	0.00	Q	|	|	|	V|
23+55	0.0455	0.00	Q	|	|	|	V|
24+ 0	0.0456	0.00	Q	|	|	|	V|
24+ 5	0.0456	0.00	Q	|	|	|	V|
24+10	0.0456	0.00	Q	|	|	|	V|
24+15	0.0456	0.00	Q	|	|	|	V|

EXHIBIT

INDEPENDENT PLAZA
POST-DEVELOPED CONDITIONS
UNIT HYDROGRAPH MAP

WINCHESTER ASSOCIATES, INC. APRIL 2021

N

NOT TO SCALE

10
1799

20
1784

CENTROID

HYDROLOGY AREA
POST-DEVELOPED
A= 2.88 AC
L= 750'; Lc= 410'
Δ ELEV= 15'
AVERAGE "N"= 0.015
LOW LOSS RATE= 0.27
Imp= 79%; RI= 56

OFFSITE DEDICATION REQUIRED

7' VACATION

LEGEND:

DRAINAGE AREA BOUNDARY

NODE
ELEV

C:\Users\mariela anguelov\Documents\WAI-Jobs\863 Chandresh\04 PRELIMINARY DESIGN\HH\P-HH\01 HYDRO DWGs\863-UH-POST-int.dwg 4/14/21

Post-developed conditions
2 year 24 hour

U n i t H y d r o g r a p h A n a l y s i s

Study date 04/14/21 File: 863postwq242.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6311

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Independent Plaza, MoVal (APN 488-310-012)
Post-developed conditions
2 year
(Job 863)

Drainage Area = 2.88(Ac.) = 0.004 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.88(Ac.) = 0.004 Sq. Mi.
Length along longest watercourse = 750.00(Ft.)
Length along longest watercourse measured to centroid = 410.00(Ft.)
Length along longest watercourse = 0.142 Mi.
Length along longest watercourse measured to centroid = 0.078 Mi.
Difference in elevation = 15.00(Ft.)
Slope along watercourse = 105.6000 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.027 Hr.
Lag time = 1.61 Min.
25% of lag time = 0.40 Min.
40% of lag time = 0.64 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]
2.88	1.90	5.47

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.88	4.50	12.96

STORM EVENT (YEAR) = 2.00

Area Averaged 2-Year Rainfall = 1.900(In)
Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.880	56.00	0.790

Total Area Entered = 2.88(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	0.790	0.204	1.000	0.204
					Sum (F) =	0.204

Area averaged mean soil loss (F) (In/Hr) = 0.204
Minimum soil loss rate ((In/Hr)) = 0.102
(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
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	311.052	57.787	1.677
2	0.167	622.104	36.528	1.060
3	0.250	933.156	5.685	0.165
			Sum = 100.000 Sum=	2.902

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	0.015	(0.362)	0.004	0.011
2	0.17	0.07	0.015	(0.360)	0.004	0.011
3	0.25	0.07	0.015	(0.359)	0.004	0.011
4	0.33	0.10	0.023	(0.358)	0.006	0.017
5	0.42	0.10	0.023	(0.356)	0.006	0.017
6	0.50	0.10	0.023	(0.355)	0.006	0.017
7	0.58	0.10	0.023	(0.353)	0.006	0.017
8	0.67	0.10	0.023	(0.352)	0.006	0.017
9	0.75	0.10	0.023	(0.351)	0.006	0.017
10	0.83	0.13	0.030	(0.349)	0.008	0.022
11	0.92	0.13	0.030	(0.348)	0.008	0.022
12	1.00	0.13	0.030	(0.346)	0.008	0.022
13	1.08	0.10	0.023	(0.345)	0.006	0.017
14	1.17	0.10	0.023	(0.344)	0.006	0.017
15	1.25	0.10	0.023	(0.342)	0.006	0.017
16	1.33	0.10	0.023	(0.341)	0.006	0.017
17	1.42	0.10	0.023	(0.340)	0.006	0.017
18	1.50	0.10	0.023	(0.338)	0.006	0.017
19	1.58	0.10	0.023	(0.337)	0.006	0.017
20	1.67	0.10	0.023	(0.336)	0.006	0.017

21	1.75	0.10	0.023	(0.334)	0.006	0.017
22	1.83	0.13	0.030	(0.333)	0.008	0.022
23	1.92	0.13	0.030	(0.332)	0.008	0.022
24	2.00	0.13	0.030	(0.330)	0.008	0.022
25	2.08	0.13	0.030	(0.329)	0.008	0.022
26	2.17	0.13	0.030	(0.328)	0.008	0.022
27	2.25	0.13	0.030	(0.326)	0.008	0.022
28	2.33	0.13	0.030	(0.325)	0.008	0.022
29	2.42	0.13	0.030	(0.324)	0.008	0.022
30	2.50	0.13	0.030	(0.322)	0.008	0.022
31	2.58	0.17	0.038	(0.321)	0.010	0.028
32	2.67	0.17	0.038	(0.320)	0.010	0.028
33	2.75	0.17	0.038	(0.318)	0.010	0.028
34	2.83	0.17	0.038	(0.317)	0.010	0.028
35	2.92	0.17	0.038	(0.316)	0.010	0.028
36	3.00	0.17	0.038	(0.314)	0.010	0.028
37	3.08	0.17	0.038	(0.313)	0.010	0.028
38	3.17	0.17	0.038	(0.312)	0.010	0.028
39	3.25	0.17	0.038	(0.310)	0.010	0.028
40	3.33	0.17	0.038	(0.309)	0.010	0.028
41	3.42	0.17	0.038	(0.308)	0.010	0.028
42	3.50	0.17	0.038	(0.307)	0.010	0.028
43	3.58	0.17	0.038	(0.305)	0.010	0.028
44	3.67	0.17	0.038	(0.304)	0.010	0.028
45	3.75	0.17	0.038	(0.303)	0.010	0.028
46	3.83	0.20	0.046	(0.301)	0.012	0.033
47	3.92	0.20	0.046	(0.300)	0.012	0.033
48	4.00	0.20	0.046	(0.299)	0.012	0.033
49	4.08	0.20	0.046	(0.298)	0.012	0.033
50	4.17	0.20	0.046	(0.296)	0.012	0.033
51	4.25	0.20	0.046	(0.295)	0.012	0.033
52	4.33	0.23	0.053	(0.294)	0.014	0.039
53	4.42	0.23	0.053	(0.293)	0.014	0.039
54	4.50	0.23	0.053	(0.291)	0.014	0.039
55	4.58	0.23	0.053	(0.290)	0.014	0.039
56	4.67	0.23	0.053	(0.289)	0.014	0.039
57	4.75	0.23	0.053	(0.288)	0.014	0.039
58	4.83	0.27	0.061	(0.286)	0.016	0.044
59	4.92	0.27	0.061	(0.285)	0.016	0.044
60	5.00	0.27	0.061	(0.284)	0.016	0.044
61	5.08	0.20	0.046	(0.283)	0.012	0.033
62	5.17	0.20	0.046	(0.281)	0.012	0.033
63	5.25	0.20	0.046	(0.280)	0.012	0.033
64	5.33	0.23	0.053	(0.279)	0.014	0.039
65	5.42	0.23	0.053	(0.278)	0.014	0.039
66	5.50	0.23	0.053	(0.277)	0.014	0.039
67	5.58	0.27	0.061	(0.275)	0.016	0.044
68	5.67	0.27	0.061	(0.274)	0.016	0.044
69	5.75	0.27	0.061	(0.273)	0.016	0.044
70	5.83	0.27	0.061	(0.272)	0.016	0.044
71	5.92	0.27	0.061	(0.271)	0.016	0.044
72	6.00	0.27	0.061	(0.269)	0.016	0.044
73	6.08	0.30	0.068	(0.268)	0.018	0.050
74	6.17	0.30	0.068	(0.267)	0.018	0.050
75	6.25	0.30	0.068	(0.266)	0.018	0.050
76	6.33	0.30	0.068	(0.265)	0.018	0.050
77	6.42	0.30	0.068	(0.263)	0.018	0.050
78	6.50	0.30	0.068	(0.262)	0.018	0.050
79	6.58	0.33	0.076	(0.261)	0.021	0.055
80	6.67	0.33	0.076	(0.260)	0.021	0.055
81	6.75	0.33	0.076	(0.259)	0.021	0.055
82	6.83	0.33	0.076	(0.257)	0.021	0.055
83	6.92	0.33	0.076	(0.256)	0.021	0.055

84	7.00	0.33	0.076	(0.255)	0.021	0.055
85	7.08	0.33	0.076	(0.254)	0.021	0.055
86	7.17	0.33	0.076	(0.253)	0.021	0.055
87	7.25	0.33	0.076	(0.252)	0.021	0.055
88	7.33	0.37	0.084	(0.251)	0.023	0.061
89	7.42	0.37	0.084	(0.249)	0.023	0.061
90	7.50	0.37	0.084	(0.248)	0.023	0.061
91	7.58	0.40	0.091	(0.247)	0.025	0.067
92	7.67	0.40	0.091	(0.246)	0.025	0.067
93	7.75	0.40	0.091	(0.245)	0.025	0.067
94	7.83	0.43	0.099	(0.244)	0.027	0.072
95	7.92	0.43	0.099	(0.243)	0.027	0.072
96	8.00	0.43	0.099	(0.241)	0.027	0.072
97	8.08	0.50	0.114	(0.240)	0.031	0.083
98	8.17	0.50	0.114	(0.239)	0.031	0.083
99	8.25	0.50	0.114	(0.238)	0.031	0.083
100	8.33	0.50	0.114	(0.237)	0.031	0.083
101	8.42	0.50	0.114	(0.236)	0.031	0.083
102	8.50	0.50	0.114	(0.235)	0.031	0.083
103	8.58	0.53	0.122	(0.234)	0.033	0.089
104	8.67	0.53	0.122	(0.233)	0.033	0.089
105	8.75	0.53	0.122	(0.231)	0.033	0.089
106	8.83	0.57	0.129	(0.230)	0.035	0.094
107	8.92	0.57	0.129	(0.229)	0.035	0.094
108	9.00	0.57	0.129	(0.228)	0.035	0.094
109	9.08	0.63	0.144	(0.227)	0.039	0.105
110	9.17	0.63	0.144	(0.226)	0.039	0.105
111	9.25	0.63	0.144	(0.225)	0.039	0.105
112	9.33	0.67	0.152	(0.224)	0.041	0.111
113	9.42	0.67	0.152	(0.223)	0.041	0.111
114	9.50	0.67	0.152	(0.222)	0.041	0.111
115	9.58	0.70	0.160	(0.221)	0.043	0.117
116	9.67	0.70	0.160	(0.220)	0.043	0.117
117	9.75	0.70	0.160	(0.219)	0.043	0.117
118	9.83	0.73	0.167	(0.218)	0.045	0.122
119	9.92	0.73	0.167	(0.217)	0.045	0.122
120	10.00	0.73	0.167	(0.215)	0.045	0.122
121	10.08	0.50	0.114	(0.214)	0.031	0.083
122	10.17	0.50	0.114	(0.213)	0.031	0.083
123	10.25	0.50	0.114	(0.212)	0.031	0.083
124	10.33	0.50	0.114	(0.211)	0.031	0.083
125	10.42	0.50	0.114	(0.210)	0.031	0.083
126	10.50	0.50	0.114	(0.209)	0.031	0.083
127	10.58	0.67	0.152	(0.208)	0.041	0.111
128	10.67	0.67	0.152	(0.207)	0.041	0.111
129	10.75	0.67	0.152	(0.206)	0.041	0.111
130	10.83	0.67	0.152	(0.205)	0.041	0.111
131	10.92	0.67	0.152	(0.204)	0.041	0.111
132	11.00	0.67	0.152	(0.203)	0.041	0.111
133	11.08	0.63	0.144	(0.202)	0.039	0.105
134	11.17	0.63	0.144	(0.201)	0.039	0.105
135	11.25	0.63	0.144	(0.200)	0.039	0.105
136	11.33	0.63	0.144	(0.199)	0.039	0.105
137	11.42	0.63	0.144	(0.198)	0.039	0.105
138	11.50	0.63	0.144	(0.197)	0.039	0.105
139	11.58	0.57	0.129	(0.196)	0.035	0.094
140	11.67	0.57	0.129	(0.195)	0.035	0.094
141	11.75	0.57	0.129	(0.194)	0.035	0.094
142	11.83	0.60	0.137	(0.193)	0.037	0.100
143	11.92	0.60	0.137	(0.192)	0.037	0.100
144	12.00	0.60	0.137	(0.191)	0.037	0.100
145	12.08	0.83	0.190	(0.190)	0.051	0.139
146	12.17	0.83	0.190	(0.190)	0.051	0.139

147	12.25	0.83	0.190	(0.189)	0.051	0.139
148	12.33	0.87	0.198	(0.188)	0.053	0.144
149	12.42	0.87	0.198	(0.187)	0.053	0.144
150	12.50	0.87	0.198	(0.186)	0.053	0.144
151	12.58	0.93	0.213	(0.185)	0.057	0.155
152	12.67	0.93	0.213	(0.184)	0.057	0.155
153	12.75	0.93	0.213	(0.183)	0.057	0.155
154	12.83	0.97	0.220	(0.182)	0.060	0.161
155	12.92	0.97	0.220	(0.181)	0.060	0.161
156	13.00	0.97	0.220	(0.180)	0.060	0.161
157	13.08	1.13	0.258	(0.179)	0.070	0.189
158	13.17	1.13	0.258	(0.178)	0.070	0.189
159	13.25	1.13	0.258	(0.177)	0.070	0.189
160	13.33	1.13	0.258	(0.177)	0.070	0.189
161	13.42	1.13	0.258	(0.176)	0.070	0.189
162	13.50	1.13	0.258	(0.175)	0.070	0.189
163	13.58	0.77	0.175	(0.174)	0.047	0.128
164	13.67	0.77	0.175	(0.173)	0.047	0.128
165	13.75	0.77	0.175	(0.172)	0.047	0.128
166	13.83	0.77	0.175	(0.171)	0.047	0.128
167	13.92	0.77	0.175	(0.170)	0.047	0.128
168	14.00	0.77	0.175	(0.169)	0.047	0.128
169	14.08	0.90	0.205	(0.169)	0.055	0.150
170	14.17	0.90	0.205	(0.168)	0.055	0.150
171	14.25	0.90	0.205	(0.167)	0.055	0.150
172	14.33	0.87	0.198	(0.166)	0.053	0.144
173	14.42	0.87	0.198	(0.165)	0.053	0.144
174	14.50	0.87	0.198	(0.164)	0.053	0.144
175	14.58	0.87	0.198	(0.164)	0.053	0.144
176	14.67	0.87	0.198	(0.163)	0.053	0.144
177	14.75	0.87	0.198	(0.162)	0.053	0.144
178	14.83	0.83	0.190	(0.161)	0.051	0.139
179	14.92	0.83	0.190	(0.160)	0.051	0.139
180	15.00	0.83	0.190	(0.159)	0.051	0.139
181	15.08	0.80	0.182	(0.159)	0.049	0.133
182	15.17	0.80	0.182	(0.158)	0.049	0.133
183	15.25	0.80	0.182	(0.157)	0.049	0.133
184	15.33	0.77	0.175	(0.156)	0.047	0.128
185	15.42	0.77	0.175	(0.155)	0.047	0.128
186	15.50	0.77	0.175	(0.155)	0.047	0.128
187	15.58	0.63	0.144	(0.154)	0.039	0.105
188	15.67	0.63	0.144	(0.153)	0.039	0.105
189	15.75	0.63	0.144	(0.152)	0.039	0.105
190	15.83	0.63	0.144	(0.151)	0.039	0.105
191	15.92	0.63	0.144	(0.151)	0.039	0.105
192	16.00	0.63	0.144	(0.150)	0.039	0.105
193	16.08	0.13	0.030	(0.149)	0.008	0.022
194	16.17	0.13	0.030	(0.148)	0.008	0.022
195	16.25	0.13	0.030	(0.148)	0.008	0.022
196	16.33	0.13	0.030	(0.147)	0.008	0.022
197	16.42	0.13	0.030	(0.146)	0.008	0.022
198	16.50	0.13	0.030	(0.145)	0.008	0.022
199	16.58	0.10	0.023	(0.145)	0.006	0.017
200	16.67	0.10	0.023	(0.144)	0.006	0.017
201	16.75	0.10	0.023	(0.143)	0.006	0.017
202	16.83	0.10	0.023	(0.142)	0.006	0.017
203	16.92	0.10	0.023	(0.142)	0.006	0.017
204	17.00	0.10	0.023	(0.141)	0.006	0.017
205	17.08	0.17	0.038	(0.140)	0.010	0.028
206	17.17	0.17	0.038	(0.140)	0.010	0.028
207	17.25	0.17	0.038	(0.139)	0.010	0.028
208	17.33	0.17	0.038	(0.138)	0.010	0.028
209	17.42	0.17	0.038	(0.137)	0.010	0.028

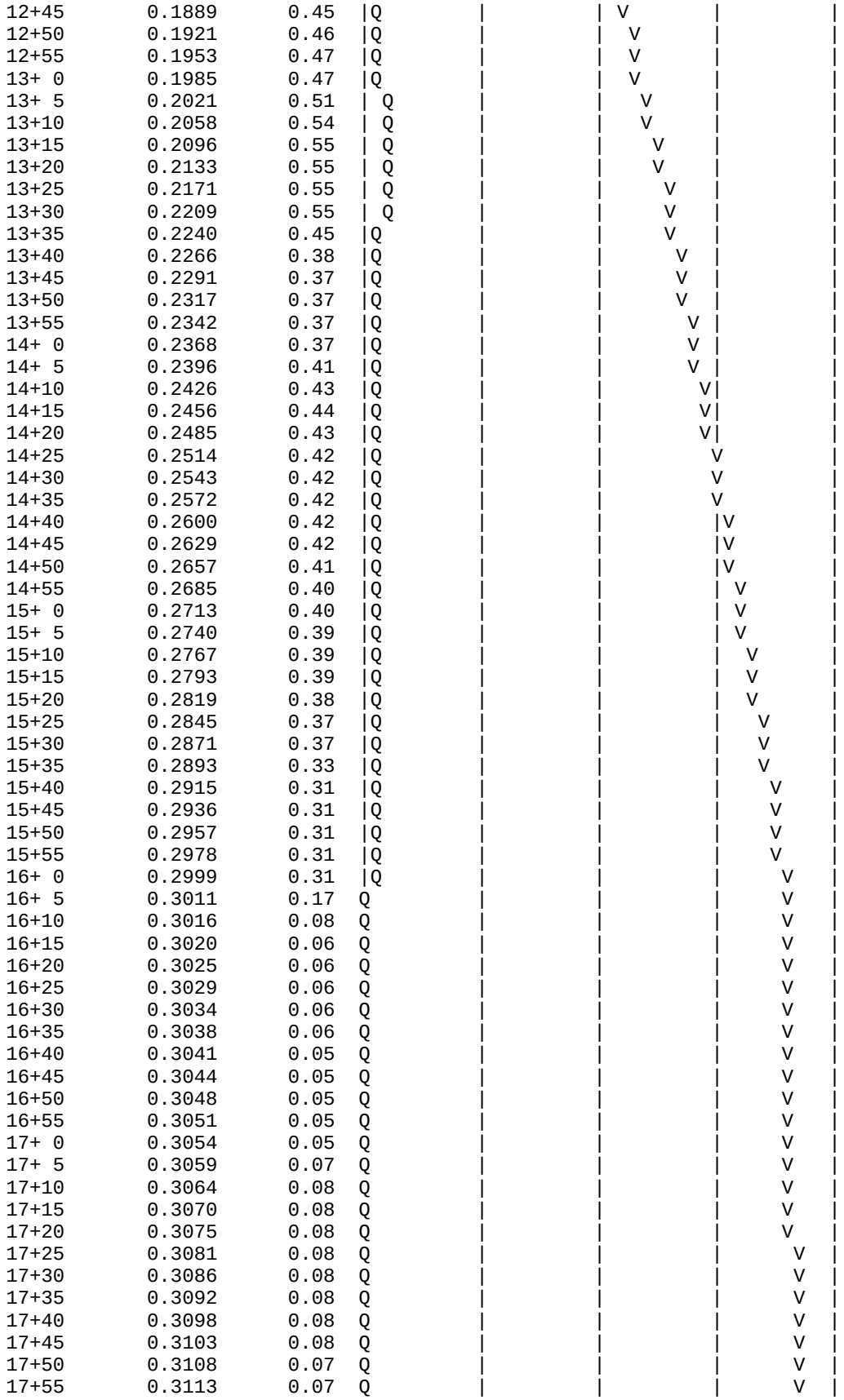
210	17.50	0.17	0.038	(0.137)	0.010	0.028
211	17.58	0.17	0.038	(0.136)	0.010	0.028
212	17.67	0.17	0.038	(0.135)	0.010	0.028
213	17.75	0.17	0.038	(0.135)	0.010	0.028
214	17.83	0.13	0.030	(0.134)	0.008	0.022
215	17.92	0.13	0.030	(0.133)	0.008	0.022
216	18.00	0.13	0.030	(0.133)	0.008	0.022
217	18.08	0.13	0.030	(0.132)	0.008	0.022
218	18.17	0.13	0.030	(0.131)	0.008	0.022
219	18.25	0.13	0.030	(0.131)	0.008	0.022
220	18.33	0.13	0.030	(0.130)	0.008	0.022
221	18.42	0.13	0.030	(0.129)	0.008	0.022
222	18.50	0.13	0.030	(0.129)	0.008	0.022
223	18.58	0.10	0.023	(0.128)	0.006	0.017
224	18.67	0.10	0.023	(0.128)	0.006	0.017
225	18.75	0.10	0.023	(0.127)	0.006	0.017
226	18.83	0.07	0.015	(0.126)	0.004	0.011
227	18.92	0.07	0.015	(0.126)	0.004	0.011
228	19.00	0.07	0.015	(0.125)	0.004	0.011
229	19.08	0.10	0.023	(0.125)	0.006	0.017
230	19.17	0.10	0.023	(0.124)	0.006	0.017
231	19.25	0.10	0.023	(0.123)	0.006	0.017
232	19.33	0.13	0.030	(0.123)	0.008	0.022
233	19.42	0.13	0.030	(0.122)	0.008	0.022
234	19.50	0.13	0.030	(0.122)	0.008	0.022
235	19.58	0.10	0.023	(0.121)	0.006	0.017
236	19.67	0.10	0.023	(0.121)	0.006	0.017
237	19.75	0.10	0.023	(0.120)	0.006	0.017
238	19.83	0.07	0.015	(0.120)	0.004	0.011
239	19.92	0.07	0.015	(0.119)	0.004	0.011
240	20.00	0.07	0.015	(0.118)	0.004	0.011
241	20.08	0.10	0.023	(0.118)	0.006	0.017
242	20.17	0.10	0.023	(0.117)	0.006	0.017
243	20.25	0.10	0.023	(0.117)	0.006	0.017
244	20.33	0.10	0.023	(0.116)	0.006	0.017
245	20.42	0.10	0.023	(0.116)	0.006	0.017
246	20.50	0.10	0.023	(0.115)	0.006	0.017
247	20.58	0.10	0.023	(0.115)	0.006	0.017
248	20.67	0.10	0.023	(0.114)	0.006	0.017
249	20.75	0.10	0.023	(0.114)	0.006	0.017
250	20.83	0.07	0.015	(0.114)	0.004	0.011
251	20.92	0.07	0.015	(0.113)	0.004	0.011
252	21.00	0.07	0.015	(0.113)	0.004	0.011
253	21.08	0.10	0.023	(0.112)	0.006	0.017
254	21.17	0.10	0.023	(0.112)	0.006	0.017
255	21.25	0.10	0.023	(0.111)	0.006	0.017
256	21.33	0.07	0.015	(0.111)	0.004	0.011
257	21.42	0.07	0.015	(0.110)	0.004	0.011
258	21.50	0.07	0.015	(0.110)	0.004	0.011
259	21.58	0.10	0.023	(0.110)	0.006	0.017
260	21.67	0.10	0.023	(0.109)	0.006	0.017
261	21.75	0.10	0.023	(0.109)	0.006	0.017
262	21.83	0.07	0.015	(0.108)	0.004	0.011
263	21.92	0.07	0.015	(0.108)	0.004	0.011
264	22.00	0.07	0.015	(0.108)	0.004	0.011
265	22.08	0.10	0.023	(0.107)	0.006	0.017
266	22.17	0.10	0.023	(0.107)	0.006	0.017
267	22.25	0.10	0.023	(0.107)	0.006	0.017
268	22.33	0.07	0.015	(0.106)	0.004	0.011
269	22.42	0.07	0.015	(0.106)	0.004	0.011
270	22.50	0.07	0.015	(0.106)	0.004	0.011
271	22.58	0.07	0.015	(0.105)	0.004	0.011
272	22.67	0.07	0.015	(0.105)	0.004	0.011

```
273  22.75     0.07      0.015       (  0.105)       0.004        0.011
274  22.83     0.07      0.015       (  0.105)       0.004        0.011
275  22.92     0.07      0.015       (  0.104)       0.004        0.011
276  23.00     0.07      0.015       (  0.104)       0.004        0.011
277  23.08     0.07      0.015       (  0.104)       0.004        0.011
278  23.17     0.07      0.015       (  0.104)       0.004        0.011
279  23.25     0.07      0.015       (  0.103)       0.004        0.011
280  23.33     0.07      0.015       (  0.103)       0.004        0.011
281  23.42     0.07      0.015       (  0.103)       0.004        0.011
282  23.50     0.07      0.015       (  0.103)       0.004        0.011
283  23.58     0.07      0.015       (  0.103)       0.004        0.011
284  23.67     0.07      0.015       (  0.102)       0.004        0.011
285  23.75     0.07      0.015       (  0.102)       0.004        0.011
286  23.83     0.07      0.015       (  0.102)       0.004        0.011
287  23.92     0.07      0.015       (  0.102)       0.004        0.011
288  24.00     0.07      0.015       (  0.102)       0.004        0.011
            (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    16.6
      Flood volume = Effective rainfall      1.39(In)
       times area       2.9(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      0.51(In)
      Total soil loss =     0.123(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =       14500.2 Cubic Feet
      Total soil loss =        5363.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.548(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      0.02  Q         |         |         |         |
   0+10       0.0003      0.03  Q         |         |         |         |
   0+15       0.0006      0.03  Q         |         |         |         |
   0+20       0.0008      0.04  Q         |         |         |         |
   0+25       0.0012      0.05  Q         |         |         |         |
   0+30       0.0015      0.05  Q         |         |         |         |
   0+35       0.0018      0.05  Q         |         |         |         |
   0+40       0.0022      0.05  Q         |         |         |         |
   0+45       0.0025      0.05  Q         |         |         |         |
   0+50       0.0029      0.06  Q         |         |         |         |
   0+55       0.0033      0.06  Q         |         |         |         |
   1+ 0       0.0038      0.06  Q         |         |         |         |
   1+ 5       0.0042      0.06  Q         |         |         |         |
   1+10       0.0045      0.05  Q         |         |         |         |
   1+15       0.0048      0.05  Q         |         |         |         |
   1+20       0.0052      0.05  Q         |         |         |         |
   1+25       0.0055      0.05  Q         |         |         |         |
   1+30       0.0058      0.05  Q         |         |         |         |
   1+35       0.0062      0.05  Q         |         |         |         |
   1+40       0.0065      0.05  Q         |         |         |         |
   1+45       0.0068      0.05  Q         |         |         |         |
   1+50       0.0072      0.06  Q         |         |         |         |
   1+55       0.0077      0.06  Q         |         |         |         |
   2+ 0       0.0081      0.06  Q         |         |         |         |
   2+ 5       0.0086      0.06  QV        |         |         |         |
   2+10       0.0090      0.06  QV        |         |         |         |
```

2+15	0.0094	0.06	QV	|	|	|	|
2+20	0.0099	0.06	QV	|	|	|	|
2+25	0.0103	0.06	QV	|	|	|	|
2+30	0.0108	0.06	QV	|	|	|	|
2+35	0.0113	0.07	QV	|	|	|	|
2+40	0.0118	0.08	QV	|	|	|	|
2+45	0.0124	0.08	QV	|	|	|	|
2+50	0.0129	0.08	QV	|	|	|	|
2+55	0.0135	0.08	QV	|	|	|	|
3+ 0	0.0140	0.08	QV	|	|	|	|
3+ 5	0.0146	0.08	QV	|	|	|	|
3+10	0.0152	0.08	QV	|	|	|	|
3+15	0.0157	0.08	QV	|	|	|	|
3+20	0.0163	0.08	QV	|	|	|	|
3+25	0.0168	0.08	Q V	|	|	|	|
3+30	0.0174	0.08	Q V	|	|	|	|
3+35	0.0179	0.08	Q V	|	|	|	|
3+40	0.0185	0.08	Q V	|	|	|	|
3+45	0.0190	0.08	Q V	|	|	|	|
3+50	0.0197	0.09	Q V	|	|	|	|
3+55	0.0203	0.10	Q V	|	|	|	|
4+ 0	0.0210	0.10	Q V	|	|	|	|
4+ 5	0.0217	0.10	Q V	|	|	|	|
4+10	0.0223	0.10	Q V	|	|	|	|
4+15	0.0230	0.10	Q V	|	|	|	|
4+20	0.0237	0.11	Q V	|	|	|	|
4+25	0.0245	0.11	Q V	|	|	|	|
4+30	0.0253	0.11	Q V	|	|	|	|
4+35	0.0260	0.11	Q V	|	|	|	|
4+40	0.0268	0.11	Q V	|	|	|	|
4+45	0.0276	0.11	Q V	|	|	|	|
4+50	0.0284	0.12	Q V	|	|	|	|
4+55	0.0293	0.13	Q V	|	|	|	|
5+ 0	0.0302	0.13	Q V	|	|	|	|
5+ 5	0.0310	0.11	Q V	|	|	|	|
5+10	0.0316	0.10	Q V	|	|	|	|
5+15	0.0323	0.10	Q V	|	|	|	|
5+20	0.0330	0.11	Q V	|	|	|	|
5+25	0.0338	0.11	Q V	|	|	|	|
5+30	0.0346	0.11	Q V	|	|	|	|
5+35	0.0354	0.12	Q V	|	|	|	|
5+40	0.0363	0.13	Q V	|	|	|	|
5+45	0.0372	0.13	Q V	|	|	|	|
5+50	0.0381	0.13	Q V	|	|	|	|
5+55	0.0390	0.13	Q V	|	|	|	|
6+ 0	0.0399	0.13	Q V	|	|	|	|
6+ 5	0.0408	0.14	Q V	|	|	|	|
6+10	0.0418	0.14	Q V	|	|	|	|
6+15	0.0428	0.15	Q V	|	|	|	|
6+20	0.0438	0.15	Q V	|	|	|	|
6+25	0.0448	0.15	Q V	|	|	|	|
6+30	0.0458	0.15	Q V	|	|	|	|
6+35	0.0469	0.15	Q V	|	|	|	|
6+40	0.0480	0.16	Q V	|	|	|	|
6+45	0.0491	0.16	Q V	|	|	|	|
6+50	0.0502	0.16	Q V	|	|	|	|
6+55	0.0513	0.16	Q V	|	|	|	|
7+ 0	0.0524	0.16	Q V	|	|	|	|
7+ 5	0.0535	0.16	Q V	|	|	|	|
7+10	0.0546	0.16	Q V	|	|	|	|
7+15	0.0557	0.16	Q V	|	|	|	|
7+20	0.0569	0.17	Q V	|	|	|	|
7+25	0.0581	0.18	Q V	|	|	|	|

```
 7+30       0.0593      0.18  Q      V  |          |          |          |
 7+35       0.0606      0.19  Q      V  |          |          |          |
 7+40       0.0619      0.19  Q      V  |          |          |          |
 7+45       0.0633      0.19  Q      V  |          |          |          |
 7+50       0.0647      0.20  Q      V  |          |          |          |
 7+55       0.0661      0.21  Q      V  |          |          |          |
 8+ 0       0.0675      0.21  Q       V |          |          |          |
 8+ 5       0.0691      0.23  Q       V |          |          |          |
 8+10       0.0708      0.24  Q       V |          |          |          |
 8+15       0.0724      0.24  Q       V |          |          |          |
 8+20       0.0741      0.24  Q       V |          |          |          |
 8+25       0.0758      0.24  Q        V|          |          |          |
 8+30       0.0774      0.24  Q        V|          |          |          |
 8+35       0.0792      0.25  |Q       V|          |          |          |
 8+40       0.0809      0.26  |Q       V|          |          |          |
 8+45       0.0827      0.26  |Q       V|          |          |          |
 8+50       0.0845      0.27  |Q        V          |          |          |
 8+55       0.0864      0.27  |Q        V          |          |          |
 9+ 0       0.0883      0.27  |Q        V          |          |          |
 9+ 5       0.0903      0.29  |Q        V          |          |          |
 9+10       0.0924      0.30  |Q        |V         |          |          |
 9+15       0.0945      0.31  |Q        |V         |          |          |
 9+20       0.0967      0.32  |Q        |V         |          |          |
 9+25       0.0989      0.32  |Q        |V         |          |          |
 9+30       0.1011      0.32  |Q        | V        |          |          |
 9+35       0.1034      0.33  |Q        | V        |          |          |
 9+40       0.1057      0.34  |Q        | V        |          |          |
 9+45       0.1081      0.34  |Q        | V        |          |          |
 9+50       0.1105      0.35  |Q        |  V       |          |          |
 9+55       0.1129      0.35  |Q        |  V       |          |          |
10+ 0       0.1153      0.35  |Q        |  V       |          |          |
10+ 5       0.1173      0.29  |Q        |   V      |          |          |
10+10       0.1190      0.25  Q         |   V      |          |          |
10+15       0.1207      0.24  Q         |   V      |          |          |
10+20       0.1224      0.24  Q         |   V      |          |          |
10+25       0.1240      0.24  Q         |   V      |          |          |
10+30       0.1257      0.24  Q         |    V     |          |          |
10+35       0.1277      0.29  |Q        |    V     |          |          |
10+40       0.1299      0.32  |Q        |    V     |          |          |
10+45       0.1321      0.32  |Q        |    V     |          |          |
10+50       0.1343      0.32  |Q        |     V    |          |          |
10+55       0.1365      0.32  |Q        |     V    |          |          |
11+ 0       0.1387      0.32  |Q        |     V    |          |          |
11+ 5       0.1409      0.31  |Q        |     V    |          |          |
11+10       0.1430      0.31  |Q        |      V   |          |          |
11+15       0.1451      0.31  |Q        |      V   |          |          |
11+20       0.1472      0.31  |Q        |      V   |          |          |
11+25       0.1493      0.31  |Q        |      V   |          |          |
11+30       0.1514      0.31  |Q        |       V  |          |          |
11+35       0.1534      0.29  |Q        |       V  |          |          |
11+40       0.1553      0.28  |Q        |       V  |          |          |
11+45       0.1572      0.27  |Q        |       V  |          |          |
11+50       0.1592      0.28  |Q        |        V|          |          |
11+55       0.1612      0.29  |Q        |        V|          |          |
12+ 0       0.1632      0.29  |Q        |        V|          |          |
12+ 5       0.1656      0.36  |Q        |        V|          |          |
12+10       0.1683      0.40  |Q        |         V          |          |
12+15       0.1711      0.40  |Q        |         V          |          |
12+20       0.1739      0.41  |Q        |         V          |          |
12+25       0.1768      0.42  |Q        |         |V         |          |
12+30       0.1797      0.42  |Q        |         |V         |          |
12+35       0.1827      0.44  |Q        |         |V         |          |
12+40       0.1858      0.45  |Q        |         | V        |          |
```


12+45 0.1889 0.45
12+50 0.1921 0.46
12+55 0.1953 0.47
13+ 0 0.1985 0.47
13+ 5 0.2021 0.51
13+10 0.2058 0.54
13+15 0.2096 0.55
13+20 0.2133 0.55
13+25 0.2171 0.55
13+30 0.2209 0.55
13+35 0.2240 0.45
13+40 0.2266 0.38
13+45 0.2291 0.37
13+50 0.2317 0.37
13+55 0.2342 0.37
14+ 0 0.2368 0.37
14+ 5 0.2396 0.41
14+10 0.2426 0.43
14+15 0.2456 0.44
14+20 0.2485 0.43
14+25 0.2514 0.42
14+30 0.2543 0.42
14+35 0.2572 0.42
14+40 0.2600 0.42
14+45 0.2629 0.42
14+50 0.2657 0.41
14+55 0.2685 0.40
15+ 0 0.2713 0.40
15+ 5 0.2740 0.39
15+10 0.2767 0.39
15+15 0.2793 0.39
15+20 0.2819 0.38
15+25 0.2845 0.37
15+30 0.2871 0.37
15+35 0.2893 0.33
15+40 0.2915 0.31
15+45 0.2936 0.31
15+50 0.2957 0.31
15+55 0.2978 0.31
16+ 0 0.2999 0.31
16+ 5 0.3011 0.17
16+10 0.3016 0.08
16+15 0.3020 0.06
16+20 0.3025 0.06
16+25 0.3029 0.06
16+30 0.3034 0.06
16+35 0.3038 0.06
16+40 0.3041 0.05
16+45 0.3044 0.05
16+50 0.3048 0.05
16+55 0.3051 0.05
17+ 0 0.3054 0.05
17+ 5 0.3059 0.07
17+10 0.3064 0.08
17+15 0.3070 0.08
17+20 0.3075 0.08
17+25 0.3081 0.08
17+30 0.3086 0.08
17+35 0.3092 0.08
17+40 0.3098 0.08
17+45 0.3103 0.08
17+50 0.3108 0.07
17+55 0.3113 0.07

18+ 0	0.3117	0.06	Q	|	|	|	V |
18+ 5	0.3121	0.06	Q	|	|	|	V |
18+10	0.3126	0.06	Q	|	|	|	V |
18+15	0.3130	0.06	Q	|	|	|	V |
18+20	0.3135	0.06	Q	|	|	|	V |
18+25	0.3139	0.06	Q	|	|	|	V |
18+30	0.3144	0.06	Q	|	|	|	V |
18+35	0.3147	0.06	Q	|	|	|	V |
18+40	0.3151	0.05	Q	|	|	|	V |
18+45	0.3154	0.05	Q	|	|	|	V |
18+50	0.3157	0.04	Q	|	|	|	V |
18+55	0.3159	0.03	Q	|	|	|	V |
19+ 0	0.3161	0.03	Q	|	|	|	V |
19+ 5	0.3164	0.04	Q	|	|	|	V |
19+10	0.3167	0.05	Q	|	|	|	V |
19+15	0.3171	0.05	Q	|	|	|	V |
19+20	0.3175	0.06	Q	|	|	|	V |
19+25	0.3179	0.06	Q	|	|	|	V |
19+30	0.3184	0.06	Q	|	|	|	V |
19+35	0.3187	0.06	Q	|	|	|	V |
19+40	0.3191	0.05	Q	|	|	|	V |
19+45	0.3194	0.05	Q	|	|	|	V |
19+50	0.3197	0.04	Q	|	|	|	V |
19+55	0.3199	0.03	Q	|	|	|	V |
20+ 0	0.3201	0.03	Q	|	|	|	V |
20+ 5	0.3204	0.04	Q	|	|	|	V |
20+10	0.3207	0.05	Q	|	|	|	V |
20+15	0.3211	0.05	Q	|	|	|	V |
20+20	0.3214	0.05	Q	|	|	|	V |
20+25	0.3217	0.05	Q	|	|	|	V |
20+30	0.3221	0.05	Q	|	|	|	V |
20+35	0.3224	0.05	Q	|	|	|	V |
20+40	0.3227	0.05	Q	|	|	|	V |
20+45	0.3231	0.05	Q	|	|	|	V |
20+50	0.3233	0.04	Q	|	|	|	V |
20+55	0.3236	0.03	Q	|	|	|	V |
21+ 0	0.3238	0.03	Q	|	|	|	V |
21+ 5	0.3241	0.04	Q	|	|	|	V |
21+10	0.3244	0.05	Q	|	|	|	V |
21+15	0.3247	0.05	Q	|	|	|	V|
21+20	0.3250	0.04	Q	|	|	|	V|
21+25	0.3252	0.03	Q	|	|	|	V|
21+30	0.3254	0.03	Q	|	|	|	V|
21+35	0.3257	0.04	Q	|	|	|	V|
21+40	0.3261	0.05	Q	|	|	|	V|
21+45	0.3264	0.05	Q	|	|	|	V|
21+50	0.3267	0.04	Q	|	|	|	V|
21+55	0.3269	0.03	Q	|	|	|	V|
22+ 0	0.3271	0.03	Q	|	|	|	V|
22+ 5	0.3274	0.04	Q	|	|	|	V|
22+10	0.3277	0.05	Q	|	|	|	V|
22+15	0.3281	0.05	Q	|	|	|	V|
22+20	0.3283	0.04	Q	|	|	|	V|
22+25	0.3286	0.03	Q	|	|	|	V|
22+30	0.3288	0.03	Q	|	|	|	V|
22+35	0.3290	0.03	Q	|	|	|	V|
22+40	0.3292	0.03	Q	|	|	|	V|
22+45	0.3294	0.03	Q	|	|	|	V|
22+50	0.3297	0.03	Q	|	|	|	V|
22+55	0.3299	0.03	Q	|	|	|	V|
23+ 0	0.3301	0.03	Q	|	|	|	V|
23+ 5	0.3303	0.03	Q	|	|	|	V|
23+10	0.3306	0.03	Q	|	|	|	V|

```
   23+15       0.3308      0.03  Q          |          |          |        V|
   23+20       0.3310      0.03  Q          |          |          |        V|
   23+25       0.3312      0.03  Q          |          |          |        V|
   23+30       0.3314      0.03  Q          |          |          |        V|
   23+35       0.3317      0.03  Q          |          |          |        V|
   23+40       0.3319      0.03  Q          |          |          |        V|
   23+45       0.3321      0.03  Q          |          |          |        V|
   23+50       0.3323      0.03  Q          |          |          |        V|
   23+55       0.3325      0.03  Q          |          |          |        V|
   24+ 0       0.3328      0.03  Q          |          |          |        V|
   24+ 5       0.3329      0.01  Q          |          |          |        V|
   24+10       0.3329      0.00  Q          |          |          |         V
-------------------------------------------------------------------------
```

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

INDEPENDENT PLAZA
REDLANDS BLVD AND HEMLOCK AVE
MORENO VALLEY

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ A. **On-site storm drain inlets**	☒ **Locations of 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** ☒ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
☐ B. **Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ C. **Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ D1. **Need for future indoor & structural pest control**		☒ **Note building design features that discourage entry of pests.**	☒ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☒ D2. **Landscape/ Outdoor Pesticide Use**	☐ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☒ **Show self-retaining landscape areas, if any.** ☒ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☐ **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 insure 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/**Error! Hyperlink reference not valid.** ☒ **Provide IPM information to new owners, lessees and operators.**

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☐ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☐ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☒ F. **Food service**	☒ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☒ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☒ **Describe the location and features of the designated cleaning area.** ☒ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☒ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☒ G. **Refuse areas**	☒ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☒ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☐ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☒ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☒ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☒ **State how the following will be implemented:** **Provide adequate number of receptacles. 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, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** **www.cchealth.org/groups/hazmat/**	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
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❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **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.**	**Describe operational measures to implement the following (if applicable):** ❑ **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/ ❑**Car dealerships and similar may rinse cars with water only.**

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❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ 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/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **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**

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. **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**

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ N. **Fire Sprinkler Test Water**		☒ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	☒ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ❑ **Boiler drain lines** ☒ **Condensate drain lines** ☒ **Rooftop equipment** ❑ **Drainage sumps** ☒ **Roofing, gutters, and trim.** ❑ **Other sources**		❑ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ☒ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ☒ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ❑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ☒ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** ❑ **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ P. **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.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

To be included in F-WQMP

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

To be included in F-WQMP