APPENDIX I2

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PROJECT SPECIFIC PRELIMINARY WATER QUALITY MANAGEMENT PLAN (P-WQMP)

FOR:
NORTHERN GATEWAY LOGISTICS CENTER
EVANS ROAD BETWEEN ETHANAC ROAD AND McLAUGHLIN ROAD
MENIFEE, CALIFORNIA 92585
APNs: 331-060-007, -008, -020, -023 AND -030

PREPARED FOR:
LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760
CONTACT: TYLER BANTON

JANUARY 13, 2023
APRIL 21, 2023
AUGUST 8, 2023
NOVEMBER 1, 2023

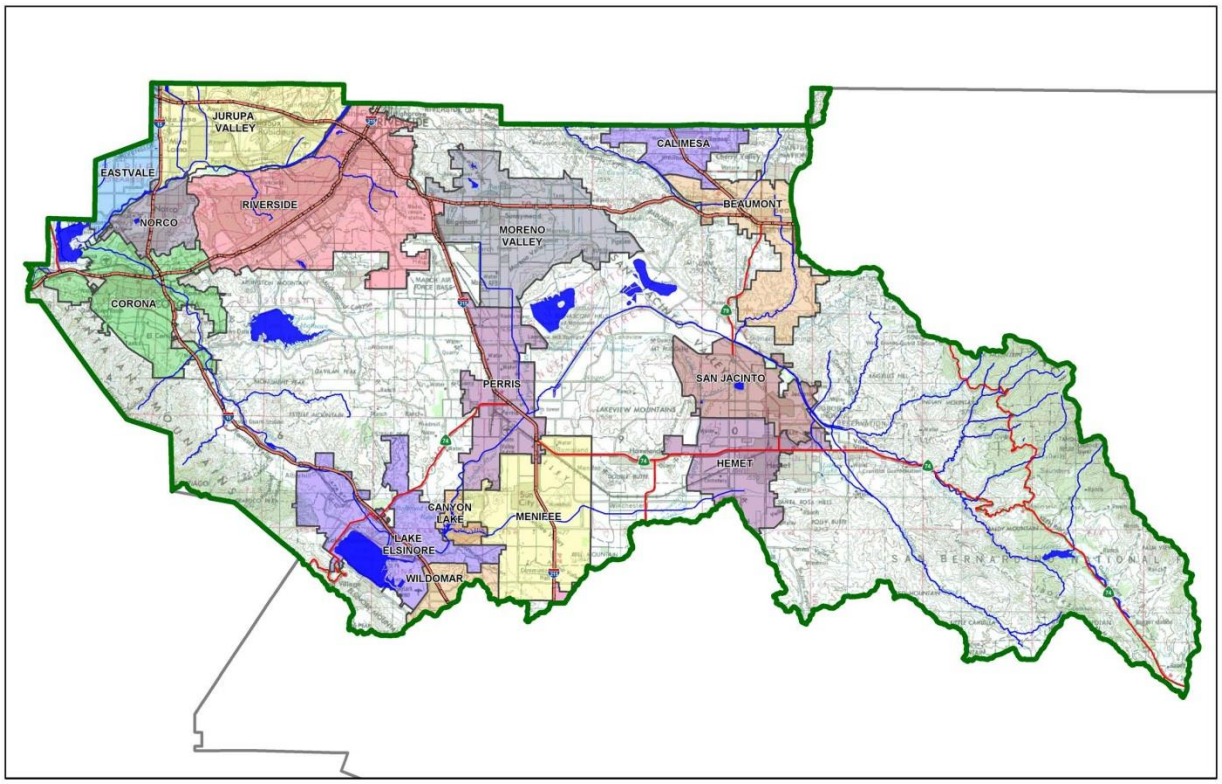
JOB NO. 4118

PREPARED BY:
THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173
CONTACT: LUIS PRADO (luisp@thieneseng.com)

Project Specific Water Quality Management Plan

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

Project Title: Northern Gateway Logistics Center
Development No: PLN23-0040
Design Review/Case No: WQ-323



Contact Information:

Prepared for:
Lovett Industrial
120 Newport Center Drive, Suite 217
Newport Beach, CA 92660
Phone: (949) 402-2760
Contact: Tyler Banton

Prepared by:
Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, CA 90638
(714) 521-4811
Contact: Luis Prado (luisp@thieneseng.com)
Job No. 4118

☒ **Preliminary**
☐ **Final**

Original Date Prepared: January 13, 2023

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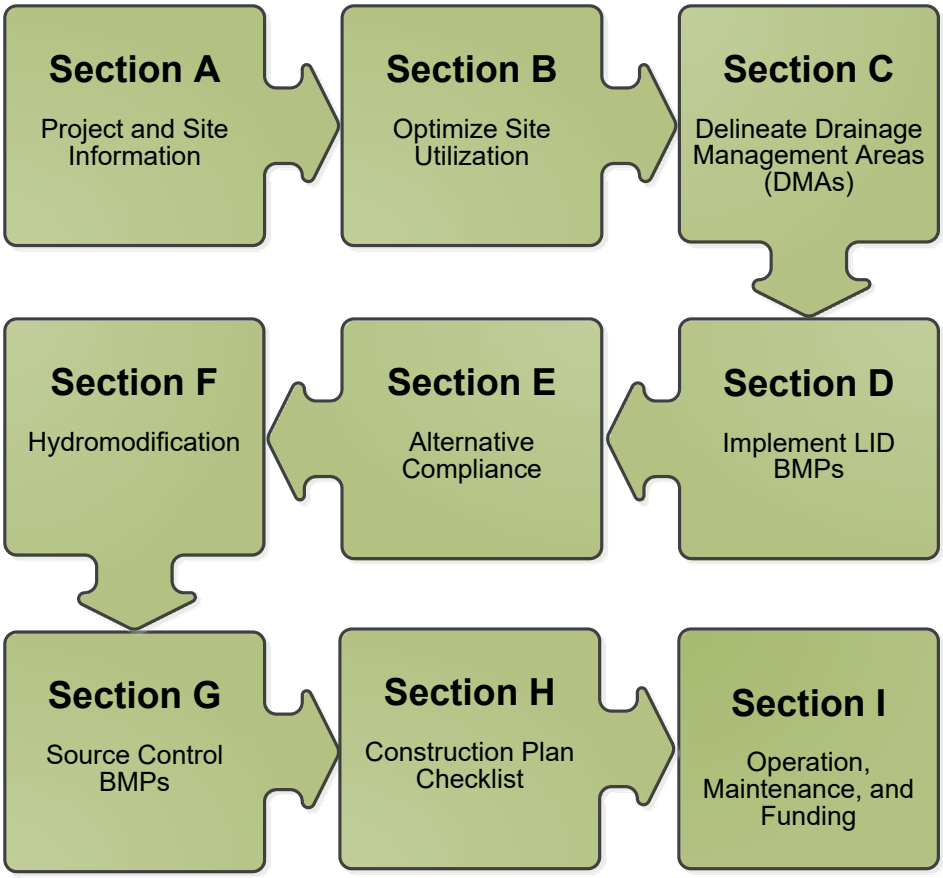
August 8, 2023
November 1, 2023

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

A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for **Lovett Industrial** by **Thienes Engineering, Inc.** for the **Northern Gateway Logistics Center** project (PLN23-0040).

This WQMP is intended to comply with the requirements of **City of Menifee** for **Ordinance No. 8.26.050** 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 Menifee** Ordinance **No. 8.26.050**.

"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	11/1/2023 Date
Tyler Banton Owner's Printed Name	Authorized signatory 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	11/1/2023 Date
Reinhard Stenzel Preparer's Printed Name	Director of Engineering Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Light Industrial Warehouse
Planning Area:	Economic Development Corridor (EDC)
Community Name:	N/A
Development Name:	Northern Gateway Logistics Center
PROJECT LOCATION	
Latitude & Longitude (GIS): 33.737685, -117.196249	
Project Watershed and Sub-Watershed: Santa Ana River & San Jacinto	
APN(s): 331-060-007, -008, -020, -023 and -030	
Map Book and Page No.: Assessor's Map BK331 PG. 06	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Light Industrial
Proposed or Potential SIC Code(s)	4225
Area of Impervious Project Footprint (SF)	720,482 (16.54 acres)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	720,482 (16.54 acres)
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0
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)	Infiltration Report Available
What is the Water Quality Design Storm Depth for the project?	0.60

Project Description:

The project site is located on Evans Road between Ethanac Road and McLaughlin Road, Menifee, CA. The project site encompasses approximately 18.74 acres. Proposed improvements to the onsite include two light industrial warehouses approximately 105,880 square feet (Building 1) and 292,715 square feet (Building 2). There will be truck yards on the south side of Building 1 and on the north side of Building 2. Vehicle parking areas will be located on the north and southeast sides of Building 1 and on the east and west sides of Building 2. Landscaping will be adjacent to the streets and scattered throughout the site. Per the geotechnical investigation, infiltration testing disclosed generally unfavorable infiltration rates across the site (predominantly between 0.3 and 1.4 inches per hour). Based on poor infiltration rates, infiltration is not considered feasible. Instead, the project proposes to use underground detention systems and proprietary biotreatment units to treat runoff produced by the 85th percentile storm rainfall depth. In addition, catch basin filters will be provided in order to pre-treat runoff prior to entering the water quality features.

Master Plan Hydrology (100-year Storm Event):

The project site is part of the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Romoland Master Drainage Plan – Zone 4. The Master Drainage Plan (MDP) was completed in April 1988 and Revision No. 1 was completed in March 2006. The project site was designated as Light Industrial in the corresponding hydrologic calculations.

The Ethanac Wash (MDP Line A) is a large open channel facility adjacent to the easterly property line of the project site. Line A originates to the southeast of the project site and generally flows in a westerly direction. After the facility crosses Interstate 215, the channel turns north near the project site. The channel then crosses Ethanac Road and turns west immediately adjacent to the north side of Ethanac Road. The channel continues in a generally

west and northwest direction to the San Jacinto River. North of the project site, the MDP 100-year flow rate in Line A is 3,673 cfs.

MDP facility Line A-8 is shown traversing northerly through the easterly portion of the project site. However, recent County storm drain plans show this facility traversing easterly through the northerly portion of the Building 2 site ultimately connecting to Line A. The MDP 100-year flow rate in Line A-8 shown on the Master Drainage Plan map is 292 cfs, although the storm drain plan shows 283 cfs. Either way, the peak flow rates are comparable.

The MDP map does not show specific drainage areas. The site is clearly tabled to Line "A", it is just not clear whether it was intended to drain directly to the Channel or to Line A-8 or via a proposed storm drain in Evans Road. It does not appear that detention will be necessary since the existing County facilities are designed for the 100-year storm event and the project site was considered as commercial development.

Existing Storm Drains:

MDP Line A is a large open channel facility along the project's easterly border. The channel has a design base width of 50', 3:1 side slopes, and is unlined. Lateral A-8 runs along the northerly portion of the southerly portion of the project site. This facility is a 10' wide x 6' high reinforced concrete box (RCB). The RCB traverses easterly through the project site and connects to MDP Line A. Both facilities are maintained by RCFC&WCD.

Existing Site:

The project site is currently mostly undeveloped agricultural land and relativity flat. Existing topography indicates that the project side drains westerly to Evans Road.

Hydrology:

DMA A – Runoff from the northerly vehicle parking area and the northerly portion of Building 1's roof will drain into curb inlets. A proposed storm drain Line "A" will then convey these flows southerly along the easterly side of Building 1. Runoff from the easterly drive aisle and a portion of the vehicle parking area located east of Building 1 will drain into a curb inlet that then connects to Line "A".

Runoff from the southerly portion of Building 1's roof, the truck yard and the southeasterly vehicle parking area will drain into grate inlets. A proposed storm drain Line "B" will then convey flows easterly and connect into Line "A". Line "A" will continue draining further south, ultimately connecting to the proposed public 10'x6' RCB (MPD Line A-8) that traverses through the project site.

DMA B – Runoff from the northerly portion of Building 2's roof, the truck yard and the easterly drive aisle will drain into grate inlets. A proposed storm drain Line "D" and Line "D1" will then convey these flows northerly and make a connection into MPD Line A-8.

Runoff from the southeasterly vehicle parking area, the southerly portion of Building 2's roof and the westerly vehicle parking area will drain to grate inlets and roof drains that connect to proposed storm drain Line "E". Line "E" will then convey these flows westerly, then northerly and make a connection into MPD Line A-8.

Prior to runoff discharging offsite, diversion structures will be utilized to direct the DCV into the underground detention systems first and then slowly pumping the treatment flowrate through the proprietary biotreatment units. DMA A will utilize two pumps designed to pump a minimum of 20 GPM (0.0445 CFS) into MWS-A and to pump 32 GPM (0.0713 CFS) for HCOC purposes. DMA B will also utilize two pumps designed to pump a minimum of 53 GPM (0.1181 CFS) into MWS-B and to pump 76 GPM (0.1693 CFS) for HCOC purposes. Pump specific details will be provided in final design.

Runoff from DMAs C, D and E fronting Evans Road, "A" Street and Barnett Road will sheet flow offsite into their respective streets (and enter the proposed public storm drain) without being routed to the proposed LID BMPs. These areas are mostly comprised of landscaping except for some small driveway areas. The landscaping is considered self-treating.

All flows ultimately discharge to the Ethanac Wash (MPD Line A) located to the east of the project site. Prior to discharging, detention will be utilized onsite to ensure that the proposed condition peak flow rate does not exceed the existing condition peak flow rate. Therefore, there will be no negative impacts on existing downstream drainage facilities.

The underground detention systems will also be utilized to mitigate the HCOC volume. Outlet pipes (for HCOC purposes), located along the storm drains conveying flows into MWS-A and MWS-B, will be set at the elevation where the DCV is met and will discharge the HCOC volume into pumps (GPM vary; see WQMP Site Map) that are designed to limit the discharge from the site to a flowrate that's 47% less than the pre-development 2-year peak flowrate. Refer to Section F.

A.1 Maps and Site Plans

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

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

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

A.2 Identify Receiving Waters

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

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River, Reach 3	None	AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Canyon Lake (aka San Jacinto River, Reach 2)	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
San Jacinto River, Reach 1	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Lake Elsinore	DDT, Nutrients, Organic Enrichment/Low Dissolved Oxygen, Polychlorinated biphenyls (PCBs), Toxicity	REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.

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 Menifee Grading Permit	☒ Y	☐ N
Other *(please list in the space below as required)* City of Menifee 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.

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?

- *Currently, the site is mostly undeveloped agricultural land and relativity flat. Existing topography indicates that the project site all drain westerly to Evans Road, ultimately discharging into the Ethanac Wash (MPD Line A). Proposed condition drainage patterns mimic pre-development conditions.*

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

- *The existing vegetation will not be protected; however, the proposed project will incorporate planters and landscaping.*
- *Not applicable, there are no sensitive areas.*

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

- *Per the geotechnical investigation, infiltration testing disclosed generally unfavorable infiltration rates across the site (predominantly between 0.3 and 1.4 inches per hour). Based on poor infiltration rates, infiltration is not considered feasible. Instead, the project proposes to use underground detention systems and proprietary biotreatment units to treat runoff produced by the 85th percentile storm rainfall depth.*

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

- *Impervious area on the site has been minimized to City standards.*
- *Due to the nature of the project site (large trucks), substitution of pavement for landscaping is not feasible. The project does not propose overflow parking where substitution of pavement for*

landscaping would be optimal. Landscaping has been provided wherever applicable and to the maximum extent practicable.

- *The entire Design Capture Volume (DCV) is handled by the proposed underground detention systems and proprietary biotreatment units.*

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

- *Roof runoff is directed to the underground detention systems and proprietary biotreatment units for treatment.*
- *The site is not on a hillside.*
- *All stormwater runoff will be piped or sheet flow into the underground detention systems and proprietary biotreatment units; therefore, curb-cuts into landscaped areas are not utilized.*

Section C: Delineate Drainage Management Areas (DMAs)

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

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	Area (Acres)	DMA Type
A1	Roofs/Conc/Asphalt	209,959	4.82	Type D
A2	Ornamental Landscaping	10,890	0.25	Type D
B1	Roofs/Conc/Asphalt	510,523	11.72	Type D
B2	Ornamental Landscaping	27,007	0.62	Type D
C	Ornamental Landscaping	27,007	0.62	Type A
D	Ornamental Landscaping	25,700	0.59	Type A
E	Ornamental Landscaping	5,227	0.12	Type A

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

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
C	27,007	California Native Vegetation	Timed Sprinklers
D	27,007	California Native Vegetation	Timed Sprinklers
E	5,227	California Native Vegetation	Timed Sprinklers

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]
n/a	n/a	n/a	n/a	n/a	n/a	n/a

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

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

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

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

DMA Name or ID	BMP Name or ID
A1	CMP-A & MWS-A
A2	CMP-A & MWS-A
B1	CMP-B & MWS-B
B2	CMP-B & MWS-B

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

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

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

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: Per the geotechnical investigation, infiltration testing disclosed generally unfavorable infiltration rates across the site (predominantly between 0.3 and 1.4 inches per hour). Based on poor infiltration rates, infiltration is not considered feasible. Instead, the project proposes to use underground detention systems and proprietary biotreatment units to treat runoff produced by the 85th percentile storm rainfall depth.		
…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.

☒ None of the above

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

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: 2.20 acres

Type of Landscaping (Conservation Design or Active Turf): Conservative 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: 16.54 acres

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: 0.79

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: 13.1 acres

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)
13.1 acres	2.20 acres

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: 352 (approximate # of parking stalls)

Project Type: Light Industrial

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: 16.54 acres

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: 172

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: 2,845

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)**
2,845	352

Other Non-Potable Use Feasibility

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

N/A

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

Average Daily Demand: N/A

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

Total Area of Impervious Surfaces: N/A

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

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

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

Minimum required use: N/A

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				Alternative Compliance
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A1	☐	☐	☐	☒	☐
A2	☐	☐	☐	☒	☐
B1	☐	☐	☐	☒	☐
B2	☐	☐	☐	☒	☐

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.

Per the geotechnical investigation, infiltration testing disclosed generally unfavorable infiltration rates across the site (predominantly between 0.3 and 1.4 inches per hour). Based on poor infiltration rates, infiltration is not considered feasible. Additionally, the project is located within Airport Land Use Commission (ALUC) jurisdiction Zone E. In accordance with Wildlife Hazard Management at Riverside County Airports: Background and Policy, Table 5-4, bioretention facilities are limited to 30 feet in length or width. Given that the project is a proposed light industrial warehouse with continuous truck yards without landscape breaks and large impervious areas makes bioretention facilities difficult to implement. Ultimately, an underground detention system and proprietary biotreatment unit are proposed for treatment.

DMAs C, D and E consist of self-treating landscape that flow offsite to Evans Road, Barnett Road and “A” Street. Detention will be utilized onsite to ensure that the proposed condition peak flow rate does not exceed the existing condition peak flow rate. Therefore, these landscaped areas do not need to be self-retaining and there will be no negative impacts on existing downstream drainage facilities.

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	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	[A]		[B]	[C]	[A] x [C]			
A1	209,959	Roofs/Conc/Asphalt	*1.00*	*0.89*	*187,283.6*	*0.6*	*9364.2*	*9,953*
A2	10,890	Ornamental Landscaping	*0.10*	*0.11*	*1,202.9*	*0.6*	*60.1*	
B1	510,523	Roofs/Conc/Asphalt	*1.00*	*0.89*	*455,386.7*	*0.6*	*22769.3*	*24,227*
B2	27,007	Ornamental Landscaping	*0.10*	*0.11*	*2,983.2*	*0.6*	*149.2*	
	758,380				*646,856*	0.6	32,342.8	34,180.0

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

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

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

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

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

P = Potential
N = Not Potential
(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected
(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected
(3) A potential Pollutant is land use involving animal waste
(4) Specifically petroleum hydrocarbons
(5) Specifically solvents
(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
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 Imp Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor				
	[A]		[B]	[C]	[A] x [C]				
N/A	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*Design Storm Depth (in)*	*Minimum Design Capture Volume (cubic feet)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*

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

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
N/A		
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 (min)			
Volume (cubic-feet)			

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

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

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

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier: The project site drains to Canyon Lake and Lake Elsinore.

F.2 HCOC Mitigation

As an alternative to the HCOC Exemption Criteria above, HCOC criteria is considered mitigated if the project meets one of the following conditions, as indicated:

☐ 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.

	2 year – 24 hour			
	Pre-condition	Post-condition	Difference	Difference (as % of pre-condition)
Flowrate (cfs)	0.45	0.24	-0.21	-46.67%

Since the excess volume cannot be infiltrated or captured and reused, discharge from the underground detention systems have been limited by proposed pump systems to a flowrate of 0.17 cfs total. This is 47% less than the pre-development 2-year peak flow and mitigates the HCOC criteria. Refer to the hydrographs in Appendix 7.

☐ d. None of the above.

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
A. On-site storm drain inlets	• Mark all inlets with the words "Only Rain Down the Storm Drain" or similar.	• Maintain and periodically repaint or replace inlet markings annually. • Provide stormwater pollution prevention information to new site owners, lessees, or operators upon occupancy and annually thereafter. • See CASQA fact sheet SC-44 for "Drainage System Maintenance," included in Appendix of this document. • Include the following lease agreements: "Tenant shall not allow anyone to discharge anything to storm drain or to store or deposit materials so as to create a potential discharge to storm drains."

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
B. Interior floor drains and elevator shaft sump pumps	• Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	• Inspect and maintain drains semi-annually to prevent blockages and overflow.
D2. Landscape / Outdoor Pesticide Use	• Landscape plans will 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. • Pest-resistant plans will be used adjacent to hardscape. • The landscape plans will consider plants appropriate to the site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	• Maintain landscaping only using minimum pesticides, when needed. • See Appendix 10 for "Landscape and Gardening" brochure by RCFlood. • Provide Integrated Pest Management (IPM) information to new owners, lessees and operators upon occupancy and annually thereafter. IPM is an effective and environmentally sensitive approach to pest management.
G. Refuse Areas	• Site refuse will be handled by contractor on a weekly basis. • Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	• A minimum of two receptacles will be provided and located indoors. Receptacles are to be inspected daily and repairs or replacements to leaky receptacles will be completed immediately. Receptacles are to remain covered when not in use. Dumping of liquid or hazardous wastes is prohibited. A "no hazardous materials" sign will be posted. Spills will be cleaned immediately upon discovery. Spill control materials will be available onsite. See Appendix 10 for CASQA fact sheet SC-34 for "Waste Handling and Disposal."
H. Industrial processes	• All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.	• See Appendix 10 for CASQA fact sheet SC-10 for "Non-Stormwater Discharges"
M. Loading Docks	• Spills will be cleaned up immediately and disposed of properly.	• Move loaded and unloaded items indoors as soon as possible. • See Appendix 10 for CASQA fact sheet SC-30 for "Outdoor Loading and Unloading"
O. Miscellaneous Drain or Wash Water or Other Sources	• A drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.	
P. Plazas, sidewalks, and parking lots		• Sweep plazas, sidewalks, and parking lots monthly 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

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
A	On-site storm drain inlets	WQMP Site Map	---	---
B	Interior floor drains and elevator shaft sump pumps	N/A	---	---
D2	Landscape / Outdoor Pesticide Use	On-Site Landscape Improvement Plans	---	---
G	Refuse Areas	WQMP Site Map	---	---
H	Industrial processes	WQMP Site Map	---	---
M	Loading Docks	WQMP Site Map	---	---
P	Plazas, sidewalks, and parking lots	WQMP Site Map	---	---
MWS-A	Modular Wetlands System	WQMP Site Map	33.738323	-117.196163
CMP-A	Underground Detention System	WQMP Site Map	33.738383	-117.196686
MWS-B	Modular Wetlands System	WQMP Site Map	33.738051	-117.197215
CMP-B	Underground Detention System	WQMP Site Map	33.737987	-117.196139

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: City of Menifee Water Quality Management Plan and Stormwater Best Management Practices Operation, Transfer, Maintenance and Right of Entry Agreement

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

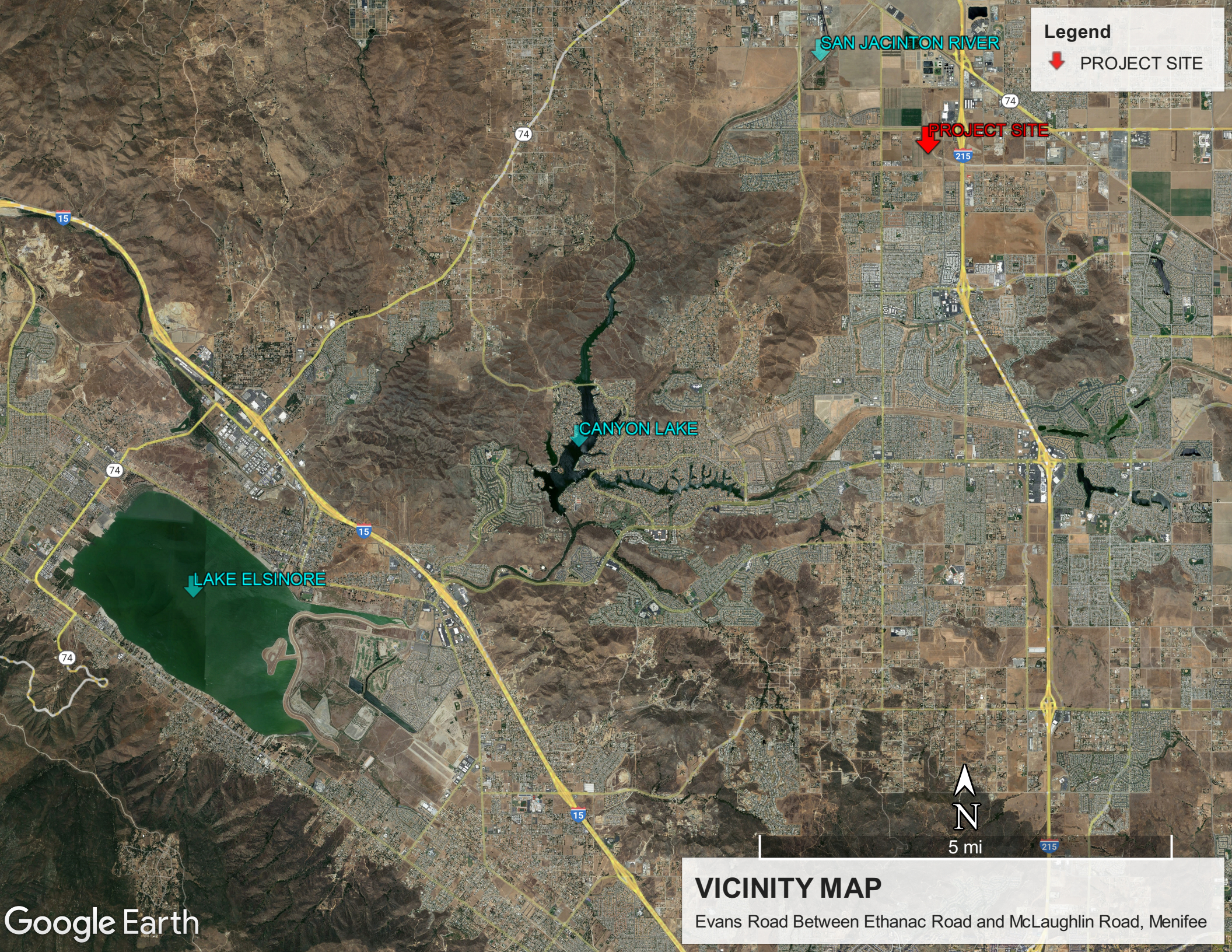
☐ Y ☒ N

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.

This section will be completed and addressed at the time of the final WQMP Submittal.

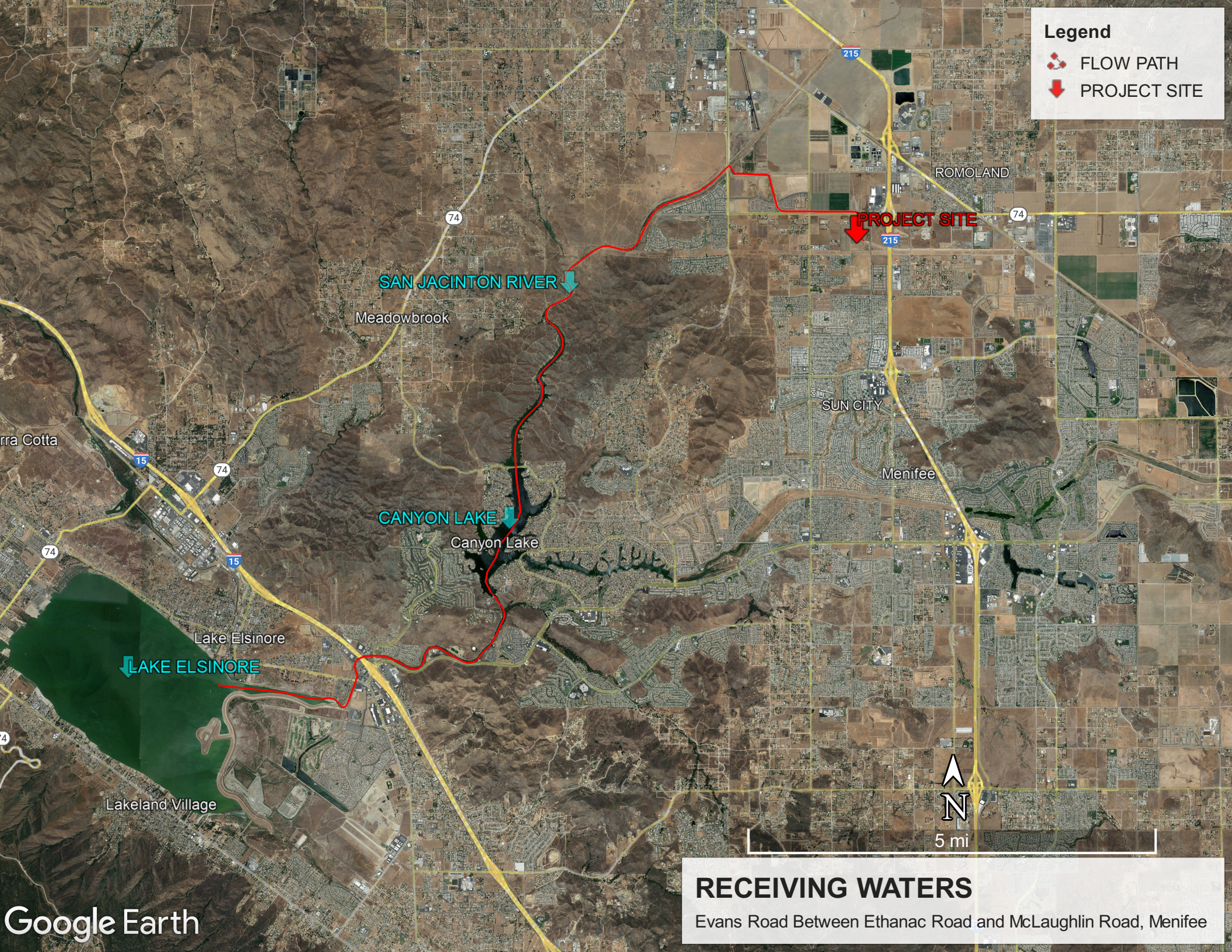
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



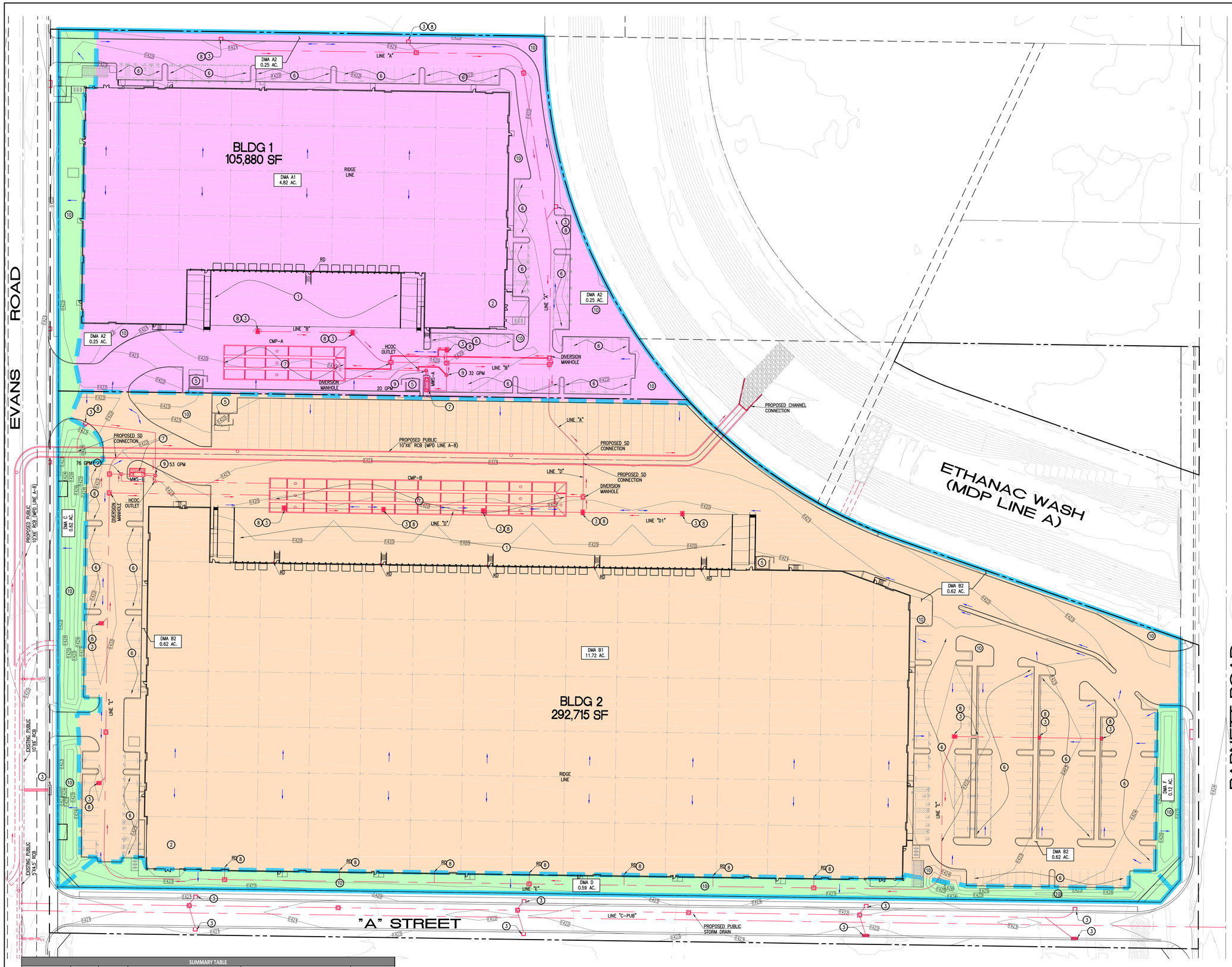
VICINITY MAP

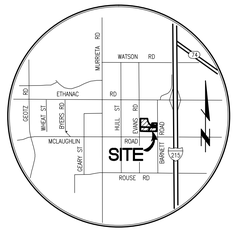
Evans Road Between Ethanac Road and McLaughlin Road, Menifee



RECEIVING WATERS

Evans Road Between Ethanac Road and McLaughlin Road, Menifee





VICINITY MAP

N.T.S.

LEGEND

1. LOADING/UNLOADING TRUCK DOCKS
2. EDUCATIONAL MATERIAL
3. STORM DRAIN STENCIL
4. SOLID UNDERGROUND DETENTION CMP
5. TRASH ENCLOSURE
6. PARKING LOT MAINTENANCE (SWEEPING)
7. PROPRIETARY BIOTREATMENT UNIT
8. DRAIN INSERT(S)
9. SUMP PUMP: 1HP, 460V, 3PH FLA, 1.8 AMP
10. LANDSCAPE/OUTDOOR PESTICIDE USE

NOTE:

- RD — ROOF DRAIN
- BOUNDARY
- SUBAREAS
- SURFACE FLOW LINE
- SD FLOW LINE
- DMA A
- DMA B
- DMA C, D AND E

SAMPLE STORM DRAIN STENCIL

0 20 40 80 120

SCALE:1"=40'

Last Update: 11/1/23
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SUMMARY TABLE

DMA	AREA (ACRES)	DCV (CF)	MODULAR WETLANDS SYSTEM (MWS)			120-INCH SOLID CMP			TOTAL VOLUME PROVIDED (CF)
			MWS MODEL	# OF UNITS	LINEAR STATIC CAPACITY (CF)	DETENTION REQUIRED (CF)	DETENTION PROVIDED (CF)*	LINEAR FEET (FT)**	
A	5.07	9,424	MWS-L-4-15-V	1	105	9,318	9,848	402	9,953
B	12.34	22,919	MWS-L-8-16-V	1	268	22,650	23,959	978	24,227
TOTAL	**17.41**	**32,343**		**2**	**373**	**31,968**	**33,807**	**1,380**	**34,180**

*This is the volume provided at a depth of approximately 3.5 feet above the invert of the CMP. The volume above this depth is utilized to mitigate HCOCs and will be released via pump systems.

**The total linear footage includes the CMP required to store the HCOC mitigation volume.

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	Area (Acres)	DMA Type
A1	Roofs/Conc/Asphalt	209,959	4.82	Type D
A2	Ornamental Landscaping	10,890	0.25	Type D
B1	Roofs/Conc/Asphalt	510,523	11.72	Type D
B2	Ornamental Landscaping	27,007	0.62	Type D
C	Ornamental Landscaping	27,007	0.62	Type A
D	Ornamental Landscaping	25,700	0.59	Type A
E	Ornamental Landscaping	5,227	0.12	Type A
		816,314	**18.74**	

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date

Public Works Director R.C.E.

Sheet 1 of 3 Sheets

CITY OF MENIFEE

PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

4118/1 OF 3 SHEETS

BIO CLEAN FULL CAPTURE FILTER WITH TROUGH SYSTEM

FOR USE IN CURB INLETS

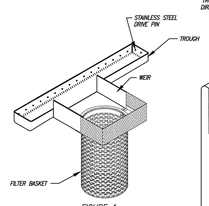

FIGURE 1:
DETAIL OF PARTS

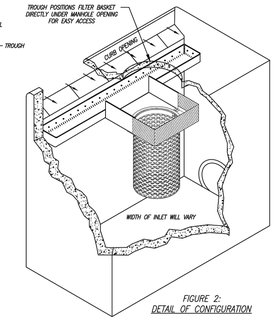

FIGURE 2:
DETAIL OF CONFIGURATION

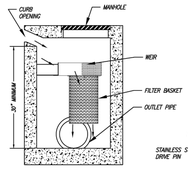

FIGURE 4:
DETAIL OF PROFILE

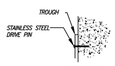

FIGURE 3:
DETAIL OF MOUNTING

MODEL NUMBER	TREATMENT FLOW (cfs)*	SOLIDS STORAGE CAPACITY (cu ft)
BIO-CURB-FULL-24	2.85	1.40
BIO-CURB-FULL-12	2.85	0.70

*SEE PAGE 2 FOR EXPLANATION OF FLOW RATES

NOTES:

1. TROUGH SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO FILTER.
2. TROUGH SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTER MANUFACTURED OF 1020 STAINLESS STEEL.
5. FILTER MADE OF NON-CLOGGIN SCREEN WITH 4.7 MM OPENINGS AND MEETS FULL CAPTURE REQUIREMENTS.
6. FILTER CAN BE FITTED WITH HYDROCARBON ABSORBENT BOOM.
7. FILTER IS LOCATED DIRECTLY UNDER THE MANHOLE FOR EASY REMOVAL AND MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'.
9. OTHER STANDARD AND CUSTOM MODEL SIZES AVAILABLE - CONTACT BIO CLEAN FOR MORE INFORMATION.
10. CONSIDERS A SAFETY FACTOR OF 2.0
11. BYPASS IS FACILITATED VIA OVERFLOW OF THE TROUGH SYSTEM AND IS EQUAL TO THE CAPACITY OF THE CURB OPENING
12. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
13. ADDITIONAL TREATMENT AND STORAGE CAPACITY CAN BE ACHIEVED BY UTILIZING MULTIPLE FILTER BASKETS.

DRAWING: BIO CLEAN CURB INLET FILTER DETAILS		MEETS FULL CAPTURE REQUIREMENTS
TREATMENT FLOW RATE: 2.85 cfs		MODEL #: BIO-CURB-FULL
WARRANTY: 1 YEAR MANUFACTURER'S	PROJECT:	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640 FAX: 760-433-3176	REVISIONS:	DATE:
	REVISIONS:	DATE:
DATE: 10/12/2017 SCALE: NTS	REVISIONS:	DATE:
DRAWTER: M.C.P. UNITS = INCHES	REVISIONS:	DATE:

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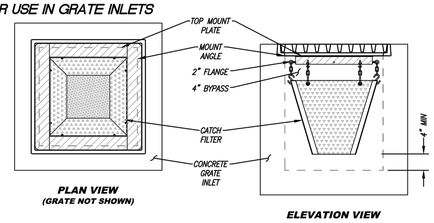
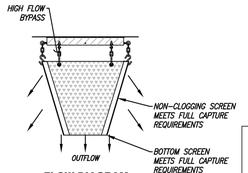
BIO CLEAN FULL CAPTURE FILTER

FOR USE IN GRATE INLETS



PLAN VIEW
(GRATE NOT SHOWN)

ELEVATION VIEW



FLOW DIAGRAM

MODEL #	TREATMENT FLOW RATE (CFS)	BYPASS FLOW (CFS)	SOLIDS STORAGE CAPACITY (CF)
BIO-GRATE-FULL 12-12-12	1.04	1.24	0.15
BIO-GRATE-FULL 18-18-12	1.78	2.79	0.33
BIO-GRATE-FULL 24-24-12	2.70	4.96	0.59
BIO-GRATE-FULL 24-40-12	3.70	6.35	0.88
BIO-GRATE-FULL 24-24-24	7.31	4.96	1.22
BIO-GRATE-FULL 24-40-24	9.53	6.35	1.82
BIO-GRATE-FULL 36-36-24	11.93	7.74	2.73

INSTALLATION NOTES:

1. ALL HARDWARE, FLANGE, FRAME, SCREENS SHALL BE STAINLESS STEEL.
2. OPTIONAL HYDROCARBON BOOM SHALL BE 2" DIAMETER.
3. SEE PERFORMANCE REPORTS IN MANUFACTURES SPECIFICATIONS.
4. OTHER STANDARD AND CUSTOM MODEL SIZES AVAILABLE - CONTACT BIO CLEAN FOR MORE INFORMATION.
5. BASED ON 37% OPEN AREA.
6. CONSIDERS A SAFETY FACTOR OF 2.0.
7. CONSIDERS A LOCAL DEPRESSION PONDING DEPTH OF 6 INCHES.
8. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
9. CONCRETE STRUCTURES SOLD SEPARATELY.

NOT TO SCALE

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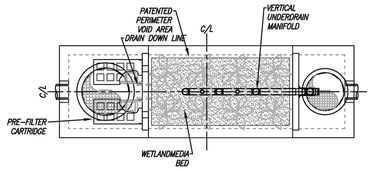
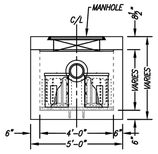
GRATE INLET FILTER
FULL CAPTURE
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.175			
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



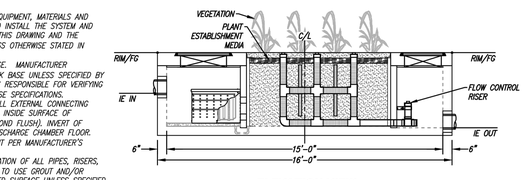
LEFT END VIEW

INSTALLATION NOTES

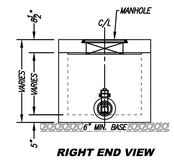
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.175
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.5
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO
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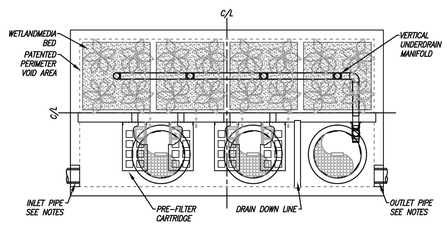
www.ContechES.com

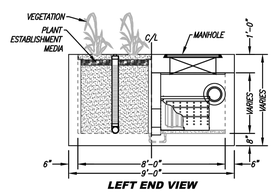
MWS-L-4-15-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.462			
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



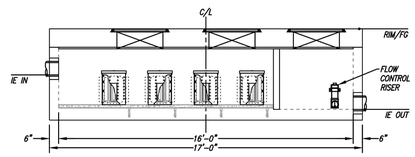
LEFT END VIEW

INSTALLATION NOTES

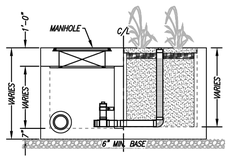
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
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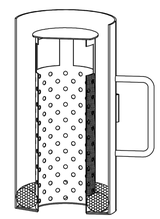
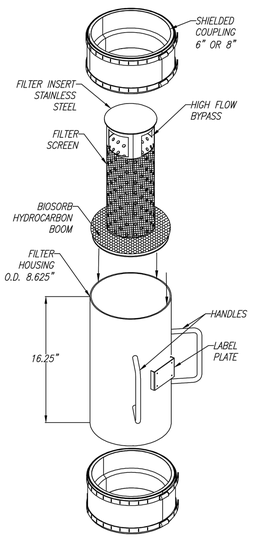
MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

BIO CLEAN 8" DIA DOWNSPOUT FILTER - SCREEN TYPE

FOR USE ON PIPES UP TO 8"



ISO VIEW



EXPLODED VIEW

BIO CLEAN 8" DIA DOWNSPOUT FILTER	
TREATMENT FLOW (CFS)	1.14
BYPASS FLOW (CFS)	2.25
FILTER SURFACE AREA (SQ FT)	1.30
SAND REMOVAL EFFICIENCY	≥60%

GENERAL NOTES

1. THE DEVICE SHALL BE SIZED ACCORDING TO THE NOMINAL SIZE OF THE INTERCONNECTING DRAINAGE SYSTEM. AT NO TIME SHALL THE ENTRANCE SIZE BE LARGER THAN THE EXIT SIZE.
2. THE DEVICE SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION TO PROVIDE MEANS FOR REPAIR AND MAINTENANCE.
3. THE DEVICE SHALL BE INSTALLED USING APPROVED ADAPTERS OR COUPLINGS TO ATTACH THE DEVICE TO THE DOWNSPOUT OR DRAINAGE PIPE. SHIELDED COUPLINGS ARE REQUIRED ON ALL APPLICATIONS. COUPLING SHALL BE PROPERLY TIGHTENED TO PIPE.
4. SCREENS ARE MADE OUT OF 46 MESH STAINLESS STEEL, 0.0055 INCH. WIRE DIAMETERS. 55% OPEN AROUND EXTERIOR OF FILTER INSERT.

WARRANTY: 1 YEAR MANUFACTURER'S		DOWNSPOUT FILTER SCREEN TYPE	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640		REVISIONS:	DATE:
		REVISIONS:	DATE:
DATE: 1/24/2020	SCALE: NTS	REVISIONS:	DATE:
DRAWTER: G.M.S.	UNITS = INCHES	REVISIONS:	DATE:

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O:\4100-4199\4118\4118BMPSITEMAP.dwg

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING * LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E.

Sheet 2 of 3 Sheets

4118/2 OF 3 SHEETS

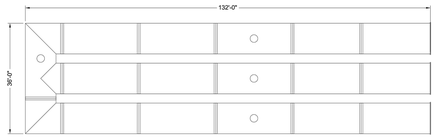
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 402 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 31,472 CF
- PIPE STORAGE VOLUME = 31,573 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 31,573 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}" \times \frac{1}{2}"$ CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN. QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

C:\CMP\DRAWINGS\ASSEMBLY - ALT2.DWG 10/18/2019 10:02 AM

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DATE	REVISION DESCRIPTION	BY

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800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19598 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA A
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19598	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

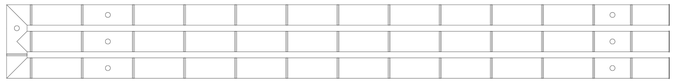
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 978 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 76,657 CF
- PIPE STORAGE VOLUME = 76,812 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 76,812 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}" \times \frac{1}{2}"$ CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN. QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 30'

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DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19599 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA B
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19599	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Last Update: 11/1/23
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CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

4118/3 OF 3 SHEETS

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

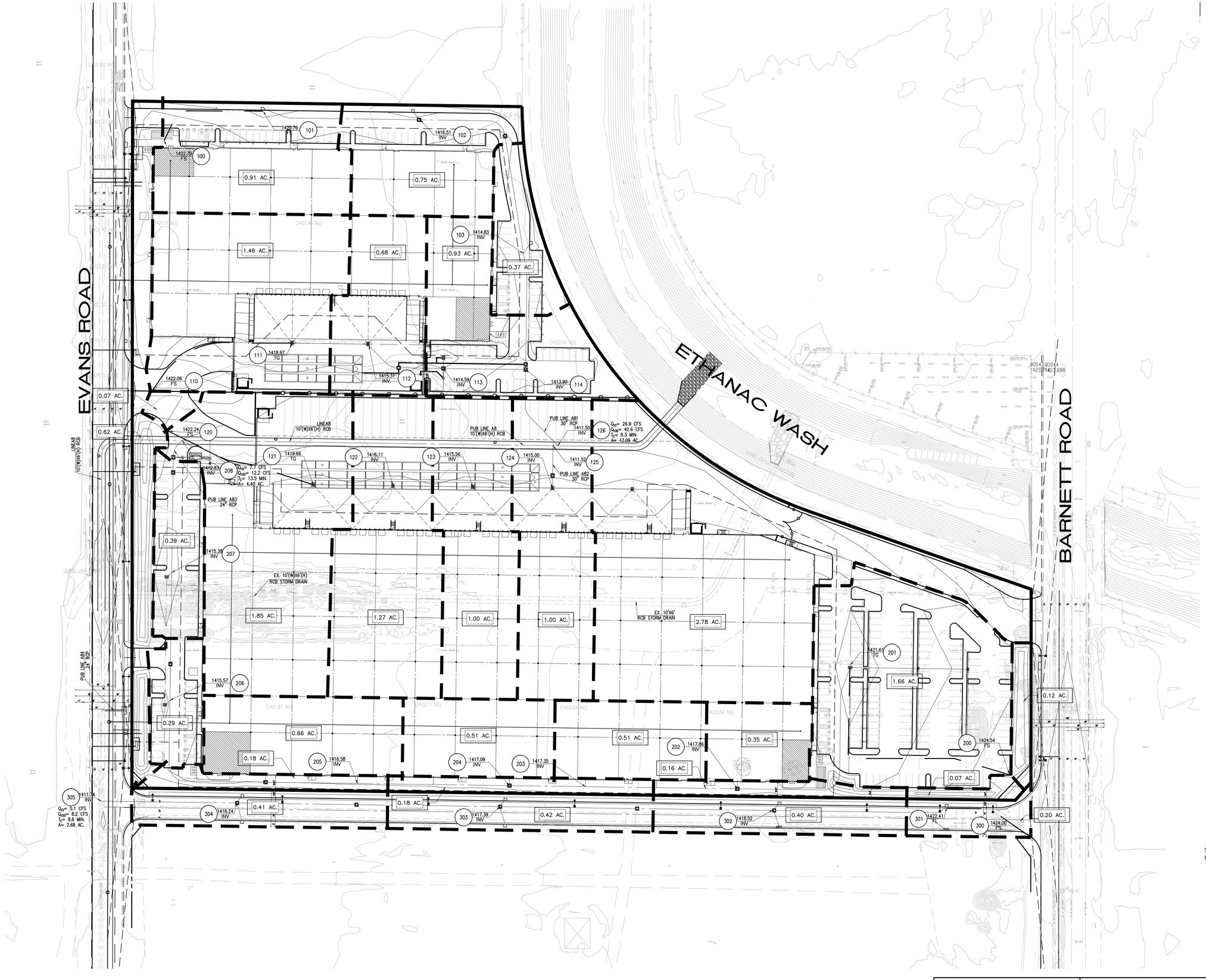
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14,349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

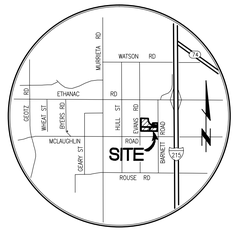
Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

Approved by _____ Date _____

Public Works Director _____ R.C.E. _____

Sheet 3 of 3 Sheets





VICINITY MAP

N.T.S.

0 25 50 100 150

SCALE:1"=50

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 4.10 AC. — SUBAREA AREA
- 100 — NODE NUMBER
- FLOW DIRECTION

SOIL C ROMOLAND C-1.42
RAIN FALL 100 YEAR
1 HOUR = 1.27"

Last Update: 11/1/23
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COUNTY OF RIVERSIDE
PUBLIC WORKS DEPARTMENT

PROPOSED CONDITION HYDROLOGY MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS ST BETWEEN ETHANAC RD AND McLAUGHLIN RD.

PREPARED FOR:
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Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E.
Sheet 1 of 1 Sheets

4118/1 OF 1 SHEET

Appendix 2: Construction Plans

Grading and Drainage Plans

CAUTION: IF THIS SHEET IS NOT 30"X42" IT IS A REDUCED PRINT

SITE PLAN GENERAL NOTES

1. THE SITE PLAN BASED ON THE SOILS REPORT PREPARED BY: T.B.D.

2. IF SOILS ARE EXPANSIVE IN NATURE, USE STEEL REINFORCING FOR ALL SITE CONCRETE.

3. ALL DIMENSIONS ARE TO THE FACE OF CONCRETE WALL, FACE OF CONCRETE CURB OR GRID LINE U.N.O.

4. SEE "C" PLANS FOR ALL CONCRETE CURBS, GUTTERS AND SWALES.

5. THE ENTIRE PROJECT SHALL BE PERMANENTLY MAINTAINED WITH AN AUTOMATIC IRRIGATION SYSTEM.

6. SEE "C" DRAWINGS FOR POINT OF CONNECTIONS TO OFF-SITE UTILITIES. CONTRACTOR SHALL VERIFY ACTUAL UTILITY LOCATIONS.

7. PROVIDE POSITIVE DRAINAGE AWAY FROM BLDG. SEE "C" DRAWINGS.

8. CONTRACTOR TO REFER TO "C" DRAWINGS FOR ALL HORIZONTAL CONTROL DIMENSIONS. SITE PLANS ARE FOR GUIDANCE AND STARTING LAYOUT POINTS.

9. SEE "C"DRAWINGS FOR FINISH GRADE ELEVATIONS.

10. CONCRETE SIDEWALKS TO BE A MINIMUM OF 4" THICK W/ TOOLED JOINTS AT 6' O.C. EXPANSION/CONSTRUCTION JOINTS SHALL BE A MAXIMUM 12' EA. WAY. EXPANSION JOINTS TO HAVE COMPRESSIVE EXPANSION FILLER MATERIAL OF 1/4". FINISH TO BE A MEDIUM BROOM FINISH U.N.O.

11. PAINT CURBS AND PROVIDE SIGNS TO INFORM OF FIRE LANES AS REQUIRED BY FIRE DEPARTMENT.

12. CONSTRUCTION DOCUMENTS PERTAINING TO THE LANDSCAPE AND IRRIGATION OF THE ENTIRE PROJECT SITE SHALL BE SUBMITTED TO THE BUILDING DEPARTMENT AND APPROVED BY PUBLIC FACILITIES DEVELOPMENT PRIOR TO ISSUANCE OF BUILDING PERMITS.

13. PRIOR TO FINAL CITY INSPECTION, THE LANDSCAPE ARCHITECT SHALL SUBMIT A CERTIFICATE OF COMPLETION TO PUBLIC FACILITIES DEVELOPMENT.

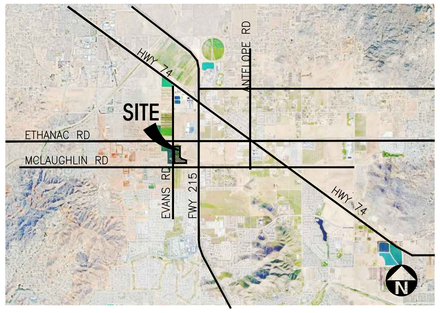
14. ALL LANDSCAPE AND IRRIGATION DESIGNS SHALL MEET CURRENT CITY STANDARDS AS LISTED IN GUIDELINES OR AS OBTAINED FROM PUBLIC FACILITIES DEVELOPMENT.

15. LANDSCAPED AREAS SHALL BE DELINEATED WITH A MINIMUM SIX INCHES (6") HIGH CURB.

SITE LEGEND

- PAVING PER CIVIL PLANS.
- STANDARD PARKING STALL (9' X 18')
- DISABLED PARKING STALL (9' X 18') + 5' W/ ACCESSIBLE AISLE
- DISABLED PARKING (VAN) STALL (12' X 18') + 5' W/ ACCESSIBLE AISLE
- LANDSCAPED AREA
- PATH OF TRAVEL
- 26' FIRE WIDE FIRELANE
- EXISTING PUBLIC FIRE HYDRANT
- PRIVATE FIRE HYDRANT- APPROXIMATE LOCATION

VICINITY MAP

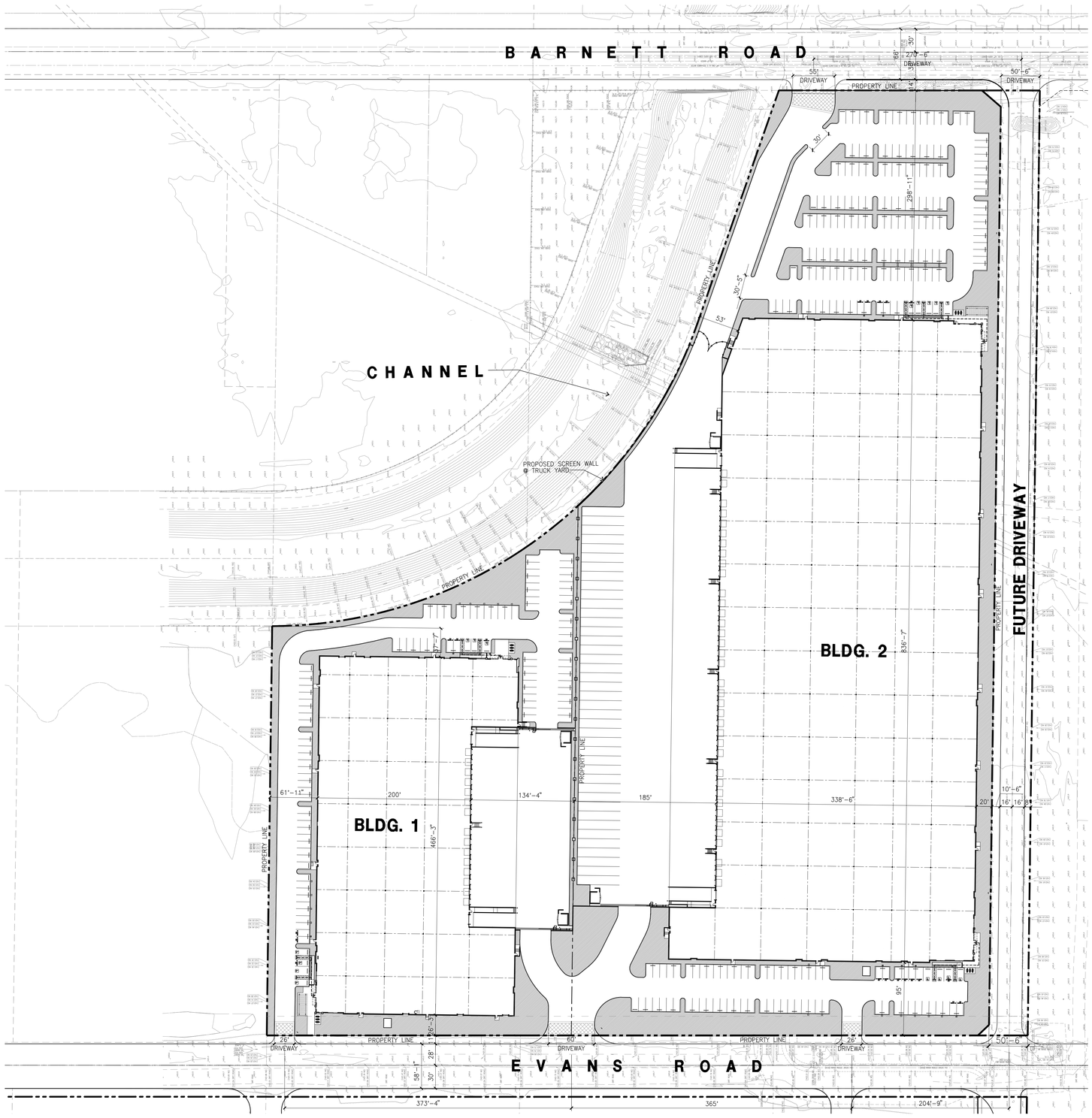


PROJECT DATA

	BLDG. 1	BLDG. 2	TOTAL
SITE AREA			
In s.f.	230,685	585,413	816,098 sf
In acres	5.30	13.44	18.74 ac
BUILDING AREA			
Office	6,000	8,000	14,000 sf
Mezzanine	0	7,000	7,000 sf
Warehouse	99,326	277,715	377,041 sf
TOTAL	**105,326**	**292,715**	**398,041** sf
FLOOR AREA RATIO			
Maximum Allowed	1.00	1.00	1.00
Actual	0.457	0.500	0.488
AUTO PARKING REQUIRED			
Office: 1/300 s.f.	20	50	70 stalls
Whse: 1K to 100K @ 1/1,000 s.f.,	100	100	200 stalls
Whse: 100K to 500K @ 1/1,500 s.f.	0	119	119 stalls
5% Reduction for street improvement	6	13	
5% Reduction for lot consolidation	6	13	
TOTAL	**108**	**243**	**351** stalls
AUTO PARKING PROVIDED			
Standard non-accessible	78	187	265 stalls
Accessible	4	5	9 stalls
Van Accessible	1	2	3 stalls
EVCS	4	12	16 stalls
EVCS Accessible	1	1	2 stalls
EVCS Van Accessible	1	1	2 stalls
EV Capable	19	36	55 stalls
TOTAL	108	244	**352** stalls
TRAILER PARKING PROVIDED			
Trailer (10' x 55')		41	41 stalls
LONG TERM BICYCLE PARKING REQUIRED			
PER CALGREEN 5% OF TOTAL PARKING	5	12	17 stalls
LONG TERM BICYCLE PARKING PROVIDED	6	12	18 stalls
SHORT TERM BICYCLE PARKING REQUIRED			
PER CALGREEN 5% OF TOTAL PARKING	5	12	17 stalls
LONG TERM BICYCLE PARKING PROVIDED	6	12	18 stalls
ZONING ORDINANCE			
Zoning Designation - Economic Development Corridor - Northern Gateway (EDC-NG)			
MAXIMUM BUILDING HEIGHT ALLOWED			
Height - 100'			
LANDSCAPE REQUIREMENT			
Percentage - 10%	23,068	58,541	81,610 sf
LANDSCAPE PROVIDED - OVERALL			
In s.f.	35,374	71,138	106,512 sf
Percentage	15.3%	12.2%	13.1%
LANDSCAPE PROVIDED WITHIN SETBACK FOR EVANS RD			
In s.f.	8,129	12,553	
LANDSCAPE PROVIDED EXCLUDING SETBACK AREA FOR EVANS RD			
In s.f.	27,245	58,585	85,830 sf
Percentage	11.8%	10.0%	10.5%
SETBACKS			
Front (Evans Rd) - 25'			
Street side - 15'			
Rear - 10'			

STATEMENT OF OPERATION

Speculative Development - Occupancy / Operations TBD (Potential Uses: General warehouse, distribution centers and storage; Manufacturing, Light or Medium-Intensity.)



MASTER SITE PLAN (A)
scale: 1" = 60'-0"

SCALE: 1" = 60'-0"
0 60' 120' 180'
TRUE NORTH

PROJECT INFORMATION

OWNER/APPLICANT

LOVETT INDUSTRIAL
120 NEWPORT CENTER DR. SUITE 217
NEWPORT BEACH, CA 92660
TEL: (949) 402-2760

PROJECT ADDRESS

T.B.D.
EVANS RD.& BARNETT RD. MENIFEE,CA

ASSESSOR'S PARCEL NUMBER

331-060-007
331-060-008
331-060-020
331-060-023
331-060-030

CODE ANALYSIS

2022 CALIFORNIA BUILDING CODE
2022 CALIFORNIA PLUMBING CODE
2022 CALIFORNIA MECHANICAL CODE
2022 CALIFORNIA ELECTRICAL CODE
2022 CALIFORNIA FIRE CODE
2022 CALIFORNIA GREEN BUILDING STANDARDS CODE
2022 CALIFORNIA ENERGY CODE

CODE ANALYSIS - BASED ON 2022 CBC

CONCRETE TILT-UP BUILDING

BUILDING OCCUPANCY: S-1/B
CONSTRUCTION TYPE: III-B
FIRE SPRINKLERS (AUTOMATIC): YES-ESFR
BUILDING 1: 105,326 S.F.
BUILDING 2: 292,715 S.F.
ALLOWABLE AREA (BASIC) S-1 = 70,000 S.F.
B = 76,000 S.F.

60' SIDE YARD WITH 40' AT <75% PERIMITER: UNLIMITED AREA PER CBC 507

ACTUAL PARAPET HEIGHT: 35'-6" TO 43'-6"
ACTUAL STORIES: 1 STORY
ALLOWABLE STORIES: 2 STORIES

ZONING

EDC-NG ECONOMIC DEVELOPMENT CORRIDOR-NORTHERN GATEWAY

FILE NUMBER

PLN23-0040

APPLICANT'S REPRESENTATIVE

HPA, INC.
18831 BARDEEN AVE.-SUITE 100
IRVINE, CA 92612
PHONE: (310)-387-9009
FAX: (949) 863-0851
CONTACT: JOSEPH KIM - JOSEPH.KIM@HPARCHS.COM

OFFICIAL USE ONLY

hpa, inc.
18831 bardeen avenue, - ste. #100
irvine, ca
92612
tel: 949•863•1770
fax: 949•863•0851
email: hpa@hparchs.com

Owner:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DR.
SUITE #217
NEWPORT BEACH, CA 92660
TEL: (949) 402-2760

Project:

NORTHERN GATEWAY LOGISTICS CENTER

EVANS & BARNETT RD.
MENIFEE, CA

Consultants:

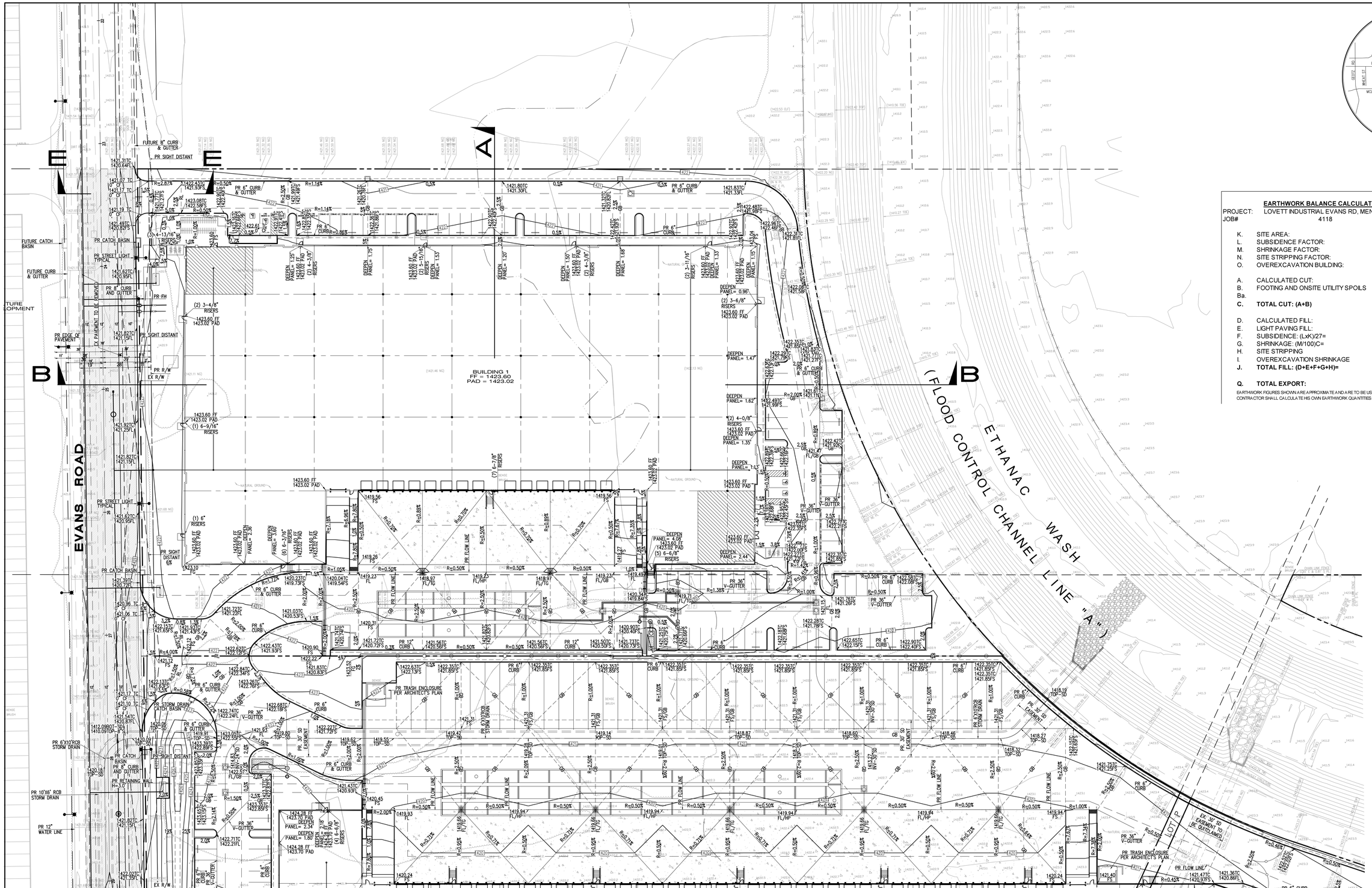
Civil:	THIENES
Structural:	
Mechanical:	
Plumbing:	
Electrical:	
Landscape:	HUNTER
Fire Protection:	-
Soils Engineer:	-

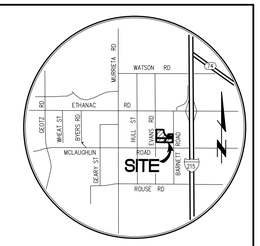
Title: MASTER SITE PLAN

Project Number:	22275
Drawn by:	JK
Date:	07/28/23
Revision:	

Sheet:

DAB-A1.0





VICINITY MAP
N.T.S.

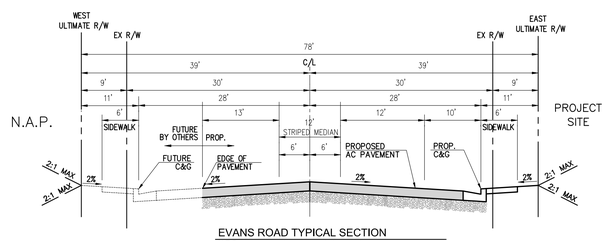
4/18/2023

EARTHWORK BALANCE CALCULATIONS

PROJECT: LOVETT INDUSTRIAL EVANS RD, MENIFEE
JOB# 4118

K.	SITE AREA:	962,400	SF
L.	SUBSIDENCE FACTOR:	0.13	FT
M.	SHRINKAGE FACTOR:	10.0	%
N.	SITE STRIPPING FACTOR:	0.04	
O.	OVEREXCAVATION BUILDING:	75,785	CY
A.	CALCULATED CUT:	28,600	CY
B.	FOOTING AND ONSITE UTILITY SPOILS	6,265	CY
Ba.		-	
C.	**TOTAL CUT: (A+B)**	**34,865**	CY
D.	CALCULATED FILL:	16,400	CY
E.	LIGHT PAVING FILL:	-	CY
F.	SUBSIDENCE: (LxK)/27=	4,456	CY
G.	SHRINKAGE: (M/100)C=	3,487	CY
H.	SITE STRIPPING	1,426	
I.	OVEREXCAVATION SHRINKAGE	7,579	CY
J.	**TOTAL FILL: (D+E+F+G+H)=**	**33,346**	CY
Q.	**TOTAL EXPORT:**	**1,519**	CY

EARTHWORK FIGURES SHOWN ARE APPROXIMATE AND ARE TO BE USE BY BUILDING DEPARTMENT ONLY. CONTRACTOR SHALL CALCULATE HIS OWN EARTHWORK QUANTITIES AND BID A COMPLETE JOB.



EVANS ROAD TYPICAL SECTION
N.T.S. INDUSTRIAL COLLECTOR (STD. 112)

LEGEND

PROPOSED STREET IMPROVEMENTS

SHEET INDEX

1. CONCEPTUAL GRADING PLAN & SECTIONS BLDG 1
2. CONCEPTUAL GRADING PLAN BLDG 2 WEST HALF
3. CONCEPTUAL GRADING PLAN BLDG 2 EAST HALF
4. CONCEPTUAL GRADING SECTIONS
5. CONCEPTUAL UTILITY PLAN
6. CONCEPTUAL STORM DRAIN PLAN
7. CONCEPTUAL STORM DRAIN PROFILES
8. CONCEPTUAL STORM DRAIN PROFILES
9. TRUCK TURNING EXHIBIT
10. EVANS RD. AND BARNETT RD. STRIPING PLAN

0 15 30 60 90
SCALE: 1" = 30'

OWNER/APPLICANT:
LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
CONTACT: LUKE SARMIENTO
PHONE: 562) 922-5784
luke.sarmiento@lovettindustrial.com

PREPARED BY:
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CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Last Update: 10/27/23
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CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

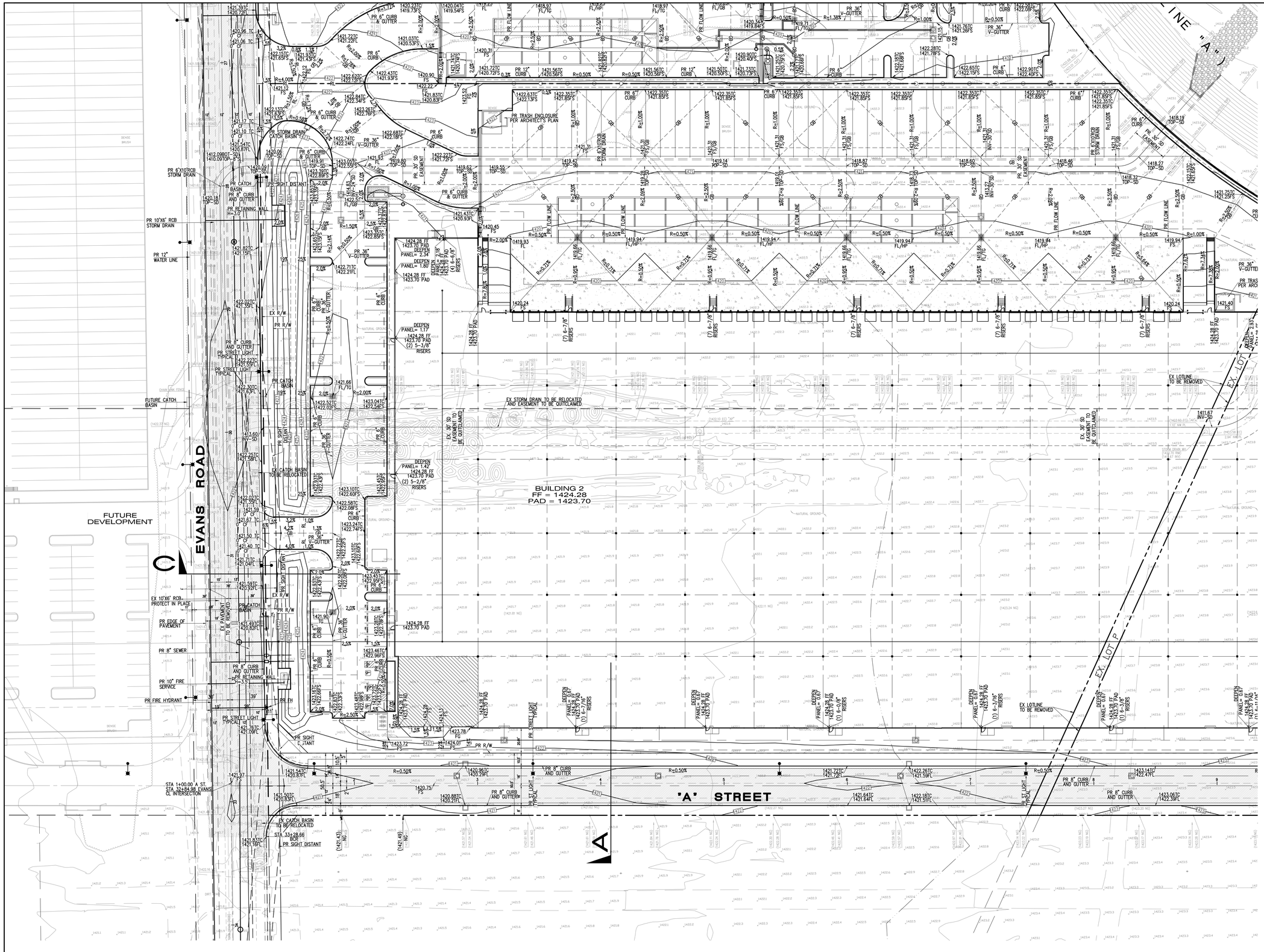
CONCEPTUAL GRADING PLAN
BUILDING 1
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

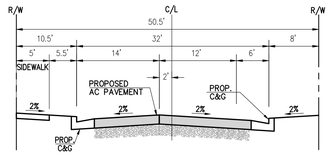
Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E. XXXXX

Sheet 1 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023





"A" STREET TYPICAL SECTION
N.T.S. TRUCK CORRIDOR

LEGEND

PROPOSED STREET IMPROVEMENTS

0 15 30 60 90
SCALE: 1" = 30'

OWNER/APPLICANT:
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NEWPORT BEACH, CA 92660
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CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

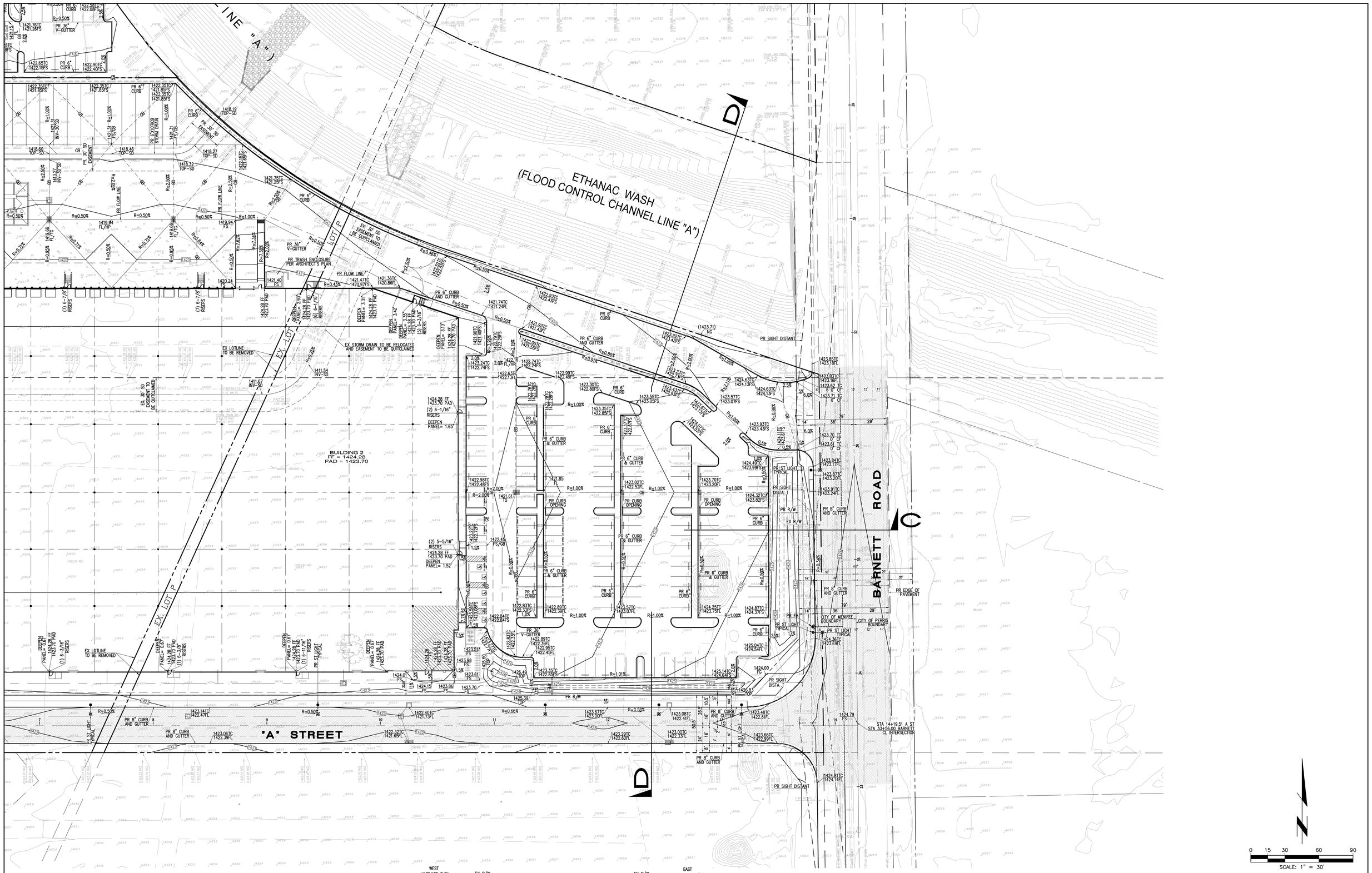
CONCEPTUAL GRADING PLAN
BUILDING 2
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

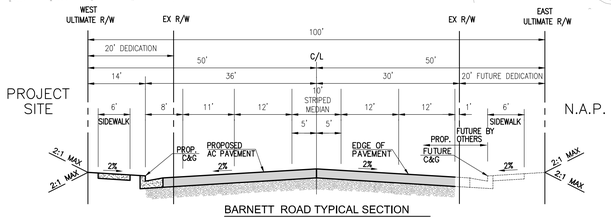
Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E. XXXXX

Sheet 2 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023





BARNETT ROAD TYPICAL SECTION
N.T.S. SECONDARY 4 LANES (STD. 111)

LEGEND

PROPOSED STREET IMPROVEMENTS

OWNER/APPLICANT:
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NEWPORT BEACH, CA 92660
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Last Update: 11/1/23
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Designed by	Approved by	Date
Date		
Checked by		
Date		
Designed by	Public Works Director	R.C.E. XXXXX
Date		
Checked by		
Date	Sheet 3 of 10 Sheets	

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL GRADING PLAN
BUILDING 2
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

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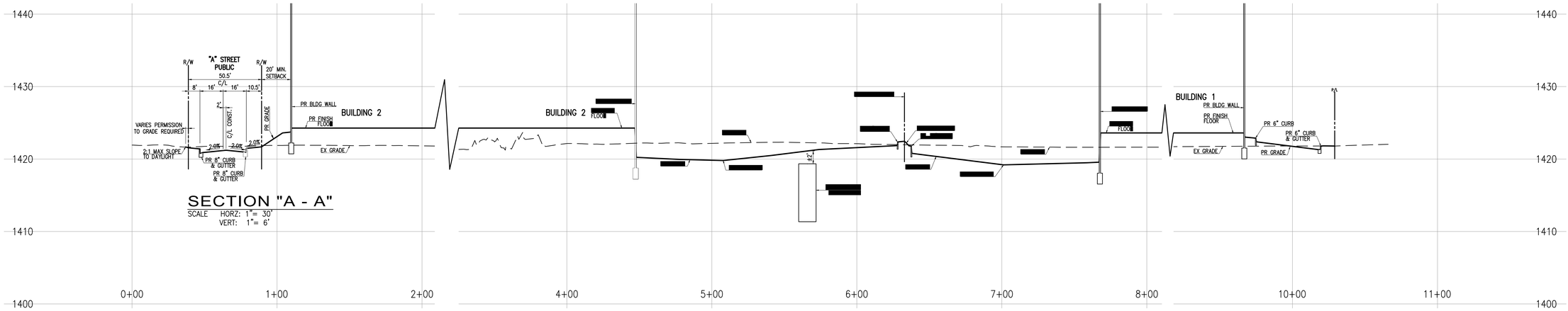
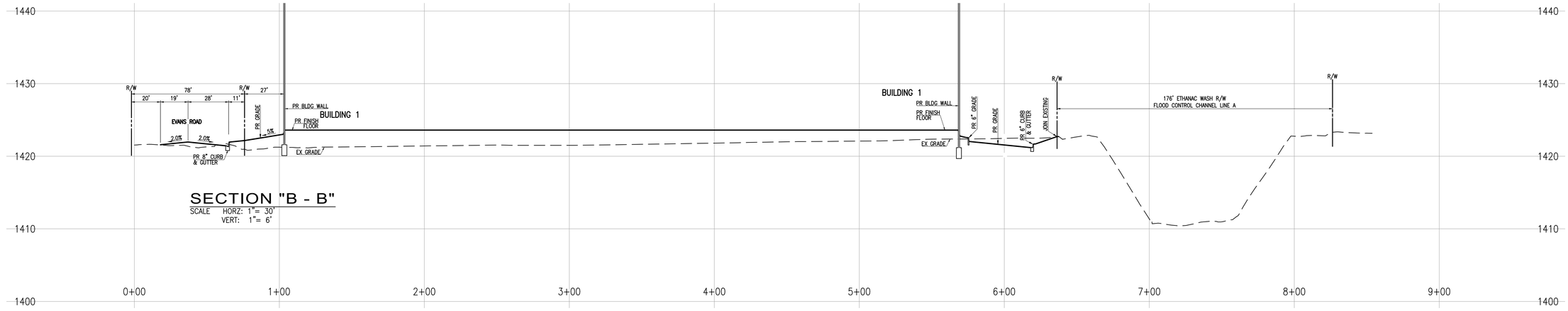


SECTION "A - A"

SCALE HORZ: 1"= 30'
VERT: 1"= 6'



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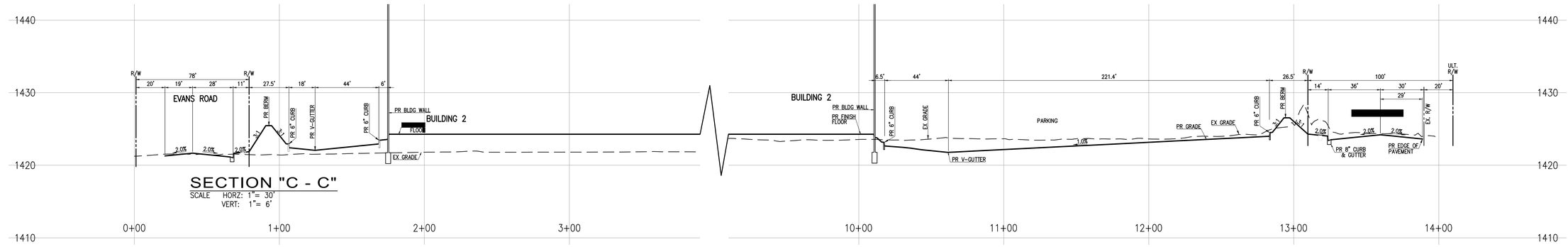

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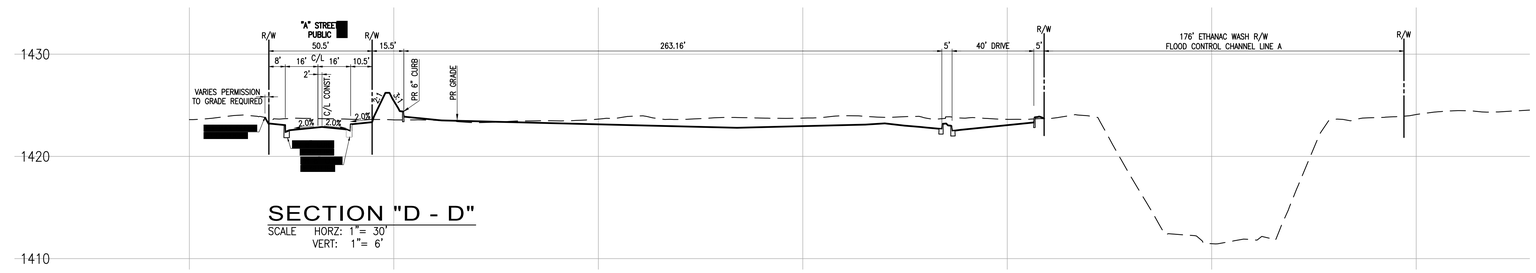

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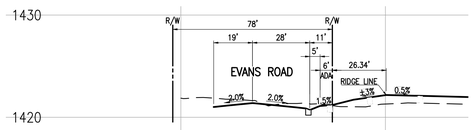

SECTION "E - E"

SCALE HORZ: 1"= 30'
VERT: 1"= 6'

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL GRADING PLAN SECTIONS

NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

OWNER/APPLICANT:
LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
CONTACT: LUKE SARMIENTO
PHONE: 562) 922-5784
luke.sarmiento@lovettindustrial.com

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING * LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Last Update: 10/27/23
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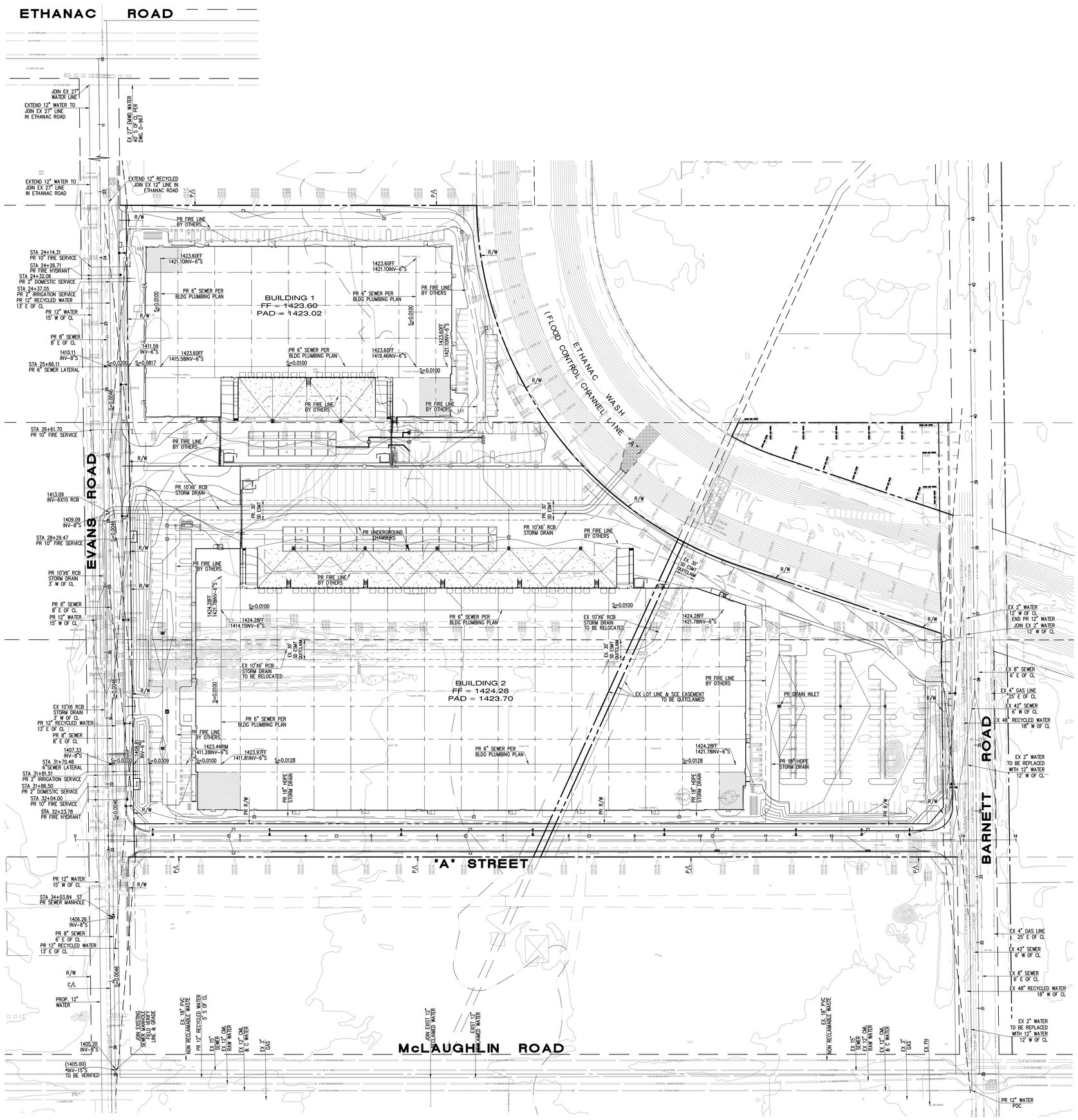
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E. XXXXX
Sheet 4 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023



CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL UTILITY PLAN

NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

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CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH:(714)521-4811 FAX(714)521-4173

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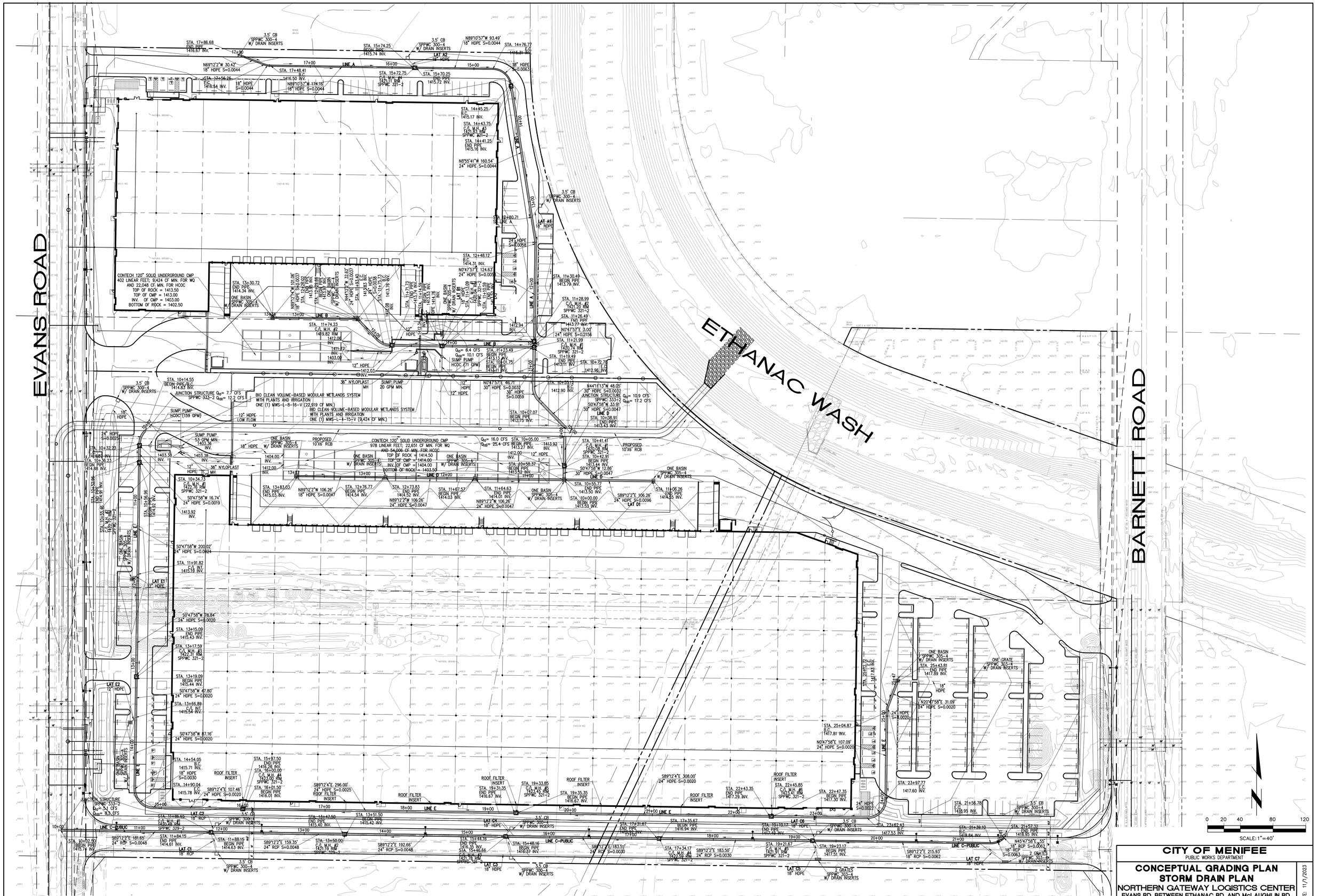
Public Works Director _____ R.C.E. XXXXX

Sheet **5** of **10** Sheets

TEI JN 4118 - PLOT DATE: 11/1/2023



OWNER/APPLICANT:
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CIVIL ENGINEERING * LAND SURVEYING
14349 FIRESTONE BOULEVARD
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PH:(714)521-4811 FAX:(714)521-4173

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CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL GRADING PLAN
STORM DRAIN PLAN
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

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Date
Designed by
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Checked by
Date

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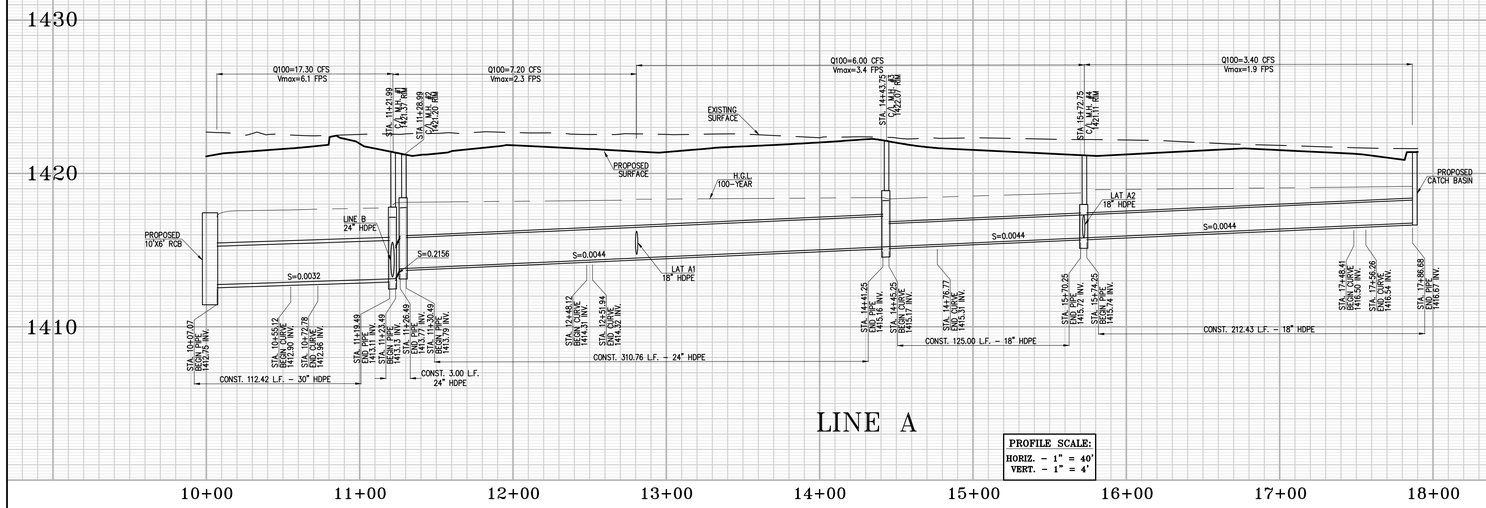
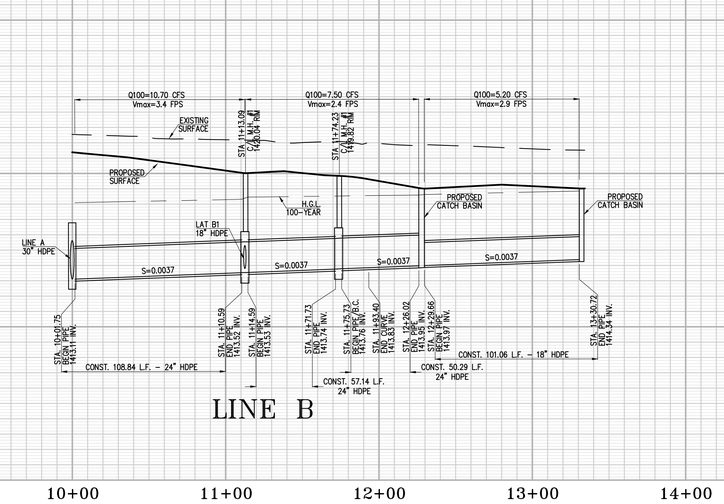
Public Works Director R.C.E. XXXXX

Sheet 6 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023



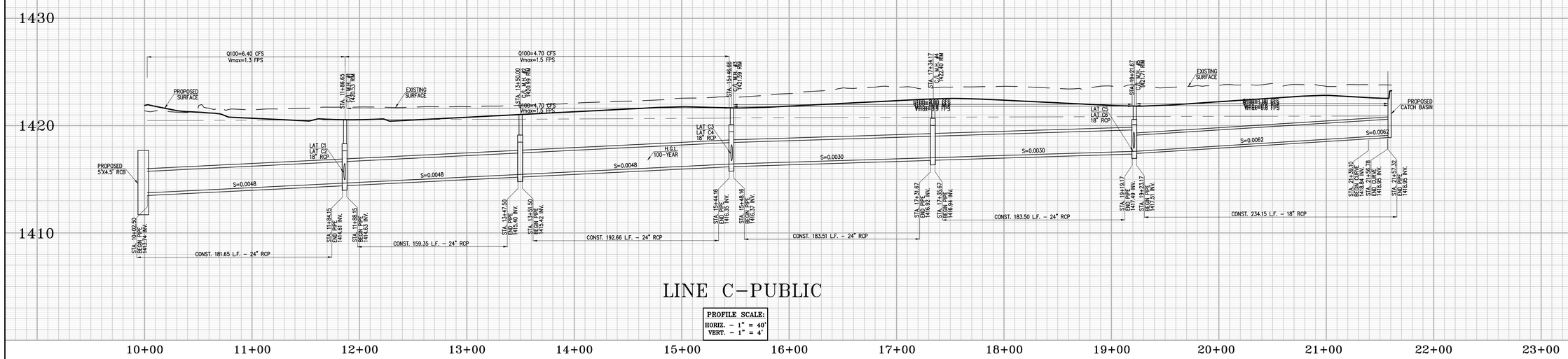
LINE A



LINE B

PROFILE SCALE:
HORIZ. - 1" = 40'
VERT. - 1" = 4'

*CONTRACTOR TO VERIFY LOCATION AND INVERT ELEVATIONS OF EXISTING UTILITIES AND DRAINAGE SYSTEMS AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO ANY CONSTRUCTION.



LINE C-PUBLIC

PROFILE SCALE:
HORIZ. - 1" = 40'
VERT. - 1" = 4'

*CONTRACTOR TO VERIFY LOCATION AND INVERT ELEVATIONS OF EXISTING UTILITIES AND DRAINAGE SYSTEMS AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO ANY CONSTRUCTION.

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL GRADING PLAN
STORM DRAIN PROFILES
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

OWNER/APPLICANT:
LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
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14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

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Public Works Director _____ R.C.E. XXXXX

Sheet 7 of 10 Sheets

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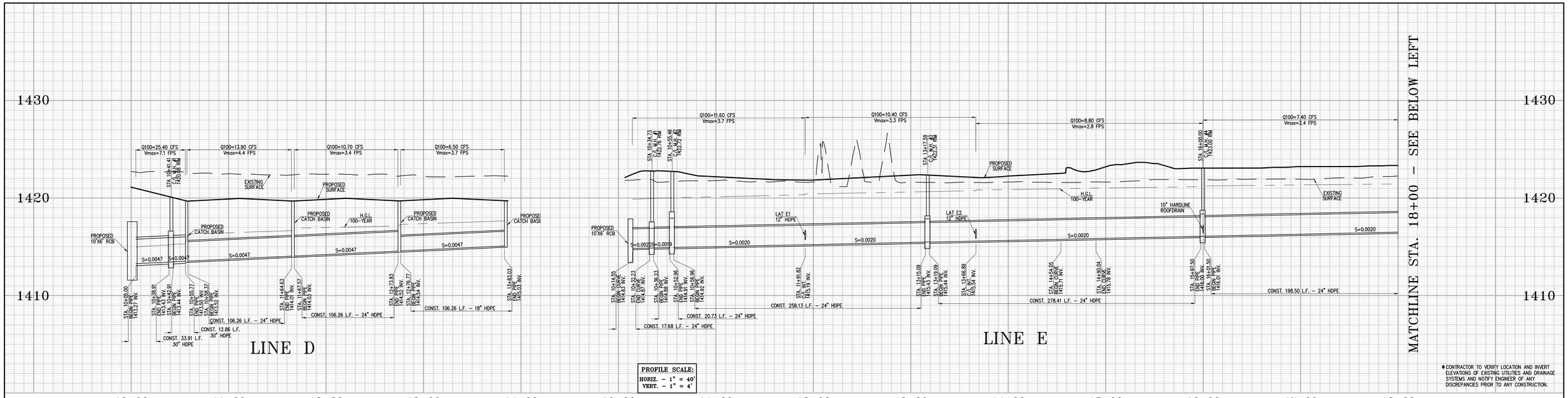

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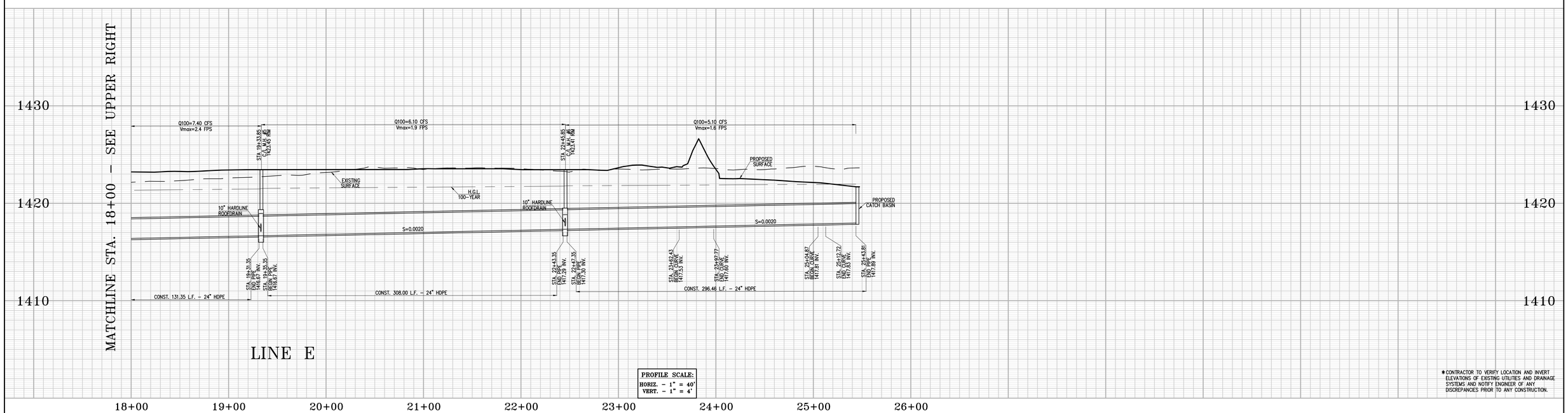

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Last Update: 10/24/23
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Date

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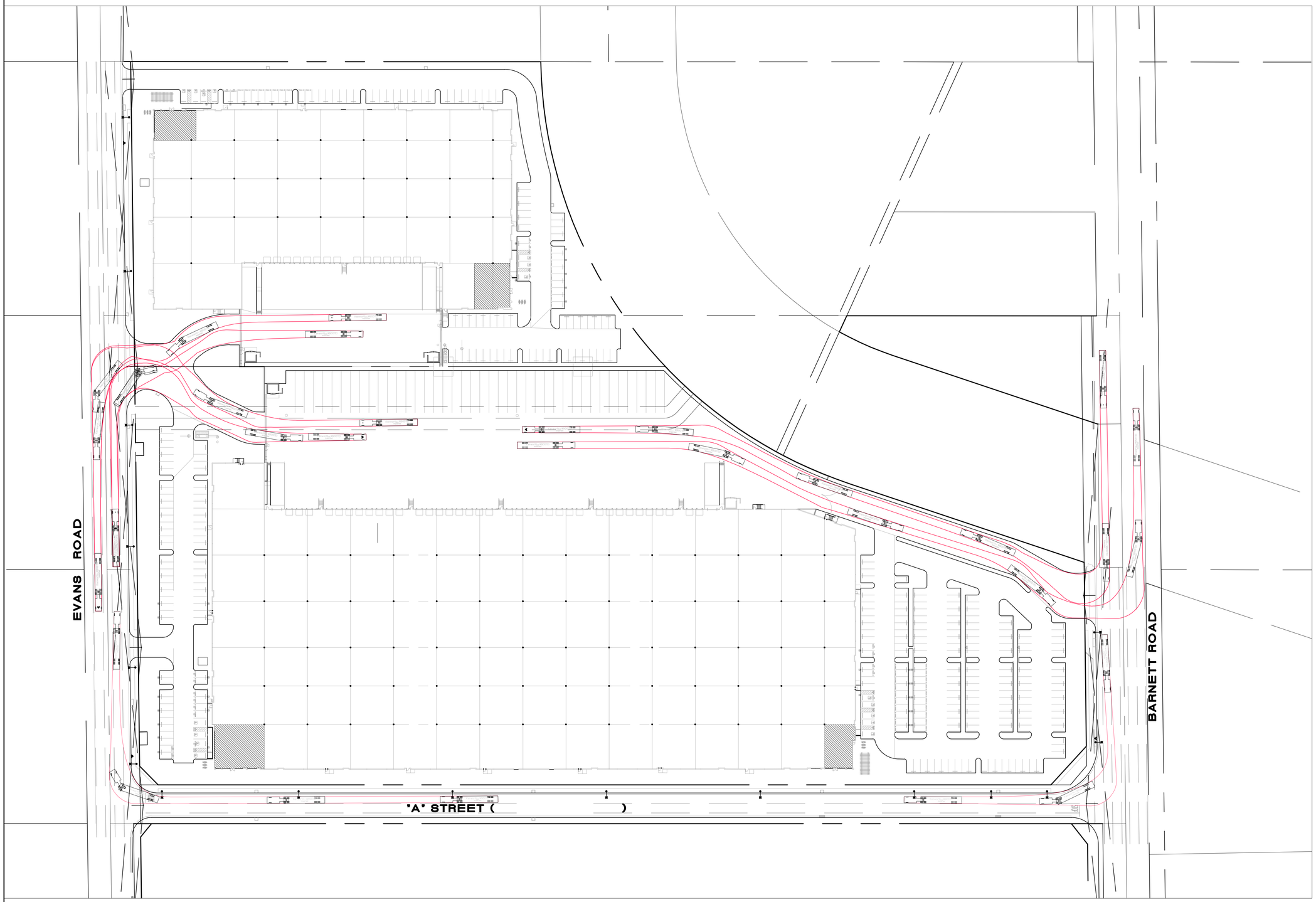
Public Works Director R.C.E. XXXXX

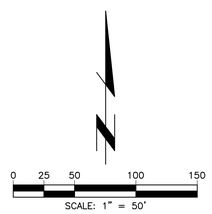
Sheet 8 of 10 Sheets

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

CONCEPTUAL GRADING PLAN
STORM DRAIN PROFILES
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

TEI JN 4118 – PLOT DATE: 11/1/2023





CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

TRUCK TURNING EXHIBIT

NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

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LOVETT INDUSTRIAL
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PH:(714)521-4811 FAX(714)521-4173

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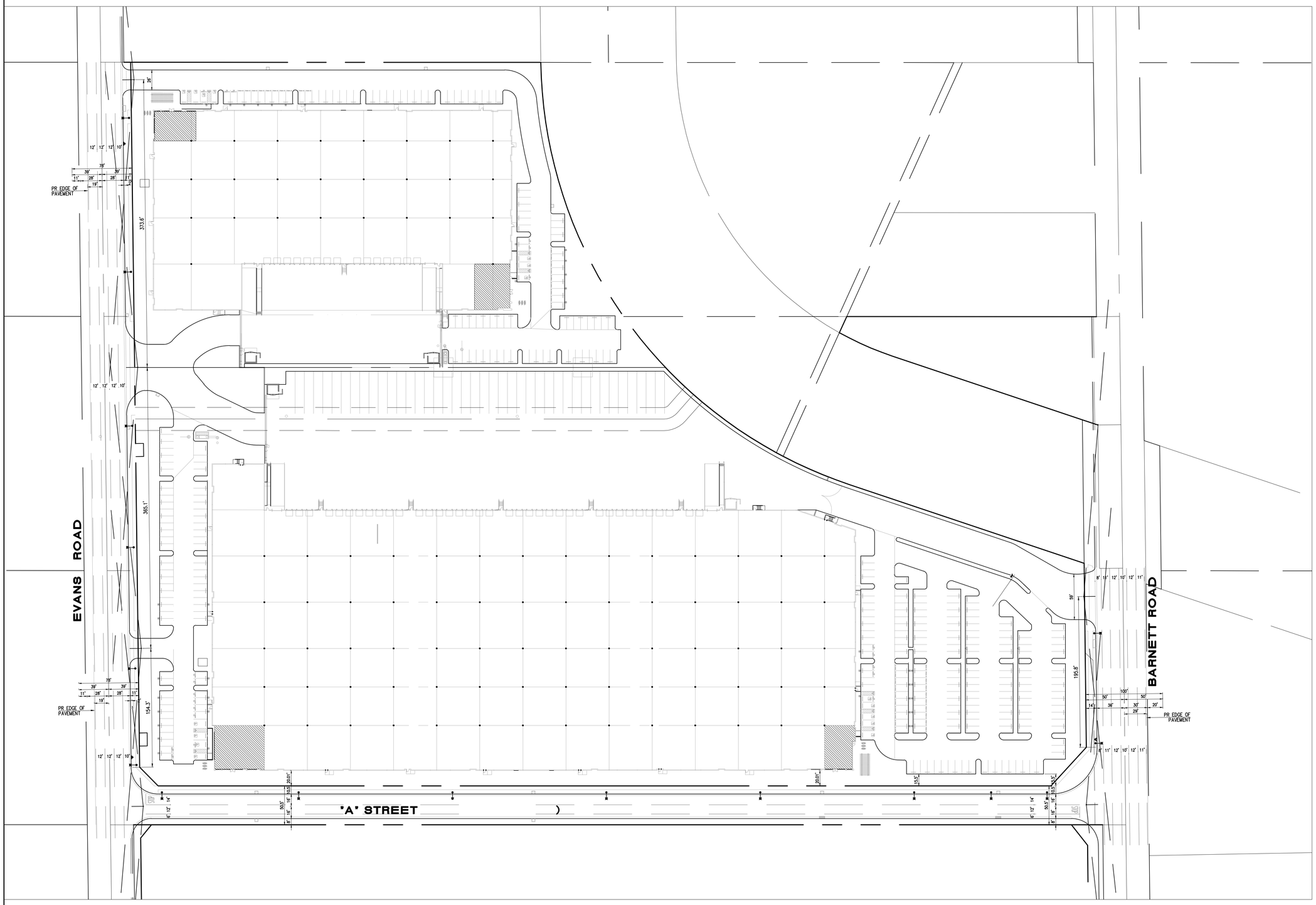
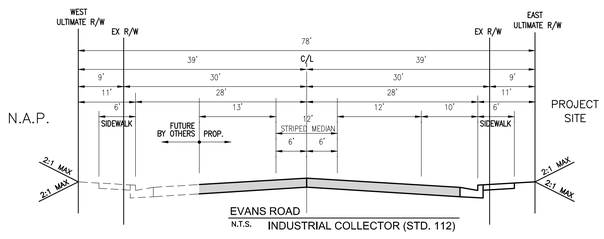
Checked by _____ Date _____

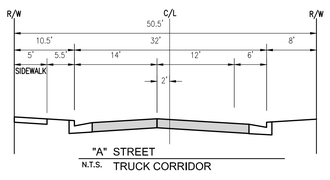
Approved by _____ Date _____
Public Works Director R.C.E. XXXXX

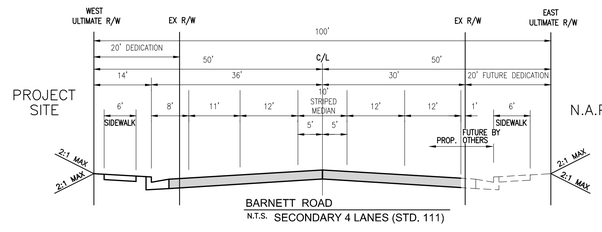
Sheet 9 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023









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14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

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CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

EVANS RD. AND BARNETT RD. STRIPING EXHIBIT

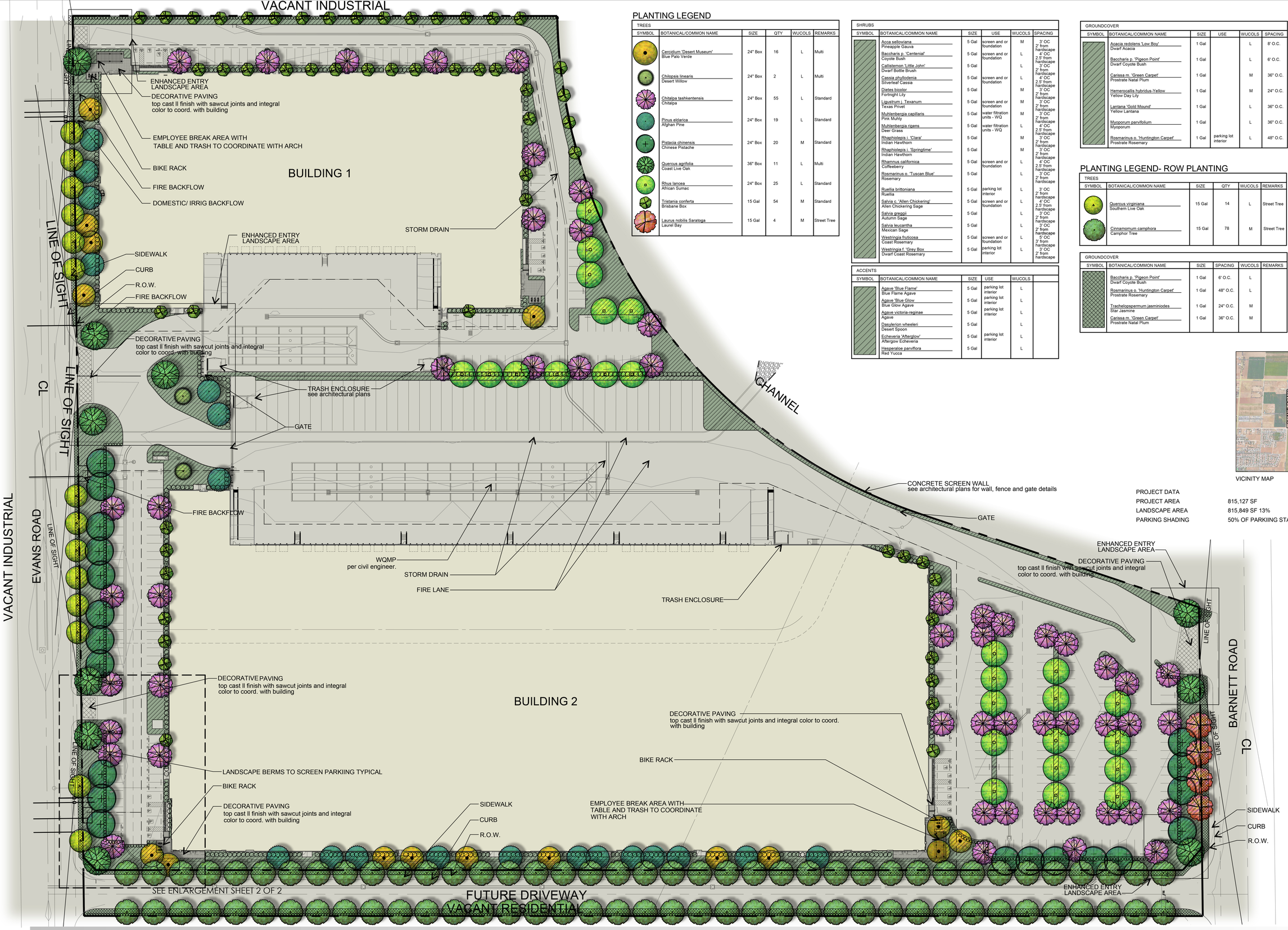
NORTHERN GATEWAY LOGISTICS CENTER
EVANS RD. BETWEEN ETHANAC RD. AND McLAUGHLIN RD.

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

Approved by _____ Date _____
Public Works Director _____ R.C.E. XXXXX

Sheet 10 of 10 Sheets

TEI JN 4118 – PLOT DATE: 11/1/2023



PLANTING LEGEND

TREES

SYMBOL	BOTANICAL/COMMON NAME	SIZE	QTY	WUCOLS	REMARKS
	Cercidium 'Desert Museum' Blue Palo Verde	24" Box	16	L	Multi
	Chilopsis linearis Desert Willow	24" Box	2	L	Multi
	Chitalpa tashkentensis Chitalpa	24" Box	55	L	Standard
	Pinus eldarica Afghan Pine	24" Box	19	L	Standard
	Pistacia chinensis Chinese Pistache	24" Box	20	M	Standard
	Quercus agrifolia Coast Live Oak	36" Box	11	L	Multi
	Rhus lancea African Sumac	24" Box	25	L	Standard
	Tristania conferta Brisbane Box	15 Gal	54	M	Standard
	Laurus nobilis Saratoga Laurel Bay	15 Gal	4	M	Street Tree

SHRUBS

SYMBOL	BOTANICAL/COMMON NAME	SIZE	USE	WUCOLS	SPACING
	Acca sellowiana Pineapple Gauva	5 Gal	screen and or foundation	M	3' OC 2' from hardscape
	Baccharis p. 'Centenial' Coyote Bush	5 Gal	screen and or foundation	L	4' OC 2.5' from hardscape
	Callistemon 'Little John' Dwarf Bottle Brush	5 Gal		L	3' OC 2' from hardscape
	Cassia phyllodenia Silverleaf Cassia	5 Gal	screen and or foundation	L	4' OC 2.5' from hardscape
	Dietes bicolor Fortnight Lily	5 Gal		M	3' OC 2' from hardscape
	Ligustrum j. Texanum Texas Privet	5 Gal	screen and or foundation	M	3' OC 2' from hardscape
	Muhlenbergia capillaris Pink Muhly	5 Gal	water filtration units - WQ	M	3' OC 2' from hardscape
	Muhlenbergia rigens Deer Grass	5 Gal	water filtration units - WQ	L	4' OC 2.5' from hardscape
	Rhaphiolepis i. 'Clara' Indian Hawthorn	5 Gal		M	3' OC 2' from hardscape
	Rhaphiolepis i. 'Springtime' Indian Hawthorn	5 Gal		M	3' OC 2' from hardscape
	Rhamnus californica Coffeeberry	5 Gal	screen and or foundation	L	4' OC 2.5' from hardscape
	Rosmarinus o. 'Tuscan Blue' Rosemary	5 Gal		L	3' OC 2' from hardscape
	Ruellia brittoniana Ruellia	5 Gal	parking lot interior	L	3' OC 2' from hardscape
	Salvia c. 'Allen Chickering' Allen Chickering Sage	5 Gal	screen and or foundation	L	4' OC 2.5' from hardscape
	Salvia greggi Autumn Sage	5 Gal		L	3' OC 2' from hardscape
	Salvia leucantha Mexican Sage	5 Gal		L	3' OC 2' from hardscape
	Westringia fruticosa Coast Rosemary	5 Gal	screen and or foundation	L	5' OC 3' from hardscape
	Westringia f. 'Grey Box Dwarf Coast Rosemary	5 Gal	parking lot interior	L	3' OC 2' from hardscape

ACCENTS

SYMBOL	BOTANICAL/COMMON NAME	SIZE	USE	WUCOLS	
	Agave 'Blue Flame' Blue Flame Agave	5 Gal	parking lot interior	L	
	Agave 'Blue Glow Blue Glow Agave	5 Gal	parking lot interior	L	
	Agave victoria-reginae Agave	5 Gal	parking lot interior	L	
	Dasylerion wheeleri Desert Spoon	5 Gal		L	
	Echeveria 'Afterglow' Aftergow Echeveria	5 Gal	parking lot interior	L	
	Hesperaloe parviflora Red Yucca	5 Gal		L	

GROUNDCOVER

SYMBOL	BOTANICAL/COMMON NAME	SIZE	USE	WUCOLS	SPACING
	Acacia redolens 'Low Boy' Dwarf Acacia	1 Gal		L	8' O.C.
	Baccharis p. 'Pigeon Point' Dwarf Coyote Bush	1 Gal		L	6' O.C.
	Carissa m. 'Green Carpet' Prostrate Natal Plum	1 Gal		M	36" O.C.
	Hemerocallis hybridus-Yellow Yellow Day Lily	1 Gal		M	24" O.C.
	Lantana 'Gold Mound' Yellow Lantana	1 Gal		L	36" O.C.
	Myoporum parvifolium Myoporum	1 Gal		L	36" O.C.
	Rosmarinus o. 'Huntington Carpet' Prostrate Rosemary	1 Gal	parking lot interior	L	48" O.C.

3' High Screen Hedge at Parking Area
Foundation Planting

Building 1
Site Area 230,685 sf
Landscape Area 36,037 sf
Shaded Parking Area 8,748 sf req. 9,101 sf provided

Building 2
Site Area 647,916 sf
Landscape Area 69,800 sf
Shaded Parking Area 19,602 sf req. 21,000 sf provided

NOTE:
All improvements are to be maintained by the property owner

Vines to be applied to large expanses of walls.
Trees within 5' of building or hardscape shall have a linear root barrier.

All planting areas to receive 3" deep organic mulch

Agronomical soil report to be taken immediately after mass grading and all soils to be amended per report.

Irrigation to be drip, rotators and bubblers. Irrigation to comply with Water Efficient Landscape Ordinance.

Irrigation to be designed as reclaimed - available along all of Barnett Rd Confirmed by Emily with the EMWD, 951-928-3777 ext. 2081

Plants 30" or less high and 42" wide or less in interior parking areas.

MINIMUM TREE CLEARANCES
10' FROM ANY WATER OR SEWER LINE
30' FROM ANY INTERSECTION
10' FROM ANY STREET LIGHT
10' FROM ANY FIRE HYDRANT AND STREET SIGN
15' FROM ANY COMMERCIAL DRIEWAY
MATURE HEIGHT MAXIMUM 20' IF PLANTING UNDER UTLITY LINES

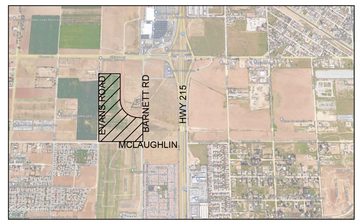
PLANTING LEGEND- ROW PLANTING

TREES

SYMBOL	BOTANICAL/COMMON NAME	SIZE	QTY	WUCOLS	REMARKS
	Quercus virginiana Southern Live Oak	15 Gal	14	L	Street Tree
	Cinnamomum camphora Camphor Tree	15 Gal	78	M	Street Tree

GROUNDCOVER

SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	WUCOLS	REMARKS
	Baccharis p. 'Pigeon Point' Dwarf Coyote Bush	1 Gal	6' O.C.	L	
	Rosmarinus o. 'Huntington Carpet' Prostrate Rosemary	1 Gal	48" O.C.	L	
	Trachelospermum jasminiodes Star Jasmine	1 Gal	24" O.C.	M	
	Carissa m. 'Green Carpet' Prostrate Natal Plum	1 Gal	36" O.C.	M	



VICINITY MAP

PROJECT DATA	
PROJECT AREA	815,127 SF
LANDSCAPE AREA	815,849 SF 13%
PARKING SHADING	50% OF PARKIING STALL AREA

OWNER/APPLICANT
LOVETT INDUSTRIAL
880 APOLLO ST, STE 301
EL SEGUNDO, CA 90345
TEL: 949-402-2760
CONTACT TYLER
BANTON
TYLER
BANTON@LOVETTINDUSTRIAL.COM

CIVIL ENGINEER
THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRANDA, CA 90638
TEL: 714-521-4811
CONTACT BRIAN
THIENES
BRIAN@THIENESENG.COM

ARCHITECT
HPA,INC
18831 BARDEEN AVE,
STE 100
IRVINE, CA 92612
TEL: 949-862-2135
CONTACT JOSPEPH KIM
JOSEPH@HPACHS.COM

APN:	PLN
331-060-007	23-0040
331-060-008	
331-060-020	
331-060-023	
331-060-030	

REGISTERED LANDSCAPE ARCHITECT
THOMAS K. HAYES
Expiration Date 1/31/2025
STATE OF CALIFORNIA

0 30' 60' 120'

N

SHEET 1 OF 3

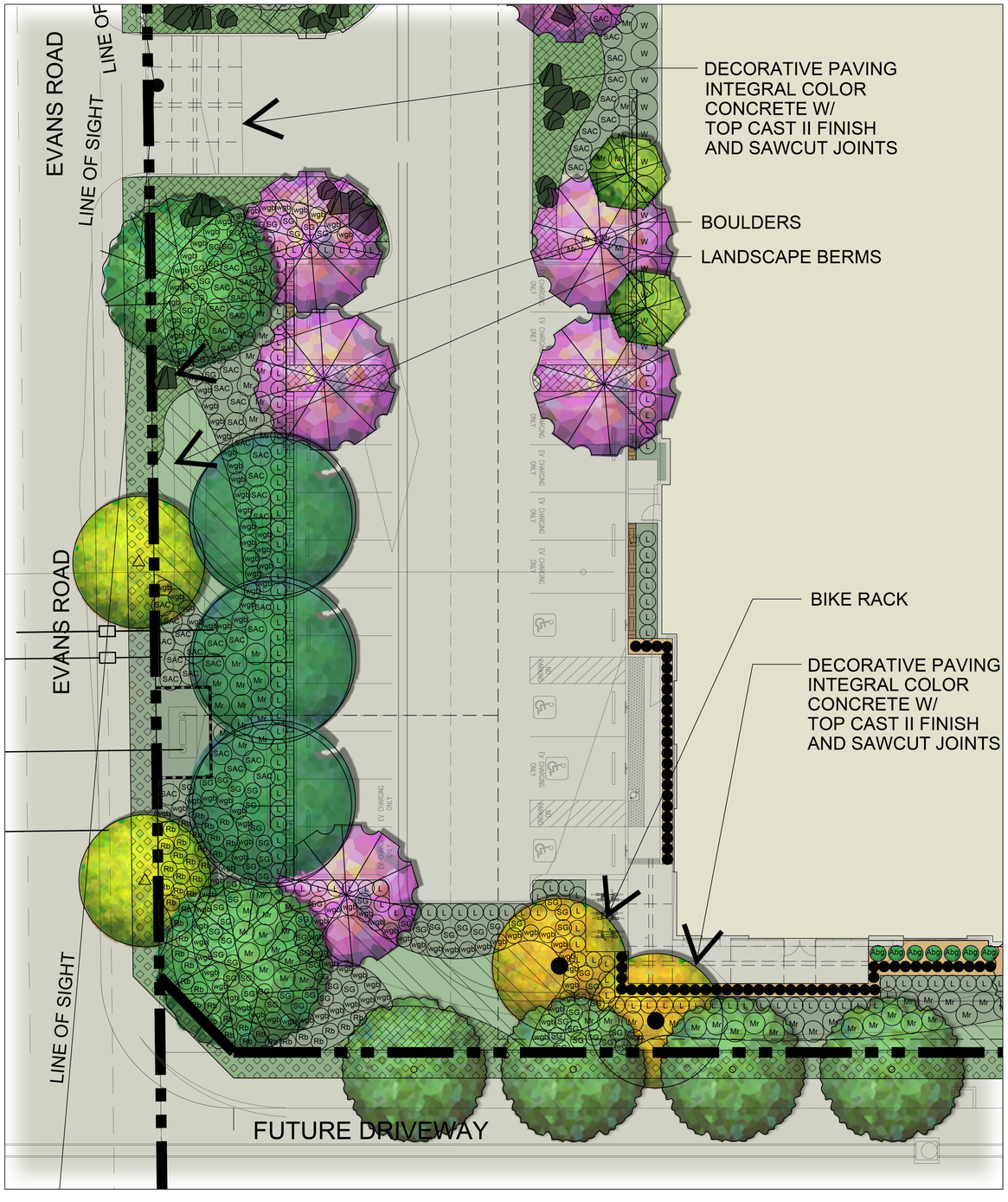
Menifee Logistics

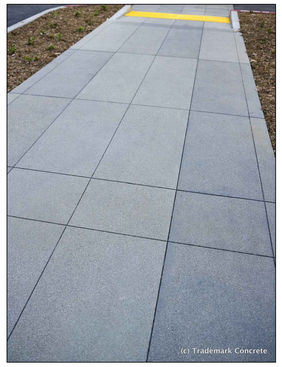
23-012
01.18.23 07.26.23
04.11.23 11.08.23
05.11.23

New Industrial Facility

Menifee, California

HUNTER LANDSCAPE
711 FEE ANA STREET PLACENTIA, CA 92870
714.986.2400 FAX 714.986.2408





DECORATIVE CONCRETE

WATER EFFICIENT LANDSCAPE WORKSHEET (Building 1)

Reference Evapotranspiration Rate (Eto): 57.33

Hydrozone # / Planting Description	Plant Factor (PF)	Irrigation Method	Irrigation Efficiency (IE)	ETAF (PF/IE)	Landscape Area	ETAF x Area	Estimated Total Water Use (ETWU) Gallons per Year	Estimated Total Water Use (ETWU) Acre Feet per Year
Regular Landscape Areas Potable Water								
[redacted]				1.00	-			
				1.00	-			
				1.00	-			
				1.00	-			
				Totals	**-**	**-**		
						ETWU Total	-	0.00
			Maximum Allowed Water Allowance (MAWA)				-	0.00
Special Landscape Areas Recycled Water								
Hydrozone 1	0.4	Drip	0.9	0.44	10,000	4,444	127,961	0.39
Hydrozone 2	0.4	Drip	0.9	0.44	20,037	8,905	256,395	0.79
Hydrozone 4	0.4	Rotary	0.75	0.5	5,000	2,667	53,317	0.16
Hydrozone 7	0.4	Bubbler	0.85	0.47	1,000	471	12,085	0.04
				Totals	**36,037**	**16,487**		
						ETWU Total	449,757	1.38
			Maximum Allowed Water Allowance (MAWA)				576,414	1.77

WATER EFFICIENT LANDSCAPE WORKSHEET (Building 2)

Reference Evapotranspiration Rate (Eto): 57.33

Hydrozone # / Planting Description	Plant Factor (PF)	Irrigation Method	Irrigation Efficiency (IE)	ETAF (PF/IE)	Landscape Area	ETAF x Area	Estimated Total Water Use (ETWU) Gallons per Year	Estimated Total Water Use (ETWU) Acre Feet per Year
Regular Landscape Areas Potable Water								
[redacted]				1.00				
				1.00				
				1.00				
				1.00				
				Totals	**-**	**-**		
						ETWU Total	-	0.00
			Maximum Allowed Water Allowance (MAWA)				-	0.00
Special Landscape Areas Recycled Water								
Hydrozone 1	0.4	Drip	0.9	0.44	20,000	8,889	255,921	0.79
Hydrozone 2	0.4	Drip	0.9	0.44	36,800	16,356	232,541	0.71
Hydrozone 4	0.4	Rotary	0.75	0.5	10,000	5,333	75,828	0.23
Hydrozone 6	0.4	Bubbler	0.85	0.47	3,000	1,412	20,072	0.06
				Totals	**69,800**	**31,990**		
						ETWU Total	**584,363**	1.79
			Maximum Allowed Water Allowance (MAWA)				**2,519,403**	7.73

SHRUBS					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	WUCOLS	USE
①	Ligustrum j. Texanum Texas Privet	5 Gal	3' OC 2' from hardscape	M	screen and or foundation
(M)	Muhlenbergia rigens Deer Grass	5 Gal	4' OC 2.5' from hardscape	M	water filtration units - WQ
(RD)	Ruellia brittoniana Ruellia	5 Gal	3' OC 2' from hardscape	L	parking lot interior
(SAC)	Salvia c. 'Allen Chickering' Allen Chickering Sage	5 Gal	4' OC 2.5' from hardscape	L	screen and or foundation
(SG)	Salvia greggii Autumn Sage	5 Gal	3' OC 2' from hardscape	L	
(W)	Westringia fruticosa Coast Rosemary	5 Gal	5' OC 3' from hardscape	L	screen and or foundation
(WB)	Westringia f. 'Grey Box Dwarf Coast Rosemary	5 Gal	3' OC 2' from hardscape	L	parking lot interior

ACCENTS					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	WUCOLS	USE
(Abg)	Agave 'Blue Glow Blue Glow Agave	5 Gal	42" OC	L	parking lot interior
●	Aloe striata Coral Aloe	1 Gal	2' OC	L	parking lot interior

GROUNDCOVER					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	WUCOLS	USE
	Myoporum parvifolium Myoporum	1 Gal	36" O.C.	L	
	Rosmarinus o. 'Huntington Carpet' Prostrate Rosemary	1 Gal	48" O.C.	L	parking lot interior
	Carissa m. 'Green Carpet' Prostrate Natal Plum	1 Gal	36" O.C.	M	right of way palette

VINES					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	QTY	WUCOLS	USE
▲	Distictus buccinatoria Blood-red Trumpet Vine	1 Gal	380	L	

Menifee Logistics

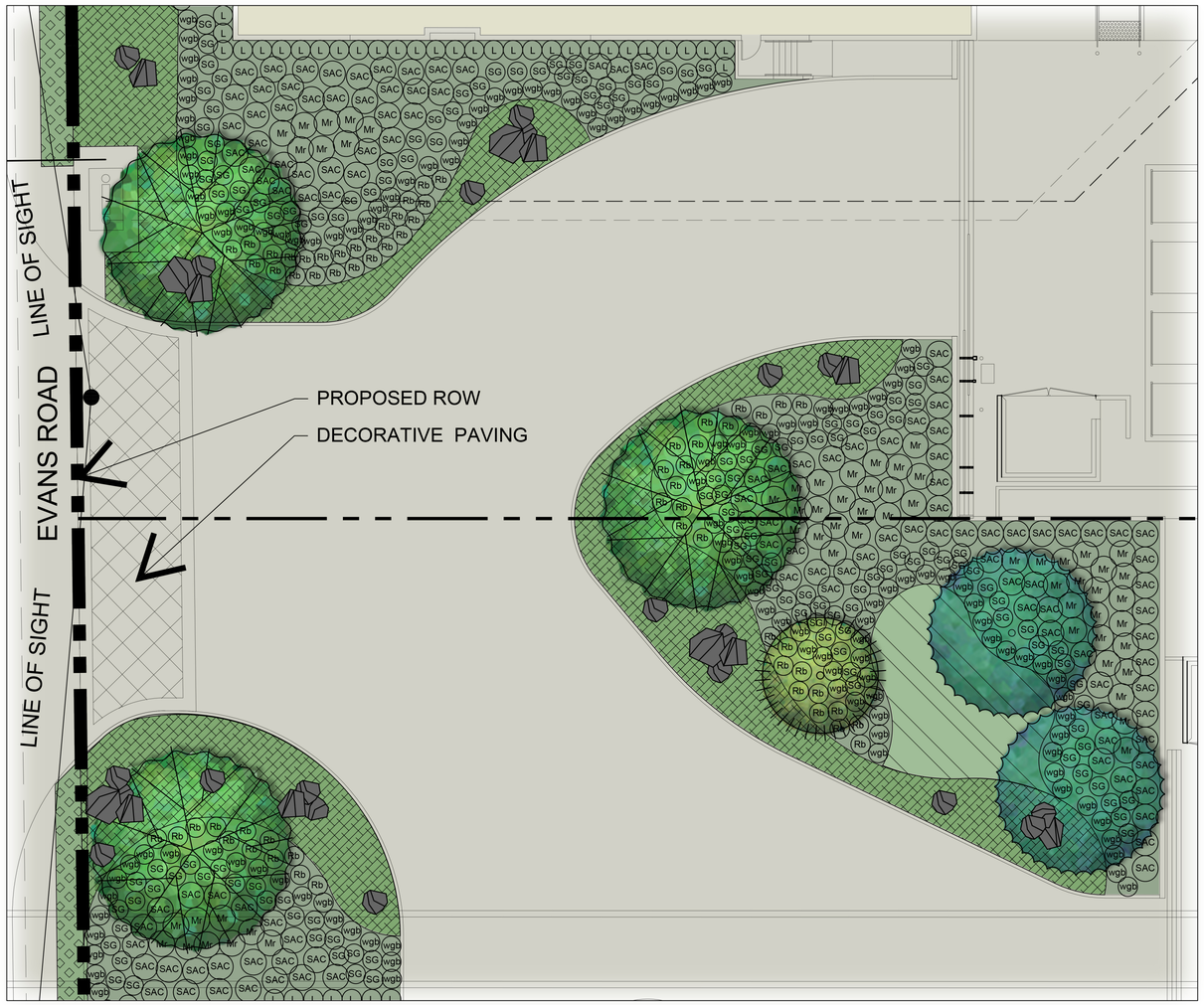
23-012
01.18.23 07.26.23
04.11.23 11.08.23
05.11.23

REGISTERED LANDSCAPE ARCHITECT
THOMAS K. HAYES
1/31/2025
Date
STATE OF CALIFORNIA

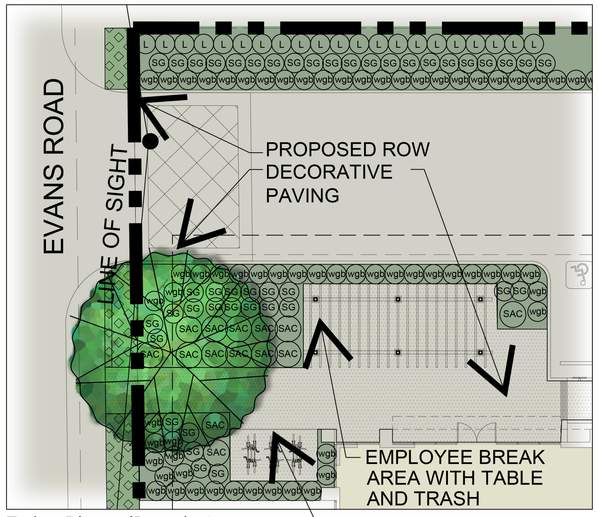
New Industrial Facility

Menifee, California

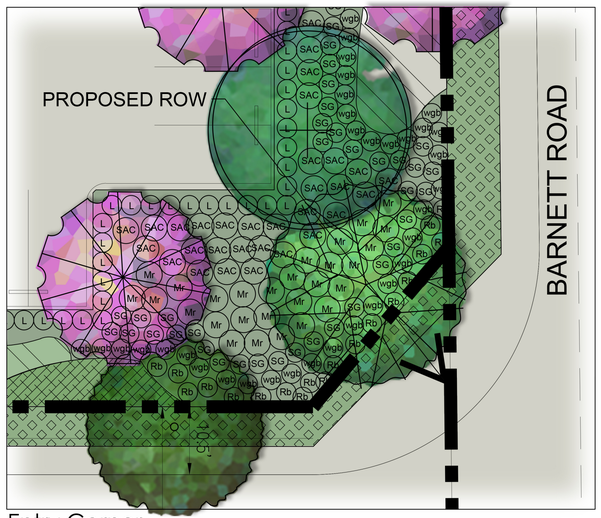
HUNTER LANDSCAPE
711 FEE ANA STREET PLACENTIA, CA 92870
714.986.2400 FAX 714.986.2408



Entry Plaza/ Break Area
Enlargement 1"=10'



Entry Plaza/Break Area
Enlargement 1"=10'



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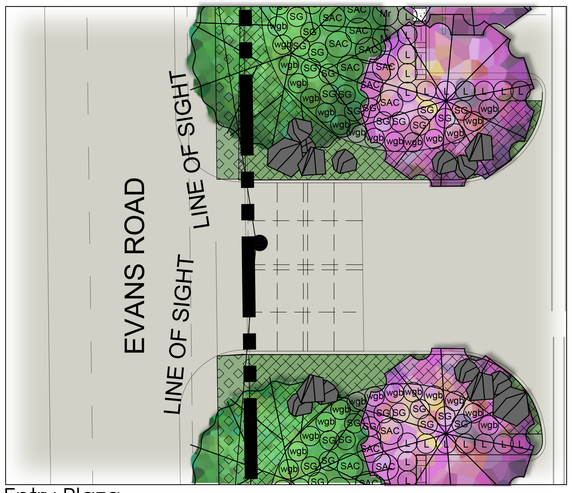
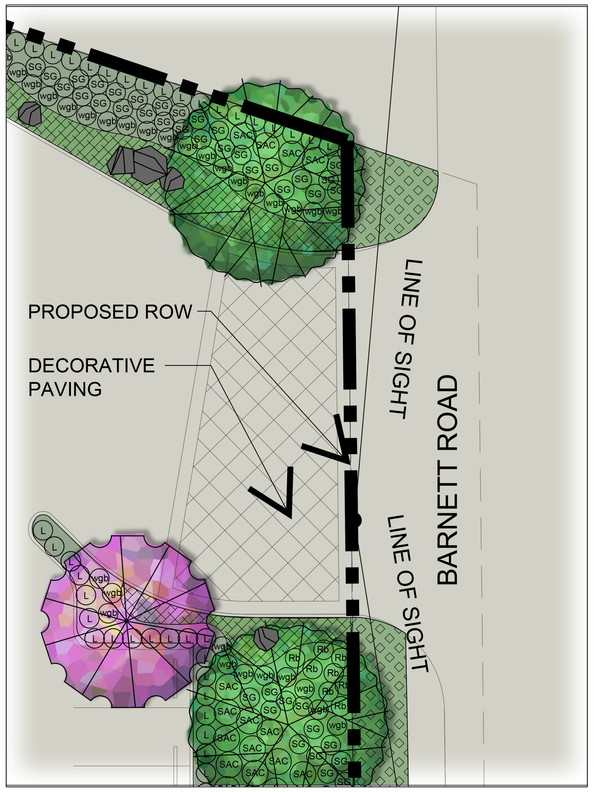
Enlargement 1"=10'



Entry Plaza
Enlargement 1"=10'



Entry Plaza
Enlargement 1"=10'

SHRUBS					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	SPACING	WUCOLS	USE
(L)	Ligustrum j. Texanum Texas Privet	5 Gal	3' OC 2' from hardscape	M	screen and or foundation
(Mr)	Muhlenbergia rigens Deer Grass	5 Gal	4' OC 2.5' from hardscape	M	water filtration units - WQ
(Rb)	Ruellia brittoniana Ruellia	5 Gal	3' OC 2' from hardscape	L	parking lot interior
(SAC)	Salvia c. 'Allen Chickering' Allen Chickering Sage	5 Gal	4' OC 2.5' from hardscape	L	screen and or foundation
(SG)	Salvia greggii Autumn Sage	5 Gal	3' OC 2' from hardscape	L	
(W)	Westringia fruticosa Coast Rosemary	5 Gal	5' OC 3' from hardscape	L	screen and or foundation
(WB)	Westringia f. 'Grey Box Dwarf Coast Rosemary	5 Gal	3' OC 2' from hardscape	L	parking lot interior

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(Ag)	Agave 'Blue Glow Blue Glow Agave	5 Gal	42" OC	L	parking lot interior
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	Rosmarinus o. 'Huntington Carpet' Prostrate Rosemary	1 Gal	48" O.C.	L	parking lot interior
	Carissa m. 'Green Carpet' Prostrate Natal Plum	1 Gal	36" O.C.	M	right of way palette

VINES					
SYMBOL	BOTANICAL/COMMON NAME	SIZE	QTY	WUCOLS	USE
▲	Distictus buccinatoria Blood-red Trumpet Vine	1 Gal	380	L	

0 5' 10' 20'
1" = 10'-0"

SHEET 3 OF 3

Menifee Logistics

23-012
01.18.23 07.26.23
04.11.23 11.08.23
05.11.23

REGISTERED LANDSCAPE ARCHITECT
THOMAS F. HAYES
Signature
1/31/2025
Date
STATE OF CALIFORNIA

New Industrial Facility

Menifee, California

HUNTER LANDSCAPE
711 FEE ANA STREET PLACENTIA, CA 92870
714.986.2400 FAX 714.986.2408

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

July 28, 2022 Project No. 22086-01

Mr. Erik Johnson
Lovett Industrial
1730 East Holly Avenue, #808
El Segundo, California 90245

Subject: ***Preliminary Geotechnical Evaluation for Proposed Industrial Development, Evans Road, Menifee, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a preliminary geotechnical evaluation for the proposed industrial development to be located between Evans Road and Barnett Road in the City of Menifee, California. The purpose of our study was to evaluate the existing onsite geotechnical conditions and to provide preliminary geotechnical recommendations relative to the proposed development.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully,

LGC Geotechnical, Inc.

Brad Zellmer, GE 2618
Project Engineer

Kevin B. Colson, CEG 2210
Vice President

BTZ/KBC/amm

Distribution: (5) Addressee (4 wet-signed and 1 electronic copy)

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Appendix B – Boring Logs & Field Infiltration Data
Appendix C – Laboratory Test Results
Appendix D – General Earthwork and Grading Specifications

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Sheet 1 – Geotechnical Map (In Pocket)

1.0 INTRODUCTION

LGC Geotechnical has performed a geotechnical evaluation for the proposed industrial development to be located between Evans Road and Barnett Road, north of McLaughlin Road, in the City of Menifee, Riverside County, California (Figure 1). This report summarizes our findings, conclusions, and preliminary geotechnical recommendations relative to the proposed development.

1.1 Project Description and Background

The approximately 14-acre, irregularly shaped site is bound by Evans Road on the west, by Barnett Road on the east, by a Southern California Edison easement along McLaughlin Road to the south, by vacant land to the north and the Romoland Flood Control channel to the northeast. The site is relatively flat and appears to have historically been used for dry farming of crops. Based on a review of aerial photos, a residence with a yard surrounded by trees was once located in the southeast corner of the site. It appears that the residence existed from the 1980's until it was demolished in the early 2000's, and the trees appear to have been removed by 2009. The Romoland Flood Control channel appears to have been constructed in 2014-2015.

We understand that the proposed development is to include grading and construction for two warehouse structures in the southern portion of the site and one in the central portion of the site. The proposed warehouses range from 74,780 square feet to 102,190 square feet (HPA, 2022). Each are presumed to be one-story, and each will include integral office space and associated parking, drive aisles and improvements. Proposed grades are not anticipated to change of significantly from existing. Preliminary building (dead plus live) loads were not provided at the time of this report. However, we have estimated the maximum column and wall structural (dead plus live) loads to be 150 kips and 4 kips per lineal foot, respectively.

The recommendations given in this report are based on the layout and estimated structural loads and grading information as indicated above. LGC Geotechnical should be provided with any updated project information, plans and/or any structural loads when they become available, in order to either confirm or modify the recommendations provided herein.

1.2 Subsurface Exploration

In June of 2022 LGC Geotechnical performed a subsurface geotechnical evaluation of the subject site consisting of the excavation of 14 hollow-stem auger borings (8 borings for field percolation testing) in order to evaluate onsite geotechnical conditions.

The borings (HS-1 through HS-6 and I-1 through I-8) were excavated using a truck-mounted drill rig equipped with 8-inch-diameter hollow-stem augers with depths ranging from approximately 12 to 50 feet below existing grade. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler. The SPT sampler (1.4-inch ID) and MCD sampler (2.4-inch ID, 3.0-inch OD) were driven using a 140-pound hammer falling 30 inches to advance the sampler a total depth of

18 inches or until refusal. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged for laboratory testing at select depths. After removal of the augers, the depth of the boring due to caving was measured and is noted on the boring logs. The borings were backfilled with cuttings. The approximate locations of our subsurface explorations are provided on our Geotechnical Map (Sheet 1). The boring logs are provided in Appendix B.

At the completion of excavation of the borings, I-1 through I-8, an infiltration well was constructed within each boring for testing as outlined in the "Field Percolation Testing" section below. At the completion of infiltration testing, the installed pipe was removed, and the resulting void backfilled with native soils. Please note that some settlement of the backfill may occur over time and the excavations should be topped off as needed.

1.3 Field Percolation Testing

Eight field percolation tests (I-1 through I-8) were performed in the approximate locations indicated on our Geotechnical Map (Sheet 1). Estimation of infiltration rates was accomplished in general accordance with the guidelines set forth by the County of Riverside (2011). A 3-inch diameter perforated PVC pipe was placed in the borehole, and the annulus was backfilled with gravel, including placement of approximately 2 inches of gravel at the bottom of the borehole. The infiltration wells were pre-soaked the day prior to testing. During the pre-test, if the water level drops more than 6 inches in 25 minutes for two consecutive readings, the test procedure for coarse-grained soils should be followed. If the water level does not meet that criterion, the procedure for fine-grained soils should be followed. The procedure for coarse-grained soils requires performing the test for one hour and taking one reading every 10 minutes from a fixed reference point. The procedure for fine-grained soils requires performing the test for six hours and taking one reading every 30 minutes from a fixed reference point. The pre-tests indicated the procedure for fine grained soils should be followed for the majority of the tests. The calculated infiltration is normalized relative to the three-dimensional flow that occurs within the field test to a one-dimensional flow out of the bottom of the boring only (i.e., "Porchet Method"). The percolation tests were performed using relatively clean water free of particulates, silt, etc. The calculated infiltration rates are provided in Table 1 on the following page. Refer to the discussion provided in Section 4.9. Infiltration test data is provided in Appendix B.

TABLE 1

Summary of Field Infiltration Testing

Infiltration Test Location	Approximate Depth Below Existing Grade (feet)	Tested Infiltration Rate (inch/hr.) *	Reduced Infiltration Rate (inch/hr.) **
I-1	12	1.4	0.5
I-2	12	1.2	0.4
I-3	14	0.2	0.1
I-4	14	0.1	0.0
I-5	14	0.4	0.1
I-6	14	0.2	0.1
I-7	12	0.6	0.2
I-8	12	0.4	0.1

*Does not include a factor of safety
**Based on minimum Factor of Safety of 3.

1.4 Laboratory Testing

Representative bulk and driven samples were obtained for laboratory testing during our field evaluation. Laboratory testing included in-situ moisture content and dry density, Atterberg Limits, gradation/fines content, Expansion Index, consolidation, laboratory compaction, and corrosion characteristics (sulfate, chloride, pH and minimum resistivity). A summary of the laboratory test results is presented below with complete results provided in Appendix C.

- Dry density of the samples collected ranged from approximately 93 pounds per cubic foot (pcf) to 128 pcf, with an average of 113 pounds per cubic foot (pcf). Field moisture contents ranged from approximately 3 percent to 27 percent, with an average of 13 percent.
- Four Atterberg Limit (liquid limit and plastic limit) tests were performed. The Plasticity Index (PI) values ranged from 11 to 16.
- Nine fines content/gradation tests indicated a fines content (passing No. 200 sieve) ranging from approximately 29 to 58 percent. Based on the Unified Soils Classification System (USCS), six of the tested samples would be classified as “coarse-grained” and the remaining three samples would be classified as “fine-grained.”
- Consolidation tests were performed. Swell at water inundation was about 1.5 percent or less. The deformation versus vertical stress plots are provided in Appendix C.
- Three Expansion Index (EI) tests indicated EI values ranging from 0 and 34, corresponding to “Very Low” to “Low” expansion potential.
- A laboratory compaction curve resulted in maximum dry density value of 133.5.0 pcf with optimum moisture content of 8.5.
- Corrosion testing indicated soluble sulfate content less than approximately 0.02 percent, chloride contents of 62 parts per million (ppm) and 126 ppm, pH values of 7.3 ad 7.7, and minimum resistivity values of 2,100 ohm-centimeters and 3,960 ohm-centimeters.

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional and Local Geology

The site is located in the Northern Peninsular Range on the southern sector of the structural unit known as the Perris Block. The Perris Block is bounded on the northeast by the San Jacinto Fault Zone, on the southwest by the Elsinore Fault Zone, and the north by the Cucamonga Fault Zone. The southern boundary of the Perris Block is not as distinct but is believed to coincide with a complex group of faults trending southeast from the Murrieta, California area (Kennedy, 1977). The Peninsular Range is characterized by large Mesozoic age intrusive rock masses flanked by volcanic, metasedimentary and sedimentary rocks. Various thicknesses of colluvial and alluvial sediments derived from the erosion of the elevated portions of the region fill the low-lying areas.

Locally the site is within the Perris Valley. The Perris Valley is flanked by steep rocky hillsides composed of granitic and metasedimentary bedrock. The low-lying areas of the valley are gently sloping to generally flat and are typically underlain by old alluvial fan deposits.

2.2 Site-Specific Geology

Based on the Geologic Map of the Romoland Quadrangle (Morton, 2003), and our geologic field mapping, the subject site is underlain by undocumented agricultural fill, young alluvial fan deposits, and old alluvial fan deposits. The geologic units are summarized below, and their approximate lateral limits are depicted on the Geotechnical Map (Sheet 1). It should be noted that the relatively thin agricultural fill is not shown on the site plan and therefore there are areas delineated on the site plan that indicate alluvial deposits exposed at the surface that may be overlain by a thin cover of agricultural fill.

It should be noted that the excavated borings and trenches are only representative of the locations where they were excavated at the time in which they were performed, and varying subsurface conditions may exist outside of those location. In addition, subsurface conditions can change over time. The soil descriptions provided should not be construed to indicate that the subsurface profile is uniform, and that soil is homogeneous within the project area.

2.2.1 Artificial Fill - undocumented (not mapped)

Relatively thin undocumented agricultural fill from the tilling of the land for crop cultivation is not mapped on the site plan, as discussed above. However, it is interpreted as existing in the upper 1 to 2 feet. It is anticipated that the agricultural fill consists of the same material as the other near-surface soils encountered in the borings, and it is anticipated that the agricultural fill is dry and loose.

A residence was once located near the southeast corner of site, and undocumented fill may be associated with the former residence. It is not known if the residence was once serviced by an on-site sewage disposal system (septic system), however, the possibility of encountering a septic system is high given the rural setting. Typical septic systems consist of a septic tank connected to relatively shallow leach lines, or less commonly

connected to a deep seepage pit (cesspit). Any existing fill associated with the former residence and associated septic system should be considered undocumented.

2.2.2 Quaternary Old Alluvial Fan Deposits (Map Symbol - Qof)

Quaternary old alluvial fan deposits were encountered to the maximum explored depth of approximately 51.5 feet below the ground surface. The upper approximately 2 to 4 feet were found to be porous, with root hairs. In general, the old alluvial fan deposits were found to consist mostly of silty sand to sandy silt that was dry to moist and medium dense to very dense or stiff to hard in-place. Scattered discontinuous beds of sandy clay and clayey sand, along with lenses of poorly graded sand were encountered.

2.3 Geologic Structure

Geologic structure was not identified in the subject site geotechnical evaluation. The alluvial materials encountered are generally massive, and bedding is likely nearly horizontal.

2.4 Landslides

The site is nearly flat. Our research and field observations do not indicate the presence of landslides on the site or in the immediate vicinity. Review of regional geologic maps of the area do not indicate the presence of known or suspected landslides at the site or in the vicinity of the site.

2.5 Groundwater

Groundwater was not encountered during our subsurface field evaluation to the maximum explored depth of approximately 50 feet below existing ground surface. Groundwater is anticipated to be greater than 50 feet below existing grade. Seasonal fluctuations of groundwater elevations should be expected over time. In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Groundwater conditions below the site may be variable, depending on numerous factors including seasonal rainfall, local irrigation and groundwater pumping, among others.

2.6 Faulting

California is located on the boundary between the Pacific and North American Lithospheric Plates. The average motion along this boundary is on the order of 50-mm/yr. in a right-lateral sense. The majority of the motion is expressed at the surface along the northwest trending San Andreas Fault Zone with lesser amounts of motion accommodated by sub-parallel faults located predominantly west of the San Andreas including the Elsinore, Newport-Inglewood, Rose Canyon, and Coronado Bank Faults. Within Southern California, a large bend in the San Andreas Fault north of the San Gabriel Mountains has resulted in a transfer of a portion of the

right-lateral motion between the plates into left-lateral displacement and vertical uplift. Compression south and west of the bend has resulted in folding, left-lateral, reverse thrust faulting, and regional uplift creating the east-west trending Transverse Ranges and several east-west trending faults. Further south within the Los Angeles Basin, "blind thrust" faults are believed to have developed below the surface also as a result of this compression, which have resulted in earthquakes such as the 1994 Northridge event along faults with little to no surface expression.

Prompted by damaging earthquakes in Northern and Southern California, State legislation and policies concerning the classification and land-use criteria associated with faults have been developed. The Alquist-Priolo Earthquake Fault Zoning Act was implemented in 1972 to prevent the construction of urban developments across the trace of active faults. California Geologic Survey Special Publication 42 was created to provide guidance for following and implementing the law requirements. Special Publication 42 was most recently revised in 2018 (CGS, 2018). According to the State Geologist, an "active" fault is defined as one which has had surface displacement within Holocene time (roughly the last 11,700 years). Regulatory Earthquake Fault Zones have been delineated to encompass traces of known, Holocene-active faults to address hazards associated with surface fault rupture within California. Where developments for human occupation are proposed within these zones, the state requires detailed fault evaluations be performed so that engineering-geologists can identify the locations of active faults and recommend setbacks from locations of possible surface fault rupture.

The subject site is not located within a State of California Fault Rupture Hazard Zone or a Riverside County Fault Zone (CGS, 2018 and County, 2022). The nearest Holocene-active faults to the site are faults in the Elsinore Fault Zone, located approximately 10 miles southwest of the site, and faults in the San Jacinto Fault Zone, located approximately 11 miles northeast of the site. The faults in both of these fault zones trend northwest-southeast, oblique to the site, and do not trend toward the site. Therefore, the possibility of damage due to ground rupture, as a result of faulting, is considered very low since active faults are not known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching, and shallow ground rupture, soil liquefaction, dynamic settlement, seiches and tsunamis. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault, and the onsite geology. A discussion of these secondary effects is provided in the following sections.

2.6.1 <u>Lurching and Shallow Ground Rupture</u>

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are not likely to be significant where the thickness of soft sediments do not vary appreciably under structures. Ground cracking due to shaking from distant seismic events is not considered a significant hazard, although it is a possibility at any site.

2.6.2 Liquefaction and Dynamic Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that saturated, loose near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction, depending on their plasticity and moisture content. Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry loose sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

The site located in a zone of "Low" potential for liquefaction as delineated by the County of Riverside (County, 2022). Due to the depth of groundwater greater than 50 feet, the generally dense nature of the underlying soils, and the presence of cohesive soils, the potential for liquefaction and liquefaction-induced settlement is considered very low. The proposed development will primarily consist of compacted fill over dense alluvial fan deposits. These soils are not considered susceptible to dynamic settlement.

2.6.3 Lateral Spreading

Lateral spreading is a type of liquefaction-induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move down-slope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the very low potential for liquefaction, the potential for lateral spreading is also considered very low.

2.6.4 Tsunamis and Seiches

Based on the elevation of the site, with respect to sea level, the possibility of damage to the site during a large tsunami event is nil. Due to the lack of large, enclosed bodies of water close to the site, the possibility of damage from a seiche is nil.

2.7 Seismic Design Parameters

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2019 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-

specific ground motion procedures are required by ASCE 7-16. Representative site coordinates of latitude 33.7394 degrees north and longitude -117.1959 degrees west were utilized in our analyses. Please note that these coordinates are considered representative of the site for preliminary planning purposes only, however their applicability must be verified with respect to a desired specific location within the site. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 2 on the following page. Since site soils are Site Class D, additional adjustments are required to code acceleration response spectrums as outlined below and provided in ASCE 7-16. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

Section 1803.5.12 of the 2019 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.550g (SEAOC, 2022). The design PGA may be taken as 0.367g (2/3 of PGA_M).

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.91 at a distance of 16.51 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period (Design Earthquake) indicates that an earthquake magnitude of 6.81 at a distance of 19.67 km from the site would contribute the most to this ground motion (USGS, 2014).

TABLE 2

Seismic Design Parameters

Selected Parameters from 2019 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**	**Notes/Exceptions**
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	1.410g	From SEAOC, 2022
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.522g	From SEAOC, 2022
F_a (per Table 1613.2.3(1))	1.0	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.778	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.410g	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	0.928g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.940g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.619g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.940	ASCE 7 Chapter 22
C_{R1} (Mapped Risk Coefficient at 1 sec)	0.619	ASCE 7 Chapter 22
*Since site soils are Site Class D and S_1 is greater than or equal to 0.2, the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for $T_L \geq T > T_s$, or Eq. 12.8-4 for $T > T_L$. Refer to ASCE 7-16.		

2.8 Subsidence

Subsidence is the settlement of the ground surface over large areas (typically on the order of square miles) typically due to the lowering of the groundwater table. Mitigation against such a large-scale groundwater drawdown cannot be mitigated on a site-specific level, but instead "requires regional cooperation among numerous agencies" and therefore is not a site-specific geotechnical consideration. The subject site is located within an area considered susceptible to subsidence as delineated by the County of Riverside (2022). The soils encountered in our field evaluation did not indicate the presence of soils susceptible to collapse or excessive settlement.

Based on the site geologic conditions, the potential for subsidence in the site development area is considered low.

2.9 ***Rippability***

In general, excavation for foundations and underground improvements should be achievable with the appropriate equipment.

2.10 ***Oversized Material***

Oversized material (material larger than 8 inches in maximum dimension) is not likely to be encountered or generated during site grading. However, if oversized material is encountered, recommendations are provided for appropriate handling of oversized materials in Appendix D. If feasible, crushing oversized materials or exporting to an offsite location may be considered.

3.0 FINDINGS AND CONCLUSIONS

Based on the results of our geotechnical evaluation, it is our opinion that the proposed site development is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are incorporated into the site design, grading, and construction.

The following is a summary of the primary geotechnical factors, which may affect future development of the site.

- In general, our subsurface evaluation primarily indicates that the site contains dense, clayey and silty sands and very stiff to hard sandy clays to the maximum explored depth of approximately 50 feet below existing grade. The near-surface undocumented/agricultural fill and loose and compressible natural alluvial soils are not suitable for the planned improvements in their present condition (refer to Section 4.1).
- Groundwater was not encountered to the maximum explored depth of approximately 50 feet below existing ground surface. Historic high groundwater is anticipated to be greater than 50 feet below existing ground surface.
- The subject site is not located within an Alquist-Priolo Earthquake Fault Zone or a County of Riverside Fault Zone. No active faults are mapped on the site. No faults were identified on the site during our site evaluation. The proposed development will likely be subjected to strong seismic ground shaking during its design life from one of the regional faults.
- Due to a lack of groundwater in the upper 50 feet, the site is not considered susceptible to liquefaction and liquefaction-induced settlement. The soils at the site encountered in our borings were generally found to be dense and contained fines (e.g., silts and clays) and these soil types are generally not considered susceptible to seismically induced dry sand settlement.
- Site soils should be considered to have “Very Low” to “Low” expansion potential (EI not exceeding 50). This shall be confirmed at the completion of site earthwork. Mitigation measures are required for foundations and site improvements like concrete flatwork to minimize the impacts of expansive soils.
- Excavation for foundations and underground improvements should be achievable with the appropriate equipment.
- Field testing resulted in infiltration rates (based on required Factor of Safety of 3) ranging from essentially zero to 0.5 inches per hour. Site consists primarily of fine-grained soils; these soils have very low permeability and therefore have very low infiltration rates.
- The site contains soils with high fines content (i.e., silts and clay) that are not suitable for backfill of any site retaining walls. Therefore, select grading and stockpiling of native suitable sandy soils and/or import of sandy soils meeting project recommendations will be required.

4.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the County. It is the responsibility of the builder to ensure these recommendations are provided to the appropriate parties.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2019 California Building Code (CBC) requirements. With regard to the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "the level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that although our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, they cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual exposed conditions.

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, foundation construction and utility line construction and backfill. We recommend that earthwork onsite be performed in accordance with the following recommendations, the City of Menifee, 2019 CBC and the General Earthwork and Grading Specifications included in Appendix D. In case of conflict, the following recommendations shall supersede previous recommendations and those included as part of Appendix D.

4.1.1 Site Preparation

Prior to grading of areas to receive structural fill, the area should be cleared of existing vegetation (shrubs, trees, grass, roots, etc.), surface obstructions, existing debris and potentially compressible or otherwise unsuitable material, including agricultural/undocumented fill. Debris should be removed and properly disposed of off-site. Holes resulting from the removal of buried obstructions, which extend below proposed removal bottoms, should be replaced with suitable compacted fill material. Any

abandoned utility lines should be completely removed and replaced with properly compacted fill.

If septic systems are encountered, they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, if deep cesspits are encountered, they can be backfilled with lean sand-cement slurry. Any encountered wells should be properly abandoned in accordance with regulatory requirements. At the conclusion of the clearing operations, a representative of LGC Geotechnical should observe and accept the site prior to further grading.

4.1.2 Removal Depths and Limits

Building Structures: In order to provide a relatively uniform bearing condition for the planned structural improvements, removals should extend a minimum depth of 5 feet below existing grade or 2 feet below the proposed footings, whichever is greater. In general, the envelope for removals should extend laterally a minimum horizontal distance of 5 feet beyond the edges of the proposed building footprint. Deeper removals will likely be required for retaining wall footings for loading docks located at the front of the building structures.

Deeper removals may be required in the western portion of Building 1. Lower blow counts were encountered in Boring HS-6 at a depth of approximately 7.5 feet. Subgrade conditions should be evaluated during grading.

Retaining/Free-Standing Wall Structures: Removals should extend a minimum of 3 feet below existing grade, or 1-foot below proposed footings, whichever is greater. Deeper removals will likely be required for retaining wall footings for loading docks located at the front of the building structures.

Pavement and Hardscape Areas: Removals should extend to a depth of at least 2 feet below the existing grade. Removals in any design cut areas of the pavement may be reduced by the depth of the design cut but should not be less than 1-foot below the finished subgrade (i.e., below planned aggregate base/asphalt concrete). In general, the envelope for removals should extend laterally a minimum lateral distance of 2 feet beyond the edges of the proposed improvements.

Local conditions may be encountered during excavation that could require additional over-excavation beyond the above-noted minimum in order to obtain an acceptable subgrade including localized areas of undocumented fill. The actual depths and lateral extents of grading will be determined by the geotechnical consultant, based on subsurface conditions encountered during grading. Removal areas should be accurately staked in the field by the Project Surveyor.

4.1.3 Temporary Excavations

We expect temporary excavation slopes up to 10 feet in height to be grossly stable at 1:1 (horizontal to vertical) inclinations or flatter, however, excavations must be performed in

accordance with all Occupational Safety and Health Administration (OSHA) requirements. Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a distance equivalent to a 1:1 projection from the bottom of the excavation, or 5 feet whichever is greater. The contractor will be responsible for providing the "competent person" required by Cal/OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain. Excavation safety and protection of off-site existing improvements during earthwork operations is the responsibility of the contractor.

In general, any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. Where needed, temporary shoring parameters can be provided, upon request.

4.1.4 Removal Bottoms and Subgrade Preparation

In general, removal bottom areas and any areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition, and re-compacted per project recommendations.

Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill (i.e., non-retaining wall backfill), provided they are screened of organic materials, construction debris and any oversized material (8 inches in greatest dimension). Moisture conditioning of site soils should be anticipated as outlined in the section below.

Retaining wall backfill should consist of sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) Test Method D1140 (or ASTM D6913/D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris and any material greater than 3 inches in maximum dimension. The site contains soils that are not suitable for retaining wall backfill due to their fines content and expansion potential, therefore select grading and stockpiling and/or import will be required by the contractor to obtain suitable retaining wall backfill soil.

From a geotechnical viewpoint, any required import soils should consist of clean, relatively granular soils of Very Low expansion potential (expansion index 20 or less based on ASTM D4829) and no particles larger than 3 inches in greatest dimension. Source samples of planned importation should be provided to the geotechnical consultant

for laboratory testing a minimum of 3 working days prior to any planned importation for required laboratory testing.

Aggregate base (crushed aggregate base or crushed miscellaneous base) should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook") for untreated base materials (except processed miscellaneous base) or Caltrans Class 2 aggregate base.

4.1.6 Fill Placement and Compaction

Material to be placed as fill should be brought to near-optimum moisture content (generally at about 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Significant moisture conditioning of site soils should be anticipated in order to achieve the required degree of compaction. Drying and/or mixing the very moist soils will be required prior to reusing the materials in compacted fills. Soils may also be present that will require additional moisture conditioning in order to achieve the required compaction. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in loose thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by the geotechnical consultant. Oversized material as previously defined should be removed from site fills.

Fill placed on any slopes greater than 5:1 (horizontal to vertical) should be properly keyed and benched into firm and competent soils as it is placed in lifts.

During backfill of excavations, the fill should be properly benched into firm and competent soils of temporary backcut slopes as it is placed in lifts.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above-optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction per ASTM D1557 at or slightly above-optimum moisture content.

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with observation by the geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is required to be wrapped in filter fabric to prevent the migration of fines into the rock backfill.

4.1.7 Trench and Retaining Wall Backfill and Compaction

Bedding material used within the pipe zone should conform to the requirements of the current Greenbook and the pipe manufacturer. Where applicable, sand having a sand

equivalent (SE) of 20 or greater (per Caltrans Test Method [CTM] 217) may be used to bed and shade the pipes within the bedding zone. Sand backfill should be densified by jetting or flooding and then tamped to ensure adequate compaction. Bedding sand should be from a natural source, manufactured sand from recycled material is not suitable for jetting. The onsite soils may generally be considered suitable as trench backfill (zone defined as 12 inches above the pipe to subgrade), provided the soils are screened of rocks greater than 6 inches in maximum dimension, construction debris and organic material. Trench backfill should be compacted in uniform lifts (as outlined above in Section "Material for Fill") by mechanical means to at least 90 percent relative compaction (per ASTM D1557). If gap-graded rock is used for trench backfill, refer to above Section 4.1.6.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, flowable fill such as sand-cement slurry may be substituted for compacted backfill. The slurry should contain about one sack of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil. Sand cement slurry placed near the surface within landscape areas should be evaluated for potential impacts on planned improvements.

Any required retaining wall backfill should consist of predominately granular, sandy soils outlined in Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater (Refer to Figure 2). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to a minimum of 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be permitted. If gap-graded rock is used for retaining wall backfill, refer to above Section 4.1.6.

A representative from LGC Geotechnical should observe, probe, and test the backfill to verify compliance with the project recommendations.

4.1.8 Shrinkage and Subsidence

Allowance in the earthwork volumes budget should be made for an estimated ±5 percent reduction in volume of near-surface (upper approximate 5 feet) soils. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence, due to earthwork operations, is expected to be on the order of 0.1-foot. These values are estimates only and exclude losses due to removal of any vegetation or debris. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor and accuracy of the topographic survey.

4.2 Preliminary Foundation Design Parameters

Site soils are anticipated to be of Very Low to Low expansion potential (EI of 50 or less per ASTM D4829). However, this must be verified based on as-graded conditions. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of project plans (i.e., foundation, grading and site layout plans) as well as completion of earthwork. Recommended soil bearing and estimated static settlement are

provided in Section 4.3. If requested, geotechnical foundation parameters for post-tensioned slabs will be provided.

In consideration of site expansive soils, the following preliminary recommendations may be used:

- Moisture-condition (presoak) slab subgrade to 100% of optimum moisture content to a minimum depth of 12 inches prior to trenching.

Slab thickness and reinforcement should be determined by the structural engineer.

For elastic design of a foundation supporting sustained concentrated loads, a modulus of vertical subgrade reaction (k) of 100 pounds per cubic inch (pounds per square inch per inch of deflection) may be used. This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed foundation using the following formula:

$k = 100[(B+1)/2B]^2$
k = modulus of vertical subgrade reaction, pounds per cubic inch (pci)
B = foundation width (feet)

4.2.1 ***Slab Underlayment Guidelines***

The following is for informational purposes only since slab underlayment (e.g., moisture retarder, sand, or gravel layers for concrete curing and/or capillary break) is unrelated to the geotechnical performance of the foundation and thereby not the purview of the geotechnical consultant. Post-construction moisture migration should be expected below the foundation. The foundation engineer/architect should determine whether the use of a capillary break (sand or gravel layer), in conjunction with the vapor retarder, is necessary or required by code. Sand layer thickness and location (above and/or below vapor retarder) should also be determined by the foundation engineer/architect.

4.2.2 ***Shallow Foundation Maintenance***

The geotechnical parameters provided herein assume that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Plants should only be provided with sufficient irrigation for life and not overwatered to saturate subgrade soils. Sunken planters placed adjacent to the foundation, should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation. Some lifting of the perimeter foundation beam should be expected even with properly constructed planters.

In addition to the factors mentioned above, future owners/property management personnel should be made aware of the potential negative influences of trees and/or

other large vegetation. Roots that extend near the vicinity of foundations can cause distress to foundations. Future owners (and the owner's landscape architect) should not plant trees/large shrubs closer to the foundations than a distance equal to half the mature height of the tree or 20 feet, whichever is more conservative unless specifically provided with root barriers to prevent root growth below the building foundation.

It is the owner's responsibility to perform periodic maintenance during hot and dry periods to ensure that adequate watering has been provided to keep soil from separating or pulling back from the foundation. Future owners and property management personnel should be informed and educated regarding the importance of maintaining a constant level of soil-moisture. The owners should be made aware of the potential negative consequences of both excessive watering, as well as allowing potentially expansive soils to become too dry. Expansive soils can undergo shrinkage during drying, and swelling during the rainy winter season, or when irrigation is resumed. This can result in distress to building structures and hardscape improvements. These recommendations should be provided to future owners and property management personnel.

4.3 Soil Bearing and Lateral Resistance

Provided our earthwork recommendations are implemented, the following minimum footing widths and embedments for isolated spread and continuous wall footings are recommended for the corresponding allowable bearing pressures.

TABLE 3

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,000	3	2
2,500	2	2
2,000	2	1.5
1,500	1.5	1.0

*Refers to minimum depth to the bottom of the footing below lowest adjacent finish grade.

These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Bearing values indicated above are for total dead loads and live loads. The above vertical bearing may be increased by one-third for short durations of loading which will include the effect of wind or seismic loading.

Soil settlement is a function of footing dimensions and applied soil bearing pressure. In utilizing the above-mentioned allowable bearing capacity, assumed structural loads, and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch or less. Differential settlement should be anticipated

between nearby columns or walls where a large differential loading condition exists. Settlement estimates should be evaluated by LGC Geotechnical when foundation plans are available.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.30 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for lateral resistance. This passive pressure is applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt concrete. The provided allowable passive pressure is based on a factor of safety of 1.5 and may be increased by one-third for short duration wind or seismic loading.

4.4 Lateral Earth Pressures for Retaining Walls

The following preliminary lateral earth pressures may be used for retaining walls 10 feet or less. Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design.

The following lateral earth pressures are presented on Table 4 below for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria.

TABLE 4

Lateral Earth Pressures – Sandy Backfill

Conditions	**Equivalent Fluid Unit Weight (pcf)**
	Level Backfill
	Approved Soils
Active	35
At-Rest	55

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. This would include 90-degree corners of retaining walls. Such walls should be designed for "at-rest." The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed (Figure 2). Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the

equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed basement/retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.3 and 0.5 may be used for the active and at-rest conditions, respectively. The vertical traffic surcharge may be determined by the structural designer. The retaining/basement wall designer should contact the geotechnical consultant for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 10 pcf for a level backfill condition. This increment should be applied in addition to the provided static lateral earth pressure using a triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2019 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. The provided seismic lateral earth pressure should not be used for retaining walls exceeding 12 feet in height. If a retaining wall greater than 12 feet in height is proposed or a retaining wall with a sloping backfill condition, the retaining wall designer should contact the geotechnical consultant for specific seismic lateral earth pressure increments based on the configuration of the planned retaining wall structures. Seismic lateral earth pressures are estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.3. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.5 Preliminary Pavement Sections

The following preliminary minimum asphalt concrete (AC) pavement sections are provided in Table 5 based on an assumed R-value of 20 for Traffic Indices (TI) of 5 through 7. These recommendations should be confirmed with R-value testing of representative near-surface soils at the completion of earthwork. Final street sections should be confirmed by the project civil engineer based upon the final design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 5

Paving Section Options

Assumed Traffic Index	5.0	6.0	7.0
R -Value Subgrade	20	20	20
AC Thickness	4.0 inches	4.0 inches	5.0 inches
Aggregate Base Thickness	5.0 inches	8.5 inches	10.0 inches

The provided preliminary Portland Cement concrete pavement section is based on the guidelines of the American Concrete Institute (ACI 330R-08). For the final design section, we recommend a traffic study be performed as LGC Geotechnical does not perform traffic engineering. Traffic study should include the design vehicle (number of axles and load per axle) and estimated number of daily repetitions/trips. Based on an assumed Traffic Category C with an assumed Average Daily Truck Traffic (ADTT) of 30, we recommend a preliminary section of a minimum of 6 inches of concrete over 4 inches of compacted aggregate base over compacted subgrade. The concrete should have a minimum compressive strength of 4,000 psi and a minimum flexural strength of 550 psi at the time the pavement is subjected to traffic. Steel reinforcement is not required (ACI, 2013). This pavement section assumes that edge restraints like a curb and gutter will be provided. To reduce the potential (but not eliminate) for cracking, paving should provide control joints at regular intervals not exceeding 10 feet in each direction. Decreasing the spacing of these joints will further reduce, but not eliminate the potential for unsightly cracking. Preliminary pavement section is based on a 20-year design. Truck loading is defined one 16-kip axle and two 32-kip tandem axles (80 kips). Alternate section(s) may be provided based on anticipated specific traffic loadings and repetitions provided by others. LGC Geotechnical does not perform traffic engineering and determination of traffic loading is not the purview of the geotechnical consultant.

The thicknesses shown are for minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Earthwork recommendations regarding aggregate base and subgrade are provided in the previous section “Site Earthwork” and the related sub-sections of this report.

4.6 Soil Corrosivity

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants, as they determine necessary.

Corrosion testing indicated soluble sulfate content less than approximately 0.02 percent,

chloride contents of 62 parts per million (ppm) and 126 ppm, pH values of 7.3 ad 7.7, and minimum resistivity values of 2,100 ohm-centimeters and 3,960 ohm-centimeters. . Based on Caltrans Corrosion Guidelines (2021), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 1,500 ppm (0.15 percent) or greater.
Based on laboratory sulfate test results, the near-surface soils have an exposure class of "S0" per ACI 318-14, Table 19.3.1.1 with respect to sulfates. This must be verified based on as-graded conditions.

4.7 Nonstructural Concrete Flatwork

Nonstructural concrete flatwork (such as walkways, etc.) has a high potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 6. These guidelines will reduce the potential for irregular cracking and promote cracking along control joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement and control joints will further reduce cosmetic distress. Please note that where tile is planned to be placed over concrete the architect must take special care to ensure that control joints are carried up through the tile from the concrete. The concrete flatwork will move over time, the architect and designer must make provisions for this movement in both design and construction.

TABLE 6

Nonstructural Concrete Flatwork for Low Expansion Potential

	Flatwork	City Sidewalk Curb and Gutters
Minimum Thickness (in.)	4 (full)	City/Agency Standard
Presoaking	Wet down prior to placing	City/Agency Standard
Reinforcement	No. 3 at 24 inches on centers	City/Agency Standard
Thickened Edge (in.)	—	City/Agency Standard
Crack Control Joints	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	City/Agency Standard
Maximum Joint Spacing	6 feet	City/Agency Standard
Aggregate Base Thickness (in.)	—	City/Agency Standard

4.8 Surface Drainage and Landscaping

4.8.1 Precise Grading

From a geotechnical perspective, we recommend that compacted finished grade soils adjacent to proposed structures be sloped away from the proposed structures and towards an approved drainage device or unobstructed swale. Drainage swales, wherever feasible, should not be constructed within 5 feet of buildings. Where lot and building geometry necessitates that drainage swales be routed closer than 5 feet to structural foundations, we recommend the use of area drains together with drainage swales. Drainage swales used in conjunction with area drains should be designed by the project civil engineer so that a properly constructed and maintained system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

4.8.2 Landscaping

Planters adjacent to a building or structure should be avoided wherever possible or be properly designed (e.g., lined with a membrane), to reduce the penetration of water into the adjacent footing subgrades and thereby reduce moisture-related damage to the foundation. Planting areas at grade should be provided with appropriate positive drainage. Wherever possible, exposed soil areas should be above adjacent paved grades to facilitate drainage. Planters should not be depressed below adjacent paved grades unless provisions for drainage, such as multiple depressed area drains, are constructed. Adequate drainage gradients, devices, and curbing should be provided to prevent runoff from adjacent pavement or walks into the planting areas. Irrigation methods should promote uniformity of moisture in planters and beneath adjacent concrete flatwork. Overwatering and underwatering of landscape areas must be avoided. Irrigation levels should be kept to the absolute minimum level necessary to maintain healthy plant life.

Area drain inlets should be maintained and kept clear of debris in order to properly function. Owners and property management personnel should also be made aware that excessive irrigation of neighboring properties can cause seepage and moisture conditions. Owners and property management personnel should be furnished with these recommendations communicating the importance of maintaining positive drainage away from structures, towards streets, when they design their improvements.

The impact of heavy irrigation or inadequate runoff gradients can create perched water conditions. This may result in seepage or shallow groundwater conditions where previously none existed. Maintaining adequate surface drainage and controlled irrigation will significantly reduce the potential for nuisance-type moisture problems. To reduce differential earth movements such as heaving and shrinkage due to the change in moisture content of foundation soils, which may cause distress to a structure

and associated improvements, moisture content of the soils surrounding the structure should be kept as relatively constant as possible.

4.9 Subsurface Water Infiltration

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. Typically, a combination of methods are implemented to reduce surface water runoff and increase infiltration including; permeable pavements/pavers for roadways and walkways, directing surface water runoff to grass-lined swales, retention areas, and/or drywells, etc.

It should be noted that collecting and concentrating surface water for the purpose of intentional infiltration below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, the vast majority of geotechnical distress issues are directly related to improper drainage. In general, distress in the form of movement of improvements could occur as a result of soil saturation and loss of soil support, expansion, internal soil erosion, collapse and/or settlement. From a geotechnical perspective, generally we do not recommend that water be intentionally infiltrated. If required, we recommend the absolute minimum amount of water be infiltrated into site soils.

The following should be considered in the design of the required infiltration system:

- Please note that the infiltration values reported herein are for native materials (not for compacted fill).
- An adequate setback distance between the proposed infiltration system and adjacent private property should be maintained.
- An adequate setback distance between the proposed infiltration system and proposed building structures should be maintained.
- Any designed infiltration system will require routine periodic maintenance.
- As with any systems that are designed to concentrate the surface flow and direct the water into the subsurface soils, some type of nuisance water and/or other water-related issues should be expected.

LGC Geotechnical should be provided with updated details for the infiltration system when available for geotechnical review.

4.10 Pre-Construction Documentation and Construction Monitoring

A program of documentation and monitoring be devised and put into practice before the onset of any groundwork. LGC Geotechnical can perform these services at your request. This should include, but not necessarily be limited to, detailed documentation of the existing improvements, buildings, and utilities around the area of proposed excavation, with particular attention to any distress that is already present prior to the start of work. At the completion of construction, we recommend that the adjacent properties be re-documented to confirm their condition after

potentially damaging activities are completed. In the event of future claims, any post-construction damage may be attributed to other causes.

4.11 Geotechnical Plan Review

Project plans (e.g., grading, foundation, etc.) and any other improvement plans, and final project drawings should be reviewed by this office prior to construction to verify that our geotechnical recommendations, provided herein, have been appropriately incorporated. Additional or modified geotechnical recommendations may be required based on the proposed design.

4.12 Geotechnical Observation and Testing During Construction

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2019 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (removal bottoms, fill placement, etc.);
- During retaining wall/utility trench backfill and compaction;
- Preparation of subgrade and placement of aggregate base;
- After excavation of structural footings (e.g., building, retaining/free standing wall, etc.) and prior to placing reinforcement and/or concrete; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

5.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The samples taken and submitted for laboratory testing, the observations made, and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification, and should not be relied upon after a period of 3 years.

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FIGURE 1
Site Location Map

PROJECT NAME	Lovett Industrial- Evans Rd
PROJECT NO.	22086-01
ENG. / GEOL.	BTZ/KBC
SCALE	Not to Scale
DATE	July 2022

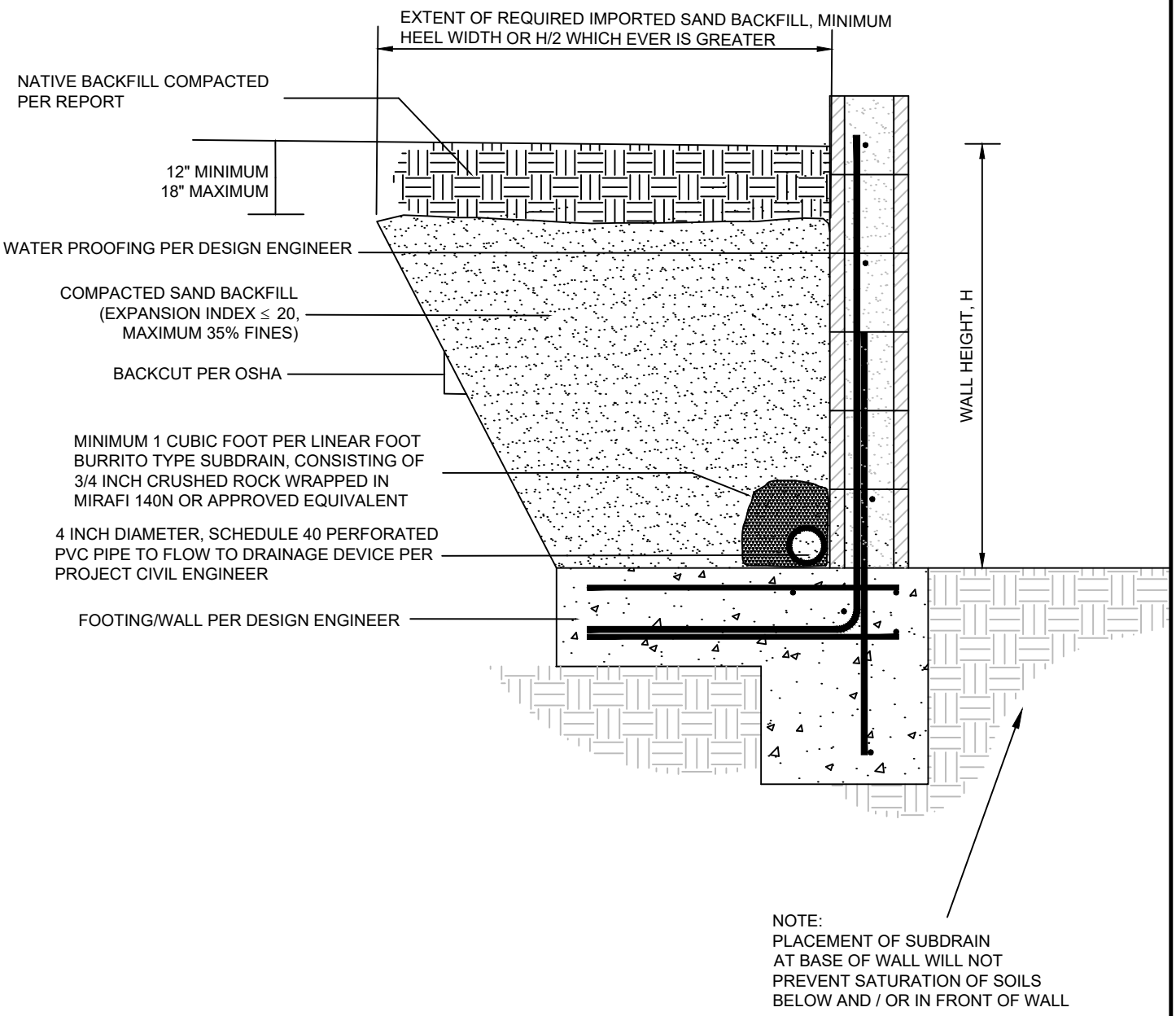

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FIGURE 2
Retaining Wall Backfill Detail

PROJECT NAME	Lovett Industrial- Evans Rd
PROJECT NO.	22086-01
ENG. / GEOL.	BTZ/KBC
SCALE	Not to Scale
DATE	July 2022

Appendix A
References

APPENDIX A

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Appendix B
Boring Logs & Field Infiltration Data

Geotechnical Boring Log Borehole HS-1

Date: 6/13/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett Industrial - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1424' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By RNP
Sampled By RNP
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - Dead dry grass, vegetation	CR EI
			R-1	5 10 15	120.4	7.2	SM	**@ 1.5 to T.D. - <u>Old Alluvial Fan Deposit (Qof)</u>** @ 2.5' - Silty SAND: dark reddish brown, moist to moist, loose to medium dense, trace of fine gravel and coarse sand, porous with minor roots	
1420	5		SPT-1	6 8 8		12.4	ML	@ 5' - Sandy SILT: olive brown to dark reddish brown, moist, very stiff	SA
			R-2	9 24 41	116.2	15.1		@ 7.5' - Sandy SILT: yellowish brown, moist, hard	
1415	10		SPT-2	10 11 16		8.8	SM	@ 10' - Silty SAND: olive brown, moist, dense	#200
1410	15		R-3	10 30 50/4"	116.5	4.3		@ 15' - Silty SAND: light brown, slightly moist, very dense	
1405	20		SPT-3	9 13 14		2.8		@ 20' - Silty SAND: light gray, slightly moist, dense, few fine gravel	
1400	25		R-4	16 22 44	111.1	3.2		@ 25' - Silty SAND: light gray, slightly moist,very dense, few fine gravel	
1395	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 6/16/2022

Geotechnical Boring Log Borehole HS-1

Date: 6/13/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett Industrial - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1424' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By RNP
Sampled By RNP
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		SPT-4	11 14 15		3.0	SM	@ 30' - Silty SAND with trace of Gravel: light gray, slightly moist, dense, medium to coarse grained	
1390									
	35		R-5	7 24 34	108.7	2.9	SP	@ 35' - SAND with trace of Gravel: light gray to brown, slightly moist, dense	
1385									
	40		SPT-5	13 16 23		6.9	SM	@ 40' - Silty SAND with trace of Gravel: light gray to yellow brown, moist, dense	
1380									
	45		R-6	12 22 31	97.7	27.0	SM/ML	@ 45' - Silty SAND to Sandy SILT: yellowish brown, moist, dense to hard	
1375									
	50		SPT-6	8 20 22		9.2	SM	@ 50' - Silty SAND: light brown, moist, very dense	
1370								Total Depth = 51.5' Groundwater Not Encountered Caving = Approximately 40' after removing auger Backfilled with Cuttings on 6/13/2022	
	55								
1365									
	60								

LGC Geotechnical, Inc.

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SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
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EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-2

Date: 6/13/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett Industrial - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1424' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - 1 foot tall dry weeds	
			R-1	18 27 41	125.7	8.2	SM	**@ 1.5 to T.D. - <u>Old Alluvial Fan Deposit (Qof)</u>** @ 2.5' - Silty SAND: dark brown, dry to slightly moist, medium dense to dense, trace of fine gravel, scattered root hairs	
1420	5		SPT-1	13 22 26		10.3		@ 5' - Silty SAND: orange brown, dry to slightly moist, medium dense	#200
			R-2	15 25 35	112.4	14.6	ML	@ 7.5' - Sandy SILT: olive brown, moist, hard	AL CN
1415	10		SPT-2	4 12 15		13.1	SM	@10' - Silty fine SAND: brown, slightly moist to moist, medium dense	
1410	15		R-3	16 23 20	109.7	5.1	SP-SM	@ 15' - SAND with Silt: reddish brown, slightly moist to moist, medium dense, little gravel, medium to coarse grained	
1405	20		SPT-3	3 6 17		23.7	ML	@ 20' - Sandy SILT: brown, moist, very stiff	
1400	25		R-4	18 28 33	118.7	4.3	SP-SM	@ 25' SAND with Silt: light gray to light brown, slightly moist, dense	
1395	30							Total Depth = 26.5' Groundwater Not Encountered Backfilled with Cuttings on 6/13/2022	

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
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SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

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EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 6/16/2022

Geotechnical Boring Log Borehole HS-3

Date: 6/13/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett Industrial - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1423' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - 1 foot tall weeds	EI
1420			R-1	15 23 24	117.8	6.3	SM	**@ 1.5 to T.D. - <u>Old Alluvial Fan Deposit (Qof)</u>** @ 2.5' - Silty SAND: brown to dark brown, dry to slightly moist, dense, porous with root hairs	
	5	B-1	SPT-1	8 7 6		8.3		@ 5' - Silty SAND with trace of Gravel: brown, slightly moist, medium dense	#200
1415			R-2	10 11 22	101.2	19.4	MH	@ 7.5' - Sandy SILT: olive brown, moist, very stiff	AL CN
	10		SPT-2	5 5 8		22.7	ML	@ 10' - Sandy SILT: brown, moist, very stiff	
1410									
	15		R-3	9 7 4	103.3	10.8	SM	@ 15' - Silty SAND with trace of Gravel: brown to olive brown, slightly moist to moist, loose	
1405									
	20		SPT-3	5 10 16		15.4	ML	@ 20' - Sandy SILT: dark brown, moist, very stiff	
1400									
	25		R-4	50/3"	112.8	14.9	SM	@ 25' - Silty SAND: olive brown, moist, very dense	
1395								Total Depth = 26.5' Groundwater Not Encountered Caving = Approximately 22' after removing auger Backfilled with Cuttings on 6/13/2022	
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

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G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
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CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 6/16/2022

Geotechnical Boring Log Borehole HS-4

Date: 6/22/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1425' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - Grass with Silty SAND - light brown, dry	
			SPT-1	18 26 38		5.2	SM	**@ 1.5 to T.D. - <u>Old Alluvial Fan Deposits (Qof)</u>** @ 2.5' - Silty SAND: red yellow, slightly moist, very dense	MD #200
1420	5	B-1	R-1	28 50/5"	112.8	14.9		@ 5' - Silty SAND: red yellow, moist, very dense	
			SPT-2	8 10 8		15.2	ML	@ 7.5' - Sandy SILT: light yellow orange, very moist, very stiff	
1415	10		R-2	8 13 13	103.9	24.7	CL	@ 10' - CLAY with Sand: dull yellow orange, very moist, very stiff	AL CN
1410	15		SPT-3	3 6 9		25.5	ML	@ 15' - Sandy SILT: dull yellow orange, very moist, very stiff	
1405	20		R-3	9 15 24	112.2	5.2	SM	@ 20' - Silty SAND and Gravel: slightly moist, dense	
1400	25		SPT-4	6 9 15		5.6		@ 25' - Silty SAND: light gray, slightly moist, dense	
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 7/11/2022

Geotechnical Boring Log Borehole HS-4

Date: 6/22/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1425' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-4	23 31 50/4"	120.7	11.1	SM	@ 30' - Silty SAND: bright yellowish brown, moist, very dense	
1390	35		SPT-5	9 14 21		19.8	ML	@ 35' - Sandy SILT: yellow brown, moist, hard	
1385	40		R-5	11 31 42	107.5	21.7		@ 40' - Sandy SILT: yellow brown, moist, hard, small amounts of fine gravel	
1380	45		SPT-6	6 17 22		13.7	SM	@ 45' - Silty SAND: dull yellow brown, moist, dense	
1375	50		R-6	17 50/6"	123.3	11.6		@ 50' - Silty SAND: light yellow orange, moist, very dense	
1370	55							Total Depth = 51' Groundwater Not Encountered Caving = Approximately 46' after removing auger Backfilled with Cuttings on 6/22/2022	
	60								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-5

Date: 6/22/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1425' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - Tall grass/flowers	
			R-1	6 12 17	127.6	10.5	SM/ML	**@ 0 to T.D. - <u>Old Alluvial Fan Deposits (Qof)</u>** @ 2.5' - Silty SAND to Sandy SILT: dark brown, moist, medium dense/very stiff	
1420	5	B-1	SPT-1	5 8 11		12.6	SM	@ 5' - Silty SAND: bright yellowish brown, moist, medium dense	
			R-2	5 12 18	124.6	11.2	CL	@ 7.5' - CLAY with Sand: dark yellowish brown, moist, very stiff	CN
1415	10		SPT-2	7 6 7		17.0		@ 10' - Sandy CLAY: dull yellowish brown, moist, very stiff	#200
1410	15		R-3	5 13 19	99.9	27.4	ML	@ 15' - Sandy SILT: dull yellowish brown, very moist, very stiff	
1405	20		SPT-3	6 9 9		20.2	SC	@ 20' - Clayey SAND: dull yellow orange, moist, medium dense	#200
1400	25		R-4	7 8 32	93.4	26.0	ML	@ 25' - Sandy SILT: dull yellow orange, very moist, hard	SA
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 7/12/2022

Geotechnical Boring Log Borehole HS-5

Date: 6/22/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1425' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		SPT-4	8 10 16		15.4	SM	@ 30' - Silty SAND: yellow orange, moist, medium dense	
1390	35		R-5	16 27 32	116.4	4.9	SP-SM	@ 35' - SAND with Silt: slightly moist, dense	
1385	40		SPT-5	13 15 16		7.7	SM	@ 40' - Silty SAND: dull yellow orange to light gray, moist, dense	
1380	45		R-6	21 31 38	117.8	5.4	SP-SM	@ 45' - SAND with Silt: light gray with white, dry to slightly moist, very dense	
1375	50		SPT-6	10 12 19		28.2	CL	@ 50' - Sandy CLAY: dull yellowish brown, very moist, hard	
1370	55							Total Depth = 51.5' Groundwater Not Encountered Caving = Approximately 45' after removing auger Backfilled with Cuttings on 6/22/2022	
	60								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-6

Date: 6/22/2022	**Drilling Company:** Cal Pac Drilling
Project Name: Lovett - Evans Rd.	**Type of Rig:** Truck Mounted
Project Number: 22086-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~1423' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0 to 1.5' - <u>Undocumented Fill (Afu)</u>** @ 0' - Grass/top soil, silty sand, dry	CR EI
1420			SPT-1	4 4 8		11.8	SM	**@ 1.5 to T.D. - <u>Old Alluvial Fan Deposits (Qof)</u>** @ 2.5' - Silty SAND: dull yellowish brown, moist, very loose	
	5	B-	R-1	9 16 20	120.3	13.7	CL	@ 5' - Sandy CLAY: dull yellowish brown to brown, slightly moist, very stiff	AL CN
1415			SPT-2	4 3 3		11.4	SM	@ 7.5' - Silty SAND: reddish brown, moist, loose	SA
	10		R-2	4 9 12	121.5	11.9		@ 10' - Silty SAND: dull yellow orange, moist, medium dense	
1410									
	15		SPT-3	4 8 16		20.4	ML	@ 15' - Sandy SILT: dull yellow orange, very moist, very stiff	
1405									
	20		R-3	4 18 19	91.9	31.4		@ 20' - Sandy SILT: dull yellow orange, very moist to wet, very stiff	
1400									
	25		SPT-4	7 9 14		16.1		@ 25' - Sandy SILT: dull yellow orange to light gray, moist, very stiff	
1395								Total Depth = 26.5' Groundwater Not Encountered Caving = Approximately 23' after removing auger Backfilled with Cuttings on 6/22/2022	
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 7/12/2022

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-1

Test hole dimensions (if circular)	
Boring Depth (feet)*:	12
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:35	9:00	25.0	8.08	9.35	1.27	Yes
2	9:01	9:26	25.0	7.35	8.75	1.40	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:28	9:42	14.0	6.13	7.05	0.92	1.4
2	9:43	9:54	11.0	6.70	7.35	0.65	1.4
3	9:55	10:05	10.0	5.75	6.38	0.63	1.2
4	10:05	10:17	12.0	6.38	7.25	0.87	1.6
5	10:19	10:29	10.0	6.95	7.55	0.60	1.5
6	10:29	10:39	10.0	7.55	8.05	0.50	1.4
7							
8							
9							
10							
11							
12							

Tested Infiltration Rate (No Factor of Safety)	**1.4**
MinimumFactor of Safety	**3.0**
Infiltration Rate (With Factor of Safety)	**0.5**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-2

Test hole dimensions (if circular)	
Boring Depth (feet)*:	12
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:39	9:04	25.0	5.90	6.65	0.75	Yes
2	9:05	9:30	25.0	4.85	5.73	0.88	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:31	9:45	14.0	3.10	3.50	0.40	0.4
2	9:45	9:57	12.0	3.50	5.00	1.50	1.9
3	9:59	10:09	10.0	3.20	4.50	1.30	1.9
4	10:09	10:19	10.0	3.08	4.40	1.32	1.9
5	10:21	10:31	10.0	2.70	2.92	0.22	0.3
6	10:31	10:41	10.0	2.92	3.80	0.88	1.2
7							
8							
9							
10							
11							
12							

Tested Infiltration Rate (No Factor of Safety)	**1.2**
MinimumFactor of Safety	**3.0**
Infiltration Rate (With Factor of Safety)	**0.4**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-3

Test hole dimensions (if circular)	
Boring Depth (feet)*:	14
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:47	9:12	25.0	8.80	9.40	0.60	Yes
2	9:13	9:38	25.0	7.50	7.80	0.30	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:40	10:12	32.0	5.65	6.35	0.70	0.3
2	10:14	10:44	30.0	3.50	5.55	2.05	0.9
3	10:44	11:14	30.0	5.55	6.20	0.65	0.3
4	11:14	11:44	30.0	6.20	6.80	0.60	0.3
5	11:44	12:14	30.0	6.80	7.28	0.48	0.3
6	12:15	12:45	30.0	6.40	6.95	0.55	0.3
7	12:45	13:15	30.0	6.95	7.41	0.46	0.3
8	13:16	13:46	30.0	6.60	7.13	0.53	0.3
9	13:46	14:16	30.0	7.13	7.55	0.42	0.2
10	14:16	14:46	30.0	7.55	7.94	0.39	0.2
11	14:46	15:16	30.0	7.94	8.25	0.31	0.2
12	15:16	15:46	30.0	8.25	8.60	0.35	0.2
						Tested Infiltration Rate (No Factor of Safety)	**0.2**
						MinimumFactor of Safety	**3.0**
						Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-4

Test hole dimensions (if circular)	
Boring Depth (feet)*:	14
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:47	9:12	25.0	5.74	6.23	0.49	No
2	9:17	9:42	25.0	6.03	6.49	0.46	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:56	10:26	30.0	6.62	6.93	0.31	0.2
2	10:27	10:57	30.0	6.93	7.28	0.35	0.2
3	10:58	11:28	30.0	6.00	6.40	0.40	0.2
4	11:28	11:58	30.0	6.40	6.75	0.35	0.2
5	11:58	12:28	30.0	6.75	7.03	0.28	0.2
6	12:29	12:59	30.0	6.10	6.51	0.41	0.2
7	12:59	13:29	30.0	6.51	6.80	0.29	0.2
8	13:29	13:59	30.0	6.80	7.10	0.30	0.2
9	13:59	14:29	30.0	7.10	7.35	0.25	0.1
10	14:29	14:59	30.0	7.35	7.55	0.20	0.1
11	14:59	15:29	30.0	7.55	7.79	0.24	0.1
12	15:29	15:59	30.0	7.79	8.00	0.21	0.1
						Tested Infiltration Rate (No Factor of Safety)	**0.1**
						MinimumFactor of Safety	**3.0**
						Infiltration Rate (With Factor of Safety)	**0.0**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-5

Test hole dimensions (if circular)	
Boring Depth (feet)*:	14
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:53	9:18	25.0	8.92	9.76	0.84	Yes
2	9:21	9:46	25.0	9.37	9.81	0.44	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:59	10:29	30.0	9.06	9.61	0.55	0.5
2	10:31	11:01	30.0	8.93	9.56	0.63	0.5
3	11:08	11:38	30.0	8.53	9.21	0.68	0.5
4	11:40	12:13	33.0	8.22	8.85	0.63	0.4
5	12:12	12:42	30.0	8.44	8.88	0.44	0.3
6	12:44	13:14	30.0	8.10	8.79	0.69	0.5
7	13:17	13:47	30.0	8.38	9.02	0.64	0.5
8	13:50	14:20	30.0	9.10	9.63	0.53	0.4
9	14:22	14:52	30.0	9.64	10.15	0.51	0.5
10	14:55	15:25	30.0	8.64	9.19	0.55	0.4
11	15:27	15:57	30.0	8.53	9.05	0.52	0.4
12	15:59	16:29	30.0	8.41	8.90	0.49	0.4
						Tested Infiltration Rate (No Factor of Safety)	**0.4**
						MinimumFactor of Safety	**3.0**
						Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/14/2022
Boring Number: I-6

Test hole dimensions (if circular)	
Boring Depth (feet)*:	14
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:57	9:22	25.0	6.22	6.84	0.62	Yes
2	9:24	9:49	25.0	6.02	6.48	0.46	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	10:01	10:31	30.0	6.49	6.93	0.44	0.2
2	10:34	11:04	30.0	6.95	7.30	0.35	0.2
3	11:10	11:40	30.0	7.31	7.64	0.33	0.2
4	11:43	12:13	30.0	7.66	7.95	0.29	0.2
5	12:15	12:45	30.0	7.95	8.29	0.34	0.2
6	12:48	13:18	30.0	8.21	8.52	0.31	0.2
7	13:20	13:50	30.0	8.25	8.53	0.28	0.2
8	13:52	14:22	30.0	8.18	8.51	0.33	0.2
9	14:24	14:54	30.0	8.15	8.40	0.25	0.2
10	14:56	15:26	30.0	8.27	8.54	0.27	0.2
11	15:28	15:58	30.0	8.31	8.57	0.26	0.2
12	16:00	16:30	30.0	8.30	8.57	0.27	0.2
						Tested Infiltration Rate (No Factor of Safety)	**0.2**
						MinimumFactor of Safety	**3.0**
						Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/23/2022
Boring Number: I-7

Test hole dimensions (if circular)	
Boring Depth (feet)*:	12
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:43	9:08	25.0	5.78	6.86	1.08	Yes
2	9:09	9:34	25.0	5.40	6.10	0.70	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:36	9:46	10.0	5.52	5.84	0.32	0.6
2	9:46	9:56	10.0	5.84	6.11	0.27	0.5
3	9:56	10:06	10.0	5.56	5.82	0.26	0.5
4	10:06	10:16	10.0	5.82	6.10	0.28	0.5
5	10:17	10:27	10.0	5.25	5.55	0.30	0.5
6	10:27	10:37	10.0	5.55	5.85	0.30	0.6
7							
8							
9							
10							
11							
12							

Tested Infiltration Rate (No Factor of Safety)	**0.6**
MinimumFactor of Safety	**3.0**
Infiltration Rate (With Factor of Safety)	**0.2**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: Lovett Industrial - Evans Rd.
Project Number: 22086-01
Date: 6/23/2022
Boring Number: I-8

Test hole dimensions (if circular)	
Boring Depth (feet)*:	12
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:41	9:06	25.0	4.70	5.42	0.72	Yes
2	9:07	9:32	25.0	4.41	5.10	0.69	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, t (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, D (feet)	Tested Infiltration Rate(in/hr)
1	9:33	9:43	10.0	4.63	4.85	0.22	0.4
2	9:43	9:53	10.0	4.85	5.12	0.27	0.5
3	9:53	10:03	10.0	5.12	5.40	0.28	0.5
4	10:04	10:14	10.0	4.80	5.03	0.23	0.4
5	10:14	10:24	10.0	5.03	5.26	0.23	0.4
6	10:24	10:34	10.0	5.26	5.47	0.21	0.4
7							
8							
9							
10							
11							
12							

Tested Infiltration Rate (No Factor of Safety)	**0.4**
MinimumFactor of Safety	**3.0**
Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: Riverside County 09/2012
Spreadsheet Revised on: 10/30/2019

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on driven samples obtained from the test borings. The results of these tests are presented in the boring logs.

Grain Size Distribution/Fines Content: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve (ASTM D1140). Where applicable, the portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D6913 (sieve).

Sample Location	Description	% Passing # 200 Sieve
HS-1 @ 5 ft	Sandy Silt	51
HS-1 @ 10 ft	Silty Sand	29
HS-2 @ 5 ft	Silty Sand	49
HS-3 @ 5 ft	Silty Sand	46
HS-4 @ 2.5 ft	Silty Sand	45
HS-5 @ 10 ft	Sandy Clay	58
HS-5 @ 20 ft	Clayey Sand	36
HS-5 @ 25 ft	Sandy Silt	50
HS-6 @ 7.5 ft	Silty Sand	42

Laboratory Test Results

Atterberg Limits: The liquid and plastic limits ("Atterberg Limits") were determined per ASTM D4318 for engineering classification of fine-grained material and presented in the table below. The USCS soil classification indicated in the table below is based on the portion of sample passing the No. 40 sieve and may not necessarily be representative of the entire sample. The plots are provided in this Appendix.

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Soil Classification
HS-2 @ 7.5 ft	42	31	11	ML
HS-3 @ 7.5 ft	51	38	13	MH
HS-4 @ 10 ft	36	24	12	CL
HS-6 @ 5 ft	32	16	16	CL

Expansion Index: The expansion potential of selected representative samples was evaluated by the Expansion Index Test per ASTM D4829. The results are presented in the table below.

Sample Location	Expansion Index	Expansion Potential*
HS-1 @ 1-5 ft	6	Very Low
HS-3 @ 0-5 ft	0	Very Low
HS-6 @ 0-5 ft	34	Low

* Per ASTM D4829

Consolidation: Consolidation tests were performed per ASTM D2435. Samples (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curves are provided in this Appendix.

Laboratory Test Results

Laboratory Compaction: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results are presented in the table below.

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-4 @ 0-5 ft	Light Brown Silty Sand	133.5	8.5

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM 417). The test results are presented in the table below.

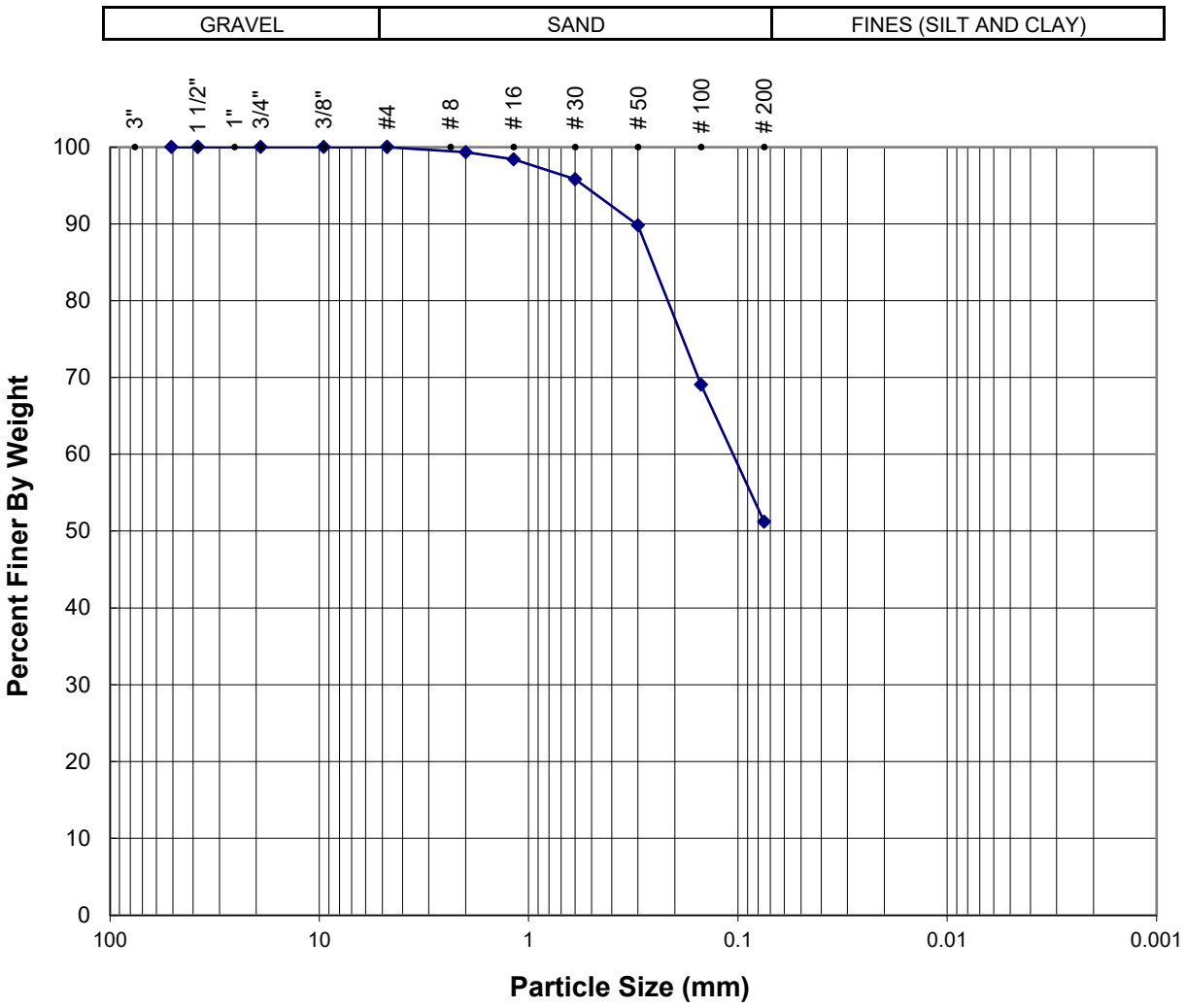
Sample Location	Sulfate Content (ppm)	Sulfate Content (%)
HS-1 @ 1-5 ft	133	< 0.02
HS-6 @ 0-5 ft	181	< 0.02

Chloride Content: Chloride content was tested per CTM 422. The results are presented below.

Sample Location	Chloride Content (ppm)
HS-1 @ 1-5 ft	62
HS-6 @ 0-5 ft	126

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The results are presented in the table below.

Sample Location	pH	Minimum Resistivity (ohms-cm)
HS-1 @ 1-5 ft	7.3	3,960
HS-6 @ 0-5 ft	7.7	2,100



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
HS-1	**SPT-1**	**5**	**ML**	**0**	**49**	**51**

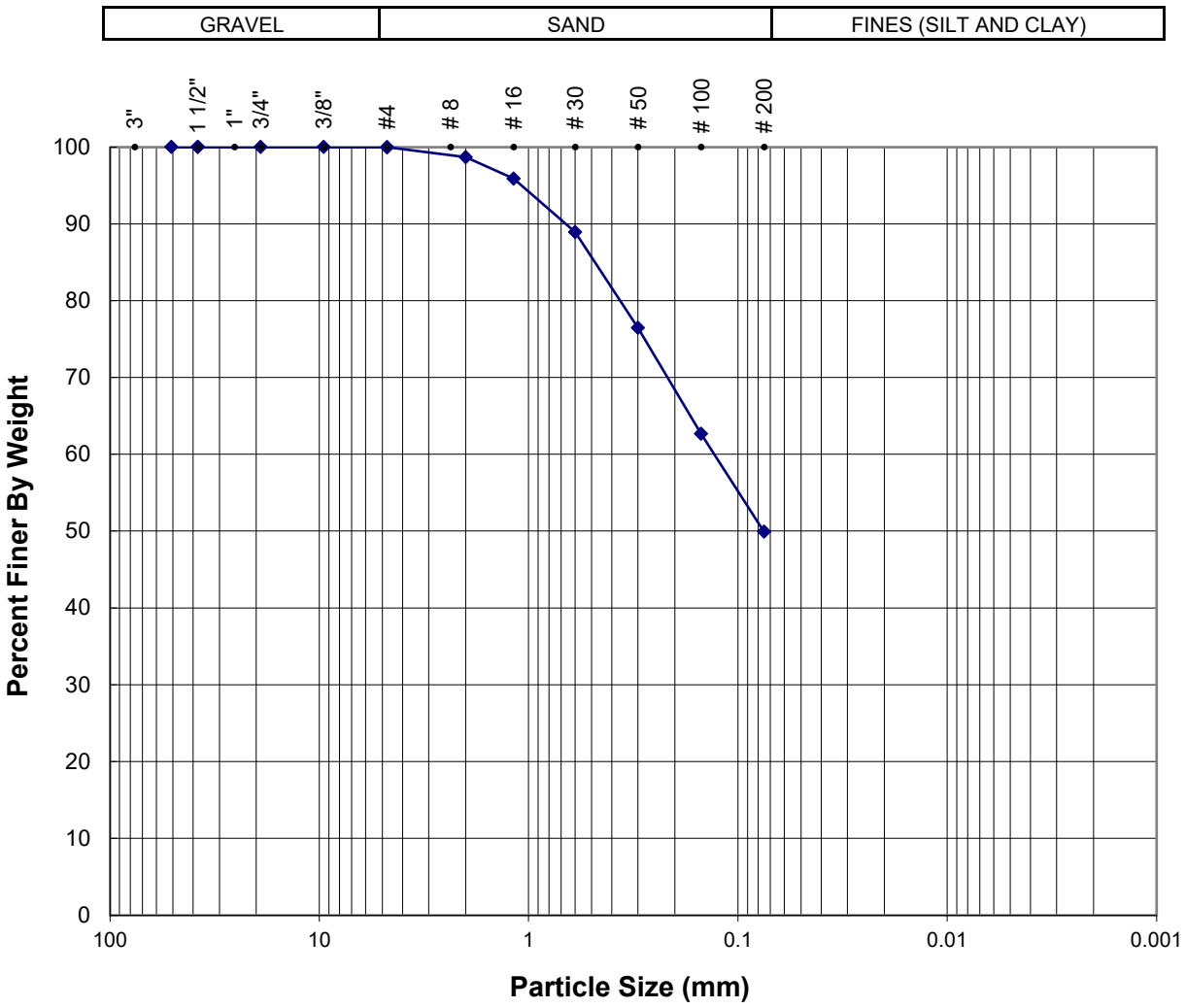
Sample Description: Brown Sandy Silt

LGC Geotechnical, Inc.

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 22086-01
Date: Jul-22

Evans Road



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
HS-5	**R-4**	**25**	**ML**	**0**	**50**	**50**

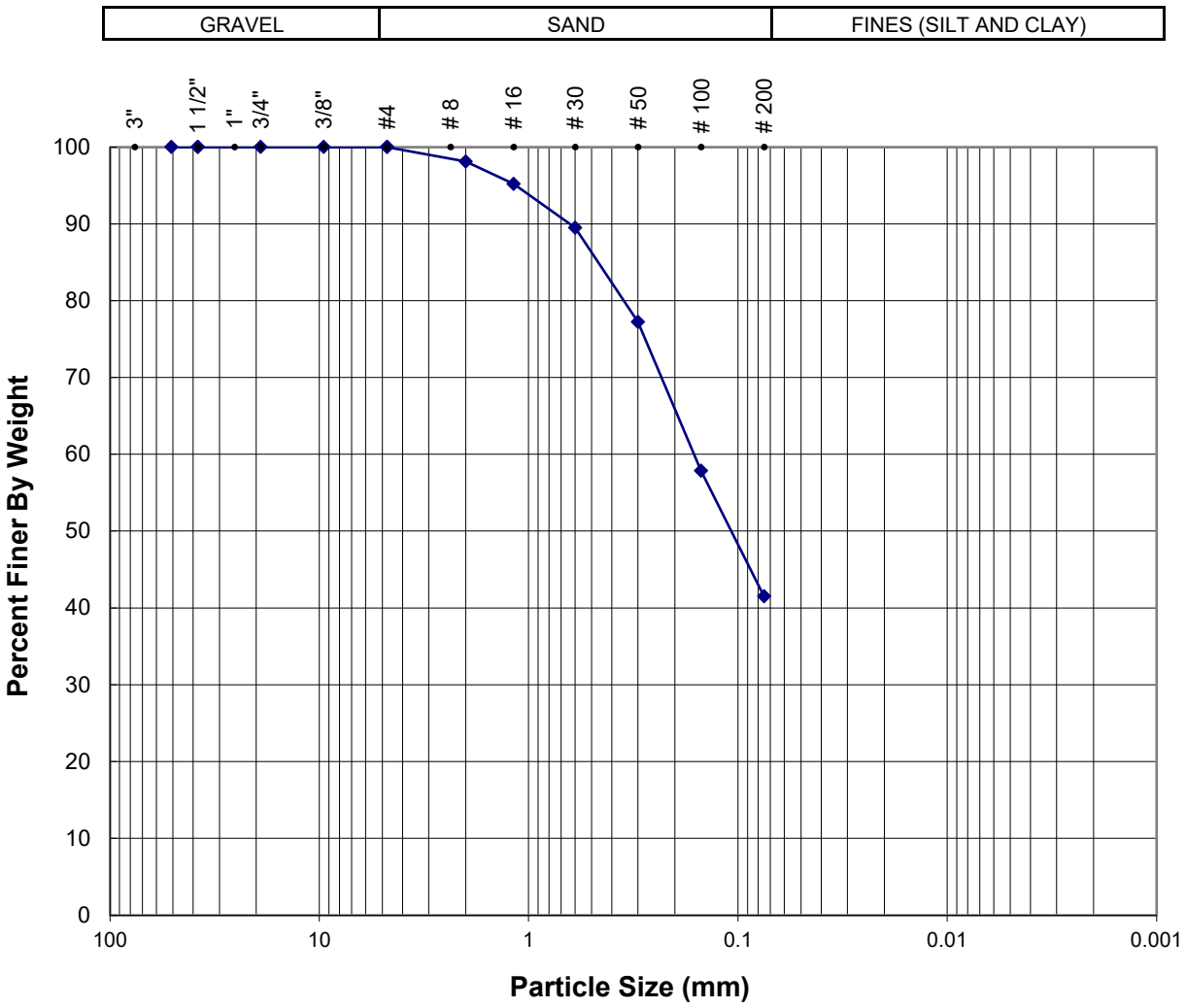
Sample Description: Reddish Brown Sandy Silt

LGC Geotechnical, Inc.

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 22086-01
Date: Jul-22

Evans Road



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
HS-6	**SPT-2**	**7.5**	**SM**	**0**	**58**	**42**

Sample Description: Reddish Brown Silty Sand

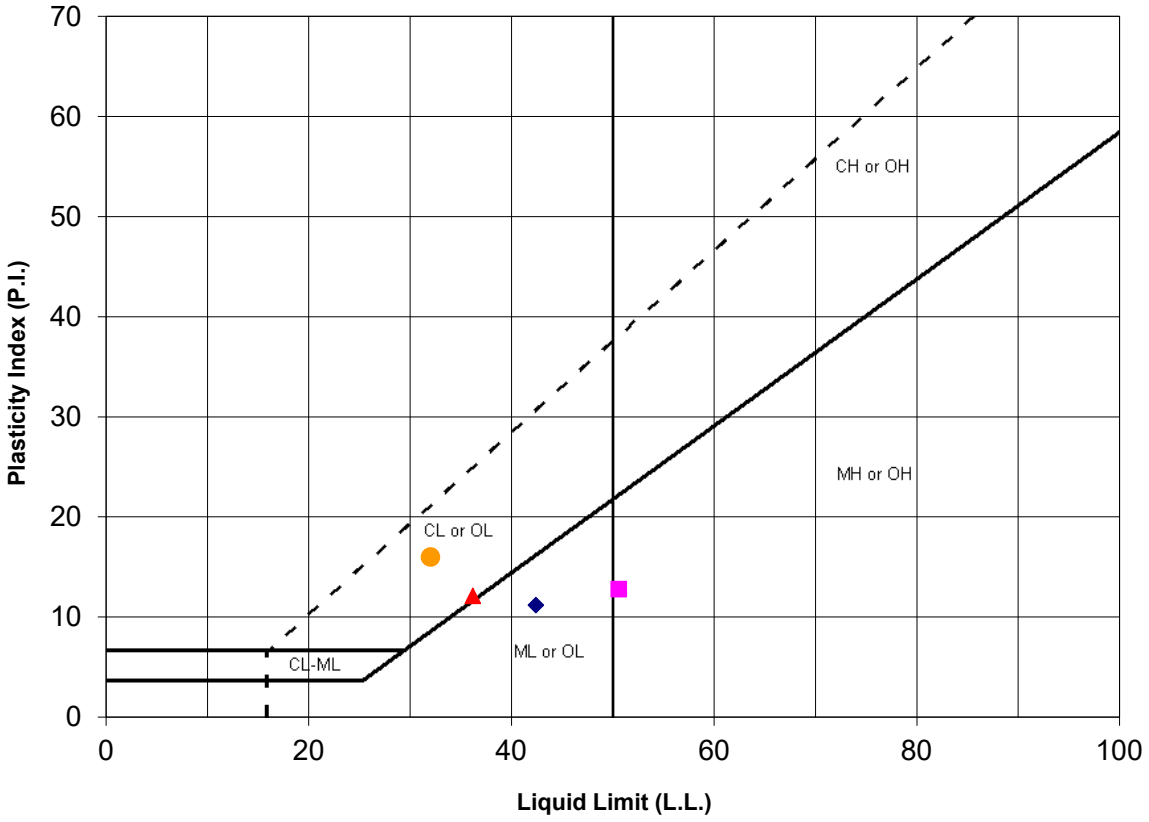
LGC Geotechnical, Inc.

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 22086-01
Date: Jul-22

Evans Road

PLASTICITY CHART - CLASSIFICATION OF FINE-GRAINED SOILS



Symbol	Location.:	Sample No.:	Depth (ft)	Passing No. 200 Sieve (%)	Liquid Limit (%) LL	Plastic Limit (%) PL	Plasticity Index (%) PI	USCS
◆	HS-2	R-2	7.5'	-	42	31	11	ML
■	HS-3	R-2	7.5'	-	51	38	13	MH
▲	HS-4	R-2	10'	-	36	24	12	CL
●	HS-6	R-1	5'	-	32	16	16	CL

LGC Geotechnical, Inc.

ATTERBERG LIMITS
(ASTM D 4318)

Project Number: 22086-01
Date: Jul-22

Evans Road

Location	Sample No.	Depth (ft)	Molding Moisture Content (%)	Initial Dry Density (pcf)	Final Moisture Content (%)	Expansion Index	Expansion Classification[1]
HS-1	B-1	1-5'	6.9	121.4	13.5	6	Very Low
HS-3	B-1	0-5'	8.2	115.9	13.6	0	Very Low
HS-6	B-1	0-5'	8.6	115.0	17.7	34	Low

LGC Geotechnical, Inc.

EXPANSION INDEX
(ASTM D 4829)

Project Number: 22086-01
Date: Jul-22

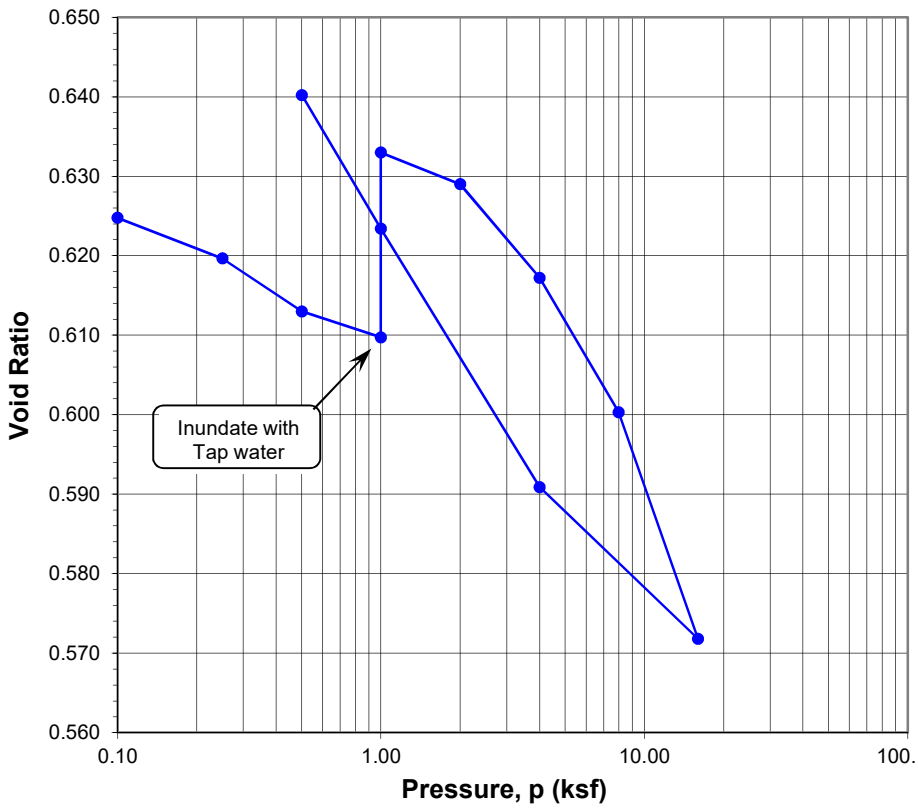
Evans Road

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Lovett Industrial - Evans Road	Tested By:	G. Bathala	Date:	06/29/22
Project No.:	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-2	Depth (ft.):	7.5		
Sample No.:	R-2	Sample Type:	Ring		
Soil Identification:	Light olive brown lean clay (CL)				

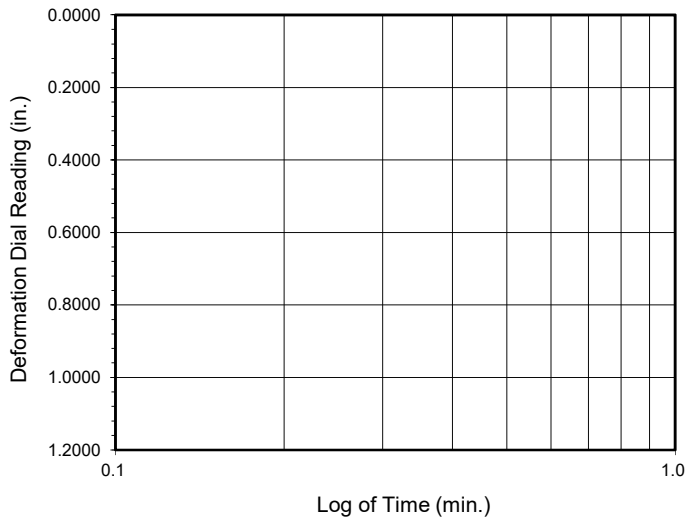
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	197.84
Weight of Ring (g):	45.29
Height after consol. (in.):	1.0092
Before Test	
Wt. of Wet Sample+Cont. (g):	171.28
Wt. of Dry Sample+Cont. (g):	150.95
Weight of Container (g):	52.01
Initial Moisture Content (%)	20.5
Initial Dry Density (pcf)	105.2
Initial Saturation (%):	90
Initial Vertical Reading (in.)	0.0671
After Test	
Wt. of Wet Sample+Cont. (g):	271.24
Wt. of Dry Sample+Cont. (g):	240.66
Weight of Container (g):	71.41
Final Moisture Content (%)	24.67
Final Dry Density (pcf):	102.2
Final Saturation (%):	100
Final Vertical Reading (in.)	0.0631
Specific Gravity (assumed):	2.74
Water Density (pcf):	62.43

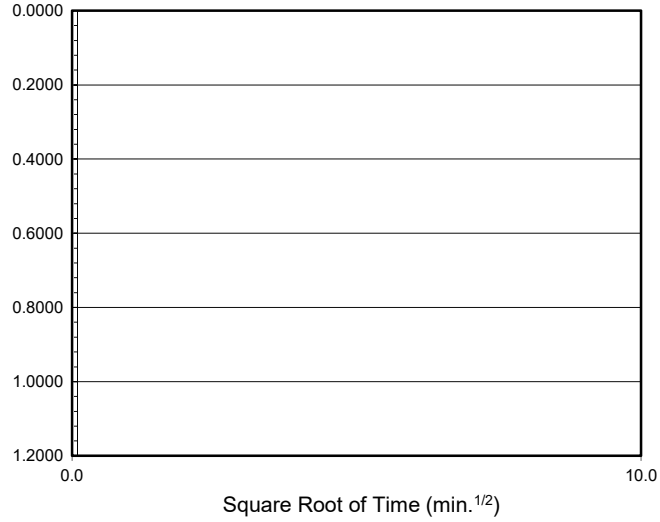


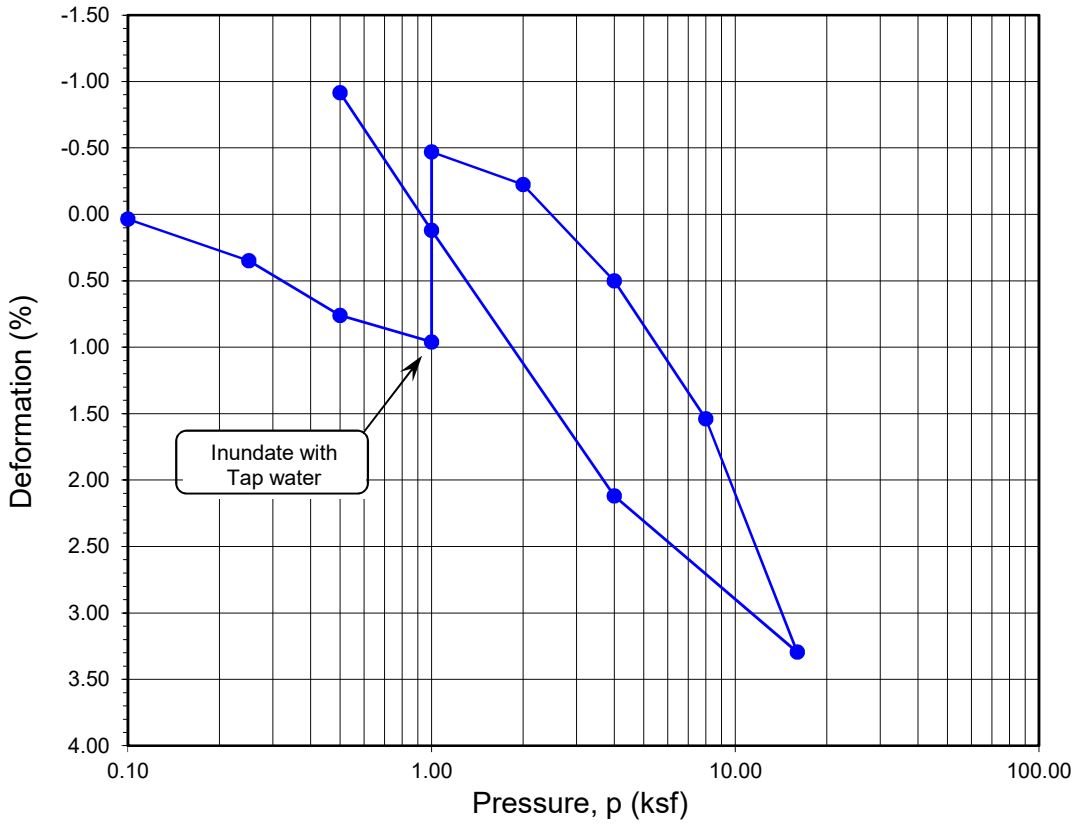
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.0675	0.9997	0.00	0.03	0.625	0.03
0.25	0.0708	0.9963	0.02	0.37	0.620	0.35
0.50	0.0756	0.9915	0.09	0.85	0.613	0.76
1.00	0.0791	0.9880	0.24	1.20	0.610	0.96
1.00	0.0648	1.0023	0.24	-0.23	0.633	-0.47
2.00	0.0688	0.9984	0.39	0.17	0.629	-0.22
4.00	0.0774	0.9897	0.53	1.03	0.617	0.50
8.00	0.0891	0.9780	0.66	2.20	0.600	1.54
16.00	0.1082	0.9590	0.81	4.11	0.572	3.30
4.00	0.0949	0.9722	0.66	2.78	0.591	2.12
1.00	0.0738	0.9933	0.55	0.67	0.623	0.12
0.50	0.0631	1.0041	0.51	-0.41	0.640	-0.92

Time Readings				
Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-2	**R-2**	**7.5**	**20.5**	**24.7**	**105.2**	**102.2**	**0.625**	**0.640**	**90**	**100**

Soil Identification: Light olive brown lean clay (CL)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22086-01

Lovett Industrial - Evans Road

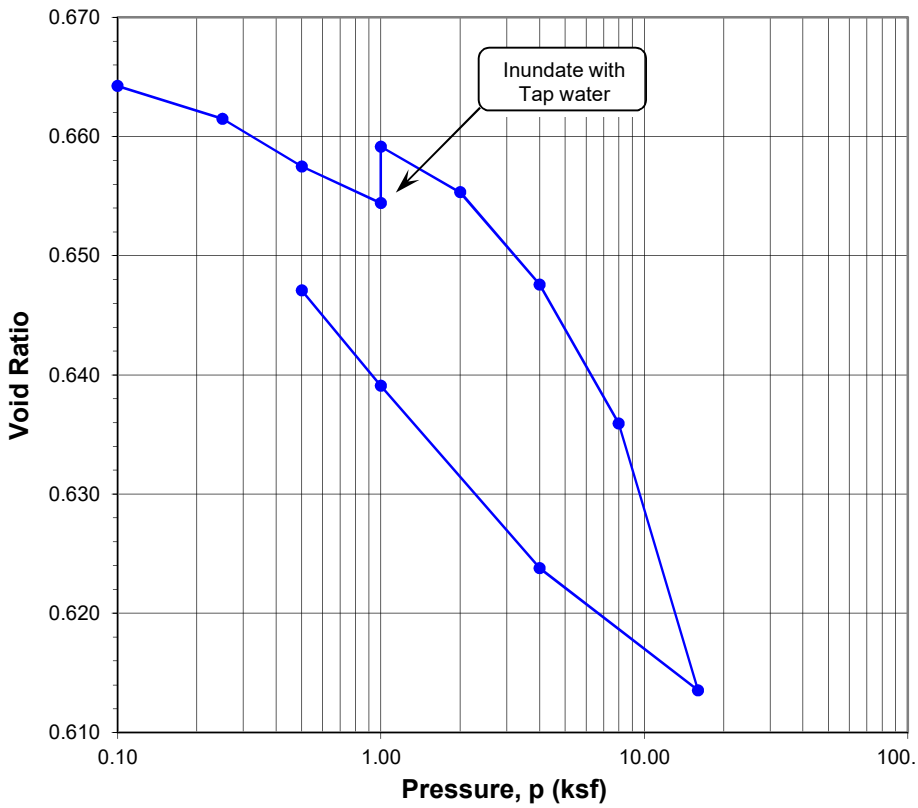
07-22

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Lovett Industrial - Evans Road	Tested By:	G. Bathala	Date:	06/29/22
Project No.:	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-3	Depth (ft.):	7.5		
Sample No.:	R-2	Sample Type:	Ring		
Soil Identification:	Olive yellow silty clay (CL-ML)				

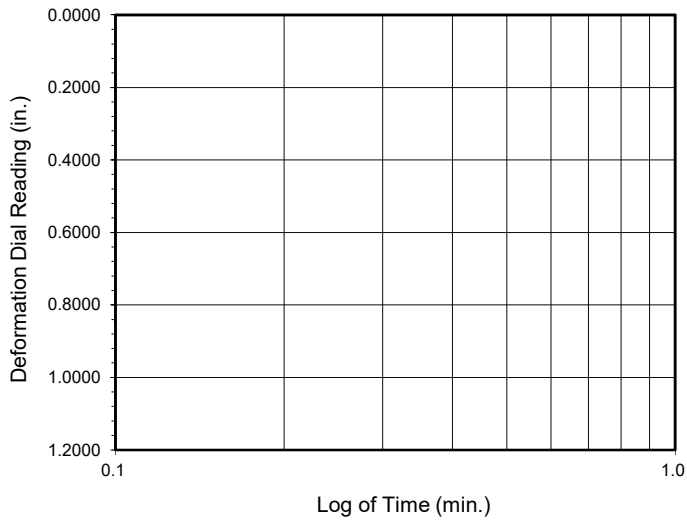
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	185.26
Weight of Ring (g):	42.18
Height after consol. (in.):	0.9895
Before Test	
Wt. of Wet Sample+Cont. (g):	184.03
Wt. of Dry Sample+Cont. (g):	165.69
Weight of Container (g):	60.94
Initial Moisture Content (%)	17.5
Initial Dry Density (pcf)	101.3
Initial Saturation (%):	71
Initial Vertical Reading (in.)	0.0523
After Test	
Wt. of Wet Sample+Cont. (g):	249.16
Wt. of Dry Sample+Cont. (g):	219.85
Weight of Container (g):	57.94
Final Moisture Content (%)	24.48
Final Dry Density (pcf):	100.6
Final Saturation (%):	98
Final Vertical Reading (in.)	0.0660
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

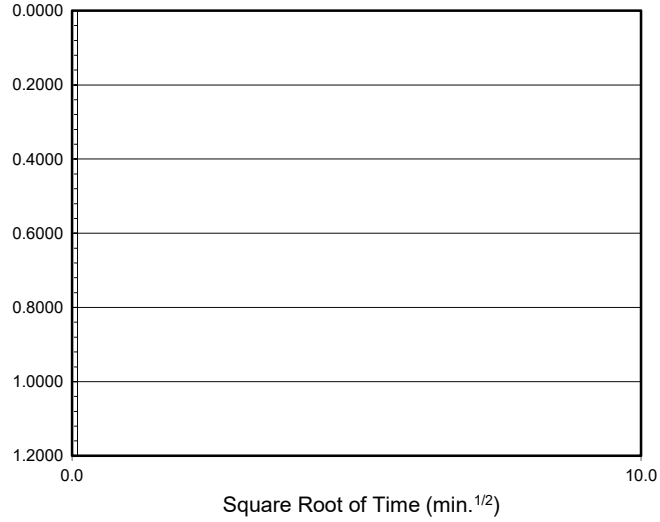


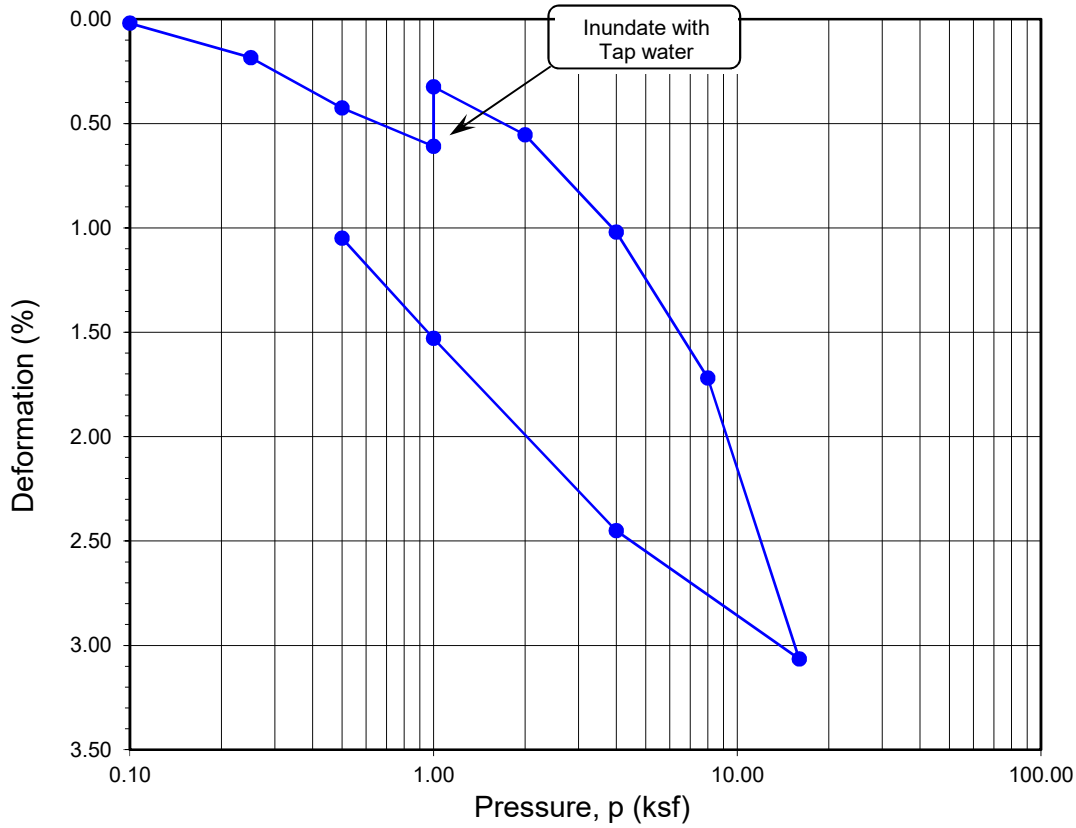
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.0525	0.9998	0.00	0.02	0.664	0.02
0.25	0.0546	0.9978	0.04	0.22	0.661	0.18
0.50	0.0576	0.9948	0.10	0.52	0.657	0.42
1.00	0.0601	0.9922	0.17	0.78	0.654	0.61
1.00	0.0573	0.9951	0.17	0.50	0.659	0.33
2.00	0.0604	0.9920	0.25	0.81	0.655	0.56
4.00	0.0660	0.9863	0.35	1.37	0.648	1.02
8.00	0.0742	0.9781	0.47	2.19	0.636	1.72
16.00	0.0893	0.9631	0.63	3.70	0.614	3.07
4.00	0.0815	0.9708	0.47	2.92	0.624	2.45
1.00	0.0712	0.9811	0.36	1.89	0.639	1.53
0.50	0.0660	0.9863	0.32	1.37	0.647	1.05

Time Readings				
Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-3	**R-2**	**7.5**	**17.5**	**24.5**	**101.3**	**100.6**	**0.665**	**0.647**	**71**	**98**

Soil Identification: Olive yellow silty clay (CL-ML)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22086-01

Lovett Industrial - Evans Road

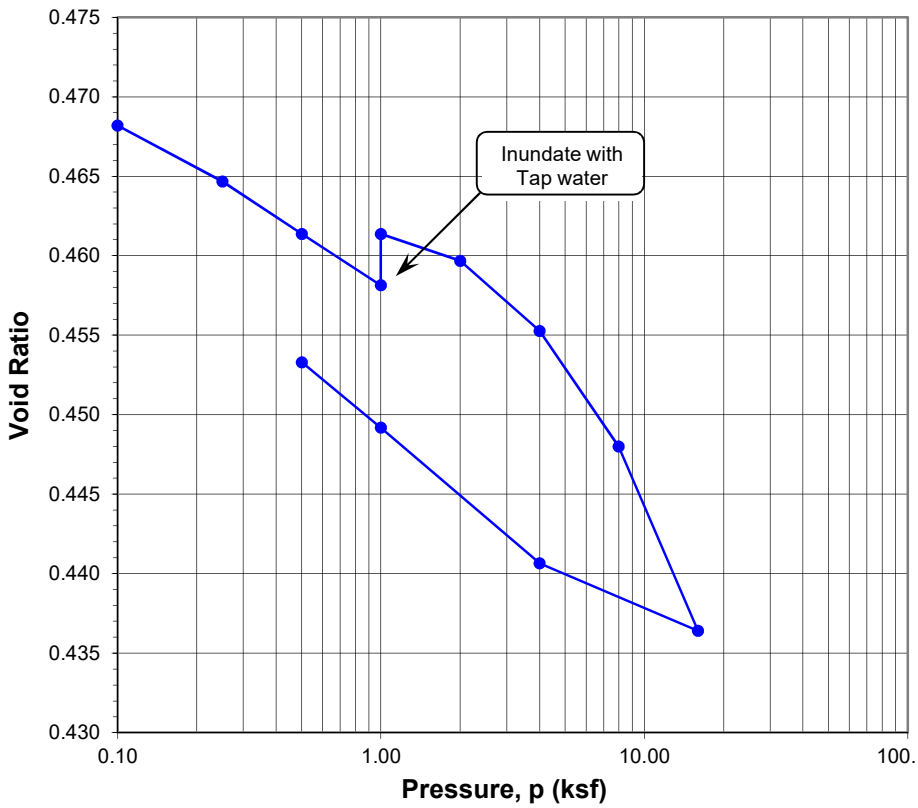
07-22

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Lovett Industrial - Evans Road	Tested By:	G. Bathala	Date:	06/29/22
Project No.:	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-4	Depth (ft.):	10.0		
Sample No.:	R-2	Sample Type:	Ring		
Soil Identification:	Light olive brown lean clay with sand (CL)s				

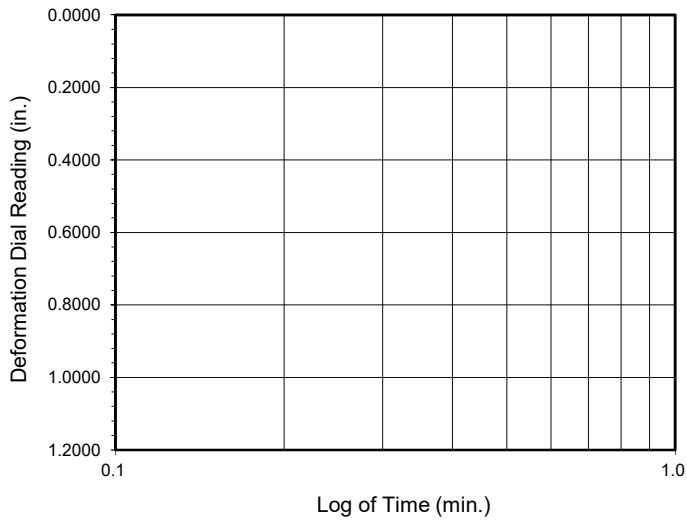
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	201.22
Weight of Ring (g):	43.38
Height after consol. (in.):	0.9895
Before Test	
Wt. of Wet Sample+Cont. (g):	174.34
Wt. of Dry Sample+Cont. (g):	159.36
Weight of Container (g):	55.17
Initial Moisture Content (%)	14.4
Initial Dry Density (pcf)	114.8
Initial Saturation (%):	83
Initial Vertical Reading (in.)	0.0901
After Test	
Wt. of Wet Sample+Cont. (g):	259.78
Wt. of Dry Sample+Cont. (g):	237.44
Weight of Container (g):	58.02
Final Moisture Content (%)	16.42
Final Dry Density (pcf):	114.3
Final Saturation (%):	93
Final Vertical Reading (in.)	0.1036
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

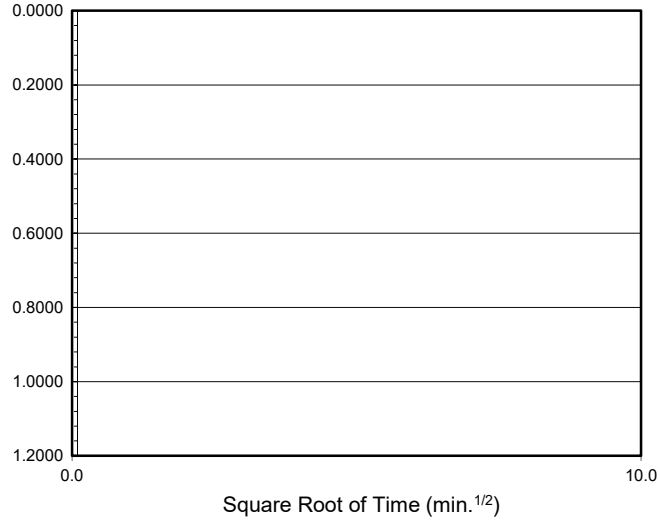


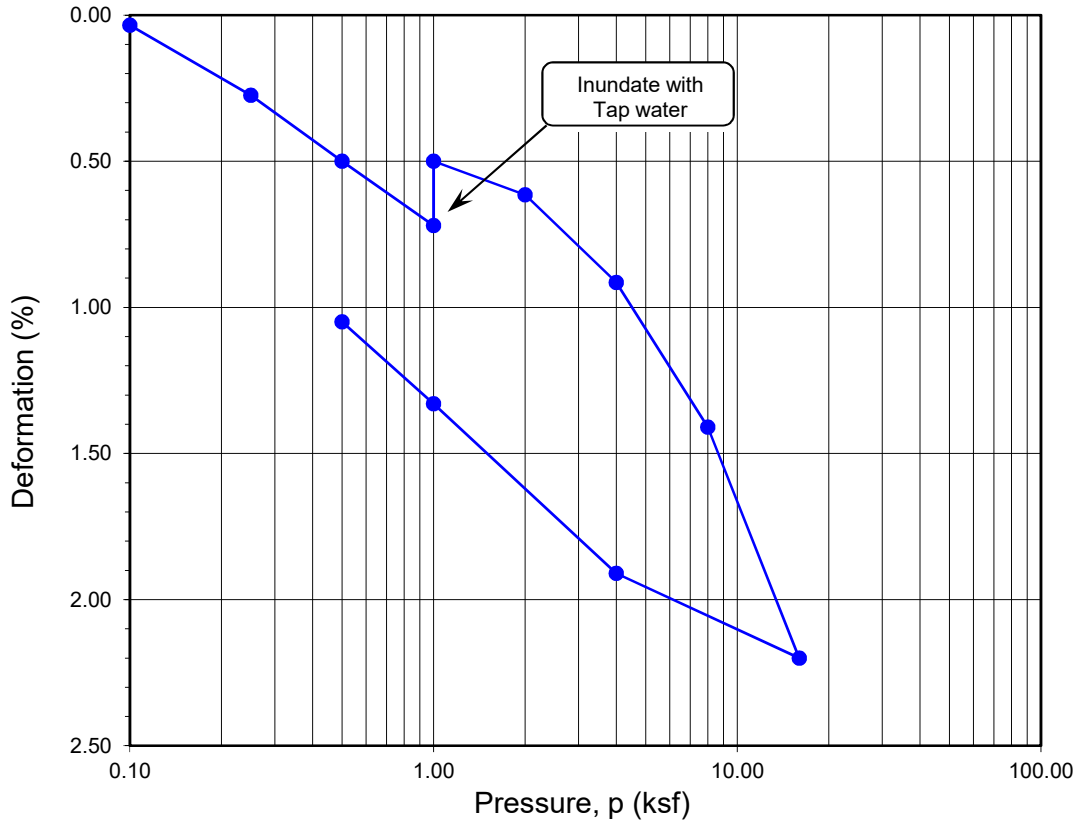
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.0905	0.9997	0.00	0.03	0.468	0.03
0.25	0.0934	0.9968	0.05	0.32	0.465	0.27
0.50	0.0962	0.9939	0.11	0.61	0.461	0.50
1.00	0.0992	0.9909	0.19	0.91	0.458	0.72
1.00	0.0970	0.9931	0.19	0.69	0.461	0.50
2.00	0.0992	0.9910	0.29	0.91	0.460	0.62
4.00	0.1034	0.9868	0.41	1.33	0.455	0.91
8.00	0.1096	0.9805	0.54	1.95	0.448	1.41
16.00	0.1190	0.9711	0.69	2.89	0.436	2.20
4.00	0.1143	0.9758	0.51	2.42	0.441	1.91
1.00	0.1070	0.9831	0.36	1.69	0.449	1.33
0.50	0.1036	0.9865	0.30	1.35	0.453	1.05

Time Readings				
Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-4	**R-2**	**10**	**14.4**	**16.4**	**114.8**	**114.3**	**0.469**	**0.453**	**83**	**93**

Soil Identification: Light olive brown lean clay with sand (CL)s

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22086-01

Lovett Industrial - Evans Road

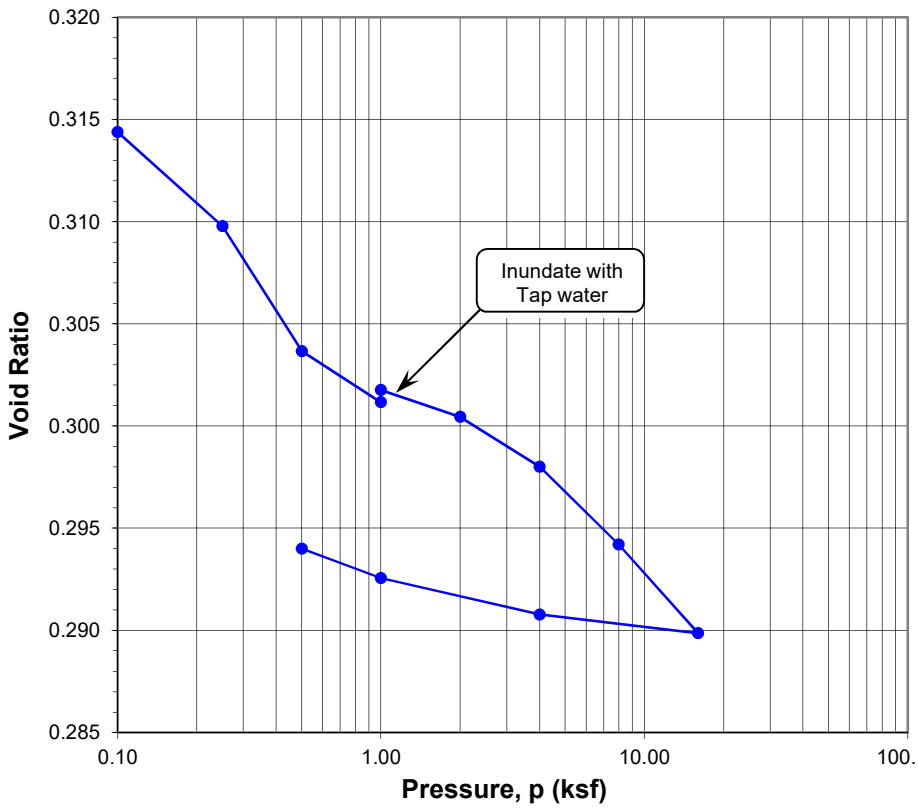
07-22

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Lovett Industrial - Evans Road	Tested By:	G. Bathala	Date:	06/29/22
Project No.:	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-5	Depth (ft.):	7.5		
Sample No.:	R-2	Sample Type:	Ring		
Soil Identification:	Dark yellowish brown lean clay with sand (CL)s				

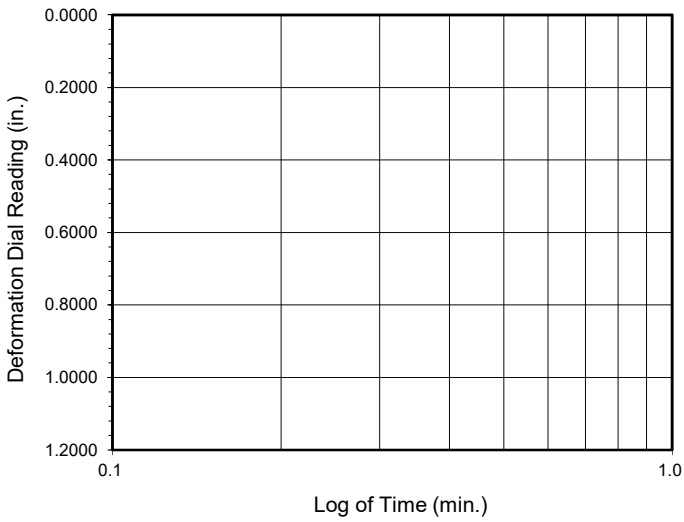
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	214.14
Weight of Ring (g):	43.42
Height after consol. (in.):	0.9842
Before Test	
Wt. of Wet Sample+Cont. (g):	191.47
Wt. of Dry Sample+Cont. (g):	179.17
Weight of Container (g):	64.76
Initial Moisture Content (%)	10.8
Initial Dry Density (pcf)	128.2
Initial Saturation (%):	92
Initial Vertical Reading (in.)	0.1371
After Test	
Wt. of Wet Sample+Cont. (g):	266.57
Wt. of Dry Sample+Cont. (g):	249.78
Weight of Container (g):	52.53
Final Moisture Content (%)	10.91
Final Dry Density (pcf):	130.0
Final Saturation (%):	99
Final Vertical Reading (in.)	0.1564
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

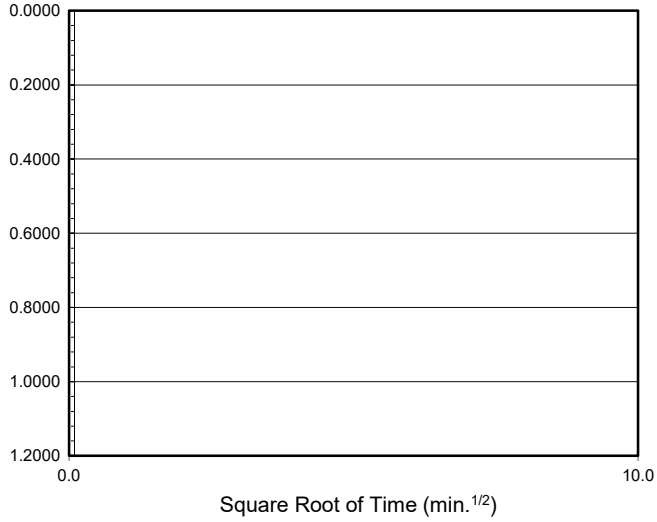


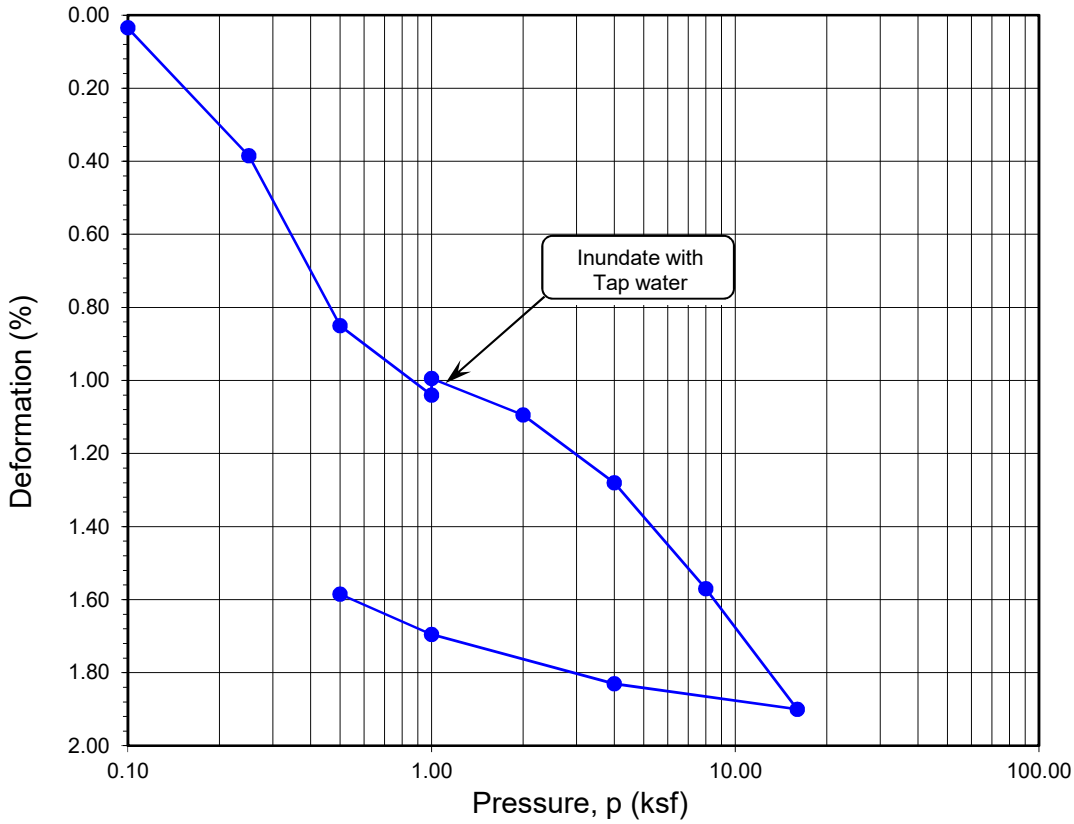
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.1375	0.9997	0.00	0.03	0.314	0.03
0.25	0.1416	0.9956	0.06	0.45	0.310	0.39
0.50	0.1470	0.9901	0.14	0.99	0.304	0.85
1.00	0.1499	0.9872	0.24	1.28	0.301	1.04
1.00	0.1495	0.9877	0.24	1.24	0.302	0.99
2.00	0.1515	0.9857	0.34	1.44	0.300	1.10
4.00	0.1544	0.9827	0.45	1.73	0.298	1.28
8.00	0.1586	0.9785	0.58	2.15	0.294	1.57
16.00	0.1634	0.9737	0.73	2.63	0.290	1.90
4.00	0.1610	0.9761	0.56	2.39	0.291	1.83
1.00	0.1581	0.9791	0.40	2.10	0.293	1.70
0.50	0.1564	0.9808	0.34	1.93	0.294	1.59

Time Readings				
Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-5	**R-2**	**7.5**	**10.8**	**10.9**	**128.2**	**130.0**	**0.315**	**0.294**	**92**	**99**

Soil Identification: Dark yellowish brown lean clay with sand (CL)s

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22086-01

Lovett Industrial - Evans Road

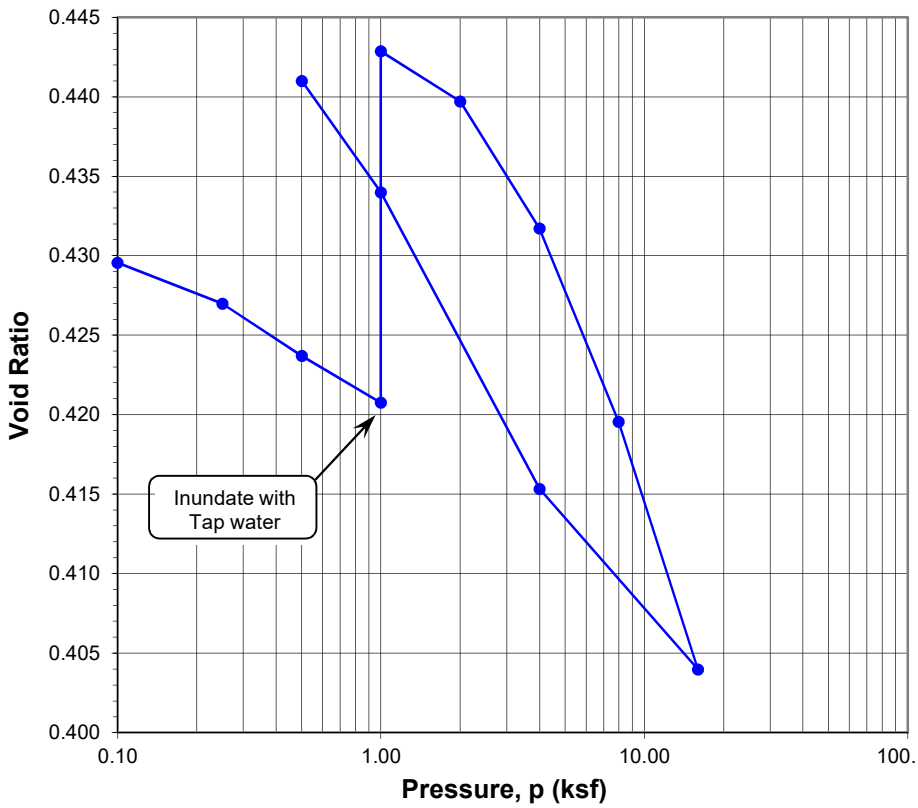
07-22

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Lovett Industrial - Evans Road	Tested By:	G. Bathala	Date:	06/29/22
Project No.:	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-6	Depth (ft.):	5.0		
Sample No.:	R-1	Sample Type:	Ring		
Soil Identification:	Yellowish brown lean clay (CL)				

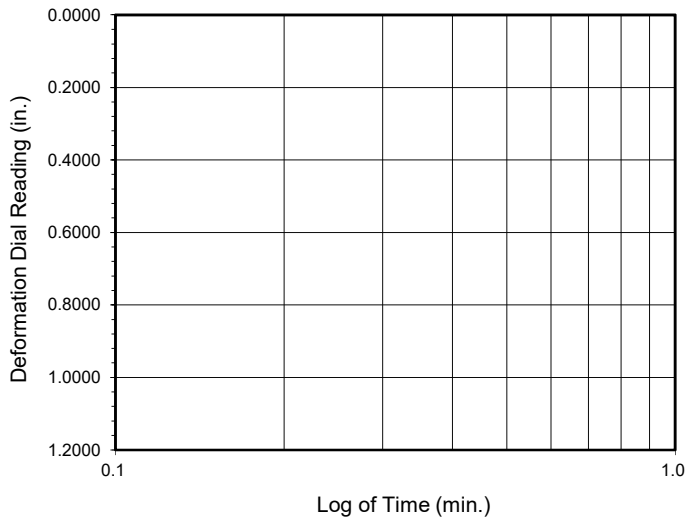
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	209.75
Weight of Ring (g):	45.08
Height after consol. (in.):	1.0077
Before Test	
Wt. of Wet Sample+Cont. (g):	199.83
Wt. of Dry Sample+Cont. (g):	182.85
Weight of Container (g):	58.50
Initial Moisture Content (%)	13.7
Initial Dry Density (pcf)	120.5
Initial Saturation (%):	88
Initial Vertical Reading (in.)	0.0945
After Test	
Wt. of Wet Sample+Cont. (g):	264.84
Wt. of Dry Sample+Cont. (g):	241.21
Weight of Container (g):	52.64
Final Moisture Content (%)	16.47
Final Dry Density (pcf):	118.4
Final Saturation (%):	100
Final Vertical Reading (in.)	0.0896
Specific Gravity (assumed):	2.76
Water Density (pcf):	62.43

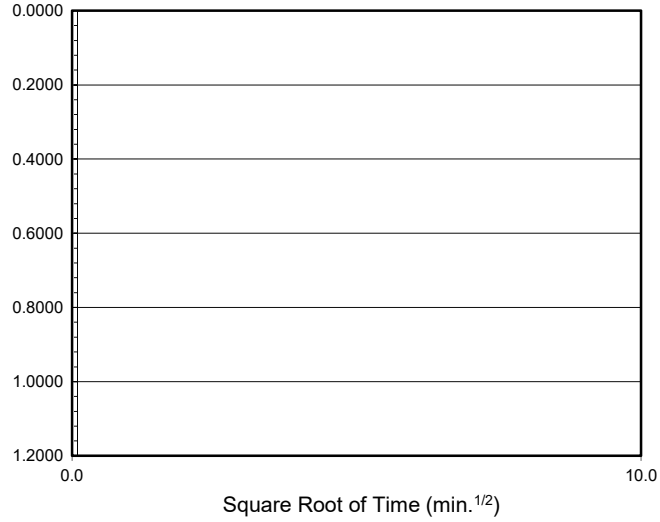


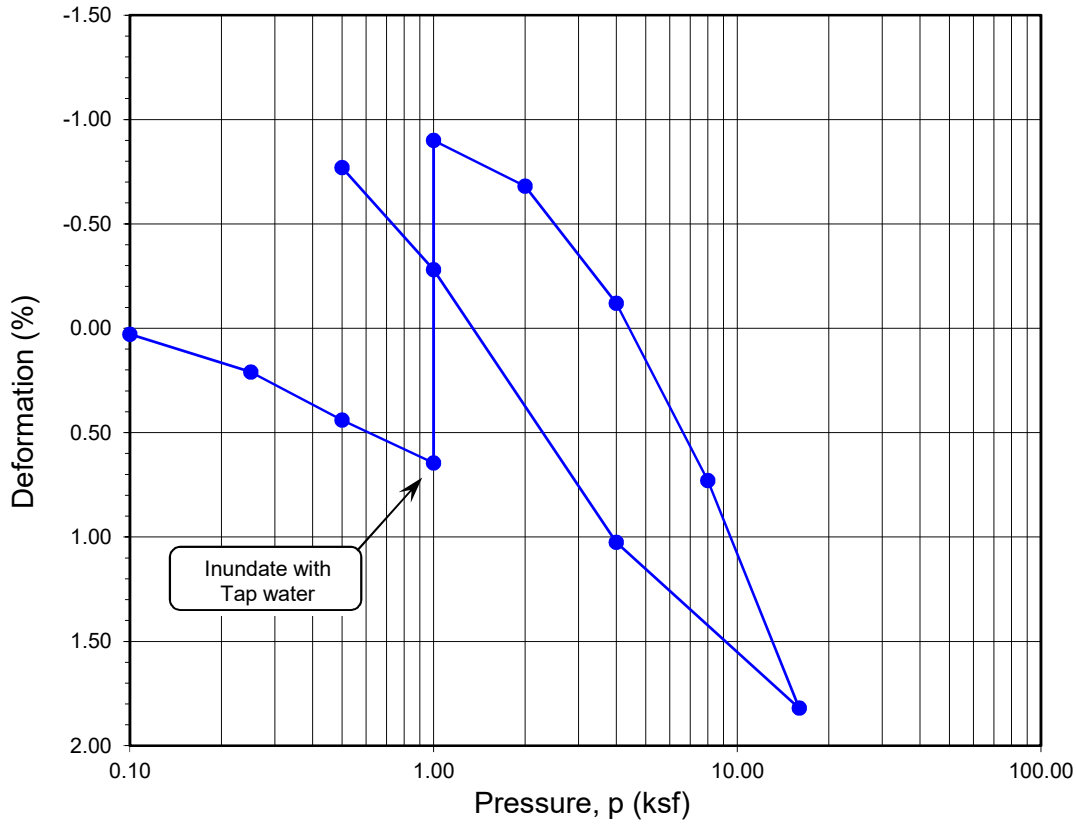
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.0948	0.9997	0.00	0.03	0.430	0.03
0.25	0.0970	0.9975	0.04	0.25	0.427	0.21
0.50	0.0998	0.9947	0.09	0.53	0.424	0.44
1.00	0.1026	0.9920	0.16	0.81	0.421	0.65
1.00	0.0871	1.0074	0.16	-0.74	0.443	-0.90
2.00	0.0901	1.0044	0.24	-0.44	0.440	-0.68
4.00	0.0968	0.9977	0.35	0.23	0.432	-0.12
8.00	0.1066	0.9879	0.48	1.21	0.420	0.73
16.00	0.1190	0.9755	0.63	2.45	0.404	1.82
4.00	0.1094	0.9852	0.46	1.49	0.415	1.03
1.00	0.0950	0.9995	0.33	0.05	0.434	-0.28
0.50	0.0896	1.0049	0.28	-0.49	0.441	-0.77

Time Readings				
Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-6	**R-1**	**5**	**13.7**	**16.5**	**120.5**	**118.4**	**0.430**	**0.441**	**88**	**100**

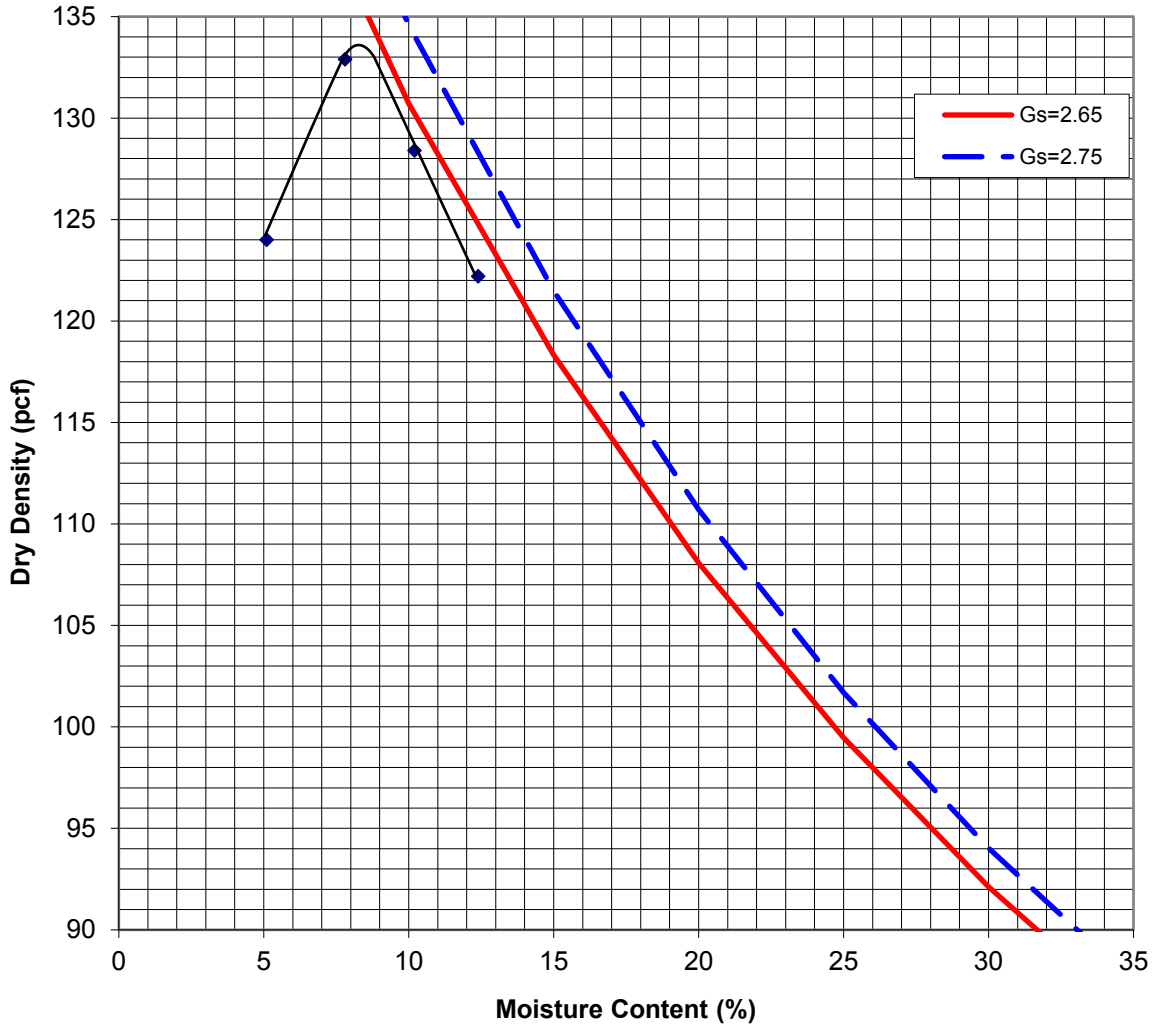
Soil Identification: Yellowish brown lean clay (CL)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22086-01

Lovett Industrial - Evans Road

07-22



Location:	Sample No.:	Depth (ft)	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-4	**B-1**	**0-5'**	**Light brown silty SAND (SM)**	**133.5**	**8.5**

LGC Geotechnical, Inc.

LABORATORY COMPACTION
(ASTM D 1557)

Project Number: 22086-01
Date: Jul-22

Evans Road

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Lovett Industrial - Evans Road Tested By : G. Berdy Date: 06/29/22

Project No. : 22086-01 Checked By: J. Ward Date: 07/22/22

Boring No.	HS-1	HS-6		
Sample No.	B-1	B-1		
Sample Depth (ft)	0-5	0-5		
Soil Identification:	Brown SM	Brown SM		
Wet Weight of Soil + Container (g)	196.84	169.34		
Dry Weight of Soil + Container (g)	192.09	164.59		
Weight of Container (g)	65.20	58.31		
Moisture Content (%)	3.74	4.47		
Weight of Soaked Soil (g)	100.15	100.15		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	61	94		
Crucible No.	2	3		
Furnace Temperature (°C)	860	860		
Time In / Time Out	8:00/8:45	8:00/8:45		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	28.7116	24.5192		
Wt. of Crucible (g)	28.7085	24.5150		
Wt. of Residue (g) (A)	0.0031	0.0042		
PPM of Sulfate (A) x 41150	127.56	172.83		
PPM of Sulfate, Dry Weight Basis	**133**	**181**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15	15		
ml of AgNO3 Soln. Used in Titration (C)	0.5	0.8		
PPM of Chloride (C -0.2) * 100 * 30 / B	60	120		
PPM of Chloride, Dry Wt. Basis	**62**	**126**		

pH TEST, DOT California Test 643

pH Value	**7.27**	**7.73**		
Temperature °C	21.0	21.1		

SOIL RESISTIVITY TEST

DOT CA TEST 643

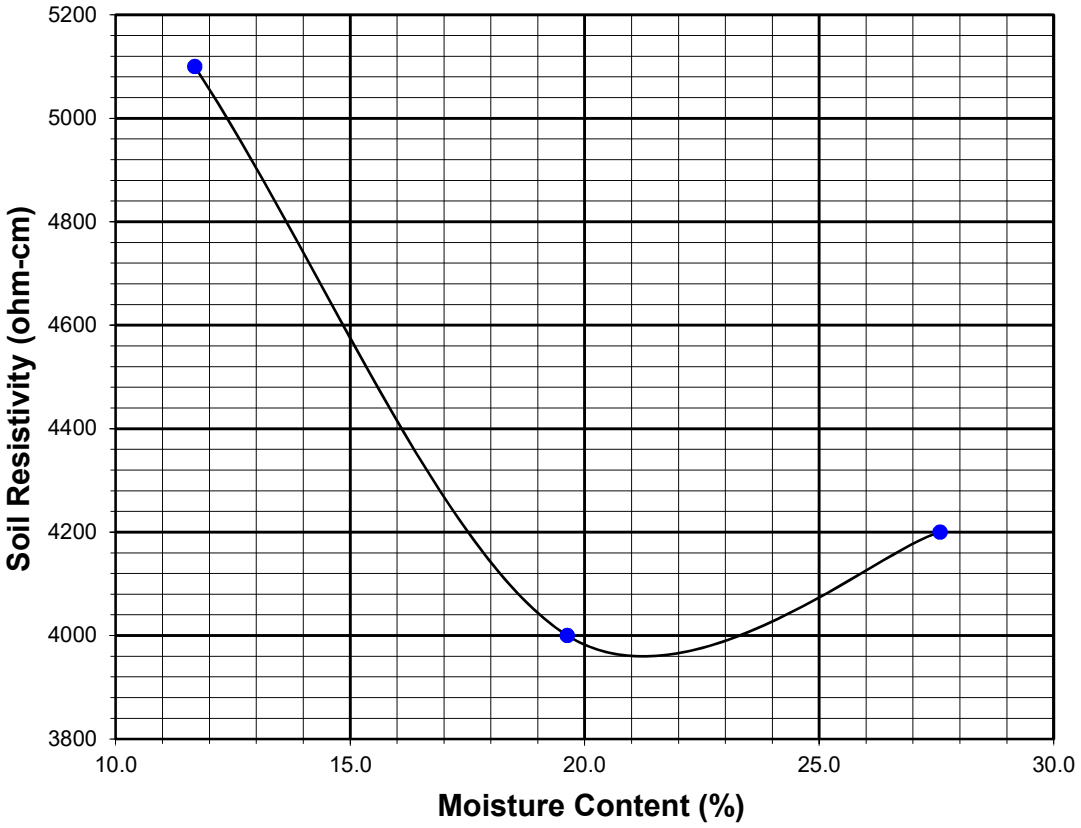
Project Name:	Lovett Industrial - Evans Road	Tested By :	A. Santos	Date:	07/07/22
Project No. :	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-1	Depth (ft.) :	0-5		
Sample No. :	B-1				
Soil Identification:*	Brown SM				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	11.69	5100	5100
2	20	19.63	4000	4000
3	30	27.57	4200	4200
4				
5				

Moisture Content (%) (MCi)	3.74
Wet Wt. of Soil + Cont. (g)	196.84
Dry Wt. of Soil + Cont. (g)	192.09
Wt. of Container (g)	65.20
Container No.	
Initial Soil Wt. (g) (Wt)	130.60
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
3960	**21.2**	**133**	**62**	**7.27**	**21.0**



SOIL RESISTIVITY TEST

DOT CA TEST 643

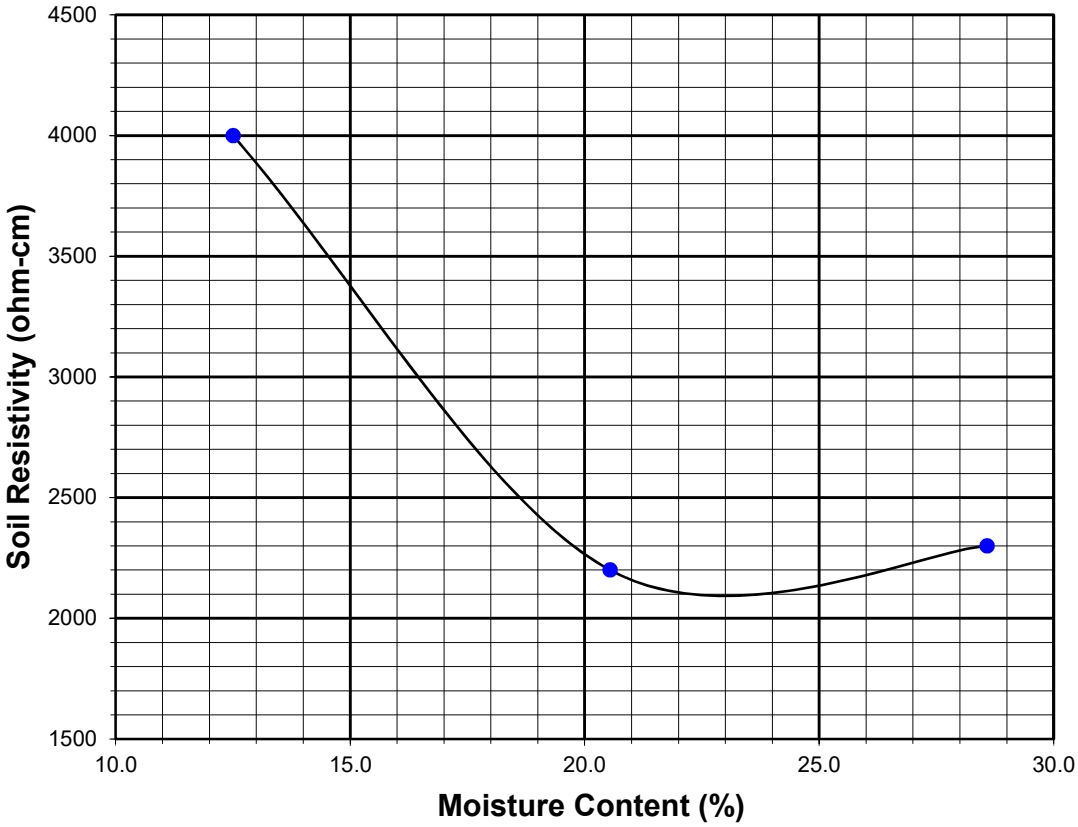
Project Name:	Lovett Industrial - Evans Road	Tested By :	A. Santos	Date:	07/07/22
Project No. :	22086-01	Checked By:	J. Ward	Date:	07/22/22
Boring No.:	HS-6	Depth (ft.) :	0-5		
Sample No. :	B-1				
Soil Identification:*	Brown SM				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	12.51	4000	4000
2	20	20.54	2200	2200
3	30	28.58	2300	2300
4				
5				

Moisture Content (%) (MCi)	4.47
Wet Wt. of Soil + Cont. (g)	169.34
Dry Wt. of Soil + Cont. (g)	164.59
Wt. of Container (g)	58.31
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
2100	**23.0**	**181**	**126**	**7.73**	**21.1**



Appendix D
General Earthwork and Grading Specifications

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of “equipment” of work and the estimated quantities of daily earthwork

contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the
Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Over-excavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of the geotechnical consultant. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 ***Frequency of Compaction Testing***

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 ***Compaction Test Locations***

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than
5 feet apart from potential test locations shall be provided.

5.0 ***Subdrain Installation***

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 ***Excavation***

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 ***Trench Backfills***

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

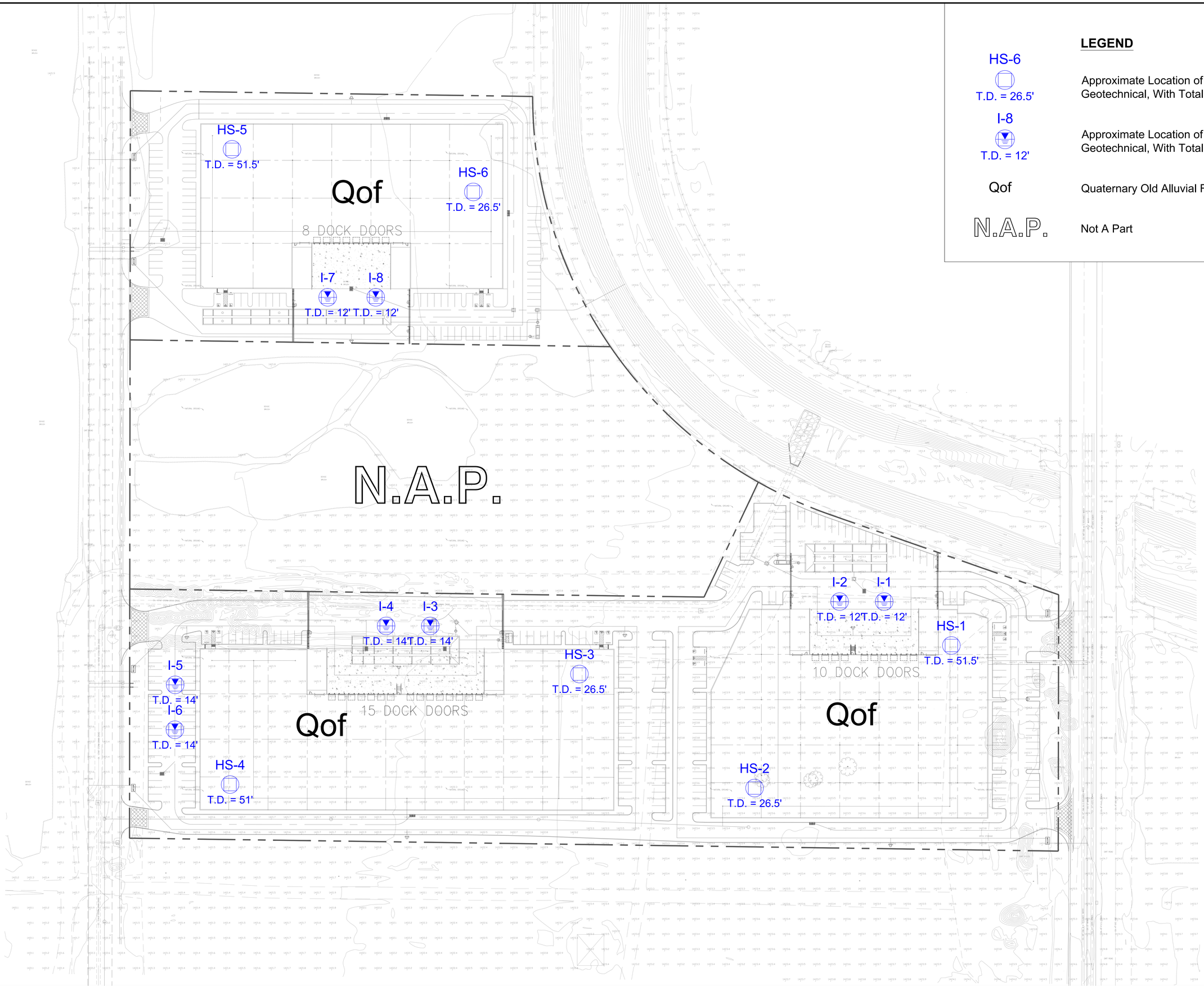
7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over

the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.



LEGEND

HS-6 T.D. = 26.5'	Approximate Location of Hollow Stem Auger Boring by LGC Geotechnical, With Total Depth in Feet
I-8 T.D. = 12'	Approximate Location of Infiltration Boring by LGC Geotechnical, With Total Depth in Feet
Qof	Quaternary Old Alluvial Fan Deposits
N.A.P.	Not A Part

SCALE: 1"=40'

40' 0 40' 80'

LGC Geotechnical, Inc.

LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Sheet 1
Geotechnical Map

CLIENT:
Lovett Industrial
1730 East Holly Avenue, #808
El Segundo, California 90245

CIVIL ENGINEER:
Thienes Engineering, Inc.
14349 Firestone Blvd.
La Mirada, CA 90638

PROJECT NAME	Lovett Industrial - Evans Road
PROJECT NO.	22086-01
ENG. / GEOL.	BTZ / KBC
SCALE	1" = 40'
DATE	July 2022

SHEET 1 of 1

Appendix 4: Historical Site Conditions

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

PHASE I ENVIRONMENTAL SITE ASSESSMENT

13.9-ACRE PROPERTY
MENIFEE, CALIFORNIA

On Behalf Of:
Lovett Industrial, LLC

Prepared By:
Ramboll US Consulting, Inc.
Los Angeles, California

Date Issued:
May 2022

Project Number:
1690026680-001

RAMBOLL

ENVIRONMENT
& HEALTH

SIGNATURE AND ENVIRONMENTAL PROFESSIONAL STATEMENT

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject property. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

_____

Nazgol Zandipour
Senior Consultant

_____

John M. Pekala, PG
Principal

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FIGURES

Figure 1: Site Location

Figure 2: Site Layout

APPENDICES

Appendix A: Site Photographs

Appendix B: Environmental Database Report and Analysis

Appendix C: Historical Research Documentation

C.1: Topographic Maps

C.2: Aerial Photographs

C.3: Abstract of City Directories

C.4: Historical Fire Insurance Maps

Appendix D: User Questionnaire

Appendix E: Qualifications of Environmental Professionals

1. SUMMARY OF CONCLUSIONS

Ramboll US Consulting, Inc. (Ramboll) was retained by Lovett Industrial, LLC ("Lovett" or the "Client") to perform a Phase I Environmental Site Assessment (ESA) of the approximately 13.9-acre property comprised of three parcels located southeast of the intersection of Ethanac Road and Evans Road in Menifee, California (the "site," see Figures 1 and 2). Ramboll's assessment was conducted in connection with a potential purchase of the site.

The objective of the Phase I ESA, which was conducted in conformance with the scope and limitations of ASTM International's *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* E1527-21[1] (the "ASTM Standard"), was to identify Recognized Environmental Conditions (RECs), as defined in the ASTM Standard (see Section 8).

1.1 Site Summary

The site is located southeast of the intersection of Ethanac Road and Evans Road in Menifee, Riverside County, California. The approximately 13.9-acre site is comprised of the three following noncontiguous parcels:

- Assessor's parcel number (APN) 331-060-020, an approximately 4.41-acre parcel, which is located in the northern portion of the site (herein referred to as "Parcel 1"). Parcel 1 is vacant, covered with natural vegetation (mostly green) and is equipped with irrigation systems (pipes and sprinklers).
- APN 331-060-007, an approximately 5.25-acre parcel, which is located in the southwestern portion of the site and south of Parcel 1 (herein referred to as "Parcel 2"). Parcel 2 is vacant and covered with natural vegetation (mostly dried).
- APN 331-060-008, an approximately 4.21-acre parcel, which is located in the southeastern portion of the site and east of Parcel 2 (herein referred to as "Parcel 3"). Parcel 3 is vacant and covered with natural vegetation (mix of green and dried).

Parcels 1 and 2 have been vacant and/or used for agricultural purposes since at least the late 1930s until present. Parcel 3 was vacant and/or used for agricultural purposes between at least the late 1930s and the mid-1980s, and was used for agricultural and residential purposes (with apparent dwellings and associated outbuildings) between the late 1980s and the late 1990s/early 2000s, when the residential structures were demolished. Parcel 3 remained vacant between the mid-2000s until present. There are no addresses associated with Parcels 1 and 2; however, Parcel 3 is referred to with the address 26401 Barnett Road, Menifee, California. Parcel 1 is owned by 14272 Commerce, while Parcels 2 and 3 are owned by Andrew Su.

1.2 Phase I ESA Conclusions

1.2.1 Recognized Environmental Conditions

Ramboll performed a Phase I ESA of the site in conformance with the scope and limitations of the ASTM Standard. Any exceptions to, or deletions from, this practice are described in Section 7.2 of this report. This assessment has identified no RECs in connection with the site.

[1] While this report was prepared to meet the 2021 ASTM Standard, it also meets the requirements of the 2013 ASTM Standard.

1.2.2 Other Findings

Although not considered to be a REC, Ramboll identified the following other finding, which represents a contingent risk not clearly defined by the ASTM Standard:

- **Past Use of Site for Residential Purposes.** Parcel 3 was previously used for agricultural and residential purposes from the 1980s until the late 1990s/early 2000s. During this time period, a few scattered residences and associated outbuildings were present on the site. No information was available concerning the possible past use and storage of chemicals and petroleum products at the site associated with these past uses. While it is possible that small-scale spills or releases of chemicals or petroleum products may have occurred in the past, because Ramboll's review did not identify documentation of a release, a suspected release, or a potentially material threat of a release of a hazardous substance or petroleum product related to this matter, it is not considered a REC. Ramboll notes that this matter is unlikely to result in regulatory scrutiny, assuming no changes to site use.

Additional findings of Ramboll's Phase I ESA that are not considered RECs or CRECs, including *de minimis* conditions are discussed in Section 7 of this report.

2. INTRODUCTION

2.1 Scope of Work

Ramboll conducted a Phase I ESA of the site, which relied upon the sources of information noted below. The date on which the information was obtained/reviewed is also indicated in the table below.

Table 1: Sources of Information Relied on for the Phase I ESA

Resource	Description	Date
Site Reconnaissance		
Site visit	Ramboll representative: Nazgol Zandipour (photographs from the site visit are provided in Appendix A)	May 3, 2022
Interviews		
Site Owner Representative	Andrew Su, Site Owner (2006)	May 2, 2022
Records Review		
Environmental Database Search[2]	Environmental Data Resources, Inc (EDR) database report (Appendix B)	April 28, 2022
Federal and State Governmental Online Resources	USEPA Envirofacts and Enforcement and Compliance History Online (ECHO) databases California Water Resources Control Board's GeoTracker website (GeoTracker) California Department of Toxic Substances Control's (DTSC's) EnviroStor (EnviroStor) website California Geologic Energy Management Division (CalGEM) website California Department of Water Resources, Water Data Library	May 2, 2022
Local Agency Records	Riverside County Environmental Department, Riverside County Building Department, City of Menifee Fire Department, City of Menifee Building Department. As of the date of this report, a response to Ramboll's request had not yet been received.	May 2, 2022
Historical Sources	Aerial photographs, topographic maps, city directory listings, Sanborn maps (as available), obtained from EDR (Appendix C).	May 2, 2022
Physical Setting Sources	Current USGS 7.5-minute topographic map for the site and surrounding area Geologic, hydrogeologic, and hydrologic information provided in the EDR report	May 2, 2022

Table 1: Sources of Information Relied on for the Phase I ESA		
Resource	**Description**	**Date**
Prior Environmental Reports and Information	Site representatives reported that, to their knowledge, no Phase I ESAs or Phase II site investigations, environmental compliance audits, or similar investigations have previously been conducted for the site.	N/A
User-provided Information		
User-provided Information	Information provided by the user of this assessment, including responses to a user questionnaire (Appendix D) consistent with Appendix X3 of the ASTM Standard and other information identified in Section 10.8 and 10.9 of the ASTM Standard.	May 5, 2022

Notes:

[1] - The site representatives interviewed by Ramboll were identified by the Client as having good knowledge of the uses, physical characteristics, and operations of the site (i.e., "key site manager" as defined by the ASTM Standard).

[2] - The radius searched for each database, as well as the databases themselves, were selected in accordance with the ASTM Standard.

This Phase I ESA was conducted in accordance with the methodology specified in the ASTM Standard, as agreed upon by Ramboll and its client in the proposal for this assignment.

The scope of work for this assignment was expanded to include an evaluation of certain additional considerations that are not included in the ASTM Standard, which included a screening-level review of wetlands, flood plains, and radon. The review of additional considerations was conducted based on available information and documentation; no samples of any media were collected as part of this assignment unless explicitly stated otherwise. Any other areas referred to as non-scope considerations by the ASTM Standard not listed above were outside the scope of this assessment.[2]

2.2 Significant Assumptions

In conducting this review, Ramboll made no significant assumptions, except for the following:

- Site-specific field measurements or other detailed hydrogeological information for the site were not publicly available or reasonably ascertainable. In the absence of such data, Ramboll has assumed that the flow direction of shallow groundwater beneath the site and in the local vicinity generally mimics surface topography and is affected by nearby surface water bodies. Therefore, in evaluating potential on-site impacts from off-site sources, those off-site facilities not located adjacent to or upgradient of the site are not considered to represent a significant contamination concern to the site. This interpretation is based on the assumption that a hazardous material released to the subsurface generally does not migrate laterally within the unsaturated soil for a

[2] The ASTM Standard considers per-/polyfluoroalkyl substances (PFAS) and other emerging contaminants as non-scope considerations; however, for the purposes of this assessment, Ramboll considered PFAS within the context of the Phase I ESA.

significant distance, although a hazardous material can migrate in the groundwater in a generally downgradient direction.

2.3 Reliance and General Limitations

This report has been prepared for the exclusive use of Lovett and may not be relied upon by any other person or entity without Ramboll's prior express written permission. Reliance on Ramboll's report may be granted through the issuance of a separate reliance letter. If granted, and unless otherwise specified in writing, Ramboll's total aggregate exposure and liability in connection with the Report to Lovett Industrial, LLC and any third party to which reliance has been issued shall not exceed the limits of liability established in the contract between Ramboll and its client for this assignment.

This report is considered current only for a period of 180 days from the site inspection (or the earliest date identified in the table above). The conclusions presented in this report represent Ramboll's professional judgment based upon the information available and conditions existing as of the date of this report. In performing its assignment, Ramboll must rely upon publicly available information, information provided by the client, and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate and complete. This review is not intended as legal advice, nor is it an exhaustive review of site conditions. Ramboll makes no representations or warranties, expressed or implied, about the conditions of the site.

Ramboll's scope of work for this assignment did not include collecting samples of any environmental media. As such, this review cannot rule out the existence of latent conditions including contamination not identified and defined by the data and information available for Ramboll's review; however, this report is intended, consistent with normal standards of practice and care, to assist the client in identifying the risks of such latent conditions.

3. SITE DESCRIPTION

3.1 Site Setting

The site is located southeast of the intersection of Ethanac Road and Evans Road in Menifee, Riverside County, California (the "site"). The approximately 13.9-acre site is located approximately 21 miles southeast of Riverside, California (Figure 1).

The site is comprised of the three following noncontiguous parcels:

- APN 331-060-020, an approximately 4.41-acre parcel, which is located in the northern portion of the site (herein referred to as "Parcel 1"). Parcel 1 is vacant, covered with natural vegetation (mostly green) and is equipped with irrigation systems (pipes and sprinklers).
- APN 331-060-007, an approximately 5.25-acre parcel, which is located in the southwestern portion of the site and south of Parcel 1 (herein referred to as "Parcel 2"). Parcel 2 is vacant and covered with natural vegetation (mostly dried).
- APN 331-060-008, an approximately 4.21-acre parcel, which is located in the southeastern portion of the site and east of Parcel 2 (herein referred to as "Parcel 3"). Parcel 3 is vacant and covered with natural vegetation (mix of green and dried).

Vehicular access is possible from Barnett Road and Evans Road (from Ethanac Road) along the eastern side of Parcel 3 and the western side of Parcels 1 and 2, respectively. Several unpaved roads are present along the northern and southern boundaries of Parcels 2 and 3, in between Parcels 2 and 3, and along the western boundary of Parcels 1 and 2 (Evans Road). There are no paved roads or parking areas present at the site. Pedestrian access is also provided along the flood control channel, which is located adjacent to the east and north of Parcels 1 and 3, respectively. There are no on-site surface water bodies.

The following table provides an overview of physical setting and utility information for the site.

Table 2: Physical Setting Information

Conditions	Description
Site Information	
Ownership	14272 Commerce (Parcel 1: APN 331-060-020); Andrew Su (Parcels 2 and 3: APNs 331-060-007 and 331-060-008)
Size	Approximately 13.9 acres
Property Tax ID	APN: 331-060-007, 331-060-008, and 331-060-020
Topography and Hydrology	
Topography	Site: Generally flat Region: Regionally, the ground slopes downward to the northwest

Table 2: Physical Setting Information	
Conditions	**Description**
Nearest Surface Water Body to the Site	On-site: There are no on-site surface water bodies. Off-site: A flood control channel (dry) is located adjacent to the east and north of Parcels 1 and 3, respectively. In addition, San Jacinto River is located approximately 1.5 miles northwest of the site.
Geology and Hydrogeology	
Presumed Direction of Shallow Groundwater Flow[1]	Northwest
Depth to Groundwater	Information not readily available for the site. According to the DWR webpage, groundwater was measured at a depth of 60.0 feet below ground surface (bgs) at a State well, which is located approximately 400 feet southwest of Parcel 2.
Nearby Groundwater Supply Wells	According to well database information provided in the EDR report, 14 federally registered wells are present within one mile of the site; none are identified as public supply wells. In addition, approximately 31 private or municipal wells identified in the state database which may be used for water supply are located within one mile of the site.
Geologic Conditions	Regional soils are well drained sandy loams with slow infiltration rates.

Notes:

Information in this table was obtained through visual observations during the site visit; a review of USGS topographic maps, Google Earth imagery, information contained in the database search report, prior environmental assessment reports (if available), and local agency sources (noted in Chapter 2), and information provided by site representatives.

[1] - In the absence of on-site measurements of groundwater flow direction, presumed direction of groundwater flow is based on local/regional topography and the location and direction of flow of nearby surface water bodies.

3.2 Current Use of the Site

The site is comprised of undeveloped vacant land covered with natural vegetation. There are no chemicals or raw materials stored or utilized at the site. During the site visit, a number of concrete conduits (reinforced concrete pipes) were stored along the eastern portion of Parcel 3. In addition, several PVC pipes were observed along the western portion of Parcel 2.

According to site representatives, no chlorinated solvents or PFAS are currently used at the site, and the use of such chemicals would not be expected since the site is vacant.

4. RECORDS REVIEW

4.1 Historical Site Use and Local Agency Information

Parcels 1 and 2 have been vacant and/or used for agricultural purposes since at least the late 1930s until present. Parcel 3 was vacant and/or used for agricultural purposes between at least the late 1930s and the mid-1980s, and was used for agricultural and residential purposes (with apparent dwellings and associated outbuildings) between the late 1980s and the late 1990s/early 2000s, when the residential structures were demolished. Parcel 3 remained vacant between the mid-2000s until present. There are no addresses associated with Parcels 1 and 2; however, Parcel 3 is referred to with the address 26401 Barnett Road, Menifee, California. Parcel 1 is owned by 14272 Commerce, while Parcels 2 and 3 are owned by Andrew Su.

Based on Ramboll's review of the past uses of the site, it is unlikely that chlorinated solvents and PFAS were previously used, stored, or handled at the site.

The following table provides a summary of key information obtained by Ramboll from a review of available historical resources and information obtained from local governmental agencies and regulatory bodies.

Table 3: Summary of Historical Resources and Local Agency Information for the Site

Historical Resource	Key Observations Regarding Site History
Historical Resources	
Aerial Photographs (1938, 1949, 1953, 1961, 1967, 1978, 1985, 1989, 1997, 2002, 2006, 2009, 2012, and 2016) Satellite Imagery [1] (1985 to 2021)	1938 – 1978: The site appears as vacant and/or agricultural land. 1985: Parcels 1 and 2 appear as vacant and/or agricultural land, while a residential structure is depicted in the southeastern portion of Parcel 3. 1989 – 1997: Parcels 1 and 2 remain unchanged. Parcel 3 is further developed with roads, landscaped areas, and other small structures. 2002 – 2006: Parcels 1 and 2 remain unchanged. The residential dwellings and associated small structures are no longer visible on Parcel 3; only the landscaped areas and roads are depicted. 2009 – 2021: The site appears as vacant and/or agricultural land.
Topographic Maps (1901 to 2018)	1901 – 2018: No development depicted. An unnamed tributary is depicted on Parcels 2 and 3, oriented in the north-south direction, in the 1942, 1943, and 1947 maps.
Local Agency Information	
Tax assessor website	The Property Record Card provided in the Assessor's page for the site indicates that: • The ownership of Parcel 1 was transferred on February 24, 2012. The primary use of the parcel is described as "Residential." • The ownership of Parcel 2 was transferred on May 9, 2006. The primary use of the parcel is described as "Manufactured Home." • The ownership of Parcel 3 was transferred on April 14, 2006. The primary use of the parcel is described as "Residential."

Table 3: Summary of Historical Resources and Local Agency Information for the Site	
Historical Resource	**Key Observations Regarding Site History**
Riverside County Environmental Department (Environmental Health Department)	Ramboll requested records from the Environmental Health Department for information regarding soil or groundwater investigations, USTs, LUSTs, hazardous materials inspections, or violations/permits for the site. As of the date of this report, a response had not been received from the Environmental Health Department.
Riverside County Building Department (County Building Department)	Ramboll requested records for the site from the County Building Department; however, as of the date of this report, a response had not been received from the County Building Department.
City of Menifee Fire Department (Fire Department)	Ramboll submitted a record request to the Fire Department requesting information pertaining to UST closures and emergency/environmental responses at the site. As of the date of this report, a response had not been received from the Fire Department.
City of Menifee Building Department (City Building Department)	Ramboll requested records for the site from the City Building Department; however, as of the date of this report, a response had not been received from the City Building Department.

Notes:

[1] In addition to aerial photographs provided by the third-party provider, Ramboll viewed historical satellite imagery available on Google Earth. Printed copies were not obtained, and imagery dates were not independently verified.

The third-party provider reported that Sanborn fire insurance map coverage and city directory coverage are not available for the site.

4.2 Environmental Regulatory Database Review for the Site

Ramboll reviewed the results of the state and federal environmental database searches performed by EDR (see Appendix B) and reviewed information available in California's GeoTracker and EnviroStor databases. The site was not listed on any of the databases searched.

4.3 Previous Environmental Assessments and Activities

Based on a review of historical site documents and interviews with site representatives, no prior Phase I environmental assessments, UST closures, environmental sampling, or remediation activities are known to have been conducted at the site.

4.4 User-Provided Information

Ramboll provided Lovett with a User Questionnaire (consistent with Appendix X3 of the ASTM Standard) that requested information relating to environmental liens, activity use limitations (AULs), specialized knowledge of the site, property value diminution, chain-of-title, and any other commonly known or obvious indications of site contamination, as well as information on any proceedings involving the site (as noted in Section 10.9 of the ASTM Standard) that was not otherwise provided to Ramboll (see Appendix D). The user did not provide any information that was not otherwise obtained and reviewed by Ramboll.

5. SITE OBSERVATIONS

5.1 Chemical and Petroleum Storage

5.1.1 Underground Storage Tanks (USTs)

According to site representatives, there are no current or former USTs at the site, and Ramboll identified no visual evidence of such (e.g., vent pipes, fill ports, or dispensing equipment) during the site visit or in the review of records pertaining to the site.

5.1.2 Aboveground Storage Tanks (ASTs)

Site representatives reported that there are currently no ASTs at the site, and Ramboll did not observe any during the site visit. Ramboll did not identify visual evidence of former aboveground storage tanks during the site visit (e.g., concrete pads or tank cradles) or during the review of historical records.

5.1.3 Other Chemical and Petroleum Containers

There are no chemicals or raw materials stored and/or utilized at the site, as the site is vacant.

5.2 Other Site Reconnaissance Observations

During the site visit, Ramboll made observations of interior and exterior portions of the site to look for and identify the features, activities, uses, and conditions specified in 9.4 of the ASTM Standard, as discussed in the table below.

Table 7: Site Reconnaissance Observations

Conditions	Description
Site Utilities and Equipment	
Heating and Cooling Equipment	There is no heating and cooling equipment onsite, as the site is vacant.
Natural Gas Service	N/A; natural gas service is not provided to the site.
Use of Fuel Oil for Building Heat	N/A; no current or known former use of fuel oil usage.
Foam-based Fire Suppression System	N/A; the site is not equipped with a built-in foam-based fire suppression system, as the site is vacant.
Water Supply and On-site Water Wells	N/A; Site representatives reported that there currently is no municipal water service at the site.
PCB-containing Equipment	Site representatives were not aware of any on-site equipment that is known to contain PCBs. There are currently no transformers on the site, as the site is vacant.

Table 7: Site Reconnaissance Observations		
Conditions	**Description**	
Waste, Wastewater and Stormwater		
Waste	Hazardous and Universal	According to site representatives and based on Ramboll observations, operations at the site do not result in the generation of hazardous waste.
	Nonhazardous	No waste is generated at the site, as the site is vacant.
	Observations	Ramboll observed no evidence of a contamination concern associated with waste storage and management at the site.
Wastewater	Sanitary	The site is not served by the municipal sewer system.
	Process	No process wastewater is generated at the site.
	Septic Systems	No identified current or former septic systems.
	Observations	Ramboll observed no evidence a contamination concern associated with wastewater management at the site. Parcels 1 and 2 are equipped with irrigation systems comprised of pipes and sprinklers.
Stormwater	Management	Percolates into the ground surface at unpaved areas, which encompasses the entire site.
	Observations	Ramboll observed no evidence of a contamination concern associated with stormwater management at the site.
Other Interior and Exterior Observations		
Exterior Ponds, Pits, Lagoons and Standing Surface Water	During the site visit, Ramboll observed an area of approximately 4 feet by 2 feet of shallow standing water in the western portion of Parcel 1. The standing surface water could have resulted from excessive irrigation. Ramboll observed no ponds, pits, or lagoons at the site.	
On-site Disposal or Fill Material	Ramboll did not observe any areas of the site indicative of on-site waste disposal or placement of fill material, except that a number of concrete conduits were observed along the eastern portion of Parcel 3 and several PVC pipes were observed along the western portion of Parcel 2. Ramboll did not observe any staining on the soil in the vicinity of the concrete and PVC pipes.	
Staining and Stressed Vegetation	Ramboll did not observe any staining or stressed vegetation.	
Interior Drains, Sumps, Pits, and Trenches	According to site representative and Ramboll's observations, there are no sub-grade structures at the site (e.g., below-grade pits, below-grade oil/water separators, or trenches).	

Table 7: Site Reconnaissance Observations	
Conditions	**Description**
Odors	At the time of the site visit, Ramboll did not note strong odors in interior or exterior areas at the site.

6. SURROUNDING PROPERTIES

The ASTM Phase I Standard requires an evaluation of the potential for migration of contamination onto the site from adjoining and other off-site properties. Ramboll's review of potential contamination risks posed by properties surrounding the site is presented below.

6.1 Current and Past Uses of Adjoining Properties and Surrounding Area

The site is located in an agricultural/residential land use area, as summarized below. The nearest residence to the site is located approximately 200 feet northwest of the site.

The properties in the vicinity of the site have primarily been used for agricultural purposes and/or have been vacant (north, east, south, and west) since as early as the 1930s. Ramboll did not observe obvious indications of environmental concern on the historical sources reviewed.

Table 9: Current and Past Uses of Adjoining Properties

Uses of Adjoining and Nearby Properties	Notable Past Uses and Approximate Time Period	Observations and Notes
North		
Parcel 1: Vacant land, followed by Ethanac Road Parcel 2: Vacant land Parcel 3: Vacant land, followed by the flood control channel	Vacant and/or agricultural since at least the 1930s until present.	Ramboll did not observe conditions on or identify past uses of adjacent properties that represent a potential contamination concern to the site.
East		
Parcel 1: Flood Control Channel Parcel 2: Parcel 3 Parcel 3: Barnett Road, followed by vacant land	Vacant and/or agricultural since at least the 1930s until present.	Ramboll did not observe conditions on or identify past uses of adjacent properties that represent a potential contamination concern to the site.
South		
Parcel 1: Vacant land covered with natural vegetation Parcel 2: Vacant land, followed by McLaughlin Road Parcel 3: Vacant land (which appeared to be under construction), followed by McLaughlin Road	Vacant and/or agricultural since at least the 1930s until present.	Ramboll did not observe conditions on or identify past uses of adjacent properties that represent a potential contamination concern to the site.

Table 9: Current and Past Uses of Adjoining Properties		
Uses of Adjoining and Nearby Properties	**Notable Past Uses and Approximate Time Period**	**Observations and Notes**
West		
Parcels 1 and 2: Evans Road (an unpaved road) followed by agricultural land Parcel 3: Parcel 2	Vacant and/or agricultural since at least the 1930s until present.	Ramboll did not observe conditions on or identify past uses of adjacent properties that represent a potential contamination concern to the site.
Notes: During the site visit, Ramboll walked or drove by the borders of the properties that are adjacent to the site. Ramboll did not enter the neighboring properties.		

6.2 Database Review for Off-site Properties

6.2.1 Adjoining Properties

According to the environmental database search report, no adjoining sites are listed on databases that are indicative of a potential contamination concern.[3]

6.2.2 Other Surrounding Properties

There are several listings in the environmental database report for non-adjoining off-site facilities within applicable ASTM search radii; however, Ramboll has not identified any properties that are likely to represent a potential contamination concern to the site.[4]

The database report indicates that poor or inadequate address information was available for a property located in the vicinity of the site; therefore, this property could not be readily mapped by the third-party provider. Because the location of this property with respect to the site could not be evaluated, Ramboll is limited in its ability to express an opinion regarding the potential for impact to the site from this property. It was beyond the scope of this review to accurately locate the unmapped property identified in the database report; however, based on Ramboll's review of the unmapped property, it appears that it is not located adjacent to the site.

[3] Ramboll's analysis of adjoining sites was based on observations made during the site reconnaissance (as discussed in Table 2) and location information for off-site listings as presented in the database report. Also, for purposes of this analysis, Ramboll considers as "adjoining" properties that are adjacent, even if separated by a road or other physical barrier. Ramboll has not included a discussion of compliance-related databases in this table, as Ramboll considers it unlikely that off-site properties listed on compliance-related databases without indication of a release or chemical mishandling represent a potential risk for contamination to the subject site.

[4] Ramboll considered non-adjoining properties to represent a potential risk of contamination to the site only if they are listed on databases indicative of contamination, with open status, and located potentially upgradient of the site (as the issuance of regulatory closure suggests that impacts to the site from the noted off-site property are unlikely).

7. FINDINGS, OPINION, AND CONCLUSIONS

7.1 Findings, Opinions, and Conclusions

7.1.1 Recognized Environmental Conditions

Ramboll has performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-21 of the approximately 13.9-acre property comprised of three parcels located southeast of the intersection of Ethanac Road and Evans Road in Menifee, California. Any exceptions to, or deletions from, this practice are described in Section 7.2 of this report. This assessment has revealed no evidence of RECs in connection with the site.

7.1.2 Other Findings

The following additional finding related to potential contamination concerns was identified:

- **Past Use of Site for Residential Purposes.** Parcel 3 was previously used for agricultural and residential purposes from the 1980s until the late 1990s/early 2000s. During this time period, a few scattered residences and associated outbuildings were present on the site. No information was available concerning the possible past use and storage of chemicals and petroleum products at the site associated with these past uses. While it is possible that small-scale spills or releases of chemicals or petroleum products may have occurred in the past, because Ramboll's review did not identify documentation of a release, a suspected release, or a potentially material threat of a release of a hazardous substance or petroleum product related to this matter, it is not considered a REC. Ramboll notes that this matter is unlikely to result in regulatory scrutiny, assuming no changes to site use.

7.1.3 *De Minimis* Conditions

De minimis conditions are those that do not represent a material risk of harm to public health or the environment and that generally would not be the subject of enforcement action if brought to the attention of appropriate governmental agencies. Ramboll identified the following *de minimis* conditions related to the site:

- **Historical Agricultural Use of the Site.** Based on Ramboll's review of historical information sources, the site may historically have been used for agricultural purposes from at least the late 1930s until present. Ramboll was not provided with any specific information regarding historical agricultural chemical use, but pesticides or other agricultural chemicals may have been applied on the site. It is possible that residual concentrations of agricultural chemicals may be present in soil and potentially groundwater. If residual concentrations of these chemicals are present, it is unlikely that they would be the subject of regulatory scrutiny in the context of a non-residential land use scenario. As such, Ramboll characterizes this finding as a *de minimis* condition, provided the future site use will be industrial/commercial and the site is not re-zoned for residential use.

7.2 Analysis of Data Gaps

The ASTM Standard defines a data gap as "a lack of or inability to obtain information required by the practice despite good faith efforts by the environmental professional to gather such information." A data gap is only significant if other information obtained during the ESA, or professional experience, raises reasonable concerns and affects the ability of the environmental professional to identify whether a given issue is a REC. The ASTM Standard requires that the ESA report identify and comment on significant data gaps.

Limiting conditions and deviations to the ASTM Standard for the assessment are discussed below.

- Site representatives did not have current contact information for representatives of former site owners/occupants. Ramboll made reasonable attempts to obtain such information, but it was not otherwise readily available. Thus, Ramboll was unable to interview former owners/occupants about historical operations and site conditions. However, Ramboll conducted an interview with the current site owner with tenure at the site dating back to 2006 and reviewed other historical sources regarding former uses of the site.
- During the site visit, certain portions of the site were not accessible due to the presence of dense vegetation. These areas were observed from perimeter areas.
- Ramboll has requested site-related information, but not yet received a response, from the Environmental Health Department, County Building Department, Fire Department, and City Building Department.
- As it is a user requirement, Ramboll did not conduct a review of records to identify whether any environmental liens or activity and use limitations (AULs) have been imposed on the site.

None of the exceptions, deletions, deviations, or site reconnaissance limitations noted above is considered to represent significant data gaps.

8. ASTM DEFINITIONS

The following definitions are presented in the ASTM Standard:

REC - Recognized Environmental Condition:

(1) The presence of hazardous substances or petroleum products in, on, or at the subject property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on, or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on, or at the subject property under conditions that pose a material threat of a future release to the environment.

CREC - Controlled Recognized Environmental Condition:

A REC affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities with hazardous substances or petroleum products allowed to remain in place subject to implementation of required controls (for example, activity and use limitations or other property use limitations).

HREC - Historical Recognized Environmental Condition:

A previous release of hazardous substances or petroleum products affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities and meeting unrestricted use criteria established by the applicable regulatory authority or authorities without subjecting the subject property to any controls (for example, activity and use limitations or other property use limitations).

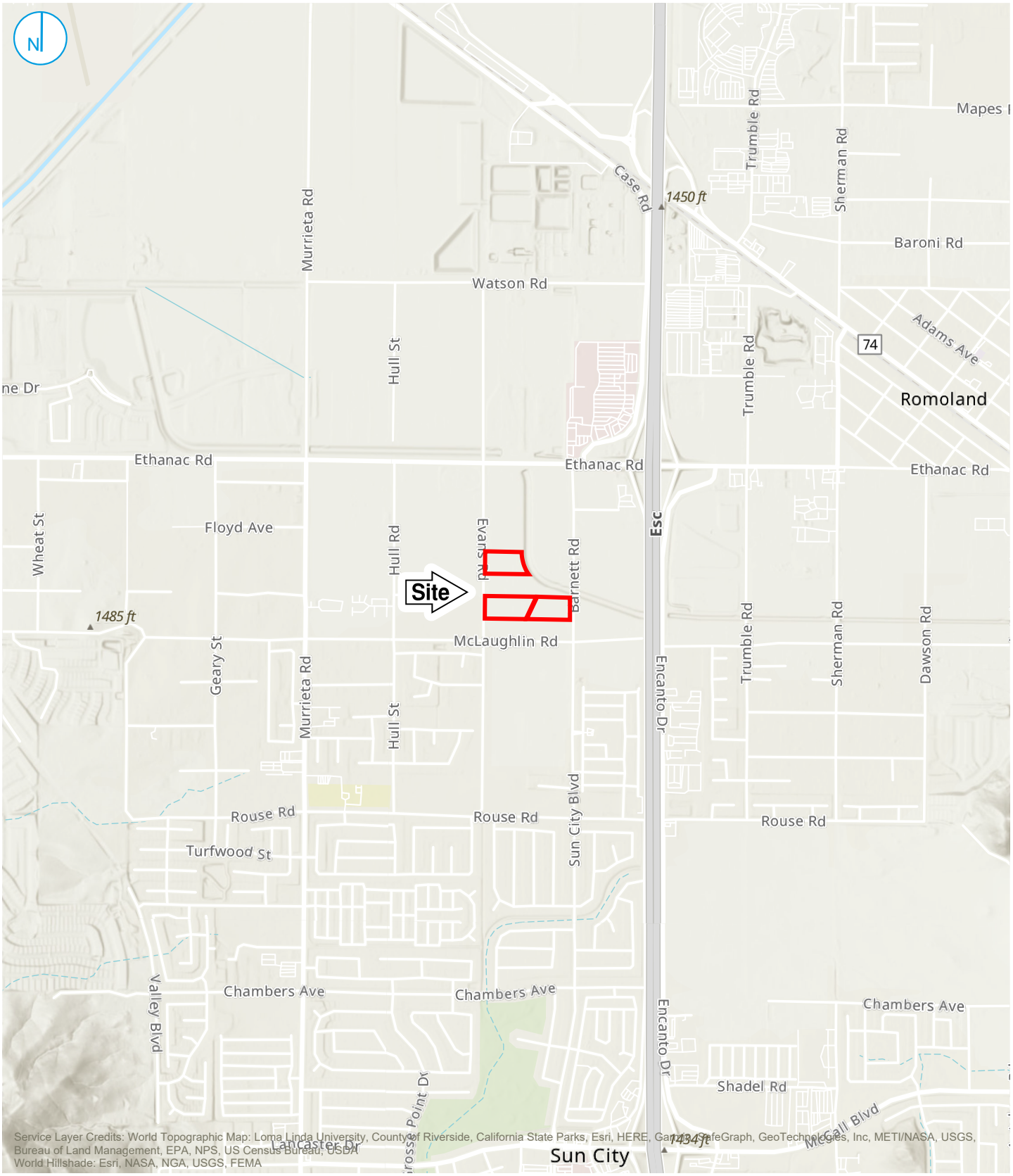
***De minimis* Condition:**

A condition related to a release that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

Data Gap/Significant Data Gap:

A lack of or inability to obtain information required by the practice despite good faith efforts by the environmental professional to gather such information. A data gap that affects the ability of the environmental professional to identify a REC is considered a significant data gap.

FIGURES



C:\Users\CWILLIAMSFREIER\Ramboll\Melody Kneale - Projects_Phase_II\Lovett Industrial\Evans Road Menifee\Phase\Figures.aprx\Figure 01 - Site Location

Map Scale: 1:24,000 | Map Center: 117°11'47"W 33°44'17"N

KEY MAP (not to scale)

Site Boundary

0 1,000 2,000 Feet

SITE LOCATION

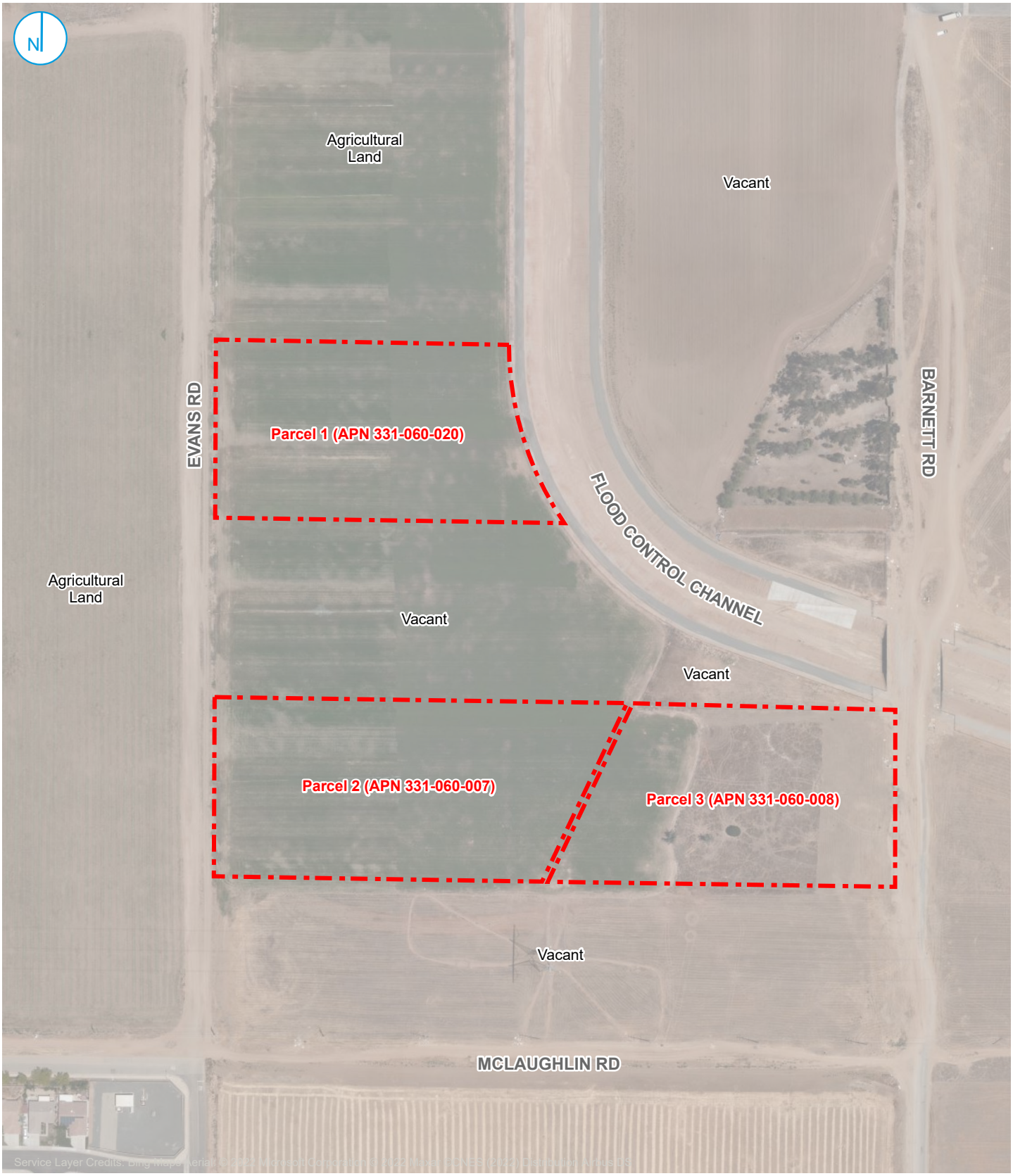
13.9-Acre Property
Southeast of the Intersection
of Ethanac Road and Evans Road
Menifee, California

FIGURE 01

DRAFT

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL



C:\Users\CWILLIAMSFREIER\Ramboll\Melody Kneale - Projects_Phase_I\Lovett Industrial\Evans Road Menifee\Phase\Figures.aprx\Figure 02 - Site Layout

Site Boundary

0 150 300 Feet

SITE LAYOUT

13.9-Acre Property
Southeast of the Intersection
of Ethanac Road and Evans Road
Menifee, California

FIGURE 02

DRAFT

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

APPENDIX A
SITE PHOTOGRAPHS

Photo 1: Overall view of Parcel 3 from the northeast corner of the parcel, looking southwest.

Photo 2: View of the reinforced concrete pipe stored along the eastern side of Parcel 3.

RAMBOLL	**Site Photographs** 13.9-Acre Property Southeast of the intersection of Ethanac Road and Evans Road Menifee, California May, 2022

Photo 3: Overall view of Parcel 3 from the eastern boundary, looking west.

Photo 4: View of the flood control channel, located adjacent to the north of Parcel 3 and east of Parcel 1.

Photo 5: Overall view of Parcel 3 from the southwest corner of the parcel, looking northeast.

Photo 6: Overall view of Parcel 2 from the southeast corner of the parcel, looking northwest.

Photo 7: View of an unpaved road, located in between Parcels 2 and 3, looking south.

Photo 8: Overall view of Parcel 2 from the northern portion of the parcel, looking south.

Photo 9: View of two of several storm drain system manholes, located north of Parcels 2 and 3.

Photo 10: Overall view of Parcel 2 from the northwest corner of the parcel, looking southeast.

Photo 11: Overall view of Parcel 2 from the southwest corner of the parcel, looking northeast.

Photo 12: Overall view of Parcel 1 from the western boundary, looking east.

Photo 13: Overall view of Parcel 1 from the northwest corner, looking southeast.

Photo 14: View of an area of shallow standing water, located along the western side of Parcel 1.

RAMBOLL	**Site Photographs** 13.9-Acre Property Southeast of the intersection of Ethanac Road and Evans Road Menifee, California May, 2022

APPENDIX B
ENVIRONMENTAL DATABASE REPORT

NOTES ON ENVIRONMENTAL DATABASE REPORT

The third-party provider conducted its searches for the standard environmental record sources and the minimum search distances, as specified by the ASTM Standard. The ASTM Standard uses the terminology "approximate minimum search distance" to refer to the radii searched in the environmental database report.

Because the environmental databases themselves are sometimes not updated by the specific regulatory agencies for periods of up to one year or more (depending on the database and the state), the database search conducted herein will not necessarily list any facility or site for which an environmental investigation/listing has been initiated subsequent to the last update.

APPENDIX C
HISTORICAL RESEARCH DOCUMENTATION

APPENDIX C.1
TOPOGRAPHIC MAPS

APPENDIX C.2
AERIAL PHOTOGRAPHS

APPENDIX C.3
ABSTRACT OF CITY DIRECTORIES

APPENDIX C.4
HISTORICAL FIRE INSURANCE MAPS

APPENDIX D
USER QUESTIONNAIRE

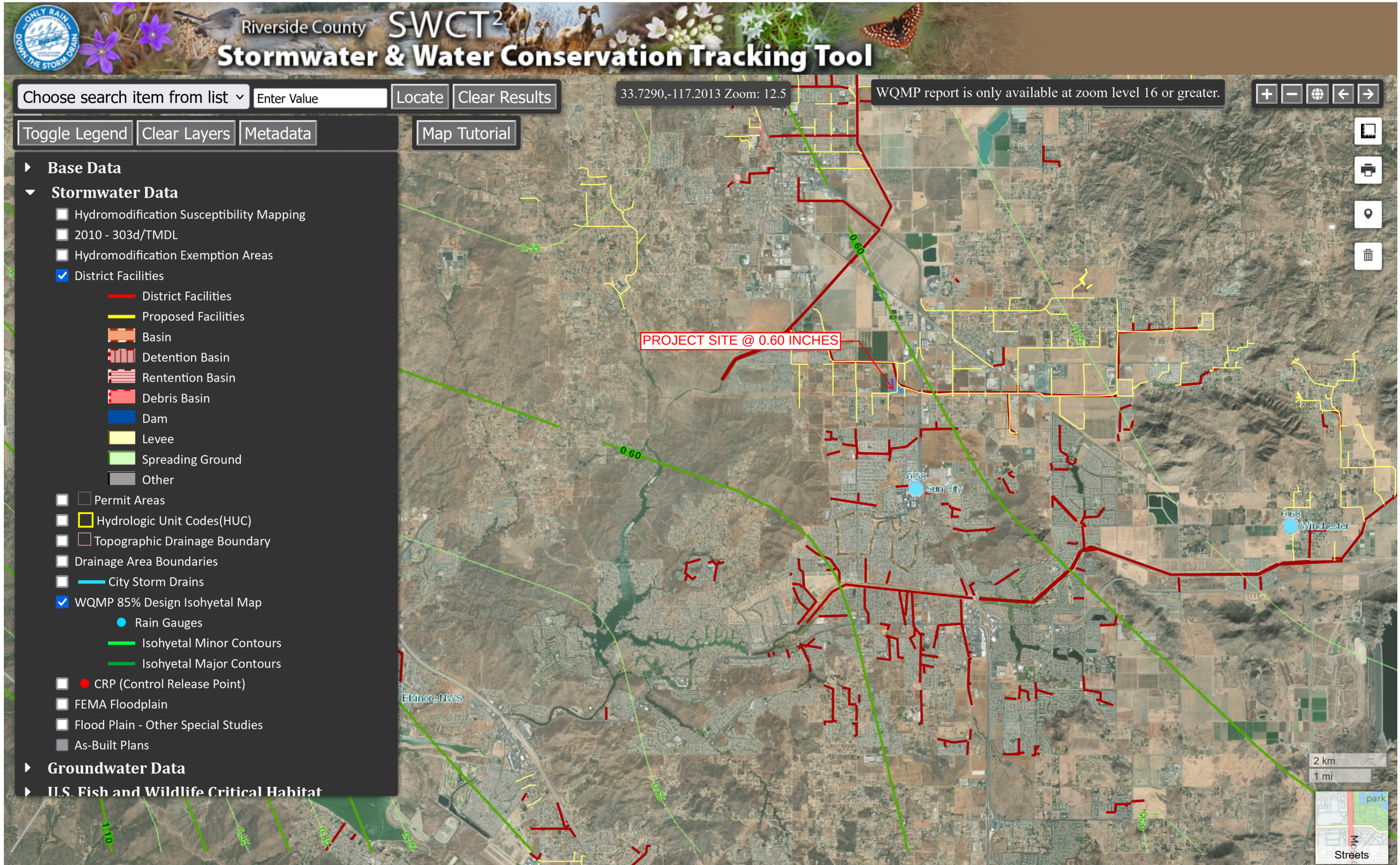
APPENDIX E
QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis (NOT APPLICABLE)

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation


Riverside County SWCT²
Stormwater & Water Conservation Tracking Tool
Choose search item from list
Enter Value
Locate
Clear Results
Toggle Legend
Clear Layers
Metadata
Map Tutorial
33.7290,-117.2013 Zoom: 12.5
WQMP report is only available at zoom level 16 or greater.
Base Data
Stormwater Data
Hydromodification Susceptibility Mapping
2010 - 303d/TMDL
Hydromodification Exemption Areas
District Facilities
District Facilities
Proposed Facilities
Basin
Detention Basin
Rentention Basin
Debris Basin
Dam
Levee
Spreading Ground
Other
Permit Areas
Hydrologic Unit Codes(HUC)
Topographic Drainage Boundary
Drainage Area Boundaries
City Storm Drains
WQMP 85% Design Isohyetal Map
Rain Gauges
Isohyetal Minor Contours
Isohyetal Major Contours
CRP (Control Release Point)
FEMA Floodplain
Flood Plain - Other Special Studies
As-Built Plans
Groundwater Data
U.S. Fish and Wildlife Critical Habitat
PROJECT SITE @ 0.60 INCHES
0.60
0.38
Sun City
0.68
Winchester
Elsinore NWS
2 km
1 mi
Streets

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: Thienes Engineering, Inc. — Date: 11/1/2023

Designed by: Luis Prado — Case No:

Company Project Number/Name: TEI 4118 / Northern Gateway Logistics Center (DMA A)

BMP Identification

BMP NAME / ID: CMP/MWS "A"

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}= 0.60 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 Impervious 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)*
A1	*209,959*	*Concrete or Asphalt*	*1*	*0.89*	*187283.6*			
A2	*10,890*	*Ornamental Landscaping*	*0.1*	*0.11*	*1202.9*			
	220849.2	***Total***			**188486.5**	**0.60**	***9424.3***	***9953***

Notes:

Tributary area = 5.07 acres

Volume required for HCOC = 0.7225 ac-ft = 31,472 CF (2-year, 24-hr proposed condition hydrograph)

The underground CMP system will be utilized to store the DCV plus the HCOC mitigation volume. The DCV is met at approximately 3.5 feet above the invert of the CMP. The volume above this depth will be released via a pump.

MWS VOLUME BASED SIZING SHEET

Project Information

Project ID	
Project Name	TEI 4118 / Northern Gateway Logistics Center (DMA A)
Project Location	Menifee, CA
Date	11/1/2023

Horizontal Flow Biofiltration System

SIZING CALCULATIONS	Inputs	Units	Notes/References
Impervious Area			
BMP Drainage Area (not required - manual entry - not part of formula)	5.07	Acres	This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP.
Watershed Impervious Ratio (not reguired - manual entry - not part of formula)			Watershed Imperviousness Ratio", is equal to the percent of total impervious area in the "BMP Drainage Area" divided by 100
Runoff Coefficient "C" (not required - manual entry - not part of formula)			
Water Quality Volume (required)	9424	cubic feet	Use sizing procedures provided by state or local agencies to determine the appropriate Water Quality Volume. Intensities and design storms vary widely by region and method.
Design Storm Duration	0	hours	Varies depending on geographical region. Set at 0 for pump system set up. LA County 3 hours. Call for details.
MWS Sizing			
WetlandMod Model Number (from matrix)	MWS-L-4-15		Please choose size from "Model Size Matrix" Tab
HGL	3.4		Treatment Hydraulic Grade Line
# Of Units	1	quantity	Select the number of systems required to treat the water quality volume. Will very depending on drain down time regulaitons.
Discharge Rate (from matrix)	19.80	gallons/minute	Loading Rate of 0.26 gpm/sq ft or 25 in/hr. Field Verified.
Volume Treated During Event			
Processed through MWS - Linear	0	cubic feet	19.8016 gals/minute
Volume Treated Following Event			
MWS Static Capacity (from matrix)	104.99	cubic feet	
Volume Needed in *Pre-Storage*	9319	cubic feet	Set at zero to start. Size pre-storage system to hold this volume
			Sizing complete when eqaul to value of zero.
TOTAL STORMWATER TREATED	**9424**	cubic feet	Note: This amount should be equal to the "Water Quality Volume"
Drain Down Time	**59.49**	hours	Drain down time must be equal to or less than requirement of local juristiction. Default 48 hours.

Feel free to call or email proposed sizing calculations to Modular Wetlands Systems for assistance with sizing, compliance, and design.

Phone: 1-800-338-1122
Email: info@conteches.com

CONTECH® ENGINEERED SOLUTIONS
A CONCRETE® COMPANY

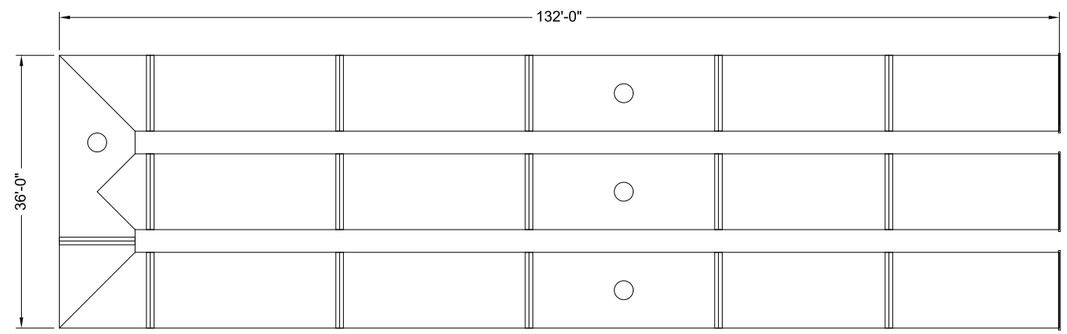
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 402 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 31,472 CF
- PIPE STORAGE VOLUME = 31,573 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 31,573 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

C:\EXPORTS\TEMPLATES\CMP_V8.DWG 10/18/2019 10:02 AM

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DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO19598 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA A
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19598	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Date: 4/21/2023
Project Name: TEI 4118 - DMA A - 19598 (4-21-2023 19-15-46

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	132.0	Backfill Porosity (%):	0%	System Diameter (in):	120
Out-to-out width (ft):	36.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	3.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	0.16	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.33	0.33	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.67	0.66	114.8	114.8	0.0	0.0	114.8	114.8	100.0%	1,029.3
0.83	0.83	208.2	322.9	0.0	0.0	208.2	322.9	100.0%	1,443.2
1.00	1.00	267.3	590.2	0.0	0.0	267.3	590.2	100.0%	1,752.3
1.17	1.16	313.8	904.0	0.0	0.0	313.8	904.0	100.0%	2,005.5
1.33	1.33	352.7	1,256.7	0.0	0.0	352.7	1,256.7	100.0%	2,222.1
1.50	1.50	386.5	1,643.2	0.0	0.0	386.5	1,643.2	100.0%	2,412.0
1.67	1.66	416.3	2,059.5	0.0	0.0	416.3	2,059.5	100.0%	2,581.0
1.83	1.83	443.1	2,502.6	0.0	0.0	443.1	2,502.6	100.0%	2,733.1
2.00	2.00	467.2	2,969.8	0.0	0.0	467.2	2,969.8	100.0%	2,870.9
2.17	2.16	489.1	3,458.9	0.0	0.0	489.1	3,458.9	100.0%	2,996.3
2.33	2.33	509.1	3,967.9	0.0	0.0	509.1	3,967.9	100.0%	3,111.0
2.50	2.50	527.4	4,495.3	0.0	0.0	527.4	4,495.3	100.0%	3,216.0
2.67	2.66	544.1	5,039.5	0.0	0.0	544.1	5,039.5	100.0%	3,312.3
2.83	2.83	559.5	5,599.0	0.0	0.0	559.5	5,599.0	100.0%	3,400.5
3.00	3.00	573.6	6,172.6	0.0	0.0	573.6	6,172.6	100.0%	3,481.4
3.17	3.16	586.5	6,759.1	0.0	0.0	586.5	6,759.1	100.0%	3,555.4
3.33	3.33	598.3	7,357.3	0.0	0.0	598.3	7,357.3	100.0%	3,623.0
3.50	3.50	609.0	7,966.4	0.0	0.0	609.0	7,966.4	100.0%	3,684.4
3.67	3.66	618.8	8,585.1	0.0	0.0	618.8	8,585.1	100.0%	3,740.0
3.83	3.83	627.6	9,212.7	0.0	0.0	627.6	9,212.7	100.0%	3,790.1
4.00	4.00	635.5	9,848.2	0.0	0.0	635.5	9,848.2	100.0%	3,834.8
4.17	4.16	642.5	10,490.7	0.0	0.0	642.5	10,490.7	100.0%	3,874.4
4.33	4.33	648.7	11,139.4	0.0	0.0	648.7	11,139.4	100.0%	3,909.0
4.50	4.50	654.1	11,793.5	0.0	0.0	654.1	11,793.5	100.0%	3,938.8
4.67	4.66	658.6	12,452.1	0.0	0.0	658.6	12,452.1	100.0%	3,963.8
4.83	4.83	662.4	13,114.5	0.0	0.0	662.4	13,114.5	100.0%	3,984.1
5.00	5.00	665.4	13,779.9	0.0	0.0	665.4	13,779.9	100.0%	3,999.8
5.17	5.16	667.6	14,447.5	0.0	0.0	667.6	14,447.5	100.0%	4,011.1
5.33	5.33	669.1	15,116.6	0.0	0.0	669.1	15,116.6	100.0%	4,017.8
5.50	5.50	669.9	15,786.5	0.0	0.0	669.9	15,786.5	100.0%	4,020.0
5.67	5.66	669.9	16,456.4	0.0	0.0	669.9	16,456.4	100.0%	4,017.8
5.83	5.83	669.1	17,125.5	0.0	0.0	669.1	17,125.5	100.0%	4,011.1
6.00	6.00	667.6	17,793.1	0.0	0.0	667.6	17,793.1	100.0%	3,999.8

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

6.17	6.16	665.4	18,458.5	0.0	0.0	665.4	18,458.5	100.0%	3,984.1
6.33	6.33	662.4	19,120.9	0.0	0.0	662.4	19,120.9	100.0%	3,963.8
6.50	6.50	658.6	19,779.5	0.0	0.0	658.6	19,779.5	100.0%	3,938.8
6.67	6.66	654.1	20,433.6	0.0	0.0	654.1	20,433.6	100.0%	3,909.0
6.83	6.83	648.7	21,082.3	0.0	0.0	648.7	21,082.3	100.0%	3,874.4
7.00	7.00	642.5	21,724.8	0.0	0.0	642.5	21,724.8	100.0%	3,834.8
7.17	7.16	635.5	22,360.3	0.0	0.0	635.5	22,360.3	100.0%	3,790.1
7.33	7.33	627.6	22,987.9	0.0	0.0	627.6	22,987.9	100.0%	3,740.0
7.50	7.50	618.8	23,606.6	0.0	0.0	618.8	23,606.6	100.0%	3,684.4
7.67	7.66	609.0	24,215.7	0.0	0.0	609.0	24,215.7	100.0%	3,623.0
7.83	7.83	598.3	24,814.0	0.0	0.0	598.3	24,814.0	100.0%	3,555.4
8.00	8.00	586.5	25,400.4	0.0	0.0	586.5	25,400.4	100.0%	3,481.4
8.17	8.16	573.6	25,974.0	0.0	0.0	573.6	25,974.0	100.0%	3,400.5
8.33	8.33	559.5	26,533.6	0.0	0.0	559.5	26,533.6	100.0%	3,312.3
8.50	8.50	544.1	27,077.7	0.0	0.0	544.1	27,077.7	100.0%	3,216.0
8.67	8.66	527.4	27,605.1	0.0	0.0	527.4	27,605.1	100.0%	3,111.0
8.83	8.83	509.1	28,114.2	0.0	0.0	509.1	28,114.2	100.0%	2,996.3
9.00	9.00	489.1	28,603.2	0.0	0.0	489.1	28,603.2	100.0%	2,870.9
9.17	9.16	467.2	29,070.4	0.0	0.0	467.2	29,070.4	100.0%	2,733.1
9.33	9.33	443.1	29,513.5	0.0	0.0	443.1	29,513.5	100.0%	2,581.0
9.50	9.50	416.3	29,929.8	0.0	0.0	416.3	29,929.8	100.0%	2,412.0
9.67	9.66	386.5	30,316.3	0.0	0.0	386.5	30,316.3	100.0%	2,222.1
9.83	9.83	352.7	30,669.1	0.0	0.0	352.7	30,669.1	100.0%	2,005.5
10.00	10.00	313.8	30,982.8	0.0	0.0	313.8	30,982.8	100.0%	1,752.3
10.17	10.16	267.3	31,250.1	0.0	0.0	267.3	31,250.1	100.0%	1,443.2
10.33	10.33	208.2	31,458.3	0.0	0.0	208.2	31,458.3	100.0%	1,029.3
10.50	10.50	114.8	31,573.0	0.0	0.0	114.8	31,573.0	100.0%	0.0
10.67	10.66	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0
10.83	10.83	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0
11.00	11.00	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0

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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: Thienes Engineering, Inc. — Date: 11/1/2023

Designed by: Luis Prado — Case No:

Company Project Number/Name: TEI 4118 / Northern Gateway Logistics Center (DMA B)

BMP Identification

BMP NAME / ID: CMP/MWS "B"

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}= 0.60 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)*
B1	*510,523*	*Concrete or Asphalt*	*1*	*0.89*	*455386.7*			
B2	*27,007*	*Ornamental Landscaping*	*0.1*	*0.11*	*2983.2*			
	537530.4	***Total***			**458369.9**	**0.60**	***22918.5***	***24227***

Notes:
Tributary area = 12.34 acres
Volume required for HCOC = 1.7598 ac-ft = 76,657 CF (2-year, 24-hr proposed condition hydrograph)

The underground CMP system will be utilized to store the DCV plus the HCOC mitigation volume. The DCV is met at approximately 3.5 feet above the invert of the CMP. The volume above this depth will be released via a pump.

MWS VOLUME BASED SIZING SHEET

Project Information

Project ID	
Project Name	TEI 4118 / Northern Gateway Logistics Center (DMA B)
Project Location	Menifee, CA
Date	11/1/2023

Horizontal Flow Biofiltration System

SIZING CALCULATIONS	Inputs	Units	Notes/References
Impervious Area			
BMP Drainage Area (not required - manual entry - not part of formula)	12.34	Acres	This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP.
Watershed Impervious Ratio (not reguired - manual entry - not part of formula)			Watershed Imperviousness Ratio", is equal to the percent of total impervious area in the "BMP Drainage Area" divided by 100
Runoff Coefficient "C" (not required - manual entry - not part of formula)			
Water Quality Volume (required)	22919	cubic feet	Use sizing procedures provided by state or local agencies to determine the appropriate Water Quality Volume. Intensities and design storms vary widely by region and method.
Design Storm Duration	0	hours	Varies depending on geographical region. Set at 0 for pump system set up. LA County 3 hours. Call for details.
MWS Sizing			
WetlandMod Model Number (from matrix)	MWS-L-8-16		Please choose size from "Model Size Matrix" Tab
HGL	3.4		Treatment Hydraulic Grade Line
# Of Units	1	quantity	Select the number of systems required to treat the water quality volume. Will very depending on drain down time regulaitons.
Discharge Rate (from matrix)	52.33	gallons/minute	Loading Rate of 0.26 gpm/sq ft or 25 in/hr. Field Verified.
Volume Treated During Event			
Processed through MWS - Linear	0	cubic feet	52.3328 gals/minute
Volume Treated Following Event			
MWS Static Capacity (from matrix)	267.65	cubic feet	
Volume Needed in *Pre-Storage*	22651	cubic feet	Set at zero to start. Size pre-storage system to hold this volume
			Sizing complete when eqaul to value of zero.
TOTAL STORMWATER TREATED	22919	cubic feet	Note: This amount should be equal to the "Water Quality Volume"
Drain Down Time	54.74	hours	Drain down time must be equal to or less than requirement of local juristiction. Default 48 hours.

Feel free to call or email proposed sizing calculations to Modular Wetlands Systems for assistance with sizing, compliance, and design.

Phone: 1-800-338-1122

Email: info@conteches.com

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A CONCRETE® COMPANY

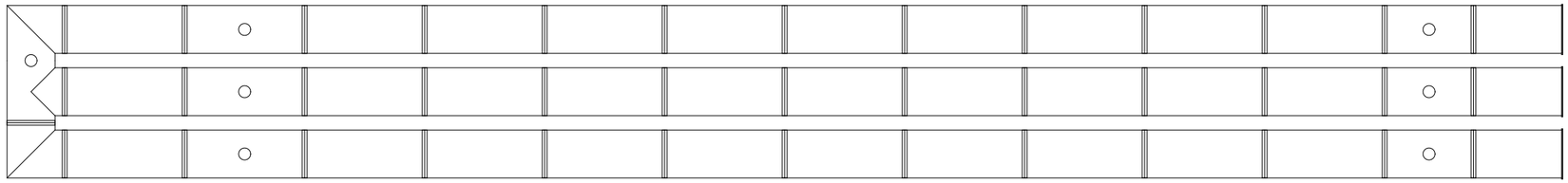
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 978 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 76,657 CF
- PIPE STORAGE VOLUME = 76,812 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 76,812 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 30'

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CONTECH® CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO19599 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA B
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19599	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Date: 4/21/2023
Project Name: TEI 4118 - DMA B - 19599 (4-21-2023 19-36-49

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System Storage Volume Estimation

=Adjustable Input Cells

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Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	324.0	Backfill Porosity (%):	0%	System Diameter (in):	120
Out-to-out width (ft):	36.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	3.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	0.16	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.33	0.33	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.67	0.66	279.2	279.2	0.0	0.0	279.2	279.2	100.0%	2,504.1
0.83	0.83	506.4	785.6	0.0	0.0	506.4	785.6	100.0%	3,511.1
1.00	1.00	650.2	1,435.8	0.0	0.0	650.2	1,435.8	100.0%	4,263.0
1.17	1.16	763.3	2,199.2	0.0	0.0	763.3	2,199.2	100.0%	4,879.1
1.33	1.33	858.1	3,057.3	0.0	0.0	858.1	3,057.3	100.0%	5,406.1
1.50	1.50	940.3	3,997.6	0.0	0.0	940.3	3,997.6	100.0%	5,868.0
1.67	1.66	1,012.9	5,010.5	0.0	0.0	1,012.9	5,010.5	100.0%	6,279.2
1.83	1.83	1,077.9	6,088.4	0.0	0.0	1,077.9	6,088.4	100.0%	6,649.1
2.00	2.00	1,136.6	7,224.9	0.0	0.0	1,136.6	7,224.9	100.0%	6,984.3
2.17	2.16	1,189.9	8,414.8	0.0	0.0	1,189.9	8,414.8	100.0%	7,289.6
2.33	2.33	1,238.5	9,653.3	0.0	0.0	1,238.5	9,653.3	100.0%	7,568.5
2.50	2.50	1,283.0	10,936.4	0.0	0.0	1,283.0	10,936.4	100.0%	7,824.0
2.67	2.66	1,323.8	12,260.2	0.0	0.0	1,323.8	12,260.2	100.0%	8,058.2
2.83	2.83	1,361.2	13,621.4	0.0	0.0	1,361.2	13,621.4	100.0%	8,273.0
3.00	3.00	1,395.5	15,016.8	0.0	0.0	1,395.5	15,016.8	100.0%	8,469.7
3.17	3.16	1,426.8	16,443.7	0.0	0.0	1,426.8	16,443.7	100.0%	8,649.8
3.33	3.33	1,455.5	17,899.2	0.0	0.0	1,455.5	17,899.2	100.0%	8,814.1
3.50	3.50	1,481.7	19,380.9	0.0	0.0	1,481.7	19,380.9	100.0%	8,963.5
3.67	3.66	1,505.4	20,886.3	0.0	0.0	1,505.4	20,886.3	100.0%	9,098.8
3.83	3.83	1,526.8	22,413.1	0.0	0.0	1,526.8	22,413.1	100.0%	9,220.7
4.00	4.00	1,546.0	23,959.1	0.0	0.0	1,546.0	23,959.1	100.0%	9,329.5
4.17	4.16	1,563.1	25,522.2	0.0	0.0	1,563.1	25,522.2	100.0%	9,425.9
4.33	4.33	1,578.2	27,100.4	0.0	0.0	1,578.2	27,100.4	100.0%	9,510.0
4.50	4.50	1,591.2	28,691.6	0.0	0.0	1,591.2	28,691.6	100.0%	9,582.4
4.67	4.66	1,602.3	30,293.9	0.0	0.0	1,602.3	30,293.9	100.0%	9,643.2
4.83	4.83	1,611.5	31,905.3	0.0	0.0	1,611.5	31,905.3	100.0%	9,692.7
5.00	5.00	1,618.8	33,524.1	0.0	0.0	1,618.8	33,524.1	100.0%	9,731.0
5.17	5.16	1,624.3	35,148.4	0.0	0.0	1,624.3	35,148.4	100.0%	9,758.2
5.33	5.33	1,627.9	36,776.3	0.0	0.0	1,627.9	36,776.3	100.0%	9,774.6
5.50	5.50	1,629.7	38,406.0	0.0	0.0	1,629.7	38,406.0	100.0%	9,780.0
5.67	5.66	1,629.7	40,035.7	0.0	0.0	1,629.7	40,035.7	100.0%	9,774.6
5.83	5.83	1,627.9	41,663.6	0.0	0.0	1,627.9	41,663.6	100.0%	9,758.2
6.00	6.00	1,624.3	43,287.8	0.0	0.0	1,624.3	43,287.8	100.0%	9,731.0

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

6.17	6.16	1,618.8	44,906.6	0.0	0.0	1,618.8	44,906.6	100.0%	9,692.7
6.33	6.33	1,611.5	46,518.1	0.0	0.0	1,611.5	46,518.1	100.0%	9,643.2
6.50	6.50	1,602.3	48,120.4	0.0	0.0	1,602.3	48,120.4	100.0%	9,582.4
6.67	6.66	1,591.2	49,711.6	0.0	0.0	1,591.2	49,711.6	100.0%	9,510.0
6.83	6.83	1,578.2	51,289.7	0.0	0.0	1,578.2	51,289.7	100.0%	9,425.9
7.00	7.00	1,563.1	52,852.8	0.0	0.0	1,563.1	52,852.8	100.0%	9,329.5
7.17	7.16	1,546.0	54,398.9	0.0	0.0	1,546.0	54,398.9	100.0%	9,220.7
7.33	7.33	1,526.8	55,925.7	0.0	0.0	1,526.8	55,925.7	100.0%	9,098.8
7.50	7.50	1,505.4	57,431.1	0.0	0.0	1,505.4	57,431.1	100.0%	8,963.5
7.67	7.66	1,481.7	58,912.7	0.0	0.0	1,481.7	58,912.7	100.0%	8,814.1
7.83	7.83	1,455.5	60,368.3	0.0	0.0	1,455.5	60,368.3	100.0%	8,649.8
8.00	8.00	1,426.8	61,795.1	0.0	0.0	1,426.8	61,795.1	100.0%	8,469.7
8.17	8.16	1,395.5	63,190.6	0.0	0.0	1,395.5	63,190.6	100.0%	8,273.0
8.33	8.33	1,361.2	64,551.8	0.0	0.0	1,361.2	64,551.8	100.0%	8,058.2
8.50	8.50	1,323.8	65,875.6	0.0	0.0	1,323.8	65,875.6	100.0%	7,824.0
8.67	8.66	1,283.0	67,158.6	0.0	0.0	1,283.0	67,158.6	100.0%	7,568.5
8.83	8.83	1,238.5	68,397.1	0.0	0.0	1,238.5	68,397.1	100.0%	7,289.6
9.00	9.00	1,189.9	69,587.0	0.0	0.0	1,189.9	69,587.0	100.0%	6,984.3
9.17	9.16	1,136.6	70,723.6	0.0	0.0	1,136.6	70,723.6	100.0%	6,649.1
9.33	9.33	1,077.9	71,801.4	0.0	0.0	1,077.9	71,801.4	100.0%	6,279.2
9.50	9.50	1,012.9	72,814.3	0.0	0.0	1,012.9	72,814.3	100.0%	5,868.0
9.67	9.66	940.3	73,754.6	0.0	0.0	940.3	73,754.6	100.0%	5,406.1
9.83	9.83	858.1	74,612.8	0.0	0.0	858.1	74,612.8	100.0%	4,879.1
10.00	10.00	763.3	75,376.1	0.0	0.0	763.3	75,376.1	100.0%	4,263.0
10.17	10.16	650.2	76,026.3	0.0	0.0	650.2	76,026.3	100.0%	3,511.1
10.33	10.33	506.4	76,532.8	0.0	0.0	506.4	76,532.8	100.0%	2,504.1
10.50	10.50	279.2	76,811.9	0.0	0.0	279.2	76,811.9	100.0%	0.0
10.67	10.66	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0
10.83	10.83	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0
11.00	11.00	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0

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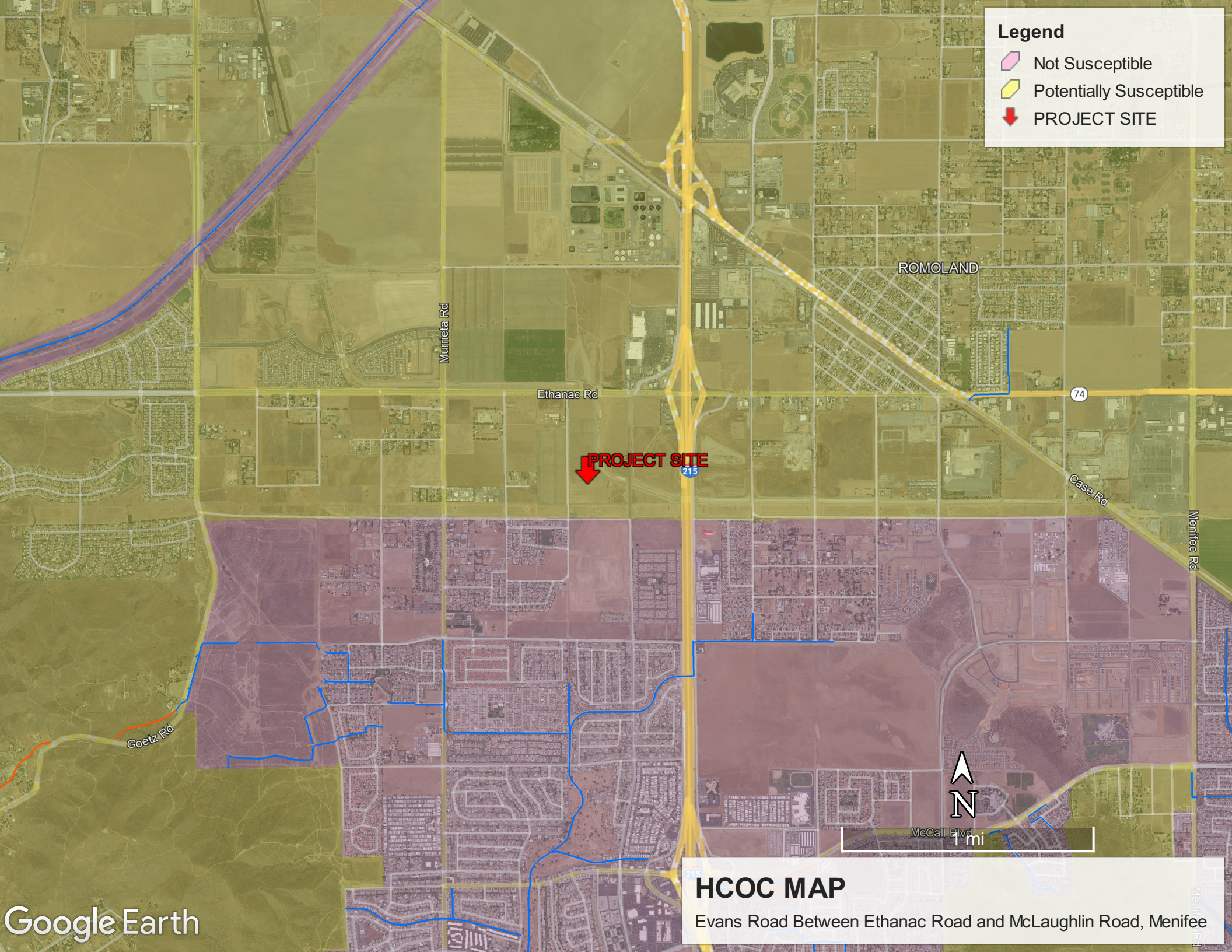
Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

HCOC MAP



HCOC MAP

Evans Road Between Ethanac Road and McLaughlin Road, Menifee

SUMMARY TABLE

HCOC Flow Rate Summary Table

Drainage Area	Pre-condition Flow Rate (cfs)	*Post-condition Flow Rate (cfs)
DMA A	0.13	0.07
DMA B	0.32	0.17
Total	**0.45**	**0.24**

* Flow rate after detention

Notes:
-Existing Q for DMA A found in PDF page 6 of 46
-Existing Q for DMA B found in PDF page 29 of 46
-Proposed Q for DMA A found in PDF page 20 of 46
-Proposed Q for DMA B found in PDF page 43 of 46

PRE-CONDITION HYDROGRAPH (DMA A)

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                Study date  04/21/23 File: 4118exa2242.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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


Program License Serial Number 6400

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

 English Units used in output format



----------------------------------------------------------------------
LOVETT MENIFEE LOGISTICS - RIVERSIDE COUNTY
EXISTING CONDITION - BUILDING 1
HYDROLOGIC ANALYSIS - 2-YEAR

---------------------------------------------------------------------
Drainage Area =       5.07(Ac.)  =      0.008 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       5.07(Ac.)  =      0.008 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.000 Hr.
Lag time =     0.00 Min.
25% of lag time =     0.00 Min.
40% of lag time =     0.00 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]
        5.07            1.90                    9.63

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.07            5.00                   25.35

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.900(In)
Area Averaged 100-Year Rainfall =    5.000(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 %
     5.070           77.00         0.000
 Total Area Entered =      5.07(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
77.0  59.4      0.476     0.000        0.476       1.000      0.476
                                                  Sum (F) =   0.476
Area averaged mean soil loss (F) (In/Hr) =  0.476
Minimum soil loss rate ((In/Hr)) =  0.238
(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	1.#IO	100.000	5.110
		Sum = 100.000	Sum= 5.110

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	(0.844)	0.014	0.002
2	0.17	0.07	0.015	(0.841)	0.014	0.002
3	0.25	0.07	0.015	(0.838)	0.014	0.002
4	0.33	0.10	0.023	(0.834)	0.021	0.002
5	0.42	0.10	0.023	(0.831)	0.021	0.002
6	0.50	0.10	0.023	(0.828)	0.021	0.002
7	0.58	0.10	0.023	(0.825)	0.021	0.002
8	0.67	0.10	0.023	(0.821)	0.021	0.002
9	0.75	0.10	0.023	(0.818)	0.021	0.002
10	0.83	0.13	0.030	(0.815)	0.027	0.003
11	0.92	0.13	0.030	(0.812)	0.027	0.003
12	1.00	0.13	0.030	(0.808)	0.027	0.003
13	1.08	0.10	0.023	(0.805)	0.021	0.002
14	1.17	0.10	0.023	(0.802)	0.021	0.002
15	1.25	0.10	0.023	(0.799)	0.021	0.002
16	1.33	0.10	0.023	(0.796)	0.021	0.002
17	1.42	0.10	0.023	(0.793)	0.021	0.002
18	1.50	0.10	0.023	(0.789)	0.021	0.002
19	1.58	0.10	0.023	(0.786)	0.021	0.002
20	1.67	0.10	0.023	(0.783)	0.021	0.002
21	1.75	0.10	0.023	(0.780)	0.021	0.002
22	1.83	0.13	0.030	(0.777)	0.027	0.003
23	1.92	0.13	0.030	(0.774)	0.027	0.003
24	2.00	0.13	0.030	(0.771)	0.027	0.003
25	2.08	0.13	0.030	(0.767)	0.027	0.003
26	2.17	0.13	0.030	(0.764)	0.027	0.003
27	2.25	0.13	0.030	(0.761)	0.027	0.003
28	2.33	0.13	0.030	(0.758)	0.027	0.003
29	2.42	0.13	0.030	(0.755)	0.027	0.003
30	2.50	0.13	0.030	(0.752)	0.027	0.003
31	2.58	0.17	0.038	(0.749)	0.034	0.004
32	2.67	0.17	0.038	(0.746)	0.034	0.004
33	2.75	0.17	0.038	(0.743)	0.034	0.004
34	2.83	0.17	0.038	(0.740)	0.034	0.004
35	2.92	0.17	0.038	(0.737)	0.034	0.004
36	3.00	0.17	0.038	(0.734)	0.034	0.004
37	3.08	0.17	0.038	(0.731)	0.034	0.004
38	3.17	0.17	0.038	(0.728)	0.034	0.004
39	3.25	0.17	0.038	(0.724)	0.034	0.004
40	3.33	0.17	0.038	(0.721)	0.034	0.004
41	3.42	0.17	0.038	(0.718)	0.034	0.004
42	3.50	0.17	0.038	(0.715)	0.034	0.004
43	3.58	0.17	0.038	(0.712)	0.034	0.004
44	3.67	0.17	0.038	(0.709)	0.034	0.004
45	3.75	0.17	0.038	(0.706)	0.034	0.004
46	3.83	0.20	0.046	(0.704)	0.041	0.005
47	3.92	0.20	0.046	(0.701)	0.041	0.005
48	4.00	0.20	0.046	(0.698)	0.041	0.005
49	4.08	0.20	0.046	(0.695)	0.041	0.005
50	4.17	0.20	0.046	(0.692)	0.041	0.005
51	4.25	0.20	0.046	(0.689)	0.041	0.005
52	4.33	0.23	0.053	(0.686)	0.048	0.005
53	4.42	0.23	0.053	(0.683)	0.048	0.005
54	4.50	0.23	0.053	(0.680)	0.048	0.005
55	4.58	0.23	0.053	(0.677)	0.048	0.005
56	4.67	0.23	0.053	(0.674)	0.048	0.005
57	4.75	0.23	0.053	(0.671)	0.048	0.005
58	4.83	0.27	0.061	(0.668)	0.055	0.006
59	4.92	0.27	0.061	(0.665)	0.055	0.006
60	5.00	0.27	0.061	(0.663)	0.055	0.006
61	5.08	0.20	0.046	(0.660)	0.041	0.005
62	5.17	0.20	0.046	(0.657)	0.041	0.005
63	5.25	0.20	0.046	(0.654)	0.041	0.005

64	5.33	0.23	0.053	(0.651)	0.048	0.005
65	5.42	0.23	0.053	(0.648)	0.048	0.005
66	5.50	0.23	0.053	(0.645)	0.048	0.005
67	5.58	0.27	0.061	(0.643)	0.055	0.006
68	5.67	0.27	0.061	(0.640)	0.055	0.006
69	5.75	0.27	0.061	(0.637)	0.055	0.006
70	5.83	0.27	0.061	(0.634)	0.055	0.006
71	5.92	0.27	0.061	(0.631)	0.055	0.006
72	6.00	0.27	0.061	(0.628)	0.055	0.006
73	6.08	0.30	0.068	(0.626)	0.062	0.007
74	6.17	0.30	0.068	(0.623)	0.062	0.007
75	6.25	0.30	0.068	(0.620)	0.062	0.007
76	6.33	0.30	0.068	(0.617)	0.062	0.007
77	6.42	0.30	0.068	(0.615)	0.062	0.007
78	6.50	0.30	0.068	(0.612)	0.062	0.007
79	6.58	0.33	0.076	(0.609)	0.068	0.008
80	6.67	0.33	0.076	(0.606)	0.068	0.008
81	6.75	0.33	0.076	(0.604)	0.068	0.008
82	6.83	0.33	0.076	(0.601)	0.068	0.008
83	6.92	0.33	0.076	(0.598)	0.068	0.008
84	7.00	0.33	0.076	(0.595)	0.068	0.008
85	7.08	0.33	0.076	(0.593)	0.068	0.008
86	7.17	0.33	0.076	(0.590)	0.068	0.008
87	7.25	0.33	0.076	(0.587)	0.068	0.008
88	7.33	0.37	0.084	(0.585)	0.075	0.008
89	7.42	0.37	0.084	(0.582)	0.075	0.008
90	7.50	0.37	0.084	(0.579)	0.075	0.008
91	7.58	0.40	0.091	(0.577)	0.082	0.009
92	7.67	0.40	0.091	(0.574)	0.082	0.009
93	7.75	0.40	0.091	(0.571)	0.082	0.009
94	7.83	0.43	0.099	(0.569)	0.089	0.010
95	7.92	0.43	0.099	(0.566)	0.089	0.010
96	8.00	0.43	0.099	(0.563)	0.089	0.010
97	8.08	0.50	0.114	(0.561)	0.103	0.011
98	8.17	0.50	0.114	(0.558)	0.103	0.011
99	8.25	0.50	0.114	(0.556)	0.103	0.011
100	8.33	0.50	0.114	(0.553)	0.103	0.011
101	8.42	0.50	0.114	(0.550)	0.103	0.011
102	8.50	0.50	0.114	(0.548)	0.103	0.011
103	8.58	0.53	0.122	(0.545)	0.109	0.012
104	8.67	0.53	0.122	(0.543)	0.109	0.012
105	8.75	0.53	0.122	(0.540)	0.109	0.012
106	8.83	0.57	0.129	(0.538)	0.116	0.013
107	8.92	0.57	0.129	(0.535)	0.116	0.013
108	9.00	0.57	0.129	(0.533)	0.116	0.013
109	9.08	0.63	0.144	(0.530)	0.130	0.014
110	9.17	0.63	0.144	(0.528)	0.130	0.014
111	9.25	0.63	0.144	(0.525)	0.130	0.014
112	9.33	0.67	0.152	(0.523)	0.137	0.015
113	9.42	0.67	0.152	(0.520)	0.137	0.015
114	9.50	0.67	0.152	(0.518)	0.137	0.015
115	9.58	0.70	0.160	(0.515)	0.144	0.016
116	9.67	0.70	0.160	(0.513)	0.144	0.016
117	9.75	0.70	0.160	(0.510)	0.144	0.016
118	9.83	0.73	0.167	(0.508)	0.150	0.017
119	9.92	0.73	0.167	(0.505)	0.150	0.017
120	10.00	0.73	0.167	(0.503)	0.150	0.017
121	10.08	0.50	0.114	(0.500)	0.103	0.011
122	10.17	0.50	0.114	(0.498)	0.103	0.011
123	10.25	0.50	0.114	(0.496)	0.103	0.011
124	10.33	0.50	0.114	(0.493)	0.103	0.011
125	10.42	0.50	0.114	(0.491)	0.103	0.011
126	10.50	0.50	0.114	(0.488)	0.103	0.011
127	10.58	0.67	0.152	(0.486)	0.137	0.015
128	10.67	0.67	0.152	(0.484)	0.137	0.015
129	10.75	0.67	0.152	(0.481)	0.137	0.015
130	10.83	0.67	0.152	(0.479)	0.137	0.015
131	10.92	0.67	0.152	(0.476)	0.137	0.015
132	11.00	0.67	0.152	(0.474)	0.137	0.015
133	11.08	0.63	0.144	(0.472)	0.130	0.014
134	11.17	0.63	0.144	(0.469)	0.130	0.014
135	11.25	0.63	0.144	(0.467)	0.130	0.014
136	11.33	0.63	0.144	(0.465)	0.130	0.014
137	11.42	0.63	0.144	(0.463)	0.130	0.014
138	11.50	0.63	0.144	(0.460)	0.130	0.014
139	11.58	0.57	0.129	(0.458)	0.116	0.013
140	11.67	0.57	0.129	(0.456)	0.116	0.013
141	11.75	0.57	0.129	(0.453)	0.116	0.013
142	11.83	0.60	0.137	(0.451)	0.123	0.014

143	11.92	0.60	0.137	(0.449)	0.123	0.014
144	12.00	0.60	0.137	(0.447)	0.123	0.014
145	12.08	0.83	0.190	(0.444)	0.171	0.019
146	12.17	0.83	0.190	(0.442)	0.171	0.019
147	12.25	0.83	0.190	(0.440)	0.171	0.019
148	12.33	0.87	0.198	(0.438)	0.178	0.020
149	12.42	0.87	0.198	(0.436)	0.178	0.020
150	12.50	0.87	0.198	(0.433)	0.178	0.020
151	12.58	0.93	0.213	(0.431)	0.192	0.021
152	12.67	0.93	0.213	(0.429)	0.192	0.021
153	12.75	0.93	0.213	(0.427)	0.192	0.021
154	12.83	0.97	0.220	(0.425)	0.198	0.022
155	12.92	0.97	0.220	(0.423)	0.198	0.022
156	13.00	0.97	0.220	(0.420)	0.198	0.022
157	13.08	1.13	0.258	(0.418)	0.233	0.026
158	13.17	1.13	0.258	(0.416)	0.233	0.026
159	13.25	1.13	0.258	(0.414)	0.233	0.026
160	13.33	1.13	0.258	(0.412)	0.233	0.026
161	13.42	1.13	0.258	(0.410)	0.233	0.026
162	13.50	1.13	0.258	(0.408)	0.233	0.026
163	13.58	0.77	0.175	(0.406)	0.157	0.017
164	13.67	0.77	0.175	(0.404)	0.157	0.017
165	13.75	0.77	0.175	(0.402)	0.157	0.017
166	13.83	0.77	0.175	(0.400)	0.157	0.017
167	13.92	0.77	0.175	(0.398)	0.157	0.017
168	14.00	0.77	0.175	(0.395)	0.157	0.017
169	14.08	0.90	0.205	(0.393)	0.185	0.021
170	14.17	0.90	0.205	(0.391)	0.185	0.021
171	14.25	0.90	0.205	(0.389)	0.185	0.021
172	14.33	0.87	0.198	(0.387)	0.178	0.020
173	14.42	0.87	0.198	(0.385)	0.178	0.020
174	14.50	0.87	0.198	(0.384)	0.178	0.020
175	14.58	0.87	0.198	(0.382)	0.178	0.020
176	14.67	0.87	0.198	(0.380)	0.178	0.020
177	14.75	0.87	0.198	(0.378)	0.178	0.020
178	14.83	0.83	0.190	(0.376)	0.171	0.019
179	14.92	0.83	0.190	(0.374)	0.171	0.019
180	15.00	0.83	0.190	(0.372)	0.171	0.019
181	15.08	0.80	0.182	(0.370)	0.164	0.018
182	15.17	0.80	0.182	(0.368)	0.164	0.018
183	15.25	0.80	0.182	(0.366)	0.164	0.018
184	15.33	0.77	0.175	(0.364)	0.157	0.017
185	15.42	0.77	0.175	(0.362)	0.157	0.017
186	15.50	0.77	0.175	(0.361)	0.157	0.017
187	15.58	0.63	0.144	(0.359)	0.130	0.014
188	15.67	0.63	0.144	(0.357)	0.130	0.014
189	15.75	0.63	0.144	(0.355)	0.130	0.014
190	15.83	0.63	0.144	(0.353)	0.130	0.014
191	15.92	0.63	0.144	(0.351)	0.130	0.014
192	16.00	0.63	0.144	(0.350)	0.130	0.014
193	16.08	0.13	0.030	(0.348)	0.027	0.003
194	16.17	0.13	0.030	(0.346)	0.027	0.003
195	16.25	0.13	0.030	(0.344)	0.027	0.003
196	16.33	0.13	0.030	(0.343)	0.027	0.003
197	16.42	0.13	0.030	(0.341)	0.027	0.003
198	16.50	0.13	0.030	(0.339)	0.027	0.003
199	16.58	0.10	0.023	(0.337)	0.021	0.002
200	16.67	0.10	0.023	(0.336)	0.021	0.002
201	16.75	0.10	0.023	(0.334)	0.021	0.002
202	16.83	0.10	0.023	(0.332)	0.021	0.002
203	16.92	0.10	0.023	(0.331)	0.021	0.002
204	17.00	0.10	0.023	(0.329)	0.021	0.002
205	17.08	0.17	0.038	(0.327)	0.034	0.004
206	17.17	0.17	0.038	(0.326)	0.034	0.004
207	17.25	0.17	0.038	(0.324)	0.034	0.004
208	17.33	0.17	0.038	(0.322)	0.034	0.004
209	17.42	0.17	0.038	(0.321)	0.034	0.004
210	17.50	0.17	0.038	(0.319)	0.034	0.004
211	17.58	0.17	0.038	(0.317)	0.034	0.004
212	17.67	0.17	0.038	(0.316)	0.034	0.004
213	17.75	0.17	0.038	(0.314)	0.034	0.004
214	17.83	0.13	0.030	(0.313)	0.027	0.003
215	17.92	0.13	0.030	(0.311)	0.027	0.003
216	18.00	0.13	0.030	(0.310)	0.027	0.003
217	18.08	0.13	0.030	(0.308)	0.027	0.003
218	18.17	0.13	0.030	(0.307)	0.027	0.003
219	18.25	0.13	0.030	(0.305)	0.027	0.003
220	18.33	0.13	0.030	(0.304)	0.027	0.003
221	18.42	0.13	0.030	(0.302)	0.027	0.003

222	18.50	0.13	0.030	(	0.301)	0.027	0.003
223	18.58	0.10	0.023	(	0.299)	0.021	0.002
224	18.67	0.10	0.023	(	0.298)	0.021	0.002
225	18.75	0.10	0.023	(	0.296)	0.021	0.002
226	18.83	0.07	0.015	(	0.295)	0.014	0.002
227	18.92	0.07	0.015	(	0.294)	0.014	0.002
228	19.00	0.07	0.015	(	0.292)	0.014	0.002
229	19.08	0.10	0.023	(	0.291)	0.021	0.002
230	19.17	0.10	0.023	(	0.289)	0.021	0.002
231	19.25	0.10	0.023	(	0.288)	0.021	0.002
232	19.33	0.13	0.030	(	0.287)	0.027	0.003
233	19.42	0.13	0.030	(	0.285)	0.027	0.003
234	19.50	0.13	0.030	(	0.284)	0.027	0.003
235	19.58	0.10	0.023	(	0.283)	0.021	0.002
236	19.67	0.10	0.023	(	0.281)	0.021	0.002
237	19.75	0.10	0.023	(	0.280)	0.021	0.002
238	19.83	0.07	0.015	(	0.279)	0.014	0.002
239	19.92	0.07	0.015	(	0.278)	0.014	0.002
240	20.00	0.07	0.015	(	0.276)	0.014	0.002
241	20.08	0.10	0.023	(	0.275)	0.021	0.002
242	20.17	0.10	0.023	(	0.274)	0.021	0.002
243	20.25	0.10	0.023	(	0.273)	0.021	0.002
244	20.33	0.10	0.023	(	0.272)	0.021	0.002
245	20.42	0.10	0.023	(	0.271)	0.021	0.002
246	20.50	0.10	0.023	(	0.269)	0.021	0.002
247	20.58	0.10	0.023	(	0.268)	0.021	0.002
248	20.67	0.10	0.023	(	0.267)	0.021	0.002
249	20.75	0.10	0.023	(	0.266)	0.021	0.002
250	20.83	0.07	0.015	(	0.265)	0.014	0.002
251	20.92	0.07	0.015	(	0.264)	0.014	0.002
252	21.00	0.07	0.015	(	0.263)	0.014	0.002
253	21.08	0.10	0.023	(	0.262)	0.021	0.002
254	21.17	0.10	0.023	(	0.261)	0.021	0.002
255	21.25	0.10	0.023	(	0.260)	0.021	0.002
256	21.33	0.07	0.015	(	0.259)	0.014	0.002
257	21.42	0.07	0.015	(	0.258)	0.014	0.002
258	21.50	0.07	0.015	(	0.257)	0.014	0.002
259	21.58	0.10	0.023	(	0.256)	0.021	0.002
260	21.67	0.10	0.023	(	0.255)	0.021	0.002
261	21.75	0.10	0.023	(	0.254)	0.021	0.002
262	21.83	0.07	0.015	(	0.253)	0.014	0.002
263	21.92	0.07	0.015	(	0.252)	0.014	0.002
264	22.00	0.07	0.015	(	0.251)	0.014	0.002
265	22.08	0.10	0.023	(	0.251)	0.021	0.002
266	22.17	0.10	0.023	(	0.250)	0.021	0.002
267	22.25	0.10	0.023	(	0.249)	0.021	0.002
268	22.33	0.07	0.015	(	0.248)	0.014	0.002
269	22.42	0.07	0.015	(	0.247)	0.014	0.002
270	22.50	0.07	0.015	(	0.247)	0.014	0.002
271	22.58	0.07	0.015	(	0.246)	0.014	0.002
272	22.67	0.07	0.015	(	0.245)	0.014	0.002
273	22.75	0.07	0.015	(	0.245)	0.014	0.002
274	22.83	0.07	0.015	(	0.244)	0.014	0.002
275	22.92	0.07	0.015	(	0.243)	0.014	0.002
276	23.00	0.07	0.015	(	0.243)	0.014	0.002
277	23.08	0.07	0.015	(	0.242)	0.014	0.002
278	23.17	0.07	0.015	(	0.242)	0.014	0.002
279	23.25	0.07	0.015	(	0.241)	0.014	0.002
280	23.33	0.07	0.015	(	0.241)	0.014	0.002
281	23.42	0.07	0.015	(	0.240)	0.014	0.002
282	23.50	0.07	0.015	(	0.240)	0.014	0.002
283	23.58	0.07	0.015	(	0.239)	0.014	0.002
284	23.67	0.07	0.015	(	0.239)	0.014	0.002
285	23.75	0.07	0.015	(	0.239)	0.014	0.002
286	23.83	0.07	0.015	(	0.238)	0.014	0.002
287	23.92	0.07	0.015	(	0.238)	0.014	0.002
288	24.00	0.07	0.015	(	0.238)	0.014	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.3

Flood volume = Effective rainfall 0.19(In)
times area 5.1(Ac.)/[(In)/(Ft.)] = 0.1(Ac.Ft)
Total soil loss = 1.71(In)
Total soil loss = 0.722(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 3496.7 Cubic Feet
Total soil loss = 31470.7 Cubic Feet

Peak flow rate of this hydrograph = 0.132(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0001	0.01	Q				
0+15	0.0002	0.01	Q				
0+20	0.0002	0.01	Q				
0+25	0.0003	0.01	Q				
0+30	0.0004	0.01	Q				
0+35	0.0005	0.01	Q				
0+40	0.0006	0.01	Q				
0+45	0.0006	0.01	Q				
0+50	0.0007	0.02	Q				
0+55	0.0009	0.02	Q				
1+ 0	0.0010	0.02	Q				
1+ 5	0.0010	0.01	Q				
1+10	0.0011	0.01	Q				
1+15	0.0012	0.01	Q				
1+20	0.0013	0.01	Q				
1+25	0.0014	0.01	Q				
1+30	0.0014	0.01	Q				
1+35	0.0015	0.01	Q				
1+40	0.0016	0.01	Q				
1+45	0.0017	0.01	Q				
1+50	0.0018	0.02	Q				
1+55	0.0019	0.02	Q				
2+ 0	0.0020	0.02	QV				
2+ 5	0.0021	0.02	QV				
2+10	0.0022	0.02	QV				
2+15	0.0023	0.02	QV				
2+20	0.0024	0.02	QV				
2+25	0.0025	0.02	QV				
2+30	0.0026	0.02	QV				
2+35	0.0028	0.02	QV				
2+40	0.0029	0.02	QV				
2+45	0.0031	0.02	QV				
2+50	0.0032	0.02	QV				
2+55	0.0033	0.02	QV				
3+ 0	0.0035	0.02	QV				
3+ 5	0.0036	0.02	QV				
3+10	0.0037	0.02	QV				
3+15	0.0039	0.02	QV				
3+20	0.0040	0.02	QV				
3+25	0.0041	0.02	Q V				
3+30	0.0043	0.02	Q V				
3+35	0.0044	0.02	Q V				
3+40	0.0045	0.02	Q V				
3+45	0.0047	0.02	Q V				
3+50	0.0048	0.02	Q V				
3+55	0.0050	0.02	Q V				
4+ 0	0.0051	0.02	Q V				
4+ 5	0.0053	0.02	Q V				
4+10	0.0055	0.02	Q V				
4+15	0.0056	0.02	Q V				
4+20	0.0058	0.03	Q V				
4+25	0.0060	0.03	Q V				
4+30	0.0062	0.03	Q V				
4+35	0.0064	0.03	Q V				
4+40	0.0066	0.03	Q V				
4+45	0.0067	0.03	Q V				
4+50	0.0070	0.03	Q V				
4+55	0.0072	0.03	Q V				
5+ 0	0.0074	0.03	Q V				
5+ 5	0.0075	0.02	Q V				
5+10	0.0077	0.02	Q V				
5+15	0.0079	0.02	Q V				
5+20	0.0081	0.03	Q V				
5+25	0.0082	0.03	Q V				
5+30	0.0084	0.03	Q V				
5+35	0.0086	0.03	Q V				
5+40	0.0089	0.03	Q V				
5+45	0.0091	0.03	Q V				
5+50	0.0093	0.03	Q V				

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 5+55       0.0095      0.03  Q   V     |         |         |         |
 6+ 0       0.0097      0.03  Q   V     |         |         |         |
 6+ 5       0.0100      0.03  Q   V     |         |         |         |
 6+10       0.0102      0.03  Q    V    |         |         |         |
 6+15       0.0104      0.03  Q    V    |         |         |         |
 6+20       0.0107      0.03  Q    V    |         |         |         |
 6+25       0.0109      0.03  Q    V    |         |         |         |
 6+30       0.0112      0.03  Q    V    |         |         |         |
 6+35       0.0114      0.04  Q    V    |         |         |         |
 6+40       0.0117      0.04  Q    V    |         |         |         |
 6+45       0.0120      0.04  Q    V    |         |         |         |
 6+50       0.0122      0.04  Q     V   |         |         |         |
 6+55       0.0125      0.04  Q     V   |         |         |         |
 7+ 0       0.0128      0.04  Q     V   |         |         |         |
 7+ 5       0.0130      0.04  Q     V   |         |         |         |
 7+10       0.0133      0.04  Q     V   |         |         |         |
 7+15       0.0136      0.04  Q     V   |         |         |         |
 7+20       0.0139      0.04  Q     V   |         |         |         |
 7+25       0.0142      0.04  Q      V  |         |         |         |
 7+30       0.0144      0.04  Q      V  |         |         |         |
 7+35       0.0148      0.05  Q      V  |         |         |         |
 7+40       0.0151      0.05  Q      V  |         |         |         |
 7+45       0.0154      0.05  Q      V  |         |         |         |
 7+50       0.0158      0.05  Q      V  |         |         |         |
 7+55       0.0161      0.05  Q       V |         |         |         |
 8+ 0       0.0165      0.05  Q       V |         |         |         |
 8+ 5       0.0169      0.06  Q       V |         |         |         |
 8+10       0.0173      0.06  Q       V |         |         |         |
 8+15       0.0177      0.06  Q       V |         |         |         |
 8+20       0.0181      0.06  Q        V|         |         |         |
 8+25       0.0185      0.06  Q        V|         |         |         |
 8+30       0.0189      0.06  Q        V|         |         |         |
 8+35       0.0193      0.06  Q        V|         |         |         |
 8+40       0.0197      0.06  Q        V|         |         |         |
 8+45       0.0201      0.06  Q         V         |         |         |
 8+50       0.0206      0.07  Q         V         |         |         |
 8+55       0.0211      0.07  Q         V         |         |         |
 9+ 0       0.0215      0.07  Q         V         |         |         |
 9+ 5       0.0220      0.07  Q         V         |         |         |
 9+10       0.0225      0.07  Q         |V        |         |         |
 9+15       0.0230      0.07  Q         |V        |         |         |
 9+20       0.0236      0.08  Q         |V        |         |         |
 9+25       0.0241      0.08  Q         | V       |         |         |
 9+30       0.0246      0.08  Q         | V       |         |         |
 9+35       0.0252      0.08  Q         | V       |         |         |
 9+40       0.0258      0.08  Q         | V       |         |         |
 9+45       0.0263      0.08  Q         |  V      |         |         |
 9+50       0.0269      0.09  Q         |  V      |         |         |
 9+55       0.0275      0.09  Q         |  V      |         |         |
10+ 0       0.0281      0.09  Q         |   V     |         |         |
10+ 5       0.0285      0.06  Q         |   V     |         |         |
10+10       0.0289      0.06  Q         |   V     |         |         |
10+15       0.0293      0.06  Q         |   V     |         |         |
10+20       0.0297      0.06  Q         |   V     |         |         |
10+25       0.0301      0.06  Q         |    V    |         |         |
10+30       0.0305      0.06  Q         |    V    |         |         |
10+35       0.0310      0.08  Q         |    V    |         |         |
10+40       0.0316      0.08  Q         |    V    |         |         |
10+45       0.0321      0.08  Q         |     V   |         |         |
10+50       0.0326      0.08  Q         |     V   |         |         |
10+55       0.0332      0.08  Q         |     V   |         |         |
11+ 0       0.0337      0.08  Q         |     V   |         |         |
11+ 5       0.0342      0.07  Q         |      V  |         |         |
11+10       0.0347      0.07  Q         |      V  |         |         |
11+15       0.0352      0.07  Q         |      V  |         |         |
11+20       0.0357      0.07  Q         |      V  |         |         |
11+25       0.0363      0.07  Q         |       V |         |         |
11+30       0.0368      0.07  Q         |       V |         |         |
11+35       0.0372      0.07  Q         |       V |         |         |
11+40       0.0377      0.07  Q         |       V |         |         |
11+45       0.0381      0.07  Q         |        V|         |         |
11+50       0.0386      0.07  Q         |        V|         |         |
11+55       0.0391      0.07  Q         |        V|         |         |
12+ 0       0.0396      0.07  Q         |        V|         |         |
12+ 5       0.0402      0.10  Q         |         V         |         |
12+10       0.0409      0.10  Q         |         V         |         |
12+15       0.0416      0.10  Q         |         V         |         |
12+20       0.0423      0.10  Q         |         |V        |         |
12+25       0.0430      0.10  Q         |         |V        |         |
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12+30       0.0437      0.10  Q         |         |V        |         |
12+35       0.0444      0.11  Q         |         | V       |         |
12+40       0.0452      0.11  Q         |         | V       |         |
12+45       0.0459      0.11  Q         |         | V       |         |
12+50       0.0467      0.11  Q         |         |  V      |         |
12+55       0.0475      0.11  Q         |         |  V      |         |
13+ 0       0.0482      0.11  Q         |         |   V     |         |
13+ 5       0.0492      0.13  Q         |         |   V     |         |
13+10       0.0501      0.13  Q         |         |   V     |         |
13+15       0.0510      0.13  Q         |         |    V    |         |
13+20       0.0519      0.13  Q         |         |    V    |         |
13+25       0.0528      0.13  Q         |         |     V   |         |
13+30       0.0537      0.13  Q         |         |     V   |         |
13+35       0.0543      0.09  Q         |         |      V  |         |
13+40       0.0549      0.09  Q         |         |      V  |         |
13+45       0.0555      0.09  Q         |         |      V  |         |
13+50       0.0562      0.09  Q         |         |      V  |         |
13+55       0.0568      0.09  Q         |         |       V |         |
14+ 0       0.0574      0.09  Q         |         |       V |         |
14+ 5       0.0581      0.10  Q         |         |       V |         |
14+10       0.0588      0.10  Q         |         |        V|         |
14+15       0.0596      0.10  Q         |         |        V|         |
14+20       0.0603      0.10  Q         |         |         V         |
14+25       0.0610      0.10  Q         |         |         V         |
14+30       0.0617      0.10  Q         |         |         V         |
14+35       0.0623      0.10  Q         |         |         |V        |
14+40       0.0630      0.10  Q         |         |         |V        |
14+45       0.0637      0.10  Q         |         |         |V        |
14+50       0.0644      0.10  Q         |         |         | V       |
14+55       0.0651      0.10  Q         |         |         | V       |
15+ 0       0.0657      0.10  Q         |         |         | V       |
15+ 5       0.0664      0.09  Q         |         |         |  V      |
15+10       0.0670      0.09  Q         |         |         |  V      |
15+15       0.0677      0.09  Q         |         |         |  V      |
15+20       0.0683      0.09  Q         |         |         |   V     |
15+25       0.0689      0.09  Q         |         |         |   V     |
15+30       0.0695      0.09  Q         |         |         |   V     |
15+35       0.0700      0.07  Q         |         |         |   V     |
15+40       0.0705      0.07  Q         |         |         |    V    |
15+45       0.0710      0.07  Q         |         |         |    V    |
15+50       0.0716      0.07  Q         |         |         |    V    |
15+55       0.0721      0.07  Q         |         |         |    V    |
16+ 0       0.0726      0.07  Q         |         |         |     V   |
16+ 5       0.0727      0.02  Q         |         |         |     V   |
16+10       0.0728      0.02  Q         |         |         |     V   |
16+15       0.0729      0.02  Q         |         |         |     V   |
16+20       0.0730      0.02  Q         |         |         |     V   |
16+25       0.0731      0.02  Q         |         |         |     V   |
16+30       0.0732      0.02  Q         |         |         |     V   |
16+35       0.0733      0.01  Q         |         |         |     V   |
16+40       0.0734      0.01  Q         |         |         |     V   |
16+45       0.0735      0.01  Q         |         |         |     V   |
16+50       0.0735      0.01  Q         |         |         |     V   |
16+55       0.0736      0.01  Q         |         |         |     V   |
17+ 0       0.0737      0.01  Q         |         |         |     V   |
17+ 5       0.0738      0.02  Q         |         |         |     V   |
17+10       0.0740      0.02  Q         |         |         |     V   |
17+15       0.0741      0.02  Q         |         |         |     V   |
17+20       0.0742      0.02  Q         |         |         |     V   |
17+25       0.0744      0.02  Q         |         |         |      V  |
17+30       0.0745      0.02  Q         |         |         |      V  |
17+35       0.0746      0.02  Q         |         |         |      V  |
17+40       0.0748      0.02  Q         |         |         |      V  |
17+45       0.0749      0.02  Q         |         |         |      V  |
17+50       0.0750      0.02  Q         |         |         |      V  |
17+55       0.0751      0.02  Q         |         |         |      V  |
18+ 0       0.0752      0.02  Q         |         |         |      V  |
18+ 5       0.0753      0.02  Q         |         |         |      V  |
18+10       0.0754      0.02  Q         |         |         |      V  |
18+15       0.0755      0.02  Q         |         |         |      V  |
18+20       0.0756      0.02  Q         |         |         |      V  |
18+25       0.0758      0.02  Q         |         |         |      V  |
18+30       0.0759      0.02  Q         |         |         |      V  |
18+35       0.0759      0.01  Q         |         |         |      V  |
18+40       0.0760      0.01  Q         |         |         |      V  |
18+45       0.0761      0.01  Q         |         |         |      V  |
18+50       0.0762      0.01  Q         |         |         |      V  |
18+55       0.0762      0.01  Q         |         |         |      V  |
19+ 0       0.0763      0.01  Q         |         |         |       V |
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 19+ 5       0.0763      0.01  Q         |         |         |       V |
 19+10       0.0764      0.01  Q         |         |         |       V |
 19+15       0.0765      0.01  Q         |         |         |       V |
 19+20       0.0766      0.02  Q         |         |         |       V |
 19+25       0.0767      0.02  Q         |         |         |       V |
 19+30       0.0768      0.02  Q         |         |         |       V |
 19+35       0.0769      0.01  Q         |         |         |       V |
 19+40       0.0770      0.01  Q         |         |         |       V |
 19+45       0.0771      0.01  Q         |         |         |       V |
 19+50       0.0771      0.01  Q         |         |         |       V |
 19+55       0.0772      0.01  Q         |         |         |       V |
 20+ 0       0.0772      0.01  Q         |         |         |       V |
 20+ 5       0.0773      0.01  Q         |         |         |       V |
 20+10       0.0774      0.01  Q         |         |         |       V |
 20+15       0.0775      0.01  Q         |         |         |       V |
 20+20       0.0775      0.01  Q         |         |         |       V |
 20+25       0.0776      0.01  Q         |         |         |       V |
 20+30       0.0777      0.01  Q         |         |         |       V |
 20+35       0.0778      0.01  Q         |         |         |       V |
 20+40       0.0779      0.01  Q         |         |         |       V |
 20+45       0.0779      0.01  Q         |         |         |       V |
 20+50       0.0780      0.01  Q         |         |         |       V |
 20+55       0.0781      0.01  Q         |         |         |       V |
 21+ 0       0.0781      0.01  Q         |         |         |       V |
 21+ 5       0.0782      0.01  Q         |         |         |       V |
 21+10       0.0783      0.01  Q         |         |         |        V|
 21+15       0.0783      0.01  Q         |         |         |        V|
 21+20       0.0784      0.01  Q         |         |         |        V|
 21+25       0.0785      0.01  Q         |         |         |        V|
 21+30       0.0785      0.01  Q         |         |         |        V|
 21+35       0.0786      0.01  Q         |         |         |        V|
 21+40       0.0787      0.01  Q         |         |         |        V|
 21+45       0.0787      0.01  Q         |         |         |        V|
 21+50       0.0788      0.01  Q         |         |         |        V|
 21+55       0.0789      0.01  Q         |         |         |        V|
 22+ 0       0.0789      0.01  Q         |         |         |        V|
 22+ 5       0.0790      0.01  Q         |         |         |        V|
 22+10       0.0791      0.01  Q         |         |         |        V|
 22+15       0.0792      0.01  Q         |         |         |        V|
 22+20       0.0792      0.01  Q         |         |         |        V|
 22+25       0.0793      0.01  Q         |         |         |        V|
 22+30       0.0793      0.01  Q         |         |         |        V|
 22+35       0.0794      0.01  Q         |         |         |        V|
 22+40       0.0794      0.01  Q         |         |         |        V|
 22+45       0.0795      0.01  Q         |         |         |        V|
 22+50       0.0795      0.01  Q         |         |         |        V|
 22+55       0.0796      0.01  Q         |         |         |        V|
 23+ 0       0.0796      0.01  Q         |         |         |        V|
 23+ 5       0.0797      0.01  Q         |         |         |        V|
 23+10       0.0797      0.01  Q         |         |         |        V|
 23+15       0.0798      0.01  Q         |         |         |        V|
 23+20       0.0798      0.01  Q         |         |         |        V|
 23+25       0.0799      0.01  Q         |         |         |        V|
 23+30       0.0800      0.01  Q         |         |         |        V|
 23+35       0.0800      0.01  Q         |         |         |        V|
 23+40       0.0801      0.01  Q         |         |         |        V|
 23+45       0.0801      0.01  Q         |         |         |        V|
 23+50       0.0802      0.01  Q         |         |         |        V|
 23+55       0.0802      0.01  Q         |         |         |        V|
 24+ 0       0.0803      0.01  Q         |         |         |         V
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POST-CONDITION HYDROGRAPH (DMA A)

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                Study date  04/21/23 File: 4118pra2242.out


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


Program License Serial Number 6400

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

 English Units used in output format



----------------------------------------------------------------------
LOVETT MENIFEE LOGISTICS - RIVERSIDE COUNTY
PROPOSED CONDITION - BUILDING 1
HYDROLOGIC ANALYSIS - 2-YEAR

---------------------------------------------------------------------
Drainage Area =       5.07(Ac.)  =      0.008 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       5.07(Ac.)  =      0.008 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.000 Hr.
Lag time =     0.00 Min.
25% of lag time =     0.00 Min.
40% of lag time =     0.00 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]
        5.07            1.90                    9.63

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.07            5.00                   25.35

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.900(In)
Area Averaged 100-Year Rainfall =    5.000(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 %
     5.070           69.00         0.900
 Total Area Entered =      5.07(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  49.8      0.574     0.900        0.109       1.000      0.109
                                                  Sum (F) =   0.109
Area averaged mean soil loss (F) (In/Hr) =  0.109
Minimum soil loss rate ((In/Hr)) =  0.055
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.100
----------------------------------------------------------------------

                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	1.#IO	100.000	5.110
		Sum = 100.000	Sum= 5.110

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	(0.193)	0.002	0.014
2	0.17	0.07	0.015	(0.193)	0.002	0.014
3	0.25	0.07	0.015	(0.192)	0.002	0.014
4	0.33	0.10	0.023	(0.191)	0.002	0.021
5	0.42	0.10	0.023	(0.190)	0.002	0.021
6	0.50	0.10	0.023	(0.190)	0.002	0.021
7	0.58	0.10	0.023	(0.189)	0.002	0.021
8	0.67	0.10	0.023	(0.188)	0.002	0.021
9	0.75	0.10	0.023	(0.187)	0.002	0.021
10	0.83	0.13	0.030	(0.187)	0.003	0.027
11	0.92	0.13	0.030	(0.186)	0.003	0.027
12	1.00	0.13	0.030	(0.185)	0.003	0.027
13	1.08	0.10	0.023	(0.184)	0.002	0.021
14	1.17	0.10	0.023	(0.184)	0.002	0.021
15	1.25	0.10	0.023	(0.183)	0.002	0.021
16	1.33	0.10	0.023	(0.182)	0.002	0.021
17	1.42	0.10	0.023	(0.182)	0.002	0.021
18	1.50	0.10	0.023	(0.181)	0.002	0.021
19	1.58	0.10	0.023	(0.180)	0.002	0.021
20	1.67	0.10	0.023	(0.179)	0.002	0.021
21	1.75	0.10	0.023	(0.179)	0.002	0.021
22	1.83	0.13	0.030	(0.178)	0.003	0.027
23	1.92	0.13	0.030	(0.177)	0.003	0.027
24	2.00	0.13	0.030	(0.176)	0.003	0.027
25	2.08	0.13	0.030	(0.176)	0.003	0.027
26	2.17	0.13	0.030	(0.175)	0.003	0.027
27	2.25	0.13	0.030	(0.174)	0.003	0.027
28	2.33	0.13	0.030	(0.174)	0.003	0.027
29	2.42	0.13	0.030	(0.173)	0.003	0.027
30	2.50	0.13	0.030	(0.172)	0.003	0.027
31	2.58	0.17	0.038	(0.172)	0.004	0.034
32	2.67	0.17	0.038	(0.171)	0.004	0.034
33	2.75	0.17	0.038	(0.170)	0.004	0.034
34	2.83	0.17	0.038	(0.169)	0.004	0.034
35	2.92	0.17	0.038	(0.169)	0.004	0.034
36	3.00	0.17	0.038	(0.168)	0.004	0.034
37	3.08	0.17	0.038	(0.167)	0.004	0.034
38	3.17	0.17	0.038	(0.167)	0.004	0.034
39	3.25	0.17	0.038	(0.166)	0.004	0.034
40	3.33	0.17	0.038	(0.165)	0.004	0.034
41	3.42	0.17	0.038	(0.165)	0.004	0.034
42	3.50	0.17	0.038	(0.164)	0.004	0.034
43	3.58	0.17	0.038	(0.163)	0.004	0.034
44	3.67	0.17	0.038	(0.162)	0.004	0.034
45	3.75	0.17	0.038	(0.162)	0.004	0.034
46	3.83	0.20	0.046	(0.161)	0.005	0.041
47	3.92	0.20	0.046	(0.160)	0.005	0.041
48	4.00	0.20	0.046	(0.160)	0.005	0.041
49	4.08	0.20	0.046	(0.159)	0.005	0.041
50	4.17	0.20	0.046	(0.158)	0.005	0.041
51	4.25	0.20	0.046	(0.158)	0.005	0.041
52	4.33	0.23	0.053	(0.157)	0.005	0.048
53	4.42	0.23	0.053	(0.156)	0.005	0.048
54	4.50	0.23	0.053	(0.156)	0.005	0.048
55	4.58	0.23	0.053	(0.155)	0.005	0.048
56	4.67	0.23	0.053	(0.154)	0.005	0.048
57	4.75	0.23	0.053	(0.154)	0.005	0.048
58	4.83	0.27	0.061	(0.153)	0.006	0.055
59	4.92	0.27	0.061	(0.152)	0.006	0.055
60	5.00	0.27	0.061	(0.152)	0.006	0.055
61	5.08	0.20	0.046	(0.151)	0.005	0.041
62	5.17	0.20	0.046	(0.150)	0.005	0.041
63	5.25	0.20	0.046	(0.150)	0.005	0.041

64	5.33	0.23	0.053	(0.149)	0.005	0.048
65	5.42	0.23	0.053	(0.148)	0.005	0.048
66	5.50	0.23	0.053	(0.148)	0.005	0.048
67	5.58	0.27	0.061	(0.147)	0.006	0.055
68	5.67	0.27	0.061	(0.147)	0.006	0.055
69	5.75	0.27	0.061	(0.146)	0.006	0.055
70	5.83	0.27	0.061	(0.145)	0.006	0.055
71	5.92	0.27	0.061	(0.145)	0.006	0.055
72	6.00	0.27	0.061	(0.144)	0.006	0.055
73	6.08	0.30	0.068	(0.143)	0.007	0.062
74	6.17	0.30	0.068	(0.143)	0.007	0.062
75	6.25	0.30	0.068	(0.142)	0.007	0.062
76	6.33	0.30	0.068	(0.141)	0.007	0.062
77	6.42	0.30	0.068	(0.141)	0.007	0.062
78	6.50	0.30	0.068	(0.140)	0.007	0.062
79	6.58	0.33	0.076	(0.140)	0.008	0.068
80	6.67	0.33	0.076	(0.139)	0.008	0.068
81	6.75	0.33	0.076	(0.138)	0.008	0.068
82	6.83	0.33	0.076	(0.138)	0.008	0.068
83	6.92	0.33	0.076	(0.137)	0.008	0.068
84	7.00	0.33	0.076	(0.136)	0.008	0.068
85	7.08	0.33	0.076	(0.136)	0.008	0.068
86	7.17	0.33	0.076	(0.135)	0.008	0.068
87	7.25	0.33	0.076	(0.135)	0.008	0.068
88	7.33	0.37	0.084	(0.134)	0.008	0.075
89	7.42	0.37	0.084	(0.133)	0.008	0.075
90	7.50	0.37	0.084	(0.133)	0.008	0.075
91	7.58	0.40	0.091	(0.132)	0.009	0.082
92	7.67	0.40	0.091	(0.131)	0.009	0.082
93	7.75	0.40	0.091	(0.131)	0.009	0.082
94	7.83	0.43	0.099	(0.130)	0.010	0.089
95	7.92	0.43	0.099	(0.130)	0.010	0.089
96	8.00	0.43	0.099	(0.129)	0.010	0.089
97	8.08	0.50	0.114	(0.128)	0.011	0.103
98	8.17	0.50	0.114	(0.128)	0.011	0.103
99	8.25	0.50	0.114	(0.127)	0.011	0.103
100	8.33	0.50	0.114	(0.127)	0.011	0.103
101	8.42	0.50	0.114	(0.126)	0.011	0.103
102	8.50	0.50	0.114	(0.125)	0.011	0.103
103	8.58	0.53	0.122	(0.125)	0.012	0.109
104	8.67	0.53	0.122	(0.124)	0.012	0.109
105	8.75	0.53	0.122	(0.124)	0.012	0.109
106	8.83	0.57	0.129	(0.123)	0.013	0.116
107	8.92	0.57	0.129	(0.123)	0.013	0.116
108	9.00	0.57	0.129	(0.122)	0.013	0.116
109	9.08	0.63	0.144	(0.121)	0.014	0.130
110	9.17	0.63	0.144	(0.121)	0.014	0.130
111	9.25	0.63	0.144	(0.120)	0.014	0.130
112	9.33	0.67	0.152	(0.120)	0.015	0.137
113	9.42	0.67	0.152	(0.119)	0.015	0.137
114	9.50	0.67	0.152	(0.119)	0.015	0.137
115	9.58	0.70	0.160	(0.118)	0.016	0.144
116	9.67	0.70	0.160	(0.117)	0.016	0.144
117	9.75	0.70	0.160	(0.117)	0.016	0.144
118	9.83	0.73	0.167	(0.116)	0.017	0.150
119	9.92	0.73	0.167	(0.116)	0.017	0.150
120	10.00	0.73	0.167	(0.115)	0.017	0.150
121	10.08	0.50	0.114	(0.115)	0.011	0.103
122	10.17	0.50	0.114	(0.114)	0.011	0.103
123	10.25	0.50	0.114	(0.113)	0.011	0.103
124	10.33	0.50	0.114	(0.113)	0.011	0.103
125	10.42	0.50	0.114	(0.112)	0.011	0.103
126	10.50	0.50	0.114	(0.112)	0.011	0.103
127	10.58	0.67	0.152	(0.111)	0.015	0.137
128	10.67	0.67	0.152	(0.111)	0.015	0.137
129	10.75	0.67	0.152	(0.110)	0.015	0.137
130	10.83	0.67	0.152	(0.110)	0.015	0.137
131	10.92	0.67	0.152	(0.109)	0.015	0.137
132	11.00	0.67	0.152	(0.109)	0.015	0.137
133	11.08	0.63	0.144	(0.108)	0.014	0.130
134	11.17	0.63	0.144	(0.108)	0.014	0.130
135	11.25	0.63	0.144	(0.107)	0.014	0.130
136	11.33	0.63	0.144	(0.106)	0.014	0.130
137	11.42	0.63	0.144	(0.106)	0.014	0.130
138	11.50	0.63	0.144	(0.105)	0.014	0.130
139	11.58	0.57	0.129	(0.105)	0.013	0.116
140	11.67	0.57	0.129	(0.104)	0.013	0.116
141	11.75	0.57	0.129	(0.104)	0.013	0.116
142	11.83	0.60	0.137	(0.103)	0.014	0.123

143	11.92	0.60	0.137	(0.103)	0.014	0.123
144	12.00	0.60	0.137	(0.102)	0.014	0.123
145	12.08	0.83	0.190	(0.102)	0.019	0.171
146	12.17	0.83	0.190	(0.101)	0.019	0.171
147	12.25	0.83	0.190	(0.101)	0.019	0.171
148	12.33	0.87	0.198	(0.100)	0.020	0.178
149	12.42	0.87	0.198	(0.100)	0.020	0.178
150	12.50	0.87	0.198	(0.099)	0.020	0.178
151	12.58	0.93	0.213	(0.099)	0.021	0.192
152	12.67	0.93	0.213	(0.098)	0.021	0.192
153	12.75	0.93	0.213	(0.098)	0.021	0.192
154	12.83	0.97	0.220	(0.097)	0.022	0.198
155	12.92	0.97	0.220	(0.097)	0.022	0.198
156	13.00	0.97	0.220	(0.096)	0.022	0.198
157	13.08	1.13	0.258	(0.096)	0.026	0.233
158	13.17	1.13	0.258	(0.095)	0.026	0.233
159	13.25	1.13	0.258	(0.095)	0.026	0.233
160	13.33	1.13	0.258	(0.094)	0.026	0.233
161	13.42	1.13	0.258	(0.094)	0.026	0.233
162	13.50	1.13	0.258	(0.093)	0.026	0.233
163	13.58	0.77	0.175	(0.093)	0.017	0.157
164	13.67	0.77	0.175	(0.092)	0.017	0.157
165	13.75	0.77	0.175	(0.092)	0.017	0.157
166	13.83	0.77	0.175	(0.092)	0.017	0.157
167	13.92	0.77	0.175	(0.091)	0.017	0.157
168	14.00	0.77	0.175	(0.091)	0.017	0.157
169	14.08	0.90	0.205	(0.090)	0.021	0.185
170	14.17	0.90	0.205	(0.090)	0.021	0.185
171	14.25	0.90	0.205	(0.089)	0.021	0.185
172	14.33	0.87	0.198	(0.089)	0.020	0.178
173	14.42	0.87	0.198	(0.088)	0.020	0.178
174	14.50	0.87	0.198	(0.088)	0.020	0.178
175	14.58	0.87	0.198	(0.087)	0.020	0.178
176	14.67	0.87	0.198	(0.087)	0.020	0.178
177	14.75	0.87	0.198	(0.086)	0.020	0.178
178	14.83	0.83	0.190	(0.086)	0.019	0.171
179	14.92	0.83	0.190	(0.086)	0.019	0.171
180	15.00	0.83	0.190	(0.085)	0.019	0.171
181	15.08	0.80	0.182	(0.085)	0.018	0.164
182	15.17	0.80	0.182	(0.084)	0.018	0.164
183	15.25	0.80	0.182	(0.084)	0.018	0.164
184	15.33	0.77	0.175	(0.083)	0.017	0.157
185	15.42	0.77	0.175	(0.083)	0.017	0.157
186	15.50	0.77	0.175	(0.083)	0.017	0.157
187	15.58	0.63	0.144	(0.082)	0.014	0.130
188	15.67	0.63	0.144	(0.082)	0.014	0.130
189	15.75	0.63	0.144	(0.081)	0.014	0.130
190	15.83	0.63	0.144	(0.081)	0.014	0.130
191	15.92	0.63	0.144	(0.080)	0.014	0.130
192	16.00	0.63	0.144	(0.080)	0.014	0.130
193	16.08	0.13	0.030	(0.080)	0.003	0.027
194	16.17	0.13	0.030	(0.079)	0.003	0.027
195	16.25	0.13	0.030	(0.079)	0.003	0.027
196	16.33	0.13	0.030	(0.078)	0.003	0.027
197	16.42	0.13	0.030	(0.078)	0.003	0.027
198	16.50	0.13	0.030	(0.078)	0.003	0.027
199	16.58	0.10	0.023	(0.077)	0.002	0.021
200	16.67	0.10	0.023	(0.077)	0.002	0.021
201	16.75	0.10	0.023	(0.076)	0.002	0.021
202	16.83	0.10	0.023	(0.076)	0.002	0.021
203	16.92	0.10	0.023	(0.076)	0.002	0.021
204	17.00	0.10	0.023	(0.075)	0.002	0.021
205	17.08	0.17	0.038	(0.075)	0.004	0.034
206	17.17	0.17	0.038	(0.075)	0.004	0.034
207	17.25	0.17	0.038	(0.074)	0.004	0.034
208	17.33	0.17	0.038	(0.074)	0.004	0.034
209	17.42	0.17	0.038	(0.073)	0.004	0.034
210	17.50	0.17	0.038	(0.073)	0.004	0.034
211	17.58	0.17	0.038	(0.073)	0.004	0.034
212	17.67	0.17	0.038	(0.072)	0.004	0.034
213	17.75	0.17	0.038	(0.072)	0.004	0.034
214	17.83	0.13	0.030	(0.072)	0.003	0.027
215	17.92	0.13	0.030	(0.071)	0.003	0.027
216	18.00	0.13	0.030	(0.071)	0.003	0.027
217	18.08	0.13	0.030	(0.071)	0.003	0.027
218	18.17	0.13	0.030	(0.070)	0.003	0.027
219	18.25	0.13	0.030	(0.070)	0.003	0.027
220	18.33	0.13	0.030	(0.070)	0.003	0.027
221	18.42	0.13	0.030	(0.069)	0.003	0.027

222	18.50	0.13	0.030	(	0.069)	0.003	0.027
223	18.58	0.10	0.023	(	0.069)	0.002	0.021
224	18.67	0.10	0.023	(	0.068)	0.002	0.021
225	18.75	0.10	0.023	(	0.068)	0.002	0.021
226	18.83	0.07	0.015	(	0.068)	0.002	0.014
227	18.92	0.07	0.015	(	0.067)	0.002	0.014
228	19.00	0.07	0.015	(	0.067)	0.002	0.014
229	19.08	0.10	0.023	(	0.067)	0.002	0.021
230	19.17	0.10	0.023	(	0.066)	0.002	0.021
231	19.25	0.10	0.023	(	0.066)	0.002	0.021
232	19.33	0.13	0.030	(	0.066)	0.003	0.027
233	19.42	0.13	0.030	(	0.065)	0.003	0.027
234	19.50	0.13	0.030	(	0.065)	0.003	0.027
235	19.58	0.10	0.023	(	0.065)	0.002	0.021
236	19.67	0.10	0.023	(	0.064)	0.002	0.021
237	19.75	0.10	0.023	(	0.064)	0.002	0.021
238	19.83	0.07	0.015	(	0.064)	0.002	0.014
239	19.92	0.07	0.015	(	0.064)	0.002	0.014
240	20.00	0.07	0.015	(	0.063)	0.002	0.014
241	20.08	0.10	0.023	(	0.063)	0.002	0.021
242	20.17	0.10	0.023	(	0.063)	0.002	0.021
243	20.25	0.10	0.023	(	0.062)	0.002	0.021
244	20.33	0.10	0.023	(	0.062)	0.002	0.021
245	20.42	0.10	0.023	(	0.062)	0.002	0.021
246	20.50	0.10	0.023	(	0.062)	0.002	0.021
247	20.58	0.10	0.023	(	0.061)	0.002	0.021
248	20.67	0.10	0.023	(	0.061)	0.002	0.021
249	20.75	0.10	0.023	(	0.061)	0.002	0.021
250	20.83	0.07	0.015	(	0.061)	0.002	0.014
251	20.92	0.07	0.015	(	0.060)	0.002	0.014
252	21.00	0.07	0.015	(	0.060)	0.002	0.014
253	21.08	0.10	0.023	(	0.060)	0.002	0.021
254	21.17	0.10	0.023	(	0.060)	0.002	0.021
255	21.25	0.10	0.023	(	0.059)	0.002	0.021
256	21.33	0.07	0.015	(	0.059)	0.002	0.014
257	21.42	0.07	0.015	(	0.059)	0.002	0.014
258	21.50	0.07	0.015	(	0.059)	0.002	0.014
259	21.58	0.10	0.023	(	0.059)	0.002	0.021
260	21.67	0.10	0.023	(	0.058)	0.002	0.021
261	21.75	0.10	0.023	(	0.058)	0.002	0.021
262	21.83	0.07	0.015	(	0.058)	0.002	0.014
263	21.92	0.07	0.015	(	0.058)	0.002	0.014
264	22.00	0.07	0.015	(	0.058)	0.002	0.014
265	22.08	0.10	0.023	(	0.057)	0.002	0.021
266	22.17	0.10	0.023	(	0.057)	0.002	0.021
267	22.25	0.10	0.023	(	0.057)	0.002	0.021
268	22.33	0.07	0.015	(	0.057)	0.002	0.014
269	22.42	0.07	0.015	(	0.057)	0.002	0.014
270	22.50	0.07	0.015	(	0.057)	0.002	0.014
271	22.58	0.07	0.015	(	0.056)	0.002	0.014
272	22.67	0.07	0.015	(	0.056)	0.002	0.014
273	22.75	0.07	0.015	(	0.056)	0.002	0.014
274	22.83	0.07	0.015	(	0.056)	0.002	0.014
275	22.92	0.07	0.015	(	0.056)	0.002	0.014
276	23.00	0.07	0.015	(	0.056)	0.002	0.014
277	23.08	0.07	0.015	(	0.055)	0.002	0.014
278	23.17	0.07	0.015	(	0.055)	0.002	0.014
279	23.25	0.07	0.015	(	0.055)	0.002	0.014
280	23.33	0.07	0.015	(	0.055)	0.002	0.014
281	23.42	0.07	0.015	(	0.055)	0.002	0.014
282	23.50	0.07	0.015	(	0.055)	0.002	0.014
283	23.58	0.07	0.015	(	0.055)	0.002	0.014
284	23.67	0.07	0.015	(	0.055)	0.002	0.014
285	23.75	0.07	0.015	(	0.055)	0.002	0.014
286	23.83	0.07	0.015	(	0.055)	0.002	0.014
287	23.92	0.07	0.015	(	0.055)	0.002	0.014
288	24.00	0.07	0.015	(	0.055)	0.002	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 20.5

Flood volume = Effective rainfall 1.71(In)
times area 5.1(Ac.)/[(In)/(Ft.)] = 0.7(Ac.Ft)
Total soil loss = 0.19(In)
Total soil loss = 0.080(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 31470.7 Cubic Feet
Total soil loss = 3496.7 Cubic Feet

Peak flow rate of this hydrograph = 1.189(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0005	0.07	Q	|	|	|	|
0+10	0.0010	0.07	Q	|	|	|	|
0+15	0.0014	0.07	Q	|	|	|	|
0+20	0.0022	0.10	Q	|	|	|	|
0+25	0.0029	0.10	Q	|	|	|	|
0+30	0.0036	0.10	Q	|	|	|	|
0+35	0.0043	0.10	Q	|	|	|	|
0+40	0.0051	0.10	Q	|	|	|	|
0+45	0.0058	0.10	Q	|	|	|	|
0+50	0.0067	0.14	Q	|	|	|	|
0+55	0.0077	0.14	Q	|	|	|	|
1+ 0	0.0087	0.14	Q	|	|	|	|
1+ 5	0.0094	0.10	Q	|	|	|	|
1+10	0.0101	0.10	Q	|	|	|	|
1+15	0.0108	0.10	Q	|	|	|	|
1+20	0.0116	0.10	Q	|	|	|	|
1+25	0.0123	0.10	Q	|	|	|	|
1+30	0.0130	0.10	Q	|	|	|	|
1+35	0.0137	0.10	Q	|	|	|	|
1+40	0.0144	0.10	Q	|	|	|	|
1+45	0.0152	0.10	Q	|	|	|	|
1+50	0.0161	0.14	Q	|	|	|	|
1+55	0.0171	0.14	Q	|	|	|	|
2+ 0	0.0181	0.14	QV	|	|	|	|
2+ 5	0.0190	0.14	QV	|	|	|	|
2+10	0.0200	0.14	QV	|	|	|	|
2+15	0.0210	0.14	QV	|	|	|	|
2+20	0.0219	0.14	QV	|	|	|	|
2+25	0.0229	0.14	QV	|	|	|	|
2+30	0.0238	0.14	QV	|	|	|	|
2+35	0.0250	0.17	QV	|	|	|	|
2+40	0.0262	0.17	QV	|	|	|	|
2+45	0.0275	0.17	QV	|	|	|	|
2+50	0.0287	0.17	QV	|	|	|	|
2+55	0.0299	0.17	QV	|	|	|	|
3+ 0	0.0311	0.17	QV	|	|	|	|
3+ 5	0.0323	0.17	QV	|	|	|	|
3+10	0.0335	0.17	QV	|	|	|	|
3+15	0.0347	0.17	QV	|	|	|	|
3+20	0.0359	0.17	QV	|	|	|	|
3+25	0.0371	0.17	Q V	|	|	|	|
3+30	0.0383	0.17	Q V	|	|	|	|
3+35	0.0395	0.17	Q V	|	|	|	|
3+40	0.0407	0.17	Q V	|	|	|	|
3+45	0.0419	0.17	Q V	|	|	|	|
3+50	0.0433	0.21	Q V	|	|	|	|
3+55	0.0448	0.21	Q V	|	|	|	|
4+ 0	0.0462	0.21	Q V	|	|	|	|
4+ 5	0.0477	0.21	Q V	|	|	|	|
4+10	0.0491	0.21	Q V	|	|	|	|
4+15	0.0506	0.21	Q V	|	|	|	|
4+20	0.0523	0.24	Q V	|	|	|	|
4+25	0.0539	0.24	Q V	|	|	|	|
4+30	0.0556	0.24	Q V	|	|	|	|
4+35	0.0573	0.24	Q V	|	|	|	|
4+40	0.0590	0.24	Q V	|	|	|	|
4+45	0.0607	0.24	Q V	|	|	|	|
4+50	0.0626	0.28	|Q V	|	|	|	|
4+55	0.0645	0.28	|Q V	|	|	|	|
5+ 0	0.0665	0.28	|Q V	|	|	|	|
5+ 5	0.0679	0.21	Q V	|	|	|	|
5+10	0.0694	0.21	Q V	|	|	|	|
5+15	0.0708	0.21	Q V	|	|	|	|
5+20	0.0725	0.24	Q V	|	|	|	|
5+25	0.0742	0.24	Q V	|	|	|	|
5+30	0.0759	0.24	Q V	|	|	|	|
5+35	0.0778	0.28	|Q V	|	|	|	|
5+40	0.0797	0.28	|Q V	|	|	|	|
5+45	0.0816	0.28	|Q V	|	|	|	|
5+50	0.0836	0.28	|Q V	|	|	|	|

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 5+55       0.0855      0.28  |Q  V     |         |         |         |
 6+ 0       0.0874      0.28  |Q  V     |         |         |         |
 6+ 5       0.0896      0.31  |Q  V     |         |         |         |
 6+10       0.0918      0.31  |Q   V    |         |         |         |
 6+15       0.0939      0.31  |Q   V    |         |         |         |
 6+20       0.0961      0.31  |Q   V    |         |         |         |
 6+25       0.0983      0.31  |Q   V    |         |         |         |
 6+30       0.1004      0.31  |Q   V    |         |         |         |
 6+35       0.1028      0.35  |Q   V    |         |         |         |
 6+40       0.1052      0.35  |Q   V    |         |         |         |
 6+45       0.1076      0.35  |Q   V    |         |         |         |
 6+50       0.1101      0.35  |Q    V   |         |         |         |
 6+55       0.1125      0.35  |Q    V   |         |         |         |
 7+ 0       0.1149      0.35  |Q    V   |         |         |         |
 7+ 5       0.1173      0.35  |Q    V   |         |         |         |
 7+10       0.1197      0.35  |Q    V   |         |         |         |
 7+15       0.1221      0.35  |Q    V   |         |         |         |
 7+20       0.1247      0.38  |Q    V   |         |         |         |
 7+25       0.1274      0.38  |Q     V  |         |         |         |
 7+30       0.1300      0.38  |Q     V  |         |         |         |
 7+35       0.1329      0.42  |Q     V  |         |         |         |
 7+40       0.1358      0.42  |Q     V  |         |         |         |
 7+45       0.1387      0.42  |Q     V  |         |         |         |
 7+50       0.1418      0.45  |Q     V  |         |         |         |
 7+55       0.1450      0.45  |Q      V |         |         |         |
 8+ 0       0.1481      0.45  |Q      V |         |         |         |
 8+ 5       0.1517      0.52  | Q     V |         |         |         |
 8+10       0.1553      0.52  | Q     V |         |         |         |
 8+15       0.1589      0.52  | Q     V |         |         |         |
 8+20       0.1626      0.52  | Q      V|         |         |         |
 8+25       0.1662      0.52  | Q      V|         |         |         |
 8+30       0.1698      0.52  | Q      V|         |         |         |
 8+35       0.1736      0.56  | Q      V|         |         |         |
 8+40       0.1775      0.56  | Q      V|         |         |         |
 8+45       0.1813      0.56  | Q       V         |         |         |
 8+50       0.1854      0.59  | Q       V         |         |         |
 8+55       0.1895      0.59  | Q       V         |         |         |
 9+ 0       0.1936      0.59  | Q       V         |         |         |
 9+ 5       0.1982      0.66  | Q       V         |         |         |
 9+10       0.2028      0.66  | Q       |V        |         |         |
 9+15       0.2073      0.66  | Q       |V        |         |         |
 9+20       0.2122      0.70  | Q       |V        |         |         |
 9+25       0.2170      0.70  | Q       | V       |         |         |
 9+30       0.2218      0.70  | Q       | V       |         |         |
 9+35       0.2269      0.73  | Q       | V       |         |         |
 9+40       0.2319      0.73  | Q       | V       |         |         |
 9+45       0.2370      0.73  | Q       |  V      |         |         |
 9+50       0.2423      0.77  |  Q      |  V      |         |         |
 9+55       0.2476      0.77  |  Q      |  V      |         |         |
10+ 0       0.2529      0.77  |  Q      |   V     |         |         |
10+ 5       0.2565      0.52  | Q       |   V     |         |         |
10+10       0.2601      0.52  | Q       |   V     |         |         |
10+15       0.2637      0.52  | Q       |   V     |         |         |
10+20       0.2673      0.52  | Q       |   V     |         |         |
10+25       0.2709      0.52  | Q       |    V    |         |         |
10+30       0.2745      0.52  | Q       |    V    |         |         |
10+35       0.2794      0.70  | Q       |    V    |         |         |
10+40       0.2842      0.70  | Q       |    V    |         |         |
10+45       0.2890      0.70  | Q       |    V    |         |         |
10+50       0.2938      0.70  | Q       |     V   |         |         |
10+55       0.2986      0.70  | Q       |     V   |         |         |
11+ 0       0.3034      0.70  | Q       |     V   |         |         |
11+ 5       0.3080      0.66  | Q       |      V  |         |         |
11+10       0.3126      0.66  | Q       |      V  |         |         |
11+15       0.3172      0.66  | Q       |      V  |         |         |
11+20       0.3217      0.66  | Q       |      V  |         |         |
11+25       0.3263      0.66  | Q       |       V |         |         |
11+30       0.3309      0.66  | Q       |       V |         |         |
11+35       0.3350      0.59  | Q       |       V |         |         |
11+40       0.3391      0.59  | Q       |       V |         |         |
11+45       0.3432      0.59  | Q       |        V|         |         |
11+50       0.3475      0.63  | Q       |        V|         |         |
11+55       0.3518      0.63  | Q       |        V|         |         |
12+ 0       0.3562      0.63  | Q       |        V|         |         |
12+ 5       0.3622      0.87  |  Q      |         V         |         |
12+10       0.3682      0.87  |  Q      |         V         |         |
12+15       0.3742      0.87  |  Q      |         V         |         |
12+20       0.3805      0.91  |  Q      |         |V        |         |
12+25       0.3868      0.91  |  Q      |         |V        |         |
```

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12+30      0.3930      0.91  |  Q      |         |V        |         |
12+35      0.3998      0.98  |  Q      |         | V       |         |
12+40      0.4065      0.98  |  Q      |         | V       |         |
12+45      0.4133      0.98  |  Q      |         | V       |         |
12+50      0.4202      1.01  |   Q     |         |  V      |         |
12+55      0.4272      1.01  |   Q     |         |  V      |         |
13+ 0      0.4342      1.01  |   Q     |         |   V     |         |
13+ 5      0.4424      1.19  |   Q     |         |   V     |         |
13+10      0.4506      1.19  |   Q     |         |   V     |         |
13+15      0.4588      1.19  |   Q     |         |    V    |         |
13+20      0.4670      1.19  |   Q     |         |    V    |         |
13+25      0.4751      1.19  |   Q     |         |     V   |         |
13+30      0.4833      1.19  |   Q     |         |     V   |         |
13+35      0.4889      0.80  |  Q      |         |      V  |         |
13+40      0.4944      0.80  |  Q      |         |      V  |         |
13+45      0.4999      0.80  |  Q      |         |      V  |         |
13+50      0.5055      0.80  |  Q      |         |      V  |         |
13+55      0.5110      0.80  |  Q      |         |       V |         |
14+ 0      0.5166      0.80  |  Q      |         |       V |         |
14+ 5      0.5231      0.94  |  Q      |         |       V |         |
14+10      0.5296      0.94  |  Q      |         |        V|         |
14+15      0.5361      0.94  |  Q      |         |        V|         |
14+20      0.5423      0.91  |  Q      |         |         V         |
14+25      0.5486      0.91  |  Q      |         |         V         |
14+30      0.5549      0.91  |  Q      |         |         V         |
14+35      0.5611      0.91  |  Q      |         |         |V        |
14+40      0.5674      0.91  |  Q      |         |         |V        |
14+45      0.5736      0.91  |  Q      |         |         |V        |
14+50      0.5797      0.87  |  Q      |         |         | V       |
14+55      0.5857      0.87  |  Q      |         |         | V       |
15+ 0      0.5917      0.87  |  Q      |         |         | V       |
15+ 5      0.5975      0.84  |  Q      |         |         |  V      |
15+10      0.6033      0.84  |  Q      |         |         |  V      |
15+15      0.6090      0.84  |  Q      |         |         |  V      |
15+20      0.6146      0.80  |  Q      |         |         |   V     |
15+25      0.6201      0.80  |  Q      |         |         |   V     |
15+30      0.6257      0.80  |  Q      |         |         |   V     |
15+35      0.6302      0.66  | Q       |         |         |   V     |
15+40      0.6348      0.66  | Q       |         |         |    V    |
15+45      0.6394      0.66  | Q       |         |         |    V    |
15+50      0.6440      0.66  | Q       |         |         |    V    |
15+55      0.6485      0.66  | Q       |         |         |    V    |
16+ 0      0.6531      0.66  | Q       |         |         |     V   |
16+ 5      0.6541      0.14  Q         |         |         |     V   |
16+10      0.6550      0.14  Q         |         |         |     V   |
16+15      0.6560      0.14  Q         |         |         |     V   |
16+20      0.6570      0.14  Q         |         |         |     V   |
16+25      0.6579      0.14  Q         |         |         |     V   |
16+30      0.6589      0.14  Q         |         |         |     V   |
16+35      0.6596      0.10  Q         |         |         |     V   |
16+40      0.6603      0.10  Q         |         |         |     V   |
16+45      0.6611      0.10  Q         |         |         |     V   |
16+50      0.6618      0.10  Q         |         |         |     V   |
16+55      0.6625      0.10  Q         |         |         |     V   |
17+ 0      0.6632      0.10  Q         |         |         |     V   |
17+ 5      0.6644      0.17  Q         |         |         |     V   |
17+10      0.6656      0.17  Q         |         |         |     V   |
17+15      0.6668      0.17  Q         |         |         |     V   |
17+20      0.6680      0.17  Q         |         |         |     V   |
17+25      0.6692      0.17  Q         |         |         |      V  |
17+30      0.6705      0.17  Q         |         |         |      V  |
17+35      0.6717      0.17  Q         |         |         |      V  |
17+40      0.6729      0.17  Q         |         |         |      V  |
17+45      0.6741      0.17  Q         |         |         |      V  |
17+50      0.6750      0.14  Q         |         |         |      V  |
17+55      0.6760      0.14  Q         |         |         |      V  |
18+ 0      0.6770      0.14  Q         |         |         |      V  |
18+ 5      0.6779      0.14  Q         |         |         |      V  |
18+10      0.6789      0.14  Q         |         |         |      V  |
18+15      0.6798      0.14  Q         |         |         |      V  |
18+20      0.6808      0.14  Q         |         |         |      V  |
18+25      0.6818      0.14  Q         |         |         |      V  |
18+30      0.6827      0.14  Q         |         |         |      V  |
18+35      0.6835      0.10  Q         |         |         |      V  |
18+40      0.6842      0.10  Q         |         |         |      V  |
18+45      0.6849      0.10  Q         |         |         |      V  |
18+50      0.6854      0.07  Q         |         |         |      V  |
18+55      0.6859      0.07  Q         |         |         |      V  |
19+ 0      0.6863      0.07  Q         |         |         |       V |
```

Peak flow rate

```
 19+ 5      0.6871      0.10  Q         |         |         |       V |
 19+10      0.6878      0.10  Q         |         |         |       V |
 19+15      0.6885      0.10  Q         |         |         |       V |
 19+20      0.6895      0.14  Q         |         |         |       V |
 19+25      0.6904      0.14  Q         |         |         |       V |
 19+30      0.6914      0.14  Q         |         |         |       V |
 19+35      0.6921      0.10  Q         |         |         |       V |
 19+40      0.6928      0.10  Q         |         |         |       V |
 19+45      0.6936      0.10  Q         |         |         |       V |
 19+50      0.6941      0.07  Q         |         |         |       V |
 19+55      0.6945      0.07  Q         |         |         |       V |
 20+ 0      0.6950      0.07  Q         |         |         |       V |
 20+ 5      0.6957      0.10  Q         |         |         |       V |
 20+10      0.6965      0.10  Q         |         |         |       V |
 20+15      0.6972      0.10  Q         |         |         |       V |
 20+20      0.6979      0.10  Q         |         |         |       V |
 20+25      0.6986      0.10  Q         |         |         |       V |
 20+30      0.6993      0.10  Q         |         |         |       V |
 20+35      0.7001      0.10  Q         |         |         |       V |
 20+40      0.7008      0.10  Q         |         |         |       V |
 20+45      0.7015      0.10  Q         |         |         |       V |
 20+50      0.7020      0.07  Q         |         |         |       V |
 20+55      0.7025      0.07  Q         |         |         |       V |
 21+ 0      0.7030      0.07  Q         |         |         |       V |
 21+ 5      0.7037      0.10  Q         |         |         |       V |
 21+10      0.7044      0.10  Q         |         |         |        V|
 21+15      0.7051      0.10  Q         |         |         |        V|
 21+20      0.7056      0.07  Q         |         |         |        V|
 21+25      0.7061      0.07  Q         |         |         |        V|
 21+30      0.7066      0.07  Q         |         |         |        V|
 21+35      0.7073      0.10  Q         |         |         |        V|
 21+40      0.7080      0.10  Q         |         |         |        V|
 21+45      0.7087      0.10  Q         |         |         |        V|
 21+50      0.7092      0.07  Q         |         |         |        V|
 21+55      0.7097      0.07  Q         |         |         |        V|
 22+ 0      0.7102      0.07  Q         |         |         |        V|
 22+ 5      0.7109      0.10  Q         |         |         |        V|
 22+10      0.7116      0.10  Q         |         |         |        V|
 22+15      0.7124      0.10  Q         |         |         |        V|
 22+20      0.7128      0.07  Q         |         |         |        V|
 22+25      0.7133      0.07  Q         |         |         |        V|
 22+30      0.7138      0.07  Q         |         |         |        V|
 22+35      0.7143      0.07  Q         |         |         |        V|
 22+40      0.7148      0.07  Q         |         |         |        V|
 22+45      0.7152      0.07  Q         |         |         |        V|
 22+50      0.7157      0.07  Q         |         |         |        V|
 22+55      0.7162      0.07  Q         |         |         |        V|
 23+ 0      0.7167      0.07  Q         |         |         |        V|
 23+ 5      0.7172      0.07  Q         |         |         |        V|
 23+10      0.7177      0.07  Q         |         |         |        V|
 23+15      0.7181      0.07  Q         |         |         |        V|
 23+20      0.7186      0.07  Q         |         |         |        V|
 23+25      0.7191      0.07  Q         |         |         |        V|
 23+30      0.7196      0.07  Q         |         |         |        V|
 23+35      0.7201      0.07  Q         |         |         |        V|
 23+40      0.7205      0.07  Q         |         |         |        V|
 23+45      0.7210      0.07  Q         |         |         |        V|
 23+50      0.7215      0.07  Q         |         |         |        V|
 23+55      0.7220      0.07  Q         |         |         |        V|
 24+ 0      0.7225      0.07  Q         |         |         |         V
----------------------------------------------------------------------
```

2-year, 24-hour volume = 0.7225 ac-ft

Underground detention provided = 0.7248 ac-ft

The peak flow rate of 1.19 cfs is stored in the underground detention system.

Underground detention provided > 2-year, 24-hour volume; therefore, the flow rate being discharged is 0.07 cfs.

STORAGE CALCULATOR (DMA A)

Date: 4/21/2023
Project Name: TEI 4118 - DMA A - 19598 (4-21-2023 19-15-46

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	132.0	Backfill Porosity (%):	0%	System Diameter (in):	120
Out-to-out width (ft):	36.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	3.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	0.16	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.33	0.33	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.67	0.66	114.8	114.8	0.0	0.0	114.8	114.8	100.0%	1,029.3
0.83	0.83	208.2	322.9	0.0	0.0	208.2	322.9	100.0%	1,443.2
1.00	1.00	267.3	590.2	0.0	0.0	267.3	590.2	100.0%	1,752.3
1.17	1.16	313.8	904.0	0.0	0.0	313.8	904.0	100.0%	2,005.5
1.33	1.33	352.7	1,256.7	0.0	0.0	352.7	1,256.7	100.0%	2,222.1
1.50	1.50	386.5	1,643.2	0.0	0.0	386.5	1,643.2	100.0%	2,412.0
1.67	1.66	416.3	2,059.5	0.0	0.0	416.3	2,059.5	100.0%	2,581.0
1.83	1.83	443.1	2,502.6	0.0	0.0	443.1	2,502.6	100.0%	2,733.1
2.00	2.00	467.2	2,969.8	0.0	0.0	467.2	2,969.8	100.0%	2,870.9
2.17	2.16	489.1	3,458.9	0.0	0.0	489.1	3,458.9	100.0%	2,996.3
2.33	2.33	509.1	3,967.9	0.0	0.0	509.1	3,967.9	100.0%	3,111.0
2.50	2.50	527.4	4,495.3	0.0	0.0	527.4	4,495.3	100.0%	3,216.0
2.67	2.66	544.1	5,039.5	0.0	0.0	544.1	5,039.5	100.0%	3,312.3
2.83	2.83	559.5	5,599.0	0.0	0.0	559.5	5,599.0	100.0%	3,400.5
3.00	3.00	573.6	6,172.6	0.0	0.0	573.6	6,172.6	100.0%	3,481.4
3.17	3.16	586.5	6,759.1	0.0	0.0	586.5	6,759.1	100.0%	3,555.4
3.33	3.33	598.3	7,357.3	0.0	0.0	598.3	7,357.3	100.0%	3,623.0
3.50	3.50	609.0	7,966.4	0.0	0.0	609.0	7,966.4	100.0%	3,684.4
3.67	3.66	618.8	8,585.1	0.0	0.0	618.8	8,585.1	100.0%	3,740.0
3.83	3.83	627.6	9,212.7	0.0	0.0	627.6	9,212.7	100.0%	3,790.1
4.00	4.00	635.5	9,848.2	0.0	0.0	635.5	9,848.2	100.0%	3,834.8
4.17	4.16	642.5	10,490.7	0.0	0.0	642.5	10,490.7	100.0%	3,874.4
4.33	4.33	648.7	11,139.4	0.0	0.0	648.7	11,139.4	100.0%	3,909.0
4.50	4.50	654.1	11,793.5	0.0	0.0	654.1	11,793.5	100.0%	3,938.8
4.67	4.66	658.6	12,452.1	0.0	0.0	658.6	12,452.1	100.0%	3,963.8
4.83	4.83	662.4	13,114.5	0.0	0.0	662.4	13,114.5	100.0%	3,984.1
5.00	5.00	665.4	13,779.9	0.0	0.0	665.4	13,779.9	100.0%	3,999.8
5.17	5.16	667.6	14,447.5	0.0	0.0	667.6	14,447.5	100.0%	4,011.1
5.33	5.33	669.1	15,116.6	0.0	0.0	669.1	15,116.6	100.0%	4,017.8
5.50	5.50	669.9	15,786.5	0.0	0.0	669.9	15,786.5	100.0%	4,020.0
5.67	5.66	669.9	16,456.4	0.0	0.0	669.9	16,456.4	100.0%	4,017.8
5.83	5.83	669.1	17,125.5	0.0	0.0	669.1	17,125.5	100.0%	4,011.1
6.00	6.00	667.6	17,793.1	0.0	0.0	667.6	17,793.1	100.0%	3,999.8

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

6.17	6.16	665.4	18,458.5	0.0	0.0	665.4	18,458.5	100.0%	3,984.1
6.33	6.33	662.4	19,120.9	0.0	0.0	662.4	19,120.9	100.0%	3,963.8
6.50	6.50	658.6	19,779.5	0.0	0.0	658.6	19,779.5	100.0%	3,938.8
6.67	6.66	654.1	20,433.6	0.0	0.0	654.1	20,433.6	100.0%	3,909.0
6.83	6.83	648.7	21,082.3	0.0	0.0	648.7	21,082.3	100.0%	3,874.4
7.00	7.00	642.5	21,724.8	0.0	0.0	642.5	21,724.8	100.0%	3,834.8
7.17	7.16	635.5	22,360.3	0.0	0.0	635.5	22,360.3	100.0%	3,790.1
7.33	7.33	627.6	22,987.9	0.0	0.0	627.6	22,987.9	100.0%	3,740.0
7.50	7.50	618.8	23,606.6	0.0	0.0	618.8	23,606.6	100.0%	3,684.4
7.67	7.66	609.0	24,215.7	0.0	0.0	609.0	24,215.7	100.0%	3,623.0
7.83	7.83	598.3	24,814.0	0.0	0.0	598.3	24,814.0	100.0%	3,555.4
8.00	8.00	586.5	25,400.4	0.0	0.0	586.5	25,400.4	100.0%	3,481.4
8.17	8.16	573.6	25,974.0	0.0	0.0	573.6	25,974.0	100.0%	3,400.5
8.33	8.33	559.5	26,533.6	0.0	0.0	559.5	26,533.6	100.0%	3,312.3
8.50	8.50	544.1	27,077.7	0.0	0.0	544.1	27,077.7	100.0%	3,216.0
8.67	8.66	527.4	27,605.1	0.0	0.0	527.4	27,605.1	100.0%	3,111.0
8.83	8.83	509.1	28,114.2	0.0	0.0	509.1	28,114.2	100.0%	2,996.3
9.00	9.00	489.1	28,603.2	0.0	0.0	489.1	28,603.2	100.0%	2,870.9
9.17	9.16	467.2	29,070.4	0.0	0.0	467.2	29,070.4	100.0%	2,733.1
9.33	9.33	443.1	29,513.5	0.0	0.0	443.1	29,513.5	100.0%	2,581.0
9.50	9.50	416.3	29,929.8	0.0	0.0	416.3	29,929.8	100.0%	2,412.0
9.67	9.66	386.5	30,316.3	0.0	0.0	386.5	30,316.3	100.0%	2,222.1
9.83	9.83	352.7	30,669.1	0.0	0.0	352.7	30,669.1	100.0%	2,005.5
10.00	10.00	313.8	30,982.8	0.0	0.0	313.8	30,982.8	100.0%	1,752.3
10.17	10.16	267.3	31,250.1	0.0	0.0	267.3	31,250.1	100.0%	1,443.2
10.33	10.33	208.2	31,458.3	0.0	0.0	208.2	31,458.3	100.0%	1,029.3
10.50	10.50	114.8	31,573.0	0.0	0.0	114.8	31,573.0	100.0%	0.0
10.67	10.66	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0
10.83	10.83	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0
11.00	11.00	0.0	31,573.0	0.0	0.0	0.0	31,573.0	100.0%	0.0

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

PRE-CONDITION HYDROGRAPH (DMA B)

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

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                Study date  04/21/23 File: 4118exb2242.out


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----------------------------------------------------------------------

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


Program License Serial Number 6400

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

 English Units used in output format



----------------------------------------------------------------------
LOVETT MENIFEE LOGISTICS - RIVERSIDE COUNTY
EXISTING CONDITION - BUILDING 2
HYDROLOGIC ANALYSIS - 2-YEAR

---------------------------------------------------------------------
Drainage Area =      12.35(Ac.)  =      0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      12.35(Ac.)  =      0.019 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.000 Hr.
Lag time =     0.00 Min.
25% of lag time =     0.00 Min.
40% of lag time =     0.00 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       12.35            1.90                  23.47

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       12.35            5.00                  61.75

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.900(In)
Area Averaged 100-Year Rainfall =    5.000(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 %
    12.350           77.00         0.000
 Total Area Entered =     12.35(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
77.0  59.4      0.476     0.000        0.476       1.000      0.476
                                                  Sum (F) =   0.476
Area averaged mean soil loss (F) (In/Hr) =  0.476
Minimum soil loss rate ((In/Hr)) =  0.238
(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
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Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1 0.083	1.#IO	100.000	12.446
		Sum = 100.000	Sum= 12.446

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	(0.844)	0.014	0.002
2	0.17	0.07	0.015	(0.841)	0.014	0.002
3	0.25	0.07	0.015	(0.838)	0.014	0.002
4	0.33	0.10	0.023	(0.834)	0.021	0.002
5	0.42	0.10	0.023	(0.831)	0.021	0.002
6	0.50	0.10	0.023	(0.828)	0.021	0.002
7	0.58	0.10	0.023	(0.825)	0.021	0.002
8	0.67	0.10	0.023	(0.821)	0.021	0.002
9	0.75	0.10	0.023	(0.818)	0.021	0.002
10	0.83	0.13	0.030	(0.815)	0.027	0.003
11	0.92	0.13	0.030	(0.812)	0.027	0.003
12	1.00	0.13	0.030	(0.808)	0.027	0.003
13	1.08	0.10	0.023	(0.805)	0.021	0.002
14	1.17	0.10	0.023	(0.802)	0.021	0.002
15	1.25	0.10	0.023	(0.799)	0.021	0.002
16	1.33	0.10	0.023	(0.796)	0.021	0.002
17	1.42	0.10	0.023	(0.793)	0.021	0.002
18	1.50	0.10	0.023	(0.789)	0.021	0.002
19	1.58	0.10	0.023	(0.786)	0.021	0.002
20	1.67	0.10	0.023	(0.783)	0.021	0.002
21	1.75	0.10	0.023	(0.780)	0.021	0.002
22	1.83	0.13	0.030	(0.777)	0.027	0.003
23	1.92	0.13	0.030	(0.774)	0.027	0.003
24	2.00	0.13	0.030	(0.771)	0.027	0.003
25	2.08	0.13	0.030	(0.767)	0.027	0.003
26	2.17	0.13	0.030	(0.764)	0.027	0.003
27	2.25	0.13	0.030	(0.761)	0.027	0.003
28	2.33	0.13	0.030	(0.758)	0.027	0.003
29	2.42	0.13	0.030	(0.755)	0.027	0.003
30	2.50	0.13	0.030	(0.752)	0.027	0.003
31	2.58	0.17	0.038	(0.749)	0.034	0.004
32	2.67	0.17	0.038	(0.746)	0.034	0.004
33	2.75	0.17	0.038	(0.743)	0.034	0.004
34	2.83	0.17	0.038	(0.740)	0.034	0.004
35	2.92	0.17	0.038	(0.737)	0.034	0.004
36	3.00	0.17	0.038	(0.734)	0.034	0.004
37	3.08	0.17	0.038	(0.731)	0.034	0.004
38	3.17	0.17	0.038	(0.728)	0.034	0.004
39	3.25	0.17	0.038	(0.724)	0.034	0.004
40	3.33	0.17	0.038	(0.721)	0.034	0.004
41	3.42	0.17	0.038	(0.718)	0.034	0.004
42	3.50	0.17	0.038	(0.715)	0.034	0.004
43	3.58	0.17	0.038	(0.712)	0.034	0.004
44	3.67	0.17	0.038	(0.709)	0.034	0.004
45	3.75	0.17	0.038	(0.706)	0.034	0.004
46	3.83	0.20	0.046	(0.704)	0.041	0.005
47	3.92	0.20	0.046	(0.701)	0.041	0.005
48	4.00	0.20	0.046	(0.698)	0.041	0.005
49	4.08	0.20	0.046	(0.695)	0.041	0.005
50	4.17	0.20	0.046	(0.692)	0.041	0.005
51	4.25	0.20	0.046	(0.689)	0.041	0.005
52	4.33	0.23	0.053	(0.686)	0.048	0.005
53	4.42	0.23	0.053	(0.683)	0.048	0.005
54	4.50	0.23	0.053	(0.680)	0.048	0.005
55	4.58	0.23	0.053	(0.677)	0.048	0.005
56	4.67	0.23	0.053	(0.674)	0.048	0.005
57	4.75	0.23	0.053	(0.671)	0.048	0.005
58	4.83	0.27	0.061	(0.668)	0.055	0.006
59	4.92	0.27	0.061	(0.665)	0.055	0.006
60	5.00	0.27	0.061	(0.663)	0.055	0.006
61	5.08	0.20	0.046	(0.660)	0.041	0.005
62	5.17	0.20	0.046	(0.657)	0.041	0.005
63	5.25	0.20	0.046	(0.654)	0.041	0.005

64	5.33	0.23	0.053	(0.651)	0.048	0.005
65	5.42	0.23	0.053	(0.648)	0.048	0.005
66	5.50	0.23	0.053	(0.645)	0.048	0.005
67	5.58	0.27	0.061	(0.643)	0.055	0.006
68	5.67	0.27	0.061	(0.640)	0.055	0.006
69	5.75	0.27	0.061	(0.637)	0.055	0.006
70	5.83	0.27	0.061	(0.634)	0.055	0.006
71	5.92	0.27	0.061	(0.631)	0.055	0.006
72	6.00	0.27	0.061	(0.628)	0.055	0.006
73	6.08	0.30	0.068	(0.626)	0.062	0.007
74	6.17	0.30	0.068	(0.623)	0.062	0.007
75	6.25	0.30	0.068	(0.620)	0.062	0.007
76	6.33	0.30	0.068	(0.617)	0.062	0.007
77	6.42	0.30	0.068	(0.615)	0.062	0.007
78	6.50	0.30	0.068	(0.612)	0.062	0.007
79	6.58	0.33	0.076	(0.609)	0.068	0.008
80	6.67	0.33	0.076	(0.606)	0.068	0.008
81	6.75	0.33	0.076	(0.604)	0.068	0.008
82	6.83	0.33	0.076	(0.601)	0.068	0.008
83	6.92	0.33	0.076	(0.598)	0.068	0.008
84	7.00	0.33	0.076	(0.595)	0.068	0.008
85	7.08	0.33	0.076	(0.593)	0.068	0.008
86	7.17	0.33	0.076	(0.590)	0.068	0.008
87	7.25	0.33	0.076	(0.587)	0.068	0.008
88	7.33	0.37	0.084	(0.585)	0.075	0.008
89	7.42	0.37	0.084	(0.582)	0.075	0.008
90	7.50	0.37	0.084	(0.579)	0.075	0.008
91	7.58	0.40	0.091	(0.577)	0.082	0.009
92	7.67	0.40	0.091	(0.574)	0.082	0.009
93	7.75	0.40	0.091	(0.571)	0.082	0.009
94	7.83	0.43	0.099	(0.569)	0.089	0.010
95	7.92	0.43	0.099	(0.566)	0.089	0.010
96	8.00	0.43	0.099	(0.563)	0.089	0.010
97	8.08	0.50	0.114	(0.561)	0.103	0.011
98	8.17	0.50	0.114	(0.558)	0.103	0.011
99	8.25	0.50	0.114	(0.556)	0.103	0.011
100	8.33	0.50	0.114	(0.553)	0.103	0.011
101	8.42	0.50	0.114	(0.550)	0.103	0.011
102	8.50	0.50	0.114	(0.548)	0.103	0.011
103	8.58	0.53	0.122	(0.545)	0.109	0.012
104	8.67	0.53	0.122	(0.543)	0.109	0.012
105	8.75	0.53	0.122	(0.540)	0.109	0.012
106	8.83	0.57	0.129	(0.538)	0.116	0.013
107	8.92	0.57	0.129	(0.535)	0.116	0.013
108	9.00	0.57	0.129	(0.533)	0.116	0.013
109	9.08	0.63	0.144	(0.530)	0.130	0.014
110	9.17	0.63	0.144	(0.528)	0.130	0.014
111	9.25	0.63	0.144	(0.525)	0.130	0.014
112	9.33	0.67	0.152	(0.523)	0.137	0.015
113	9.42	0.67	0.152	(0.520)	0.137	0.015
114	9.50	0.67	0.152	(0.518)	0.137	0.015
115	9.58	0.70	0.160	(0.515)	0.144	0.016
116	9.67	0.70	0.160	(0.513)	0.144	0.016
117	9.75	0.70	0.160	(0.510)	0.144	0.016
118	9.83	0.73	0.167	(0.508)	0.150	0.017
119	9.92	0.73	0.167	(0.505)	0.150	0.017
120	10.00	0.73	0.167	(0.503)	0.150	0.017
121	10.08	0.50	0.114	(0.500)	0.103	0.011
122	10.17	0.50	0.114	(0.498)	0.103	0.011
123	10.25	0.50	0.114	(0.496)	0.103	0.011
124	10.33	0.50	0.114	(0.493)	0.103	0.011
125	10.42	0.50	0.114	(0.491)	0.103	0.011
126	10.50	0.50	0.114	(0.488)	0.103	0.011
127	10.58	0.67	0.152	(0.486)	0.137	0.015
128	10.67	0.67	0.152	(0.484)	0.137	0.015
129	10.75	0.67	0.152	(0.481)	0.137	0.015
130	10.83	0.67	0.152	(0.479)	0.137	0.015
131	10.92	0.67	0.152	(0.476)	0.137	0.015
132	11.00	0.67	0.152	(0.474)	0.137	0.015
133	11.08	0.63	0.144	(0.472)	0.130	0.014
134	11.17	0.63	0.144	(0.469)	0.130	0.014
135	11.25	0.63	0.144	(0.467)	0.130	0.014
136	11.33	0.63	0.144	(0.465)	0.130	0.014
137	11.42	0.63	0.144	(0.463)	0.130	0.014
138	11.50	0.63	0.144	(0.460)	0.130	0.014
139	11.58	0.57	0.129	(0.458)	0.116	0.013
140	11.67	0.57	0.129	(0.456)	0.116	0.013
141	11.75	0.57	0.129	(0.453)	0.116	0.013
142	11.83	0.60	0.137	(0.451)	0.123	0.014

143	11.92	0.60	0.137	(0.449)	0.123	0.014
144	12.00	0.60	0.137	(0.447)	0.123	0.014
145	12.08	0.83	0.190	(0.444)	0.171	0.019
146	12.17	0.83	0.190	(0.442)	0.171	0.019
147	12.25	0.83	0.190	(0.440)	0.171	0.019
148	12.33	0.87	0.198	(0.438)	0.178	0.020
149	12.42	0.87	0.198	(0.436)	0.178	0.020
150	12.50	0.87	0.198	(0.433)	0.178	0.020
151	12.58	0.93	0.213	(0.431)	0.192	0.021
152	12.67	0.93	0.213	(0.429)	0.192	0.021
153	12.75	0.93	0.213	(0.427)	0.192	0.021
154	12.83	0.97	0.220	(0.425)	0.198	0.022
155	12.92	0.97	0.220	(0.423)	0.198	0.022
156	13.00	0.97	0.220	(0.420)	0.198	0.022
157	13.08	1.13	0.258	(0.418)	0.233	0.026
158	13.17	1.13	0.258	(0.416)	0.233	0.026
159	13.25	1.13	0.258	(0.414)	0.233	0.026
160	13.33	1.13	0.258	(0.412)	0.233	0.026
161	13.42	1.13	0.258	(0.410)	0.233	0.026
162	13.50	1.13	0.258	(0.408)	0.233	0.026
163	13.58	0.77	0.175	(0.406)	0.157	0.017
164	13.67	0.77	0.175	(0.404)	0.157	0.017
165	13.75	0.77	0.175	(0.402)	0.157	0.017
166	13.83	0.77	0.175	(0.400)	0.157	0.017
167	13.92	0.77	0.175	(0.398)	0.157	0.017
168	14.00	0.77	0.175	(0.395)	0.157	0.017
169	14.08	0.90	0.205	(0.393)	0.185	0.021
170	14.17	0.90	0.205	(0.391)	0.185	0.021
171	14.25	0.90	0.205	(0.389)	0.185	0.021
172	14.33	0.87	0.198	(0.387)	0.178	0.020
173	14.42	0.87	0.198	(0.385)	0.178	0.020
174	14.50	0.87	0.198	(0.384)	0.178	0.020
175	14.58	0.87	0.198	(0.382)	0.178	0.020
176	14.67	0.87	0.198	(0.380)	0.178	0.020
177	14.75	0.87	0.198	(0.378)	0.178	0.020
178	14.83	0.83	0.190	(0.376)	0.171	0.019
179	14.92	0.83	0.190	(0.374)	0.171	0.019
180	15.00	0.83	0.190	(0.372)	0.171	0.019
181	15.08	0.80	0.182	(0.370)	0.164	0.018
182	15.17	0.80	0.182	(0.368)	0.164	0.018
183	15.25	0.80	0.182	(0.366)	0.164	0.018
184	15.33	0.77	0.175	(0.364)	0.157	0.017
185	15.42	0.77	0.175	(0.362)	0.157	0.017
186	15.50	0.77	0.175	(0.361)	0.157	0.017
187	15.58	0.63	0.144	(0.359)	0.130	0.014
188	15.67	0.63	0.144	(0.357)	0.130	0.014
189	15.75	0.63	0.144	(0.355)	0.130	0.014
190	15.83	0.63	0.144	(0.353)	0.130	0.014
191	15.92	0.63	0.144	(0.351)	0.130	0.014
192	16.00	0.63	0.144	(0.350)	0.130	0.014
193	16.08	0.13	0.030	(0.348)	0.027	0.003
194	16.17	0.13	0.030	(0.346)	0.027	0.003
195	16.25	0.13	0.030	(0.344)	0.027	0.003
196	16.33	0.13	0.030	(0.343)	0.027	0.003
197	16.42	0.13	0.030	(0.341)	0.027	0.003
198	16.50	0.13	0.030	(0.339)	0.027	0.003
199	16.58	0.10	0.023	(0.337)	0.021	0.002
200	16.67	0.10	0.023	(0.336)	0.021	0.002
201	16.75	0.10	0.023	(0.334)	0.021	0.002
202	16.83	0.10	0.023	(0.332)	0.021	0.002
203	16.92	0.10	0.023	(0.331)	0.021	0.002
204	17.00	0.10	0.023	(0.329)	0.021	0.002
205	17.08	0.17	0.038	(0.327)	0.034	0.004
206	17.17	0.17	0.038	(0.326)	0.034	0.004
207	17.25	0.17	0.038	(0.324)	0.034	0.004
208	17.33	0.17	0.038	(0.322)	0.034	0.004
209	17.42	0.17	0.038	(0.321)	0.034	0.004
210	17.50	0.17	0.038	(0.319)	0.034	0.004
211	17.58	0.17	0.038	(0.317)	0.034	0.004
212	17.67	0.17	0.038	(0.316)	0.034	0.004
213	17.75	0.17	0.038	(0.314)	0.034	0.004
214	17.83	0.13	0.030	(0.313)	0.027	0.003
215	17.92	0.13	0.030	(0.311)	0.027	0.003
216	18.00	0.13	0.030	(0.310)	0.027	0.003
217	18.08	0.13	0.030	(0.308)	0.027	0.003
218	18.17	0.13	0.030	(0.307)	0.027	0.003
219	18.25	0.13	0.030	(0.305)	0.027	0.003
220	18.33	0.13	0.030	(0.304)	0.027	0.003
221	18.42	0.13	0.030	(0.302)	0.027	0.003

222	18.50	0.13	0.030	(	0.301)	0.027	0.003
223	18.58	0.10	0.023	(	0.299)	0.021	0.002
224	18.67	0.10	0.023	(	0.298)	0.021	0.002
225	18.75	0.10	0.023	(	0.296)	0.021	0.002
226	18.83	0.07	0.015	(	0.295)	0.014	0.002
227	18.92	0.07	0.015	(	0.294)	0.014	0.002
228	19.00	0.07	0.015	(	0.292)	0.014	0.002
229	19.08	0.10	0.023	(	0.291)	0.021	0.002
230	19.17	0.10	0.023	(	0.289)	0.021	0.002
231	19.25	0.10	0.023	(	0.288)	0.021	0.002
232	19.33	0.13	0.030	(	0.287)	0.027	0.003
233	19.42	0.13	0.030	(	0.285)	0.027	0.003
234	19.50	0.13	0.030	(	0.284)	0.027	0.003
235	19.58	0.10	0.023	(	0.283)	0.021	0.002
236	19.67	0.10	0.023	(	0.281)	0.021	0.002
237	19.75	0.10	0.023	(	0.280)	0.021	0.002
238	19.83	0.07	0.015	(	0.279)	0.014	0.002
239	19.92	0.07	0.015	(	0.278)	0.014	0.002
240	20.00	0.07	0.015	(	0.276)	0.014	0.002
241	20.08	0.10	0.023	(	0.275)	0.021	0.002
242	20.17	0.10	0.023	(	0.274)	0.021	0.002
243	20.25	0.10	0.023	(	0.273)	0.021	0.002
244	20.33	0.10	0.023	(	0.272)	0.021	0.002
245	20.42	0.10	0.023	(	0.271)	0.021	0.002
246	20.50	0.10	0.023	(	0.269)	0.021	0.002
247	20.58	0.10	0.023	(	0.268)	0.021	0.002
248	20.67	0.10	0.023	(	0.267)	0.021	0.002
249	20.75	0.10	0.023	(	0.266)	0.021	0.002
250	20.83	0.07	0.015	(	0.265)	0.014	0.002
251	20.92	0.07	0.015	(	0.264)	0.014	0.002
252	21.00	0.07	0.015	(	0.263)	0.014	0.002
253	21.08	0.10	0.023	(	0.262)	0.021	0.002
254	21.17	0.10	0.023	(	0.261)	0.021	0.002
255	21.25	0.10	0.023	(	0.260)	0.021	0.002
256	21.33	0.07	0.015	(	0.259)	0.014	0.002
257	21.42	0.07	0.015	(	0.258)	0.014	0.002
258	21.50	0.07	0.015	(	0.257)	0.014	0.002
259	21.58	0.10	0.023	(	0.256)	0.021	0.002
260	21.67	0.10	0.023	(	0.255)	0.021	0.002
261	21.75	0.10	0.023	(	0.254)	0.021	0.002
262	21.83	0.07	0.015	(	0.253)	0.014	0.002
263	21.92	0.07	0.015	(	0.252)	0.014	0.002
264	22.00	0.07	0.015	(	0.251)	0.014	0.002
265	22.08	0.10	0.023	(	0.251)	0.021	0.002
266	22.17	0.10	0.023	(	0.250)	0.021	0.002
267	22.25	0.10	0.023	(	0.249)	0.021	0.002
268	22.33	0.07	0.015	(	0.248)	0.014	0.002
269	22.42	0.07	0.015	(	0.247)	0.014	0.002
270	22.50	0.07	0.015	(	0.247)	0.014	0.002
271	22.58	0.07	0.015	(	0.246)	0.014	0.002
272	22.67	0.07	0.015	(	0.245)	0.014	0.002
273	22.75	0.07	0.015	(	0.245)	0.014	0.002
274	22.83	0.07	0.015	(	0.244)	0.014	0.002
275	22.92	0.07	0.015	(	0.243)	0.014	0.002
276	23.00	0.07	0.015	(	0.243)	0.014	0.002
277	23.08	0.07	0.015	(	0.242)	0.014	0.002
278	23.17	0.07	0.015	(	0.242)	0.014	0.002
279	23.25	0.07	0.015	(	0.241)	0.014	0.002
280	23.33	0.07	0.015	(	0.241)	0.014	0.002
281	23.42	0.07	0.015	(	0.240)	0.014	0.002
282	23.50	0.07	0.015	(	0.240)	0.014	0.002
283	23.58	0.07	0.015	(	0.239)	0.014	0.002
284	23.67	0.07	0.015	(	0.239)	0.014	0.002
285	23.75	0.07	0.015	(	0.239)	0.014	0.002
286	23.83	0.07	0.015	(	0.238)	0.014	0.002
287	23.92	0.07	0.015	(	0.238)	0.014	0.002
288	24.00	0.07	0.015	(	0.238)	0.014	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.3

Flood volume = Effective rainfall 0.19(In)
times area 12.4(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 1.71(In)
Total soil loss = 1.760(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 8517.6 Cubic Feet
Total soil loss = 76658.3 Cubic Feet

Peak flow rate of this hydrograph = 0.322(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q	|	|	|	|
0+10	0.0003	0.02	Q	|	|	|	|
0+15	0.0004	0.02	Q	|	|	|	|
0+20	0.0006	0.03	Q	|	|	|	|
0+25	0.0008	0.03	Q	|	|	|	|
0+30	0.0010	0.03	Q	|	|	|	|
0+35	0.0012	0.03	Q	|	|	|	|
0+40	0.0014	0.03	Q	|	|	|	|
0+45	0.0016	0.03	Q	|	|	|	|
0+50	0.0018	0.04	Q	|	|	|	|
0+55	0.0021	0.04	Q	|	|	|	|
1+ 0	0.0023	0.04	Q	|	|	|	|
1+ 5	0.0025	0.03	Q	|	|	|	|
1+10	0.0027	0.03	Q	|	|	|	|
1+15	0.0029	0.03	Q	|	|	|	|
1+20	0.0031	0.03	Q	|	|	|	|
1+25	0.0033	0.03	Q	|	|	|	|
1+30	0.0035	0.03	Q	|	|	|	|
1+35	0.0037	0.03	Q	|	|	|	|
1+40	0.0039	0.03	Q	|	|	|	|
1+45	0.0041	0.03	Q	|	|	|	|
1+50	0.0044	0.04	Q	|	|	|	|
1+55	0.0046	0.04	Q	|	|	|	|
2+ 0	0.0049	0.04	QV	|	|	|	|
2+ 5	0.0051	0.04	QV	|	|	|	|
2+10	0.0054	0.04	QV	|	|	|	|
2+15	0.0057	0.04	QV	|	|	|	|
2+20	0.0059	0.04	QV	|	|	|	|
2+25	0.0062	0.04	QV	|	|	|	|
2+30	0.0065	0.04	QV	|	|	|	|
2+35	0.0068	0.05	QV	|	|	|	|
2+40	0.0071	0.05	QV	|	|	|	|
2+45	0.0074	0.05	QV	|	|	|	|
2+50	0.0078	0.05	QV	|	|	|	|
2+55	0.0081	0.05	QV	|	|	|	|
3+ 0	0.0084	0.05	QV	|	|	|	|
3+ 5	0.0087	0.05	QV	|	|	|	|
3+10	0.0091	0.05	QV	|	|	|	|
3+15	0.0094	0.05	QV	|	|	|	|
3+20	0.0097	0.05	QV	|	|	|	|
3+25	0.0100	0.05	Q V	|	|	|	|
3+30	0.0104	0.05	Q V	|	|	|	|
3+35	0.0107	0.05	Q V	|	|	|	|
3+40	0.0110	0.05	Q V	|	|	|	|
3+45	0.0113	0.05	Q V	|	|	|	|
3+50	0.0117	0.06	Q V	|	|	|	|
3+55	0.0121	0.06	Q V	|	|	|	|
4+ 0	0.0125	0.06	Q V	|	|	|	|
4+ 5	0.0129	0.06	Q V	|	|	|	|
4+10	0.0133	0.06	Q V	|	|	|	|
4+15	0.0137	0.06	Q V	|	|	|	|
4+20	0.0141	0.07	Q V	|	|	|	|
4+25	0.0146	0.07	Q V	|	|	|	|
4+30	0.0151	0.07	Q V	|	|	|	|
4+35	0.0155	0.07	Q V	|	|	|	|
4+40	0.0160	0.07	Q V	|	|	|	|
4+45	0.0164	0.07	Q V	|	|	|	|
4+50	0.0169	0.08	Q V	|	|	|	|
4+55	0.0175	0.08	Q V	|	|	|	|
5+ 0	0.0180	0.08	Q V	|	|	|	|
5+ 5	0.0184	0.06	Q V	|	|	|	|
5+10	0.0188	0.06	Q V	|	|	|	|
5+15	0.0192	0.06	Q V	|	|	|	|
5+20	0.0196	0.07	Q V	|	|	|	|
5+25	0.0201	0.07	Q V	|	|	|	|
5+30	0.0205	0.07	Q V	|	|	|	|
5+35	0.0211	0.08	Q V	|	|	|	|
5+40	0.0216	0.08	Q V	|	|	|	|
5+45	0.0221	0.08	Q V	|	|	|	|
5+50	0.0226	0.08	Q V	|	|	|	|

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 5+55       0.0231      0.08  Q   V     |         |         |         |
 6+ 0       0.0237      0.08  Q   V     |         |         |         |
 6+ 5       0.0242      0.09  Q   V     |         |         |         |
 6+10       0.0248      0.09  Q    V    |         |         |         |
 6+15       0.0254      0.09  Q    V    |         |         |         |
 6+20       0.0260      0.09  Q    V    |         |         |         |
 6+25       0.0266      0.09  Q    V    |         |         |         |
 6+30       0.0272      0.09  Q    V    |         |         |         |
 6+35       0.0278      0.09  Q    V    |         |         |         |
 6+40       0.0285      0.09  Q    V    |         |         |         |
 6+45       0.0291      0.09  Q    V    |         |         |         |
 6+50       0.0298      0.09  Q     V   |         |         |         |
 6+55       0.0304      0.09  Q     V   |         |         |         |
 7+ 0       0.0311      0.09  Q     V   |         |         |         |
 7+ 5       0.0317      0.09  Q     V   |         |         |         |
 7+10       0.0324      0.09  Q     V   |         |         |         |
 7+15       0.0330      0.09  Q     V   |         |         |         |
 7+20       0.0338      0.10  Q     V   |         |         |         |
 7+25       0.0345      0.10  Q      V  |         |         |         |
 7+30       0.0352      0.10  Q      V  |         |         |         |
 7+35       0.0360      0.11  Q      V  |         |         |         |
 7+40       0.0368      0.11  Q      V  |         |         |         |
 7+45       0.0375      0.11  Q      V  |         |         |         |
 7+50       0.0384      0.12  Q      V  |         |         |         |
 7+55       0.0392      0.12  Q       V |         |         |         |
 8+ 0       0.0401      0.12  Q       V |         |         |         |
 8+ 5       0.0411      0.14  Q       V |         |         |         |
 8+10       0.0420      0.14  Q       V |         |         |         |
 8+15       0.0430      0.14  Q       V |         |         |         |
 8+20       0.0440      0.14  Q        V|         |         |         |
 8+25       0.0450      0.14  Q        V|         |         |         |
 8+30       0.0460      0.14  Q        V|         |         |         |
 8+35       0.0470      0.15  Q        V|         |         |         |
 8+40       0.0480      0.15  Q        V|         |         |         |
 8+45       0.0491      0.15  Q         V         |         |         |
 8+50       0.0502      0.16  Q         V         |         |         |
 8+55       0.0513      0.16  Q         V         |         |         |
 9+ 0       0.0524      0.16  Q         V         |         |         |
 9+ 5       0.0536      0.18  Q         V         |         |         |
 9+10       0.0549      0.18  Q         |V        |         |         |
 9+15       0.0561      0.18  Q         |V        |         |         |
 9+20       0.0574      0.19  Q         |V        |         |         |
 9+25       0.0587      0.19  Q         | V       |         |         |
 9+30       0.0600      0.19  Q         | V       |         |         |
 9+35       0.0614      0.20  Q         | V       |         |         |
 9+40       0.0628      0.20  Q         | V       |         |         |
 9+45       0.0641      0.20  Q         |  V      |         |         |
 9+50       0.0656      0.21  Q         |  V      |         |         |
 9+55       0.0670      0.21  Q         |  V      |         |         |
10+ 0       0.0684      0.21  Q         |   V     |         |         |
10+ 5       0.0694      0.14  Q         |   V     |         |         |
10+10       0.0704      0.14  Q         |   V     |         |         |
10+15       0.0714      0.14  Q         |   V     |         |         |
10+20       0.0723      0.14  Q         |   V     |         |         |
10+25       0.0733      0.14  Q         |    V    |         |         |
10+30       0.0743      0.14  Q         |    V    |         |         |
10+35       0.0756      0.19  Q         |    V    |         |         |
10+40       0.0769      0.19  Q         |    V    |         |         |
10+45       0.0782      0.19  Q         |     V   |         |         |
10+50       0.0795      0.19  Q         |     V   |         |         |
10+55       0.0808      0.19  Q         |     V   |         |         |
11+ 0       0.0821      0.19  Q         |     V   |         |         |
11+ 5       0.0834      0.18  Q         |      V  |         |         |
11+10       0.0846      0.18  Q         |      V  |         |         |
11+15       0.0858      0.18  Q         |      V  |         |         |
11+20       0.0871      0.18  Q         |      V  |         |         |
11+25       0.0883      0.18  Q         |       V |         |         |
11+30       0.0896      0.18  Q         |       V |         |         |
11+35       0.0907      0.16  Q         |       V |         |         |
11+40       0.0918      0.16  Q         |       V |         |         |
11+45       0.0929      0.16  Q         |        V|         |         |
11+50       0.0941      0.17  Q         |        V|         |         |
11+55       0.0952      0.17  Q         |        V|         |         |
12+ 0       0.0964      0.17  Q         |        V|         |         |
12+ 5       0.0980      0.24  Q         |         V         |         |
12+10       0.0997      0.24  Q         |         V         |         |
12+15       0.1013      0.24  Q         |         V         |         |
12+20       0.1030      0.25  Q         |         |V        |         |
12+25       0.1047      0.25  Q         |         |V        |         |
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12+30       0.1064      0.25  Q         |         |V        |         |
12+35       0.1082      0.26  |Q        |         | V       |         |
12+40       0.1100      0.26  |Q        |         | V       |         |
12+45       0.1118      0.26  |Q        |         | V       |         |
12+50       0.1137      0.27  |Q        |         |  V      |         |
12+55       0.1156      0.27  |Q        |         |  V      |         |
13+ 0       0.1175      0.27  |Q        |         |   V     |         |
13+ 5       0.1197      0.32  |Q        |         |   V     |         |
13+10       0.1219      0.32  |Q        |         |   V     |         |
13+15       0.1242      0.32  |Q        |         |    V    |         |
13+20       0.1264      0.32  |Q        |         |    V    |         |
13+25       0.1286      0.32  |Q        |         |     V   |         |
13+30       0.1308      0.32  |Q        |         |     V   |         |
13+35       0.1323      0.22  Q         |         |      V  |         |
13+40       0.1338      0.22  Q         |         |      V  |         |
13+45       0.1353      0.22  Q         |         |      V  |         |
13+50       0.1368      0.22  Q         |         |      V  |         |
13+55       0.1383      0.22  Q         |         |       V |         |
14+ 0       0.1398      0.22  Q         |         |       V |         |
14+ 5       0.1416      0.26  |Q        |         |       V |         |
14+10       0.1433      0.26  |Q        |         |        V|         |
14+15       0.1451      0.26  |Q        |         |        V|         |
14+20       0.1468      0.25  Q         |         |         V         |
14+25       0.1485      0.25  Q         |         |         V         |
14+30       0.1502      0.25  Q         |         |         V         |
14+35       0.1519      0.25  Q         |         |         |V        |
14+40       0.1536      0.25  Q         |         |         |V        |
14+45       0.1553      0.25  Q         |         |         |V        |
14+50       0.1569      0.24  Q         |         |         | V       |
14+55       0.1585      0.24  Q         |         |         | V       |
15+ 0       0.1601      0.24  Q         |         |         | V       |
15+ 5       0.1617      0.23  Q         |         |         |  V      |
15+10       0.1633      0.23  Q         |         |         |  V      |
15+15       0.1648      0.23  Q         |         |         |  V      |
15+20       0.1663      0.22  Q         |         |         |   V     |
15+25       0.1678      0.22  Q         |         |         |   V     |
15+30       0.1693      0.22  Q         |         |         |   V     |
15+35       0.1706      0.18  Q         |         |         |   V     |
15+40       0.1718      0.18  Q         |         |         |    V    |
15+45       0.1731      0.18  Q         |         |         |    V    |
15+50       0.1743      0.18  Q         |         |         |    V    |
15+55       0.1755      0.18  Q         |         |         |    V    |
16+ 0       0.1768      0.18  Q         |         |         |     V   |
16+ 5       0.1770      0.04  Q         |         |         |     V   |
16+10       0.1773      0.04  Q         |         |         |     V   |
16+15       0.1775      0.04  Q         |         |         |     V   |
16+20       0.1778      0.04  Q         |         |         |     V   |
16+25       0.1781      0.04  Q         |         |         |     V   |
16+30       0.1783      0.04  Q         |         |         |     V   |
16+35       0.1785      0.03  Q         |         |         |     V   |
16+40       0.1787      0.03  Q         |         |         |     V   |
16+45       0.1789      0.03  Q         |         |         |     V   |
16+50       0.1791      0.03  Q         |         |         |     V   |
16+55       0.1793      0.03  Q         |         |         |     V   |
17+ 0       0.1795      0.03  Q         |         |         |     V   |
17+ 5       0.1798      0.05  Q         |         |         |     V   |
17+10       0.1802      0.05  Q         |         |         |     V   |
17+15       0.1805      0.05  Q         |         |         |     V   |
17+20       0.1808      0.05  Q         |         |         |     V   |
17+25       0.1811      0.05  Q         |         |         |      V  |
17+30       0.1815      0.05  Q         |         |         |      V  |
17+35       0.1818      0.05  Q         |         |         |      V  |
17+40       0.1821      0.05  Q         |         |         |      V  |
17+45       0.1824      0.05  Q         |         |         |      V  |
17+50       0.1827      0.04  Q         |         |         |      V  |
17+55       0.1830      0.04  Q         |         |         |      V  |
18+ 0       0.1832      0.04  Q         |         |         |      V  |
18+ 5       0.1835      0.04  Q         |         |         |      V  |
18+10       0.1837      0.04  Q         |         |         |      V  |
18+15       0.1840      0.04  Q         |         |         |      V  |
18+20       0.1843      0.04  Q         |         |         |      V  |
18+25       0.1845      0.04  Q         |         |         |      V  |
18+30       0.1848      0.04  Q         |         |         |      V  |
18+35       0.1850      0.03  Q         |         |         |      V  |
18+40       0.1852      0.03  Q         |         |         |      V  |
18+45       0.1854      0.03  Q         |         |         |      V  |
18+50       0.1855      0.02  Q         |         |         |      V  |
18+55       0.1856      0.02  Q         |         |         |      V  |
19+ 0       0.1858      0.02  Q         |         |         |       V |
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 19+ 5       0.1860      0.03  Q         |         |         |       V |
 19+10       0.1862      0.03  Q         |         |         |       V |
 19+15       0.1863      0.03  Q         |         |         |       V |
 19+20       0.1866      0.04  Q         |         |         |       V |
 19+25       0.1869      0.04  Q         |         |         |       V |
 19+30       0.1871      0.04  Q         |         |         |       V |
 19+35       0.1873      0.03  Q         |         |         |       V |
 19+40       0.1875      0.03  Q         |         |         |       V |
 19+45       0.1877      0.03  Q         |         |         |       V |
 19+50       0.1878      0.02  Q         |         |         |       V |
 19+55       0.1880      0.02  Q         |         |         |       V |
 20+ 0       0.1881      0.02  Q         |         |         |       V |
 20+ 5       0.1883      0.03  Q         |         |         |       V |
 20+10       0.1885      0.03  Q         |         |         |       V |
 20+15       0.1887      0.03  Q         |         |         |       V |
 20+20       0.1889      0.03  Q         |         |         |       V |
 20+25       0.1891      0.03  Q         |         |         |       V |
 20+30       0.1893      0.03  Q         |         |         |       V |
 20+35       0.1895      0.03  Q         |         |         |       V |
 20+40       0.1897      0.03  Q         |         |         |       V |
 20+45       0.1899      0.03  Q         |         |         |       V |
 20+50       0.1900      0.02  Q         |         |         |       V |
 20+55       0.1901      0.02  Q         |         |         |       V |
 21+ 0       0.1903      0.02  Q         |         |         |       V |
 21+ 5       0.1905      0.03  Q         |         |         |       V |
 21+10       0.1906      0.03  Q         |         |         |        V|
 21+15       0.1908      0.03  Q         |         |         |        V|
 21+20       0.1910      0.02  Q         |         |         |        V|
 21+25       0.1911      0.02  Q         |         |         |        V|
 21+30       0.1912      0.02  Q         |         |         |        V|
 21+35       0.1914      0.03  Q         |         |         |        V|
 21+40       0.1916      0.03  Q         |         |         |        V|
 21+45       0.1918      0.03  Q         |         |         |        V|
 21+50       0.1920      0.02  Q         |         |         |        V|
 21+55       0.1921      0.02  Q         |         |         |        V|
 22+ 0       0.1922      0.02  Q         |         |         |        V|
 22+ 5       0.1924      0.03  Q         |         |         |        V|
 22+10       0.1926      0.03  Q         |         |         |        V|
 22+15       0.1928      0.03  Q         |         |         |        V|
 22+20       0.1929      0.02  Q         |         |         |        V|
 22+25       0.1931      0.02  Q         |         |         |        V|
 22+30       0.1932      0.02  Q         |         |         |        V|
 22+35       0.1933      0.02  Q         |         |         |        V|
 22+40       0.1935      0.02  Q         |         |         |        V|
 22+45       0.1936      0.02  Q         |         |         |        V|
 22+50       0.1937      0.02  Q         |         |         |        V|
 22+55       0.1938      0.02  Q         |         |         |        V|
 23+ 0       0.1940      0.02  Q         |         |         |        V|
 23+ 5       0.1941      0.02  Q         |         |         |        V|
 23+10       0.1942      0.02  Q         |         |         |        V|
 23+15       0.1944      0.02  Q         |         |         |        V|
 23+20       0.1945      0.02  Q         |         |         |        V|
 23+25       0.1946      0.02  Q         |         |         |        V|
 23+30       0.1948      0.02  Q         |         |         |        V|
 23+35       0.1949      0.02  Q         |         |         |        V|
 23+40       0.1950      0.02  Q         |         |         |        V|
 23+45       0.1951      0.02  Q         |         |         |        V|
 23+50       0.1953      0.02  Q         |         |         |        V|
 23+55       0.1954      0.02  Q         |         |         |        V|
 24+ 0       0.1955      0.02  Q         |         |         |         V
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POST-CONDITION HYDROGRAPH (DMA B)

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

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                Study date  04/21/23 File: 4118prb2242.out


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


Program License Serial Number 6400

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

 English Units used in output format



----------------------------------------------------------------------
LOVETT MENIFEE LOGISTICS - RIVERSIDE COUNTY
PROPOSED CONDITION - BUILDING 2
HYDROLOGIC ANALYSIS - 2-YEAR

---------------------------------------------------------------------
Drainage Area =      12.35(Ac.)  =      0.019 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      12.35(Ac.)  =      0.019 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.000 Hr.
Lag time =     0.00 Min.
25% of lag time =     0.00 Min.
40% of lag time =     0.00 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       12.35            1.90                  23.47

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       12.35            5.00                  61.75

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.900(In)
Area Averaged 100-Year Rainfall =    5.000(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 %
    12.350           69.00         0.900
 Total Area Entered =     12.35(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  49.8      0.574     0.900        0.109       1.000      0.109
                                                  Sum (F) =   0.109
Area averaged mean soil loss (F) (In/Hr) =  0.109
Minimum soil loss rate ((In/Hr)) =  0.055
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.100
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                U n i t  H y d r o g r a p h
                        VALLEY S-Curve
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Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1 0.083	1.#IO	100.000	12.446
		Sum = 100.000	Sum= 12.446

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	(0.193)	0.002	0.014
2	0.17	0.07	0.015	(0.193)	0.002	0.014
3	0.25	0.07	0.015	(0.192)	0.002	0.014
4	0.33	0.10	0.023	(0.191)	0.002	0.021
5	0.42	0.10	0.023	(0.190)	0.002	0.021
6	0.50	0.10	0.023	(0.190)	0.002	0.021
7	0.58	0.10	0.023	(0.189)	0.002	0.021
8	0.67	0.10	0.023	(0.188)	0.002	0.021
9	0.75	0.10	0.023	(0.187)	0.002	0.021
10	0.83	0.13	0.030	(0.187)	0.003	0.027
11	0.92	0.13	0.030	(0.186)	0.003	0.027
12	1.00	0.13	0.030	(0.185)	0.003	0.027
13	1.08	0.10	0.023	(0.184)	0.002	0.021
14	1.17	0.10	0.023	(0.184)	0.002	0.021
15	1.25	0.10	0.023	(0.183)	0.002	0.021
16	1.33	0.10	0.023	(0.182)	0.002	0.021
17	1.42	0.10	0.023	(0.182)	0.002	0.021
18	1.50	0.10	0.023	(0.181)	0.002	0.021
19	1.58	0.10	0.023	(0.180)	0.002	0.021
20	1.67	0.10	0.023	(0.179)	0.002	0.021
21	1.75	0.10	0.023	(0.179)	0.002	0.021
22	1.83	0.13	0.030	(0.178)	0.003	0.027
23	1.92	0.13	0.030	(0.177)	0.003	0.027
24	2.00	0.13	0.030	(0.176)	0.003	0.027
25	2.08	0.13	0.030	(0.176)	0.003	0.027
26	2.17	0.13	0.030	(0.175)	0.003	0.027
27	2.25	0.13	0.030	(0.174)	0.003	0.027
28	2.33	0.13	0.030	(0.174)	0.003	0.027
29	2.42	0.13	0.030	(0.173)	0.003	0.027
30	2.50	0.13	0.030	(0.172)	0.003	0.027
31	2.58	0.17	0.038	(0.172)	0.004	0.034
32	2.67	0.17	0.038	(0.171)	0.004	0.034
33	2.75	0.17	0.038	(0.170)	0.004	0.034
34	2.83	0.17	0.038	(0.169)	0.004	0.034
35	2.92	0.17	0.038	(0.169)	0.004	0.034
36	3.00	0.17	0.038	(0.168)	0.004	0.034
37	3.08	0.17	0.038	(0.167)	0.004	0.034
38	3.17	0.17	0.038	(0.167)	0.004	0.034
39	3.25	0.17	0.038	(0.166)	0.004	0.034
40	3.33	0.17	0.038	(0.165)	0.004	0.034
41	3.42	0.17	0.038	(0.165)	0.004	0.034
42	3.50	0.17	0.038	(0.164)	0.004	0.034
43	3.58	0.17	0.038	(0.163)	0.004	0.034
44	3.67	0.17	0.038	(0.162)	0.004	0.034
45	3.75	0.17	0.038	(0.162)	0.004	0.034
46	3.83	0.20	0.046	(0.161)	0.005	0.041
47	3.92	0.20	0.046	(0.160)	0.005	0.041
48	4.00	0.20	0.046	(0.160)	0.005	0.041
49	4.08	0.20	0.046	(0.159)	0.005	0.041
50	4.17	0.20	0.046	(0.158)	0.005	0.041
51	4.25	0.20	0.046	(0.158)	0.005	0.041
52	4.33	0.23	0.053	(0.157)	0.005	0.048
53	4.42	0.23	0.053	(0.156)	0.005	0.048
54	4.50	0.23	0.053	(0.156)	0.005	0.048
55	4.58	0.23	0.053	(0.155)	0.005	0.048
56	4.67	0.23	0.053	(0.154)	0.005	0.048
57	4.75	0.23	0.053	(0.154)	0.005	0.048
58	4.83	0.27	0.061	(0.153)	0.006	0.055
59	4.92	0.27	0.061	(0.152)	0.006	0.055
60	5.00	0.27	0.061	(0.152)	0.006	0.055
61	5.08	0.20	0.046	(0.151)	0.005	0.041
62	5.17	0.20	0.046	(0.150)	0.005	0.041
63	5.25	0.20	0.046	(0.150)	0.005	0.041

64	5.33	0.23	0.053	(0.149)	0.005	0.048
65	5.42	0.23	0.053	(0.148)	0.005	0.048
66	5.50	0.23	0.053	(0.148)	0.005	0.048
67	5.58	0.27	0.061	(0.147)	0.006	0.055
68	5.67	0.27	0.061	(0.147)	0.006	0.055
69	5.75	0.27	0.061	(0.146)	0.006	0.055
70	5.83	0.27	0.061	(0.145)	0.006	0.055
71	5.92	0.27	0.061	(0.145)	0.006	0.055
72	6.00	0.27	0.061	(0.144)	0.006	0.055
73	6.08	0.30	0.068	(0.143)	0.007	0.062
74	6.17	0.30	0.068	(0.143)	0.007	0.062
75	6.25	0.30	0.068	(0.142)	0.007	0.062
76	6.33	0.30	0.068	(0.141)	0.007	0.062
77	6.42	0.30	0.068	(0.141)	0.007	0.062
78	6.50	0.30	0.068	(0.140)	0.007	0.062
79	6.58	0.33	0.076	(0.140)	0.008	0.068
80	6.67	0.33	0.076	(0.139)	0.008	0.068
81	6.75	0.33	0.076	(0.138)	0.008	0.068
82	6.83	0.33	0.076	(0.138)	0.008	0.068
83	6.92	0.33	0.076	(0.137)	0.008	0.068
84	7.00	0.33	0.076	(0.136)	0.008	0.068
85	7.08	0.33	0.076	(0.136)	0.008	0.068
86	7.17	0.33	0.076	(0.135)	0.008	0.068
87	7.25	0.33	0.076	(0.135)	0.008	0.068
88	7.33	0.37	0.084	(0.134)	0.008	0.075
89	7.42	0.37	0.084	(0.133)	0.008	0.075
90	7.50	0.37	0.084	(0.133)	0.008	0.075
91	7.58	0.40	0.091	(0.132)	0.009	0.082
92	7.67	0.40	0.091	(0.131)	0.009	0.082
93	7.75	0.40	0.091	(0.131)	0.009	0.082
94	7.83	0.43	0.099	(0.130)	0.010	0.089
95	7.92	0.43	0.099	(0.130)	0.010	0.089
96	8.00	0.43	0.099	(0.129)	0.010	0.089
97	8.08	0.50	0.114	(0.128)	0.011	0.103
98	8.17	0.50	0.114	(0.128)	0.011	0.103
99	8.25	0.50	0.114	(0.127)	0.011	0.103
100	8.33	0.50	0.114	(0.127)	0.011	0.103
101	8.42	0.50	0.114	(0.126)	0.011	0.103
102	8.50	0.50	0.114	(0.125)	0.011	0.103
103	8.58	0.53	0.122	(0.125)	0.012	0.109
104	8.67	0.53	0.122	(0.124)	0.012	0.109
105	8.75	0.53	0.122	(0.124)	0.012	0.109
106	8.83	0.57	0.129	(0.123)	0.013	0.116
107	8.92	0.57	0.129	(0.123)	0.013	0.116
108	9.00	0.57	0.129	(0.122)	0.013	0.116
109	9.08	0.63	0.144	(0.121)	0.014	0.130
110	9.17	0.63	0.144	(0.121)	0.014	0.130
111	9.25	0.63	0.144	(0.120)	0.014	0.130
112	9.33	0.67	0.152	(0.120)	0.015	0.137
113	9.42	0.67	0.152	(0.119)	0.015	0.137
114	9.50	0.67	0.152	(0.119)	0.015	0.137
115	9.58	0.70	0.160	(0.118)	0.016	0.144
116	9.67	0.70	0.160	(0.117)	0.016	0.144
117	9.75	0.70	0.160	(0.117)	0.016	0.144
118	9.83	0.73	0.167	(0.116)	0.017	0.150
119	9.92	0.73	0.167	(0.116)	0.017	0.150
120	10.00	0.73	0.167	(0.115)	0.017	0.150
121	10.08	0.50	0.114	(0.115)	0.011	0.103
122	10.17	0.50	0.114	(0.114)	0.011	0.103
123	10.25	0.50	0.114	(0.113)	0.011	0.103
124	10.33	0.50	0.114	(0.113)	0.011	0.103
125	10.42	0.50	0.114	(0.112)	0.011	0.103
126	10.50	0.50	0.114	(0.112)	0.011	0.103
127	10.58	0.67	0.152	(0.111)	0.015	0.137
128	10.67	0.67	0.152	(0.111)	0.015	0.137
129	10.75	0.67	0.152	(0.110)	0.015	0.137
130	10.83	0.67	0.152	(0.110)	0.015	0.137
131	10.92	0.67	0.152	(0.109)	0.015	0.137
132	11.00	0.67	0.152	(0.109)	0.015	0.137
133	11.08	0.63	0.144	(0.108)	0.014	0.130
134	11.17	0.63	0.144	(0.108)	0.014	0.130
135	11.25	0.63	0.144	(0.107)	0.014	0.130
136	11.33	0.63	0.144	(0.106)	0.014	0.130
137	11.42	0.63	0.144	(0.106)	0.014	0.130
138	11.50	0.63	0.144	(0.105)	0.014	0.130
139	11.58	0.57	0.129	(0.105)	0.013	0.116
140	11.67	0.57	0.129	(0.104)	0.013	0.116
141	11.75	0.57	0.129	(0.104)	0.013	0.116
142	11.83	0.60	0.137	(0.103)	0.014	0.123

143	11.92	0.60	0.137	(0.103)	0.014	0.123
144	12.00	0.60	0.137	(0.102)	0.014	0.123
145	12.08	0.83	0.190	(0.102)	0.019	0.171
146	12.17	0.83	0.190	(0.101)	0.019	0.171
147	12.25	0.83	0.190	(0.101)	0.019	0.171
148	12.33	0.87	0.198	(0.100)	0.020	0.178
149	12.42	0.87	0.198	(0.100)	0.020	0.178
150	12.50	0.87	0.198	(0.099)	0.020	0.178
151	12.58	0.93	0.213	(0.099)	0.021	0.192
152	12.67	0.93	0.213	(0.098)	0.021	0.192
153	12.75	0.93	0.213	(0.098)	0.021	0.192
154	12.83	0.97	0.220	(0.097)	0.022	0.198
155	12.92	0.97	0.220	(0.097)	0.022	0.198
156	13.00	0.97	0.220	(0.096)	0.022	0.198
157	13.08	1.13	0.258	(0.096)	0.026	0.233
158	13.17	1.13	0.258	(0.095)	0.026	0.233
159	13.25	1.13	0.258	(0.095)	0.026	0.233
160	13.33	1.13	0.258	(0.094)	0.026	0.233
161	13.42	1.13	0.258	(0.094)	0.026	0.233
162	13.50	1.13	0.258	(0.093)	0.026	0.233
163	13.58	0.77	0.175	(0.093)	0.017	0.157
164	13.67	0.77	0.175	(0.092)	0.017	0.157
165	13.75	0.77	0.175	(0.092)	0.017	0.157
166	13.83	0.77	0.175	(0.092)	0.017	0.157
167	13.92	0.77	0.175	(0.091)	0.017	0.157
168	14.00	0.77	0.175	(0.091)	0.017	0.157
169	14.08	0.90	0.205	(0.090)	0.021	0.185
170	14.17	0.90	0.205	(0.090)	0.021	0.185
171	14.25	0.90	0.205	(0.089)	0.021	0.185
172	14.33	0.87	0.198	(0.089)	0.020	0.178
173	14.42	0.87	0.198	(0.088)	0.020	0.178
174	14.50	0.87	0.198	(0.088)	0.020	0.178
175	14.58	0.87	0.198	(0.087)	0.020	0.178
176	14.67	0.87	0.198	(0.087)	0.020	0.178
177	14.75	0.87	0.198	(0.086)	0.020	0.178
178	14.83	0.83	0.190	(0.086)	0.019	0.171
179	14.92	0.83	0.190	(0.086)	0.019	0.171
180	15.00	0.83	0.190	(0.085)	0.019	0.171
181	15.08	0.80	0.182	(0.085)	0.018	0.164
182	15.17	0.80	0.182	(0.084)	0.018	0.164
183	15.25	0.80	0.182	(0.084)	0.018	0.164
184	15.33	0.77	0.175	(0.083)	0.017	0.157
185	15.42	0.77	0.175	(0.083)	0.017	0.157
186	15.50	0.77	0.175	(0.083)	0.017	0.157
187	15.58	0.63	0.144	(0.082)	0.014	0.130
188	15.67	0.63	0.144	(0.082)	0.014	0.130
189	15.75	0.63	0.144	(0.081)	0.014	0.130
190	15.83	0.63	0.144	(0.081)	0.014	0.130
191	15.92	0.63	0.144	(0.080)	0.014	0.130
192	16.00	0.63	0.144	(0.080)	0.014	0.130
193	16.08	0.13	0.030	(0.080)	0.003	0.027
194	16.17	0.13	0.030	(0.079)	0.003	0.027
195	16.25	0.13	0.030	(0.079)	0.003	0.027
196	16.33	0.13	0.030	(0.078)	0.003	0.027
197	16.42	0.13	0.030	(0.078)	0.003	0.027
198	16.50	0.13	0.030	(0.078)	0.003	0.027
199	16.58	0.10	0.023	(0.077)	0.002	0.021
200	16.67	0.10	0.023	(0.077)	0.002	0.021
201	16.75	0.10	0.023	(0.076)	0.002	0.021
202	16.83	0.10	0.023	(0.076)	0.002	0.021
203	16.92	0.10	0.023	(0.076)	0.002	0.021
204	17.00	0.10	0.023	(0.075)	0.002	0.021
205	17.08	0.17	0.038	(0.075)	0.004	0.034
206	17.17	0.17	0.038	(0.075)	0.004	0.034
207	17.25	0.17	0.038	(0.074)	0.004	0.034
208	17.33	0.17	0.038	(0.074)	0.004	0.034
209	17.42	0.17	0.038	(0.073)	0.004	0.034
210	17.50	0.17	0.038	(0.073)	0.004	0.034
211	17.58	0.17	0.038	(0.073)	0.004	0.034
212	17.67	0.17	0.038	(0.072)	0.004	0.034
213	17.75	0.17	0.038	(0.072)	0.004	0.034
214	17.83	0.13	0.030	(0.072)	0.003	0.027
215	17.92	0.13	0.030	(0.071)	0.003	0.027
216	18.00	0.13	0.030	(0.071)	0.003	0.027
217	18.08	0.13	0.030	(0.071)	0.003	0.027
218	18.17	0.13	0.030	(0.070)	0.003	0.027
219	18.25	0.13	0.030	(0.070)	0.003	0.027
220	18.33	0.13	0.030	(0.070)	0.003	0.027
221	18.42	0.13	0.030	(0.069)	0.003	0.027

222	18.50	0.13	0.030	(	0.069)	0.003	0.027
223	18.58	0.10	0.023	(	0.069)	0.002	0.021
224	18.67	0.10	0.023	(	0.068)	0.002	0.021
225	18.75	0.10	0.023	(	0.068)	0.002	0.021
226	18.83	0.07	0.015	(	0.068)	0.002	0.014
227	18.92	0.07	0.015	(	0.067)	0.002	0.014
228	19.00	0.07	0.015	(	0.067)	0.002	0.014
229	19.08	0.10	0.023	(	0.067)	0.002	0.021
230	19.17	0.10	0.023	(	0.066)	0.002	0.021
231	19.25	0.10	0.023	(	0.066)	0.002	0.021
232	19.33	0.13	0.030	(	0.066)	0.003	0.027
233	19.42	0.13	0.030	(	0.065)	0.003	0.027
234	19.50	0.13	0.030	(	0.065)	0.003	0.027
235	19.58	0.10	0.023	(	0.065)	0.002	0.021
236	19.67	0.10	0.023	(	0.064)	0.002	0.021
237	19.75	0.10	0.023	(	0.064)	0.002	0.021
238	19.83	0.07	0.015	(	0.064)	0.002	0.014
239	19.92	0.07	0.015	(	0.064)	0.002	0.014
240	20.00	0.07	0.015	(	0.063)	0.002	0.014
241	20.08	0.10	0.023	(	0.063)	0.002	0.021
242	20.17	0.10	0.023	(	0.063)	0.002	0.021
243	20.25	0.10	0.023	(	0.062)	0.002	0.021
244	20.33	0.10	0.023	(	0.062)	0.002	0.021
245	20.42	0.10	0.023	(	0.062)	0.002	0.021
246	20.50	0.10	0.023	(	0.062)	0.002	0.021
247	20.58	0.10	0.023	(	0.061)	0.002	0.021
248	20.67	0.10	0.023	(	0.061)	0.002	0.021
249	20.75	0.10	0.023	(	0.061)	0.002	0.021
250	20.83	0.07	0.015	(	0.061)	0.002	0.014
251	20.92	0.07	0.015	(	0.060)	0.002	0.014
252	21.00	0.07	0.015	(	0.060)	0.002	0.014
253	21.08	0.10	0.023	(	0.060)	0.002	0.021
254	21.17	0.10	0.023	(	0.060)	0.002	0.021
255	21.25	0.10	0.023	(	0.059)	0.002	0.021
256	21.33	0.07	0.015	(	0.059)	0.002	0.014
257	21.42	0.07	0.015	(	0.059)	0.002	0.014
258	21.50	0.07	0.015	(	0.059)	0.002	0.014
259	21.58	0.10	0.023	(	0.059)	0.002	0.021
260	21.67	0.10	0.023	(	0.058)	0.002	0.021
261	21.75	0.10	0.023	(	0.058)	0.002	0.021
262	21.83	0.07	0.015	(	0.058)	0.002	0.014
263	21.92	0.07	0.015	(	0.058)	0.002	0.014
264	22.00	0.07	0.015	(	0.058)	0.002	0.014
265	22.08	0.10	0.023	(	0.057)	0.002	0.021
266	22.17	0.10	0.023	(	0.057)	0.002	0.021
267	22.25	0.10	0.023	(	0.057)	0.002	0.021
268	22.33	0.07	0.015	(	0.057)	0.002	0.014
269	22.42	0.07	0.015	(	0.057)	0.002	0.014
270	22.50	0.07	0.015	(	0.057)	0.002	0.014
271	22.58	0.07	0.015	(	0.056)	0.002	0.014
272	22.67	0.07	0.015	(	0.056)	0.002	0.014
273	22.75	0.07	0.015	(	0.056)	0.002	0.014
274	22.83	0.07	0.015	(	0.056)	0.002	0.014
275	22.92	0.07	0.015	(	0.056)	0.002	0.014
276	23.00	0.07	0.015	(	0.056)	0.002	0.014
277	23.08	0.07	0.015	(	0.055)	0.002	0.014
278	23.17	0.07	0.015	(	0.055)	0.002	0.014
279	23.25	0.07	0.015	(	0.055)	0.002	0.014
280	23.33	0.07	0.015	(	0.055)	0.002	0.014
281	23.42	0.07	0.015	(	0.055)	0.002	0.014
282	23.50	0.07	0.015	(	0.055)	0.002	0.014
283	23.58	0.07	0.015	(	0.055)	0.002	0.014
284	23.67	0.07	0.015	(	0.055)	0.002	0.014
285	23.75	0.07	0.015	(	0.055)	0.002	0.014
286	23.83	0.07	0.015	(	0.055)	0.002	0.014
287	23.92	0.07	0.015	(	0.055)	0.002	0.014
288	24.00	0.07	0.015	(	0.055)	0.002	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 20.5

Flood volume = Effective rainfall 1.71(In)
times area 12.4(Ac.)/[(In)/(Ft.)] = 1.8(Ac.Ft)
Total soil loss = 0.19(In)
Total soil loss = 0.196(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 76658.3 Cubic Feet
Total soil loss = 8517.6 Cubic Feet

Peak flow rate of this hydrograph = 2.896(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0012	0.17	Q				
0+10	0.0023	0.17	Q				
0+15	0.0035	0.17	Q				
0+20	0.0053	0.26	VQ				
0+25	0.0070	0.26	VQ				
0+30	0.0088	0.26	VQ				
0+35	0.0106	0.26	VQ				
0+40	0.0123	0.26	VQ				
0+45	0.0141	0.26	VQ				
0+50	0.0164	0.34	VQ				
0+55	0.0188	0.34	VQ				
1+ 0	0.0211	0.34	VQ				
1+ 5	0.0229	0.26	VQ				
1+10	0.0246	0.26	VQ				
1+15	0.0264	0.26	VQ				
1+20	0.0282	0.26	VQ				
1+25	0.0299	0.26	VQ				
1+30	0.0317	0.26	VQ				
1+35	0.0334	0.26	VQ				
1+40	0.0352	0.26	VQ				
1+45	0.0370	0.26	VQ				
1+50	0.0393	0.34	VQ				
1+55	0.0416	0.34	VQ				
2+ 0	0.0440	0.34	VQ				
2+ 5	0.0463	0.34	|Q				
2+10	0.0487	0.34	|Q				
2+15	0.0510	0.34	|Q				
2+20	0.0534	0.34	|Q				
2+25	0.0557	0.34	|Q				
2+30	0.0581	0.34	|Q				
2+35	0.0610	0.43	|Q				
2+40	0.0639	0.43	|Q				
2+45	0.0669	0.43	|Q				
2+50	0.0698	0.43	|Q				
2+55	0.0727	0.43	|Q				
3+ 0	0.0757	0.43	|Q				
3+ 5	0.0786	0.43	|Q				
3+10	0.0815	0.43	|Q				
3+15	0.0845	0.43	|Q				
3+20	0.0874	0.43	|Q				
3+25	0.0903	0.43	|QV				
3+30	0.0933	0.43	|QV				
3+35	0.0962	0.43	|QV				
3+40	0.0991	0.43	|QV				
3+45	0.1021	0.43	|QV				
3+50	0.1056	0.51	| Q				
3+55	0.1091	0.51	| Q				
4+ 0	0.1126	0.51	| Q				
4+ 5	0.1161	0.51	| Q				
4+10	0.1197	0.51	| Q				
4+15	0.1232	0.51	| Q				
4+20	0.1273	0.60	| Q				
4+25	0.1314	0.60	| Q				
4+30	0.1355	0.60	| QV				
4+35	0.1396	0.60	| QV				
4+40	0.1437	0.60	| QV				
4+45	0.1478	0.60	| QV				
4+50	0.1525	0.68	| QV				
4+55	0.1572	0.68	| QV				
5+ 0	0.1619	0.68	| QV				
5+ 5	0.1654	0.51	| QV				
5+10	0.1689	0.51	| QV				
5+15	0.1725	0.51	| QV				
5+20	0.1766	0.60	| Q V				
5+25	0.1807	0.60	| Q V				
5+30	0.1848	0.60	| Q V				
5+35	0.1895	0.68	| Q V				
5+40	0.1942	0.68	| Q V				
5+45	0.1989	0.68	| Q V				
5+50	0.2036	0.68	| Q V				

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 5+55       0.2082      0.68  | Q V     |         |         |         |
 6+ 0       0.2129      0.68  | Q V     |         |         |         |
 6+ 5       0.2182      0.77  |  QV     |         |         |         |
 6+10       0.2235      0.77  |  Q V    |         |         |         |
 6+15       0.2288      0.77  |  Q V    |         |         |         |
 6+20       0.2341      0.77  |  Q V    |         |         |         |
 6+25       0.2393      0.77  |  Q V    |         |         |         |
 6+30       0.2446      0.77  |  Q V    |         |         |         |
 6+35       0.2505      0.85  |  Q V    |         |         |         |
 6+40       0.2563      0.85  |  Q V    |         |         |         |
 6+45       0.2622      0.85  |  Q V    |         |         |         |
 6+50       0.2681      0.85  |  Q  V   |         |         |         |
 6+55       0.2739      0.85  |  Q  V   |         |         |         |
 7+ 0       0.2798      0.85  |  Q  V   |         |         |         |
 7+ 5       0.2857      0.85  |  Q  V   |         |         |         |
 7+10       0.2915      0.85  |  Q  V   |         |         |         |
 7+15       0.2974      0.85  |  Q  V   |         |         |         |
 7+20       0.3039      0.94  |  Q  V   |         |         |         |
 7+25       0.3103      0.94  |  Q   V  |         |         |         |
 7+30       0.3168      0.94  |  Q   V  |         |         |         |
 7+35       0.3238      1.02  |   Q  V  |         |         |         |
 7+40       0.3308      1.02  |   Q  V  |         |         |         |
 7+45       0.3379      1.02  |   Q  V  |         |         |         |
 7+50       0.3455      1.11  |   Q  V  |         |         |         |
 7+55       0.3531      1.11  |   Q   V |         |         |         |
 8+ 0       0.3608      1.11  |   Q   V |         |         |         |
 8+ 5       0.3696      1.28  |    Q  V |         |         |         |
 8+10       0.3784      1.28  |    Q  V |         |         |         |
 8+15       0.3872      1.28  |    Q  V |         |         |         |
 8+20       0.3960      1.28  |    Q   V|         |         |         |
 8+25       0.4048      1.28  |    Q   V|         |         |         |
 8+30       0.4136      1.28  |    Q   V|         |         |         |
 8+35       0.4229      1.36  |    Q   V|         |         |         |
 8+40       0.4323      1.36  |    Q   V|         |         |         |
 8+45       0.4417      1.36  |    Q    V         |         |         |
 8+50       0.4517      1.45  |    Q    V         |         |         |
 8+55       0.4617      1.45  |    Q    V         |         |         |
 9+ 0       0.4716      1.45  |    Q    V         |         |         |
 9+ 5       0.4828      1.62  |     Q   V         |         |         |
 9+10       0.4939      1.62  |     Q   |V        |         |         |
 9+15       0.5051      1.62  |     Q   |V        |         |         |
 9+20       0.5168      1.70  |     Q   |V        |         |         |
 9+25       0.5285      1.70  |     Q   | V       |         |         |
 9+30       0.5403      1.70  |     Q   | V       |         |         |
 9+35       0.5526      1.79  |      Q  | V       |         |         |
 9+40       0.5649      1.79  |      Q  | V       |         |         |
 9+45       0.5772      1.79  |      Q  |  V      |         |         |
 9+50       0.5901      1.87  |      Q  |  V      |         |         |
 9+55       0.6030      1.87  |      Q  |  V      |         |         |
10+ 0       0.6159      1.87  |      Q  |   V     |         |         |
10+ 5       0.6247      1.28  |    Q    |   V     |         |         |
10+10       0.6335      1.28  |    Q    |   V     |         |         |
10+15       0.6423      1.28  |    Q    |   V     |         |         |
10+20       0.6511      1.28  |    Q    |   V     |         |         |
10+25       0.6599      1.28  |    Q    |    V    |         |         |
10+30       0.6687      1.28  |    Q    |    V    |         |         |
10+35       0.6805      1.70  |     Q   |    V    |         |         |
10+40       0.6922      1.70  |     Q   |    V    |         |         |
10+45       0.7039      1.70  |     Q   |     V   |         |         |
10+50       0.7157      1.70  |     Q   |     V   |         |         |
10+55       0.7274      1.70  |     Q   |     V   |         |         |
11+ 0       0.7391      1.70  |     Q   |     V   |         |         |
11+ 5       0.7503      1.62  |     Q   |      V  |         |         |
11+10       0.7614      1.62  |     Q   |      V  |         |         |
11+15       0.7726      1.62  |     Q   |      V  |         |         |
11+20       0.7837      1.62  |     Q   |      V  |         |         |
11+25       0.7949      1.62  |     Q   |       V |         |         |
11+30       0.8060      1.62  |     Q   |       V |         |         |
11+35       0.8160      1.45  |    Q    |       V |         |         |
11+40       0.8259      1.45  |    Q    |       V |         |         |
11+45       0.8359      1.45  |    Q    |        V|         |         |
11+50       0.8465      1.53  |     Q   |        V|         |         |
11+55       0.8570      1.53  |     Q   |        V|         |         |
12+ 0       0.8676      1.53  |     Q   |        V|         |         |
12+ 5       0.8823      2.13  |       Q |         V         |         |
12+10       0.8969      2.13  |       Q |         V         |         |
12+15       0.9116      2.13  |       Q |         V         |         |
12+20       0.9268      2.21  |       Q |         |V        |         |
12+25       0.9421      2.21  |       Q |         |V        |         |
```

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12+30      0.9573      2.21  |       Q |         |V        |         |
12+35      0.9738      2.38  |        Q|         | V       |         |
12+40      0.9902      2.38  |        Q|         | V       |         |
12+45      1.0066      2.38  |        Q|         | V       |         |
12+50      1.0236      2.47  |        Q|         |  V      |         |
12+55      1.0406      2.47  |        Q|         |  V      |         |
13+ 0      1.0577      2.47  |        Q|         |   V     |         |
13+ 5      1.0776      2.90  |         |Q        |   V     |         |
13+10      1.0975      2.90  |         |Q        |   V     |         |
13+15      1.1175      2.90  |         |Q        |    V    |         |
13+20      1.1374      2.90  |         |Q        |    V    |         |
13+25      1.1574      2.90  |         |Q        |     V   |         |
13+30      1.1773      2.90  |         |Q        |     V   |         |
13+35      1.1908      1.96  |      Q  |         |      V  |         |
13+40      1.2043      1.96  |      Q  |         |      V  |         |
13+45      1.2178      1.96  |      Q  |         |      V  |         |
13+50      1.2313      1.96  |      Q  |         |      V  |         |
13+55      1.2448      1.96  |      Q  |         |       V |         |
14+ 0      1.2583      1.96  |      Q  |         |       V |         |
14+ 5      1.2741      2.30  |        Q|         |       V |         |
14+10      1.2900      2.30  |        Q|         |        V|         |
14+15      1.3058      2.30  |        Q|         |        V|         |
14+20      1.3210      2.21  |       Q |         |         V         |
14+25      1.3363      2.21  |       Q |         |         V         |
14+30      1.3516      2.21  |       Q |         |         V         |
14+35      1.3668      2.21  |       Q |         |         |V        |
14+40      1.3821      2.21  |       Q |         |         |V        |
14+45      1.3973      2.21  |       Q |         |         |V        |
14+50      1.4120      2.13  |       Q |         |         | V       |
14+55      1.4266      2.13  |       Q |         |         | V       |
15+ 0      1.4413      2.13  |       Q |         |         | V       |
15+ 5      1.4554      2.04  |       Q |         |         |  V      |
15+10      1.4695      2.04  |       Q |         |         |  V      |
15+15      1.4835      2.04  |       Q |         |         |  V      |
15+20      1.4970      1.96  |      Q  |         |         |   V     |
15+25      1.5105      1.96  |      Q  |         |         |   V     |
15+30      1.5240      1.96  |      Q  |         |         |   V     |
15+35      1.5352      1.62  |     Q   |         |         |   V     |
15+40      1.5463      1.62  |     Q   |         |         |    V    |
15+45      1.5575      1.62  |     Q   |         |         |    V    |
15+50      1.5686      1.62  |     Q   |         |         |    V    |
15+55      1.5797      1.62  |     Q   |         |         |    V    |
16+ 0      1.5909      1.62  |     Q   |         |         |     V   |
16+ 5      1.5932      0.34  |Q        |         |         |     V   |
16+10      1.5956      0.34  |Q        |         |         |     V   |
16+15      1.5979      0.34  |Q        |         |         |     V   |
16+20      1.6003      0.34  |Q        |         |         |     V   |
16+25      1.6026      0.34  |Q        |         |         |     V   |
16+30      1.6050      0.34  |Q        |         |         |     V   |
16+35      1.6067      0.26  |Q        |         |         |     V   |
16+40      1.6085      0.26  |Q        |         |         |     V   |
16+45      1.6102      0.26  |Q        |         |         |     V   |
16+50      1.6120      0.26  |Q        |         |         |     V   |
16+55      1.6138      0.26  |Q        |         |         |     V   |
17+ 0      1.6155      0.26  |Q        |         |         |     V   |
17+ 5      1.6185      0.43  |Q        |         |         |     V   |
17+10      1.6214      0.43  |Q        |         |         |     V   |
17+15      1.6243      0.43  |Q        |         |         |     V   |
17+20      1.6273      0.43  |Q        |         |         |     V   |
17+25      1.6302      0.43  |Q        |         |         |      V  |
17+30      1.6331      0.43  |Q        |         |         |      V  |
17+35      1.6361      0.43  |Q        |         |         |      V  |
17+40      1.6390      0.43  |Q        |         |         |      V  |
17+45      1.6419      0.43  |Q        |         |         |      V  |
17+50      1.6443      0.34  |Q        |         |         |      V  |
17+55      1.6466      0.34  |Q        |         |         |      V  |
18+ 0      1.6490      0.34  |Q        |         |         |      V  |
18+ 5      1.6513      0.34  |Q        |         |         |      V  |
18+10      1.6537      0.34  |Q        |         |         |      V  |
18+15      1.6560      0.34  |Q        |         |         |      V  |
18+20      1.6583      0.34  |Q        |         |         |      V  |
18+25      1.6607      0.34  |Q        |         |         |      V  |
18+30      1.6630      0.34  |Q        |         |         |      V  |
18+35      1.6648      0.26  |Q        |         |         |      V  |
18+40      1.6666      0.26  |Q        |         |         |      V  |
18+45      1.6683      0.26  |Q        |         |         |      V  |
18+50      1.6695      0.17  Q         |         |         |      V  |
18+55      1.6707      0.17  Q         |         |         |      V  |
19+ 0      1.6718      0.17  Q         |         |         |       V |
```

Peak flow rate

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 19+ 5      1.6736      0.26  |Q        |         |         |       V |
 19+10      1.6754      0.26  |Q        |         |         |       V |
 19+15      1.6771      0.26  |Q        |         |         |       V |
 19+20      1.6795      0.34  |Q        |         |         |       V |
 19+25      1.6818      0.34  |Q        |         |         |       V |
 19+30      1.6842      0.34  |Q        |         |         |       V |
 19+35      1.6859      0.26  |Q        |         |         |       V |
 19+40      1.6877      0.26  |Q        |         |         |       V |
 19+45      1.6894      0.26  |Q        |         |         |       V |
 19+50      1.6906      0.17  Q         |         |         |       V |
 19+55      1.6918      0.17  Q         |         |         |       V |
 20+ 0      1.6930      0.17  Q         |         |         |       V |
 20+ 5      1.6947      0.26  |Q        |         |         |       V |
 20+10      1.6965      0.26  |Q        |         |         |       V |
 20+15      1.6982      0.26  |Q        |         |         |       V |
 20+20      1.7000      0.26  |Q        |         |         |       V |
 20+25      1.7018      0.26  |Q        |         |         |       V |
 20+30      1.7035      0.26  |Q        |         |         |       V |
 20+35      1.7053      0.26  |Q        |         |         |       V |
 20+40      1.7070      0.26  |Q        |         |         |       V |
 20+45      1.7088      0.26  |Q        |         |         |       V |
 20+50      1.7100      0.17  Q         |         |         |       V |
 20+55      1.7111      0.17  Q         |         |         |       V |
 21+ 0      1.7123      0.17  Q         |         |         |       V |
 21+ 5      1.7141      0.26  |Q        |         |         |       V |
 21+10      1.7158      0.26  |Q        |         |         |        V|
 21+15      1.7176      0.26  |Q        |         |         |        V|
 21+20      1.7188      0.17  Q         |         |         |        V|
 21+25      1.7199      0.17  Q         |         |         |        V|
 21+30      1.7211      0.17  Q         |         |         |        V|
 21+35      1.7229      0.26  |Q        |         |         |        V|
 21+40      1.7246      0.26  |Q        |         |         |        V|
 21+45      1.7264      0.26  |Q        |         |         |        V|
 21+50      1.7276      0.17  Q         |         |         |        V|
 21+55      1.7287      0.17  Q         |         |         |        V|
 22+ 0      1.7299      0.17  Q         |         |         |        V|
 22+ 5      1.7317      0.26  |Q        |         |         |        V|
 22+10      1.7334      0.26  |Q        |         |         |        V|
 22+15      1.7352      0.26  |Q        |         |         |        V|
 22+20      1.7364      0.17  Q         |         |         |        V|
 22+25      1.7375      0.17  Q         |         |         |        V|
 22+30      1.7387      0.17  Q         |         |         |        V|
 22+35      1.7399      0.17  Q         |         |         |        V|
 22+40      1.7411      0.17  Q         |         |         |        V|
 22+45      1.7422      0.17  Q         |         |         |        V|
 22+50      1.7434      0.17  Q         |         |         |        V|
 22+55      1.7446      0.17  Q         |         |         |        V|
 23+ 0      1.7458      0.17  Q         |         |         |        V|
 23+ 5      1.7469      0.17  Q         |         |         |        V|
 23+10      1.7481      0.17  Q         |         |         |        V|
 23+15      1.7493      0.17  Q         |         |         |        V|
 23+20      1.7504      0.17  Q         |         |         |        V|
 23+25      1.7516      0.17  Q         |         |         |        V|
 23+30      1.7528      0.17  Q         |         |         |        V|
 23+35      1.7540      0.17  Q         |         |         |        V|
 23+40      1.7551      0.17  Q         |         |         |        V|
 23+45      1.7563      0.17  Q         |         |         |        V|
 23+50      1.7575      0.17  Q         |         |         |        V|
 23+55      1.7587      0.17  Q         |         |         |        V|
 24+ 0      1.7598      0.17  Q         |         |         |         V
----------------------------------------------------------------------
```

2-year, 24-hour volume = 1.7598 ac-ft

Underground detention provided = 1.7633 ac-ft

The peak flow rate of 2.90 cfs is stored in the underground detention system.

Underground detention provided > 2-year, 24-hour volume; therefore, the flow rate being discharged is 0.17 cfs.

STORAGE CALCULATOR (DMA B)

Date: 4/21/2023
Project Name: TEI 4118 - DMA B - 19599 (4-21-2023 19-36-49

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	324.0	Backfill Porosity (%):	0%	System Diameter (in):	120
Out-to-out width (ft):	36.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	3.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	0.16	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.33	0.33	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
0.67	0.66	279.2	279.2	0.0	0.0	279.2	279.2	100.0%	2,504.1
0.83	0.83	506.4	785.6	0.0	0.0	506.4	785.6	100.0%	3,511.1
1.00	1.00	650.2	1,435.8	0.0	0.0	650.2	1,435.8	100.0%	4,263.0
1.17	1.16	763.3	2,199.2	0.0	0.0	763.3	2,199.2	100.0%	4,879.1
1.33	1.33	858.1	3,057.3	0.0	0.0	858.1	3,057.3	100.0%	5,406.1
1.50	1.50	940.3	3,997.6	0.0	0.0	940.3	3,997.6	100.0%	5,868.0
1.67	1.66	1,012.9	5,010.5	0.0	0.0	1,012.9	5,010.5	100.0%	6,279.2
1.83	1.83	1,077.9	6,088.4	0.0	0.0	1,077.9	6,088.4	100.0%	6,649.1
2.00	2.00	1,136.6	7,224.9	0.0	0.0	1,136.6	7,224.9	100.0%	6,984.3
2.17	2.16	1,189.9	8,414.8	0.0	0.0	1,189.9	8,414.8	100.0%	7,289.6
2.33	2.33	1,238.5	9,653.3	0.0	0.0	1,238.5	9,653.3	100.0%	7,568.5
2.50	2.50	1,283.0	10,936.4	0.0	0.0	1,283.0	10,936.4	100.0%	7,824.0
2.67	2.66	1,323.8	12,260.2	0.0	0.0	1,323.8	12,260.2	100.0%	8,058.2
2.83	2.83	1,361.2	13,621.4	0.0	0.0	1,361.2	13,621.4	100.0%	8,273.0
3.00	3.00	1,395.5	15,016.8	0.0	0.0	1,395.5	15,016.8	100.0%	8,469.7
3.17	3.16	1,426.8	16,443.7	0.0	0.0	1,426.8	16,443.7	100.0%	8,649.8
3.33	3.33	1,455.5	17,899.2	0.0	0.0	1,455.5	17,899.2	100.0%	8,814.1
3.50	3.50	1,481.7	19,380.9	0.0	0.0	1,481.7	19,380.9	100.0%	8,963.5
3.67	3.66	1,505.4	20,886.3	0.0	0.0	1,505.4	20,886.3	100.0%	9,098.8
3.83	3.83	1,526.8	22,413.1	0.0	0.0	1,526.8	22,413.1	100.0%	9,220.7
4.00	4.00	1,546.0	23,959.1	0.0	0.0	1,546.0	23,959.1	100.0%	9,329.5
4.17	4.16	1,563.1	25,522.2	0.0	0.0	1,563.1	25,522.2	100.0%	9,425.9
4.33	4.33	1,578.2	27,100.4	0.0	0.0	1,578.2	27,100.4	100.0%	9,510.0
4.50	4.50	1,591.2	28,691.6	0.0	0.0	1,591.2	28,691.6	100.0%	9,582.4
4.67	4.66	1,602.3	30,293.9	0.0	0.0	1,602.3	30,293.9	100.0%	9,643.2
4.83	4.83	1,611.5	31,905.3	0.0	0.0	1,611.5	31,905.3	100.0%	9,692.7
5.00	5.00	1,618.8	33,524.1	0.0	0.0	1,618.8	33,524.1	100.0%	9,731.0
5.17	5.16	1,624.3	35,148.4	0.0	0.0	1,624.3	35,148.4	100.0%	9,758.2
5.33	5.33	1,627.9	36,776.3	0.0	0.0	1,627.9	36,776.3	100.0%	9,774.6
5.50	5.50	1,629.7	38,406.0	0.0	0.0	1,629.7	38,406.0	100.0%	9,780.0
5.67	5.66	1,629.7	40,035.7	0.0	0.0	1,629.7	40,035.7	100.0%	9,774.6
5.83	5.83	1,627.9	41,663.6	0.0	0.0	1,627.9	41,663.6	100.0%	9,758.2
6.00	6.00	1,624.3	43,287.8	0.0	0.0	1,624.3	43,287.8	100.0%	9,731.0

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

6.17	6.16	1,618.8	44,906.6	0.0	0.0	1,618.8	44,906.6	100.0%	9,692.7
6.33	6.33	1,611.5	46,518.1	0.0	0.0	1,611.5	46,518.1	100.0%	9,643.2
6.50	6.50	1,602.3	48,120.4	0.0	0.0	1,602.3	48,120.4	100.0%	9,582.4
6.67	6.66	1,591.2	49,711.6	0.0	0.0	1,591.2	49,711.6	100.0%	9,510.0
6.83	6.83	1,578.2	51,289.7	0.0	0.0	1,578.2	51,289.7	100.0%	9,425.9
7.00	7.00	1,563.1	52,852.8	0.0	0.0	1,563.1	52,852.8	100.0%	9,329.5
7.17	7.16	1,546.0	54,398.9	0.0	0.0	1,546.0	54,398.9	100.0%	9,220.7
7.33	7.33	1,526.8	55,925.7	0.0	0.0	1,526.8	55,925.7	100.0%	9,098.8
7.50	7.50	1,505.4	57,431.1	0.0	0.0	1,505.4	57,431.1	100.0%	8,963.5
7.67	7.66	1,481.7	58,912.7	0.0	0.0	1,481.7	58,912.7	100.0%	8,814.1
7.83	7.83	1,455.5	60,368.3	0.0	0.0	1,455.5	60,368.3	100.0%	8,649.8
8.00	8.00	1,426.8	61,795.1	0.0	0.0	1,426.8	61,795.1	100.0%	8,469.7
8.17	8.16	1,395.5	63,190.6	0.0	0.0	1,395.5	63,190.6	100.0%	8,273.0
8.33	8.33	1,361.2	64,551.8	0.0	0.0	1,361.2	64,551.8	100.0%	8,058.2
8.50	8.50	1,323.8	65,875.6	0.0	0.0	1,323.8	65,875.6	100.0%	7,824.0
8.67	8.66	1,283.0	67,158.6	0.0	0.0	1,283.0	67,158.6	100.0%	7,568.5
8.83	8.83	1,238.5	68,397.1	0.0	0.0	1,238.5	68,397.1	100.0%	7,289.6
9.00	9.00	1,189.9	69,587.0	0.0	0.0	1,189.9	69,587.0	100.0%	6,984.3
9.17	9.16	1,136.6	70,723.6	0.0	0.0	1,136.6	70,723.6	100.0%	6,649.1
9.33	9.33	1,077.9	71,801.4	0.0	0.0	1,077.9	71,801.4	100.0%	6,279.2
9.50	9.50	1,012.9	72,814.3	0.0	0.0	1,012.9	72,814.3	100.0%	5,868.0
9.67	9.66	940.3	73,754.6	0.0	0.0	940.3	73,754.6	100.0%	5,406.1
9.83	9.83	858.1	74,612.8	0.0	0.0	858.1	74,612.8	100.0%	4,879.1
10.00	10.00	763.3	75,376.1	0.0	0.0	763.3	75,376.1	100.0%	4,263.0
10.17	10.16	650.2	76,026.3	0.0	0.0	650.2	76,026.3	100.0%	3,511.1
10.33	10.33	506.4	76,532.8	0.0	0.0	506.4	76,532.8	100.0%	2,504.1
10.50	10.50	279.2	76,811.9	0.0	0.0	279.2	76,811.9	100.0%	0.0
10.67	10.66	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0
10.83	10.83	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0
11.00	11.00	0.0	76,811.9	0.0	0.0	0.0	76,811.9	100.0%	0.0

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

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):

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.**

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
❑ 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

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
☒ 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/

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
❑ 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		
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
❑ 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.**

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
❑ 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.**

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
☒ 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**

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
❑ 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.**	

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

Operation and Maintenance Plan

Project Title: Northern Gateway Logistics Center

Original Date Prepared: December 1, 2023

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Contact Information:

Prepared for:
Lovett Industrial
120 Newport Center Drive, Suite 217
Newport Beach, CA 92660
Phone: (949) 402-2760
Contact: Tyler Banton

Prepared by:
Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, CA 90638
(714) 521-4811
Contact: Luis Prado (luisp@thieneseng.com)
Job No. 4118

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I. Inspection and Maintenance Log

Date	Observations/Actions	Inspector

Additional inspection and maintenance logs to be included in Appendix 1 of this O&M Plan.

II. Updates, Revisions, and Errata

Revision Number	Date	Brief Description of Update/Revision/Errata, include section and page number	Prepared and Approved By

Additional updates, revisions, and errata to be include in Appendix 2 of this O&M Plan.

III. Introduction

Project Description:

The project site is located on Evans Road between Ethanac Road and McLaughlin Road, Menifee, CA. The project site encompasses approximately 18.74 acres. Proposed improvements to the onsite include two light industrial warehouses approximately 105,880 square feet (Building 1) and 292,715 square feet (Building 2). There will be truck yards on the south side of Building 1 and on the north side of Building 2. Vehicle parking areas will be located on the north and southeast sides of Building 1 and on the east and west sides of Building 2. Landscaping will be adjacent to the streets and scattered throughout the site. Per the geotechnical investigation, infiltration testing disclosed generally unfavorable infiltration rates across the site (predominantly between 0.3 and 1.4 inches per hour). Based on poor infiltration rates, infiltration is not considered feasible. Instead, the project proposes to use underground detention systems and proprietary biotreatment units to treat runoff produced by the 85th percentile storm rainfall depth. In addition, catch basin filters will be provided in order to pre-treat runoff prior to entering the water quality features.

Master Plan Hydrology (100-year Storm Event):

The project site is part of the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Romoland Master Drainage Plan – Zone 4. The Master Drainage Plan (MDP) was completed in April 1988 and Revision No. 1 was completed in March 2006. The project site was designated as Light Industrial in the corresponding hydrologic calculations.

The Ethanac Wash (MDP Line A) is a large open channel facility adjacent to the easterly property line of the project site. Line A originates to the southeast of the project site and generally flows in a westerly direction. After the facility crosses Interstate 215, the channel turns north near the project site. The channel then crosses Ethanac Road and turns west immediately adjacent to the north side of Ethanac Road. The channel continues in a generally west and northwest direction to the San Jacinto River. North of the project site, the MDP 100-year flow rate in Line A is 3,673 cfs.

MDP facility Line A-8 is shown traversing northerly through the easterly portion of the project site. However, recent County storm drain plans show this facility traversing easterly through the northerly portion of the Building 2 site ultimately connecting to Line A. The MDP 100-year flow rate in Line A-8 shown on the Master Drainage Plan map is 292 cfs, although the storm drain plan shows 283 cfs. Either way, the peak flow rates are comparable.

The MDP map does not show specific drainage areas. The site is clearly tabled to Line “A”, it is just not clear whether it was intended to drain directly to the Channel or to Line A-8 or via a proposed storm drain in Evans Road. It does not appear that detention will be necessary since the existing County facilities are designed for the 100-year storm event and the project site was considered as commercial development.

Existing Storm Drains:

MDP Line A is a large open channel facility along the project’s easterly border. The channel has a design base width of 50’, 3:1 side slopes, and is unlined. Lateral A-8 runs along the northerly portion of the southerly portion of the project site. This facility is a 10’ wide x 6’ high reinforced concrete box (RCB). The RCB traverses easterly through the project site and connects to MDP Line A. Both facilities are maintained by RCFC&WCD.

Existing Site:

The project site is currently mostly undeveloped agricultural land and relativity flat. Existing topography indicates that the project side drains westerly to Evans Road.

Hydrology:

DMA A – Runoff from the northerly vehicle parking area and the northerly portion of Building 1's roof will drain into curb inlets. A proposed storm drain Line "A" will then convey these flows southerly along the easterly side of Building 1. Runoff from the easterly drive aisle and a portion of the vehicle parking area located east of Building 1 will drain into a curb inlet that then connects to Line "A".

Runoff from the southerly portion of Building 1's roof, the truck yard and the southeasterly vehicle parking area will drain into grate inlets. A proposed storm drain Line "B" will then convey flows easterly and connect into Line "A". Line "A" will continue draining further south, ultimately connecting to the proposed public 10'x6' RCB (MPD Line A-8) that traverses through the project site.

DMA B – Runoff from the northerly portion of Building 2's roof, the truck yard and the easterly drive aisle will drain into grate inlets. A proposed storm drain Line "D" and Line "D1" will then convey these flows northerly and make a connection into MPD Line A-8.

Runoff from the southeasterly vehicle parking area, the southerly portion of Building 2's roof and the westerly vehicle parking area will drain to grate inlets and roof drains that connect to proposed storm drain Line "E". Line "E" will then convey these flows westerly, then northerly and make a connection into MPD Line A-8.

Prior to runoff discharging offsite, diversion structures will be utilized to direct the DCV into the underground detention systems first and then slowly pumping the treatment flowrate through the proprietary biotreatment units. DMA A will utilize two pumps designed to pump a minimum of 20 GPM (0.0445 CFS) into MWS-A and to pump 32 GPM (0.0713 CFS) for HCOC purposes. DMA B will also utilize two pumps designed to pump a minimum of 53 GPM (0.1181 CFS) into MWS-B and to pump 76 GPM (0.1693 CFS) for HCOC purposes. Pump specific details will be provided in final design.

Runoff from DMAs C, D and E fronting Evans Road, "A" Street and Barnett Road will sheet flow offsite into their respective streets (and enter the proposed public storm drain) without being routed to the proposed LID BMPs. These areas are mostly comprised of landscaping except for some small driveway areas. The landscaping is considered self-treating.

All flows ultimately discharge to the Ethanac Wash (MPD Line A) located to the east of the project site. Prior to discharging, detention will be utilized onsite to ensure that the proposed condition peak flow rate does not exceed the existing condition peak flow rate. Therefore, there will be no negative impacts on existing downstream drainage facilities.

The underground detention systems will also be utilized to mitigate the HCOC volume. Outlet pipes (for HCOC purposes), located along the storm drains conveying flows into MWS-A and MWS-B, will be set at the elevation where the DCV is met and will discharge the HCOC volume into pumps (GPM vary; see WQMP Site Map) that are designed to limit the discharge from the site to a flowrate that's 47% less than the pre-development 2-year peak flowrate. Refer to Section F.

IV. Responsibility for Maintenance

IV.A General

Funding will be provided by the owner:

Lovett Industrial
120 Newport Center Drive, Suite 217
Newport Beach, CA 92660
Phone: (949) 402-2760
Contact: Tyler Banton

It shall be the responsibility of the owner to maintain from the time the BMPs are constructed until the responsibility for operation and maintenance is legally transferred.

A copy of the Covenant Agreement will be attached in Appendix 3 of this O&M Plan.

IV.B Staff Training Program

Staff training records and descriptions will be inserted in Appendix 4 of this O&M Plan.

IV.C Records

Maintenance records are to be inserted chronologically in Appendix 1 of this O&M Plan.

IV.D Safety

All maintenance procedures shall comply with the latest OSHA standards.

V. Summary of Drainage Management Areas and Stormwater BMPs

V.A Drainage Areas

See Appendix 5 of this O&M Plan for WQMP site map.

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	Area (Acres)	DMA Type
A1	Roofs/Conc/Asphalt	209,959	4.82	Type D
A2	Ornamental Landscaping	10,890	0.25	Type D
B1	Roofs/Conc/Asphalt	510,523	11.72	Type D
B2	Ornamental Landscaping	27,007	0.62	Type D
C	Ornamental Landscaping	27,007	0.62	Type A
D	Ornamental Landscaping	25,700	0.59	Type A
E	Ornamental Landscaping	5,227	0.12	Type A

DMA Name or ID	BMP Name or ID	Type of Stormwater BMP	Location of DMA	Pervious Areas (ac.)	Impervious Areas (ac.)	Geo-Location of BMPs	
						Latitude	
A1	CMP-A & MWS-A	Modular Wetlands System with Underground Detention	DMA A1 consists of roof area, concrete and asphalt parking/drive aisles (which is the majority of the project site).	*0.00*	*4.82*	MWS-A 33.738323	MWS-A -117.196163
A2			DMA A2 consists of landscaping located at the parking lot areas, along the building edges and along the project boundaries.	*0.25*	*0.00*	CMP-A 33.738383	CMP-A -117.196686
B1	CMP-B & MWS-B	Modular Wetlands System with Underground Detention	DMA B1 consists of roof area, concrete and asphalt parking/drive aisles (which is the majority of the project site).	*0.00*	*11.72*	MWS-B 33.738051	MWS-B -117.197215
B2			DMA B2 consists of landscaping located at the parking lot areas, along the building edges and along the project boundaries.	*0.62*	*0.00*	CMP-B 33.737987	CMP-B -117.196139

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.

V.B Structural Post-Construction BMPs

See Appendix 5 of this O&M Plan for WQMP site map.

Additional BMP details are available in Appendix 10 of the WQMP.

V.C Self-Retaining Areas or Other

Landscaped areas in DMAs C, D, and E are considered self-treating areas. Refer to Appendix 9-5: Site Plan and Details for locations of self-treating areas. These areas will be maintained with normal landscape maintenance.

VI. Stormwater BMP Design Documentation

VI.A "As-Built" Drawings of each Stormwater BMP

See Appendix 6 of this O&M Plan for "as-built" drawings.

VI.B Manufacturer's Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

VI.C Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

VII.A Maintenance Schedule

Schedule (Underground Detention CMP)	Inspection and Maintenance Activity (Underground Detention CMP)
Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	• The manholes shall be inspected semi-annually (October 1st and February 1st) and maintained upon sediment reaching 3-inches in depth. The rows shall be inspected and maintained by a qualified technician and he/she will properly dispose of all wastes. Manholes are installed in order to inspect and maintain the system. It is installed per OSHA codes to ensure operator and inspector safety.

Schedule (Proprietary Biotreatment)	Inspection and Maintenance Activity (Proprietary Biotreatment)
Average maintenance interval of 6 to 12 months for removing trash from Screening Device. Average interval of 12 to 24 months for removing sediment, replacing Cartridge Filter Media, replacing Drain Down Filter Media and trimming vegetation.	• Remove trash from Screening Device, sediment from Separation Chamber and replace cartridge Filter Media, and Drain Down Filter Media. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

VII.B Service Agreement Information

See Appendix 8 of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix 9-1: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

Date	Observations/Actions	Inspector

Appendix 9-2: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

Revision Number	Date	Brief Description of Update/Revision/Errata, include section and page number	Prepared and Approved By

Appendix 9-3: Maintenance Mechanism

Copy of Covenant Agreement
Establishing Notification Process And Responsibility
For Water Quality Management Plan Implementation And Maintenance

Notification Process and Responsibility

1. **Name:** _____
   Title: _____
   Phone No.: _____

   WQMP Responsibilities, Duties, and Activities:
   (1) Routine inspections to evaluate BMP effectiveness.
   (2) Identifying when BMPs require maintenance.
   (3) Working with qualified contractors to maintain the BMP.
   (4) Recordkeeping of inspections and maintenance activities.

2. **Name:** _____
   Title: _____
   Phone No.: _____

   WQMP Responsibilities, Duties, and Activities:
   (1) Cleaning, repairing, servicing, and maintenance of BMP.

3. **Name:** _____
   Title: _____
   Phone No.: _____

   WQMP Responsibilities, Duties, and Activities:
   (1) In event of failure, and with City Engineer's authorization, modify or replace with an upgraded BMP to prevent future failure.
   (2) Notify successors of BMPs and maintenance requirements.

RECORDING REQUESTED BY:

CITY OF MENIFEE

AND WHEN RECORDED MAIL TO:

CITY OF MENIFEE
CITY CLERK
29844 HAUN ROAD
MENIFEE, CA 92586-6540

SPACE ABOVE THIS LINE FOR RECORDER'S USE

WATER QUALITY MANAGEMENT PLAN AND STORMWATER BEST MANAGEMENT PRACTICES OPERATION, TRANSFER, MAINTENANCE AND RIGHT OF ENTRY AGREEMENT

PROJECT NAME: Northern Gateway Logistics Center

PROPERTY OWNER NAME: Lovett Industrial

PROPERTY ADDRESS: Evans Road Between Ethanac Road and McLaughlin Road
Menifee, California 92585

APN: 331-060-007, -008, -020, -023 and -030

THIS AGREEMENT is made and entered into in

_____, California, this _____ day of _____,20 24, by and between

Lovett Industrial, herein after

referred to as "Owner", and the CITY OF MENIFEE, a municipal corporation, located in the County of Riverside, State of California hereinafter referred to as "City";

WHEREAS, the City is a Co-Permittee for discharging stormwater from its MS4 facilities pursuant to the Santa Ana Regional Water Quality Control Board Order No. R8-2010-0033, MS4 NPDES Permit No. CAS 618033. Under the terms of the Permit the City is required to enforce the provisions of the Permit within its jurisdiction. The requirements contained in this Agreement are intended to achieve the goals of the Permit;

WHEREAS, the Owner owns real property ("Property) in the City of Menifee, County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of the development project known as: Northern Gateway Logistics Center, within the Property described herein, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP," to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff;

WHEREAS, said WQMP has been certified by the Owner and reviewed and accepted by the City;

WHEREAS, said BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Right of Access: Owner hereby provides the City of Menifee designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by the City's Engineer, no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency to direct all necessary repairs or other preventative measures at owner's expense in accordance with the procedures set forth in paragraph 3 below. City shall make every effort at times to minimize or avoid interference with Owner's use of the Property.

2. Responsibility for Operation and Maintenance of BMPs: Owner shall use its best efforts diligently to implement BMPs in a manner assuring p performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. City Maintenance at Owner's Expense: In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, the City may cause such maintenance to be conducted on Owner's

Property at Owner's expense if Owner does not commence and diligently work to perform the maintenance within five (5) days of receiving written notice from the City, in accordance with paragraph 10 below, of Owner's failure to comply with the terms of this Agreement. The City may charge the entire cost and expense of any maintenance undertaken by the City, whether performed as a response to an emergency situation or following five (5) day written notice by the City, to the Owner or Owner's successors or assigns, including administrative costs, attorney's fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full. The City, at its sole election, may take these costs to be a lien upon the property that may be collected at the same time and in the same manner as ordinary municipal taxes as provided in Government Code section 38773.5. Nothing in this section or this Agreement creates an obligation by the City to maintain or repair any BMP, nor does this section prohibit the City from pursuing other legal recourse against Owner.

4. Surety Bond: The City may require the owner to post security in form and for a time period satisfactory to the City to guarantee the performance of the obligations stated herein. Should the owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the City's Engineer may withdraw any previous stomwater-related approval with respect to the property on which BMPs have been installed and/or implemented until such time as Owner repays to City its reasonable costs incurred in accordance with paragraph 3 above.

5. Recording: This Agreement shall be recorded in the Office of the Recorder of Riverside County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as herein above set forth, subject to foreclosure in even of default in payment.

6. Attorney's Fees: In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

7. Covenant: It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

8. Binding on Successors: The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

9. Time of the Essence: Time is of the essence in the performance of this Agreement.

10. Notice: Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

IF TO CITY:

City of Menifee

29844 Haun Road

Menifee, CA 92586-6540

IF TO OWNER:

TBD

120 Newport Center Drive, Suite 217

Newport Beach, CA 92660

CITY:

By: _____
Armango G. Villa,
City Manager

APPROVED AS TO FORM:

_____
Jeffrey T. Melching, City Attorney

ATTEST:

_____
Sarah Manwaring, City Clerk

OWNER:

By: TBD
Name

Title: TBD

NOTARY ACKNOWLEDGEMENTS ON FOLLOWING PAGE

EXHIBIT A
(Legal Description)

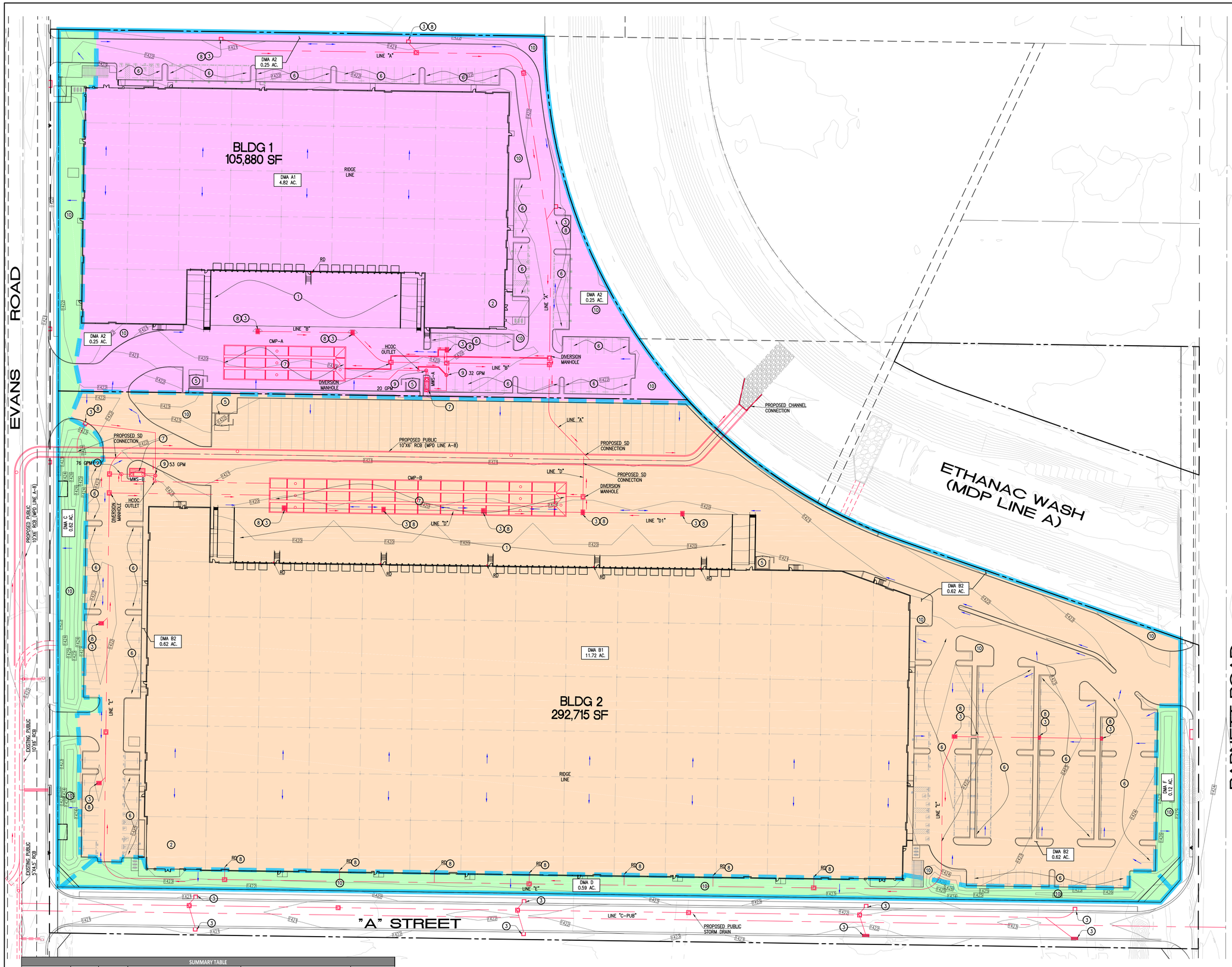
EXHIBIT B
(Map/Illustration)

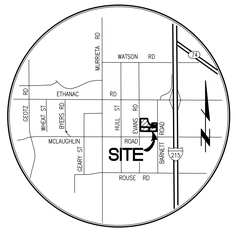
Appendix 9-4: Training Records

Insert Training Records with Brief Discussion Here

Appendix 9-5: Site Plan and Details

WQMP Site Map and BMP Details





VICINITY MAP

N.T.S.

LEGEND

1. LOADING/UNLOADING TRUCK DOCKS
2. EDUCATIONAL MATERIAL
3. STORM DRAIN STENCIL
4. SOLID UNDERGROUND DETENTION CMP
5. TRASH ENCLOSURE
6. PARKING LOT MAINTENANCE (SWEEPING)
7. PROPRIETARY BIOTREATMENT UNIT
8. DRAIN INSERT(S)
9. SUMP PUMP: 1HP, 460V, 3PH FLA, 1.8 AMP
10. LANDSCAPE/OUTDOOR PESTICIDE USE

NOTE:

- RD — ROOF DRAIN
- BOUNDARY
- SUBAREAS
- SURFACE FLOW LINE
- SD FLOW LINE
- DMA A
- DMA B
- DMA C, D AND E

SAMPLE STORM DRAIN STENCIL

0 20 40 80 120

SCALE:1"=40'

Last Update: 11/1/23
O:\4100-4199\4118\4118BMPSITEMAP.dwg

SUMMARY TABLE

DMA	AREA (ACRES)	DCV (CF)	MODULAR WETLANDS SYSTEM (MWS) MWS MODEL	# OF UNITS	LINEAR STATIC CAPACITY (CF)	120-INCH SOLID CMP DETENTION REQUIRED (CF)	DETENTION PROVIDED (CF)*	LINEAR FEET (FT)**	TOTAL VOLUME PROVIDED (CF)
A	5.07	9,424	MWS-L-4-15-V	1	105	9,318	9,848	402	9,953
B	12.34	22,919	MWS-L-8-16-V	1	268	22,650	23,959	978	24,227
TOTAL	**17.41**	**32,343**		**2**	**373**	**31,968**	**33,807**	**1,380**	**34,180**

*This is the volume provided at a depth of approximately 3.5 feet above the invert of the CMP. The volume above this depth is utilized to mitigate HCOCs and will be released via pump systems.

**The total linear footage includes the CMP required to store the HCOC mitigation volume.

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	Area (Acres)	DMA Type
A1	Roofs/Conc/Asphalt	209,959	4.82	Type D
A2	Ornamental Landscaping	10,890	0.25	Type D
B1	Roofs/Conc/Asphalt	510,523	11.72	Type D
B2	Ornamental Landscaping	27,007	0.62	Type D
C	Ornamental Landscaping	27,007	0.62	Type A
D	Ornamental Landscaping	25,700	0.59	Type A
E	Ornamental Landscaping	5,227	0.12	Type A
		816,314	**18.74**	

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date

Public Works Director R.C.E.

Sheet 1 of 3 Sheets

CITY OF MENIFEE

PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

4118/1 OF 3 SHEETS

BIO CLEAN FULL CAPTURE FILTER WITH TROUGH SYSTEM

FOR USE IN CURB INLETS

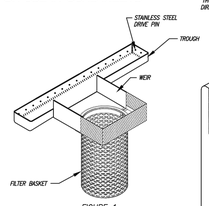


FIGURE 1:
DETAIL OF PARTS

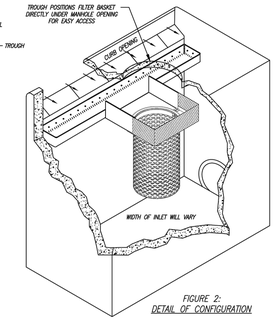


FIGURE 2:
DETAIL OF CONFIGURATION

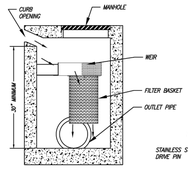


FIGURE 4:
DETAIL OF PROFILE

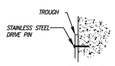


FIGURE 3:
DETAIL OF MOUNTING

MODEL NUMBER	TREATMENT FLOW (cfs)*	SOLIDS STORAGE CAPACITY (cu ft)
BIO-CURB-FULL-24	2.85	1.40
BIO-CURB-FULL-12	2.85	0.70

*SEE PAGE 2 FOR EXPLANATION OF FLOW RATES

NOTES:

1. TROUGH SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO FILTER.
2. TROUGH SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTER MANUFACTURED OF 1020 STAINLESS STEEL.
5. FILTER MADE OF NON-CLOGGIN SCREEN WITH 4.7 MM OPENINGS AND MEETS FULL CAPTURE REQUIREMENTS.
6. FILTER CAN BE FITTED WITH HYDROCARBON ABSORBENT BOOM.
7. FILTER IS LOCATED DIRECTLY UNDER THE MANHOLE FOR EASY REMOVAL AND MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'.
9. OTHER STANDARD AND CUSTOM MODEL SIZES AVAILABLE - CONTACT BIO CLEAN FOR MORE INFORMATION.
10. CONSIDERS A SAFETY FACTOR OF 2.0
11. BYPASS IS FACILITATED VIA OVERFLOW OF THE TROUGH SYSTEM AND IS EQUAL TO THE CAPACITY OF THE CURB OPENING
12. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
13. ADDITIONAL TREATMENT AND STORAGE CAPACITY CAN BE ACHIEVED BY UTILIZING MULTIPLE FILTER BASKETS.

DRAWING: BIO CLEAN CURB INLET FILTER DETAILS		MEETS FULL CAPTURE REQUIREMENTS
TREATMENT FLOW RATE: 2.85 cfs		MODEL #: BIO-CURB-FULL
WARRANTY: 1 YEAR MANUFACTURER'S	PROJECT:	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640 FAX: 760-433-3176	REVISIONS:	DATE:
	REVISIONS:	DATE:
DATE: 10/12/2017 SCALE: NTS	REVISIONS:	DATE:
DRAWTER: M.C.P. UNITS = INCHES	REVISIONS:	DATE:

CONTECH® ENGINEERED SOLUTIONS LLC
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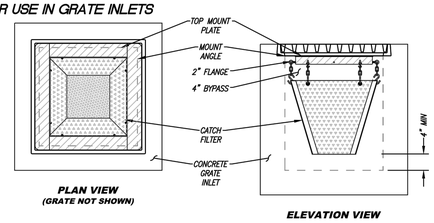
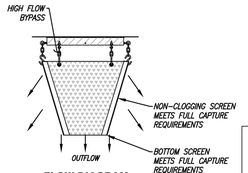
BIO CLEAN FULL CAPTURE FILTER

FOR USE IN GRATE INLETS



PLAN VIEW
(GRATE NOT SHOWN)

ELEVATION VIEW



FLOW DIAGRAM

MODEL #	TREATMENT FLOW RATE (CFS)	BYPASS FLOW (CFS)	SOLIDS STORAGE CAPACITY (CF)
BIO-GRATE-FULL 12-12-12	1.04	1.24	0.15
BIO-GRATE-FULL 18-18-12	1.78	2.79	0.33
BIO-GRATE-FULL 24-24-12	2.70	4.96	0.59
BIO-GRATE-FULL 24-40-12	3.70	6.35	0.88
BIO-GRATE-FULL 24-24-24	7.31	4.96	1.22
BIO-GRATE-FULL 24-40-24	9.53	6.35	1.82
BIO-GRATE-FULL 36-36-24	11.93	7.74	2.73

INSTALLATION NOTES:

1. ALL HARDWARE, FLANGE, FRAME, SCREENS SHALL BE STAINLESS STEEL.
2. OPTIONAL HYDROCARBON BOOM SHALL BE 2" DIAMETER.
3. SEE PERFORMANCE REPORTS IN MANUFACTURES SPECIFICATIONS.
4. OTHER STANDARD AND CUSTOM MODEL SIZES AVAILABLE - CONTACT BIO CLEAN FOR MORE INFORMATION.
5. BASED ON 37% OPEN AREA.
6. CONSIDERS A SAFETY FACTOR OF 2.0.
7. CONSIDERS A LOCAL DEPRESSION PONDING DEPTH OF 6 INCHES.
8. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
9. CONCRETE STRUCTURES SOLD SEPARATELY.

NOT TO SCALE

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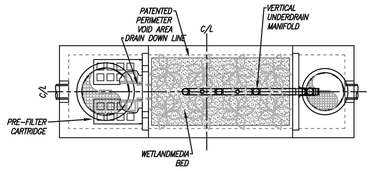
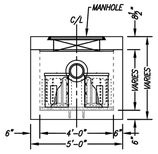
GRATE INLET FILTER
FULL CAPTURE
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.175			
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



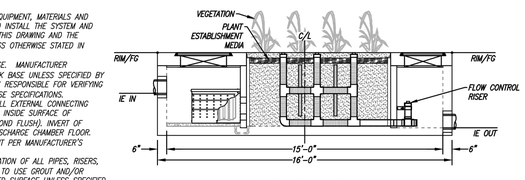
LEFT END VIEW

INSTALLATION NOTES

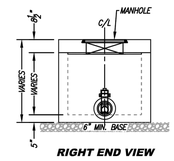
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.175
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.5
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO
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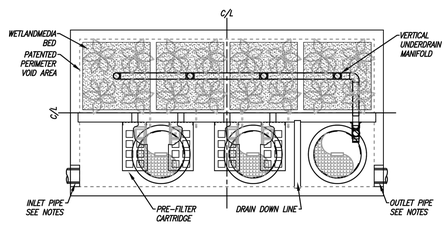
www.ContechES.com

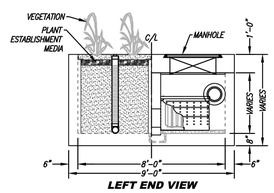
MWS-L-4-15-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.462			
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



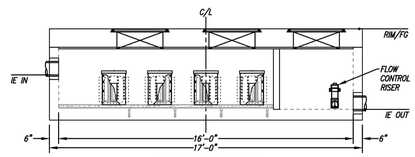
LEFT END VIEW

INSTALLATION NOTES

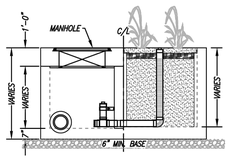
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
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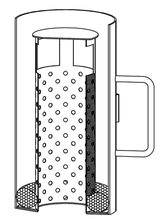
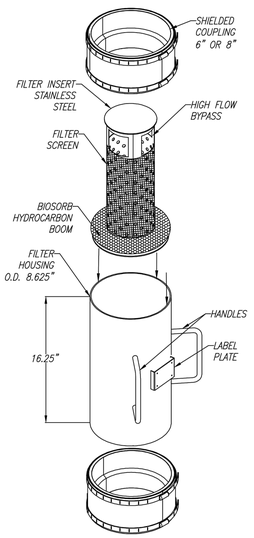
MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

BIO CLEAN 8" DIA DOWNSPOUT FILTER - SCREEN TYPE

FOR USE ON PIPES UP TO 8"



ISO VIEW



EXPLODED VIEW

BIO CLEAN 8" DIA DOWNSPOUT FILTER	
TREATMENT FLOW (CFS)	1.14
BYPASS FLOW (CFS)	2.25
FILTER SURFACE AREA (SQ FT)	1.30
SAND REMOVAL EFFICIENCY	≥60%

GENERAL NOTES

1. THE DEVICE SHALL BE SIZED ACCORDING TO THE NOMINAL SIZE OF THE INTERCONNECTING DRAINAGE SYSTEM. AT NO TIME SHALL THE ENTRANCE SIZE BE LARGER THAN THE EXIT SIZE.
2. THE DEVICE SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION TO PROVIDE MEANS FOR REPAIR AND MAINTENANCE.
3. THE DEVICE SHALL BE INSTALLED USING APPROVED ADAPTERS OR COUPLINGS TO ATTACH THE DEVICE TO THE DOWNSPOUT OR DRAINAGE PIPE. SHIELDED COUPLINGS ARE REQUIRED ON ALL APPLICATIONS. COUPLING SHALL BE PROPERLY TIGHTENED TO PIPE.
4. SCREENS ARE MADE OUT OF 46 MESH STAINLESS STEEL, 0.0055 INCH. WIRE DIAMETERS. 55% OPEN AROUND EXTERIOR OF FILTER INSERT.

WARRANTY: 1 YEAR MANUFACTURER'S		DOWNSPOUT FILTER SCREEN TYPE	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640		REVISIONS:	DATE:
		REVISIONS:	DATE:
DATE: 1/24/2020	SCALE: NTS	REVISIONS:	DATE:
DRAWTER: G.M.S.	UNITS = INCHES	REVISIONS:	DATE:

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O:\4100-4199\4118\4118BMPSITEMAP.dwg

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING * LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E.

Sheet 2 of 3 Sheets

4118/2 OF 3 SHEETS

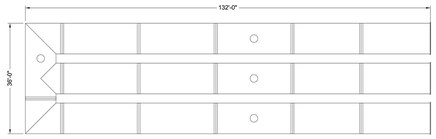
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 402 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 31,472 CF
- PIPE STORAGE VOLUME = 31,573 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 31,573 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}" \times \frac{1}{2}"$ CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN. QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

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DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19598 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA A
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19598	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

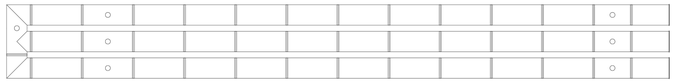
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 978 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 76,657 CF
- PIPE STORAGE VOLUME = 76,812 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 76,812 CF

PIPE DETAILS
- DIAMETER = 120"
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}" \times \frac{1}{2}"$ CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
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ASSEMBLY
SCALE: 1" = 30'

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DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO19599 TEI 4118 - Northern Gateway Logistics Center
TEI 4118 - DMA B
Perris, CA
DETENTION SYSTEM

PROJECT No.: 12694	SEQ. No.: 19599	DATE: 11/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Last Update: 11/1/23
O:\4100-4199\4118\4118BMPSITEMAP.dwg

CITY OF MENIFEE
PUBLIC WORKS DEPARTMENT

WQMP SITE MAP

NORTHERN GATEWAY LOGISTICS CENTER

EVANS RD BETWEEN ETHANAC RD AND McLAUGHLIN RD

4118/3 OF 3 SHEETS

PREPARED FOR:

LOVETT INDUSTRIAL
120 NEWPORT CENTER DRIVE, SUITE 217
NEWPORT BEACH, CA 92660
PHONE: (949) 402-2760

PREPARED BY:

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14,349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

Approved by _____ Date _____

Public Works Director _____ R.C.E. _____

Sheet 3 of 3 Sheets

Appendix 9-6: "As-Built" Drawings

Insert "As-Builts" Here When Available

Appendix 9-7: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix 9-8: Service Agreement Information

Insert Contractor Information (if any)

California Compliance Environmental, LLC
1858 Boa Vista Cir
Costa Mesa, CA 92626
+1 9252343892
Joe@CaCompEnv.com

Estimate

ADDRESS

Lovett Industrial
1730 E. Holly Avenue
El Segundo, CA 90245

ESTIMATE # 3299
DATE 08/09/2023
EXPIRATION DATE 08/09/2023

SITE ADDRESS
Evans Road between Ethanac Rd &

CITY / STATE
McLaughlin Rd,Menifee, CA 92585

ACTIVITY	QTY	RATE	AMOUNT
Budget Cost - Stormwater WQMP Compliance Estimate Site evaluation required prior to service agreements. Scope per provided WQMP map and inventory from engineers. Both Buildings - $16,410.00 Annually Estimated			
Catch Basin Insert Service Quarterly Service (24) BIO-GRATE-FULL-25-40-24 - remove grate/ manhole, clean filter, clean basin, place filter back into frame, place grate back into frame. Media replacement annually. Digital report used with before and after photos and any discrepancies or recommendation noted.	96	75.00	7,200.00
Catch Basin Insert Service Quarterly Service (4) BIO-CURB-FULL for a 3.5' - remove grate/ manhole, clean filter, clean basin, place filter back into frame, place grate back into frame. Media replacement annually. Digital report used with before and after photos and any discrepancies or recommendation noted.	16	75.00	1,200.00
Down Spout Filter Service Quarterly Service (7) 8" Bioclean Downspout filters. Remove device from downspout, clean filter, inspect structure, replace media when required, re-install filter into structure. Digital report with before and after photos used for recording.	28	95.00	2,660.00
MWS Service Semi-Annual Service of MWS-L-8-16-V Stormwater biofiltration system. Remove Trash from Screening Device. Remove Sediment from Separation Chamber. Replace Cartridge Filter Media (when required @ 12 to 24 months). Replace Drain Down Filter Media (when required @ 12 to 24 months). Trim Vegetation if needed.	2	800.00	1,600.00
MWS Service Semi-Annual Service of MWS-L-4-15-V Stormwater biofiltration system. Remove Trash from Screening Device. Remove Sediment from Separation Chamber. Replace Cartridge Filter Media (when required @ 12 to 24 months). Replace Drain Down Filter Media (when required @ 12 to 24 months). Trim Vegetation if needed.	2	675.00	1,350.00
UGBF UnderGround BioFiltration Inspection Semi-Annual Inspection of (2) CMP 120" 402' & 978' - inspect per manufacturer recommendations. Sediment/ material loading, floatables, vector concerns, inspection of functioning parts, odors and structure. Digital report with photos and discrepancies recorded. Maintenance required when impact effects function - Estimated 10+ years - Quote provided when required.	4	200.00	800.00
Lift Station / Sump Pump Inspection Semi-Annual (4) Lift Station/ Sump Pump Inspection - visually inspect plumbing and electrical, lift bobber to test for reaction, record sediment levels, oils, floatables, and all functioning parts. Digital report with photos and discrepancies recorded.	8	200.00	1,600.00

Please Mail Payment to -
1858 Boa Vista Circle,
Costa Mesa CA 92626

ACTIVITY	QTY	RATE	AMOUNT
Stenciling of storm drains Inspection of storm drain's signage, check for legibility for compliance purposes. If re-stenciling required, a stencil will be provided. Included with acceptance of entire scope. No Dumping Drains to River	4	0.00	0.00
WQMP Training Education for Owner, Operators, Occupants, or Employees - Scheduled education to review WQMP and educate on safe storm water practices. Attendance log kept for compliance purposes. Price per education ordered and not included in annual price.	0	350.00	0.00
Terms and Conditions Labor charge for work performed is based on vehicle access during normal working hours and excludes inclement weather. Payment terms are net 30, no retention to be withheld. Additional insured certificates are available upon request. Special wording/insurance requests will be subject to additional charges. California Compliance Environmental cannot guarantee the effectiveness of any filtration system, device, or product and must refer customer to the manufacturer of said product. Maintenance contracts do not include the costs for repair or replacement of damaged filter structures or system devices. California Compliance Environmental hereby disclaims liability for any malfunction of or damage to filter structures, systems, or other devices that results from carelessness, negligence, and / or improper installation or maintenance by on-site or third parties. Damage to filter structures from catastrophic or natural occurrences is also disclaimed by California Compliance Environmental. Additional services or repairs will not be performed without consent of customer and will be quoted and invoiced separately from this contract. This contract shall be for the entire term stated above unless or until expressly canceled with a 30-day written notice by customer or California Compliance Environmental. In addition, this contract shall automatically renew at the end of this contract term unless expressly canceled or revised with a 30-day written notice by customer or California Compliance Environmental.	1	0.00	0.00

TOTAL **$16,410.00**

Accepted By

Accepted Date

Please Mail Payment to -
1858 Boa Vista Circle,
Costa Mesa CA 92626

Appendix 10: Educational Materials

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

WHEN IT RAINS IT DRAINS

After the Storm

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

EPA United States Environmental Protection Agency

EPA 833-B-03-002

January 2003

Internet Address (URL) • HTTP://www.epa.gov
Recycled/Recyclable • Printed With Vegetable Oil Based Inks on 100% Postconsumer, Process Chlorine Free Recycled Paper

THE YEAR OF CLEAN WATER
Celebration & Recommitment

A Citizen's Guide to Understanding Stormwater

WHEN IT RAINS IT DRAINS

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.

- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater Pollution Solutions

Residential

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

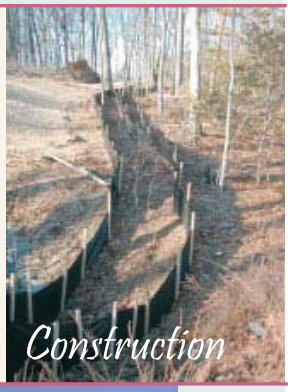
Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

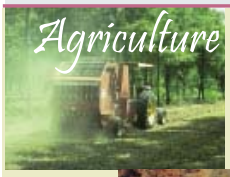
Construction



Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

Agriculture



Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

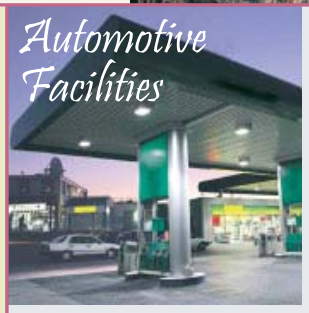
- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

For Information:

For more information on the General Industrial Storm Water Permit contact:

State Water Resources Control Board (SWRCB)
(916) 657-1146 or www.swrcb.ca.gov/ or, at your Regional Water Quality Control Board (RWQCB).

Santa Ana Region (8)
California Tower
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
(909) 782-4130

San Diego Region (9)
9771 Clairemont Mesa Blvd., Ste. A
San Diego, CA 92124
(619) 467-2952

Colorado River Basin Region (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491

Spill Response Agency:
Haz-Mat: (909) 358-5055
Hazardous Waste Disposal: (909) 358-5055
Recycling Information: 1-800-366-SAVE
To Report Illegal Dumping or a Clogged Storm Drain: 1-800-506-2555

To order additional brochures or to obtain information on other pollution prevention activities, call:
(909) 955-1111.

StormWater CleanWater
PROTECTION PROGRAM

Riverside County gratefully acknowledges the State Water Quality Control Board and the American Public Works Association, Storm Water Quality Task Force for the information provided in this brochure.

Did You Know . . .

Your Facility May Need A Storm Water Permit?

Many industrial facilities and manufacturing operations must obtain coverage under the Industrial Activities Storm Water General Permit

FIND OUT
IF YOUR FACILITY MUST OBTAIN A PERMIT

StormWater Pollution . . . What you should know

Riverside County has two drainage systems - sanitary sewers and storm drains. The storm drain system is designed to help prevent flooding by carrying excess rainwater away from streets. Since the storm drain system does not provide for water treatment, it also serves the *unintended* function of transporting pollutants directly to our waterways.

Unlike sanitary sewers, storm drains are not connected to a treatment plant - they flow directly to our local streams, rivers and lakes.

In recent years, awareness of the need to protect water quality has increased. As a result, federal, state, and local programs have been established to reduce polluted stormwater discharges to our waterways. The emphasis of these programs is to prevent stormwater pollution since it's much easier, and less costly, than cleaning up "after the fact."

National Pollutant Discharge Elimination System (NPDES)

In 1987, the Federal Clean Water Act was amended to establish a framework for regulating industrial stormwater discharges under the NPDES permit program. In California, NPDES permits are issued by the State Water Resources Control Board (SWRCB) and the nine (9) Regional Water Quality Control Boards (RWQCB). In general, certain industrial facilities and manufacturing operations must obtain coverage under the Industrial Activities Storm Water General Permit if the type of facilities or operations falls into one of the several categories described in this brochure.

How Do I Know If I Need A Permit?

Following are ***general descriptions*** of the industry categories types that are regulated by the Industrial Activities Storm Water General Permit. Contact your local Region Water Quality Control Board to determine if your facility/operation requires coverage under the Permit.

➜ Facilities such as cement manufacturing; feedlots; fertilizer manufacturing; petroleum refining; phosphate manufacturing; steam electric power generation; coal mining; mineral mining and processing; ore mining and dressing; and asphalt emulsion;

➜ Facilities classified as lumber and wood products (except wood kitchen cabinets); pulp, paper, and paperboard mills; chemical producers (except some pharmaceutical and biological products); petroleum and coal products; leather production and products; stone, clay and glass products; primary metal industries; fabricated structural metal; ship and boat building and repairing;

➜ Active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations;

➜ Hazardous waste treatment, storage, or disposal facilities;

➜ Landfills, land application sites and open dumps that receive or have received any industrial waste; unless there is a new overlying land use such as a golf course, park, etc., and there is no discharge associated with the landfill;

➜ Facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards;

➜ Steam electric power generating facilities, facilities that generate steam for electric power by combustion;

➜ Transportation facilities that have vehicle maintenance shops, fueling facilities, equipment cleaning operations, or airport deicing operations. This includes school bus maintenance facilities operated by a school district;

➜ Sewage treatment facilities;

➜ Facilities that have areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water.

How do I obtain coverage under the Industrial Activities Storm Water General Permit?

Obtain a permit application package from your local Regional Water Quality Control Board listed on the back of this brochure or the State Water Resources Control Board (SWRCB). Submit a completed Notice of Intent (NOI) form, site map and the appropriate fee ($250 or $500) to the SWRCB. Facilities must submit an NOI thirty (30) days prior to beginning operation. Once you submit the NOI, the State Board will send you a letter acknowledging receipt of your NOI and will assign your facility a waste discharge identification number (WDID No.). You will also receive an annual fee billing. These billings should roughly coincide with the date the State Board processed your original NOI submittal.

What are the requirements of the Industrial Activities Storm Water General Permit?

The basic requirements of the Permit are:

1. The facility must eliminate any non-stormwater discharges or obtain a separate permit for such discharges.

2. The facility must develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must identify sources of pollutants that may be exposed to stormwater. Once the sources of pollutants have been identified, the facility operator must develop and implement Best Management Practices (BMPs) to minimize or prevent polluted runoff.

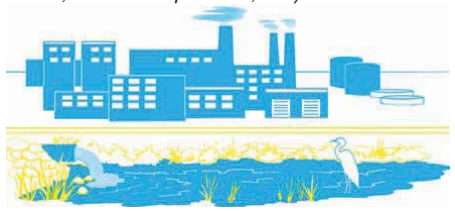
   Guidance in preparing a SWPPP is available from a document prepared by the California Storm Water Quality Task Force called the California Storm Water Best Management Practice Handbook.

3. The facility must develop and implement a Monitoring Program that includes conducting visual observations and collecting samples of the facility's storm water discharges associated with industrial activity. The General Permit requires that the analysis be conducted by a laboratory that is certified by the State of California.

4. The facility must submit to the Regional Board, every July 1, an annual report that includes the results of its monitoring program.

A Non-Storm Water Discharge is... *any discharge to a storm drain system that is not composed entirely of storm water. The following non-storm water discharges are authorized by the General Permit: fire hydrant flushing; potable water sources, including potable water related to the operation, maintenance, or testing of potable water systems; drinking fountain water; atmospheric condensates including refrigeration, air conditioning, and compressor condensate; irrigation drainage; landscape watering; springs; non-contaminated ground water; foundation or footing drainage; and sea water infiltration where the sea waters are discharged back into the sea water source.*

A BMP is . . . *a technique, process, activity, or structure used to reduce the pollutant content of a storm water discharge. BMPs may include simple, non-structural methods such as good housekeeping, staff training and preventive maintenance. Additionally, BMPs may include structural modifications such as the installation of berms, canopies or treatment control (e.g. setting basins, oil/water separators, etc.)*



WARNING*: There are significant penalties for non-compliance: a minimum fine of $5,000 for failing to obtain permit coverage, and, up to $10,000 per day, per violation plus $10 per gallon of discharge in excess of 1,000 gallons.*

Stormwater Pollution

What you should know for...

Industrial & Commercial Facilities

Best Management Practices (BMPS) for:

- Industrial Facilities
- Commercial Facilities

Riverside County Stormwater Program Members

City of Banning
(951) 922-3105

City of Beaumont
(951) 769-8520

City of Calimesa
(909) 795-9801

City of Canyon Lake
(951) 244-2955

City of Cathedral City
(760) 770-0340

City of Coachella
(760) 398-3502

City of Corona
(951) 736-2447

City of Desert Hot Springs
(760) 329-6411

City of Eastvale
(951) 361-0900

City of Hemet
(951) 765-2300

City of Indian Wells
(760) 346-2489

City of Indio
(760) 391-4000

City of Jurupa Valley
(951) 332-6464

City of Lake Elsinore
(951) 674-3124

City of La Quinta
(760) 777-7000

City of Menifee
(951) 672-6777

City of Moreno Valley
(951) 413-3000

City of Murrieta
(951) 304-2489

City of Norco
(951) 270-5607

City of Palm Desert
(760) 346-0611

City of Palm Springs
(760) 323-8299

City of Perris
(951) 943-6100

City of Rancho Mirage
(760) 324-4511

City of Riverside
(951) 826-5311

City of San Jacinto
(951) 487-7330

City of Temecula
(951) 694-6444

City of Wildomar
(951) 677-7751

Coachella Valley Water District
(760) 398-2651

County of Riverside
(951) 955-1000

Riverside County Flood Control District
(951) 955-1200

YOU can prevent Stormwater Pollution following these practices...

Industrial and Commercial Facilities

The Riverside County Stormwater Program has identified a number of Best Management Practices (BMPs) for Industrial and Commercial Facilities. These BMPs control and reduce stormwater pollutants from reaching our storm drain system and ultimately our local water bodies. City and County ordinances require businesses to use these BMPs to protect our water quality. Local cities and the County are required to verify implementation of these BMPs by performing regular facility inspections.

Prohibited Discharges

Discontinue all non-stormwater discharges to the storm drain system. It is *prohibited* to discharge any chemicals, paints, debris, wastes or wastewater into the gutter, street or storm drain.

Outdoor Storage BMPs

- Install covers and secondary containment areas for all hazardous materials and wastes stored outdoors in accordance with County and/or City standards.
- Keep all temporary waste containers covered, at all times when not in use.
- Sweep outdoor areas instead of using a hose or pressure washer.
- Move all process operations including vehicle/equipment maintenance inside of the building or under a covered and contained area.
- Wash equipment and vehicles in a contained and covered wash bay which is closed-loop or connected to a clarifier sized to local standards and discharged to a sanitary sewer or take them to a commercial car wash.

Spills and Clean Up BMPs

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep up the area.
- Clean up spills immediately when they occur, using dry clean up methods such as absorbent materials or sweep followed by proper disposal of materials.
- Always have a spill kit available near chemical loading dock doors and vehicle maintenance and fueling areas.
- Follow your Business Emergency Plan, as filed with the local Fire Department.
- Report all prohibited discharges and non-implementation of BMPs to your local Stormwater Coordinator as listed on the back of this pamphlet.
- Report hazardous materials spills to 951-358-5055 or call after hours to 951-782-2973 or, if an emergency, call the Fire Department's Haz Mat Team at 911.

Plastic Manufacturing Facilities BMPs

AB 258 requires plastic product manufacturers to use BMPs, such as safe storage and clean-up procedures to prevent plastic pellets (nurdles) from entering the waterway. The plastic pellets are released into the environment during transporting, packaging and processing and migrate to waterways through the storm drain system. AB 258 will help protect fish and wildlife from the hazards of plastic pollution.

Training BMPs

As prescribed by your City and County Stormwater Ordinance(s), train employees in spill procedures and prohibit non-stormwater discharges to the storm drain system. Applicable BMP examples can be found at www.cabmphandbooks.com.

Permitting

Stormwater discharges associated with specific categories for industrial facilities are regulated by the State Water Resources Control Board through an Industrial Stormwater General Permit. A copy of this General Permit and application forms are available at: www.waterboards.ca.gov, select stormwater then the industrial quick link.

To report illegal dumping or for more information on stormwater pollution prevention call: 1-800-506-2555 or e-mail us at: fcnpdes@rcflood.org.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

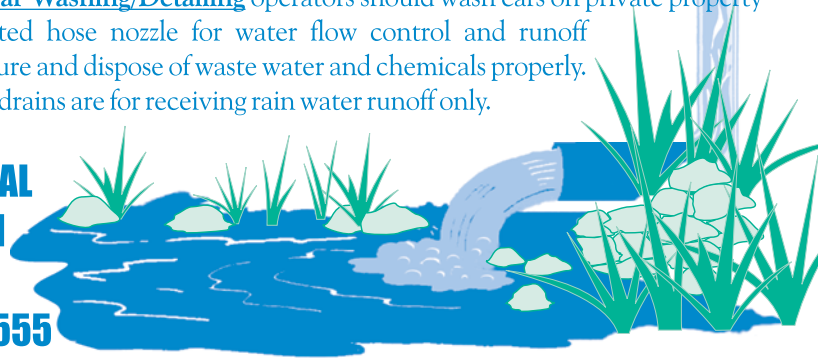
Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

...ONLY RAIN... DOWN THE STORM DRAIN

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

SAMPLE STENCIL

PER BMP SD-13

CONTECH®
ENGINEERED SOLUTIONS

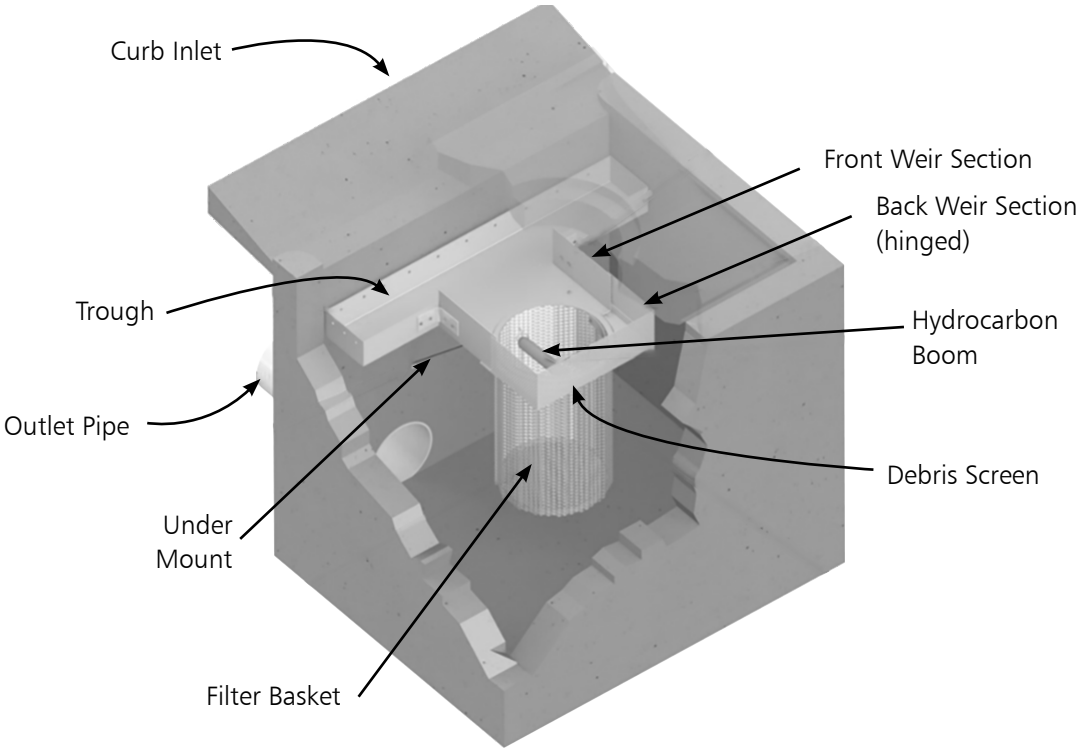
Bio Clean® Curb Inlet Filter
Operation & Maintenance Manual

Bio Clean®

Operation & Maintenance

Contech's Bio Clean® Curb Inlet Filter is a stormwater device designed to remove high levels of trash, debris, sediments and hydrocarbons. The filter is available in several configurations including trash full capture,filter fabric, and Kraken membrane filter variations. This manual covers maintenance procedures of the trash full capture and filter fabric configurations. A supplemental manual is available for the Kraken variations. The innovative trough & weir system is mounted along the curb face and directs incoming stormwater toward the filter basket which is positioned "directly" under the manhole access opening regardless of its location in the catch basin. This innovative design allows the filter to be cleaned from finish surface without access into the catch basin, therefore drastically reducing maintenance time and eliminating confined space entry. The filter has a lifting handle allowing for the filter to be removed easily through the manhole. The weir also folds up to allow for unimpeded access into the basin for routine maintenance or pipe jetting.

As with all stormwater BMPs, inspection and maintenance on the Curb Inlet Filter is necessary. Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess site-specific loading conditions. This is recommended because pollutant loading can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding of roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years. Without appropriate maintenance a BMP can exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Curb Inlet Filter:

- Contech Inspection Form (contained within this manual).
- Manhole hook or appropriate tools to remove access hatches and covers.
- Appropriate traffic control signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections or maintenance of the system.

Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Curb Inlet Filter are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long-term inspection and maintenance interval requirements.

The Curb Inlet Filter can be inspected though visual observation without entry into the catch basin. All necessary pre-inspection steps must be carried out before inspection occurs, such as safety measures to protect the inspector and nearby pedestrians from any dangers associated with an open access hatch or manhole. Once the manhole has been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the catch basin through the manhole. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the catch basin.
- Look for any out of the ordinary obstructions in the catch basin, trough, weir, filter basket, basin floor our outlet pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, foliage and sediment accumulated inside the filter basket. Record this information on the inspection form.
- Observe the condition and color of the hydrocarbon boom. Record this information on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components.
- Obstructions in the filter basket and its bypass.
- Excessive accumulation of trash, foliage and sediment in the filter basket. Maintenance is required when the basket is greater than half-full.
- The following chart shows the 50% and 100% storage capacity of each filter height:

Basket Model	Filter Basket Diameter (inches)	Filter Basket Height (inches)	50% Storage Capacity (CF)	100% Storage Capacity (CF)
BC-CURB-24	16	24	1.77	3.53
BC-CURB-12	16	12	0.88	1.77

Maintenance Equipment

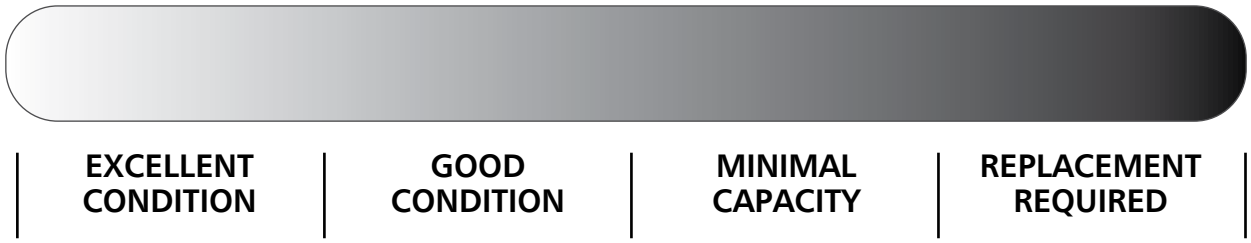
It is recommended that a vacuum truck be utilized to minimize the time required to maintain the Curb Inlet Filter though it can easily cleaned by hand:

- Contech Maintenance Form (contained in O&M Manual).
- Manhole hook or appropriate tools to access hatches and covers.
- Appropriate safety signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine maintenance of the system. Small or large vacuum truck (with pressure washer attachment preferred).

Maintenance Procedures

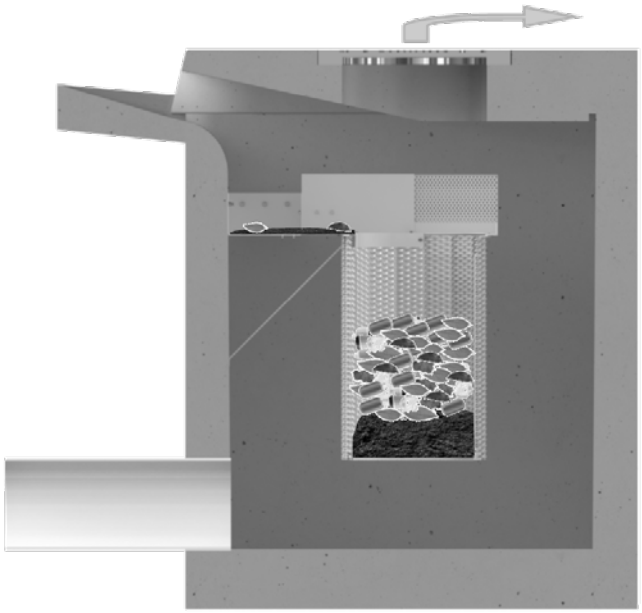
It is recommended that maintenance occurs at least two days after the most recent rain event to allow debris and sediments to dry out. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the Curb Inlet Filter can be performed from finish surface without entry into catch basin utilizing a vacuum truck. Some unique and custom configurations may create conditions which would require entry for some or all of the maintenance procedures. Once all safety measures have been set up cleaning of the Curb Inlet Filter can proceed as followed:

- Remove all manhole cover or access hatches (traffic control and safety measures to be completed prior).
- Using an extension on a vacuum truck position the hose over the opened manhole or hatch opening. Insert the vacuum hose down into the filter basket and suck out trash, foliage and sediment. A pressure wash is recommended and will assist in spraying of any debris stuck on the side or bottom of the filter basket. If the filter basket is full, trash, sediment, and debris will accumulate inside the trough and weir sections of the system. Once the filter basket is clean power wash the weir and trough pushing these debris into the filter basket (leave the hose in the filter basket during this process so entering debris will be sucked out). Power wash off the trough, weir, debris screen, and filter basket sides and bottom.
- Next remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom. Booms can be ordered directly from the manufacturer.
- Follow is a replacement indication color chart for the hydrocarbon booms:

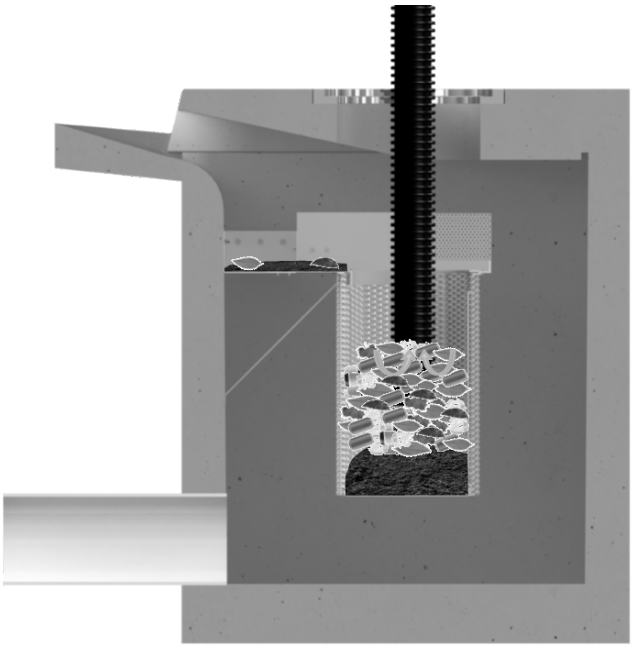


- The last step is to close up and replace the manhole or hatch and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.
- Disposal requirements for recovered pollutants may vary depending on local guidelines. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.
- In the case of damaged components, replacement parts can be ordered from the manufacturer. Hydrocarbon booms can also be ordered directly from the manufacturer as previously noted.

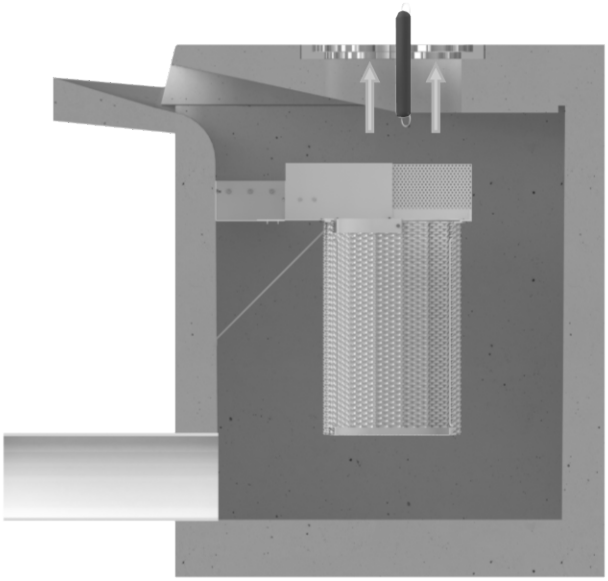
Maintenance Sequence



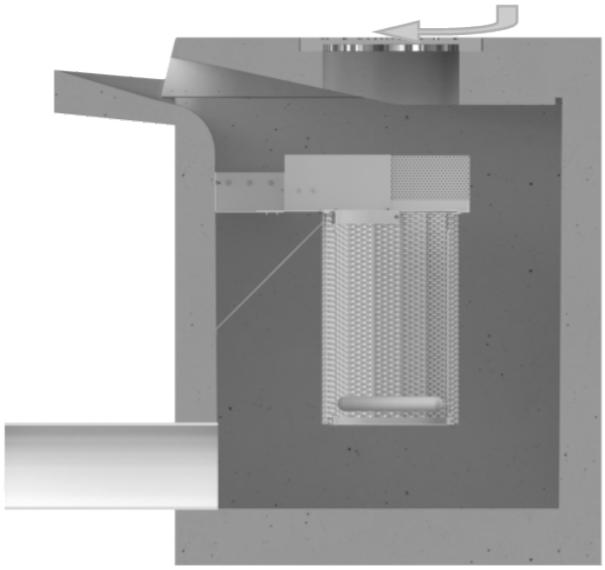
1. *Remove manhole cover and set up vacuum truck to clean the filter basket. Ensure all traffic control and safety measures are in place.*



2. *Insert the vacuum hose down into the filter basket and suck out debris. Use a pressure washer to assist in vacuum removal. Pressure wash off the weir and trough and vacuum out any remaining debris.*



3. *Remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom.*



4. *Close up and replace the manhole or hatch and remove all traffic control. All removed debris and pollutants shall be disposed of following local and state requirements.*

CONTECH®
ENGINEERED SOLUTIONS

Inspection and Maintenance Report
Catch Basin Only

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/_____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By)

(Date)

Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Catch Basin Size	Evidence of Illicit Discharge?	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Signs of Structural Damage?	Functioning Properly or Maintenance Needed?
1	Lat: Long:							
2	Lat: Long:							
3	Lat: Long:							
4	Lat: Long:							
5	Lat: Long:							
6	Lat: Long:							
7	Lat: Long:							
8	Lat: Long:							
10	Lat: Long:							
11	Lat: Long:							
12	Lat: Long:							

Comments:

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ENGINEERED SOLUTIONS

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800-338-1122

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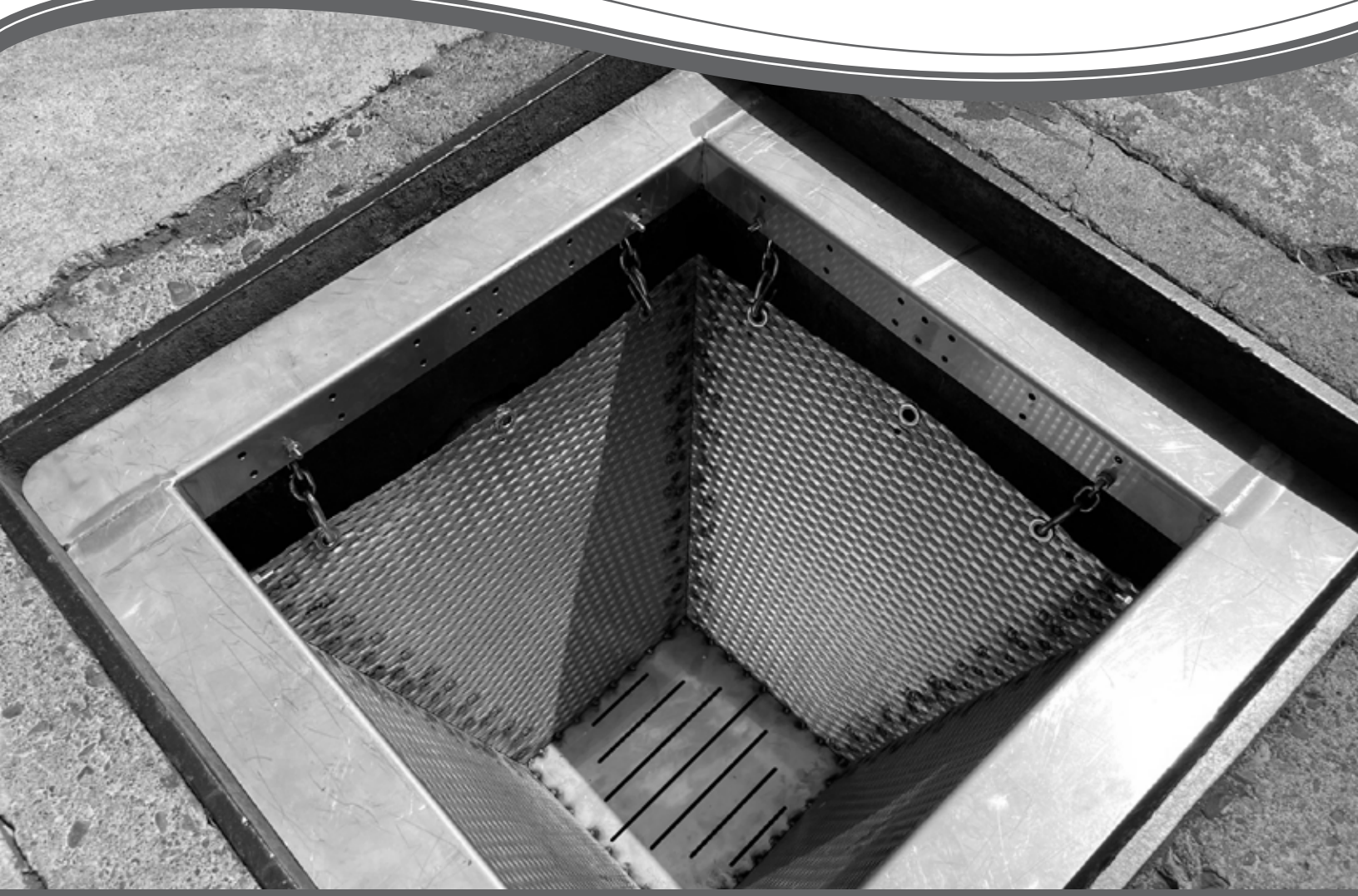
SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Curb Inlet Filter Operation & Maintenance Manual 10/22

CONTECH®
ENGINEERED SOLUTIONS

Bio Clean® Grate Inlet Filter
Operation & Maintenance Manual

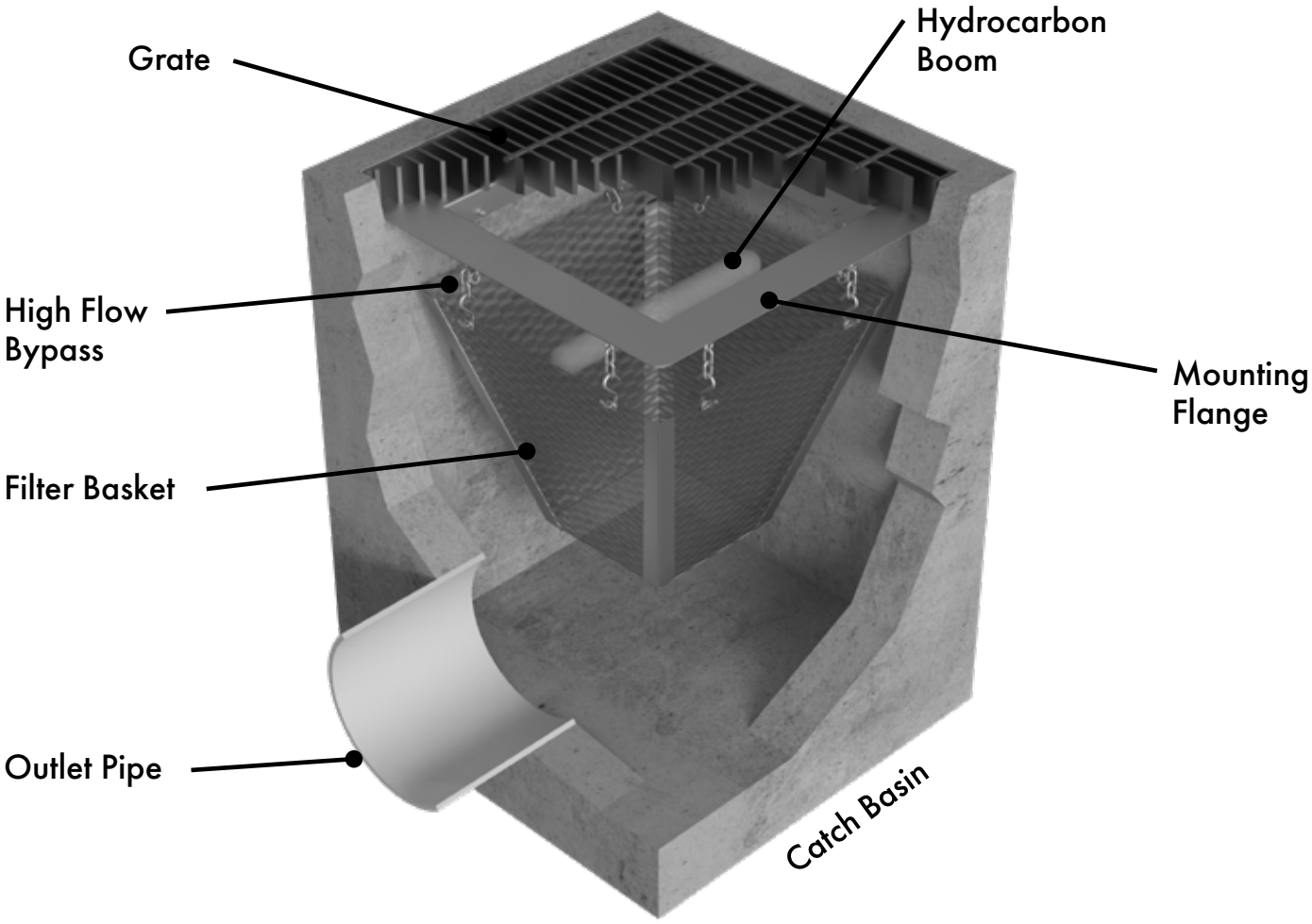


Bio Clean®

Operation & Maintenance

Contech's Bio Clean® Grate Inlet Filter is a stormwater device designed to remove high levels of trash, debris, sediments and hydrocarbons. The filter is available in several configurations including trash full capture, Kraken® membrane filter, and fabric filter variations. This manual covers maintenance procedures of the trash full capture and fabric filter configurations. A supplemental manual is available for the Kraken variation. The trash full capture filter is made of 100% stainless steel, while the fabric filter is made of a woven monofilament geotextile fabric. Both filters are available at various sizes and depths allowing them to fit in any grated catch basin inlet. The filters heavy duty construction allows for cleaning with any vacuum truck. The filter can also easily be cleaned by hand.

As with all stormwater BMPs, inspection and maintenance on the Grate Inlet Filter is necessary. Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess site-specific loading conditions. This is recommended because pollutant loading can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding of roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years. Without appropriate maintenance, a BMP can exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



System Diagram

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Grate Inlet Filter:

- Contech Inspection Form (contained within this manual).
- Manhole hook or appropriate tools to remove access hatches and covers.
- Appropriate traffic control signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections or maintenance of the system.

Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Grate Inlet Filter are quick and easy. As mentioned above, the first year should be seen as the maintenance interval establishment phase. During the first year, more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long-term inspection and maintenance interval requirements.

The Grate Inlet Filter can be inspected though visual observation. All necessary pre-inspection steps must be carried out before inspection occurs, such as safety measures to protect the inspector and nearby pedestrians from any dangers associated with an open grated inlet. Once the grate has been safely removed, the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the filter with the grate removed.
- Look for any out of the ordinary obstructions on the grate or in the filter and its bypass. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, foliage and sediment accumulated inside the filter basket. Record this information on the inspection form.
- Observe the condition and color of the hydrocarbon boom. Record this information on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components.
- Obstructions in the filter basket and its bypass.
- Excessive accumulation of trash, foliage and sediment in the filter basket. Maintenance is required when the basket is greater than half-full.
- The following chart shows the 50% and 100% storage capacity of each filter height:

Basket Model	Height[1] (inches)	Top Width (inches)	Top Length (inches)	Bottom Width (inches)	Bottom Length (inches)	50% Storage Capacity (CF)	100% Storage Capacity (CF)
BIO-GRATE-FULL/ FABRIC-12-12-12	6.00	10.00	10.00	8.31	8.31	0.15	0.30
BIO-GRATE-FULL/ FABRIC-18-18-12	6.00	15.00	15.00	12.50	12.50	0.33	0.66
BIO-GRATE-FULL/ FABRIC-24-24-12	6.00	20.00	20.00	16.69	16.69	0.59	1.18
BIO-GRATE-FULL/ FABRIC-24-24-24	18.00	20.00	20.00	10.00	10.00	1.22	2.44
BIO-GRATE-FULL/ FABRIC-24-40-12	6.00	20.00	30.00	16.69	25.00	0.88	1.76
BIO-GRATE-FULL/ FABRIC-24-40-24	18.00	20.00	30.00	10.00	15.00	1.82	3.64
BIO-GRATE-FULL/ FABRIC-36-36-24	18.00	30.00	30.00	15.00	15.00	2.73	5.46
BIO-GRATE-FULL/ FABRIC-24-40-24	18.00	20.00	30.00	10.00	15.00	1.82	3.64
BIO-GRATE-FULL/ FABRIC-36-36-24	18.00	30.00	30.00	15.00	15.00	2.73	5.46

[1] Refers to basket height, total system height is equal to basket height plus 6 inches for bypass.

Maintenance Equipment

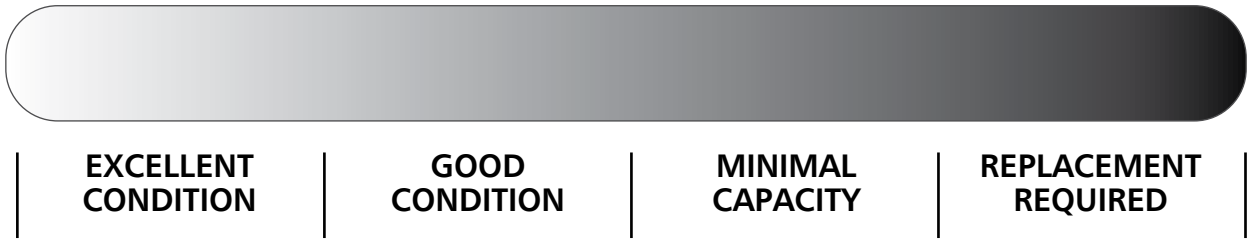
It is recommended that a vacuum truck be utilized to minimize the time required to maintain the Curb Inlet Filter, though it can easily be cleaned by hand:

- Contech Maintenance Form (contained in O&M Manual).
- Manhole hook or appropriate tools to remove the grate.
- Appropriate safety signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine maintenance of the system. Small or large vacuum truck (with pressure washer attachment preferred).

Maintenance Procedures

It is recommended that maintenance occurs at least two days after the most recent rain event to allow debris and sediments to dry out. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the Grate Inlet Filter can be performed utilizing a vacuum truck. Once all safety measures have been set up, cleaning of the Grate Inlet Filter can proceed as followed:

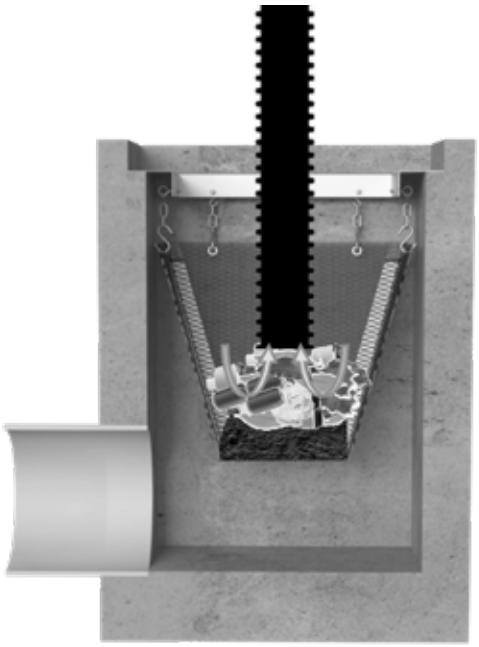
- Remove grate (traffic control and safety measures to be completed prior)
- Using an extension on a vacuum truck, position the hose over the opened catch basin. Insert the vacuum hose down into the filter basket and suck out trash, foliage and sediment. A pressure wash is recommended and will assist in spraying off any debris stuck on the side or bottom of the filter basket. Power wash off the filter basket sides and bottom.
- Next, remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required, install and fasten on a new hydrocarbon boom. Booms can be ordered directly from the manufacturer.
- The following is a replacement indication color chart for the hydrocarbon booms:



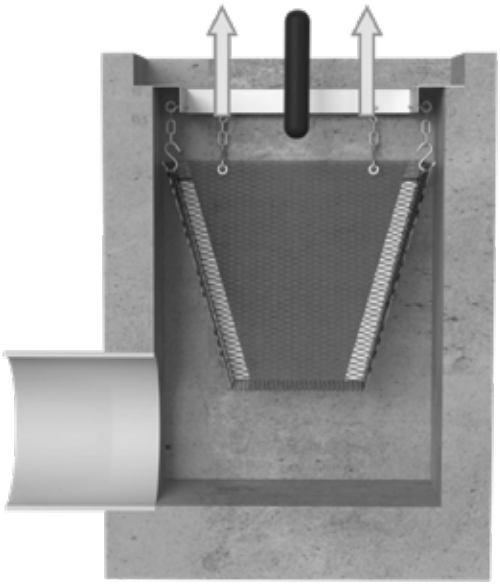
- The last step is to replace the grate and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.
- Disposal requirements for recovered pollutants may vary depending on local guidelines. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.
- In the case of damaged components, replacement parts can be ordered from the manufacturer. Hydrocarbon booms can also be ordered directly from the manufacturer as previously noted.

Maintenance Sequence

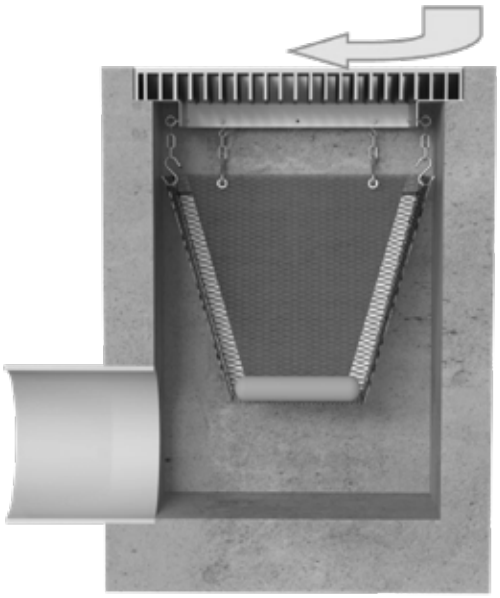
1. Remove grate and set up vacuum truck to clean the filter basket.



2. Insert the vacuum hose down into the filter basket and suck out debris. Use a pressure washer to assist in vacuum removal. Pressure wash off screens.



3. Remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the information in the chart above. If replacement is required, install and fasten on a new hydrocarbon boom.



4. Close up and replace the grate and remove all traffic control. All removed debris and pollutants shall be disposed of following local and state requirements.

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Inspection and Maintenance Report
Catch Basin Only

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/_____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By)

(Date)

Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Catch Basin Size	Evidence of Illicit Discharge?	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Signs of Structural Damage?	Functioning Properly or Maintenance Needed?
1	Lat: Long:							
2	Lat: Long:							
3	Lat: Long:							
4	Lat: Long:							
5	Lat: Long:							
6	Lat: Long:							
7	Lat: Long:							
8	Lat: Long:							
10	Lat: Long:							
11	Lat: Long:							
12	Lat: Long:							

Comments:

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Grate Inlet Filter Operation & Maintenance Manual 08/22

Bio Clean
A QUIKRETE® COMPANY

Inspection and Maintenance Report
Catch Basin Only

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/_____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ ☐

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By)

(Date)

Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Catch Basin Size	Evidence of Illicit Discharge?	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Signs of Structural Damage?	Functioning Properly or Maintenance Needed?
1	Lat: Long:							
2	Lat: Long:							
3	Lat: Long:							
4	Lat: Long:							
5	Lat: Long:							
6	Lat: Long:							
7	Lat: Long:							
8	Lat: Long:							
10	Lat: Long:							
11	Lat: Long:							
12	Lat: Long:							

Comments:

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear
Operation & Maintenance Manual

MODULAR WETLANDS

MODULAR WETLANDS® LINEAR
OPERATION & MAINTENANCE MANUAL

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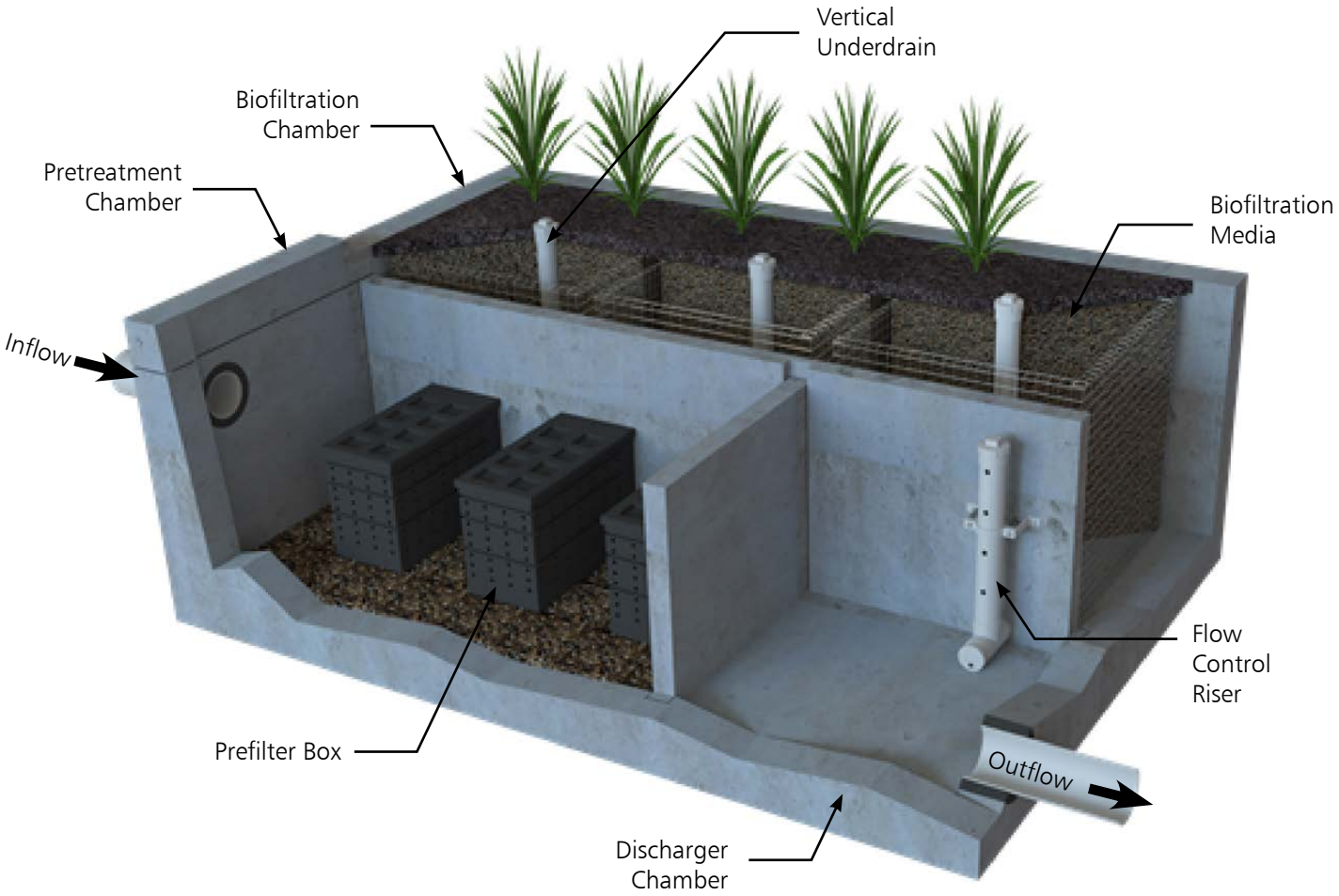
OVERVIEW

The Modular Wetlands® Linear Biofilter is designed to remove high levels of trash, debris, sediments, nutrients, metals, and hydrocarbons. Its simple design allows for quick and easy installation. The system is housed in a standard precast structure and can be installed at various depths to meet site-specific conditions.

INTRODUCTION

This is the Modular Wetlands Linear Biofilter operation and maintenance manual. Before starting, read the instructions and equipment lists closely. It is important to follow all necessary safety procedures associated with state and local regulations. Some steps required confined space entry. Please contact Contech for more information on pre-authorized third party contractors who can provide installation services in your area. For a list of service providers in your area please visit: www.conteches.com/maintenance.



INSTRUCTIONS

INSPECTION SUMMARY

Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the Modular Wetlands Linear:

- Modular Wetlands Linear Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- 7/16" open or closed ended wrench
- Large permanent black marker (initial inspections only - first year)

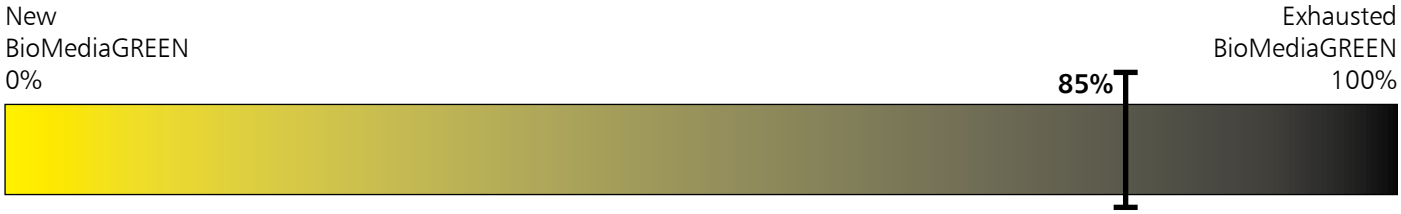
Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system

INSPECTION AND MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics, and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the biofiltration chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

INSPECTION PROCESS

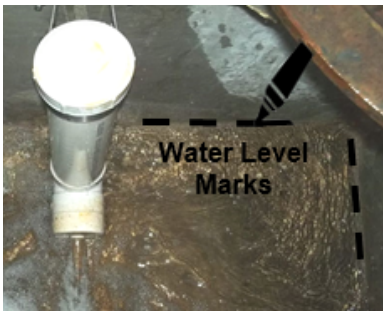
1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The prefilter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and is in need of replacement.



6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.
7. The discharge chamber houses the orifice control structure, drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL - top of bypass weir). The water level of the flowing water should be compared to the watermark level on the side walls, which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form if there is any difference in level from the watermark in inches.

NOTE: During the first few storms, the water level in the outflow chamber should be observed and a 6" long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where the line should be drawn. This line is a reference point for future inspections of the system.

Water level in the discharge chamber is a function of flow rate and pipe size. Observation of the water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when the system is at 100% capacity (water level at maximum level in the pre-treatment chamber). If future water levels are below this mark when the system is at 100% capacity, this is an indicator that maintenance to the pre-filter cartridges may be needed.



8. Finalize the inspection report for analysis by the maintenance manager to determine if maintenance is required.

MAINTENANCE INDICATORS

Based upon the observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges
- Obstructions in the system or its inlet and/or outlet pipes
- Excessive accumulation of floatables in the pretreatment chamber in which the length and width of the chamber is fully impacted more than 18". See photo below.
- Excessive accumulation of sediment in the pretreatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged, replacement is required.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.

INSPECTION PROCESS

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models). The following photos show the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged, replacement is required.

- Overgrown vegetation.

- Water level in the discharge chamber during 100% operating capacity (pretreatment chamber water level at max height) is lower than the water mark by 20%.

MAINTENANCE SUMMARY

The time has come to maintain your Modular Wetlands® Linear. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

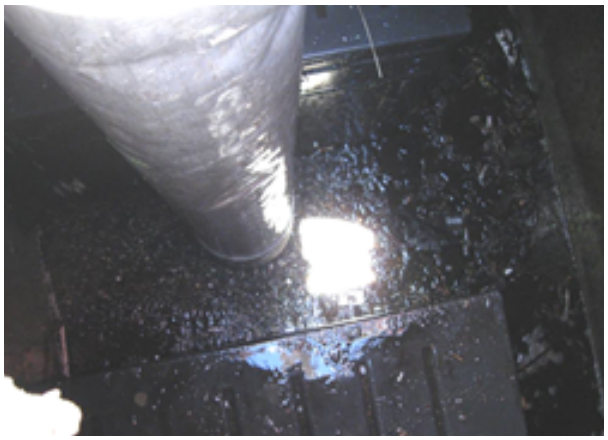
- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.

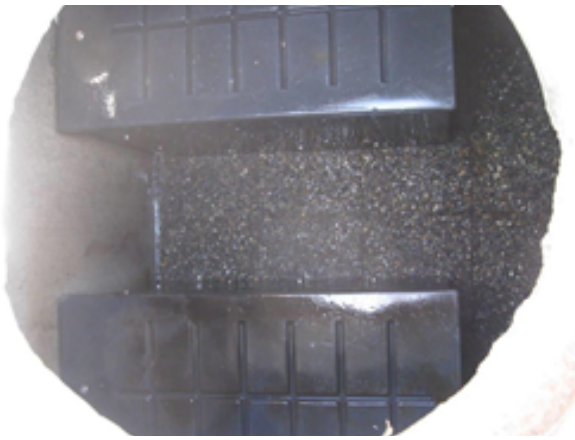
The following is a list of equipment to required for maintenance of the Modular Wetlands® Linear:

- Modular Wetlands Linear Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight, and eye protection
- 7/16" open or closed ended wrench
- Vacuum assisted truck with pressure washer
- Replacement BioMediaGREEN for pre-filter cartridges if required (order from one of Contech's Maintenance Team members at https://www.conteches.com/maintenance).

MAINTENANCE | PRETREATMENT CHAMBER

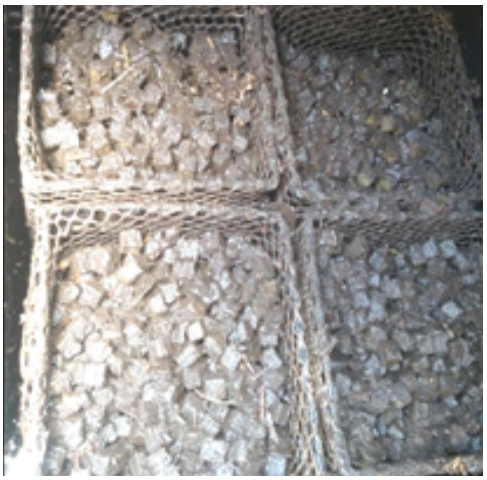
1. Remove access cover over pre-treatment chamber and position vacuum truck accordingly.
2. With a pressure washer, spray down pollutants accumulated on walls and pre-filter cartridges.
3. Vacuum out pre-treatment chamber and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the floor until the pervious pavers are visible and clean.
4. If pre-filter cartridges require media replacement, continue to step 5. If not, replace access cover and move to step 11.





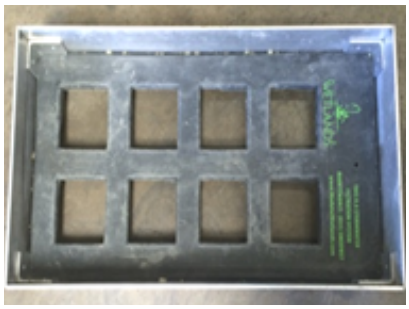
MAINTENANCE | PREFILTER CARTRIDGES

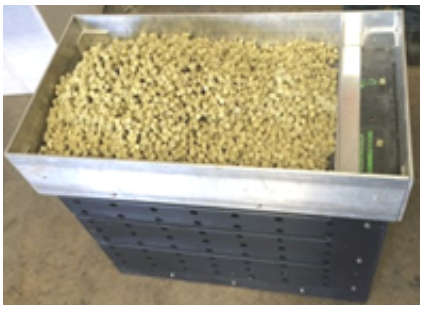
5. After successfully cleaning out the pre-treatment chamber (previous page) enter the pre-treatment chamber.
6. Unscrew the two bolts (circles shown below) holding the lid on each cartridge filter and remove lid.



7. Place the vacuum hose over each individual media filter to suck out filter media.

8. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and it's media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.
9. Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture-provided refilling tray and place on top of the cartridge. Fill the tray with new bulk media and shake down into place. Using your hands, lightly compact the media into each filter cage. Once the cages are full, remove the refilling tray and replace the cartridge top, ensuring bolts are properly tightened.





10. Exit the pre-treatment chamber. Replace access hatch or manhole cover.

MAINTENANCE | BIOFILTRATION CHAMBER

11. In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The Modular Wetlands Linear utilizes vegetation similar to surrounding landscape areas, therefore trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.

12. Each vertical under drain on the biofiltration chamber has a removable (threaded cap) that can be taken off to check any blockages or root growth. Once removed, a jetting attachment can be used to clean out the under drain and orifice riser.
13. As with all biofilter systems, at some point the biofiltration media (WetlandMedia) will need to be replaced. Either because of physical clogging of sorptive exhaustion of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading. Utilize the vacuum truck to vacuum out the media by placing the hose into the chamber. Once all the media is removed use the power washer to spray down all the netting on the outer metal cage. Inspect the netting for any damage or holes. If the netting is damaged it can be repaired or replaced with guidance by the manufacturer.
14. Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new WetlandMedia. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1000 and 2000 lbs. A lifting apparatus (backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Fill the media cages up to the same level as the old media. Replant with vegetation.

MAINTENANCE | DISCHARGE CHAMBER

15. Remove access hatch or manhole cover over discharge chamber.
16. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and lift up drain down filter housing to remove used BioMediaGREEN filter block as shown below. *NOTE: Drain down filter is only found on units installed in California prior to 2023. If no drain down filter is present, skip steps 16 and 17.*

17. Insert a new BioMediaGREEN filter block and lock drain down filter housing back in place.
18. Replace access hatch or manhole cover over discharge chamber.

NOTES

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Inspection Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____ / ____ / _____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

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(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

CONTECH®
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Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/_____ Time _____AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

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Modular Wetlands Maintenance Guide 1/2023

CONTECH®
ENGINEERED SOLUTIONS

Contech® CMP Detention & Infiltration Maintenance Guide

CONTECH®
CMP DETENTION SYSTEMS

Maintenance

Underground storm water detention and retention systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size or configuration of the system.

Inspection

Inspection is the key to effective maintenance and is easily performed. CONTECH recommends ongoing quarterly inspections of the accumulated sediment. Sediment deposition and transport may vary from year to year and quarterly inspections will help insure that systems are cleaned out at the appropriate time. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. It is very useful to keep a record of each inspection. A sample inspection log is included for your use.

Systems should be cleaned when inspection reveals that accumulated sediment or trash is clogging the discharge orifice. CONTECH suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Cleaning

Maintaining an underground detention or retention system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities.

Inspection & Maintenance Log Sample Template

_____" Diameter System			Location: Anywhere, USA		
Date	**Depth of Sediment**	**Accumulated Trash**	**Maintenance Performed**	**Maintenance Personnel**	**Comments**
12/01/10	2"	None	Removed Sediment	B. Johnson	Installed
03/01/11	1"	Some	Removed Sediment and Trash	B. Johnson	Swept parking lot
06/01/11	0"	None	None		
09/01/11	0"	Heavy	Removed Trash	S. Riley	
12/01/11	1"	None	Removed Sediment	S. Riley	
04/01/12	0"	None	None	S. Riley	
04/15/01	2	Some	Removed Sediment and Trash	ACE Environmental Services	

SAMPLE

CONTECH®
CMP DETENTION SYSTEMS

Support

Drawings and specifications are available at www.ContechES.com.

Site-specific support is available from our engineers.

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PSI Pacific Southwest Industries

ENGINEERED - PUMPS/FLUID HANDLING & DISPOSAL SYSTEMS - PACKAGED LIFT STATIONS

LIFT STATION REQUIRED MAINTENANCE

The lift station should be inspected twice a year for proper operation, and should be checked for overabundance of solid matter such as grease and soap buildup.

Proper operation and inspection would include the following:

1) Automatic operation of the system by float activation. One pump starting at lead on levels, second pump starting at high level conditions; manual operation by use of the selector switches.

2) Inspect floats for proper elevation and for proper movement. Correct any obstructions.

3) Check incoming power for proper voltage. Check voltage at motor connections.

4) Check amperage of each motor.

5) Hose down lift station to clean the walls of the wet well, pumps and floats.

MECHANICAL SEAL INSPECTION OF PUMPS

Inspection of the mechanical seals should be done every two years.

The inspection will include the following:

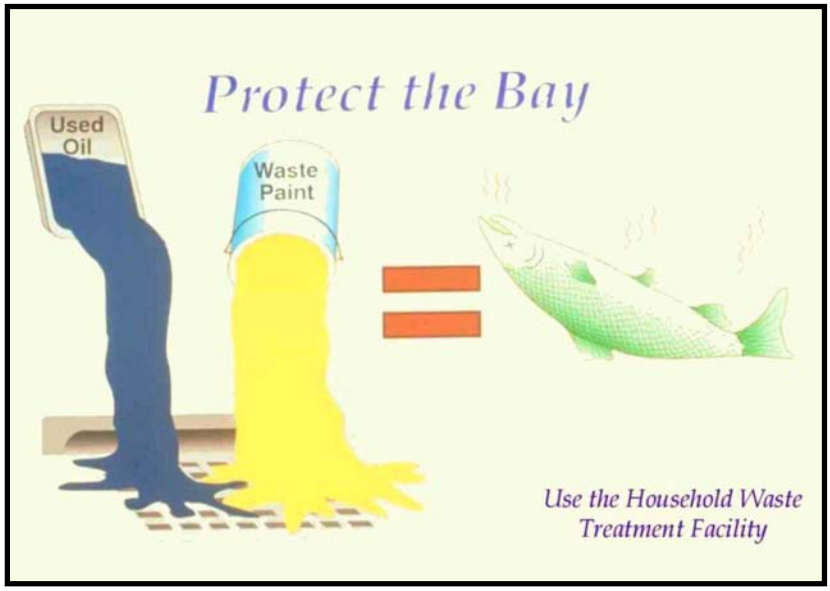
Pull pump out of wet well. Remove oil seal plug and inspect the oil for clarity. Clear oil indicates no water intrusion and chamber is to be topped off with 30 weight turbine oil. If oil is cloudy the mechanical seal and oil needs to be replaced.

PSI recommends that preventive maintenance and service be performed by a qualified technician.

Any question regarding your lift station should be directed to Scott Richardson at 800-358-9095.

P O Box 520 Lake Elsinore, CA 92531 – 18541 Collier Ave., Lake Elsinore, CA 92530
(800) 358-9095 (909) 674-2144 fax (909) 674-9444 CSL #583052
www.psipumps.com Email: info@psipumps.com

Non-Stormwater Discharges SC-10



Art Credit: Margie Winter

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

CASQA
California Stormwater Quality Association

Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain*.

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Types and quantities (in some cases) of wastes

  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Outdoor Loading/Unloading SC-30

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of material to rainfall whenever possible.
- Prevent stormwater run-on.
- Check equipment regularly for leaks.

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Suggested Protocols

Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a deadend.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all and ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Have an emergency spill cleanup plan readily available.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Other Considerations (Limitations and Regulations)

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
- It may not be possible to conduct transfers only during dry weather.

Requirements

Costs

Costs should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

- The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.

  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Approach

Pollution Prevention

- Perform the activity during dry periods.
- Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

- Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
- Cover the work area with a permanent roof if possible.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention). If possible, connect process equipment area to public sewer or facility wastewater treatment system. Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Dry clean the work area regularly.

Training

- Train employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.
- Train employee and contractors in proper techniques for spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

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- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.
- Inspect storage areas regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.

Other Considerations

- Providing cover may be expensive.
- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Requirements

Costs

Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.

Maintenance

- Conduct routine preventive maintenance, including checking process equipment for leaks.
- Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

If stormwater becomes polluted, it should be captured and treated. If you do not have your own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

Industries that generate large volumes of process wastewater typically have their own treatment system and corresponding permit. These industries have the discretion to use their wastewater treatment system to treat stormwater within the constraints of their permit requirements for process treatment. It may also be possible for the industry to discharge the stormwater directly to an effluent outfall without treatment as long as the total loading of the discharged process

water and stormwater does not exceed the loading had a stormwater treatment device been used. This could be achieved by reducing the loading from the process wastewater treatment system. Check with your Regional Water Quality Control Board or local sewering agency, as this option would be subject to permit constraints and potentially regular monitoring.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net

Waste Handling & Disposal SC-34

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

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- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures
  - Bid packages (services and supplies)
- Materials
  - Preferred or approved product and supplier lists
  - Product and supplier evaluation criteria
  - Training sessions and manuals
  - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

- Auto Recycling Project
- Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

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- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Building Repair and Construction SC-42

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Recycle

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Modifications are common particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

Approach

Pollution Prevention

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practical.
- Buy recycled products to the maximum extent practical.
- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.

- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Suggested Protocols

Repair & Remodeling

- Follow BMPs identified in Construction BMP Handbook.
- Maintain good housekeeping practices while work is underway.
- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Cover materials of particular concern that must be left outside, particularly during the rainy season.
- Do not dump waste liquids down the storm drain.
- Dispose of wash water, sweepings, and sediments properly.
- Store materials properly that are normally used in repair and remodeling such as paints and solvents.
- Sweep out the gutter or wash the gutter and trap the particles at the outlet of the downspout if when repairing roofs, small particles have accumulated in the gutter. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.
- Properly store and dispose waste materials generated from construction activities. See Construction BMP Handbook.
- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.
- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.
- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100% effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.

- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is significant risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Training

Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Limitations

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more requirements for larger projects. The companion "Construction Best Management Practice Handbook" contains specific guidance and best management practices for larger-scale projects.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.

Requirements

Costs

These BMPs are generally low to modest in cost.

Maintenance

N/A

Supplemental Information

Further Detail of the BMP

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective "in-line" treatment devices. See Treatment Control Fact Sheet TC-20 Wet Pond/Basin in Section 5 of the New Development and Redevelopment Handbook regarding design criteria. Include in the catch basin a "turn-down" elbow or similar device to trap floatables.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

CASQA
California Stormwater Quality Association

SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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CALIFORNIA STORMWATER QUALITY ASSOCIATION

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

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- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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