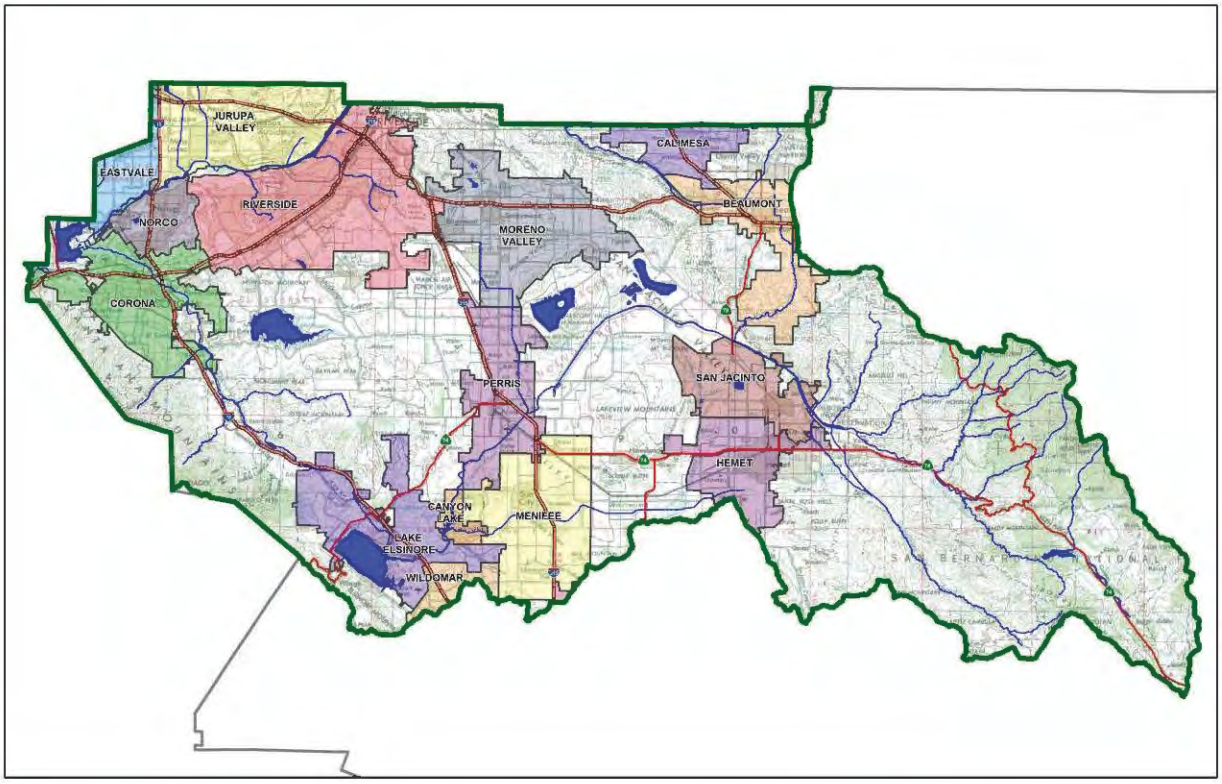
Project Specific Water Quality Management Plan

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

Project Title: TTM No. 39162

Development No: TTM No. 39162

Design Review/Case No: LWQ25-0005



☒ **Preliminary**
☐ **Final**

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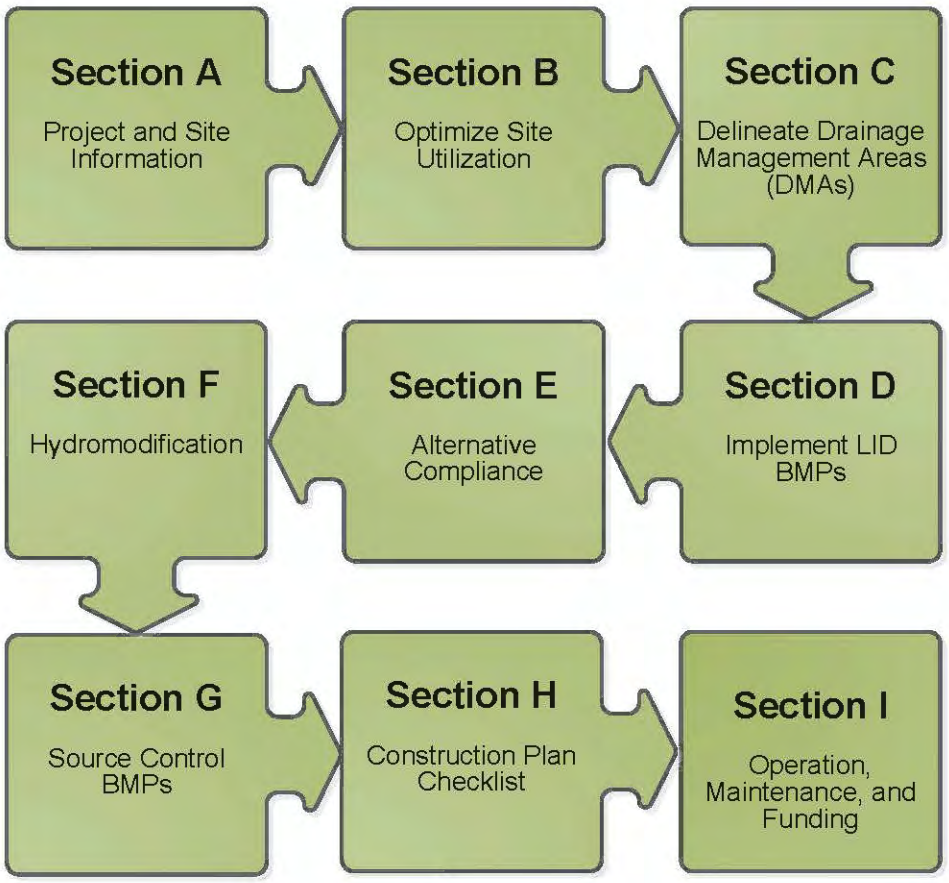
A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Warmington Residential by C&V Consulting, Inc. for the TTM No. 39162 project.

This WQMP is intended to comply with the requirements of the City of Moreno Valley, Ordinance 827 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Moreno Valley Water Quality Ordinance (Municipal Code Chapter 8.10).

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

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

PREPARER'S CERTIFICATION

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

Preparer's Signature	Date
Dane P. McDougall, PE 80705 Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 7
A.3 Additional Permits/Approvals required for the Project: 8

Section B: Optimize Site Utilization (LID Principles) 9

Section C: Delineate Drainage Management Areas (DMAs) 10

Section D: Implement LID BMPs 12

D.1 Infiltration Applicability 12
D.2 Harvest and Use Assessment 13
D.3 Bioretention and Biotreatment Assessment 15
D.4 Feasibility Assessment Summaries 16
D.5 LID BMP Sizing 17

Section E: Alternative Compliance (LID Waiver Program) 18

E.1 Identify Pollutants of Concern 19
E.2 Stormwater Credits 20
E.3 Sizing Criteria 20
E.4 Treatment Control BMP Selection 25

Section F: Hydromodification 27

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

Section G: Source Control BMPs 29

Section H: Construction Plan Checklist 32

Section I: Operation, Maintenance and Funding 33

List of Tables

Table A.1 Identification of Receiving Waters 7
Table A.2 Other Applicable Permits 8
Table C.1 DMA Classifications 10
Table C.2 Type 'A', Self-Treating Areas 10
Table C.3 Type 'B', Self-Retaining Areas 10
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas 11
Table C.5 Type 'D', Areas Draining to BMPs 11
Table D.1 Infiltration Feasibility 12
Table D.2 LID Prioritization Summary Matrix 16
Table D.3 DCV Calculations for LID BMPs 17
Table E.1 Potential Pollutants by Land Use Type 19
Table E.2 Water Quality Credits 20
Table E.3 Treatment Control BMP Sizing 20
Table E.4 Treatment Control BMP Selection 25
Table F.1 Hydrologic Conditions of Concern Summary 27
Table G.1 Permanent and Operational Source Control Measures 30
Table H.1 Construction Plan Cross-reference 32

List of Appendices

Appendix 1: Maps and Site Plans 34
Appendix 2: Construction Plans 35
Appendix 3: Soils Information 36
Appendix 4: Historical Site Conditions 37
Appendix 5: LID Infeasibility 38
Appendix 6: BMP Design Details 39
Appendix 7: Hydromodification 40
Appendix 8: Source Control 41
Appendix 9: O&M 42
Appendix 10: Educational Materials ..... - 6 -

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Residential Development
Planning Area:	
Community Name:	
Development Name:	VTTM No. 39162
PROJECT LOCATION	
Latitude & Longitude (DMS): 33.917, -117.1703	
Project Watershed and Sub-Watershed: Santa Ana River Watershed	
APN(s): 478-070-013, 478-070-014, 478-080-004, 478-080-005	
Map Book and Page No.: MB 11/10	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential
Proposed or Potential SIC Code(s)	
Area of Project Footprint (SF)	626,935.3
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	501,548.3
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:	
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)	A
What is the Water Quality Design Storm Depth for the project?	0.66

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.

The proposed site is located at 28136 Brodiaea Avenue in the City of Moreno Valley, County of Riverside. The site is bordered by Brodiaea Avenue to the south, existing single-family residential to the north, and vacant landscaping to the east and west.

The development site has a gross area of 14.39 acres. A small portion of the site consists of a few buildings, and the remainder of the site remains vacant with grass covered landscaping. The northerly offsite residential areas upstream of the development will be diverted around the perimeter of the proposed project site that are not included as part of this preliminary hydrologic analysis for onsite mitigation due to perimeter controls. Impact to downstream receiving water is not anticipated as flow will following historical drainage pattern.

The proposed project site development consists of 134 residential lots over an approximate area of 14.39-acre site. The proposed development includes drive aisles, parking, landscaping, walkways, and common open space areas. The northerly offsite residential areas upstream of the development will be diverted around the perimeter of the proposed project site. Offsite public street improvements on Brodiaea Avenue are proposed to be treated via separate grass swale. Curb cores are proposed to convey street flow into the grass swale, then route through underdrain back onto Street downstream.

Preliminary onsite grading proposes to collect runoff at multiple inlets spread throughout the site that connects to its respective Modular Wetland System (MWS) for biotreatment which then routes runoff into to the retention basin for peak outflow mitigation. The proposed development was analyzed as a single drainage management area for as the entire site drains to a single outlet downstream at the retention system. Subareas are analyzed for onsite flow-through MWS sizing for the water quality design storm event. The basin is designed to meet mitigation requirements with a control pump station routing collected runoff to the parkway drain adjacent to Brodiaea Avenue. A weir channel from the basin to the back of the parkway drain is also provided to mitigate and control overflow. Emergency overflow is provided with site grading to the outlet preserving historical drainage patterns.

A.2 Identify Receiving Waters

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

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris Valley Channel	Iron, Oil and Grease, Indicator Bacteria	AGR, GWR, REC1, REC2, RARE, WARM, WILD	3 miles
San Jacinto River Reach 3	None	AGR, GWR, RARE, REC1, REC2, WARM, WILD	10 miles
Canyon Lake	Nutrients, Dissolved Oxygen, pH, Total Dissolved Solids, Ammonia	AGR, COMM, GWR, MUN REC1, REC2, WARM, WILD	17 miles

San Jacinto River Reach 1	Aluminum	AGR, GWR, MUN, RARE, REC1, REC2, WARM, WILD	19 miles
Lake Elsinore	Organic Enrichment/Low Dissolved Oxygen, Nutrients, Toxicity, Dissolved Oxygen, pH, PCBs, Total Dissolved Solids, DDT, Ammonia, Microcystins	COMM, RARE, REC1, REC2, WARM, WILD	20 miles
Temescal Creek Reach 1a	Copper, Iron, Oil and Grease, pH	REC1, REC2, WARM, WILD	19 miles
Santa Ana River Reach 3	Copper Lead, Toxicity, Pyrethroids, Bifenthrin, Indicator Bacteria	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	28 miles

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

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

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

Section B: Optimize Site Utilization (LID Principles)

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

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

Site Optimization

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

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

The existing drainage of the site is preserved per preliminary grading of the site. The proposed drainage system is also designed to route onsite outflow following historical drainage patterns.

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

The site is currently covered in grass with little to no existing plants or trees. The entire site will be disturbed and replanted with vegetation where feasible to site maximum extent. Final landscape plan to be provided during final engineer to confirm revegetation is provided.

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

Although natural soil infiltration rate per geotechnical investigation resulted in low tested rate, pervious landscaping is considered as part of the site design to maximize natural infiltration capacity where feasible.

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

Impervious areas are proposed only where necessary, such as structures, driveways, and walkways.

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

Runoff will be diverted to pervious areas adjacent to structures and walkways where feasible.

Section C: Delineate Drainage Management Areas (DMAs)

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

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
A	Asphalt/ Concrete Landscape	501,548.3 sqft 125,387.1 sqft	Type 'D' Type 'D'

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

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

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

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

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

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

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

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

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

DMA Name or ID	BMP Name or ID
BIO-1	Bio-treatment MWS Units
RET-1	Retention Basin

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: Tested infiltration rate less than 1.6 in/hr.		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

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

D.2 Harvest and Use Assessment

Please check what applies:

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

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

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

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If 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: 2.88 ac

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

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: 11.51 ac

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

Enter your EIATIA factor: 1.05

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: 12.08 ac

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

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
12.08 ac	2.88 ac

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: 495 Users

Project Type: Residential

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: 11.51 ac

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

Enter your TUTIA factor: 108 users per impervious acre

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: 1,243

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)
1,243	495

Other Non-Potable Use Feasibility

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

N/A

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

Average Daily Demand: N/A

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

Total Area of Impervious Surfaces: N/A

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

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

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

Minimum required use: N/A

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

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

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

Based on the infiltration rate by the project-specific geotechnical engineer, infiltration and bio-retention are not technically feasible and the suitable BMP is bio-treatment LID BMP. Therefore, the proposed site will be treated via proprietary Modular Wetland Systems (MWS) that drains to a retention basin for stormwater peak outflow routing. The MWS units are sized to accommodate the design storm event in Section E. The basin is sized to its maximum (34,129 cuft) per site constraint and provides the required storage for peak flow mitigation with conjunctive biotreatment (7,180 cuft) to its maximum extent.

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) [A]	Post-Project Surface Type	Effective Impervious Fraction, I [B]	DMA Runoff Factor [C]	DMA Areas x Runoff Factor [A] x [C]	*Retention Basin*		
						Design Storm Depth (in)	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
A	*501,548.3*	*Concrete*	*1*	*0.89*	*447,381.1*			
	125,387.1	*Landscape*	*0.1*	*0.11*	*13,850.0*			
	$A_T = \Sigma[A]$ = 626,935.4				$\Sigma = [D]$ = 461,231.1	[E] = 0.66	$[F] = \frac{[D] \times [E]}{12}$ = 25,367.7	*[G] = 7,180 (34,129)

[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

***The MWS units are sized to accommodate the design storm event in Section E. The basin is sized to its maximum (34,129 cuft) per site constraint and provides the required storage for peak flow mitigation with conjunctive biotreatment (7,180 cuft) to its maximum extent.**

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.

The proposed site will be fully treated via proprietary Modular Wetland System (MWS) sized hereon.

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 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

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

[1] Cannot Exceed 50%

[2] Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A] x [C]		MWS #1		
A1	67,045.8	Concrete	1	0.89	59,804.9				
	16,761.5	Landscape	0.1	0.11	1,851.4				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A] = 83,807.3				Σ = [D] = 61,656.3	[E] = 0.30	$[F] = \frac{[D] \times [E]}{[G]}$ =0.283	N/A	[I] =0.346

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #2		
A2	27,009.1	Concrete	1	0.89	24,092.1				
	6,752.3	Landscape	0.1	0.11	745.8				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 33,761.4				Σ=[D] = 24,837.9	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.114	N/A	[I] =0.147

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #3		
A3	33,746.5	Concrete	1	0.89	30,101.9				
	8,436.6	Landscape	0.1	0.11	931.9				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 42,183.1				Σ=[D] = 31,033.8	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.142	N/A	[I] =0.147

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #4		
A4	63,204.7	Concrete	1	0.89	56,378.6				
	15,801.2	Landscape	0.1	0.11	1,745.4				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 79,005.9				Σ=[D] = 58,124.0	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.257	N/A	[I] =0.346

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #5		
A5	71,517.0	Concrete	1	0.89	63,793.2				
	17,879.2	Landscape	0.1	0.11	1,974.9				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 89,396.2				$\Sigma = [D]$ = 65,768.1	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.302	N/A	[I] =0.346

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #6		
A6	28,191.4	Concrete	1	0.89	25,146.7				
	7,047.8	Landscape	0.1	0.11	778.5				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 35,239.2				$\Sigma = [D]$ = 25,925.2	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.119	N/A	[I] =0.147

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #7		
A7	89,078.8	Concrete	1	0.89	79,458.3				
	22,269.7	Landscape	0.1	0.11	2,459.9				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 111,348.5				$\Sigma = [D]$ = 81,918.2	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.376	N/A	[I] =0.462

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #8		
A8	53,045.4	Concrete	1	0.89	47,316.5				
	13,261.3	Landscape	0.1	0.11	1,464.8				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 66,306.7				$\Sigma = [D]$ = 48,781.3	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.224	N/A	[I] =0.231

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #9		
A9	23,915.9	Concrete	1	0.89	21,333.0				
	5,979.0	Landscape	0.1	0.11	660.4				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 29,894.9				$\Sigma = [D]$ = 21,993.4	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.101	N/A	[I] =0.147

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I, [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #10		
A10	12,708.3	Concrete	1	0.89	11,335.8				
	3,177.1	Landscape	0.1	0.11	350.9				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 15,885.4				$\Sigma = [D]$ = 11,686.7	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.054	N/A	[I] =0.073

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I, [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A]x[C]		MWS #11		
A11	19,751.3	Concrete	1	0.89	17,618.2				
	4,937.8	Landscape	0.1	0.11	545.4				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$ = 24,689.1				$\Sigma = [D]$ = 18,163.6	[E] = 0.20	$[F] = \frac{[D]x[E]}{[G]}$ =0.083	N/A	[I] =0.147

[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]
A1	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A2	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A3	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A4	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A5	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A6	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A7	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A8	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%

A9	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A10	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%
A11	Bacteria Inficators, Nutrients, Pesticides, Sediments, Trash & Debris, Oil & Grease	80%

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

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

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

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

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

If Yes, HCOC criteria do not apply.

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

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

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

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

Table F.1 Hydrologic Conditions of Concern Summary

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

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

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

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

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

Per the County of Riverside Stormwater Conservation Tracking Map, the site is not subjected to Hydromodification. Refer to Report attached in Appendix 7.

F.2 HCOC Mitigation

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

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

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

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

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

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	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."
Landscape / Outdoor Pesticide Use	Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To 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 https://www.rcwatershed.org/wpcontent/uploads/2015/12/Landscapingand-Gardening-Guide.pdf Provide IPM information to new owners, lessees and operators.
Pools, spas, ponds, decorative fountains, and other water features.	Pools shall be plumbed to the sanitary sewer according to local requirements.	See the applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at https://www.rcwatershed.org/wpcontent/uploads/2015/12/Maintainingyour-Pool-Jacuzzi-or-Fountain.pdf

Refuse areas.	Trash enclosures shall be covered, graded, and paved to prevent run-on. Site refuse will be handled on a weekly basis in coordination with City services. Signs will be posted on or near trash enclosures with the words "Do not dump hazardous materials here" or similar.	Five Trash Enclosures have been provided. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Plazas, sidewalks, and parking lots.	N/A	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.

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)
BIO-1	Bio-treatment MWS Units	WQMP Exhibit
RET-1	Retention Basin	WQMP Exhibit

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: Owner/HOA

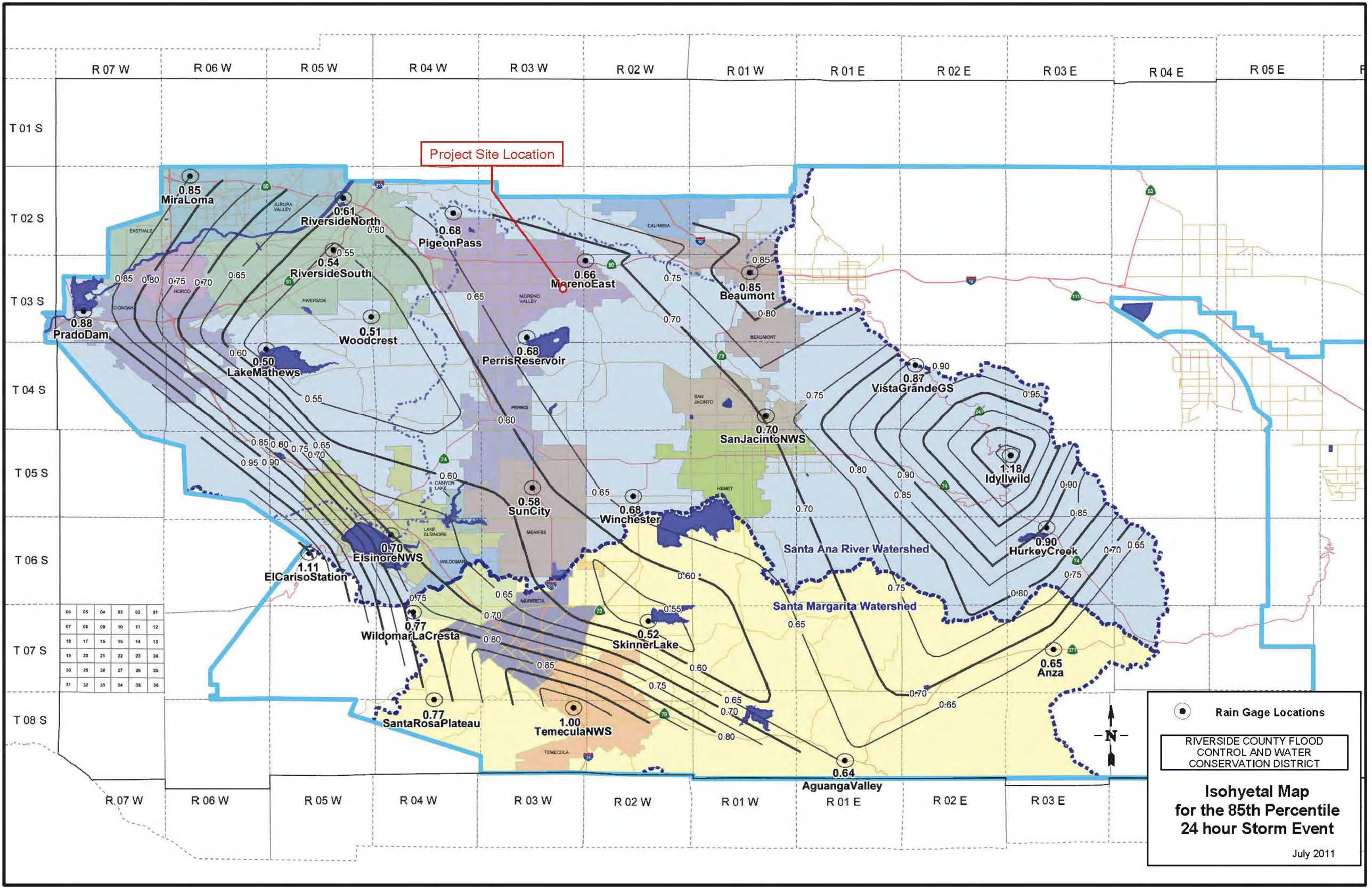
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

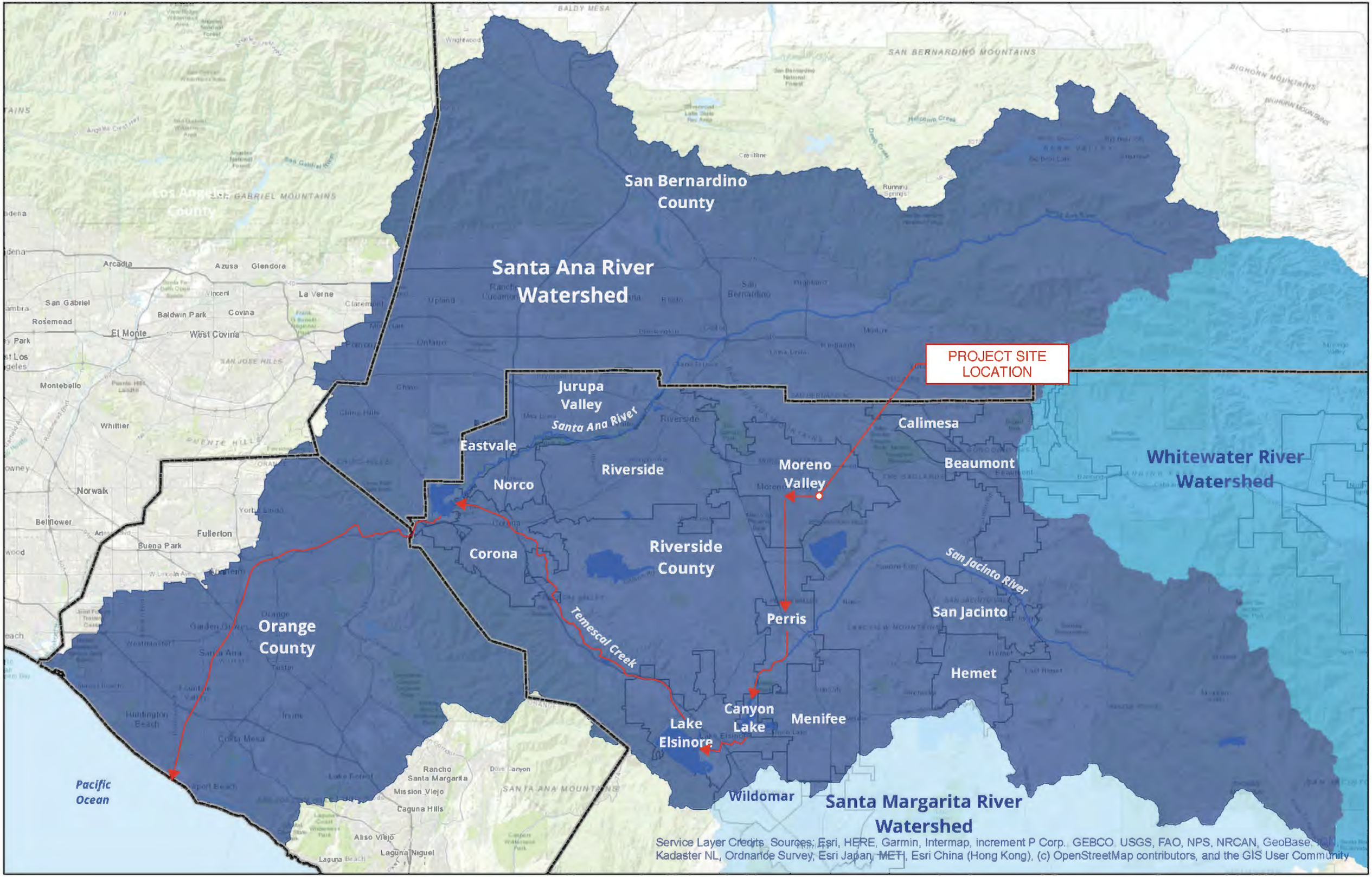
☒ Y ☐ N

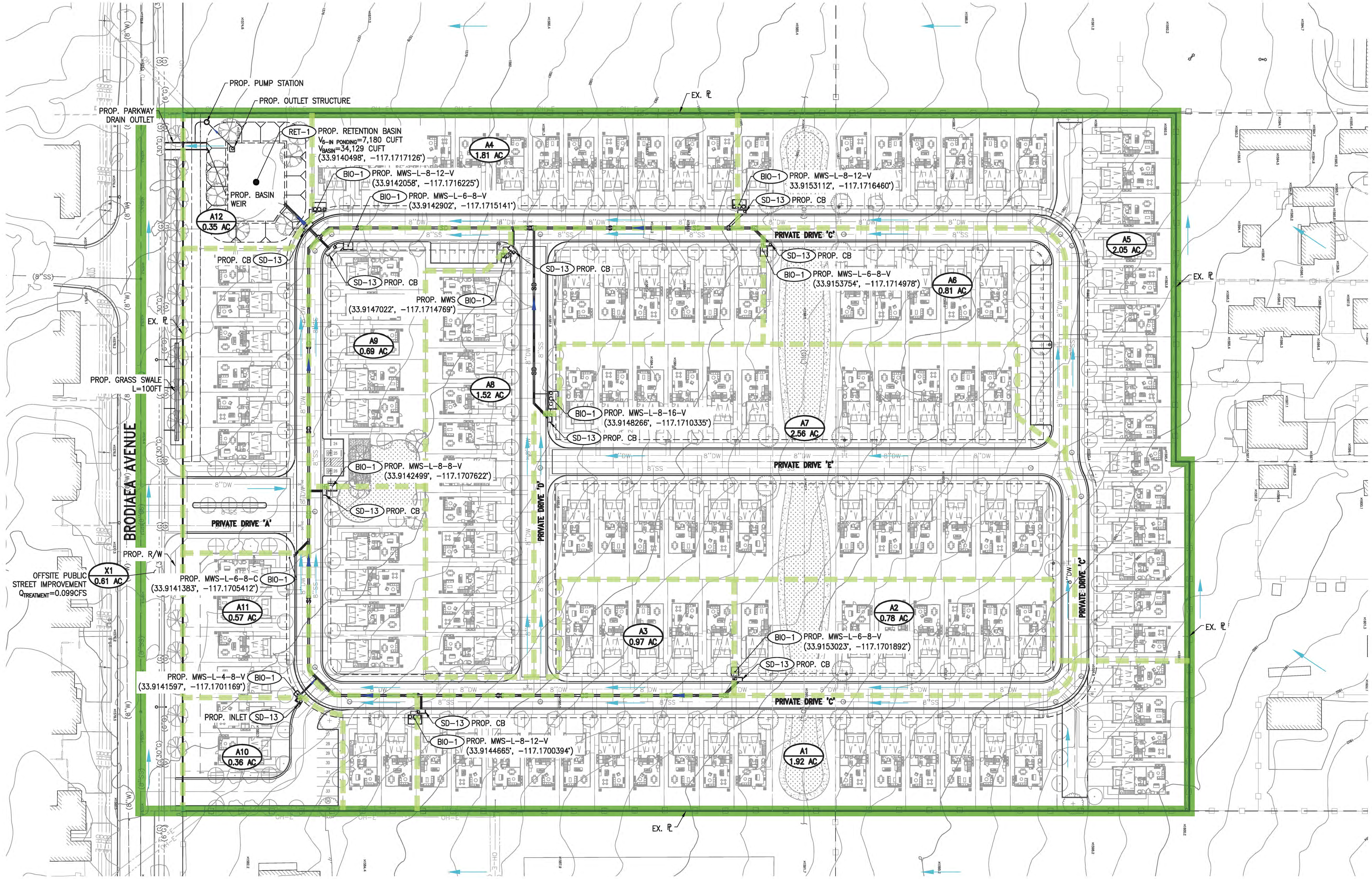
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

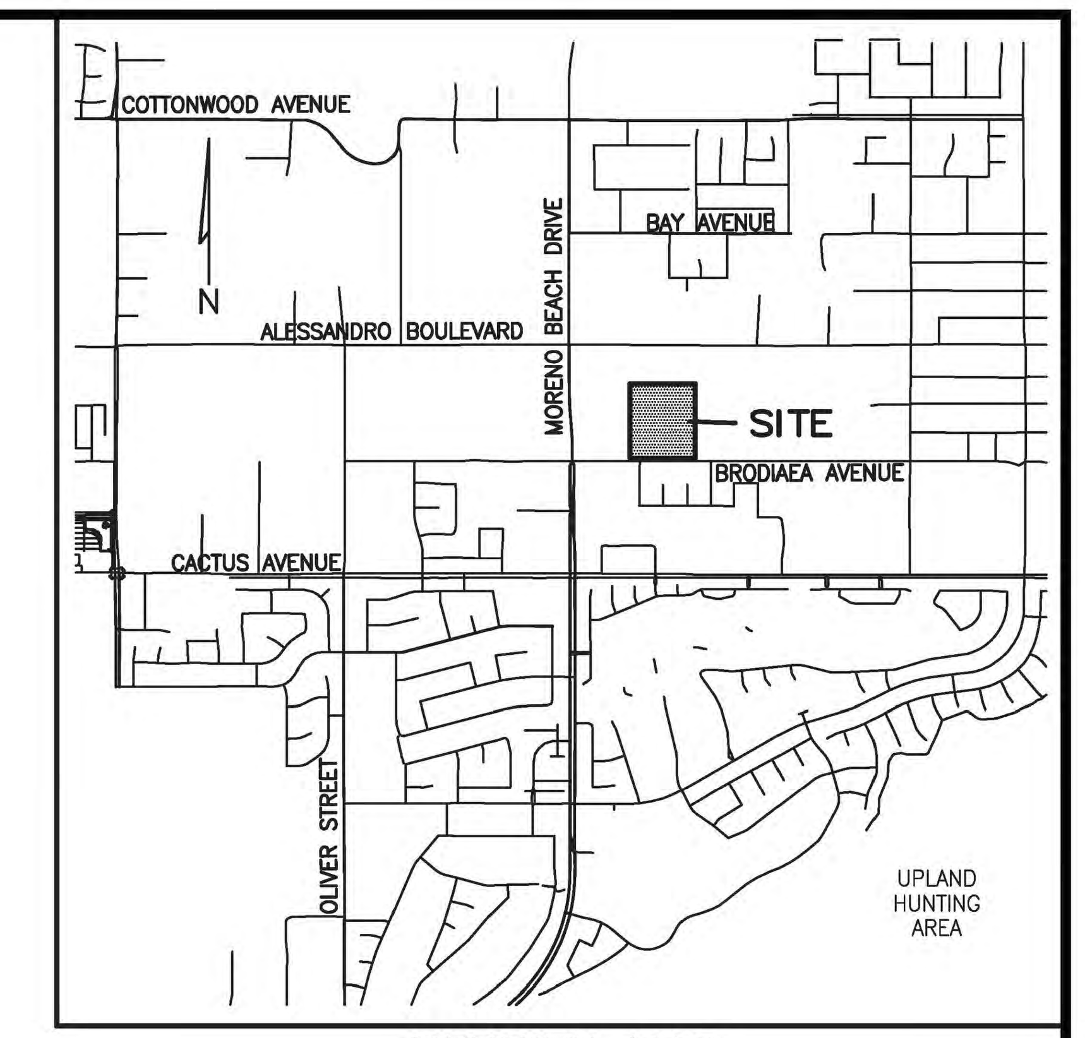
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
Project Site Location
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Santa Ana River Watershed
Santa Margarita Watershed
CORONA
NORCO
EASTVALE
JURUPA VALLEY
RIVERSIDE
MORENO VALLEY
CALIMESA
BEAUMONT
SAN JACINTO
PERRIS
HEMET
CANYON LAKE
LAKE ELSINORE
MENIFEE
WILDOMAR
MURRIETA
TEMECULA
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011


PROJECT SITE LOCATION
San Bernardino County
Santa Ana River Watershed
Riverside County
Orange County
Los Angeles County
Whitewater River Watershed
Santa Margarita River Watershed
Jurupa Valley
Eastvale
Norco
Corona
Riverside
Moreno Valley
Calimesa
Beaumont
Perris
San Jacinto
Hemet
Canyon Lake
Menifee
Lake Elsinore
Wildomar
Temescal Creek
San Jacinto River
Santa Ana River
Pacific Ocean
Arcadia
Azusa
Glendora
La Verne
San Gabriel
Rosemead
Baldwin Park
Covina
El Monte
West Covina
Montebello
Whittier
Norwalk
Bellflower
Fullerton
Buena Park
Huntington Beach
Irvine
Costa Mesa
Rancho Santa Margarita
Mission Viejo
Laguna Hills
Aliso Viejo
Laguna Niguel
Laguna Beach
BALDY MESA
SAN BERNARDINO MOUNTAINS
SAN GABRIEL MOUNTAINS
SAN JOSE HILLS
PUENTE HILLS
SANTA ANA MOUNTAINS
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community





VICINITY MAP

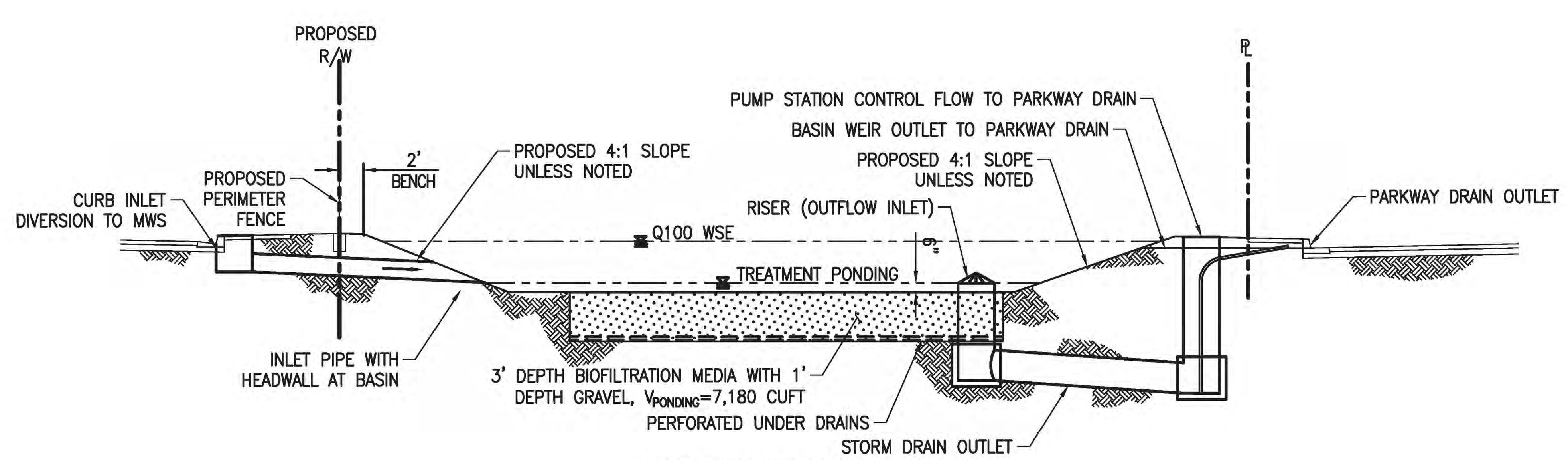
N.T.S.

LEGEND:

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- DMA SUBAREA BOUNDARY
- SITE BOUNDARY
- RIGHT OF WAY
- EXISTING LOT LINE
- EXISTING EASEMENT LINE
- SURFACE FLOW DIRECTION
- PIPE FLOW DIRECTION

BEST MANAGEMENT PRACTICE (BMPs)	
IDENTIFIER	DESCIPTION
*SE-7	PRIVATE STREET SWEEPING
*SD-10	SITE DESIGN AND LANDSCAPE PLANNING
SD-11	ROOF RUNOFF CONTROL
*SD-12	EFFICIENT IRRIGATION
SD-13	STORM DRAIN SIGNAGE
BIO-1	BIO-FILTRAITON
RET-1	RETENTION BASIN

*NOTE: GENERALLY APPLICABLE THROUGHOUT THE SITE



BIORETENTION BASIN
TYPICAL SECTION

SCALE: 1"=10'

SCALE: 1" = 50'

0 25 50 100

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER DANE P. MCDOUGALL C 80705 CIVIL STATE OF CALIFORNIA

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LAND PLANNING & SURVEYING

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COSTA MESA, CA 92626
(714) 557-5511

CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY WQMP EXHIBIT

28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO.
WARM-022

SHEET
1
OF
1

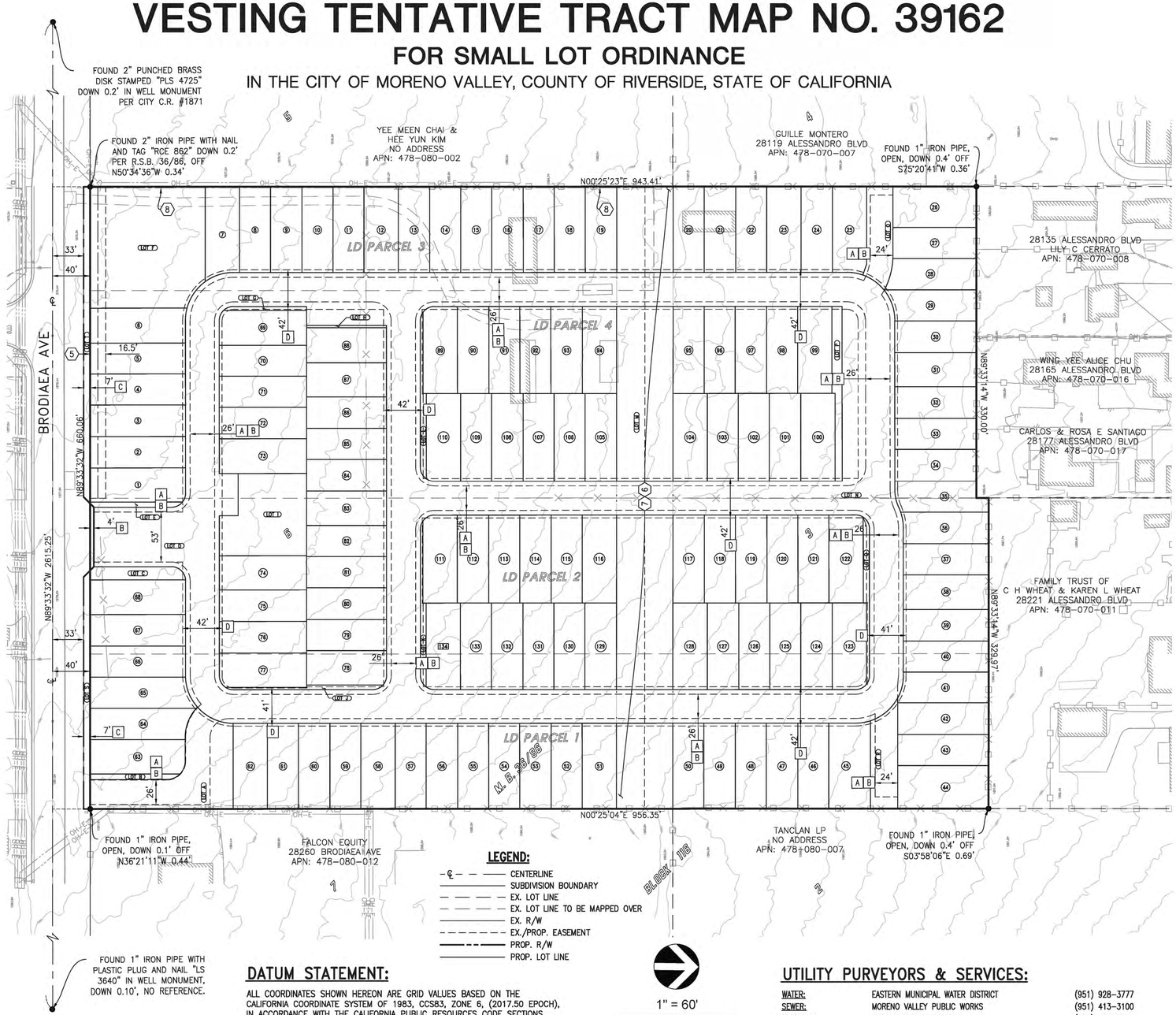
Appendix 2: Construction Plans

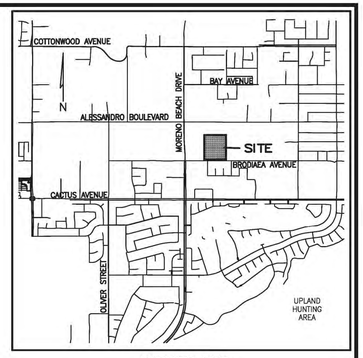
Grading and Drainage Plans

VESTING TENTATIVE TRACT MAP NO. 39162

FOR SMALL LOT ORDINANCE

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





VICINITY MAP
N.T.S.

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA AND IS DESCRIBED AS FOLLOWS:

LD PARCEL 1 (APN: 478-070-013 AND APN: 478-080-005):

THE EAST HALF OF THAT PORTION OF THE EAST ONE-HALF OF LOTS 3 AND 6, BLOCK 116 OF MAP NO. 1 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY, IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 11, PAGE 10 OF MAPS, SAN BERNARDINO COUNTY RECORDS, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID LOT 3;

THENCE SOUTH ALONG THE EAST LINE OF SAID LOT 3, 264 FEET TO THE POINT OF BEGINNING THE LAND TO BE DESCRIBED;

THENCE CONTINUING SOUTH, ALONG THE EAST LINE OF SAID LOTS 3 AND 6, 956 FEET TO THE SOUTHEAST CORNER OF SAID LOT 6;

THENCE WEST, ALONG THE SOUTH LINE OF SAID LOT 6, 330 FEET TO THE WEST LINE OF THE EAST ONE-HALF OF SAID LOT 6;

THENCE NORTH, ALONG THE WEST LINE OF THE EAST ONE-HALF OF SAID LOT 3 AND 6, 956 FEET;

THENCE EAST, 330 FEET TO THE POINT OF BEGINNING.

SAID LAND IS ALSO SHOWN ON RECORD OF SURVEY ON FILE IN BOOK 36, PAGE 86 OF RECORDS OF SURVEY, RECORDS OF SAID COUNTY.

LD PARCEL 2 (APN: 478-070-014 AND APN: 478-080-004):

THE WEST HALF OF THAT PORTION OF THE EAST ONE HALF OF LOT(S) 3 AND 6, IN BLOCK 116 OF MAP NO. 1 OF BEAR VALLEY ALESSANDRO DEVELOPMENT COMPANY, IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 11, PAGE 10 OF MAPS, SAN BERNARDINO COUNTY RECORDS, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID LOT 3;

THENCE SOUTH ALONG THE EAST LINE OF SAID LOT 3, 264 FEET TO THE POINT OF BEGINNING OF THE LAND TO BE DESCRIBED;

THENCE CONTINUING SOUTH, ALONG THE EAST LINE OF SAID LOT(S) 3 AND 6, 956 FEET TO THE SOUTHEAST COMER OF SAID LOT 6;

THENCE WEST, ALONG THE SOUTH LINE OF SAID LOT 6, 330 FEET TO THE WEST LINE OF THE EAST ONE HALF OF SAID LOT 6;

THENCE NORTH, ALONG THE WEST LINE OF THE EAST ONE HALF OF SAID LOT(S) 3 AND 6, 956 FEET;
THENCE EAST, 330 FEET TO THE POINT OF BEGINNING.

SAID LAND IS ALSO SHOWN ON RECORD OF SURVEY ON FILE IN BOOK 36, PAGE 86 OF RECORDS OF SURVEY, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

APN: 478-070-013
APN: 478-070-014
APN: 478-080-004
APN: 478-080-005

LD PARCEL 3 (PORTION OF APN: 478-080-003)

THAT PORTION OF LOT 6 IN BLOCK 116 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY, IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 11, PAGE 10, OF MAPS, SAN BERNARDINO COUNTY RECORDS, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWESTERLY CORNER OF LOT 6; THENCE NORTHERLY ALONG THE WESTERLY LINE OF SAID LOT 6, 600 FEET; THENCE EASTERLY AND PARALLEL WITH THE SOUTHERLY LINE OF SAID LOT, 110 FEET; THENCE SOUTHERLY PARALLEL WITH THE WESTERLY LINE OF SAID LOT, 600 FEET TO THE SOUTHERLY LINE THEREOF; THENCE WESTERLY ALONG SAID SOUTHERLY LINE, 110 FEET TO THE POINT OF BEGINNING.

LD PARCEL 4 (APN: 478-070-015 AND A PORTION OF APN: 478-080-003)

THE WEST HALF OF LOTS 3 AND 6 IN BLOCK 116 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY, IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 11, PAGE 10, OF MAPS, SAN BERNARDINO COUNTY RECORDS. EXCEPTING FROM LOT 3 THE NORTHERLY 277 FEET THEREOF;

ALSO EXCEPTING FROM LOT 6 THAT PORTION DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWESTERLY CORNER OF LOT 6; THENCE NORTHERLY ALONG THE WESTERLY LINE OF SAID LOT 6, 600 FEET; THENCE EASTERLY AND PARALLEL WITH THE SOUTHERLY LINE OF SAID LOT, 110 FEET; THENCE SOUTHERLY PARALLEL WITH THE WESTERLY LINE OF SAID LOT, 600 FEET TO THE SOUTHERLY LINE THEREOF; THENCE WESTERLY ALONG SAID SOUTHERLY LINE, 110 FEET TO THE POINT OF BEGINNING.

VESTED OWNER:

EDM REALTY CORP., A CALIFORNIA CORPORATION

SITE ADDRESS:

28136 BRODIAEA AVENUE,
MORENO VALLEY, CA 92555

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING S76°06'46"E BETWEEN CALIFORNIA SPATIAL REFERENCE CENTER, CSRC, CONTINUOUSLY OPERATING REFERENCE STATIONS, CORS, "RTHS" AND "CRFP".

BENCHMARK STATEMENT:

NATIONAL GEODETIC SURVEY BENCHMARK NO. DH7093 (PID)
ELEV: 1661.92 FT (NAVD88)

FLOOD NOTE:

THE SUBJECT PROPERTY FALLS WITHIN "ZONE X, AREA OF MINIMAL FLOOD HAZARD" PER FEMA MAP NO. 06065C0770G, A PRINTED PANEL, EFFECTIVE AUGUST 28, 2008 (TABLE A-3).

ENGINEER'S STATEMENT:

THIS VESTING TENTATIVE MAP WAS PREPARED BY ME, OR UNDER MY DIRECTION ON MAY 28, 2025.

DANE P. MCDOUGALL, R.C.E. 80705

SURVEYOR'S STATEMENT:

THE SURVEY ON WHICH THIS VESTING TENTATIVE MAP IS BASED WAS DONE BY ME, OR UNDER MY DIRECTION. FIELDWORK WAS COMPLETED ON SEPTEMBER 18, 2024.

DANE P. MCDOUGALL, L.S. 9297

PROFESSIONAL LAND SURVEYOR · DANE P. MCDOUGALL · L.S. 9297 · STATE OF CALIFORNIA

DATUM STATEMENT:

ALL COORDINATES SHOWN HEREON ARE GRID VALUES BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE 6, (2017.50 EPOCH), IN ACCORDANCE WITH THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801-8819. ALL DISTANCES SHOWN HEREON ARE GROUND VALUES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED. A COMBINATION SCALE FACTOR OF 0.99993479 WAS USED FOR THIS PROJECT AT NORTHING 2277736.953, EASTING 6282328.548. TO OBTAIN GRID DISTANCES, MULTIPLY GROUND DISTANCES BY THE COMBINATION SCALE FACTOR.

NOTE:

1) PURSUANT TO SUBDIVISION MAP ACT SECTION 66456.1(a), MULTIPLE FINAL MAPS MAY BE FILED ON THIS TENTATIVE MAP.

LEGEND:

- CENTERLINE
- SUBDIVISION BOUNDARY
- EX. LOT LINE
- EX. LOT LINE TO BE MAPPED OVER
- EX. R/W
- EX./PROP. EASEMENT
- PROP. R/W
- PROP. LOT LINE

1" = 60'
0 30 60 120

LAND USE SUMMARY:

GROSS AREA: 14.392 AC
NET AREA: 14.480 AC (AFTER VACATION)
TOTAL PROPOSED NUMBERED LOTS: 134
TOTAL PROPOSED LETTERED LOTS: 20 (A-T)

UTILITY PURVEYORS & SERVICES:

WATER:	EASTERN MUNICIPAL WATER DISTRICT	(951) 928-3777
SEWER:	MORENO VALLEY PUBLIC WORKS	(951) 413-3100
ELECTRIC:	MORENO VALLEY UTILITY	(951) 413-3000
GAS:	THE SOUTHERN CALIFORNIA GAS COMPANY	(800) 427-2200
TELEPHONE:	VERIZON WIRELESS	(800) 922-0204
CABLE TV:	SPECTRUM	(855) 757-7328
SCHOOL DISTRICT:	MORENO VALLEY UNIFIED SCHOOL DISTRICT	(951) 571-7500
FIRE PROTECTION:	MORENO VALLEY FIRE DEPARTMENT	(951) 242-3101
WASTE:	WASTE MANAGEMENT	(951) 413-3109

CIVIL ENGINEER:

C&V CONSULTING, INC.
9830 IRVINE CENTER DRIVE
IRVINE, CA 92618
PHONE: (949) 445-1833

SUBDIVIDER:

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
PHONE: (714) 557-5511

SHEET INDEX:

SHEET NO.	
SHEET 1	VESTING TENTATIVE TRACT MAP NO. 39162
SHEET 2	LOT SUMMARIES
SHEET 3-4	PRELIMINARY SECTIONS
SHEET 5	PRELIMINARY SITE PLAN
SHEET 6	PRELIMINARY GRADING PLAN
SHEET 7	PRELIMINARY UTILITY PLAN
SHEET 8	PRELIMINARY FIRE ACCESS & HYDRANT LOCATION PLAN

EXISTING EASEMENTS:

3 A RESERVATION OF ONE-HALF OF ALL TREES NOW STANDING AND GROWING ON THE HEREIN DESCRIBED PROPERTY AS RESERVED BY THE GRANTORS IN THE DEED FROM JAMES E. BAKER AND WIFE TO CARLTON JACKSON, AS JOINT TENANTS, DATED JANUARY 9, 1937 AND RECORDED JANUARY 22, 1937 IN BOOK 309, PAGE 422, OF OFFICIAL RECORDS.

(INDETERMINATE FROM RECORD.)

4 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED SEPTEMBER 21, 1946 AS INSTRUMENT NO. 3803, OFFICIAL RECORDS

(BLANKET IN NATURE. THE RIGHT TO PURCHASE AN EASEMENT FOR GAS PIPELINE.)

5 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED DECEMBER 23, 1947 AS INSTRUMENT NO. 3283, OFFICIAL RECORDS

6 EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 694444, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

7 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 69445, IN BOOK 2153, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

8 EASEMENT FOR PUBLIC UTILTY AND INCIDENTAL PURPOSES GRANTED TO CALIFORNIA ELECTRIC POWER COMPANY DOCUMENT RECORDED MARCH 03, 1961 AS INSTRUMENT NO. 18720, OFFICIAL RECORDS

(CENTERLINE PLOTTED. EASEMENT HAS UNDEFINED WIDTH.)

PROPOSED EASEMENTS:

A INDICATES AN EASEMENT FOR INGRESS AND EGRESS FOR EMERGENCY AND PUBLIC SECURITY VEHICLE PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

B INDICATES AN EASEMENT FOR PUBLIC RIGHT-OF-WAY DEDICATION, UTILITY, AND PUBLIC STREET PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

C INDICATES A PORTION OF BRODIAEA AVENUE TO BE VACATED

D INDICATES AN EASEMENT FOR PUBLIC UTILITIES DEDICATED TO EASTERN MUNICIPAL WATER DISTRICT (EMWD)

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER · DANE P. MCDOUGALL · C 80705 · CIVIL · STATE OF CALIFORNIA

C&V CONSULTING, INC. CIVIL ENGINEERING LAND PLANNING & SURVEYING
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PREPARED FOR:

WARMINGTON RESIDENTIAL
3090 PULLMAN STREET
COSTA MESA, CA 92626
(714) 557-5511

CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

VESTING TENTATIVE TRACT MAP NO. 39162

28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

SHEET 1 OF 8

PLAN SET: PSD2
DATE: 5/28/2025

P:\PROJECTS\WARM-022\CIVIL\VTM\VTM-39-162.DWG

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
1	3,694	0.08	SINGLE FAMILY RESIDENTIAL
2	3,349	0.08	SINGLE FAMILY RESIDENTIAL
3	3,399	0.08	SINGLE FAMILY RESIDENTIAL
4	3,348	0.08	SINGLE FAMILY RESIDENTIAL
5	3,348	0.08	SINGLE FAMILY RESIDENTIAL
6	3,710	0.09	SINGLE FAMILY RESIDENTIAL
7	3,414	0.08	SINGLE FAMILY RESIDENTIAL
8	3,003	0.07	SINGLE FAMILY RESIDENTIAL
9	3,048	0.07	SINGLE FAMILY RESIDENTIAL
10	3,003	0.07	SINGLE FAMILY RESIDENTIAL
11	3,003	0.07	SINGLE FAMILY RESIDENTIAL
12	3,321	0.08	SINGLE FAMILY RESIDENTIAL
13	3,048	0.07	SINGLE FAMILY RESIDENTIAL
14	3,003	0.07	SINGLE FAMILY RESIDENTIAL
15	3,003	0.07	SINGLE FAMILY RESIDENTIAL
16	3,048	0.07	SINGLE FAMILY RESIDENTIAL
17	3,003	0.07	SINGLE FAMILY RESIDENTIAL
18	3,003	0.07	SINGLE FAMILY RESIDENTIAL
19	3,053	0.07	SINGLE FAMILY RESIDENTIAL
20	3,007	0.07	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
21	3,048	0.07	SINGLE FAMILY RESIDENTIAL
22	3,003	0.07	SINGLE FAMILY RESIDENTIAL
23	3,321	0.08	SINGLE FAMILY RESIDENTIAL
24	3,048	0.07	SINGLE FAMILY RESIDENTIAL
25	3,325	0.08	SINGLE FAMILY RESIDENTIAL
26	3,825	0.09	SINGLE FAMILY RESIDENTIAL
27	2,936	0.07	SINGLE FAMILY RESIDENTIAL
28	3,088	0.07	SINGLE FAMILY RESIDENTIAL
29	2,990	0.07	SINGLE FAMILY RESIDENTIAL
30	2,869	0.07	SINGLE FAMILY RESIDENTIAL
31	3,173	0.07	SINGLE FAMILY RESIDENTIAL
32	2,912	0.07	SINGLE FAMILY RESIDENTIAL
33	2,868	0.07	SINGLE FAMILY RESIDENTIAL
34	2,911	0.07	SINGLE FAMILY RESIDENTIAL
35	3,011	0.07	SINGLE FAMILY RESIDENTIAL
36	3,061	0.07	SINGLE FAMILY RESIDENTIAL
37	2,998	0.07	SINGLE FAMILY RESIDENTIAL
38	3,316	0.08	SINGLE FAMILY RESIDENTIAL
39	3,043	0.07	SINGLE FAMILY RESIDENTIAL
40	2,997	0.07	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
41	3,076	0.07	SINGLE FAMILY RESIDENTIAL
42	3,242	0.07	SINGLE FAMILY RESIDENTIAL
43	3,194	0.07	SINGLE FAMILY RESIDENTIAL
44	4,450	0.10	SINGLE FAMILY RESIDENTIAL
45	4,053	0.09	SINGLE FAMILY RESIDENTIAL
46	3,003	0.07	SINGLE FAMILY RESIDENTIAL
47	3,048	0.07	SINGLE FAMILY RESIDENTIAL
48	3,003	0.07	SINGLE FAMILY RESIDENTIAL
49	3,048	0.07	SINGLE FAMILY RESIDENTIAL
50	3,007	0.07	SINGLE FAMILY RESIDENTIAL
51	3,318	0.08	SINGLE FAMILY RESIDENTIAL
52	3,003	0.07	SINGLE FAMILY RESIDENTIAL
53	3,049	0.07	SINGLE FAMILY RESIDENTIAL
54	3,004	0.07	SINGLE FAMILY RESIDENTIAL
55	3,004	0.07	SINGLE FAMILY RESIDENTIAL
56	3,049	0.07	SINGLE FAMILY RESIDENTIAL
57	3,004	0.07	SINGLE FAMILY RESIDENTIAL
58	3,323	0.08	SINGLE FAMILY RESIDENTIAL
59	3,004	0.07	SINGLE FAMILY RESIDENTIAL
60	3,050	0.07	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
61	3,004	0.07	SINGLE FAMILY RESIDENTIAL
62	3,323	0.08	SINGLE FAMILY RESIDENTIAL
63	3,669	0.08	SINGLE FAMILY RESIDENTIAL
64	3,454	0.08	SINGLE FAMILY RESIDENTIAL
65	3,553	0.08	SINGLE FAMILY RESIDENTIAL
66	3,351	0.08	SINGLE FAMILY RESIDENTIAL
67	3,401	0.08	SINGLE FAMILY RESIDENTIAL
68	3,705	0.09	SINGLE FAMILY RESIDENTIAL
69	3,378	0.08	SINGLE FAMILY RESIDENTIAL
70	3,069	0.07	SINGLE FAMILY RESIDENTIAL
71	3,069	0.07	SINGLE FAMILY RESIDENTIAL
72	3,116	0.07	SINGLE FAMILY RESIDENTIAL
73	3,394	0.08	SINGLE FAMILY RESIDENTIAL
74	3,394	0.08	SINGLE FAMILY RESIDENTIAL
75	3,069	0.07	SINGLE FAMILY RESIDENTIAL
76	3,116	0.07	SINGLE FAMILY RESIDENTIAL
77	3,370	0.08	SINGLE FAMILY RESIDENTIAL
78	3,090	0.07	SINGLE FAMILY RESIDENTIAL
79	2,805	0.06	SINGLE FAMILY RESIDENTIAL
80	2,848	0.07	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
81	2,805	0.06	SINGLE FAMILY RESIDENTIAL
82	2,805	0.06	SINGLE FAMILY RESIDENTIAL
83	3,102	0.07	SINGLE FAMILY RESIDENTIAL
84	2,848	0.07	SINGLE FAMILY RESIDENTIAL
85	2,805	0.06	SINGLE FAMILY RESIDENTIAL
86	2,847	0.07	SINGLE FAMILY RESIDENTIAL
87	3,103	0.07	SINGLE FAMILY RESIDENTIAL
88	3,102	0.07	SINGLE FAMILY RESIDENTIAL
89	3,336	0.08	SINGLE FAMILY RESIDENTIAL
90	3,082	0.07	SINGLE FAMILY RESIDENTIAL
91	3,036	0.07	SINGLE FAMILY RESIDENTIAL
92	3,036	0.07	SINGLE FAMILY RESIDENTIAL
93	3,082	0.07	SINGLE FAMILY RESIDENTIAL
94	3,362	0.08	SINGLE FAMILY RESIDENTIAL
95	3,040	0.07	SINGLE FAMILY RESIDENTIAL
96	3,036	0.07	SINGLE FAMILY RESIDENTIAL
97	3,082	0.07	SINGLE FAMILY RESIDENTIAL
98	3,036	0.07	SINGLE FAMILY RESIDENTIAL
99	3,358	0.08	SINGLE FAMILY RESIDENTIAL
100	3,394	0.08	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
101	3,115	0.07	SINGLE FAMILY RESIDENTIAL
102	3,069	0.07	SINGLE FAMILY RESIDENTIAL
103	3,069	0.07	SINGLE FAMILY RESIDENTIAL
104	3,399	0.08	SINGLE FAMILY RESIDENTIAL
105	3,119	0.07	SINGLE FAMILY RESIDENTIAL
106	3,069	0.07	SINGLE FAMILY RESIDENTIAL
107	3,069	0.07	SINGLE FAMILY RESIDENTIAL
108	3,116	0.07	SINGLE FAMILY RESIDENTIAL
109	3,069	0.07	SINGLE FAMILY RESIDENTIAL
110	3,387	0.08	SINGLE FAMILY RESIDENTIAL
111	3,372	0.08	SINGLE FAMILY RESIDENTIAL
112	3,115	0.07	SINGLE FAMILY RESIDENTIAL
113	3,069	0.07	SINGLE FAMILY RESIDENTIAL
114	3,116	0.07	SINGLE FAMILY RESIDENTIAL
115	3,069	0.07	SINGLE FAMILY RESIDENTIAL
116	3,398	0.08	SINGLE FAMILY RESIDENTIAL
117	3,120	0.07	SINGLE FAMILY RESIDENTIAL
118	3,069	0.07	SINGLE FAMILY RESIDENTIAL
119	3,116	0.07	SINGLE FAMILY RESIDENTIAL
120	3,069	0.07	SINGLE FAMILY RESIDENTIAL

NUMBER LOT SUMMARY TABLE			
LOT #	Area (SF)	Area (AC)	TYPE
121	3,069	0.07	SINGLE FAMILY RESIDENTIAL
122	3,388	0.08	SINGLE FAMILY RESIDENTIAL
123	3,337	0.08	SINGLE FAMILY RESIDENTIAL
124	3,082	0.07	SINGLE FAMILY RESIDENTIAL
125	3,036	0.07	SINGLE FAMILY RESIDENTIAL
126	3,036	0.07	SINGLE FAMILY RESIDENTIAL
127	3,082	0.07	SINGLE FAMILY RESIDENTIAL
128	3,371	0.08	SINGLE FAMILY RESIDENTIAL
129	3,094	0.07	SINGLE FAMILY RESIDENTIAL
130	3,036	0.07	SINGLE FAMILY RESIDENTIAL
131	3,036	0.07	SINGLE FAMILY RESIDENTIAL
132	3,082	0.07	SINGLE FAMILY RESIDENTIAL
133	3,036	0.07	SINGLE FAMILY RESIDENTIAL
134	3,350	0.08	SINGLE FAMILY RESIDENTIAL

TOTAL SITE SUMMARY TABLE			
LOT	Area (SF)	Area (AC)	TYPE
TOTAL SITE	626,667	14.39	

LETTER LOT SUMMARY TABLE			
LOT LETTER	Area (SF)	Area (AC)	TYPE
LOT A	8,215	0.19	PRIVATE STREET
LOT B	547	0.01	LANDSCAPE
LOT C	1,363	0.03	LANDSCAPE
LOT D	77,853	1.79	PRIVATE STREET
LOT E	514	0.01	LANDSCAPE
LOT F	15,418	0.35	WQ BASIN
LOT G	340	0.01	LANDSCAPE
LOT H	213	0.00	LANDSCAPE
LOT I	7,238	0.17	LANDSCAPE/PARK
LOT J	597	0.01	LANDSCAPE
LOT K	756	0.02	LANDSCAPE
LOT L	805	0.02	LANDSCAPE
LOT M	39,600	0.91	EXISTING OIL EASEMENT
LOT N	41,883	0.96	PRIVATE STREET
LOT O	2,820	0.06	SHARED PRIVATE DRIVEWAY
LOT P	1,703	0.04	LANDSCAPE
LOT Q	836	0.02	LANDSCAPE
LOT R	2,974	0.07	SHARED PRIVATE DRIVEWAY
LOT S	1,750	0.04	LANDSCAPE
LOT T	2,325	0.05	LANDSCAPE

NOTE:

1. ALL LETTERED LOTS WILL BE MAINTAINED BY A PRIVATE HOA.

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER — DANE P. MCDOUGALL — C 80705 — CIVIL — STATE OF CALIFORNIA

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

LOT SUMMARIES

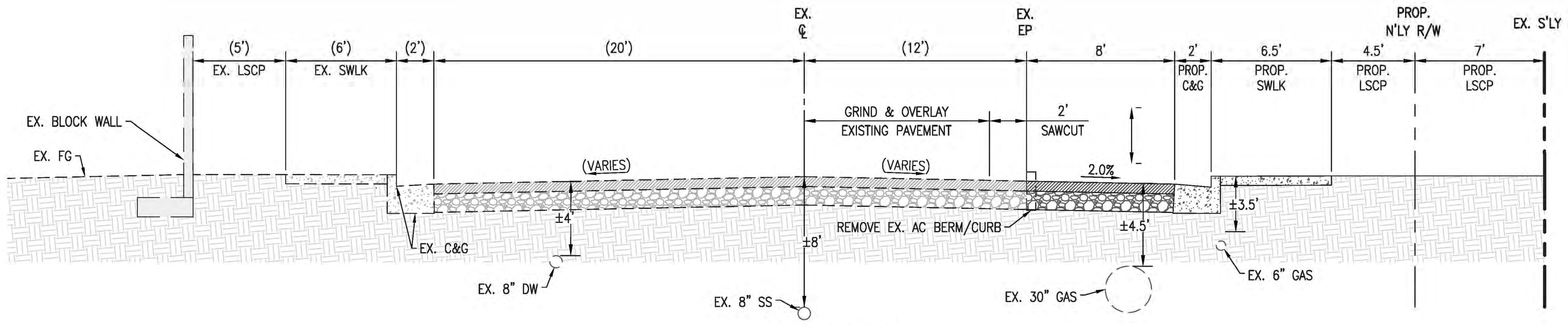
28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

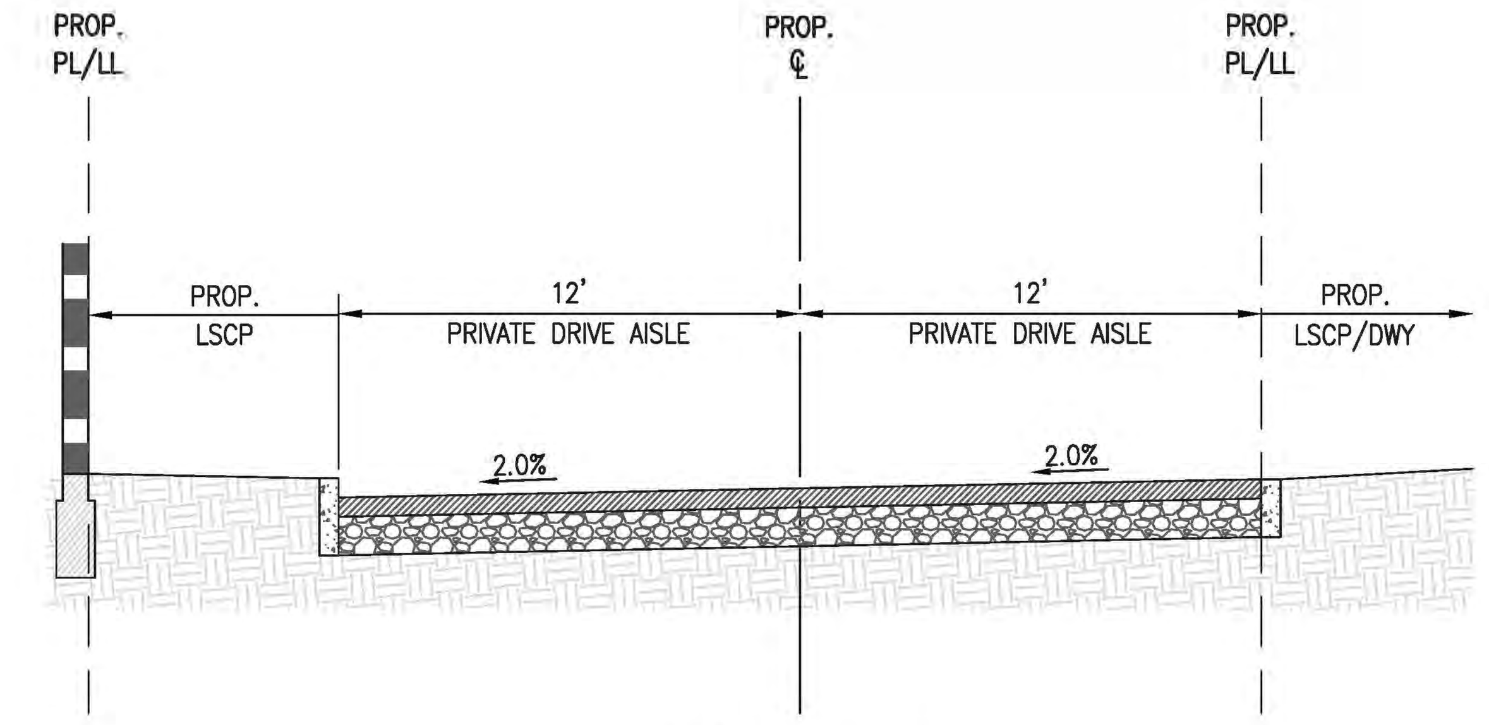
SHEET 2 OF 8

PLAN SET: PSD2
DATE: 5/28/2025

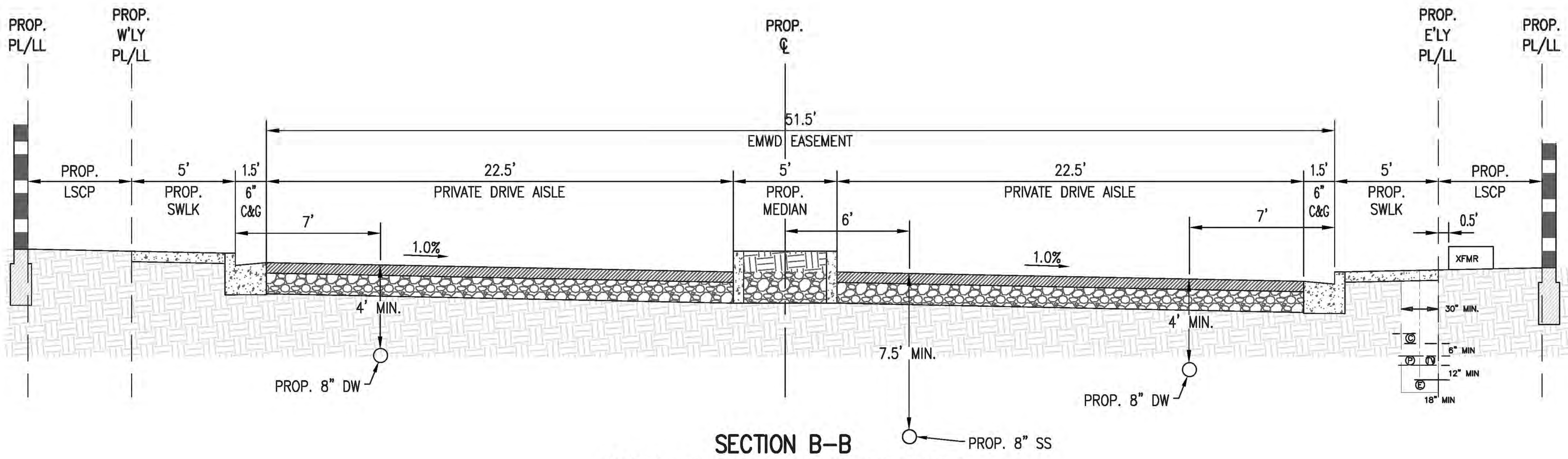
C:\WARM-022\DWG\SHEETS\WARM-P2-01-VTTM.DWG
BY: JOE JOHNSON



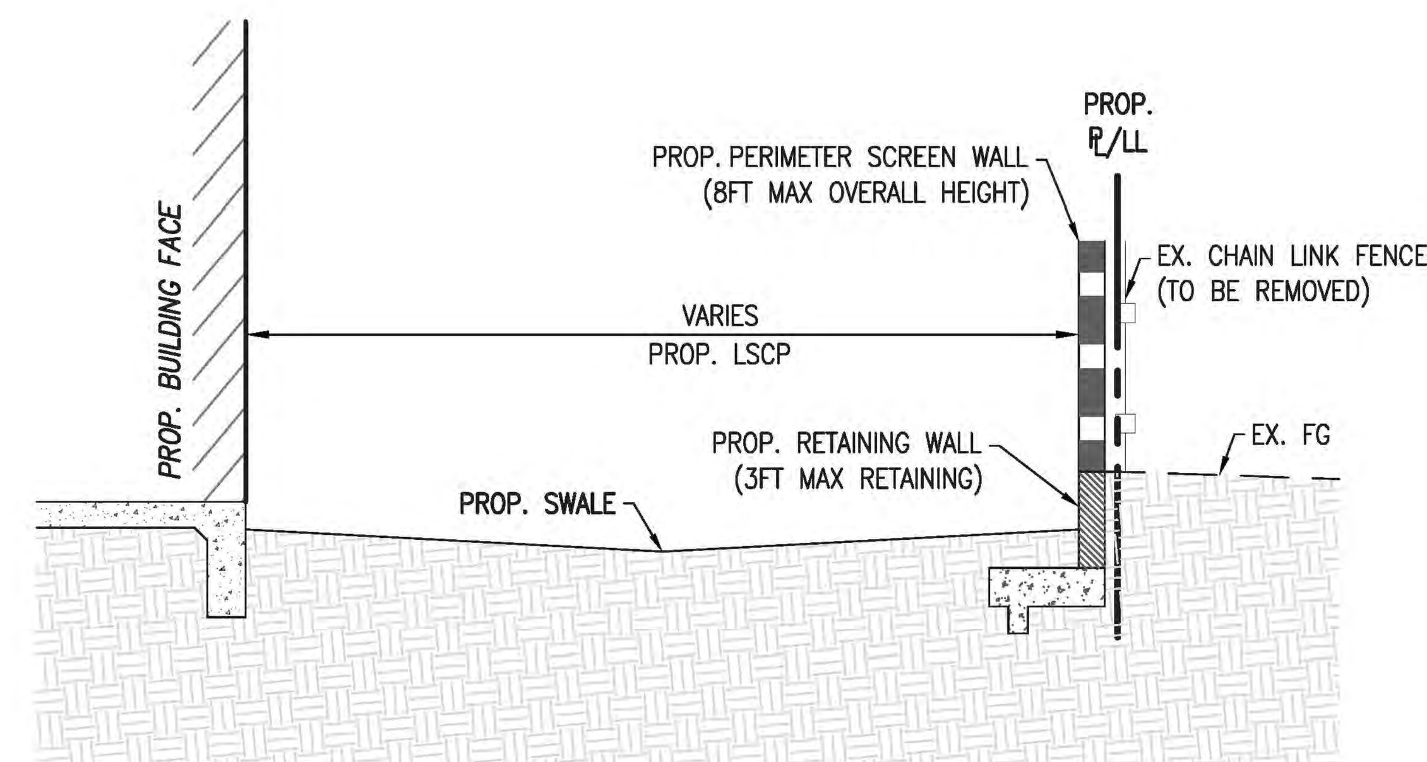
SECTION A–A
EXISTING BRODIAEA AVENUE
N.T.S.



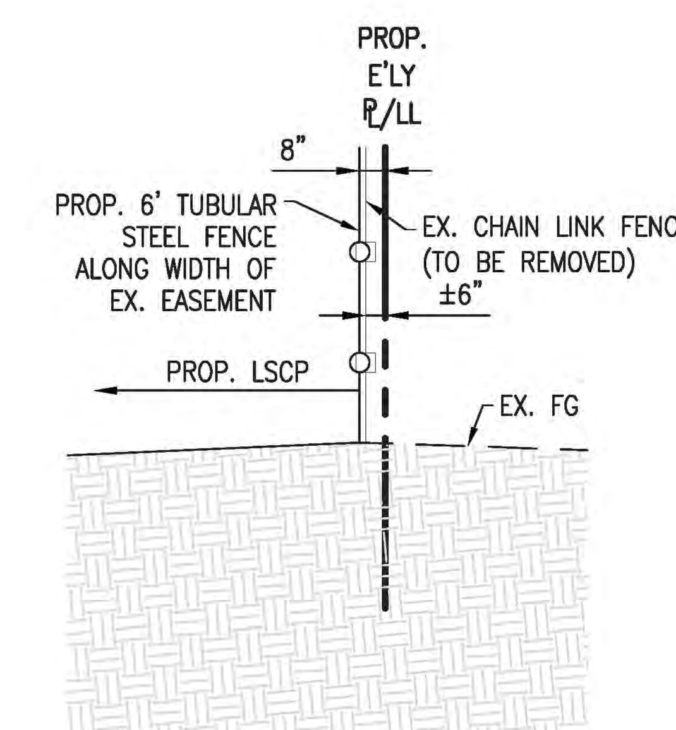
SECTION E–E
TYP. PRIVATE SHARED DRIVEWAY SECTION
N.T.S.



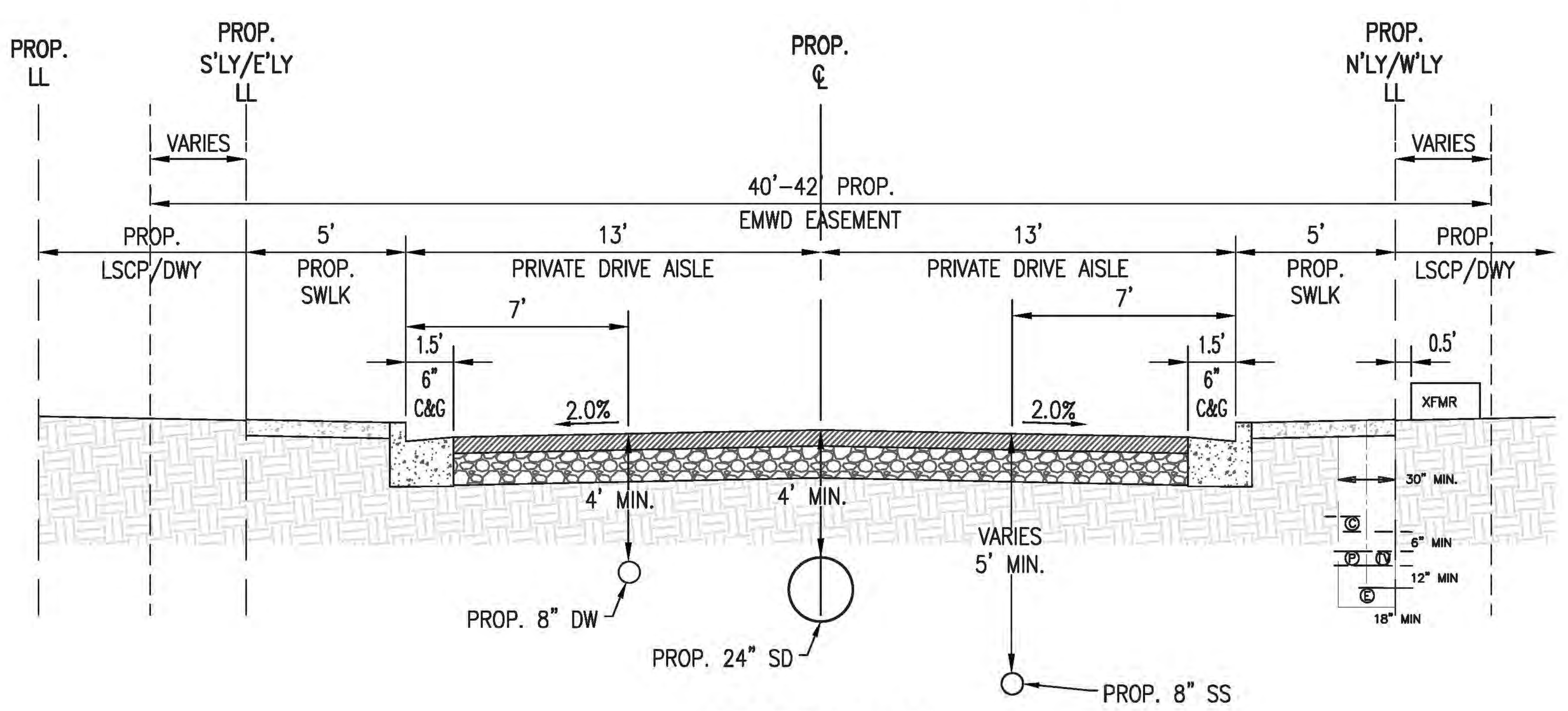
SECTION B–B
BRODIAEA AVENUE SITE ENTRANCE
N.T.S.



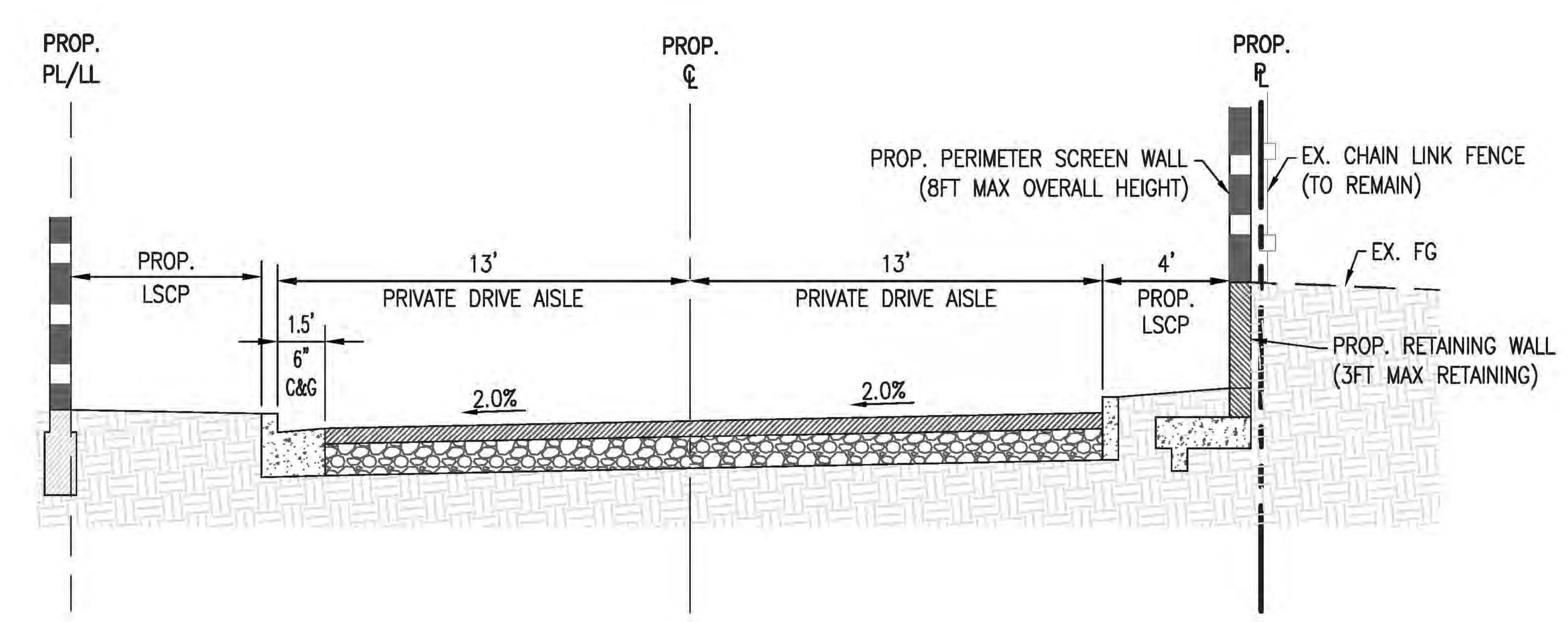
SECTION F–F
TYP. E'LY PERIMETER WALL
N.T.S.



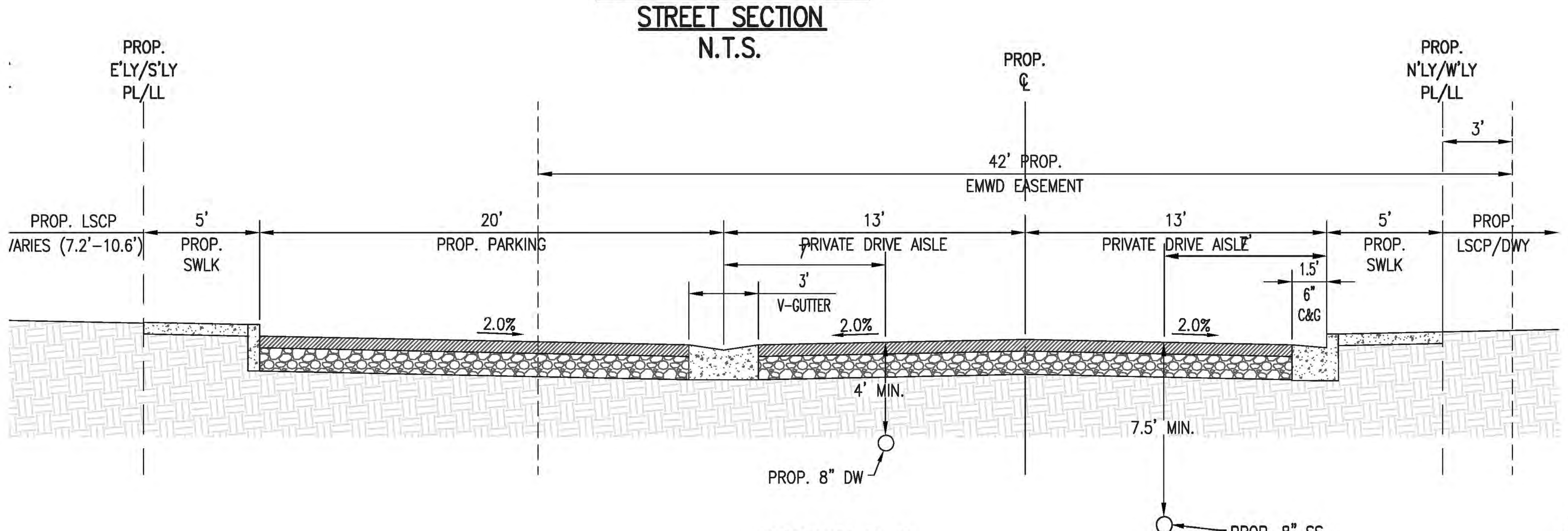
SECTION F1–F1
TYP. E'LY TUBULAR STEEL FENCE
N.T.S.



SECTION C–C
TYP. PRIVATE CROWNED STREET SECTION
N.T.S.



SECTION G–G
EMERGENCY VEHICLE ACCESS STREET
N.T.S.



SECTION D–D
PRIVATE CROWNED STREET SECTION W/ PARKING
N.T.S.

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

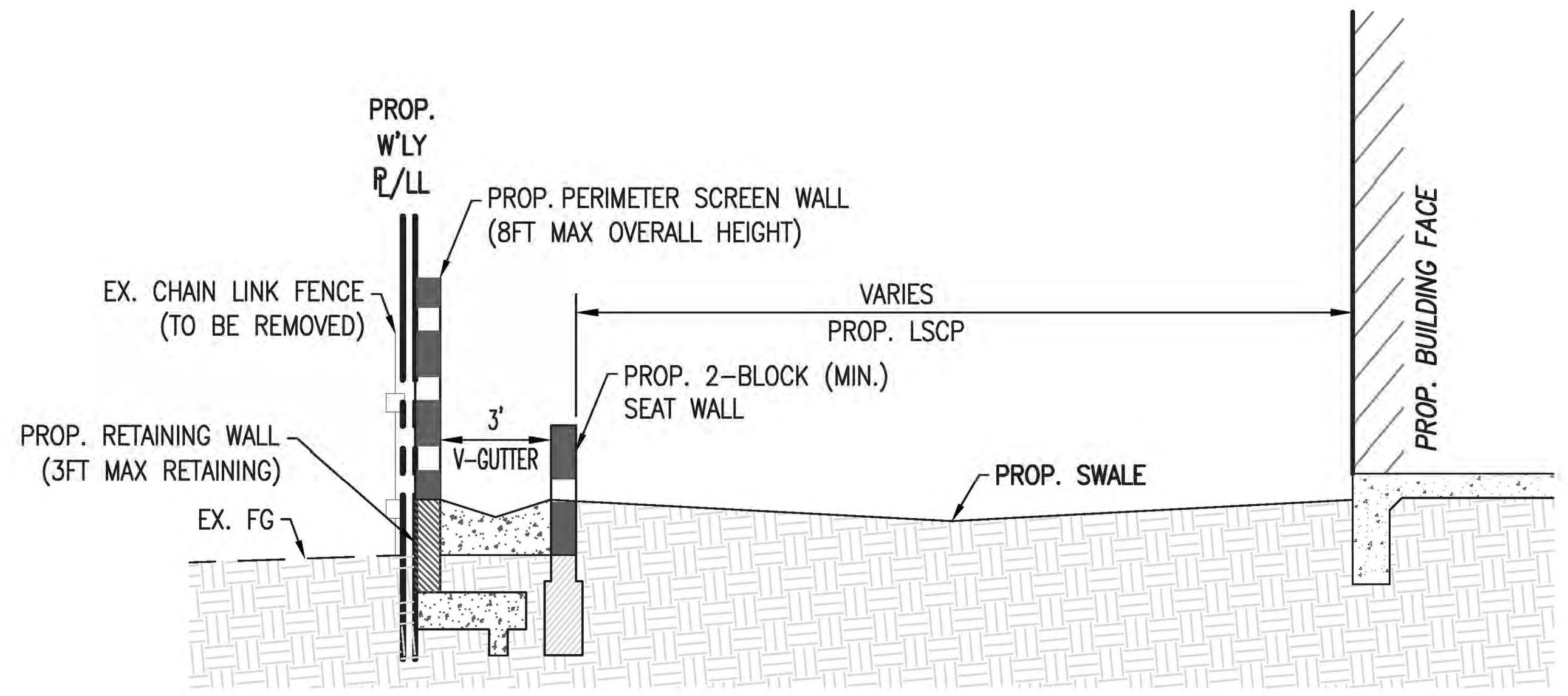
VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY SECTIONS

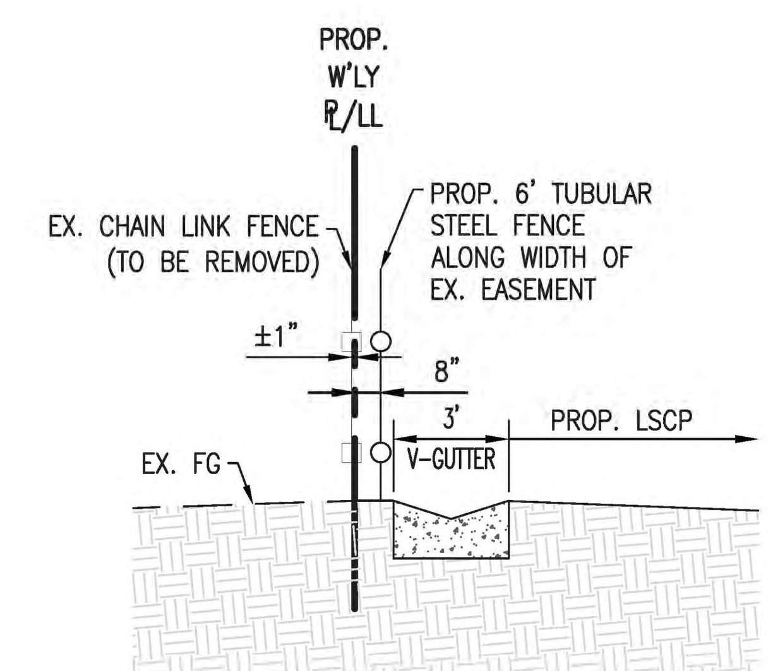
28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

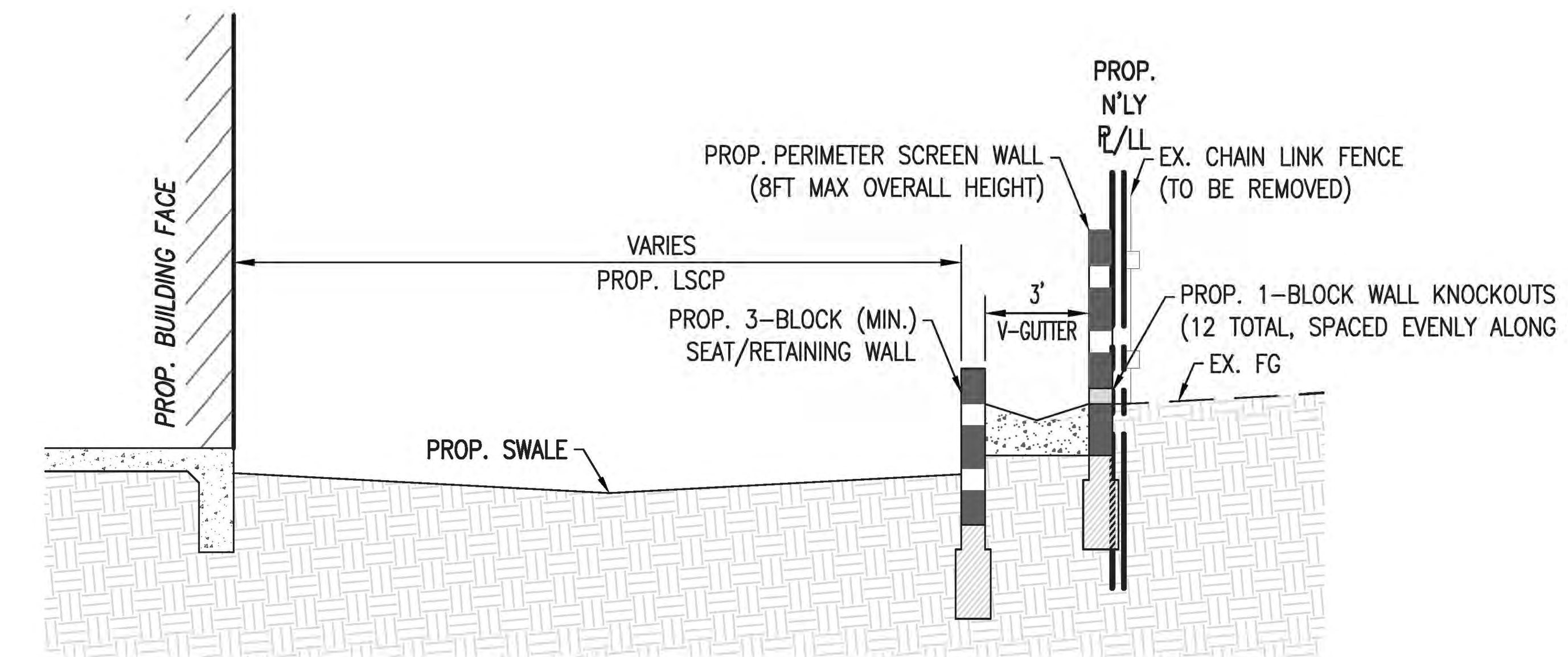
SHEET 3 OF 8



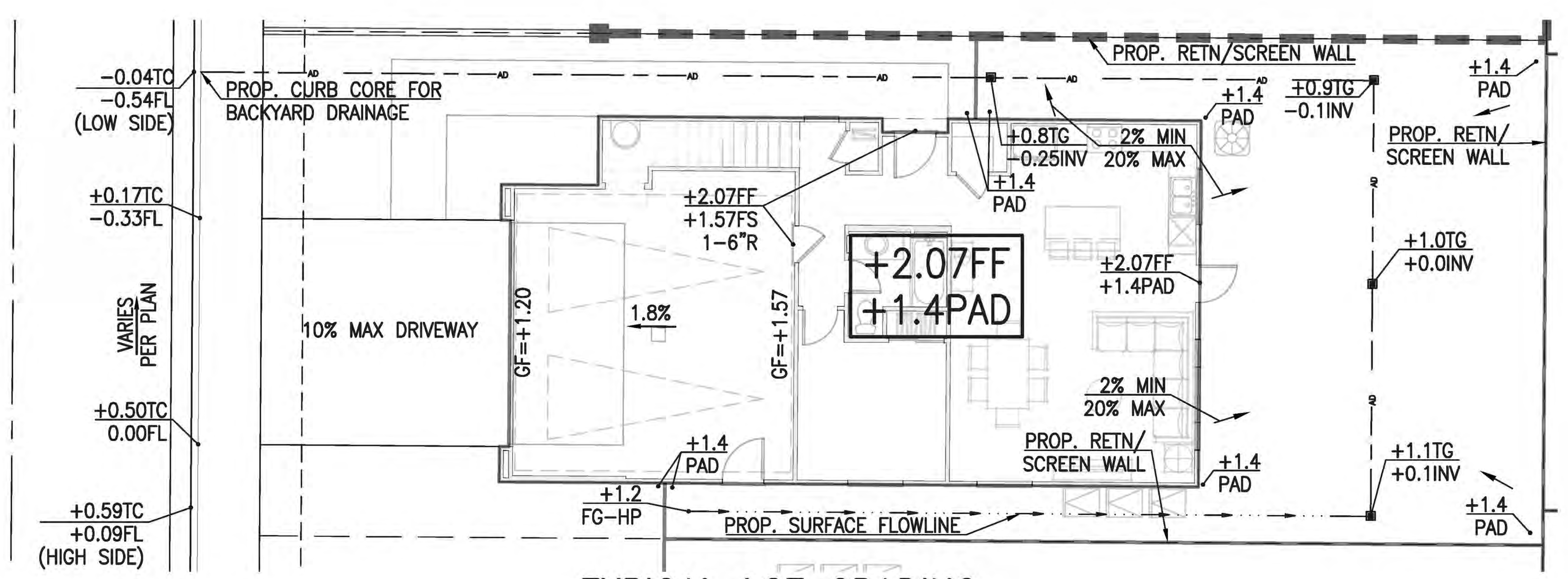
SECTION H-H
TYP. W'LY PERIMETER WALL
N.T.S.



SECTION H1-H1
TYP. W'LY TUBULAR STEEL FENCE
N.T.S.

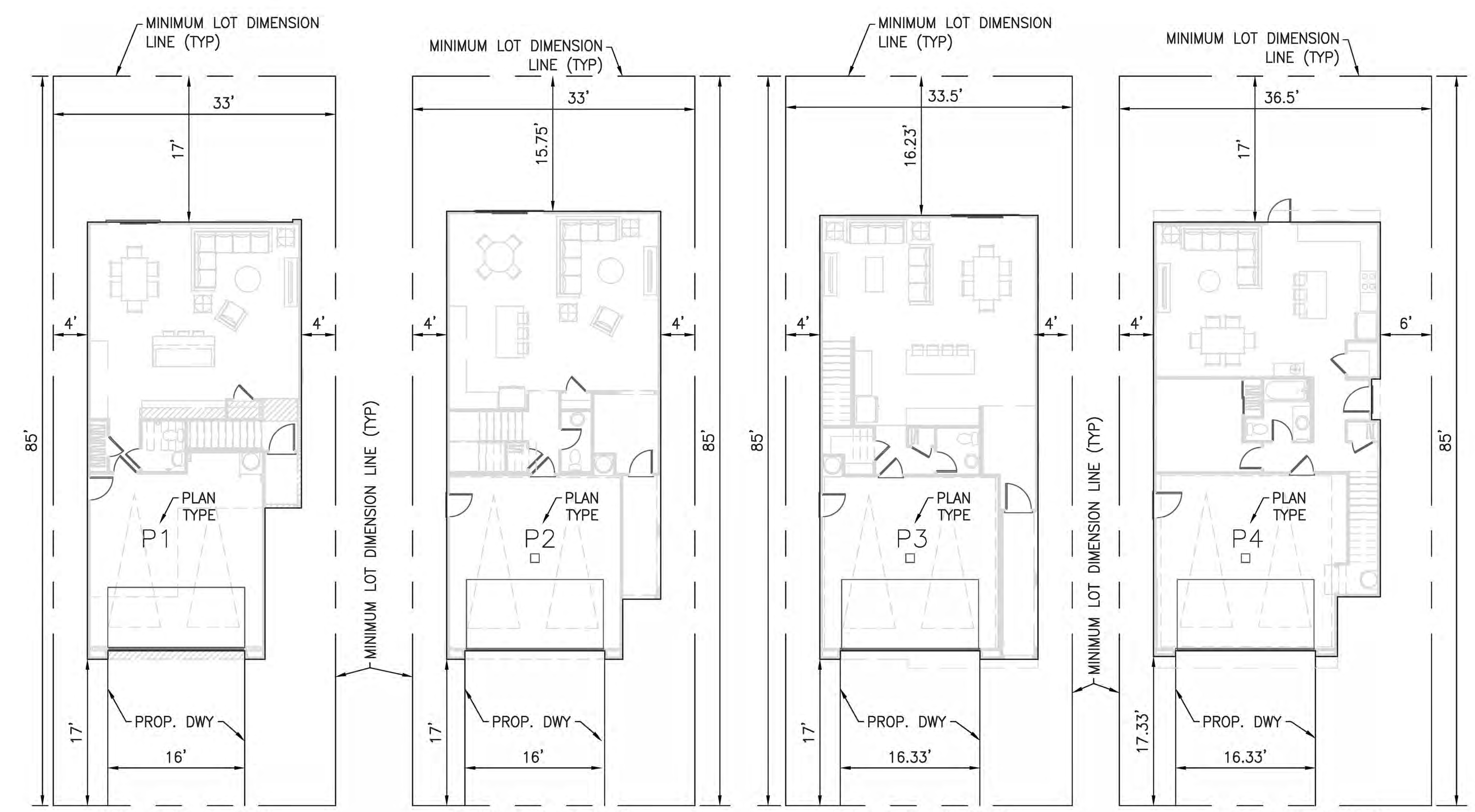


SECTION H2-H2
TYP. N'LY PERIMETER WALL
N.T.S.



TYPICAL LOT GRADING
N.T.S.

NOTE:
1. RELATIVE ELEVATION VARY PER PROPOSED STREET SLOPE. RELATIVE ELEVATIONS SHOWN HERE ARE FOR STREETS SLOPES OF 2.0%

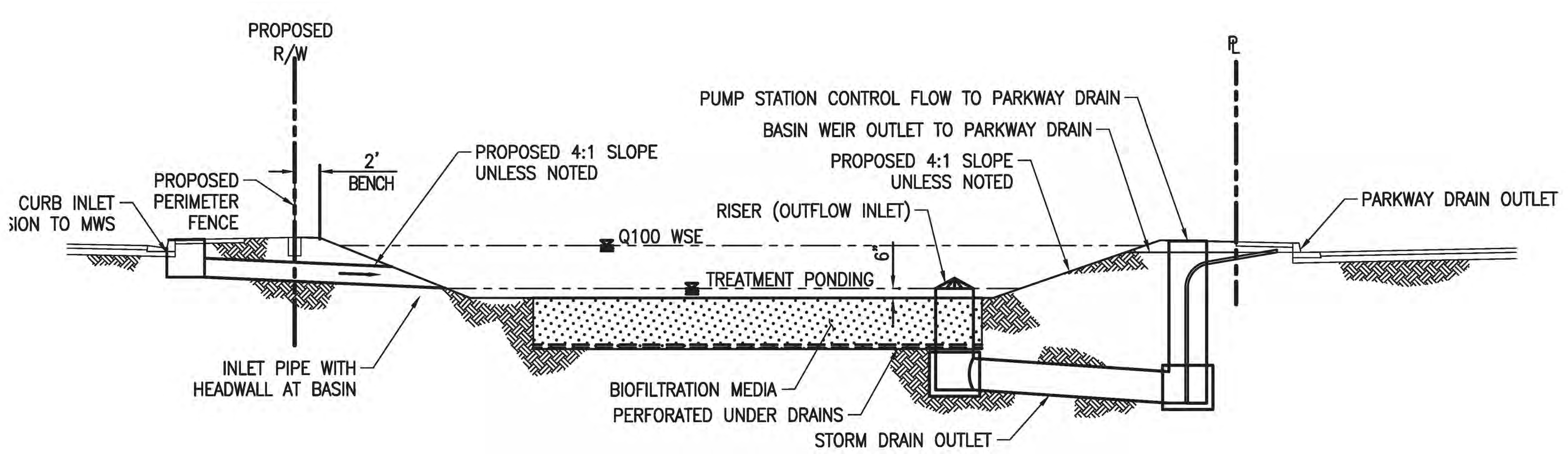


PLAN TYPE 1 (P1)
MINIMUM LOT DIMENSIONS
N.T.S.

PLAN TYPE 2 (P2)
MINIMUM LOT DIMENSIONS
N.T.S.

PLAN TYPE 3 (P3)
MINIMUM LOT DIMENSIONS
N.T.S.

PLAN TYPE 4 (P4)
MINIMUM LOT DIMENSIONS
N.T.S.



BIORETENTION BASIN
TYPICAL SECTION
SCALE: 1"=10'

PREPARED BY:

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

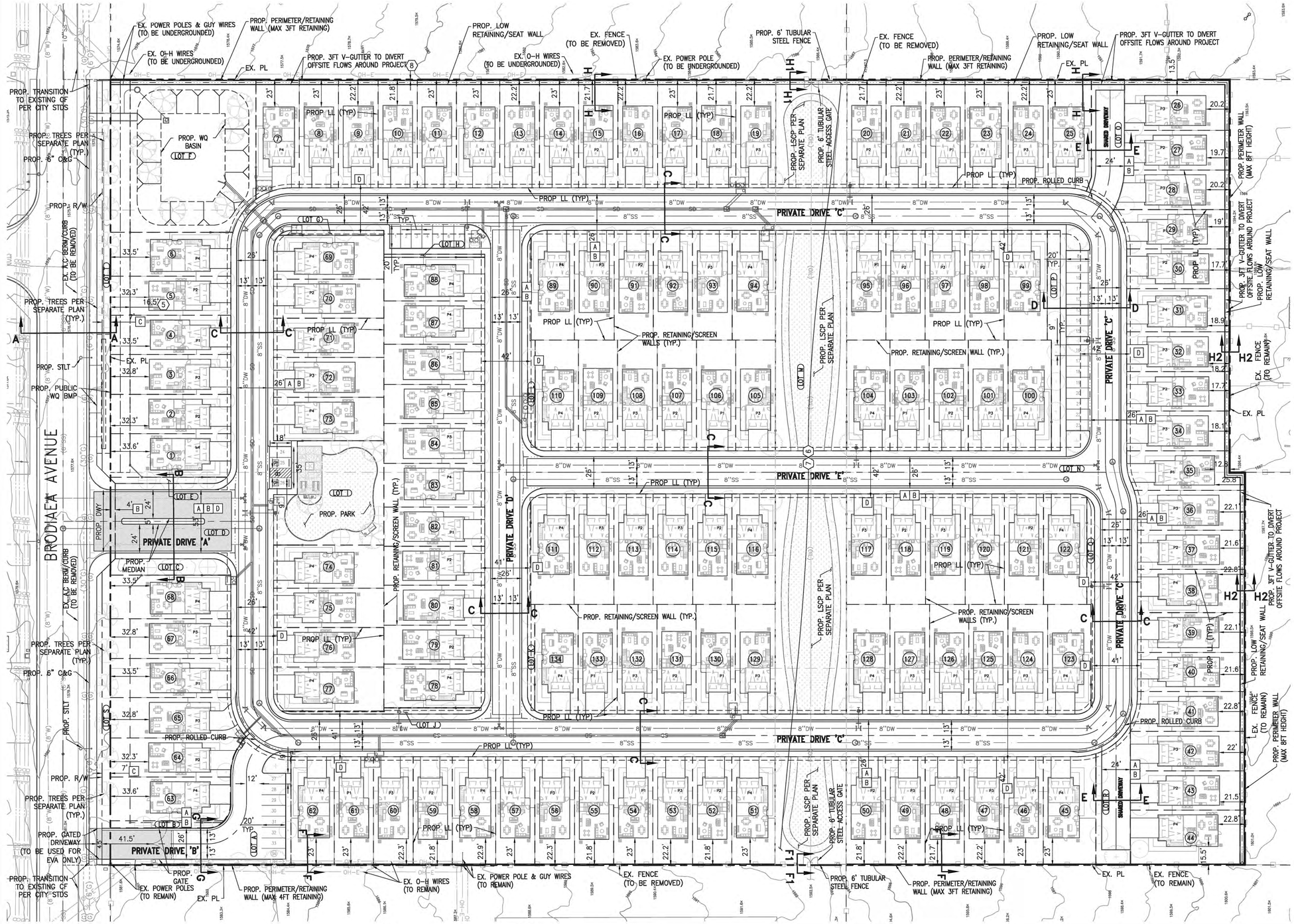
VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY SECTIONS

28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO.
WARM-022

SHEET
4
OF
8



EXISTING EASEMENTS:

3 A RESERVATION OF ONE-HALF OF ALL TREES NOW STANDING AND GROWING ON THE HEREIN DESCRIBED PROPERTY AS RESERVED BY THE GRANTORS IN THE DEED FROM JAMES E. BAKER AND WIFE TO CARLTON JACKSON, AS JOINT TENANTS, DATED JANUARY 9, 1937 AND RECORDED JANUARY 22, 1937 IN BOOK 309, PAGE 422, OF OFFICIAL RECORDS.

(INDETERMINATE FROM RECORD.)

4 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED SEPTEMBER 21, 1946 AS INSTRUMENT NO. 3803, OFFICIAL RECORDS

(BLANKET IN NATURE. THE RIGHT TO PURCHASE AN EASEMENT FOR GAS PIPELINE.)

(5) EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED DECEMBER 23, 1947 AS INSTRUMENT NO. 3283, OFFICIAL RECORDS

(6) EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 694444, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

(7) EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 69445, IN BOOK 2153, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

(8) EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO CALIFORNIA ELECTRIC POWER COMPANY DOCUMENT RECORDED MARCH 03, 1961 AS INSTRUMENT NO. 18720, OFFICIAL RECORDS

(CENTERLINE PLOTTED. EASEMENT HAS UNDEFINED WIDTH.)

PROPOSED EASEMENTS:

[A] INDICATES AN EASEMENT FOR INGRESS AND EGRESS FOR EMERGENCY AND PUBLIC SECURITY VEHICLE PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

[B] INDICATES AN EASEMENT FOR PUBLIC RIGHT-OF-WAY DEDICATION, UTILITY, AND PUBLIC STREET PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

[C] INDICATES A PORTION OF BRODIAEA AVENUE TO BE VACATED

[D] INDICATES AN EASEMENT FOR PUBLIC UTILITIES DEDICATED TO EASTERN MUNICIPAL WATER DISTRICT (EMWD)

ABBREVIATIONS:

BNDY	BOUNDARY	ELEC	ELECTRIC	PP	POWER POLE
CB	CATCH BASIN	ESMT	EASEMENT	POC	POINT OF CONNECTION
C&G	CURB & GUTTER	EX.	EXISTING	PROP	PROPOSED
CLF	CHAIN LINK FENCE	FH	FIRE HYDRANT	RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY
CO	CLEANOUT	FW	FIRE WATER	R/W	RIGHT OF WAY
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	JS	JUNCTION STRUCTURE	SF	SQUARE FOOT
DU	DRY UTILITY	LL	LOT LINE	SD	STORM DRAIN
DI	DROP INLET	MH	MANHOLE	SS	SANITARY SEWER
DW	DOMESTIC WATER	OH	OVERHEAD ELECTRICAL LINES	ST	STALL
DWY	DRIVEWAY	PKWY	PARKWAY	STLT	STREETLIGHT
		PL	PROPERTY LINE		

LEGEND:

- CENTERLINE
- EXISTING R/W
- PROPOSED PROPERTY LINE
- PROP. LOTLINE
- EXISTING LOT LINE
- EXISTING WALL
- PROPOSED WALL

NOTE:

1. ALL ONSITE STREETS ARE PROPOSED TO BE PRIVATE.
2. PRIVATE DRIVES 'C', 'D', & 'E' WILL BE CROWN STREET SECTIONS WITH 6" C&G.
3. PRIVATE DRIVES 'A', 'B', & THE SHARED DRIVEWAYS WILL BE A PITCHED STREET SECTIONS WITH 6" C&G.
4. ALL ONSITE TREES WILL BE PER A SEPARATE LANDSCAPE PLAN.

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER DANE P. MCDOUGALL C 80705 CIVIL STATE OF CALIFORNIA

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY SITE PLAN

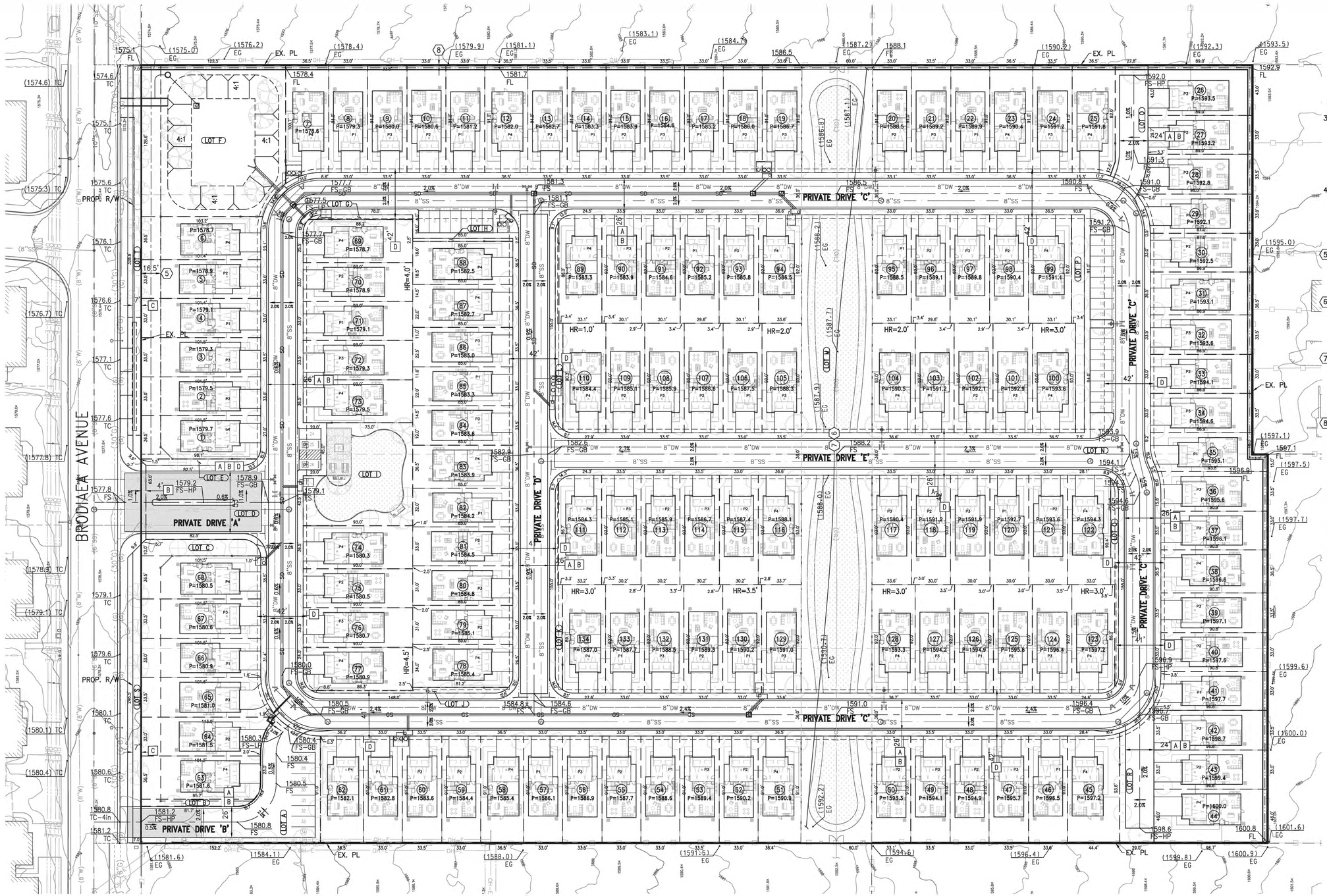
28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

SHEET 5 OF 8

PLAN SET: PSD2
DATE: 5/28/2025

P:\WARM-022\DWG\SHEETS\WARM-PRE-SS-SP.DWG
BY: JOE JOHNSON



EXISTING EASEMENTS:

3 A RESERVATION OF ONE-HALF OF ALL TREES NOW STANDING AND GROWING ON THE HEREIN DESCRIBED PROPERTY AS RESERVED BY THE GRANTORS IN THE DEED FROM JAMES E. BAKER AND WIFE TO CARLTON JACKSON, AS JOINT TENANTS, DATED JANUARY 9, 1937 AND RECORDED JANUARY 22, 1937 IN BOOK 309, PAGE 422, OF OFFICIAL RECORDS.

(INDETERMINATE FROM RECORD.)

4 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED SEPTEMBER 21, 1946 AS INSTRUMENT NO. 3803, OFFICIAL RECORDS

(BLANKET IN NATURE. THE RIGHT TO PURCHASE AN EASEMENT FOR GAS PIPELINE.)

5 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO SOUTHERN CALIFORNIA GAS COMPANY AND SOUTHERN COUNTIES GAS COMPANY OF CALIFORNIA DOCUMENT RECORDED DECEMBER 23, 1947 AS INSTRUMENT NO. 3283, OFFICIAL RECORDS

6 EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 694444, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

7 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO FOUR CORNERS PIPE LINE COMPANY DOCUMENT RECORDED SEPTEMBER 26, 1957 AS INSTRUMENT NO. 69445, IN BOOK 2153, OFFICIAL RECORDS

(APPROXIMATE LOCATION PLOTTED BASED ON IMPROVEMENTS. 60' RIGHT-OF-WAY AROUND OIL PIPELINE.)

8 EASEMENT FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES GRANTED TO CALIFORNIA ELECTRIC POWER COMPANY DOCUMENT RECORDED MARCH 03, 1961 AS INSTRUMENT NO. 18720, OFFICIAL RECORDS

(CENTERLINE PLOTTED. EASEMENT HAS UNDEFINED WIDTH.)

PROPOSED EASEMENTS:

A INDICATES AN EASEMENT FOR INGRESS AND EGRESS FOR EMERGENCY AND PUBLIC SECURITY VEHICLE PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

B INDICATES AN EASEMENT FOR PUBLIC RIGHT-OF-WAY DEDICATION, UTILITY, AND PUBLIC STREET PURPOSES DEDICATED TO THE CITY OF MORENO VALLEY

C INDICATES A PORTION OF BRODIAEA AVENUE TO BE VACATED

D INDICATES AN EASEMENT FOR PUBLIC UTILITIES DEDICATED TO EASTERN MUNICIPAL WATER DISTRICT (EMWD)

PRELIMINARY EARTHWORK SUMMARY:

RAW CUT	8,712	CY
RAW FILL	23,672	CY
SHRINKAGE	16	%
2FT REMOVAL (OVERALL SITE)	7,429	CY
5FT REMOVAL (PADs)	8,030	CY
SUBSIDENCE	0	CY
WQ BASIN SPOILS	1,111	CY
TOTAL (FILL)	22,150	CY

ASSUMPTIONS:

1. EARTHWORK CALCULATIONS DO NOT INCLUDE BUILDING FOUNDATION, WALL FOOTINGS AND/ OR UTILITY SPOILS.
2. ASSUMPTIONS PER GEOTECHNICAL INVESTIGATION PREPARED BY ALTA CALIFORNIA GEOTECHNICAL, INC. DATED OCTOBER 14, 2024.
3. QUANTITIES DO NOT INCLUDE REMOVALS DUE TO CLEARING AND GRUBBING, TOP SOILS OR VEGETATION AND/OR EXISTING PAVEMENT/ BUILDING FOUNDATIONS.
4. PER THE GEOTECHNICAL INVESTIGATION PREPARED BY ALTA CALIFORNIA GEOTECHNICAL, INC., REMOVALS RANGE FROM 7FT-10FT FOR THE ENTIRE SITE. THE VALUE SHOWN ABOVE IS AN AVERAGE OF THESE NUMBERS.

LEGEND:

- CENTERLINE
- EXISTING R/W
- PROPOSED PROPERTY LINE
- SETBACK
- EXISTING LOT LINE
- EXISTING WALL
- PROPOSED WALL
- ADA PATH OF TRAVEL
- X / Y — UNIT NUMBER / UNIT TYPE

ABBREVIATIONS:

BNDY	BOUNDARY	EX.	EXISTING	R/W	RIGHT OF WAY
CB	CATCH BASIN	FH	FIRE HYDRANT	SF	SQUARE FOOT
C&G	CURB & GUTTER	FW	FIRE WATER	SD	STORM DRAIN
CLF	CHAIN LINK FENCE	JS	JUNCTION STRUCTURE	SS	SANITARY SEWER
CO	CLEANOUT	MH	MANHOLE	ST	STALL
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	OH	OVERHEAD ELECTRICAL LINES	STLT	STREETLIGHT
DU	DRY UTILITY	PKWY	PARKWAY		
DI	DROP INLET	PL	PROPERTY LINE		
DW	DOMESTIC WATER	PP	POWER POLE		
DWY	DRIVEWAY	POC	POINT OF CONNECTION		
ELEC	ELECTRIC	PROP	PROPOSED		
ESMT	EASEMENT	RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY		

1" = 20'

0 10 20 40

PREPARED BY:

REGISTERED PROFESSIONAL ENGINEER — DANIEL P. MCDOUGALL — C 80705 — CIVIL — STATE OF CALIFORNIA

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY GRADING PLAN

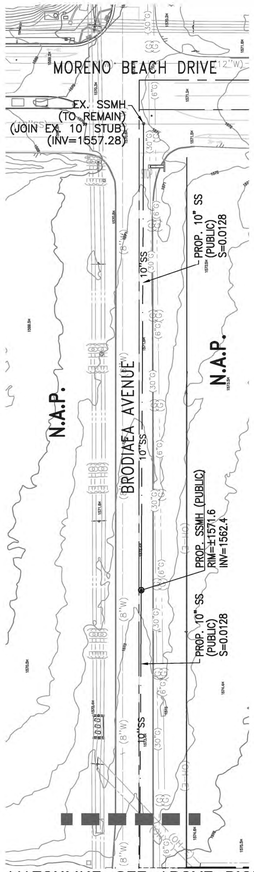
28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

SHEET 6 OF 8

PLAN SET: PDSD
DATE: 5/28/2025

P:\WARM-022\DWG\EXHIBITS\VTM\VTM-PG-06-PG.DWG
PLOTTED: 5/28/2025 BY: JOE ROBSON



MATCHLINE–SEE ABOVE RIGHT

1" = 60'

0 30 60 120

MATCHLINE–SEE BELOW LEFT

EX. POWER POLES (TO BE UNDERGROUNDED)
PROP. SD FORCE MAIN
PROP. SD PUMP STATION
PROP. SD OUTLET STRUCTURE
EX. PL
EX. O-H WIRES (TO BE UNDERGROUNDED)
EX. POWER POLE (TO BE UNDERGROUNDED)
PROP. SD PARKWAY DRAIN
PROP. PUBLIC WQ BMP CURB CORE
PROP. WQ BASIN
PROP. SD HEADWALL
PROP. MWS VAULT
PROP. SSMH (PUBLIC) RIM=1577.5 INV=1572.2
PROP. CB
PROP. SD JS
PROP. SSMH (PUBLIC) RIM=1577.5 INV=1571.9
PROP. PUBLIC WQ BMP SUB-DRAIN
PROP. R/W
PROP. PUBLIC WQ BMP CURB CORE INLETS
PROP. DW CROSSING OVER EX. 30" GAS MAIN
PROP. DW CROSSING UNDER EX. 6" GAS MAIN
PROP. MWS VAULT
PROP. CB
PROP. FH (PUBLIC)
PROP. SSMH (PUBLIC) RIM=1579.0 INV=1570.7
PROP. SS CROSSING UNDER EX. 30" & 6" GAS MAINS SEE NOTE 4
PROP. DW CROSSING UNDER EX. 6" GAS MAIN
PROP. DW CROSSING OVER EX. 30" GAS MAIN
PROP. CB & MWS VAULT
PROP. SSMH (PUBLIC) RIM=1579.9 INV=1571.5
PROP. MWS VAULT
PROP. FH (PUBLIC)
PROP. SSMH (PUBLIC) RIM=1580.5 INV=1572.1
PROP. SSMH (PUBLIC) RIM=1581.3 INV=1573.4
PROP. SSMH (PUBLIC) RIM=1587.1 INV=1578.3
PROP. SSMH (PUBLIC) RIM=1582.8 INV=1574.9
PROP. SSMH (PUBLIC) RIM=1584.8 INV=1576.2
PROP. SSMH (PUBLIC) RIM=1591.7 INV=1582.6
PROP. SSMH (PUBLIC) RIM=1593.1 INV=1585.2
PROP. SSMH (PUBLIC) RIM=1590.9 INV=1582.0
PROP. SSMH (PUBLIC) RIM=1590.9 INV=1582.3
PROP. SSMH (PUBLIC) RIM=1593.8 INV=1585.3
PROP. SSMH (PUBLIC) RIM=1594.4 INV=1585.9
PROP. SSMH (PUBLIC) RIM=1596.7 INV=1588.4
PROP. SSMH (PUBLIC) RIM=1596.5 INV=1587.2
EX. OIL PIPE (TO REMAIN)
PROP. DW CROSSING UNDER EX. 16" OIL MAIN SEE NOTE 4
PROP. SS CROSSING UNDER EX. 16" OIL MAIN SEE NOTE 4
PRIVATE DRIVE 'A'
PRIVATE DRIVE 'B'
PRIVATE DRIVE 'C'
PRIVATE DRIVE 'D'
PRIVATE DRIVE 'E'
BRODIAEA AVENUE
EX. POWER POLES (TO REMAIN)
EX. O-H WIRES (TO REMAIN)
EX. POWER POLE & GUY WIRES (TO REMAIN)

1" = 40'

0 20 40 80

NOTE:

1. ONSITE DOMESTIC WATER WILL BE A PUBLIC SYSTEM
2. ONSITE SANITARY SEWER WILL BE A PUBLIC SYSTEM
3. ONSITE STORM DRAIN WILL BE A PRIVATE SYSTEM
4. PROPOSED UTILITIES (SEWER & WATER[AS NOTED]) WILL CROSS UNDERNEATH THE EXISTING GAS AND OIL MAINS AND WILL MAINTAIN 6" OF CLEARANCE. ADDITIONAL ENCASEMENT MAY BE REQUIRED (WHERE APPLICABLE).

LEGEND

- 8"DW — PROP. DOMESTIC WATER (PUBLIC)
- 8"SS — PROP. SANITARY SEWER (PUBLIC)
- PROP. STORM DRAIN (PRIVATE)
- (8"SS) — EX. 8" SANITARY SEWER
- (8"W) — EX. 8" DOMESTIC WATER
- (G) (G) — EX. GAS
- (T) (T) — EX. TELECOMMUNICATIONS
- (OH-E) — EX. OVERHEAD ELECTRICAL

ABBREVIATIONS

BLDG	BUILDING	ESMT	EASEMENT	LSCP	LANDSCAPE	PP	POWER POLE	SWLK	SIDEWALK
BMP	BEST MANAGEMENT PRACTICES	EX	EXISTING	MAX	MAXIMUM	POC	POINT OF CONNECTION	TC	TOP OF CURB
		FDC	FIRE DEPARTMENT	MWS	MODULAR WETLANDS SYSTEM	PVMT	PAVEMENT	TB	THRUST BLOCK
BNCH	BENCH		CONNECTION			RPPA	REDUCED PRESSURE PREVENTION ASSEMBLY	TS	TRAFFIC SIGNAL
CB	CATCH BASIN	FG	FINISHED GRADE	MH	MANHOLE			TELE	TELECOMMUNICATION
CO	CLEANOUT	FH	FIRE HYDRANT	MM	MASTER METER	R/W	RIGHT-OF-WAY	TYP	TYPICAL
COF	CITY OF FULLERTON	FL	FLOWLINE	POC	POINT OF CONNECTION	SDMH	STORM DRAIN MANHOLE	XFMR	TRANSFORMER
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	FR	FIRE RISER	PIV	POST INDICATOR VALVE	SD	STORM DRAIN		
		FS	FINISHED SURFACE	PROP	PROPOSED	SS	SANITARY SEWER		
DW	DOMESTIC WATER	FW	FIRE WATER	PL	PROPERTY LINE	STLT	STREET LIGHT		
DWY	DRIVEWAY	JS	JUNCTION STRUCTURE	PB	PULLBOX				

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162

PRELIMINARY UTILITY PLAN

28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

SHEET 7 OF 8

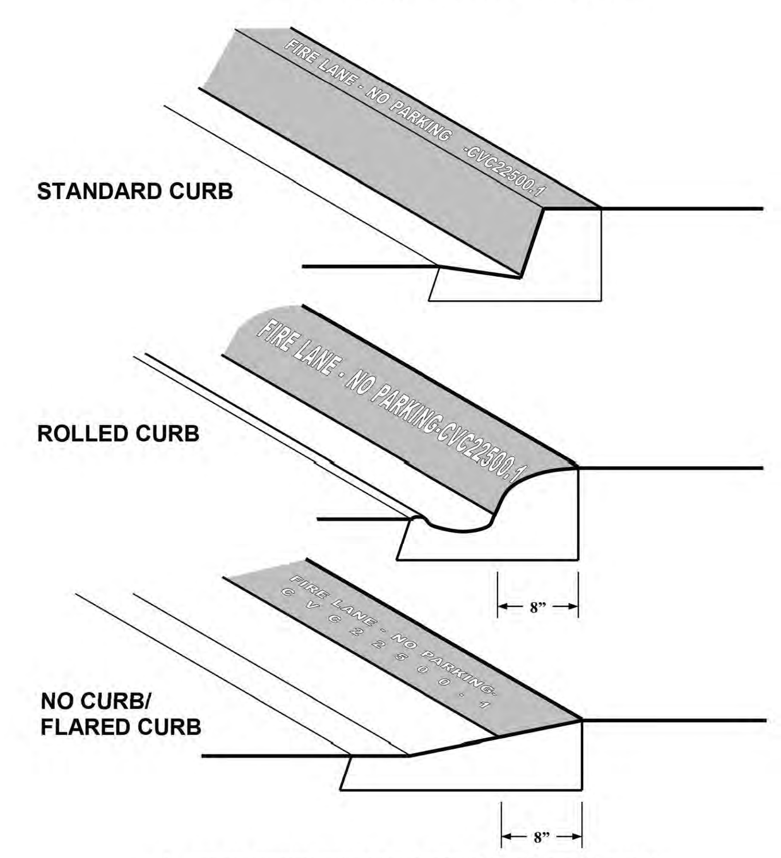
PLAN SET: PCR2
DATE: 5/28/2025

P:\WARM-022\DWG\SHEETS\VTM\VTM-PP-01.DWG
BY: JOE KNUDSEN

Riverside County Fire Department Guideline OFM-01A
Fire Department Access Requirements for Commercial & Residential Development

ATTACHMENT 9

Fire Lane Identification – Red Curbs



1. Fire lane entrance sign(s) shall also be provided per Attachment 10 or 11.
2. Curbs shall be painted OSHA safety red.
3. "FIRE LANE – NO PARKING – CVC 22500.1" shall be painted on top of curb in 3" white lettering at a spacing of 30' on center or portion thereof.
4. Other uniquely shaped areas that are part of a fire lane, may be outlined using these same methods, and adding diagonal RED lines within the designated fire lane area.

25

1/30/2024

Riverside County Fire Department Guideline OFM-01A
Fire Department Access Requirements for Commercial & Residential Development

ATTACHMENT 10

Specifications for
Fire Lane Entrance Signs
To be used only at *vehicle entry points*
to areas that contain "Fire Lane—No Parking" signs or red curbs

All sign and lettering dimensions shown are minimums. "Arial Narrow" font used is used in sample above though other legible sans-serif fonts may be acceptable.

This sign shall be posted at all vehicle entrances to areas marked with either red curbs or fire lane "No Parking" signs. Signs shall be securely mounted facing the direction of travel and clearly visible to oncoming traffic entering the designated area. Signs shall be made of durable material and installed per Attachments 13 and 14.

Towing company contact information is required for all properties with a standing written agreement for services with a towing company per the California Vehicle Code.

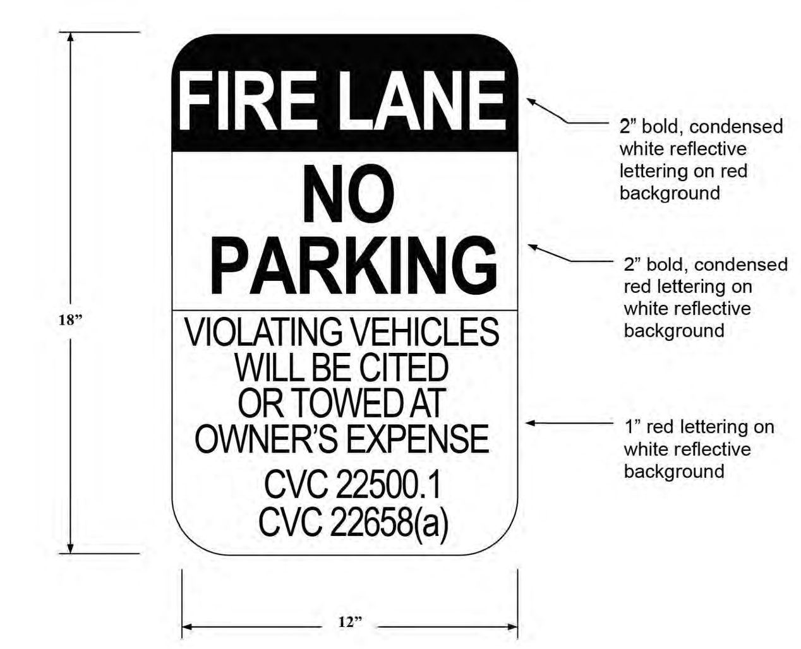
26

1/30/2024

Riverside County Fire Department Guideline OFM-01A
Fire Department Access Requirements for Commercial & Residential Development

ATTACHMENT 12

Specifications for
Fire Lane No Parking Signs



All sign and lettering dimensions shown are *minimums*. "Arial Narrow" font used is used in sample above though other legible sans-serif fonts may be acceptable.

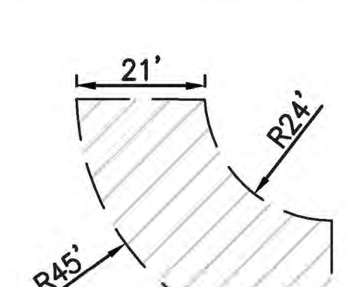
Signs shall be securely mounted facing the direction of travel and clearly visible to oncoming traffic entering the designated area. Signs shall be made of durable material and installed per Attachments 13 and 14.

28

1/30/2024

LEGEND

(arrow)	HOSE PULL LENGTH PER PLAN
(symbol)	PROP. FIRE HYDRANT
(symbol)	EX. FIRE HYDRANT
(shading)	FIRE ACCESS LANE
(line)	EX. RIGHT-OF-WAY
(line)	PROP. RIGHT-OF-WAY/EX. PROPERTY LINE
(line)	FIRE TRUCK TURN TEMPLATE OUTLINE PER DETAIL (SEE BELOW LEFT)
(line)	FIRE LANE–RED CURB SEE DETAIL HEREON.



FIRE TRUCK TURNING RADII (TYP. DIMENSIONS)

ABBREVIATIONS:

BLDG	BUILDING
BNDY	BOUNDARY
CV	CONTROL VALVE
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY
DR	DRIVE
EX.	EXISTING
FH	FIRE HYDRANT
FR	FIRE RISER
FW	FIRE WATER
FDC	FIRE DEPARTMENT CONNECTION
PL	PROPERTY LINE
PIV	POST INDICATOR VALVE
PROP	PROPOSED
R	RADIUS
R/W	RIGHT OF WAY
RPPA	REDUCED PRESSURE PREVENTION ASSEMBLY

1" = 40'

0 20 40 80

CONSTRUCTION NOTES:

1. FIRE LANE IDENTIFICATION–RED CURBS PER RIVERSIDE COUNTY FIRE DEPARTMENT ATTACHMENT 9.
2. PROPOSED PUBLIC FIRE HYDRANT
3. INSTALL "FIRE LANE" SIGN PER RIVERSIDE COUNTY FIRE DEPARTMENT ATTACHMENT 12.
4. INSTALL "FIRE LANE" ENTRANCE SIGN PER PER RIVERSIDE COUNTY FIRE DEPARTMENT ATTACHMENT 10.

PREPARED BY:

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CITY OF MORENO VALLEY
DEPARTMENT OF COMMUNITY DEVELOPMENT

VESTING TENTATIVE TRACT MAP NO. 39162
PRELIMINARY FIRE ACCESS & HYDRANT LOCATION PLAN
28136 BRODIAEA AVENUE
MORENO VALLEY, CA 92555

PROJECT NO. WARM-022

SHEET 8 OF 8

DATE: 5/28/2025

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

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DRAFT
Project No. 1-0550

Attention: Mr. Brett Ilich

Subject: **GEOTECHNICAL INVESTIGATION**
APN's 478-080-003, -004, -005, and 478-070-013, -014, -015,
Brodiaea Avenue, City of Moreno Valley, County of Riverside, California

References: Appendix A

Dear Mr. Ilich:

Alta California Geotechnical, Inc. (Alta) is pleased to present this geotechnical investigation for the proposed development of APN's 478-080-003, -004, -005, and 478-070-013, -014, -015, located off of Brodiaea Avenue, in the City of Moreno Valley, County of Riverside, California. This report is based on a recent subsurface investigation conducted by Alta, laboratory testing, a review of the referenced reports, and Alta's staff's experience with similar projects in this vicinity.

Alta's review of the data indicates that the proposed development is feasible, from a geotechnical perspective, provided that the recommendations presented in this report are incorporated into the grading and improvement plans and implemented during site development.

Included in this report are:

- Discussion of the site geotechnical conditions.
- Recommendations for remedial and site grading, including unsuitable soil removals.
- Geotechnical site construction recommendations.
- Liquefaction analysis.
- Foundation design parameters.

If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.

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Vice President

Distribution: (1) Addressee

YFH:LM:SAG:FE -1-0550, DRAFT October 14, 2024 (Geotechnical Investigation, Brodiaea Ave, Moreno Valley)

1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Scope of Work 1
1.3 Report Limitations 2
2.0 PROJECT DESCRIPTION 2
2.1 Site Location and Background 2
2.2 Proposed Development 2
3.0 SITE INVESTIGATION 3
3.1 Investigation and Laboratory Testing 3
3.2 Infiltration Testing 3
4.0 GEOLOGIC CONDITIONS 4
4.1 Geologic and Geomorphic Setting 4
4.2 Stratigraphy 4
4.2.1 Artificial fill undocumented (map symbol afu) 4
4.2.2 Alluvium (map symbol Qal) 4
4.3 Geologic Structure 5
4.3.1 Tectonic Framework 5
4.3.2 Regionally Mapped Active Faults 5
4.3.3 Geologic Structure 5
4.4 Groundwater 6
4.5 Earthquake Hazards 6
4.5.1 Local and Regional Faulting 6
4.5.2 Surface Rupture 6
4.5.3 Seismicity 7
4.5.4 Liquefaction 7
4.5.5 Dry Sand Settlement 8
5.0 ENGINEERING PROPERTIES AND ANALYSIS 8
5.1 Materials Properties 8
5.1.1 Excavation Characteristics 8
5.1.2 Compressibility 8
5.1.3 Moisture 8
5.1.4 Hydro-Consolidation 9
5.1.5 Expansion Potential 9
5.1.6 Earthwork Adjustments 9
5.1.7 Chemical Analyses 10
5.2 Engineering Analysis 10

5.2.1 Bearing Capacity and Lateral Earth Pressures 10
6.0 CONCLUSIONS AND RECOMMENDATIONS 11
6.1 Remedial Grading Recommendations 11
6.1.1 Site Preparation 11
6.1.2 Unsuitable Soil Removals 12
6.2 General Earthwork Recommendations 13
6.2.1 Compaction Standards 13
6.2.2 Groundwater/Seepage 13
6.2.3 Documentation of Removals 13
6.2.4 Treatment of Removal Bottoms 14
6.2.5 Fill Placement 14
6.2.6 Moisture Conditioning 14
6.2.7 Mixing 14
6.2.8 Import Soils 14
6.2.9 Utility Trenches 15
6.2.9.1 Excavation 15
6.2.9.2 Backfill 15
6.2.10 Backcut Stability 16
6.3 Storm Water Infiltration Systems 17
6.4 Boundary Conditions 17
7.0 DESIGN CONSIDERATIONS 17
7.1 Structural Design 17
7.1.1 Foundation Design 18
7.1.2 Conventional Foundation Systems 18
7.1.3 Post-Tensioned Slabs/Foundation Design Recommendations 20
7.2 Moisture Barrier 20
7.3 Seismic Design 21
7.4 Fence and Garden Walls 22
7.5 Footing Excavations 22
7.6 Retaining Walls 22
7.7 Exterior Slabs and Walkways 24
7.7.1 Subgrade Compaction 24
7.7.2 Subgrade Moisture 24
7.7.3 Concrete Slab Thickness 24
7.7.4 Concrete Slab Reinforcement 24

7.7.5 Control Joints 24
7.8 Concrete Design 25
7.9 Corrosion 25
7.10 Pavement Design 25
7.11 Site Drainage 26
8.0 LOT MAINTENANCE 27
8.1 Lot Drainage 27
8.2 Burrowing Animals 27
9.0 FUTURE PLAN REVIEWS 27
10.0 CLOSURE 28
10.1 Geotechnical Review 28
10.2 Limitations 28
10.3 Sulfates 29

APPENDIX A: REFERENCES
APPENDIX B: SUBSURFACE INVESTIGATION
APPENDIX C: LABORATORY TESTING
APPENDIX D: LIQUEFACTION ANALYSIS
APPENDIX E: MAINTENANCE CONSIDERATIONS
APPENDIX F: EARTHWORK SPECIFICATIONS
APPENDIX G GRADING DETAILS

1.0 INTRODUCTION

This report presents Alta's findings, conclusions, and geotechnical recommendations for the proposed development located APN's 478-080-003, -004, -005, and 478-070-013, -014, -015, located off of Brodiaea Avenue, in the City of Moreno Valley, County of Riverside, California.

1.1 Purpose

The purpose of this report is to examine the existing onsite geotechnical conditions and assess the impacts that the geotechnical conditions may have on the proposed development. This report is suitable for use in developing grading plans and engineer's cost estimates.

1.2 Scope of Work

Alta's *Scope of Work* for this geotechnical investigation included the following:

- Reviewing the referenced reports and air photos (Appendix A).
- Site geologic mapping.
- Drilling, logging, and sampling five (5) hollow-stem auger borings to a maximum depth of 51.5-feet below the existing surface (Appendix B).
- Excavating and logging eleven (11) backhoe test pits to a maximum depth of 15.0 ft below the ground surface (Appendix B).
- Conducting laboratory testing on samples obtained during our investigation (Appendix C).
- Conducting two (2) infiltration tests in two (2) additional borings at maximum depths of 5.0- and 10.0-feet.
- Conducting a liquefaction analysis.
- Evaluating engineering geologic and geotechnical engineering data, including laboratory data, to develop recommendations for site remedial grading including specialized grading techniques for unsuitable soil removals along the property boundaries, import soil, foundations, and utilities.
- Preparing this report and accompanying exhibits.

1.3 Report Limitations

The conclusions and recommendations presented in this report are based on the field and laboratory information generated during this investigation, and a review of the referenced reports. The information contained in this report is intended to be used for development of grading plans and preliminary construction cost estimates.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Background

The rectangular-shaped, approximately 14.4-acre site is bounded to the north by residential properties, to the east by vacant land and a residential property, to the south by Brodiaea Avenue, and to the west by vacant land and a nursery. The site is currently comprised of vacant land and three structures.

Historic aerial photographs are available as far back as 1959 and indicate that the site was utilized for agriculture. By 1978, the three buildings were constructed onsite. The site has remained relatively unchanged since (Historic Aerials, 2024).

2.2 Proposed Development

Alta anticipates that the site will be redeveloped to support a residential development and associated improvements. Alta anticipates that conventional cut-and-fill grading techniques will be used to develop the site. This grading will support structures consisting of wood frame construction with shallow foundations and reinforced concrete slabs-on-grade, and associated improvements.

3.0 SITE INVESTIGATION

3.1 Investigation and Laboratory Testing

Alta conducted a subsurface investigation on September 19th, 20th, and 23rd consisting of the drilling, logging and select sampling of five (5) hollow-stem auger borings up to a maximum depth of 51.5 feet, and conducting two (2) infiltration tests in two (2) additional borings up to a maximum depth of 5.0- and 10.0-feet. Alta also excavated and logged eleven (11) rubber-tire backhoe trenches. The locations of the exploratory borings and backhoe trenches are shown on enclosed Plate 1, and the boring and trench logs are presented in Appendix B.

Laboratory testing was performed on bulk and ring samples obtained during the field investigation. A brief description of the laboratory test procedures and the test results are presented in Appendix C.

3.2 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using two (2) borings to 5.0- and 10.0-ft. bgs (P-1 and P-2). The testing was performed in general accordance with the County of Riverside Technical Guidance Document. The test wells were presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 30 to 10 minutes until the readings stabilized.

The data was then adjusted to provide an infiltration rate utilizing the Porchet Method. The resulting infiltration rate is presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.3.

Table 3-1 Summary of Infiltration Testing (No Factor of Safety)		
Test Designation	P-1	P-2
Approximate Depth of Test	5.0 ft	10.0 ft
Final Time Interval	10 minutes	10 minutes
Radius of Test Hole	4 inches	4 inches
Tested Infiltration Rate	0.6 in/hr	0.7 in/hr

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located in the Peninsular Ranges geomorphic province, which characterizes the southwest portion of southern California where right lateral major active fault zones predominately trend northwest-southeast. The Peninsular Ranges province is composed of plutonic and metamorphic rock, with lesser amounts of Tertiary volcanic and sedimentary rock, Quaternary drainage in-fills and sedimentary veneers.

4.2 Stratigraphy

Based on our literature review and subsurface investigation, the site is underlain by artificial fill and alluvium. The geologic units are briefly described below.

4.2.1 Artificial fill undocumented (map symbol afu)

The artificial fill present within the site was not encountered during the subsurface investigation, but likely overlays the alluvium below the existing structures currently occupying the site.

4.2.2 Alluvium (map symbol Qal)

The alluvium observed at the site consists mainly of brown, light brown, gray, reddish brown, light gray, and orange brown silty sand and sand in a dry to slightly moist and loose to very dense condition. The unit was logged to a depth of 51.5 feet below the ground surface.

4.3 Geologic Structure

4.3.1 Tectonic Framework

Jennings (1985) defined eight structural provinces within California that have been classified by predominant regional fault trends and similar fold structure. These provinces are in turn divided into blocks and sub-blocks that are defined by "major Quaternary faults." These blocks and sub-blocks exhibit similar structural features. Within this framework, the subject site is located within Structural Province I, which is controlled by the dominant northwest trend of the San Andreas Fault and is divided into two blocks, the Coast Range Block and the Peninsular Range Block. The Peninsular Range Block, on which this site is located, is characterized by a series of parallel, northwest trending faults that exhibit right lateral strike-slip movement. These blocks are terminated by the Transverse Range block to the north and extend southward into the Baja Peninsula. These northwest trending faults divide the Peninsular Range block into eight sub-blocks. The site is located on the northeast portion of the Riverside Sub-block, one of the eight sub-blocks, which is bound on the east by the San Jacinto fault zone and on the west by the Elsinore fault zone.

4.3.2 Regionally Mapped Active Faults

Several large, active fault systems including the San Jacinto and the Elsinore fault zones occur in the region surrounding the site. These fault systems have been studied extensively and in a large part control the geologic structure of southern California.

4.3.3 Geologic Structure

Based upon our site investigation and literature review, the surficial sediments are of Quaternary age and are not folded or faulted.

4.4 Groundwater

Groundwater was not encountered during our subsurface investigation. Based on state-provided information, groundwater elevation data from the nearest groundwater site located approximately 0.8 miles to the southwest indicate groundwater was as shallow as 99.8 feet below the ground surface in 1952 (WDL, 2024). The most recent groundwater elevation data from the same monitoring site, recorded in 1986, indicates the most recent reading showed groundwater as shallow as 134.6 feet below the ground surface (WDL, 2024).

4.5 Earthquake Hazards

The subject site is located in southern California, which is a tectonically active area. The type and magnitude of seismic hazards affecting a site are dependent on the distance to the causative fault and the intensity and magnitude of the seismic event. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction and/or ground lurching.

4.5.1 Local and Regional Faulting

The site is located on the northwestern portion of the Santa Ana sub-block, where the San Jacinto, San Andreas, Elsinore, Chino, and Cucamonga Faults surround the site approximately 2.6, 3.9, 19.6, 23.6, and 24.0 miles away, respectively.

4.5.2 Surface Rupture

Active faults are not known to exist within the project and a review of Special Publication 42 indicates the site is not within a California State designated earthquake fault zone. Accordingly, the potential for fault surface rupture on the subject site is very low.

4.5.3 Seismicity

Ground shaking hazards caused by earthquakes along other active regional faults do exist. The 2022 California Building Code requires use-modified spectral accelerations and velocities for most structural designs. Seismic design parameters using soil profile types identified in the 2022 California Building Code are presented in Section 7.3.

4.5.4 Liquefaction

Seismic agitation of relatively loose saturated sands, silty sands, and some silts can result in a buildup of pore pressure. If the pore pressure exceeds the overburden stresses, a temporary quick condition known as liquefaction can occur. Liquefaction effects can manifest in several ways including: 1) loss of bearing; 2) lateral spread; 3) dynamic settlement; and 4) flow failure. Lateral spreading has typically been the most damaging mode of failure.

In general, the more recent that a sediment has been deposited, the more likely it will be susceptible to liquefaction. Other factors that must be considered are groundwater, confining stresses, relative density, and the intensity and duration of seismically induced ground shaking.

No groundwater was encountered in any of the borings advanced at the site. Groundwater elevation data from the nearest well located approximately 0.8 miles from the site indicates groundwater was as shallow as 99.8 feet below the ground surface in 1952 (WDL, 2024). Based on the depth to groundwater and the removal and re-compaction recommendations presented herein, the potential for dynamic settlement due to liquefaction is considered to be nil.

4.5.5 Dry Sand Settlement

Dry sand settlement is the process of non-uniform settlement of the ground surface during a seismic event. Based on our subsurface investigation and our removal/recompaction recommendations, the potential for dry sand settlement is anticipated to be low and within foundation design tolerances. Design dynamic settlement parameters are presented in Table 7-1. Dry sand settlement analysis results are presented in Appendix D.

5.0 ENGINEERING PROPERTIES AND ANALYSIS

5.1 Materials Properties

Presented herein is a general discussion of the engineering properties of the onsite materials that will be encountered during construction of the proposed project. Descriptions of the soil (Unified Soil Classification System) are presented on the boring logs in Appendix B.

5.1.1 Excavation Characteristics

Based on the data provided from the subsurface investigations, it is our opinion that the onsite materials possess favorable excavation characteristics such that conventional earth moving equipment can be utilized.

5.1.2 Compressibility

The undocumented artificial fill and upper portions of the alluvium onsite are considered compressible and unsuitable to support the proposed improvements. Recommended removal depths are presented in Section 6.1.2.

5.1.3 Moisture

The alluvium that will require removal and recompaction as discussed in Section 6.1.2 are typically under-optimum.

5.1.4 Hydro-Consolidation

Hydro-consolidation is the effect of introducing water into soil that is prone to collapse. Upon loading and initial wetting, the soil structure and apparent strength are altered resulting in almost immediate settlement. That settlement can have adverse impacts on engineered structures, particularly in areas where it is manifested differentially. Differential settlements are typically associated with differential wetting, irregularities in the subsurface soil conditions, or irregular loading patterns.

Based on our laboratory testing (Appendix C), there is potential for hydro-collapse in the alluvium onsite. Upon completion of the remedial grading recommendations presented herein, the potential for hydro-collapse shall be low and within foundation tolerance.

5.1.5 Expansion Potential

Expansion index testing was performed on samples taken during our subsurface investigation. Based on the results, it is anticipated that the majority of materials onsite are "very low" to "low" in expansion potential ($0 \leq EI \leq 50$, Appendix C) when tested per ASTM D: 4829.

5.1.6 Earthwork Adjustments

The values presented in Table 5-1 are deemed appropriate for estimating purposes and may be used in an effort to balance earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in-progress and actual conditions are better defined.

TABLE 5-1 Earthwork Adjustment Factors		
Geologic Unit	**Adjustment Factor Range**	**Average**
Alluvium	Shrink 14% to 18%	16%

5.1.7 Chemical Analyses

Chemical testing was performed on samples of material underlying the proposed site. Soluble sulfate test results indicate that the soluble sulfate concentrations of the soils tested are classified as negligible (Category S0) per ACI 318-14.

Negligible chloride levels were detected in the onsite soils. Based on laboratory results of soluble sulfate, chloride, and pH testing as presented in Appendix C, the onsite soils are classified as "non-corrosive" to buried metals and concrete (Caltrans, 2022). Additional discussions on corrosion are presented in Section 7.9. Corrosion tests results are presented in Appendix C.

5.2 Engineering Analysis

Presented below is a general discussion of the engineering analysis methods that were utilized to develop the conclusions and recommendations presented in this report.

5.2.1 Bearing Capacity and Lateral Earth Pressures

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

Coulomb forces, a separate analysis specific to the application can be conducted.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on Alta's findings during our subsurface investigation, the laboratory test results, and our staff's previous experience in the area, it is Alta's opinion that the development of the site is feasible from a geotechnical perspective. Presented below are recommendations that should be incorporated into site development and construction plans.

6.1 Remedial Grading Recommendations

All grading shall be accomplished under the observation and testing of the project geotechnical consultant in accordance with the recommendations contained herein and the City of Moreno Valley criteria.

6.1.1 Site Preparation

Significant amounts of vegetation, construction debris, and other deleterious materials are unsuitable as structural fill material and should be disposed of off-site prior to commencing grading/construction. Any septic tanks, seepage pits or wells should be abandoned as per the County of Riverside Department of Health Services.

Existing concrete should be removed prior to the placement of engineered fill. The demolished concrete may be incorporated into compacted, engineered fills after it is crushed to a maximum size of six (6) inches. Prior to placement as engineered fill any protruding steel rebar should be cut from the concrete pieces and disposed of offsite.

Existing asphaltic concrete should be removed prior to the placement of engineered fill. From a geotechnical perspective, this material may be incorporated into compacted, engineered fills after it is crushed to a

maximum size of six (6) inches. The crushed asphalt should not be placed under residential structures, but rather, it can be placed in approved non-residential areas, such as streets, parking areas or open space. These recommendations should be verified by the environmental consultant.

6.1.2 Unsuitable Soil Removals

The upper portions of alluvium are compressible and as such, are not suitable to support the proposed structures. As such, it is anticipated that, on average, the upper seven (7) to ten (10) feet of existing soils will require removal and recompaction, extending at a 1:1 projection horizontally outside the structures. This recommended removal combined with the foundation recommendations presented in Section 7.1 should provide suitable support for the proposed structures.

Footings for structures should be underlain by a minimum of two (2) feet of compacted fill. As such, for building pads where unsuitable soil removals do not provide the minimum depth of compacted fill, or where design grades and/or remedial grading activities create cut/fill transitions, the cut and shallow fill portions of the building pads should be over-excavated during grading and replaced with compacted fill.

The Project Geotechnical Consultant should observe the removal bottom prior to placing fill. If unsuitable soils are exposed upon the completion of the removals recommended above, additional removals may be required.

For fill areas in streets, in general, a minimum removal and recompaction of the upper two (2) feet is recommended, however all undocumented artificial fill shall be removed and recompacted. For cuts greater than two (2) feet in street areas, removals are not required so long as alluvium

are exposed. For cuts less than two (2) feet, the two (2) foot removal and recompaction applies.

Material removed as part of the unsuitable soil removals can be used as artificial fill, provided it is free of deleterious materials.

6.2 General Earthwork Recommendations

6.2.1 Compaction Standards

All fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method: D-1557. Fill material should be moisture conditioned to optimum moisture or above, and as generally discussed in Alta's Earthwork Specification Section presented in Appendix F. Compaction shall be achieved with the use of sheepsfoot rollers or similar kneading type equipment. Mixing and moisture conditioning will be required in order to achieve the recommended moisture conditions.

6.2.2 Groundwater/Seepage

It is anticipated that groundwater may be encountered during construction. Perched water conditions could be encountered depending on the time of year construction occurs.

6.2.3 Documentation of Removals

All removal/over-excavation bottoms should be observed and approved by the project Geotechnical Consultant prior to fill placement. Consideration should be given to surveying the removal bottoms and undercuts after approval by the geotechnical consultant and prior to the placement of fill. Staking should be provided in order to verify undercut locations and depths.

6.2.4 Treatment of Removal Bottoms

At the completion of removals/over-excavation, the exposed removal bottom should be ripped to a minimum depth of eight (8) inches, moisture-conditioned to above optimum moisture content and compacted in-place to the project standards.

6.2.5 Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in eight-inch bulk maximum lifts, moisture conditioned to optimum moisture content or above, compacted and tested as grading/construction progresses until final grades are attained.

6.2.6 Moisture Conditioning

The moisture content of the upper in-situ soils varies, however the majority of these soils are under-optimum, as shown on the boring logs in Appendix B. Most soils will require moisture conditioning prior to placement as compacted fill.

6.2.7 Mixing

Mixing of materials may be necessary to prevent layering of different soil types and/or different moisture contents. The mixing should be accomplished prior to and as part of compaction of each fill lift.

6.2.8 Import Soils

Import soils, if necessary, should consist of clean, structural quality, compactable materials similar to the on-site soils and should be free of trash, debris, or other objectionable materials. The project Geotechnical Consultant should be notified not less than 72 hours in advance of the locations of any soils proposed for import. Import sources should be sampled, tested, and approved by the project Geotechnical Consultant at

the source prior to the importation of the soils to the site. The project Civil Engineer should include these requirements on plans and specifications for the project.

6.2.9 Utility Trenches

6.2.9.1 Excavation

Utility trenches should be supported, either by laying back excavations or shoring, in accordance with applicable OSHA standards. In general, existing site soils are classified as Soil Type “B” and "C" per OSHA standards. Upon completion of the recommended removals and recompaction, the artificial fill will be classified as Soil Type "B". The Project Geotechnical Consulting should be consulted if geologic conditions vary from what is presented in this report.

6.2.9.2 Backfill

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

Under-slab trenches should also be compacted to project specifications. If select granular backfill (SE > 30) is used, compaction by flooding will be acceptable.

6.2.10 Backcut Stability

Temporary backcuts, if required during unsuitable soil removals, should be made no steeper than 1:1 without review and approval of the geotechnical consultant. Flatter backcuts may be necessary where geologic conditions dictate and where minimum width dimensions are to be maintained.

Care should be taken during remedial grading operations in order to minimize risk of failure. Should failure occur, complete removal of the disturbed material will be required.

In consideration of the inherent instability created by temporary construction backcuts for removals, it is imperative that grading schedules are coordinated to minimize the unsupported exposure time of these excavations. Once started, these excavations and subsequent fill operations should be maintained to completion without intervening delays imposed by avoidable circumstances. In cases where five-day workweeks comprise a normal schedule, grading should be planned to avoid exposing at-grade or near-grade excavations through a non-work weekend. Where improvements may be affected by temporary instability, either on or offsite, further restrictions such as slot cutting, extending workdays, implementing weekend schedules, and/or other requirements considered critical to serving specific circumstances may be imposed.

6.3 Storm Water Infiltration Systems

From a geotechnical perspective, allowing storm water to infiltrate the onsite soil in concentrated areas increases the potential for settlement, liquefaction, and water-related damage to structures/improvements, such as wet slabs or pumping subgrade, and should be avoided where possible. If infiltration systems are required on this site, care should be taken in designing systems that control the storm water as much as possible.

Preliminary infiltration testing was conducted at the site as part of this investigation, and the methodology is discussed in 3.2. The resulting infiltration rates for P-1 and P-2 were calculated to be 0.6- and 0.7-inches per hour, respectively. The results do not include a factor of safety.

The WQMP designer should review the test results and determine if the proposed BMP system is appropriate for the site. The Project Geotechnical Consultant should review the final WQMP design prior to construction.

6.4 Boundary Conditions

The site is bounded to the north by residential properties, to the east by vacant land and a residential property, to the south by Brodiaea Avenue, and to the west by vacant land and a nursery. Construction of retaining/screen walls along these boundaries may require additional geotechnical recommendations concerning unsuitable soil removals and foundation design parameters. Boundary conditions for the project should be reviewed by the Project Geotechnical Consultant as the design progresses.

7.0 DESIGN CONSIDERATIONS

7.1 Structural Design

It is anticipated that multi-story townhome structures with slab on-grade and shallow foundations will be constructed. Upon the completion of rough grading, finish grade samples should be collected and tested in order to provide specific

recommendations as they relate to the individual building pads. These test results and corresponding design recommendations should be presented in a final rough grading report. Final slab and foundation design recommendations should be made based upon specific structure sitings, loading conditions, and as-graded soil conditions.

It is anticipated that the majority of onsite soils will possess "very low" to "low" expansion potential when tested in general accordance with ASTM Test Method D: 4829. For budgeting purposes, the following foundation design requirements for a range of potential expansion characteristics are presented.

7.1.1 Foundation Design

Foundations may be preliminary designed based on the values presented in Table 7-1 below.

Table 7-1
Foundation Design Parameters*

Allowable Bearing	2000 lbs/ft^2 (assuming a minimum embedment depth and width of 12 inches)
Lateral Bearing	250 lbs/ft^2 at a depth of 12 inches plus 250 lbs/ft^2 for each additional 12 inches of embedment to a maximum of 2000 lbs/ft^2.
Sliding Coefficient	0.30
Settlement	Static Settlement – 0.5 inch in 40 feet Dynamic Settlement – 0.6 inch in 40 feet

*These values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern depth and reinforcement requirements and should be evaluated.

7.1.2 Conventional Foundation Systems

Based on the onsite soils conditions and information supplied by the CBC 2022, conventional foundation systems may be designed in accordance with Tables 7-1 and 7-2.

TABLE 7-2 CONVENTIONAL FOUNDATION DESIGN PARAMETERS	
Expansion Potential	***Very Low to Low***
Soil Category	I
Design Plasticity Index	12
Minimum Footing Embedment	12 inches*
*The minimum footing imbedments presented herein are based on expansion indexes. The structural engineer should determine minimum embedments based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code.	
Minimum Footing Width	12-inches-The structural engineer should determine the minimum footing width based on loading and the latest California Building Code.
Minimum Footing Reinforcement	No. 4 rebar, one (1) on top, one (1) on bottom
Minimum Slab Thickness	4 inches (actual)
Minimum Slab Reinforcement	No. 3 rebar spaced 18 inches on center, each way
Under-Slab Requirement	See Section 7.2
Slab Subgrade Moisture	Minimum of 110 percent of optimum moisture to a depth of 12 inches prior to placing concrete.
Footing Embedment Adjacent to Swales and Slopes	If exterior footings adjacent to drainage swales are to exist within five (5) feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least five- (5) feet is provided horizontally from edge of the footing to the face of the slope.
Garages	A grade beam reinforced continuously with the garage footings shall be constructed across the garage entrance, tying together the ends of the perimeter footings and between individual spread footings. This grade beam should be embedded at the same depth as the adjacent perimeter footings. A thickened slab, separated by a cold joint from the garage beam, should be provided at the garage entrance. Minimum dimensions of the thickened edge shall be six (6) inches deep. Footing depth, width and reinforcement should be the same as the structure. Slab thickness, reinforcement and under-slab treatment should be the same as the structure.

7.1.3 Post-Tensioned Slabs/Foundation Design Recommendations

Post-tensioned slabs for the project may be designed utilizing the parameters presented in Tables 7-1 and 7-3. The parameters presented herein are based on methodology provided in the Design of Post-Tensioned Slabs-On-Ground, Third Edition, by the Post-Tensioning Institute, in accordance with the 2022 CBC.

TABLE 7-3
POST-TENSION SLAB DESIGN PARAMETERS

Category	Expansion Potential	Minimum Embedment*	Edge Lift		Center Lift	
			Em (ft)	Ym (inch)	Em (ft)	Ym (inch)
I	Very Low to Low	12 inches	5.4	0.61	9.0	0.26
Slab Subgrade Moisture						
Category I	Minimum 110% of optimum moisture to a depth of 12 inches prior to pouring concrete					
Embedment*						
The minimum footing embedments presented herein are based on expansion indexes. The structural engineer should determine minimum embedments based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code. If mat slabs are utilized, alternate embedment depths can be provided.						
Moisture Barrier						
A moisture barrier should be provided in accordance with the recommendations presented in Section 7.2						
The parameters presented herein are based on procedures presented in the Design of Post-Tensioned Slabs-On-Ground, Third Edition. No corrections for vertical barriers at the edge of the slab, or for adjacent vegetation have been assumed. The design parameters are based on a Constant Suction Value of 3.9 pF.						

7.2 Moisture Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive and should be capable of effectively preventing the migration of water and reducing the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as Visqueen, placed between two to four inches of clean sand, has been used for this purpose. The use of this system or other systems can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

7.3 Seismic Design

The site classes were determined based on the referenced reports and published geologic maps in the area in general conformance with Chapter 20 of ASCE 7-16. Based on the density of the underlying soils, a Site Class of D (shear wave velocity of 259 m/s) was selected. The seismic design parameters were calculated using a program based on the USGS website and ASCE 7-16 procedures. The resulting values are presented in Table 7-4. These values are applicable providing the exceptions presented in Supplements 2 and 3 of ASCE 7-16 are utilized in the design of the structure. If the design does not include the exception methodology, then a site-specific analysis shall be conducted.

TABLE 7-4 Seismic Ground Motion Values
2022 CBC and ASCE 7-16

Parameter	*Value*
Site Class	D
Site Latitude	33.9151
Site Longitude	-117.1708
Spectral Response Acceleration Parameter, S_S	1.993
Spectral Response Acceleration Parameter, S_1	0.788
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.7
MCE Spectral Response Acceleration Parameter, S_{MS}	1.993
MCE Spectral Response Acceleration Parameter, S_{M1}	1.34
Design Spectral Response Acceleration Parameter, S_{DS}	1.329
Design Spectral Response Acceleration Parameter, S_{D1}	0.893
Peak Ground Acceleration, PGA_M	0.925

7.4 Fence and Garden Walls

Block walls, if used, should be embedded a minimum of 2 feet below the lowest adjacent grade. Construction joints (not more than 20 feet apart) should be included in the block wall construction. Side yard walls should be structurally separated from the rear yard wall.

7.5 Footing Excavations

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of all loose/sloughed materials and be neatly trimmed at the time of concrete placement. The Project Geotechnical Consultant should observe the footing excavations prior to the placement of concrete to determine that the excavations are founded in suitably compacted material.

7.6 Retaining Walls

Retaining walls should be founded on engineered fill and should be backfilled with granular soils that allow for drainage behind the wall. Foundations may be designed in accordance with the recommendations presented in Table 7-1, above. Unrestrained walls, free to horizontally move 0.0005H (for dense cohesionless backfill), may be designed to resist lateral pressures imposed by a fluid with a unit weight determined in accordance with the Table 7-5 below. The table also presents design parameters for restrained (at-rest) retaining walls. These parameters may be used to design retaining walls that may be considered as restrained due to the method of construction or location (corner sections of unrestrained retaining walls).

TABLE 7-5
Equivalent Fluid Pressures for 90% Compacted Fill (Select Material)

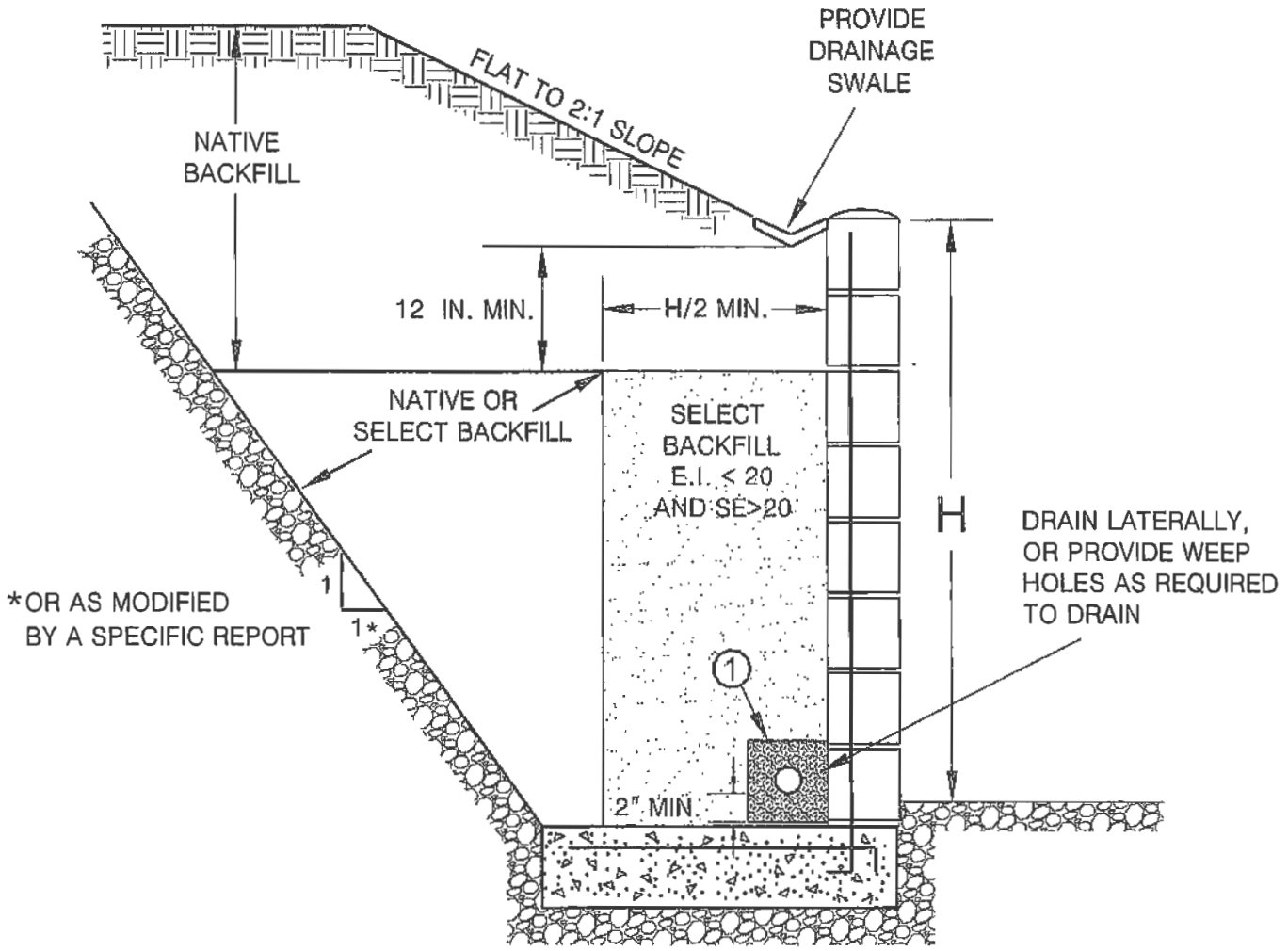
Backfill	Active Pressure (psf/ft)	At-Rest Pressure (psf/ft)
Level	35	55

Per the requirements of the 2022 CBC, the seismic force acting on the retaining walls with backfill exceeding 6-feet in height may be resolved utilizing the formula $18.5H^2$ lb/lineal ft (H=height of the wall). This force acts at approximately 0.6H above the base of the wall. The seismic value can be converted as required by the retaining wall engineer. Retaining walls should be designed in general accordance with Section 1807A.2 of the 2022 CBC.

- Restrained retaining walls should be designed for "at-rest" conditions.
- The design loads presented in the above table are to be applied on the retaining wall in a horizontal fashion and as such friction between wall and retained soils should not be allowed in the retaining wall analyses.
- Additional allowances should be made in the retaining wall design to account for the influence of construction loads, temporary loads, and possible nearby structural footing loads.
- Select backfill should be granular, structural quality backfill with a Sand Equivalent of 20 or better and an ASCE Expansion Index of 20 or less. The backfill must encompass the full active wedge area. The upper one foot of backfill should be comprised of native on-site soils (see Plate A).
- The wall design should include waterproofing (where appropriate) and backdrains or weep holes for relieving possible hydrostatic pressures. The backdrain should be comprised of a 4-inch perforated PVC pipe in a 1 ft. by 1 ft., ¾-inch gravel matrix, wrapped with a geofabric. The backdrain should be installed with a minimum gradient of 2 percent and should be outletted to an appropriate location. For subterranean walls this may include drainage by sump pumps.
- No backfill should be placed against concrete until minimum design strengths are achieved.

It should be noted that the allowable bearing and lateral bearing values presented in Table 7-1 are based on level conditions at the toe. Modified design parameters can be presented for retaining walls with sloping condition at the toe. Other conditions should be evaluated on a case-by-case basis.

RETAINING WALL BACKFILL DETAIL



(1)

PIPE: 4-INCH PERFORATED PVC, SCHEDULE 40, SDR35 OR APPROVED ALTERNATE MINIMUM 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE

ROCK: MINIMUM VOLUME OF 1 CU. FT. OF 3/4-IN. MAX. ROCK PER. LINEAL FOOT OF PIPE, OR APPROVED ALTERNATE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

7.7 Exterior Slabs and Walkways

Exterior concrete slabs and walkways should be designed and constructed in consideration of the following recommendations.

7.7.1 Subgrade Compaction

The subgrade below exterior concrete slabs should be compacted to a minimum of 90 percent relative compaction as determined by ASTM Test Method: D 1557.

7.7.2 Subgrade Moisture

The subgrade below concrete slabs should be moisture conditioned to a minimum of 110 percent of optimum moisture prior to concrete placement.

7.7.3 Concrete Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

7.7.4 Concrete Slab Reinforcement

Utilization of reinforcement for flatwork and driveways is subject to a cost/benefit analysis. Reinforcement will decrease the amount of cracking that may occur in flatwork, however, planning for occasional repairs may be more cost effective. Utilizing closely spaced control joints is likely more cost-effective than utilizing reinforcement. The majority of the soils onsite are classified as very low in expansion potential. Consideration should be given to reinforcing flatwork with irregular (non-square/rectangular) shapes.

7.7.5 Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight feet (maximum) or less. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.8 Concrete Design

As stated in Section 5.1.7, negligible concentrations of sulfates were detected in the onsite soils (Class S0). Therefore, the use of sulfate resistant concrete is not required per ACI 318-14 at this time. Post-grading conditions should be evaluated, and final recommendations made at that time.

7.9 Corrosion

Based on preliminary testing, the onsite soils are moderately corrosive to buried metal objects. Buried ferrous metals should be protected against the effects of corrosive soils in accordance with the manufacturer's recommendations. Typical measures may include using non-corrosive backfill, protective coatings, wrapping, plastic pipes, or a combination of these methods. A corrosion engineer should be consulted if specific design recommendations are required by the improvement designer.

Per ACI 318-14, an exposure class of C1 would be applicable to metals encased in concrete (rebar in footings) due to being exposed to moisture from surrounding soils. Per Table 19.3.2.1 of ACI 318-14, the requirements for concrete with an exposure class of C1 are a minimum compressive strength of 2500 psi and a maximum water-soluble chloride ion content in concrete of 0.30 (percent by weight of cement).

7.10 Pavement Design

Pavement sections for the proposed streets shall be designed based on laboratory testing conducted on samples taken from the soil subgrade. Preliminarily, based on an assumed R-Value of 30, the pavement may be designed utilizing the sections presented in Table 7-6. These sections should be verified upon the completion of grading, based on R-Value testing. The ultimate pavement section design for public streets is under the City of Moreno Valley's purview.

Table 7-5 Preliminary Pavement Sections		
Traffic Index	Pavement Section Options OR	
5.0	3-inch AC on 6-inch AB	4-inch AC on 4-inch AB
5.5	3-inch AC on 7-inch AB	4-inch AC on 5-inch AB
AC-Asphalt Concrete AB-Caltrans Class II Base		

Construction of the streets should be accomplished in accordance with the current criteria of the City of Moreno Valley. Prior to the placement of base material, the subgrade should be suitably moisture conditioned, processed and compacted to a minimum 95 percent of the laboratory maximum density (ASTM: D 1557) to at least twelve (12) inches below subgrade. After subgrade compaction, the exposed grade should then be "proof"-rolled with heavy equipment to ensure the grade does not "pump" and is verified as non-yielding. Aggregate base material should be placed on the compacted subgrade and compacted in-place to a minimum 95 percent of the laboratory standard obtained per ASTM: D 1557.

7.11 Site Drainage

Positive drainage away from the proposed structures should be provided and maintained. Roof, pad, and lot drainage should be collected and directed away from the structures toward approved disposal areas through drainage terraces, gutters, down drains, and other devices. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures.

8.0 LOT MAINTENANCE

Ongoing maintenance of the improvements is essential to the long-term performance of structures. As such, the owners must implement certain maintenance procedures. The attached " Maintenance and Improvement Considerations" presented in the Appendix E may be included as part of the sales packet to educate the owners in issues related to drainage, maintenance, improvements, etc. The following recommendations should also be implemented.

8.1 Lot Drainage

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

8.2 Burrowing Animals

Owners should undertake a program for the elimination of burrowing animals.

9.0 FUTURE PLAN REVIEWS

This report represents a geotechnical review of the site. As the project design for the project progresses, site specific geologic and geotechnical issues should be considered in the design and construction of the project. Consequently, future plan reviews may be necessary. These reviews may include reviews of:

- Grading Plans
- Foundation Plans
- Utility Plans

These plans should be forwarded to the project Geotechnical Consultant for review.

10.0 CLOSURE

10.1 Geotechnical Review

For the purposes of this report, multiple working hypotheses were established for the project, utilizing the available data and the most probable model is used for the analysis. Future information collected during the proposed grading operations is intended to evaluate the hypothesis and as such, some of the assumptions summarized in this report may need to be changed. Some modifications of the grading recommendations may become necessary, should the conditions encountered in the field differ from the conditions hypothesized in this report.

Plans and sections of the project specifications should be reviewed by Alta to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in herein, Alta must be consulted regarding the applicability of the recommendations contained herein and whether any changes are required. Alta accepts no liability for any use of its recommendations if the project description or final design varies and Alta is not consulted regarding the alterations.

10.2 Limitations

This report is based on the following: 1) the project as presented on the attached plan; 2) the information obtained from Alta's laboratory testing included herein; and 3) from the information presented in the referenced reports. The findings and recommendations are based on the results of the subsurface investigation, laboratory testing, and office analysis combined with an interpolation and extrapolation of conditions between and beyond the subsurface excavation locations. However, the materials adjacent to or beneath those observed may have different characteristics than those observed, and no precise representations are made as to the quality or extent of the materials not

observed. The results reflect an interpretation of the direct evidence obtained. Work performed by Alta has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by a geotechnical consultant who is familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report.

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

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

APPENDIX A

REFERENCES

APPENDIX A

Selected References

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APPENDIX B

Subsurface Investigation

APPENDIX B

Subsurface Investigation

Alta's subsurface investigation consisted of excavating, logging, and sampling five (5) hollow-stem auger borings and eleven (11) backhoe test pits. Details of the subsurface investigation are presented in Table B. The approximate location of the exploratory excavation is shown on the accompanying Plate 1 and the Geotechnical Logs are attached.

TABLE B
SURFACE INVESTIGATION DETAILS

Equipment	Range of Depths	Sampling Methods	Sample Locations
Hollow-stem auger	Up to 51.5 feet	1. Bulk 2. Ring Samples 3. SPT Samples	1. Bulk-Select Depths 2. Rings-Every 2.5 feet or 5 Feet 3. SPT-At Depths Below 20 Feet

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravel and Gravelly Soils More than 50% of coarse fraction retained on No. 4 sieve		GW	Well-graded gravels or gravel sand mixtures, little or no fines
			GP	Poorly-graded gravels or gravel sand mixture, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction passes on No. 4 sieve		SW	Well-graded sands or gravelly sands, little or no fines
			SP	Poorly-graded sands or gravelly sands, little or no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, and-clay mixtures

Major Divisions		grf	ltr	
Fine Grained Soils More than 50% passes on No. 200 sieve	Silts And Clays LL,<50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silt-clays of low plasticity
	Silts And Clays LL,<50		MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts
			VH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat and other highly organic soils

BOUNDARY CLASSIFICATION: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

200 — 40 — 10 — 4 — 3/4" — 3" — 12"

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot (SPT)
Very Loose	<4
Loose	4-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

CONSISTENCY CLASSIFICATION

Silts and Clays	Criteria
Very Soft	Thumb penetrates soil >1 in.
Soft	Thumb penetrates soil 1 in.
Firm	Thumb penetrates soil 1/4 in.
Stiff	Readily indented with thumbnail
Very Stiff	Thumbnail will not indent soil

HARDNESS

Bedrock
Soft
Moderately Hard
Hard
Very Hard

LABORATORY TESTS

Symbol	Test
DS	Direct Shear
DSR	Direct Shear (Remolded)
CON	Consolidation
SA	Sieve Analysis
MAX	Maximum Density
RV	Resistance (R) Value
EI	Expansion Index
SE	Sand Equivalent
AL	Atterberg Limits
CHEM	Chemical Analysis
HY	Hydrometer Analysis

SOIL MOISTURE

Increasing Visual Moisture Content

Dry - Dry to touch

Moist - Damp, but no visible free water

wet - Visible free water

SIZE PROPORTIONS

Trace - <5%

Few - 5 to 10%

Some - 15 to 25%

KEY TO EXPLORATORY BORING LOGS

ALTA CALIFORNIA GEOTECHNICAL INC.

PLATE B

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1584	BORING DESIG.	B-1
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
					SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, brown, dry, medium dense.				
		R	17			@2.5 ft. trace carbonates.	4.1	107	20	
	1580									
5		R	20		ML	@5.0 ft. SILT WITH SAND, light brown to gray, slightly moist, very stiff, some carbonates.	9.1	95	32	CON, HY
	1575									
10		R	47		SP	@10.0 ft. SAND, fine grained, reddish brown, moist, dense, trace roots.	7.5	126	63	
	1570									
15		R	50 for 6"			@15.0 ft. very dense, some carbonates.	9.8	122	73	
	1565									
20		R	33			@20.0 ft. light brown, slightly moist, dense, trace gravel.	3.4	107	17	
	1560									
25		R	50			@25.0 ft. very dense, trace gravel.	7.7	108	38	
	1555									
30		S	32			@30.0 ft. fine to medium grained, light gray, slight moist, dense, some gravel.	2.0			
	1550									
35		S	38				2.1			
	1545					Continued;				

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

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

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-1

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1584	BORING DESIG.	B-1
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		S	53		SP	Continued; **ALLUVIUM** (Qal): SAND, fine to medium grained, light gray, slightly moist, very dense, some gravel.	1.7			
	1540									
45		S	28			@45.0 ft. medium dense, trace gravel.	3.2			
	1535									
50		S	51				4.8			
						TOTAL DEPTH: 51.5 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
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S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-1

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1591	BORING DESIG.	B-2
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
	1590				SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, brown, dry, loose, wiht roots.				
		R	9				1.6	105	7	
5		R	26			@5.0 ft. light brown to gray, medium dense, trace carbonates.	1.8	106	8	MAX, EI, HY, CHEM
	1585									
10		R	31			@10.0 ft. reddish brown, slightly moist, dense.	7.6	109	39	
	1580									
15		R	50 for 3"		SP	@15.0 ft. SAND, fine grained, reddish brown, moist, very dense, trace carbonates.	9.5	128	87	
	1575									
20		R	69			@20.0 ft. brown, slightly moist, some carbonates, some gravel, some carbonates.	3.8	121	28	
	1570									
25		R	76			@25.0 ft. light brown to light gray, trace gravel.	4.3	114	26	
	1565									
30		S	11,13,14			@30.0 ft. light gray, medium dense.	1.8			
	1560									
35		S	12,11,16			@35.0 ft. light brown, trace carbonates.	3.0			
	1555									
						Continued;				

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

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
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S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-2

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1591	BORING DESIG.	B-2
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1550	S	9,9,12		SM	Continued; **ALLUVIUM** (Qal): SILTY SAND, fine grained, reddish brown, slightly moist, medium dense, trace carbonates.	5.4			
45	1545	S	11,15,17			@45.0 ft. reddish brown to brown.	7.3			
50	1540	S	22,27,29			@50.0 ft. light gray to brown.	5.3			
						TOTAL DEPTH: 51.5 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
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S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-2

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1601	BORING DESIG.	B-3
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
	1600				SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, light brown, dry, medium dense.				
		R	16			@2.5 ft. slightly moist.	4.5	112	25	MAX, EI, HY, CHEM
5										
		R	22			@5.0 ft. dry.	1.8	103	8	
	1595									
10										
		R	29			@10.0 ft. light brown to light gray, slightly moist, some carbonates.	3.8	109	19	
	1590									
15										
		R	42		SP	@15.0 ft. SAND, fine grained, reddish brown, moist, dense, some carbonates.	6.4	117	41	
	1585									
20										
		R	50 for 6"			@20.0 ft. orange brown, very dense.	10.6	123	83	
	1580									
25										
		R	53				7.6	121	55	
	1575					TOTAL DEPTH 26.0 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
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Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1584	BORING DESIG.	B-4
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
					SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, light brown, dry, medium dense, with roots.				
		R	10			@2.5 ft. trace carbonates.	5.4	107	26	
	1580									
5		R	16			@5.0 ft. slightly moist, some carbonates.	6.0	111	32	
	1575									
10		R	63			@10.0 ft. reddish brown, very dense.				
	1570									
15		R	50 for 6"		SP	@15.0 ft. SAND, fine grained, light gray to light brown, moist, very dense.	13.8	115	83	
	1565									
20		R	58			@20.0 ft. light gray, slightly moist.	3.3	110	18	
	1560									
25		R	59			@25.0 ft. moist.	19.1	91	62	
						TOTAL DEPTH 26.0 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
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Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-4

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1579	BORING DESIG.	B-5
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
					SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, brown, dry, medium dense, with roots.				
		R	12			@2.5 ft. trace carbonates.	6.8	113	39	
	1575									
5		R	18			@5.0 ft. slightly moist, some carbonates.	4.6	102	20	
	1570									
10		R	55			@10.0 ft. reddish brown, very dense.				CON, HY
	1565									
15		R	55		SP	@15.0 ft. SAND, fine grained, orange brown to reddish brown, moist, very dense.	9.8	122	74	
	1560									
20		R	65				12.2	119	82	
	1555									
25		R	33			@25.0 ft. light gray, slightly moist, dense, trace gravel.	4.2	110	22	
						TOTAL DEPTH 26.0 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

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

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-5

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1577	BORING DESIG.	P-1
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
	1575				SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, brown, dry, medium dense, with roots. @2.5 ft. trace carbonates.				
5						TOTAL DEPTH 5.0 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

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

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-6

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0550	PROJECT NAME	Brodiaea Ave		
DATE STARTED	9/20/24	GROUND ELEV.	1581	BORING DESIG.	P-2
DATE FINISHED	9/20/24	GW DEPTH (FT)		LOGGED BY	YH
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**TOPSOIL** SILTY SAND, fine grained, brown, dry, loose, with roots.				
	1580				SM	**ALLUVIUM** (Qal): SILTY SAND, fine grained, brown, dry, medium dense, with roots.				
						@2.5 ft. trace carbonates.				
5						@5.0 ft. slightly moist, some carbonates.				
	1575									
10						TOTAL DEPTH 10.0 FEET NO CAVING OBSERVED NO GROUNDWATER ENCOUNTERED				

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

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

Alta California Geotechnical, Inc.

P.N. 1-0550 PLATE B-7

Project No.	1-0550
Date Excavated	September 19th, 2024
Logged by	YH
Equipment	Backhoe

TABLE I

LOG OF TEST PITS

Trench No.	Depth (ft.)	USCS	Description
T-1	0.0-3.0	ML	**Artificial Fill - Undocumented** (afu): SANDY SILT, brown, dry, soft, with roots.
	3.0-13.0	ML	**Alluvium** (Qal): SANDY SILT, brown, slightly moist, firm.
		SM	@7.0 ft.: SILTY SAND, fine grained, light brownish gray, slightly moist, medium dense, trace clay, some carbonates.
			@9.0ft.: some clay.
		SP	@11.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense, some carbonates.
			@13.0 ft.: light brown gray.
			TOTAL DEPTH: 13.0 FEET NO GROUNDWATER ENCOUNTERED CAVING @10.0 FEET

Trench No.	Depth (ft.)	USCS	Description
T-2	0.0-4.0	SM	**Artificial Fill - Undocumented** (afu): SILTY SAND, fine grained, reddish brown, dry, loose, with roots.
	4.0-14.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, brown, slightly moist, medium dense.
			@6.0 ft. reddish brown lenses within brown silty sand layer.
		ML	@8.0 ft.: SANDY SILT, light gray, slightly moist, firm, some carbonates.
			@10.0 ft.: gray light brown.
		SP	@12.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense, trace carbonates.
			@14.0 ft.: light brown.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-3	0.0-3.0	SM	**Artificial Fill - Undocumented** (afu): SILTY SAND, fine grained, dark brown to brown, dry, loose.
	3.0-15.0	SM	**Alluvium** (Qal): SILTY SAND, light brown, dry, loose.
		ML	@5.0 ft.: SANDY SILT, light brown, slightly moist, firm.
		SM	@7.0ft.: SILTY SAND, fine grained, light brownish gray, slightly moist, medium dense, some carbonates.
		ML	@9.0 ft.: SANDY SILT, light brownish gray, slightly moist, firm, some carbonates.
		SP	@13.0 ft.: SAND, fine grained, reddish brown, slightly moist, dense, some carbonates.
			TOTAL DEPTH: 15.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-4	0.0-4.0	SM	**Artificial Fill - Undocumented** (afu): SILTY SAND, fine grained, brown, dry, loose.
	4.0-14.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, brown, slightly moist, medium dense.
		ML	@6.0 ft.: SANDY SILT, light brownish gray, slightly moist, firm, trace carbonates.
			@8.0 ft.: some carbonates.
		SP	@12.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense, some carbonates.
			@14.0 ft.: dense.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-5	0.0-3.0	SM	**Artificial Fill - Undocumented** (afu): SILTY SAND, fine grained, brown, dry, loose.
	3.0-15.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, brown, slightly moist, medium dense.
			@5.0 ft.: trace carbonates.
			@7.0 ft.: some carbonates.
		SP	@9.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense, some carbonates.
			@11.0 ft.: brown to reddish brown.
			@13.0 ft.: reddish brown, dense.
			TOTAL DEPTH: 15.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-6	0.0-14.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, light brownish gray, dry, loose, with roots.
		ML	@6.0 ft.: SANDY SILT, light gray, slightly moist, firm, some carbonates.
		SP	@10.0 ft.: SAND, fine grained, reddish brown, slightly moist, dense, some carbonates.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-7	0.0-15.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, light brown, slightly moist, medium dense, with roots.
			@7.0 ft.: light gray, trace carbonates.
		SP	@9.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense, some carbonates.
			@11.0 ft.: dense.
			TOTAL DEPTH: 15.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-8	0.0-14.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, light brownish gray, dry, loose.
			@4.0 ft.: slightly moist, medium dense.
			@8.0 ft.: trace carbonates.
			@10.0 ft.: some carbonates.
		SP	@12.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense.
			@14.0 ft.: dense.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-9	0.0-15.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, light brown, dry, loose.
			@3.0 ft.: slightly moist, medium dense.
			@7.0 ft.: light gray, trace carbonates.
			@9.0 ft.: light brown to gray, some carbonates.
			@11.0 ft.: light brown, trace reddish brown lens.
		SP	@13.0 ft.: SAND, fine grained, reddish brown, slightly moist, medium dense.
			@15.0 ft.: dense.
			TOTAL DEPTH: 15.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-10	0.0-14.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, brown, slightly moist, medium dense, with roots.
			@4.0 ft.: light brown to brown.
			@6.0 ft.: light brown.
			@8.0 ft.: light brown to gray, carbonates.
		SP	@10.0 ft.: SAND, fine grained, reddish brown, slightly moist, dense, some carbonates.
			@12.0 ft. dense.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

Trench No.	Depth (ft.)	USCS	Description
T-11	0.0-15.0	SM	**Alluvium** (Qal): SILTY SAND, fine grained, brown, slightly moist, medium dense.
			@5.0 ft.: light brown.
		SP	@11.0 ft.: SAND, fine grained, reddish brown, slightly moist, dense, some carbonates.
			@13.0 ft.: dense.
			@15.0 ft.: trace clay.
			TOTAL DEPTH: 14.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED

APPENDIX C

Laboratory Testing

LABORATORY TESTING

The following laboratory tests were performed on a representative sample in accordance with the applicable latest standards or methods from the ASTM, California Building Code (CBC) and California Department of Transportation.

Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in accordance with ASTM D-2487 and D-2488.

Particle Size Analysis

Modified hydrometer testing was conducted to aid in classification of the soil. The results of the particle size analysis are presented in Table C.

Maximum Density/Optimum Moisture

The maximum dry density and optimum moisture content of one representative bulk samples were evaluated in accordance with ASTM D-1557. The results are summarized in Table C.

Expansion Index Tests

One (1) expansion index test was performed to evaluate the expansion potential of typical on-site soil. Testing was carried out in general conformance with ASTM Test Method D-4829. The results are presented in Table C.

Chemical Analyses

Chemical testing was performed on one select samples by Alta. The results of these tests (sulfate content, resistivity, chloride content and pH) are presented on Table C.

TABLE C
SUMMARY OF LABORATORY TEST DATA
P.N. 1-0550

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	CONSOL	OTHER TESTS REMARKS
B-1	5	Silt with Sand (Qal)	ML				0	28	52	20			
B-2	5	Silty Sand (Qal)	SM	131.5	9.0		2	55	30	13	0		Sulf: 0.016% Chlr: 105 ppm pH: 7.5, Resis: 5,721 Ohm-cm
B-2	10	Silty Sand (Qal)	SM				0	43	43	14			
B-3	2.5	Silty Sand (Qal)	SM	132.6	8.0		2	54	31	13	0		Sulf: 0.019% Chlr: 145 ppm pH: 7.5, Resis: 4,914 Ohm-cm
B-4	10	Silty Sand (Qal)	SM				1	66	17	16			
B-5	10	Silty Sand (Qal)	SM				1	40	37	22			

APPENDIX D

Liquefaction and Dry Sand Settlement Analysis

APPENDIX D

LIQUEFACTION AND DRY SAND SETTLEMENT ANALYSIS

A liquefaction and dry sand settlement analysis was performed for the site based on blow count data for borings B-1 and B-2. Our analysis utilized the PGA_M, the predominant earthquake magnitude assuming a 2% probability of exceedance in 50 years, and an assumed groundwater level of 100-feet below the ground surface. The results of our liquefaction analysis are presented on Plates 1 and 2, and the results of our dry sand settlement analysis are presented on Plates 3 and 4.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-1
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

Table i : Input Data and Assumptions

Input Assumption	Setting
Field Test Type :	Standard Penetration Test (SPT)
Apply All Corrections to SPT?	True
Groundwater Level (ft) =	100
Earthquake Magnitude M =	7.4
Magnitude Scaling Factor (MSF) :	1.02 (Tokimatsu & Seed, 1987)
Fines Content Correction :	(according to user settings)
Depth Reduction Factor (Rd) :	Idriss 1999, Golesorkhi 1989
Relative Density (Dr) Estimation :	Idriss & Boulanger, 2003
Site Topography :	Gently Sloped : 0.5 %
Ground Improvement Feature :	None
Peak Ground Acceleration PGA (g) =	1.22

Table ii : CRR Calculation Methods

CRR Formula	Selected?
NCEER Workshop (1997)	True
Boulanger & Idriss (2014)	False
Vancouver Task Force (2007)	False
Cetin et al. (2004)	False
Chinese Code	False
Seed et al. (1983)	True
Japanese Highway Bridge Code	False
Tokimatsu and Yoshimi (1983)	False
Shibata (1981)	False
Kokusho et al. (1983)	False

Table iv : Field Tests

Depth (ft)	SPT Blow Counts(N)
2.5	11.05
4.5	13
9.5	30.55
14.5	32.55
19.5	31.45
24.5	32.5
29.5	32
34.5	38
39.5	53
44.5	28
49.5	51

Table iii : Subsurface Soil Layers

Layer Thickness (ft)	Soil Type	Unit Weight (lb/ft3)	Fines Content (%)	D50 (mm)	Check Liquefaction	Su (ksf)
5	Sand	120	30	2	True	0
45	Sand	125	15	2	True	0

Table v : Post-Liquefaction Displacements

Type	Method	Movement (inch)
Lateral Spreading	Zhang & Robertson, 2004	0
Lateral Spreading	Faris, 2006	0 (M<8)
Lateral Spreading	Youd et al., 2002	0
Lateral Spreading	Barlett & Youd, 1992	0 (M<8)
Lateral Spreading	Hamada et al., 1986	91
Lateral Spreading	Youd & Perkins, 1987	LSI > 80 see details for LSI=90
Vertical Settlement	Ishihara & Yoshimine, 1992	0

PLATE D–1

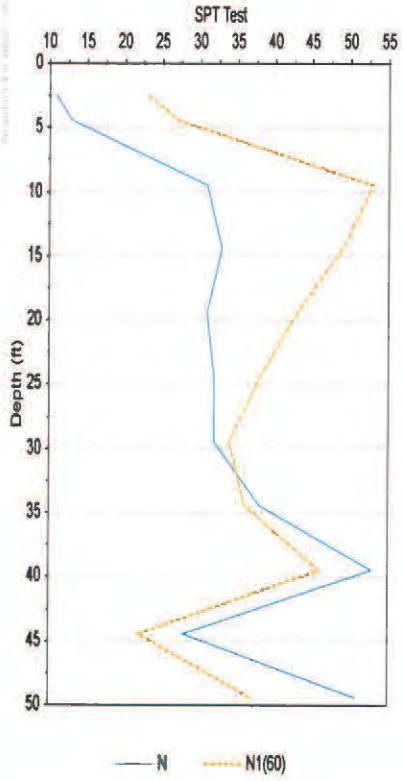
Soil Liquefaction Analysis Report

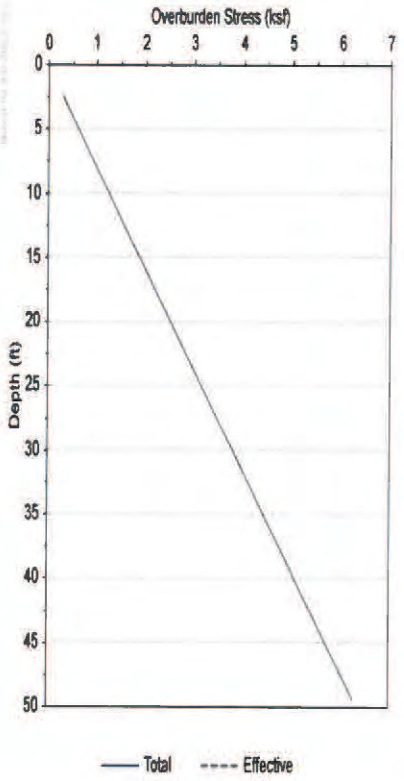
Alta California Geotechnical

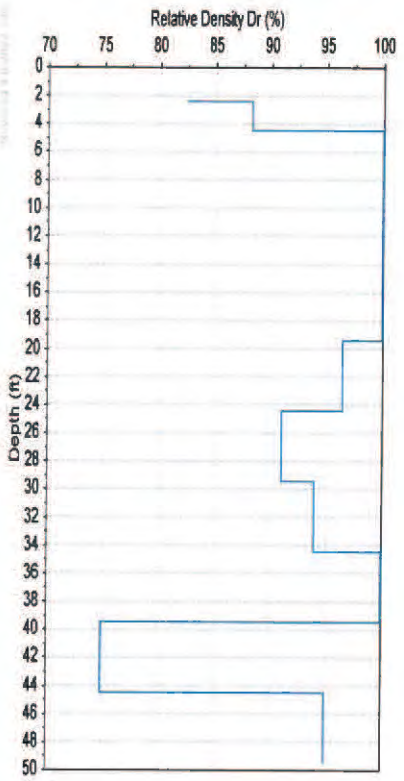
Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-1
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG







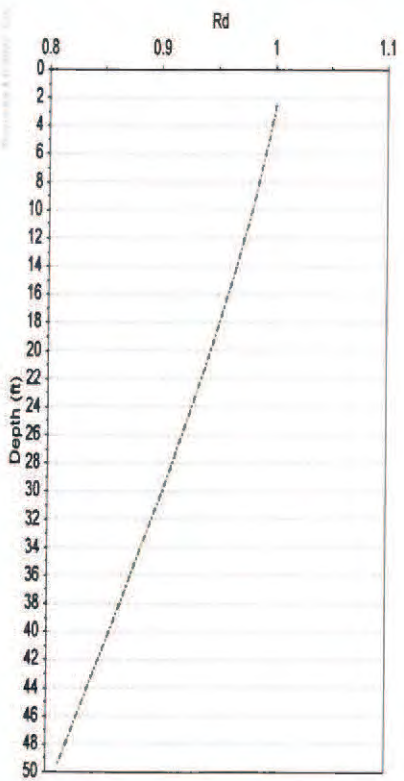


PLATE D-1 CONT.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-1
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

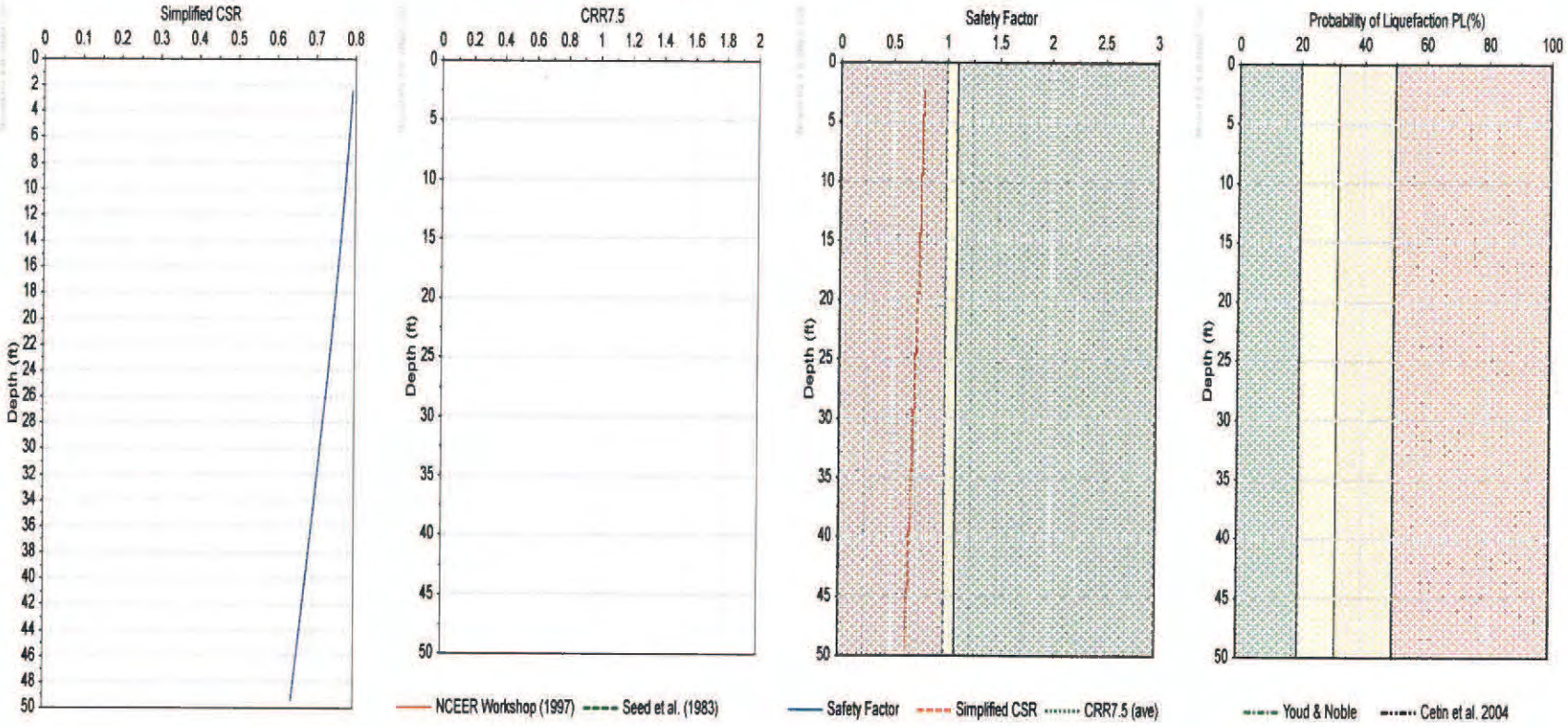


PLATE D-1 CONT.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-1
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

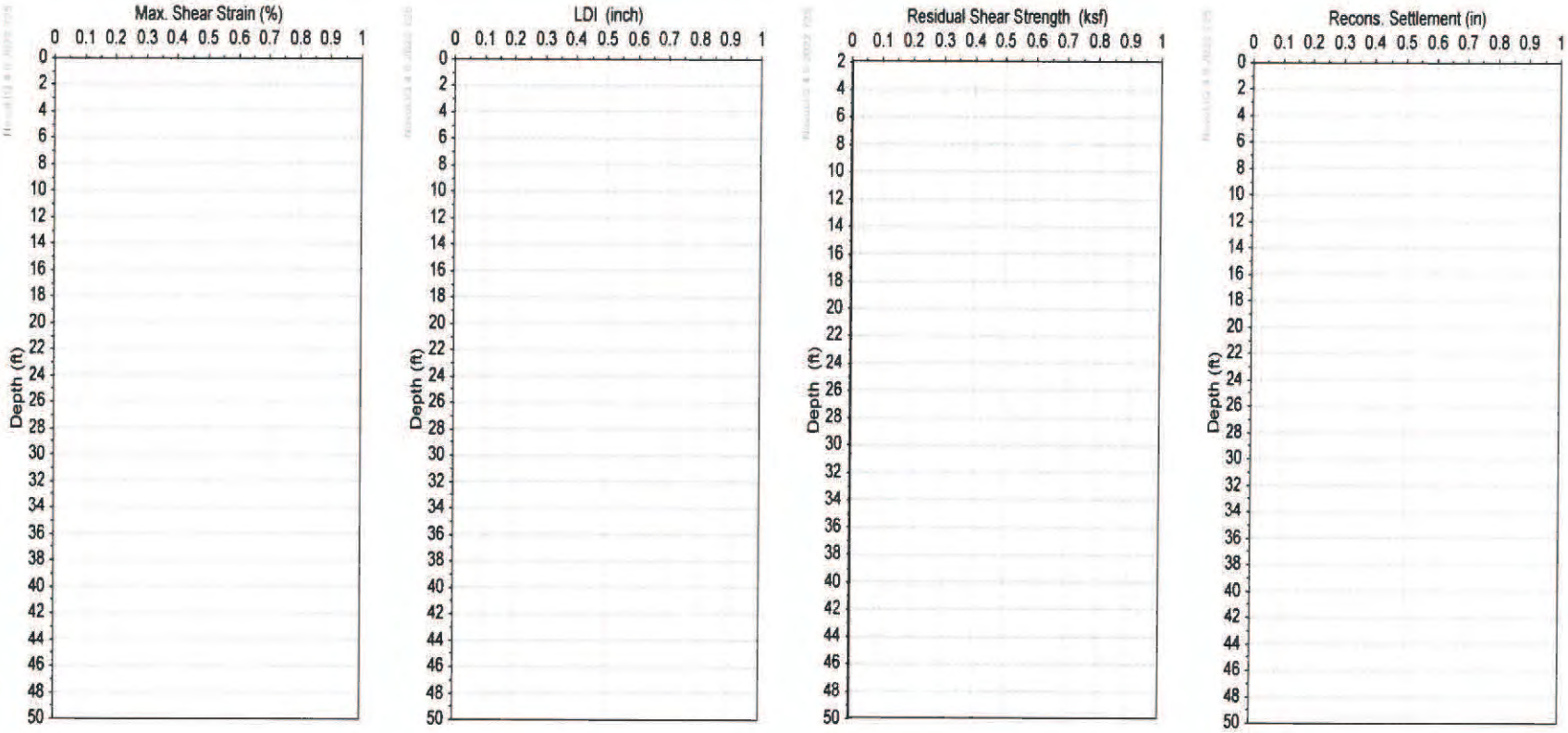


PLATE D-1 CONT.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-2
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

Table i : Input Data and Assumptions

Input Assumption	Setting
Field Test Type :	Standard Penetration Test (SPT)
Apply All Corrections to SPT?	True
Groundwater Level (ft) =	100
Earthquake Magnitude M =	7.4
Magnitude Scaling Factor (MSF) :	1.03 (Idriss, 1997 -NCEER)
Fines Content Correction :	(according to user settings)
Depth Reduction Factor (Rd) :	Idriss 1999, Golesorkhi 1989
Relative Density (Dr) Estimation :	Idriss & Boulanger, 2003
Site Topography :	Gently Sloped : 0.5 %
Ground Improvement Feature :	None
Peak Ground Acceleration PGA (g) =	1.22

Table ii : CRR Calculation Methods

CRR Formula	Selected?
NCEER Workshop (1997)	True
Boulanger & Idriss (2014)	False
Vancouver Task Force (2007)	False
Cetin et al. (2004)	False
Chinese Code	False
Seed et al. (1983)	True
Japanese Highway Bridge Code	False
Tokimatsu and Yoshimi (1983)	False
Shibata (1981)	False
Kokusho et al. (1983)	False

Table iv : Field Tests

Depth (ft)	SPT Blow Counts(N)
2.5	5.85
4.5	16.9
9.5	20.15
14.5	32.5
19.5	44.85
24.5	49.4
29.5	27
34.5	27
39.5	21
44.5	32
49.5	56

Table iii : Subsurface Soil Layers

Layer Thickness (ft)	Soil Type	Unit Weight (lb/ft3)	Fines Content (%)	D50 (mm)	Check Liquefaction	Su (ksf)
10	Sand	120	30	2	False	0
40	Sand	125	15	2	True	0

Table v : Post-Liquefaction Displacements

Type	Method	Movement (inch)
Lateral Spreading	Zhang & Robertson, 2004	0
Lateral Spreading	Faris, 2006	0 (M<8)
Lateral Spreading	Youd et al., 2002	0
Lateral Spreading	Barlett & Youd, 1992	0 (M<8)
Lateral Spreading	Hamada et al., 1986	91
Lateral Spreading	Youd & Perkins, 1987	LSI > 80 see details for LSI=90
Vertical Settlement	Ishihara & Yoshimine, 1992	0

PLATE D–2

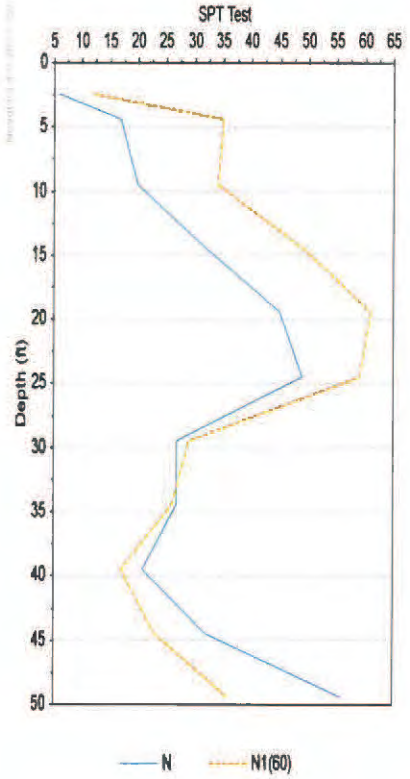
Soil Liquefaction Analysis Report

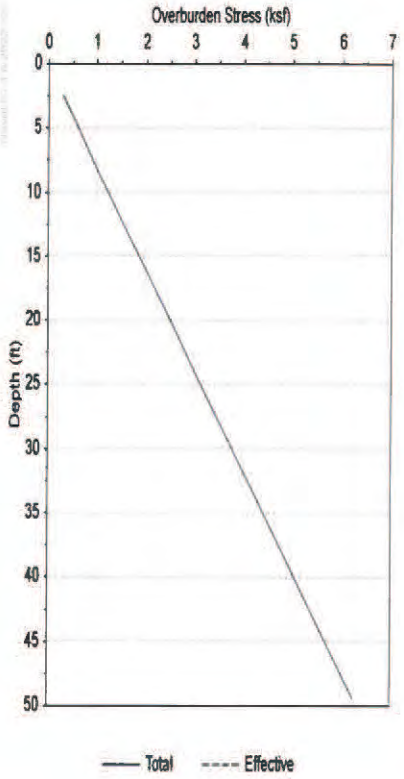
Alta California Geotechnical

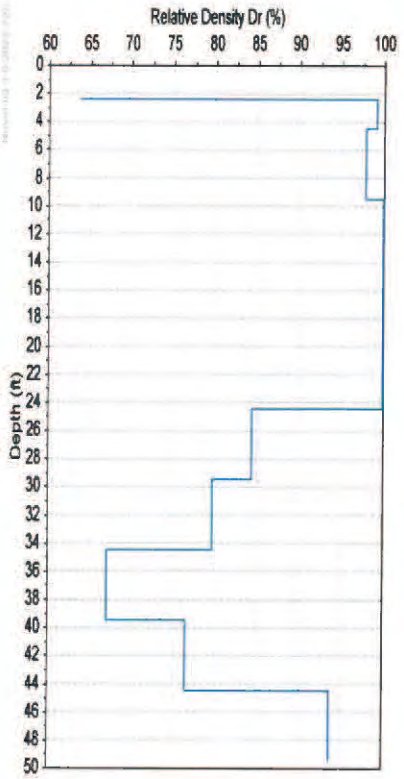
Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-2
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG







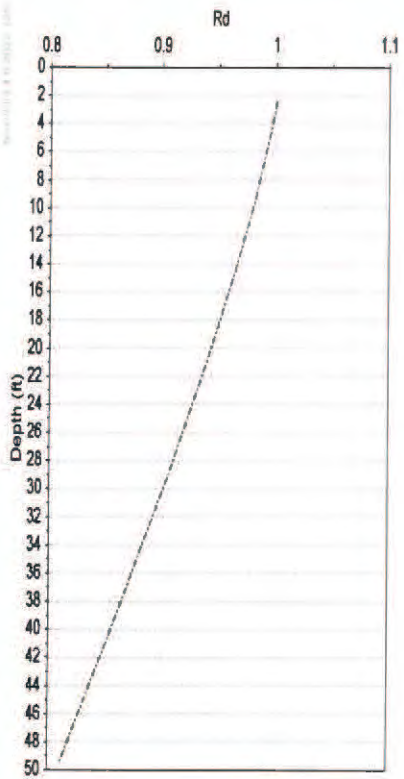


PLATE D-2 CONT.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-2
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

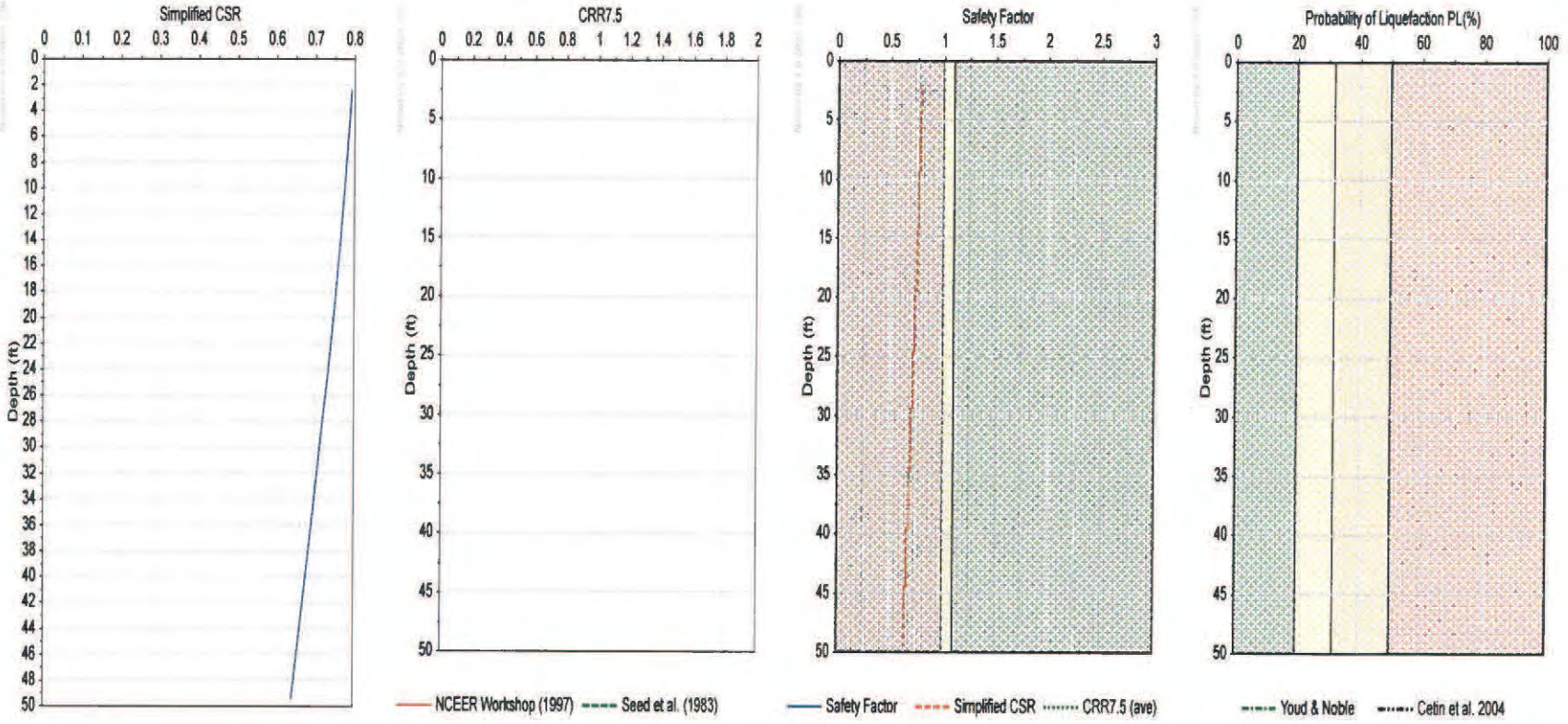


PLATE D-2 CONT.

Soil Liquefaction Analysis Report

Alta California Geotechnical

Project : Brodiaea Ave
Project No. : 1-0550
Client : Warmington Residential
Site Address : Moreno Valley, CA

Borehole : B-2
Total Depth : 50 ft
Water Level : 100 ft
Calculated By : LAM

Reviewed By : SAG

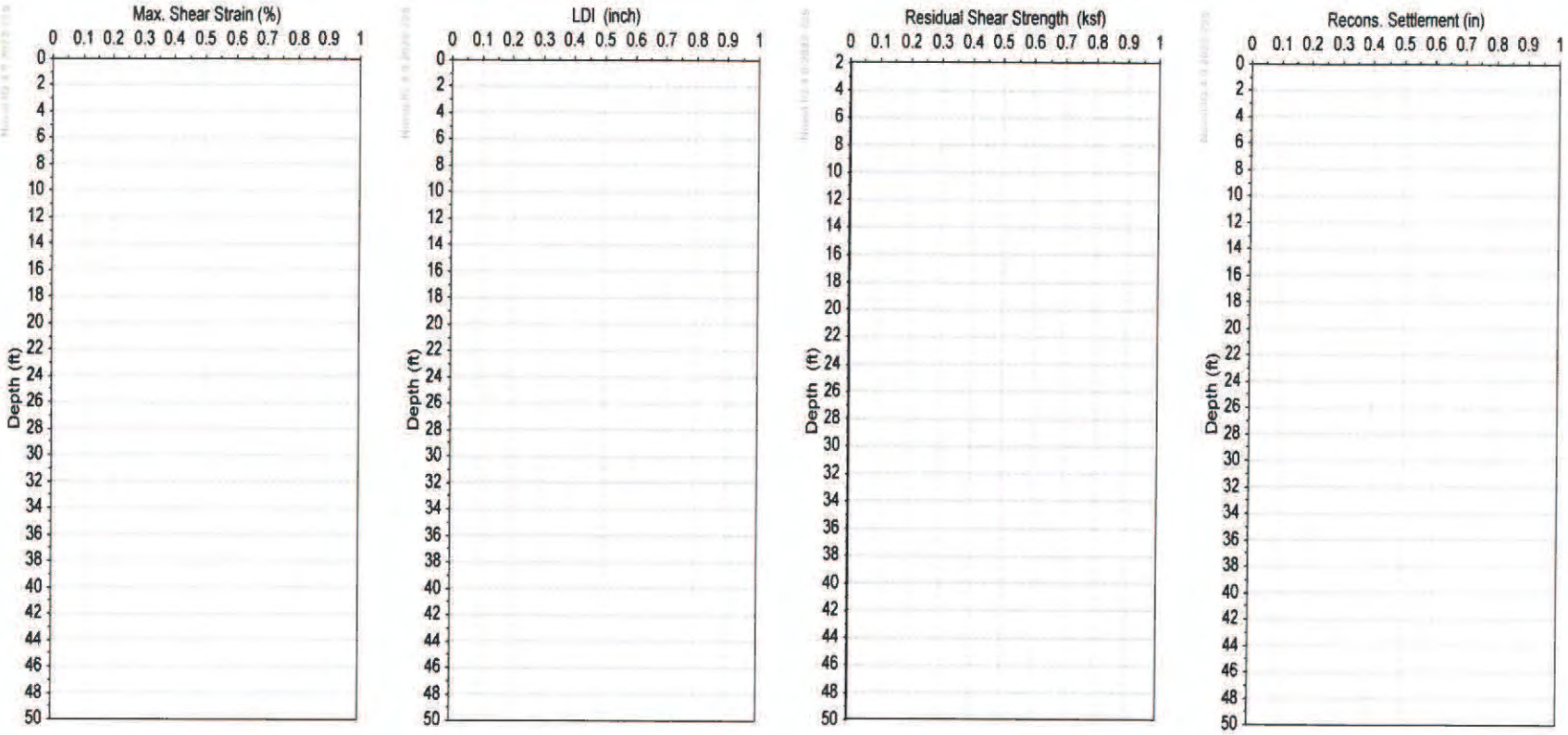


PLATE D-2 CONT.

Boring B-1																			
Depth (ft)	Rd	Overburden Stress (ksf)		Fines Content (%)	SPT Test							Relative Density Dr (%)	Simplified CSR	MSF	Ave. Shear Stress (psf)	Shear Strain (%)	Limiting Vol. Strain (%)	dS (inch)	Dry Sand Settlement (inch)
		Total	Effective		N	Ce	Cr	Cs	Cb	Cn	N1(60)								
2.5	1.001	0.31	0.31	30	11	1.36	0.75	1.2	1	1.7	23	82.4	0.794	1.02	0.24	6.38	0.22	0.1	0.9
4.5	0.996	0.55	0.55	30	13	1.36	0.75	1.2	1	1.7	27	88.3	0.79	1.02	0.44	3.58	0.19	0	0.8
9.5	0.982	1.19	1.19	15	31	1.36	0.79	1.2	1	1.33	53	100	0.778	1.02	0.92	0.76	0.11	0.1	0.8
14.5	0.965	1.82	1.82	15	33	1.36	0.86	1.2	1	1.07	49	100	0.765	1.02	1.4	0.84	0.12	0.1	0.7
19.5	0.946	2.46	2.46	15	31	1.36	0.93	1.2	1	0.89	43	100	0.751	1.02	1.85	1.04	0.14	0.1	0.6
24.5	0.926	3.1	3.1	15	32	1.36	0.95	1.2	1	0.77	38	96.5	0.735	1.02	2.28	1.17	0.16	0.1	0.5
29.5	0.905	3.74	3.74	15	32	1.36	0.97	1.2	1	0.67	34	91.1	0.717	1.02	2.68	1.35	0.18	0.1	0.4
34.5	0.882	4.37	4.37	15	38	1.36	0.98	1.2	1	0.6	36	94	0.699	1.02	3.06	1.1	0.16	0.1	0.3
39.5	0.859	5.01	5.01	15	53	1.36	0.98	1.2	1	0.54	46	100	0.681	1.02	3.41	0.7	0.13	0.1	0.2
44.5	0.835	5.65	5.65	15	28	1.36	0.99	1.2	1	0.49	22	74.9	0.662	1.02	3.74	2.15	0.26	0.2	0.2
49.5	0.811	6.29	6.29	15	51	1.36	0.99	1.2	1	0.45	37	95	0.643	1.02	4.04	0.82	0.16	0.1	0

Legend	
Rd	Depth Reduction Factor
N	SPT Blow Count
Ce	Energy Level Factor
Cr	Rod Length Factor
Cs	Sample Liner Correction
Cb	Borehole Diameter Factor
Cn	Depth Correction / Normalization Factor
N1(60)	Corrected SPT Blow Counts
MSF	Magnitude Scaling Factor
SF	$SF=CRR_{7.5}*MSF/CSR$
LDI	Lateral Displacement Index
S	Settlement

PLATE D-3

Boring B-2																			
Depth (ft)	Rd	Overburden Stress (ksf)		Fines Content (%)	SPT Test							Relative Density Dr (%)	Simplified CSR	MSF	Ave. Shear Stress (psf)	Shear Strain (%)	Limiting Vol. Strain (%)	dS (inch)	Dry Sand Settlement (inch)
		Total	Effective		N	Ce	Cr	Cs	Cb	Cn	N1(60)								
2.5	1.001	0.31	0.31	30	6	1.36	0.75	1.2	1	1.7	12	63.8	0.794	1.03	0.24	46.54	0.33	0.1	1.1
4.5	0.996	0.55	0.55	30	17	1.36	0.75	1.2	1	1.7	35	99.2	0.79	1.03	0.44	1.89	0.15	0.1	0.9
9.5	0.982	1.16	1.16	30	20	1.36	0.79	1.2	1	1.31	34	97.9	0.778	1.03	0.91	1.82	0.15	0.1	0.9
14.5	0.965	1.8	1.8	15	32	1.36	0.86	1.2	1	1.07	49	100	0.765	1.03	1.38	0.84	0.12	0.1	0.8
19.5	0.946	2.44	2.44	15	45	1.36	0.93	1.2	1	0.91	61	100	0.751	1.03	1.83	0.55	0.09	0.1	0.7
24.5	0.926	3.07	3.07	15	49	1.36	0.95	1.2	1	0.78	59	100	0.735	1.03	2.26	0.56	0.09	0.1	0.7
29.5	0.905	3.71	3.71	15	27	1.36	0.97	1.2	1	0.68	29	84.4	0.717	1.03	2.66	1.83	0.21	0.1	0.6
34.5	0.882	4.35	4.35	15	27	1.36	0.98	1.2	1	0.59	26	79.7	0.699	1.03	3.04	2.08	0.23	0.1	0.5
39.5	0.859	4.99	4.99	15	21	1.36	0.98	1.2	1	0.52	17	67.2	0.681	1.03	3.4	3.94	0.31	0.2	0.3
44.5	0.835	5.62	5.62	15	32	1.36	0.99	1.2	1	0.45	23	76.6	0.662	1.03	3.72	1.96	0.25	0.1	0.1
49.5	0.811	6.26	6.26	15	56	1.36	0.99	1.2	1	0.4	36	93.8	0.643	1.03	4.03	0.85	0.17	0.1	0

Legend	
Rd	Depth Reduction Factor
N	SPT Blow Count
Ce	Energy Level Factor
Cr	Rod Length Factor
Cs	Sample Liner Correction
Cb	Borehole Diameter Factor
Cn	Depth Correction / Normalization Factor
N1(60)	Corrected SPT Blow Counts
MSF	Magnitude Scaling Factor
SF	$SF=CRR_{7.5}*MSF/CSR$
LDI	Lateral Displacement Index
S	Settlement

PLATE D-4

APPENDIX E

Maintenance and Improvement Considerations

MAINTENANCE AND IMPROVEMENT CONSIDERATIONS

General

Owners purchasing property must assume a certain degree of responsibility for improvements and for maintaining conditions around their home. Of primary importance from a geotechnical standpoint are maintaining drainage patterns and minimizing the soil moisture variation below all improvements. Such design, construction and owner maintenance provisions may include:

- Employing contractors for improvements who design and build in recognition of local building codes and specific site soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other improvements.
- Avoiding the construction of planters adjacent to structural improvements. Alternatively, planter sides/bottoms can be sealed with an impermeable membrane and drained away from the improvements via subdrains into approved disposal areas.
- Sealing and maintaining construction/control joints within concrete slabs and walkways to reduce the potential for moisture infiltration into the subgrade soils.
- Utilizing landscaping schemes with vegetation that requires minimal watering. Watering should be done in a uniform manner, as equally as possible on all sides of the foundation, keeping the soil "moist" but not allowing the soil to become saturated.
- Maintaining positive drainage away from structures and providing roof gutters on all structures with downspouts that are designed to carry roof runoff directly into area drains or discharged well away from the foundation areas.
- Avoiding the placement of trees closer to the proposed structures than a distance of one-half the mature height of the tree.
- Observation of the soil conditions around the perimeter of the structure during extremely hot/dry or unusually wet weather conditions so that modifications can be made in irrigation programs to maintain relatively uniform moisture conditions.

Sulfates

Owners should be cautioned against the import and use of certain inorganic fertilizers, soil amendments, and/or other soils from offsite sources in the absence of specific information relating to their chemical composition. Some fertilizers have been known to leach sulfate compounds into soils and increase the sulfate concentrations to potentially detrimental levels.

Site Drainage

- The owners should be made aware of the potential problems that may develop when drainage is altered through construction of hardscape improvements. Ponded water, drainage over the slope face, leaking irrigation systems, overwatering, or other conditions which could lead to ground saturation must be avoided.
- No water should be allowed to flow over the slopes. No alteration of pad gradients should be allowed that would prevent pad and roof runoff from being directed to approved disposal areas.
- Drainage patterns have been established at the time of the fine grading should be maintained throughout the life of the structure. No alterations to these drainage patterns should be made unless designed by qualified professionals in compliance with local code requirements and site-specific soils conditions.

Slope Drainage

- Residents should be made aware of the importance of maintaining and cleaning all interceptor ditches, drainage terraces, down drains, and any other drainage devices, which have been installed to promote slope stability.
- Subsurface drainage pipe outlets may protrude through slope surfaces and/or wall faces. These pipes, in conjunction with the graded features, are essential to slope and wall stability and must be protected in-place. They should not be altered or damaged in any way.

Planting and Irrigation of Slopes

- Seeding and planting of the slopes should be planned to achieve, as rapidly as possible, a well-established and deep-rooted vegetal cover requiring minimal watering.
- It is the responsibility of the landscape architect to provide such plants initially and of the residents to maintain such planting. Alteration of such a planting scheme is at the resident's risk.
- The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be fixed immediately.

- Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.
- If automatic sprinkler systems are installed, their use must be adjusted to account for seasonal and natural rainfall conditions.

Burrowing Animals

- Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability.

Owner Improvement

Owner improvements (pools, spas, patio slabs, retaining walls, planters, etc.) should be designed to account for the terrain of the project, as well as expansive soil conditions and chemical characteristics. Design considerations on any given lot may need to include provisions for differential bearing materials, ascending/descending slope conditions, bedrock structure, perched (irrigation) water, special geologic surcharge loading conditions, expansive soil stresses, and long-term creep/settlement.

All owner improvements should be designed and constructed by qualified professionals utilizing appropriate design methodologies, which account for the on-site soils and geologic conditions. Each lot and proposed improvement should be evaluated on an individual basis.

Setback Zones

Manufactured slopes maybe subject to long-term settlement and creep that can manifest itself in the form of both horizontal and vertical movement. These movements typically are produced as a result of weathering, erosion, gravity forces, and other natural phenomenon. A setback adjacent to slopes is required by most building codes, including the California Building Code. This zone is intended to locate and support the residential structures away from these slopes and onto soils that are not subject to the potential adverse effects of these natural phenomena.

The owner may wish to construct patios, walls, walkways, planters, swimming pools, spas, etc. within this zone. Such facilities may be sensitive to settlement and creep and should not be

constructed within the setback zone unless properly engineered. It is suggested that plans for such improvements be designed by a professional engineer who is familiar with grading ordinances and design and construction requirements. In addition, we recommend that the designer and contractor familiarize themselves with the site specific geologic and geotechnical conditions on the specific lot.

APPENDIX F

Earthwork Specifications

ALTA CALIFORNIA GEOTECHNICAL, INC.
EARTHWORK SPECIFICATIONS

These specifications present the generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the project guidelines for earthwork except where specifically superseded in preliminary geology and soils reports, grading plan review reports or by the prevailing grading codes or ordinances of the controlling agency.

A. GENERAL

1. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

2. The project Geotechnical Engineer and Engineering Geologist, or their representatives, shall provide observation and testing services, and Geotechnical consultation for the duration of the project.

3. All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Geotechnical Engineer/Engineering Geologist.

4. It is the Contractor's responsibility to prepare the ground surface to receive fill to the satisfaction of the Geotechnical Engineer and to place, spread, mix, moisture condition, and compact the fill in accordance with the job specifications and as required by the Geotechnical Engineer. The Contractor shall also remove all material considered by the Geotechnical Engineer to be unsuitable for use in the construction of engineered fills.

5. The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit the proper preparation of fills.

B. PREPARATION OF FILL AREAS

1. Excessive vegetation and all deleterious material should be disposed of offsite as required by the Geotechnical Engineer.

   Existing fill, soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and hauled from the site. Where applicable, the Contractor may obtain the

approval of the Soils Engineer and the controlling authorities for the project to dispose of the above described materials, or a portion thereof, in designated areas onsite.

After removal of the deleterious materials have been accomplished, earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Geotechnical Engineer/Engineering Geologist.

2. Upon achieving a suitable bottom for fill placement, the exposed removal bottom shall be disced or bladed by the Contractor to the satisfaction of the Geotechnical Engineer. The prepared ground surfaces shall then be brought to the specified moisture content mixed as required, and compacted and tested as specified. In localities where it is necessary to obtain the approval of the controlling agency prior to placing fill, it will be the Contractor's responsibility to contact the proper authorities to visit the site.

3. Any underground structure such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or other structures not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer and/or the controlling agency for the project.

C. ENGINEERED FILLS

1. Any material imported or excavated on the property may be utilized as fill, provided the material has been determined to be suitable by the Geotechnical Engineer. Deleterious materials shall be removed from the fill as directed by the Geotechnical Engineer.

2. Rock or rock fragments less than twelve inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets and the distribution of the rocks is approved by the Geotechnical Engineer.

3. Rocks greater than twelve inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal.

4. All materials to be used as fill, shall be tested in the laboratory by the Geotechnical Engineer. Proposed import materials shall be approved by the Geotechnical Engineer 48 hours prior to importation.

5. The fill materials shall be placed by the Contractor in lifts, that when compacted, shall not exceed six inches. Each lift shall be spread evenly and shall be

thoroughly mixed to achieve a near uniform moisture condition and a uniform blend of materials.

All compaction shall be achieved at or above the optimum moisture content, as determined by the applicable laboratory standard. The Contractor will be notified if the fill materials are too wet or too dry to achieve the required compaction standard.

6. When the moisture content of the fill material is below the limit specified by the Geotechnical Engineer, water shall be added and the materials shall be blended until a uniform moisture content, within specified limits, is achieved. When the moisture content of the fill material is above the limits specified by the Geotechnical Engineer, the fill materials shall be aerated by discing, blading, mixed with dryer fill materials, or other satisfactory methods until the moisture content is within the specified limits.

7. Each fill lift shall be compacted to the minimum project standards, in compliance with the testing methods specified by the controlling governmental agency, and in accordance with recommendations of the Geotechnical Engineer.

   In the absence of specific recommendations by the Geotechnical Engineer to the contrary, the compaction standard shall be the most recent version of ASTM:D 1557.

8. Where a slope receiving fill exceeds a ratio of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable materials into sound bedrock or firm material, in accordance with the recommendations and approval of the Geotechnical Engineer.

9. Side hill fills shall have a minimum key width of 15 feet into bedrock or firm materials, unless otherwise specified in the soil report and approved by the Geotechnical Engineer in the field.

10. Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Geotechnical Engineer and Engineering Geologist.

11. The Contractor shall be required to maintain the specified minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as directed by the Geotechnical Engineer and/or the governing agency for the project. This may be achieved by either overbuilding the slope and cutting

back to the compacted core; by direct compaction of the slope face with suitable equipment; or by any other procedure which produces the required result.

12. The fill portion of fill-over-cut slopes shall be properly keyed into rock or firm material; and the fill area shall be stripped of all soil or unsuitable materials prior to placing fill.

    The design cut portion of the slope should be made first and evaluated for suitability by the Engineering Geologist prior to placement of fill in the keyway above the cut slope.

13. Pad areas in cut or natural ground shall be approved by the Geotechnical Engineer. Finished surfaces of these pads may require scarification and recompaction, or over excavation as determined by the Geotechnical Engineer.

D. CUT SLOPES

1. The Engineering Geologist shall observe all cut slopes and shall be notified by the Contractor when cut slopes are to be started.

2. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Soil Engineer shall investigate, analyze and make recommendations to remediate these problems.

3. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the superjacent, prevailing drainage.

4. Unless otherwise specified in specific geotechnical reports, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

5. Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Geotechnical Engineer or Engineering Geologist.

E. GRADING CONTROL

1. Fill placement shall be observed and tested by the Geotechnical Engineer and/or his representative during grading.

   Field density tests shall be made by the Geotechnical Engineer and/or his representative to evaluate the compaction and moisture compliance of each fill lift. Density tests shall be conducted at intervals not to exceed two feet of fill

height. Where sheepsfoot rollers are used, the fill may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Geotechnical Engineer or his representative.

2. Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture content is in evidence, that particular layer or portion thereof shall be reworked until the required density and/or moisture content has been attained. Additional fills shall not be placed over an area until the previous lift of fill has been tested and found to meet the density and moisture requirements for the project and the previous lift is approved by the Geotechnical Engineer.

3. When grading activities are interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Geotechnical Engineer indicate the moisture content and density of the fill are within the specified limits.

4. During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent the ponding of water. The Contractor shall take remedial action to control surface water and to prevent erosion of graded areas until such time as a permanent drainage and erosion devices have been installed.

5. Observation and testing by the Geotechnical Engineer and/or his representative shall be conducted during filling and compacting operations in order that he will be able to state in his opinion that all cut and filled areas are graded in accordance with the approved specifications.

6. Upon the completion of grading activities and after the Geotechnical Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or fill placement shall be undertaken without prior notification of the Geotechnical Engineer and/or Engineering Geologist.

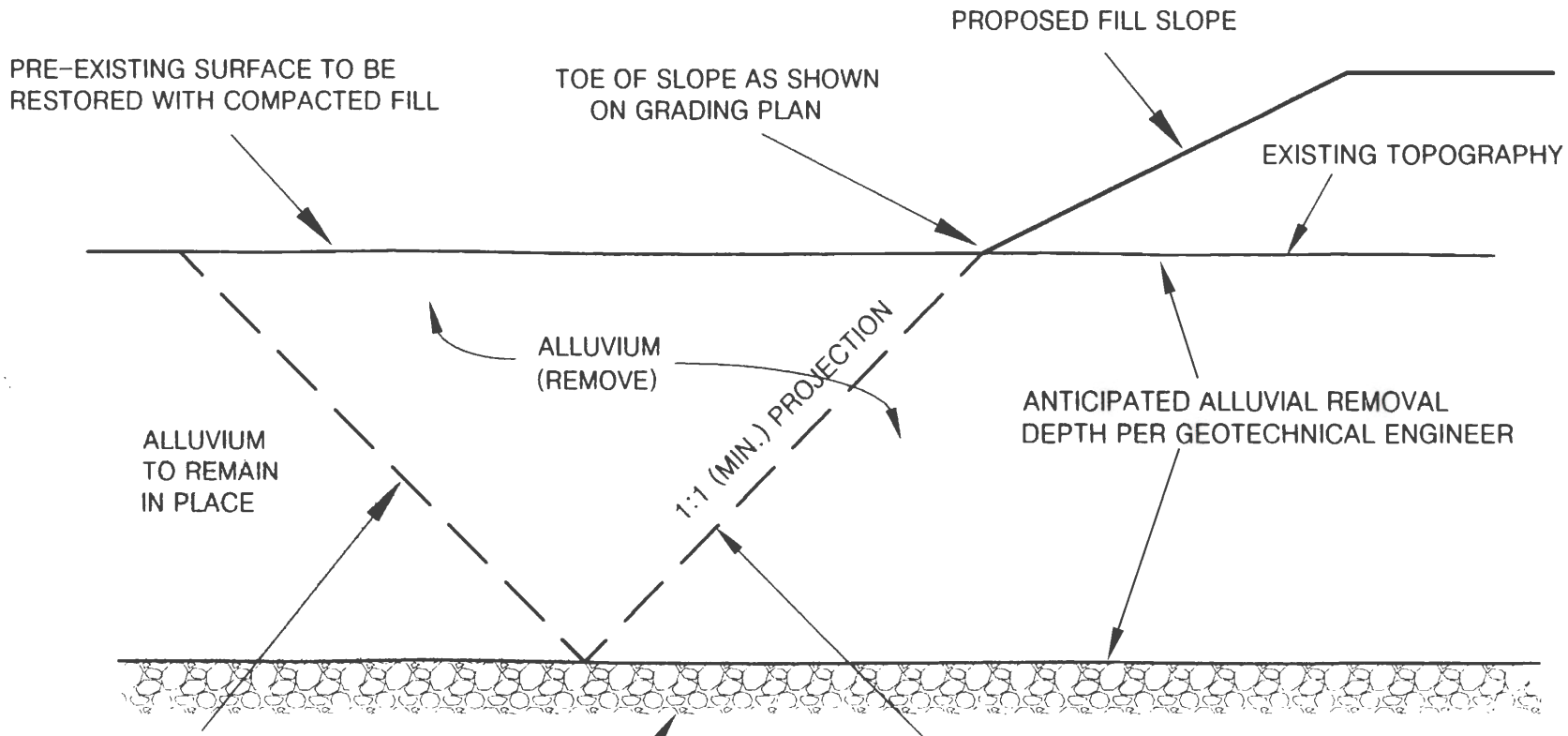
F. **FINISHED SLOPES**

All finished cut and fill slopes shall be planted and irrigated and/or protected from erosion in accordance with the project specifications, governing agencies, and/or as recommended by a landscape architect.

APPENDIX G

Grading Details

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



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VER. 3/12

PLATE G-1

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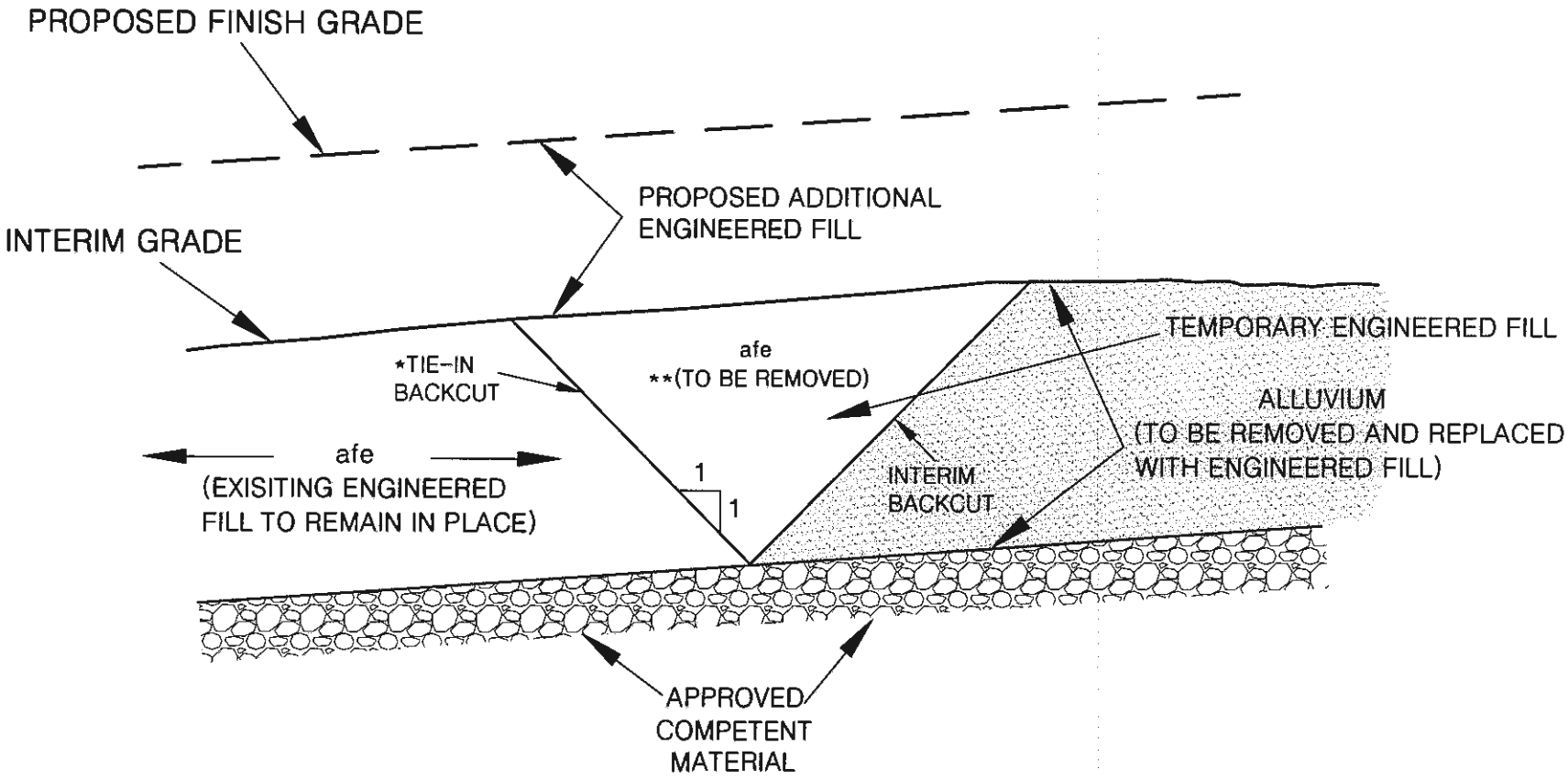
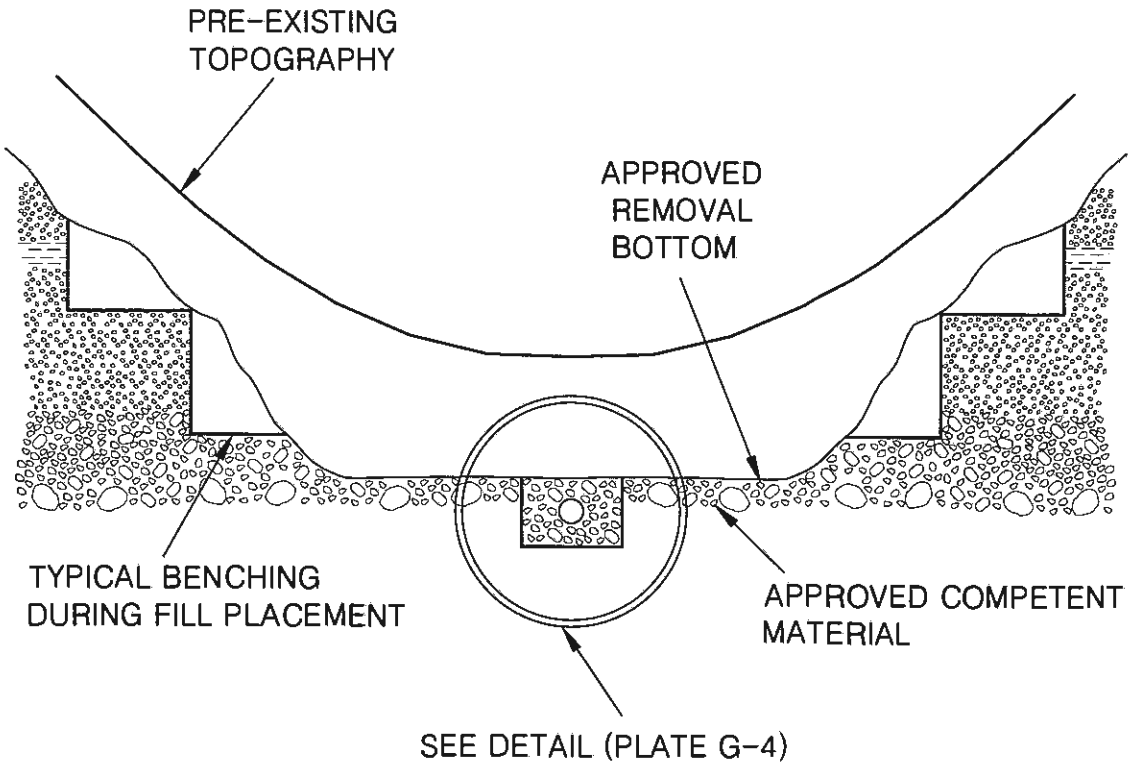
REMOVAL ADJACENT TO EXISTING FILL



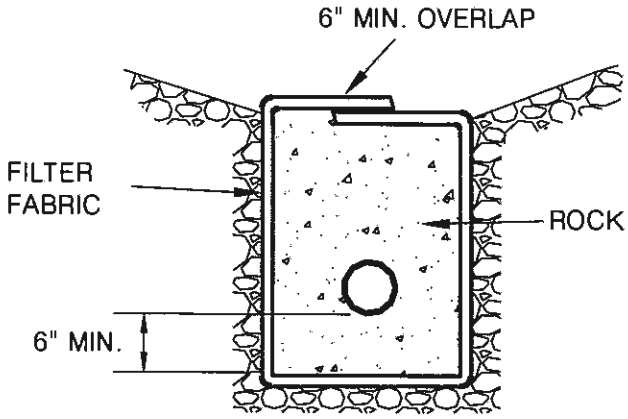
*INITIATE 1:1 TIE-IN BACKCUT TO INTERCEPT TOE OF INTERIM BACKCUT

**AS PART OF TIE-IN FOR ADDITIONAL ENGINEERED FILL

CANYON SUBDRAIN



CANYON SUBDRAIN DETAIL



PERFORATED PIPE SURROUNDED WITH ROCK AND FILTER FABRIC

ROCK: MIN. VOLUME OF 9 CU.FT. PER LINEAR FT. OF 3/4 IN. MAX. ROCK

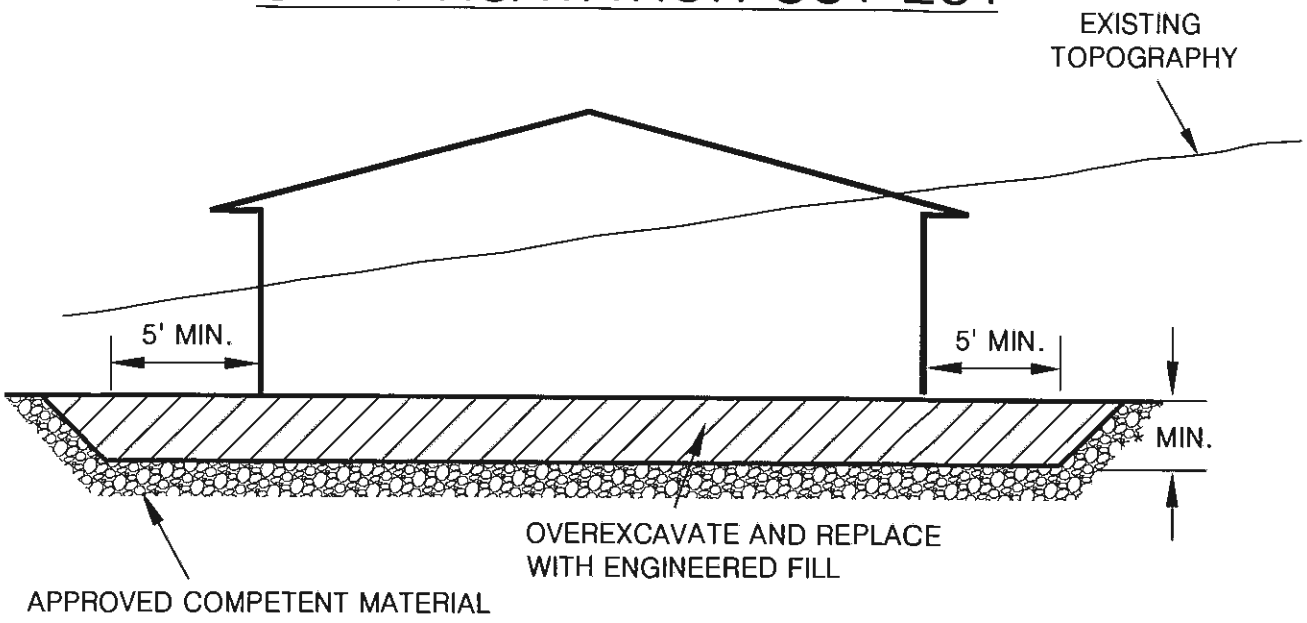
PIPE: 6 IN. ABS OR PVC PIPE WITH A MINIMUM OF 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

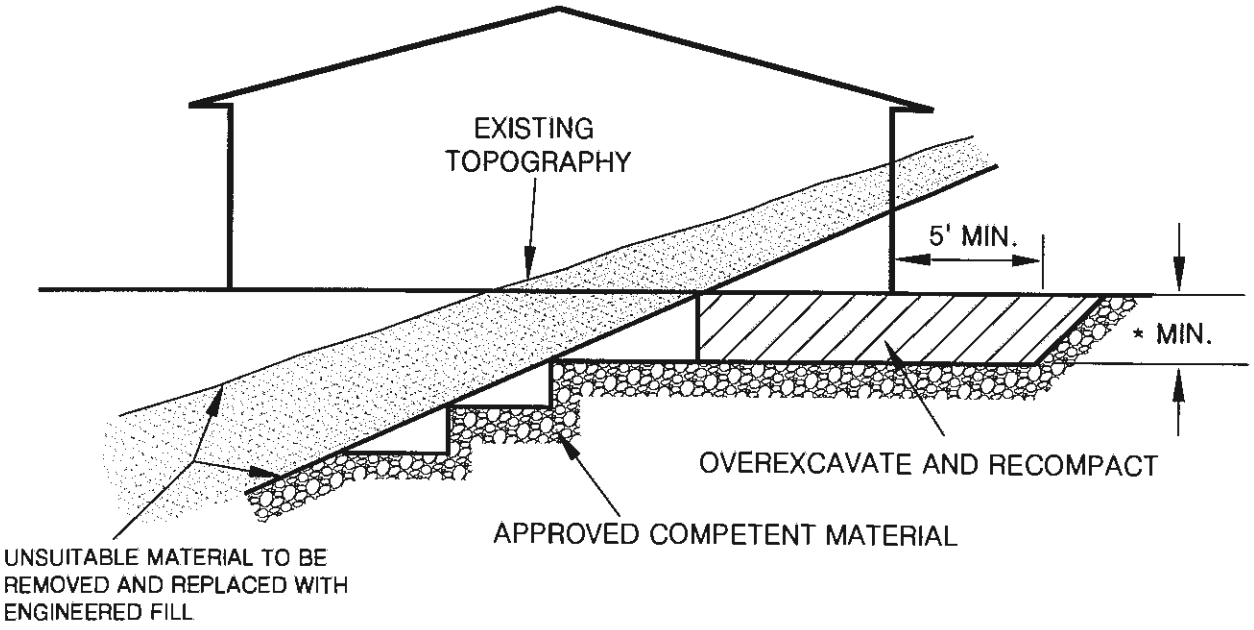
NOTES:

1. FOR CONTINUOUS RUN IN EXCESS OF 500. FT USE 8 IN. DIA. PIPE
2. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)

OVEREXCAVATION CUT LOT



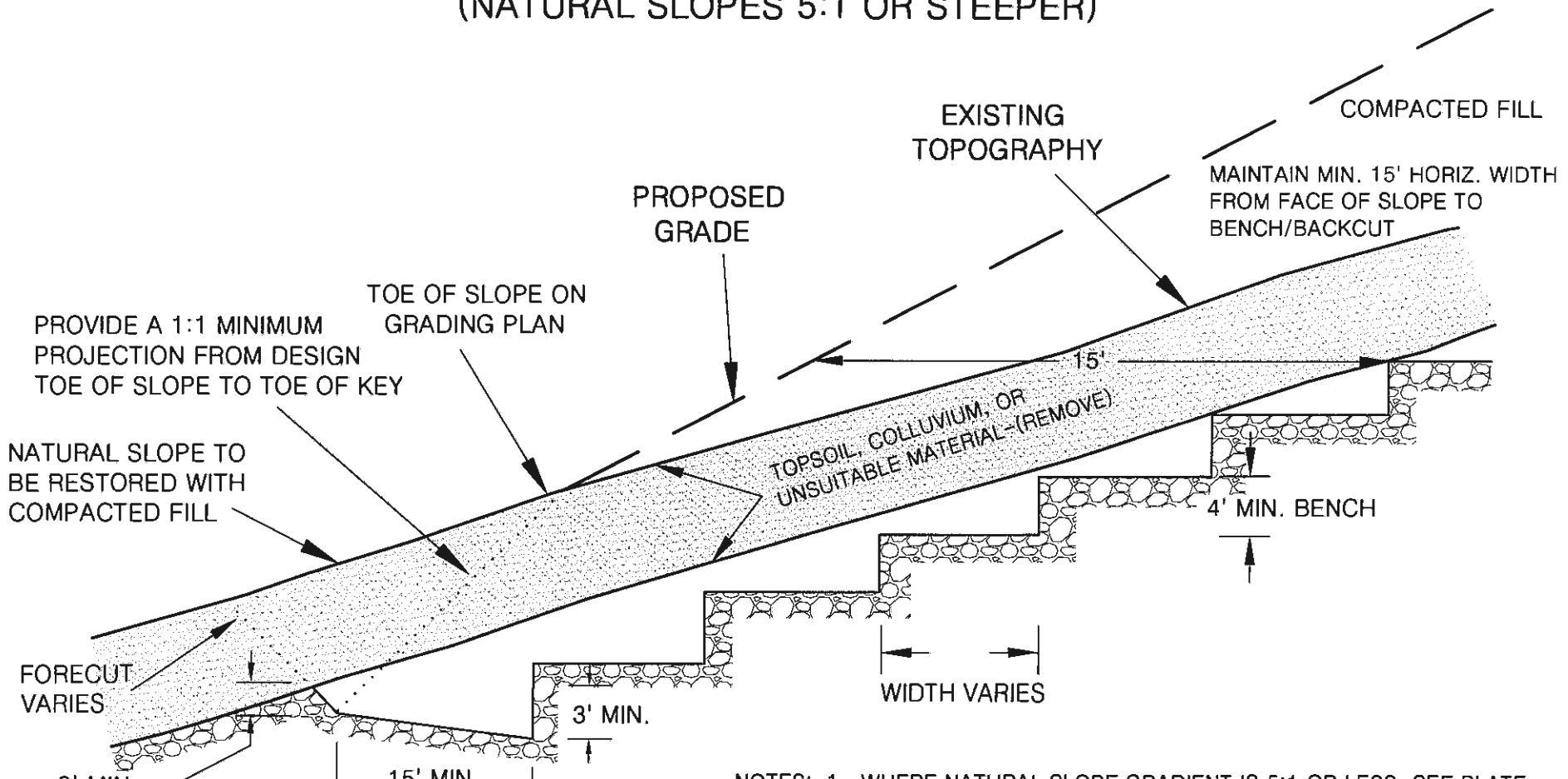
CUT-FILL LOT (TRANSITION)



*NOTE ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF ⅓ OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET (SEE PLATE G-16)

SIDE HILL SLOPE FILL DETAIL

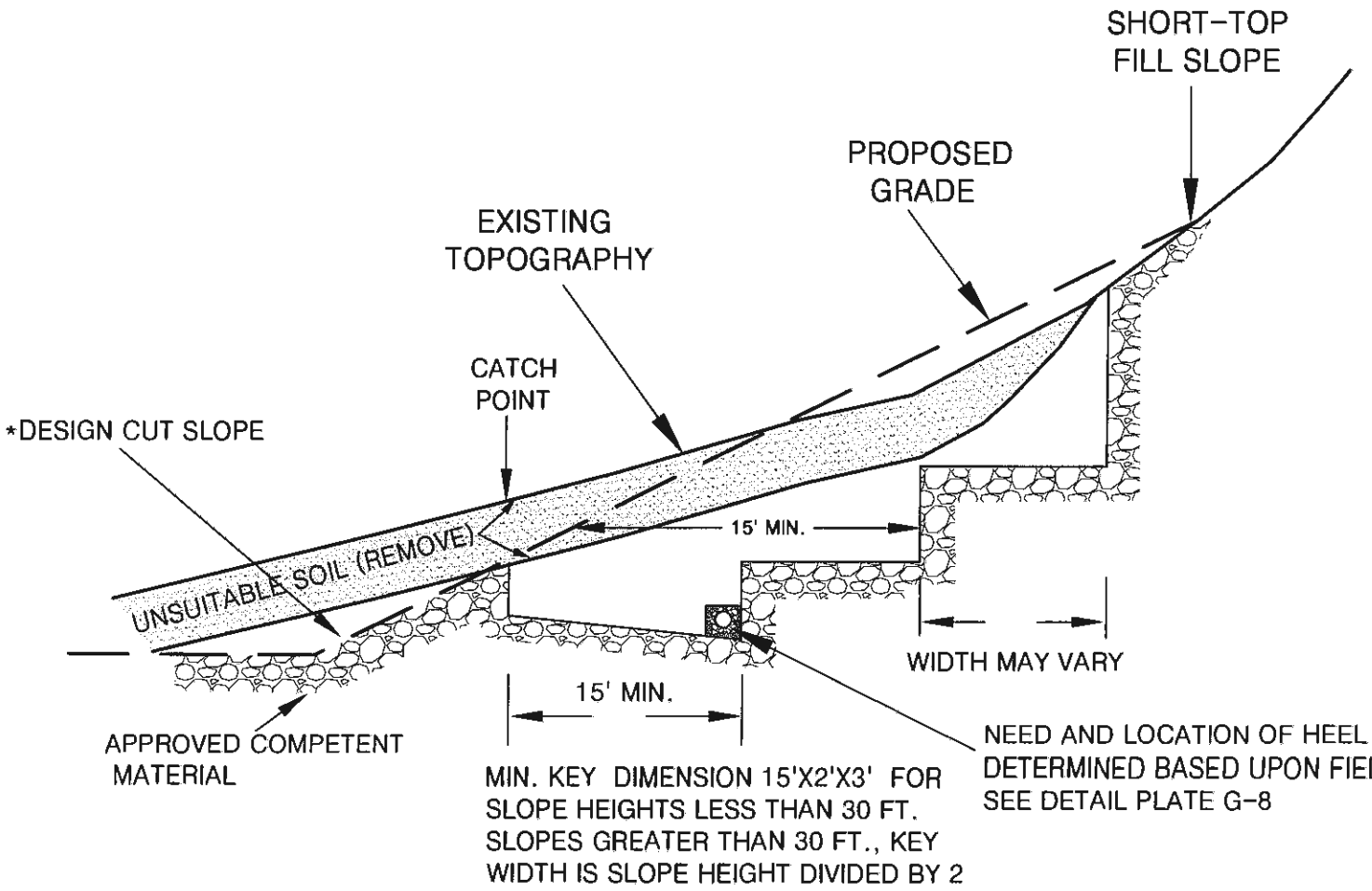
(NATURAL SLOPES 5:1 OR STEEPER)



NOTES:

1. WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, SEE PLATE G-1. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.
2. THE NEED FOR AND PLACEMENT OF DRAINS WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST BASED UPON EXPOSED FIELD CONDITIONS.

FILL OVER CUT SLOPE DETAIL

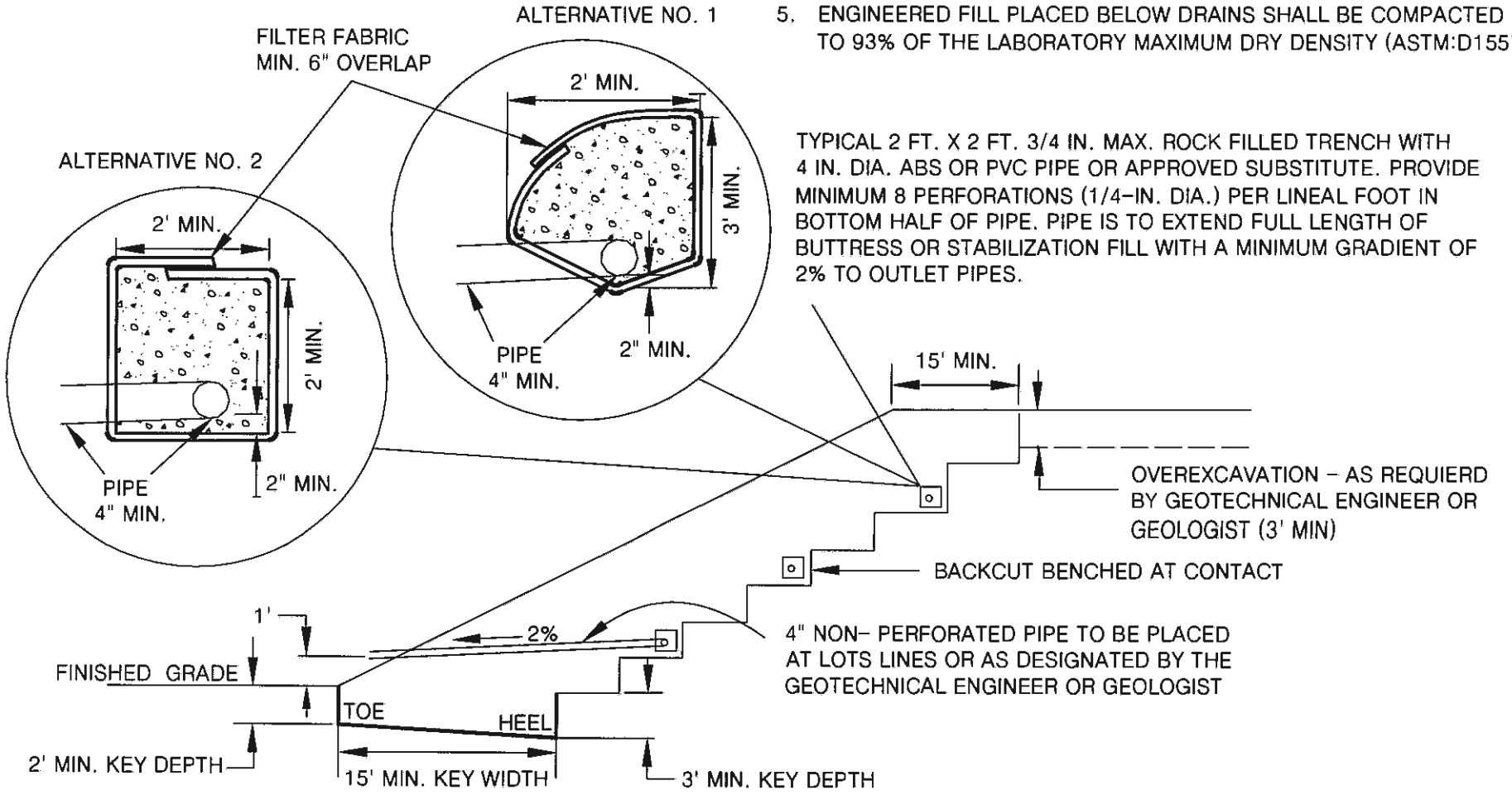


*THE CUT PORTION OF THE SLOPE SHOULD BE EXCAVATED AND EVALUATED BY THE ENGINEERING GEOLOGIST/GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTING THE FILL SLOPE

STABILIZATION/BUTTRESS FILL BACKDRAIN

NOTE:

1. ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40
2. SOLID PIPE OUTLETS TO BE PROVIDED EVERY 100 FT. AND JOINED TO PERFORATED BACKDRAIN PIPE WITH "L" OR "T"s. MIN. 2% GRADIENT.
3. GRAVEL TRENCH TO BE FILLED WITH 3/4 IN. MAXIMUM ROCK
4. THE NECESSITY FOR UPPER TIER BACKDRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST. UPPER TIER OUTLETS SHOULD DRAIN INTO PAVED TERRACE DRAINS.
5. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)



ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-8

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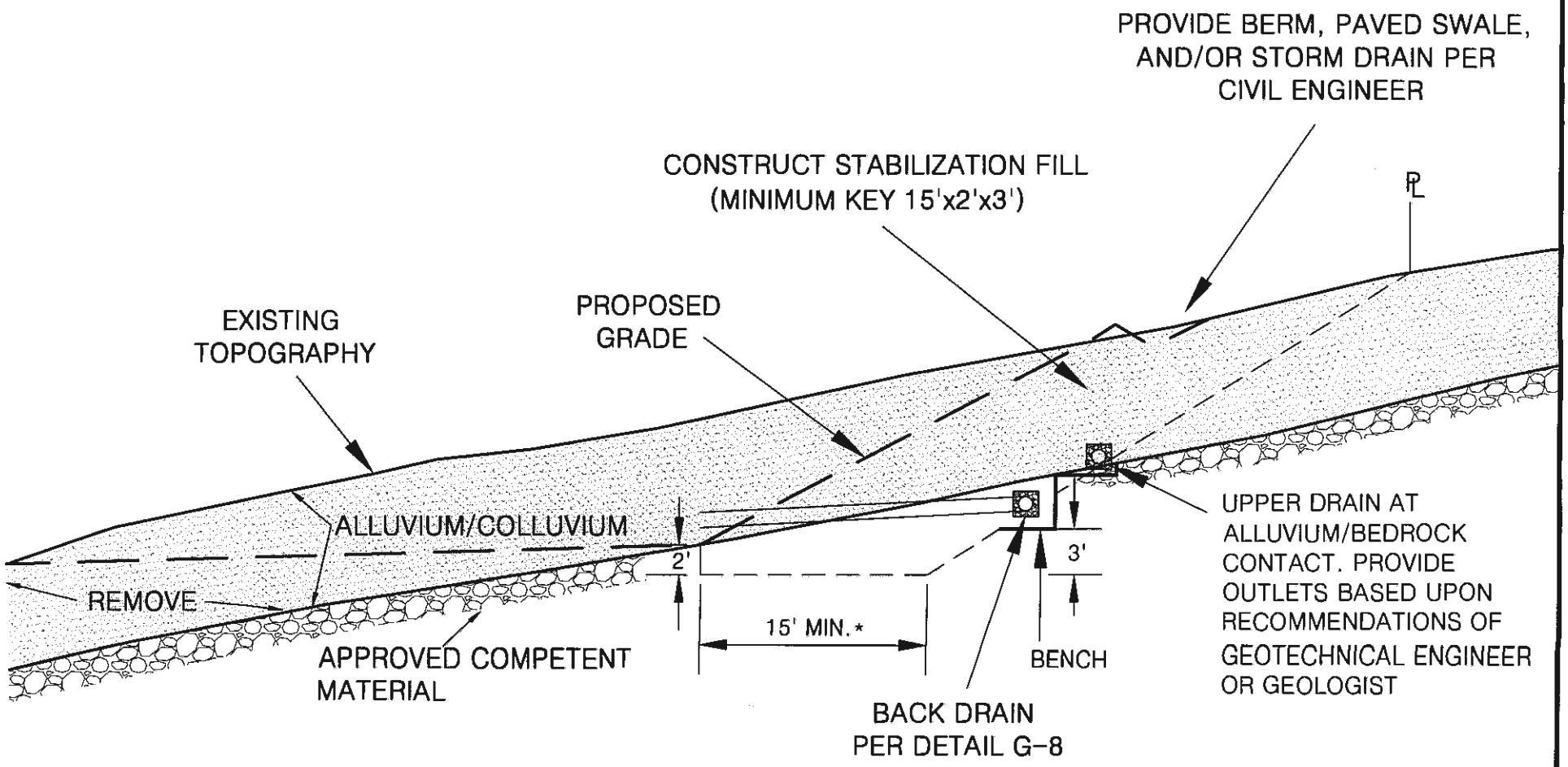
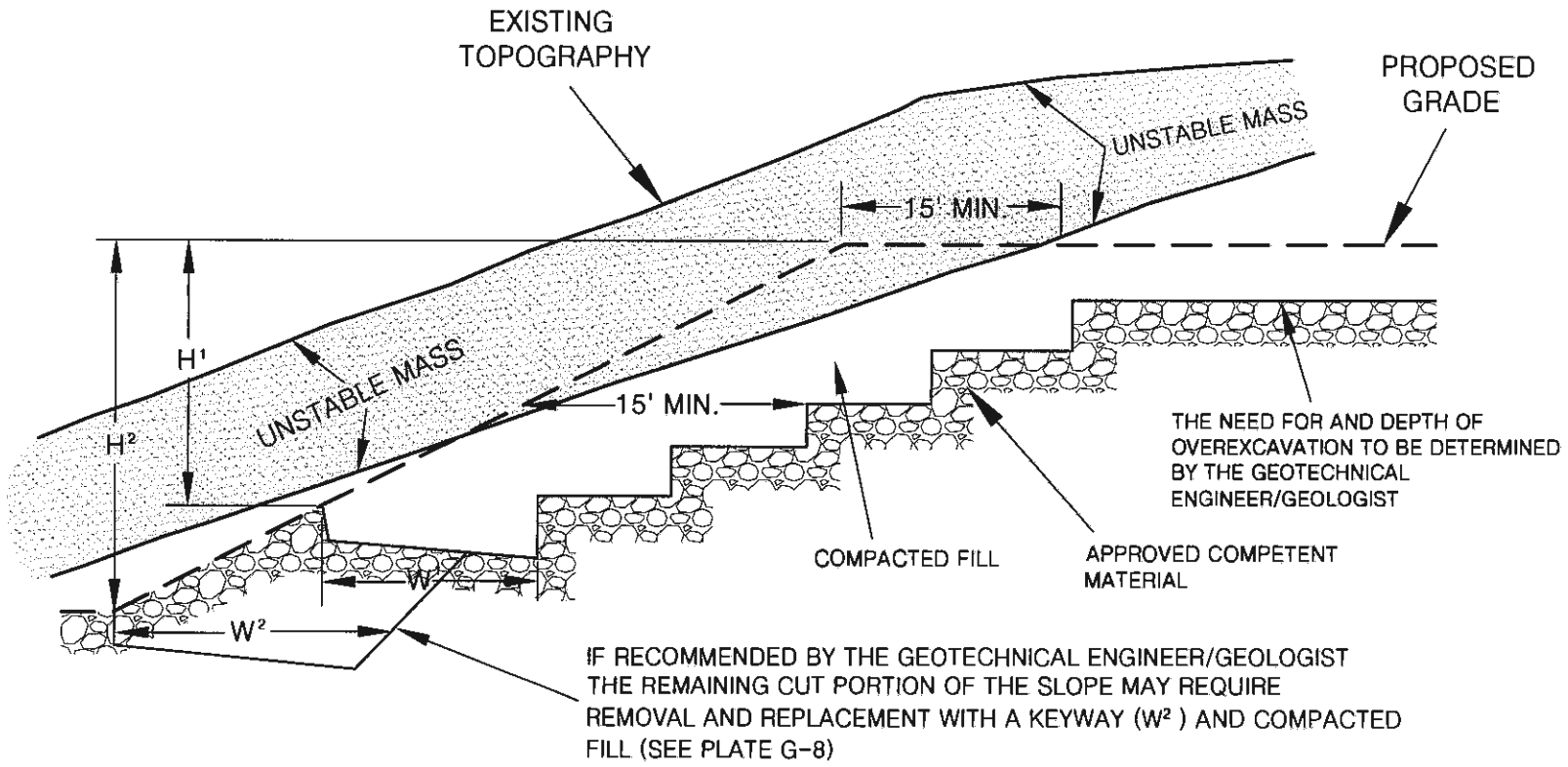
STABILIZATION FILL

(UPSLOPE ALLUVIATED AREA)



* FOR SLOPE HEIGHTS LESS THAN 30 FT. SLOPES GREATER THAN 30 FT., KEY WIDTH IS SLOPE HEIGHT DIVIDED BY 2

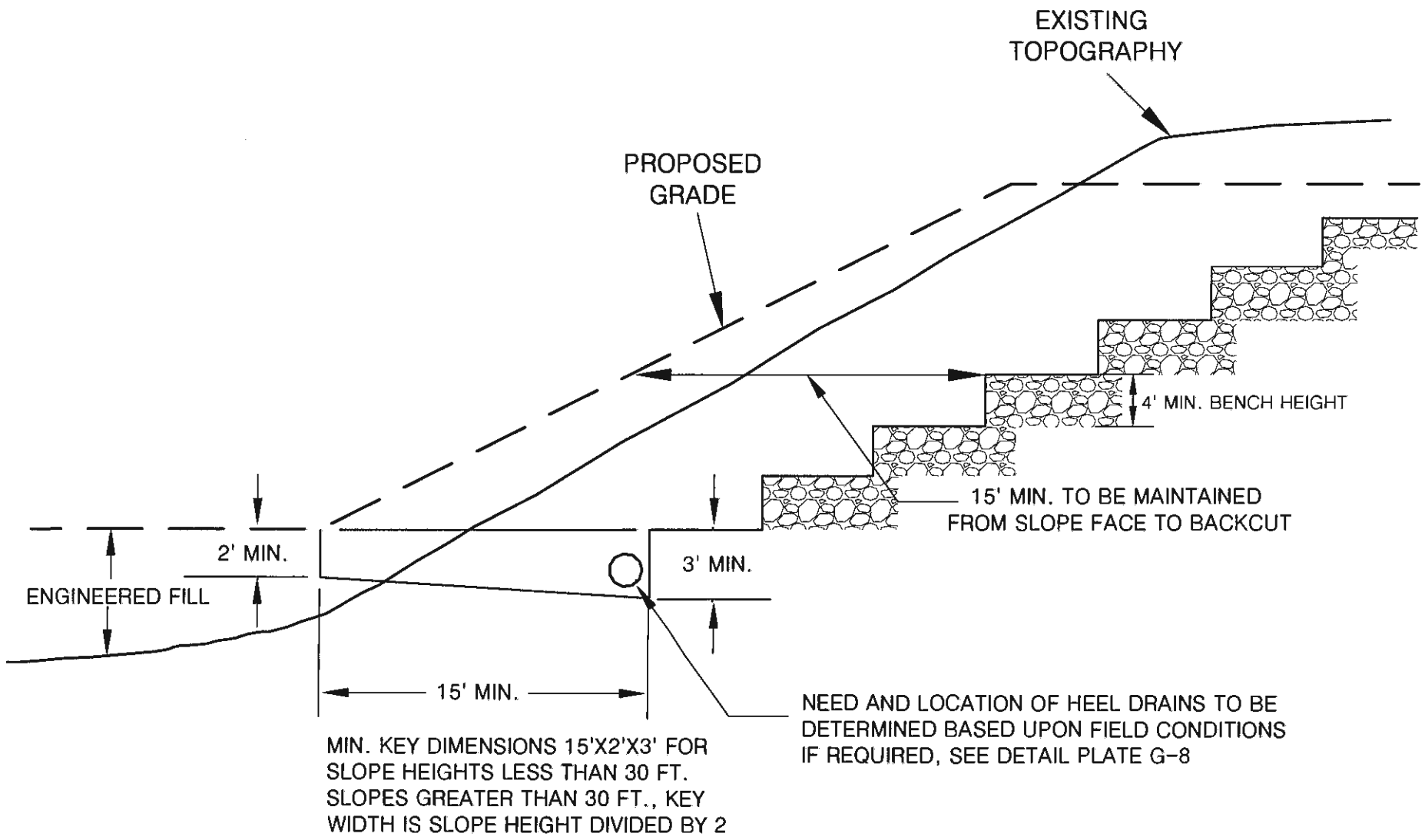
SELECTIVE GRADING DETAIL FOR STABILIZATION FILL
UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



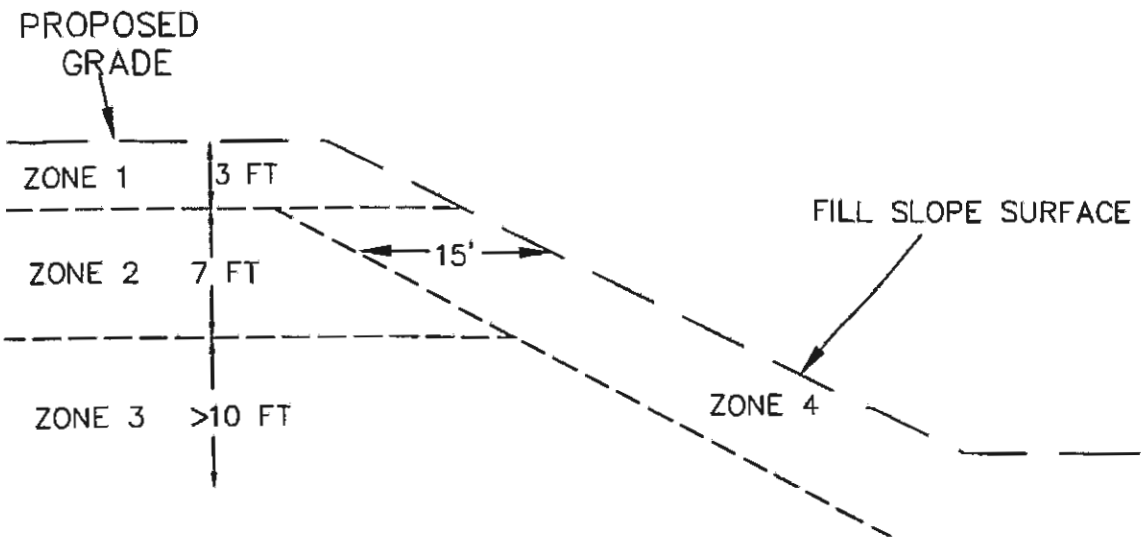
NOTES: 1. BACKDRAINS ARE NOT REQUIRED UNLESS SPECIFIED.

2. "W" SHALL BE EQUIPMENT WIDTH (15') FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER/GEOLOGIST. AT NO TIME SHALL "W" BE LESS THAN H/2.

SKIN FILL SLOPE OVER NATURAL GROUND



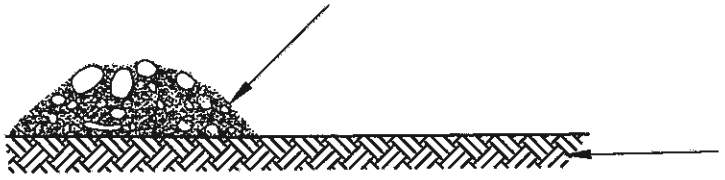
DETAIL FOR MAXIMUM PARTICLE DIMENSION



ZONE	DEPTH	PARTICLE MAX. DIMENSION	PLACEMENT METHOD
1	0-3 ft.	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)
2	3-10 ft.	≤2.0 ft.	ROCK BLANKETS (SEE PLATE G-13)
3	>10 ft.	≤8.0 ft.	ROCK BLANKETS (PLATE G-13) ROCK WINDROW (PLATE G-14) INDIVIDUAL ROCK BURIED (PLATE G-15)
4	15 HORIZONTAL FEET FROM FILL SLOPE FACE	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)

ROCK BLANKET DETAILS

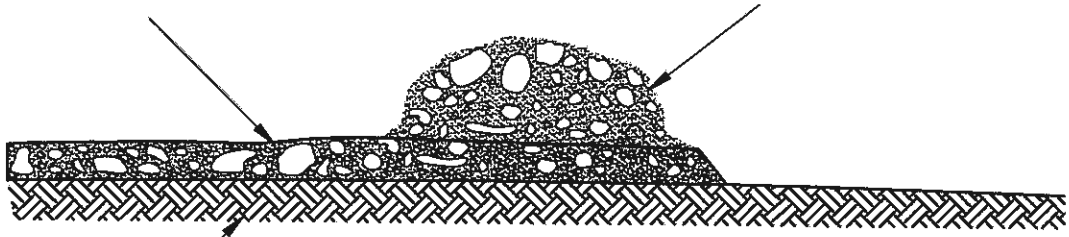
LOOSE PILE 1
LOOSE, DUMPED ROCK, GRAVEL AND SAND MIXTURE REMOVE FRAGMENTS LARGER THAT 2 FEET FOR ISOLATED BURIAL (PLATE G-15) OR WINDROW (PLATE G-10)



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

COMPACT PILE 1
SPREAD LOOSE PILE FORWARD WITH HEAVY TRACKED DOZER (D-8 OR LARGER). HEAVILY WATER, TRACK, AND APPLY ADDITIONAL SAND ANO GRAVEL AS NECESSARY TO FILL VOIDS AND CREATE A DENSE MATRIX OF ROCK, COBBLES, GRAVEL ANO SAND (2 FOOT MAXIMUM THICKNESS)

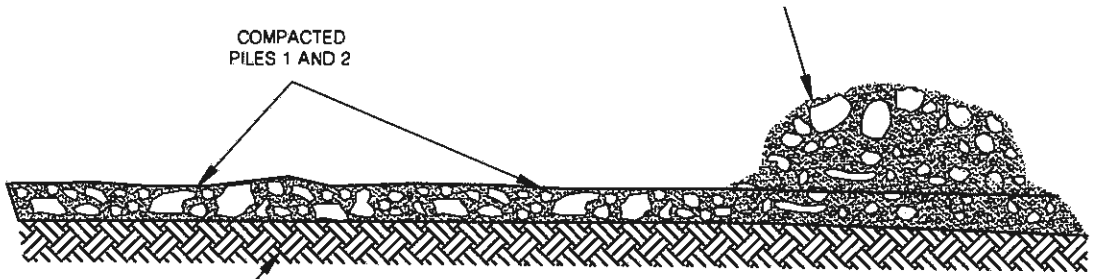
LOOSE PILE 2
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT PILE 1.



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

LOOSE PILE 3
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT EXISTING BLANKET.

COMPACTED PILES 1 AND 2

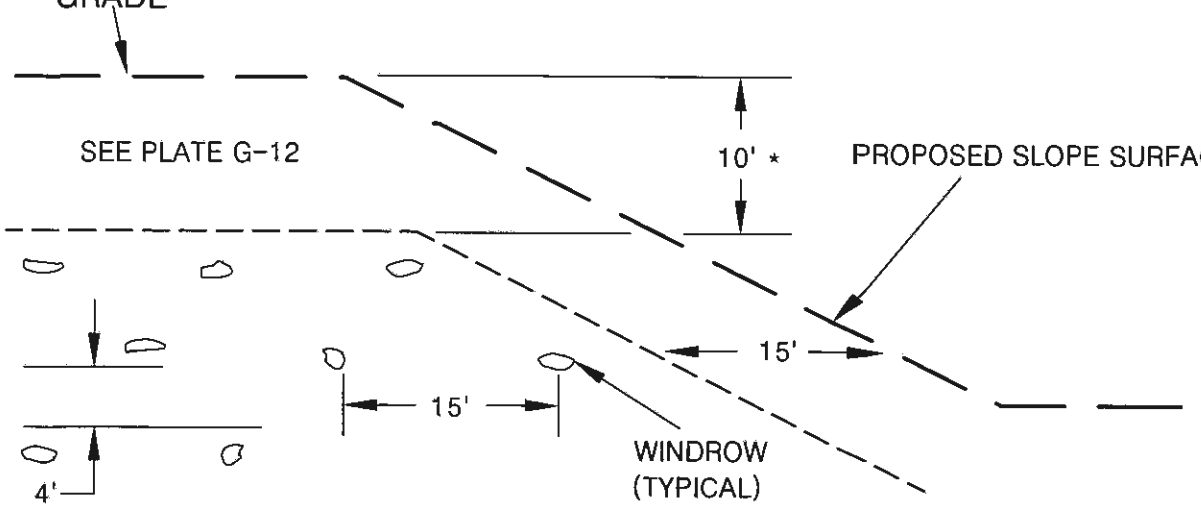


APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

OBSERVATION TESTING AND APPROVAL PROCEDURES

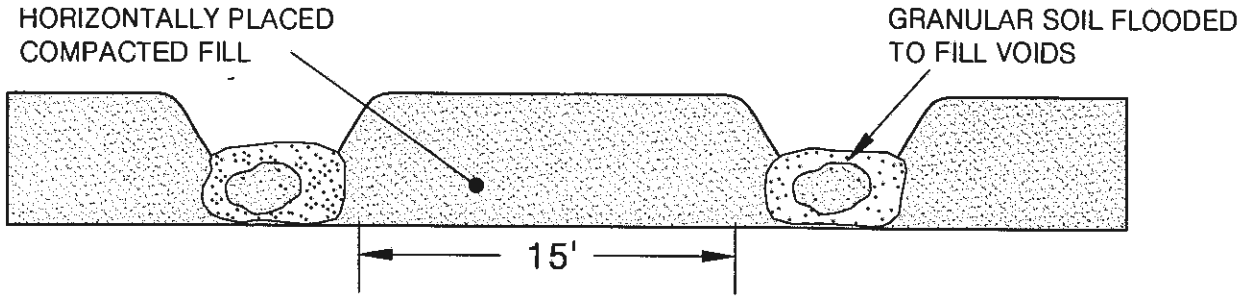
OBSERVE EQUIPMENT. SCRAPERS AND TRUCKS SHOULD BE FULLY SUPPORTED ON BLANKET WITHOUT SIGNIFICANT YIELDING. EXCAVATE TEST/OBSERVATION PITS TO CONFIRM EXISTENCE OF MIXTURE OF VARIOUS PARTICLE SIZES, WITHOUT SIGNIFICANT VOIDS, AND FORMING A DENSE, COMPACTED FILL MATRIX. TEST BY ASTM D1556, D2922 AND/OR D3017 WHEN APPROPRIATE. RECORD LIMITS AND ELEVATION OF BLANKET. ALL FILL AND COMPACTION OPERATIONS TO BE CONDUCTED UNDER THE OBSERVATION OF THE GEOTECHNICAL ENGINEER. SUBSEQUENT LIFTS TO BE APPLIED ONLY AFTER OBSERVATION AND CONFIRMATION OF SUITABILITY OF FILL AND RELEASE BY THE GEOTECHNICAL ENGINEER. BLANKETS TO BE CONSTRUCTED IN ACCORDANCE WITH PLATE G-12.

ROCK WINDROW DETAIL



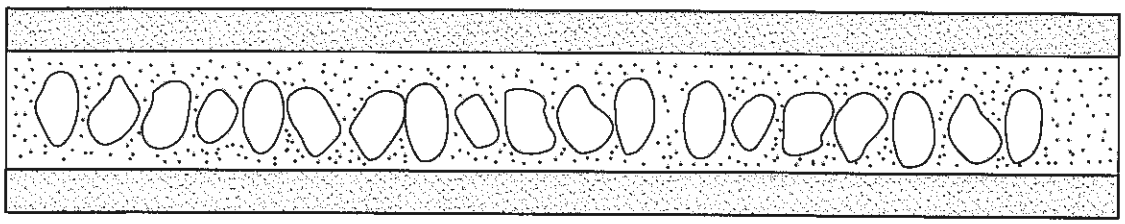
NOTE: OVERSIZED MATERIAL SHOULD BE REMOVED FROM THE 15' CLEAR ZONES WITH SPECIAL EQUIPMENT, SUCH AS A ROCK RAKE, PRIOR TO PLACING THE NEXT FILL LIFT.
*VARIANCES TO THE ABOVE ROCK HOLD DOWN MAY BE GRANTED SUBJECT TO APPROVAL BY THE OWNER, GEOTECHNICAL ENGINEER, AND GOVERNING AGENCY

TYPICAL WINDROW DETAIL (END VIEW)

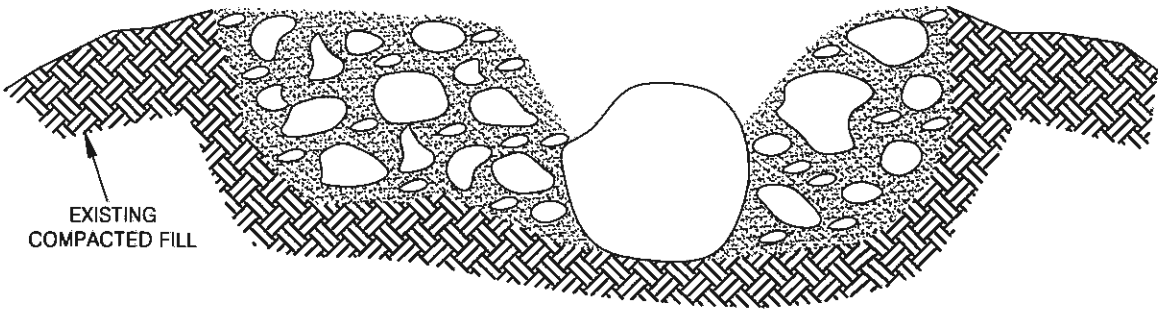


NOTE: COMPACTED FILL SHALL BE BROUGHT UP TO A HIGHER ELEVATION ALONG EACH WINDROW SO GRANULAR SOIL CAN BE FLOODED IN A "TRENCH CONDITION".

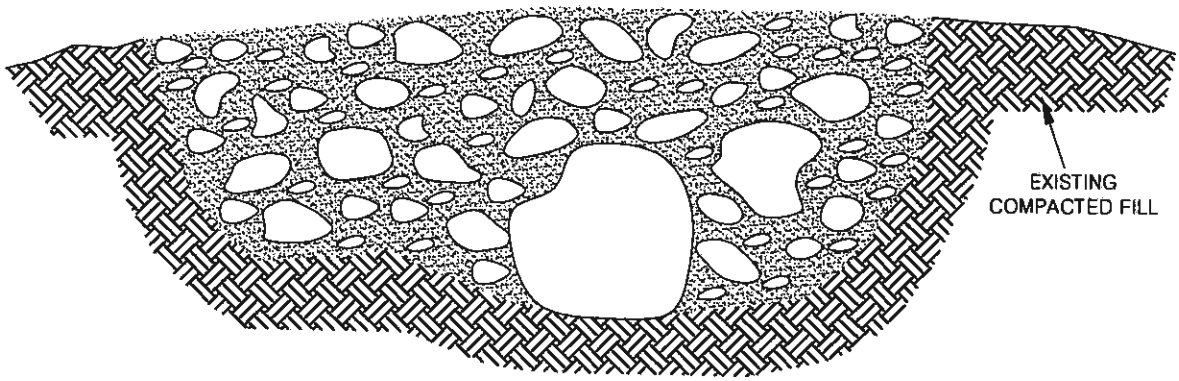
PROFILE VIEW



ISOLATED ROCK BURIAL DETAILS

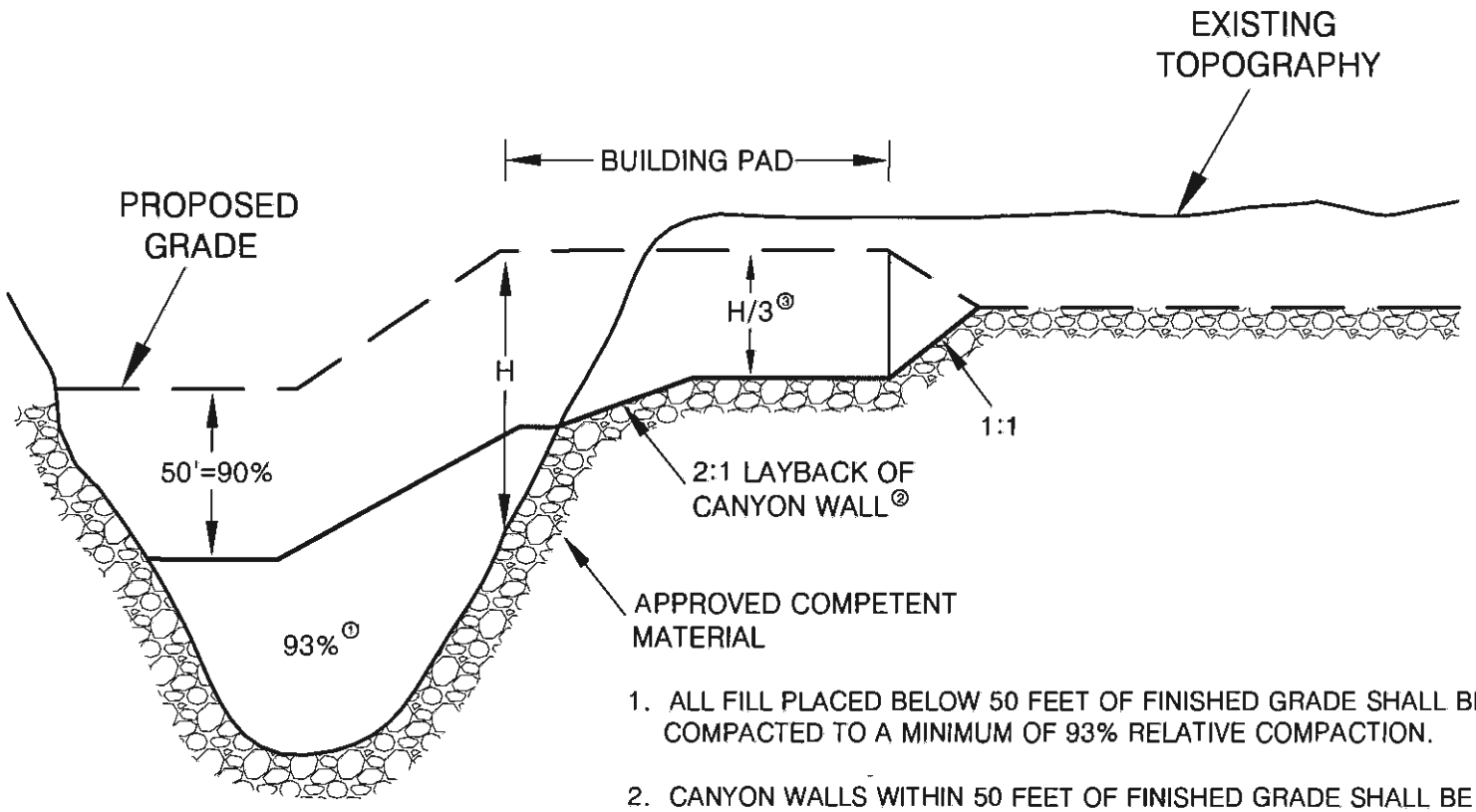


EXCAVATE HOLE INTO EXISTING FILL PRISM, PLACE BOULDER (< 8 feet in maximum dimension) INTO EXISTING COMPACTED FILL. SURROUND WITH SAND, GRAVEL, COBBLES AND WATER HEAVILY. TRACK WITH D8 OR LARGER EQUIPMENT UNTIL RESULTING FILL FULLY SUPPORTS EQUIPMENT. OBSERVE AND/OR TEST IN ACCORDANCE WITH ASTM D1556, D2922 OR D3017. ROCKS LARGER THAN 8 FEET SHALL BE FURTHER REDUCED IN SIZE BY SECONDARY BREAKING.



RELATIVE COMPACTION VS. DEPTH

CANYON WALL LAY BACK
DIFFERENTIAL FILL OVEREXCAVATION DETAILS



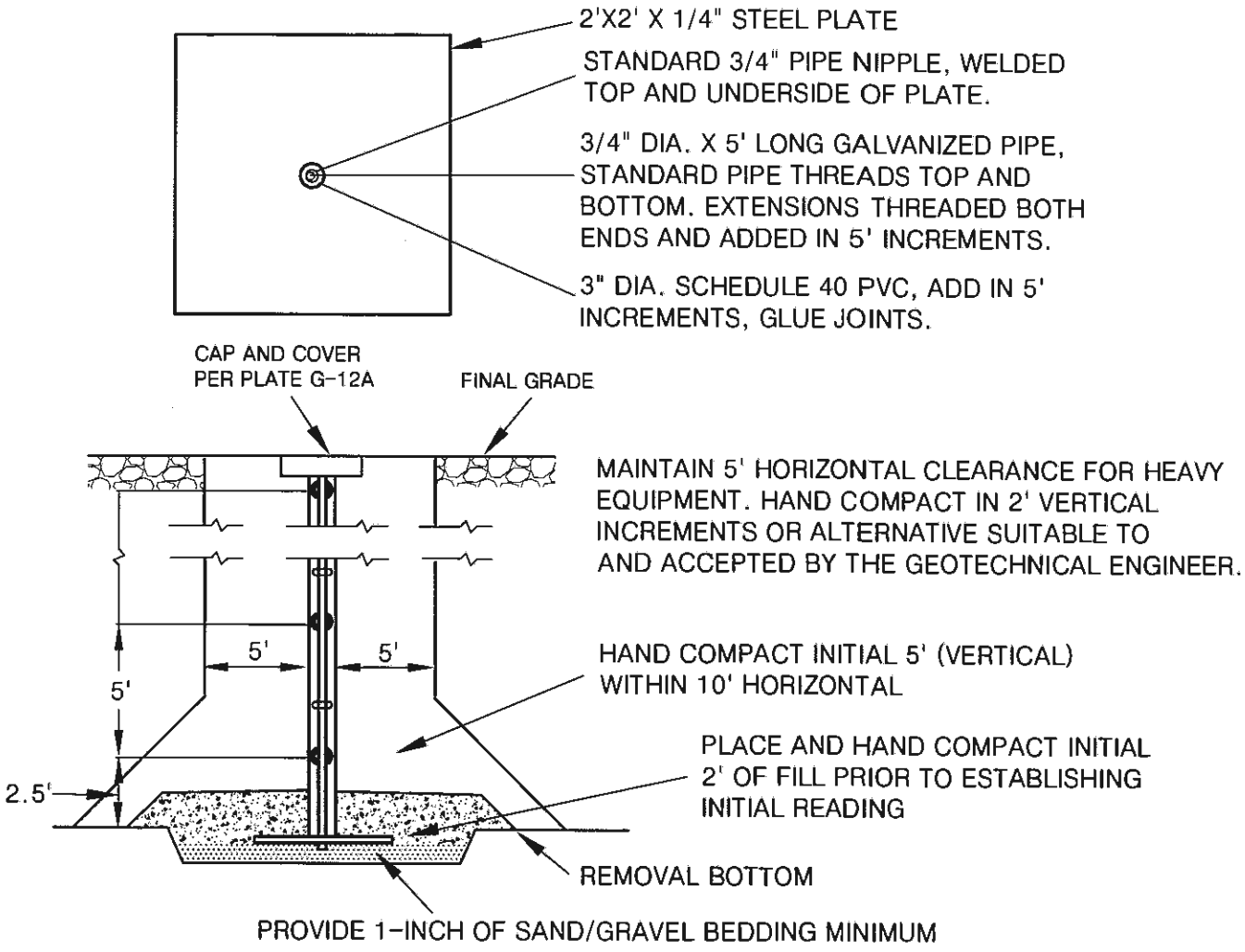
1. ALL FILL PLACED BELOW 50 FEET OF FINISHED GRADE SHALL BE COMPACTED TO A MINIMUM OF 93% RELATIVE COMPACTION.

2. CANYON WALLS WITHIN 50 FEET OF FINISHED GRADE SHALL BE LAID BACK TO A SLOPE RATIO OF 2:1 OR FLATTER.

3. ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET.

4. IF THE 2:1 LAY BACK OF THE CANYON WALL IS IMPRACTICAL, THEN AS AN ALTERNATIVE THE INCREASED COMPACTION STANDARDS IN NOTE 1 SHOULD BE EXTENDED UP TO H/3 AND THE LAY BACK WILL NOT BE REQUIRED.

SETTLEMENT PLATE DETAIL



NOTES:

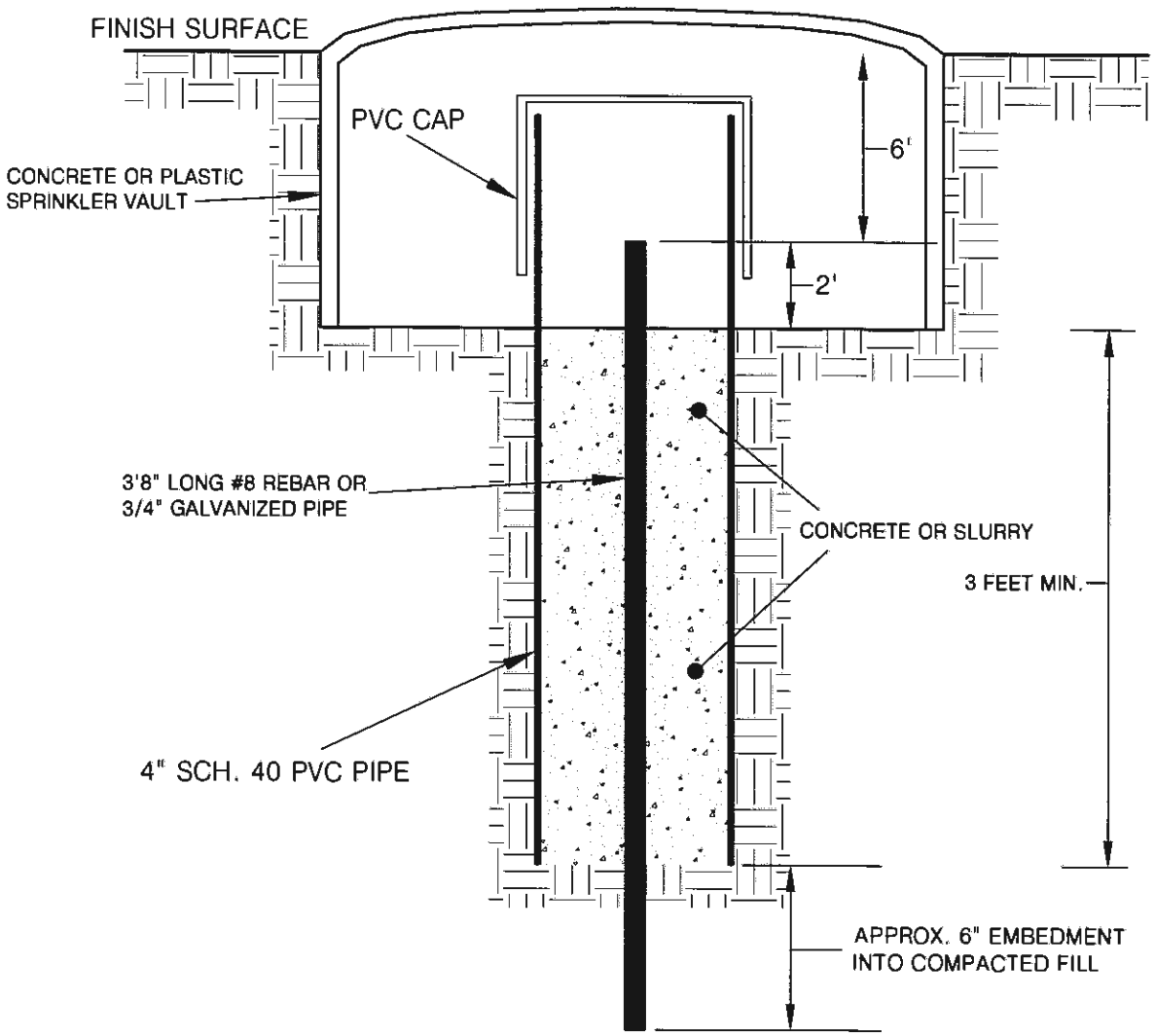
1) LOCATIONS OF SETTLEMENT PLATES SHALL BE CLEARLY MARKED AND READILY VISIBLE (RED FLAGGED) TO EQUIPMENT OPERATORS.

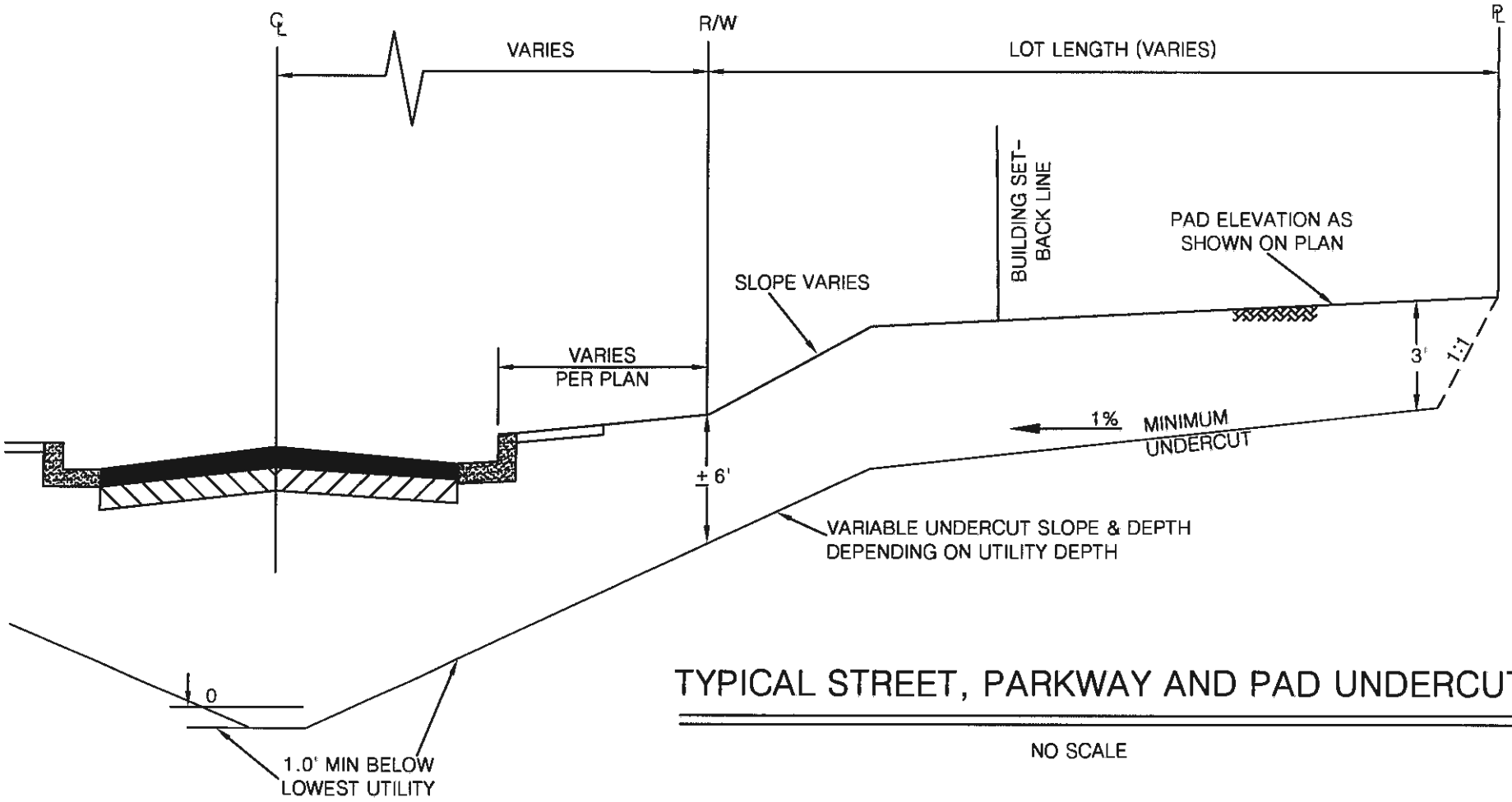
2) CONTRACTOR SHALL MAINTAIN 10' HORIZONTAL CLEARANCE FOR HEAVY EQUIPMENT WITHIN 5' (VERTICAL) OF PLATE BASE. FILL WITHIN CLEARANCE AREA SHALL BE HAND COMPACTED TO PROJECT SPECIFICATIONS OR COMPACTED BY ALTERNATIVE APPROVED BY THE GEOTECHNICAL ENGINEER.

3) AFTER 5' (VERTICAL) OF FILL IS IN PLACE, CONTRACTOR SHALL MAINTAIN 5' HORIZONTAL EQUIPMENT CLEARANCE. FILL IN CLEARANCE AREA SHALL BE HAND COMPACTED (OR APPROVED ALTERNATIVE) IN VERTICAL INCREMENTS NOT TO EXCEED 2 FEET.

4) IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE OR EXTENSION RESULTING FROM EQUIPMENT OPERATING WITHIN PRESCRIBED CLEARANCE AREA, CONTRACTOR SHALL IMMEDIATELY NOTIFY GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATE AND EXTENSION RODS TO WORKING ORDER.

SURFACE SETTLEMENT MONUMENT DETAIL





TYPICAL STREET, PARKWAY AND PAD UNDERCUT

NO SCALE

ALTA CALIFORNIA GEOTECHNICAL, INC .
VER. 3/13

PLATE G-19

PATH: C:\Users\Jinks\Desktop\Drafting\GRADING DETAILS\G-19.dwg

LEGEND

afu	ARTIFICIAL FILL-UNDOCUMENTED
Qal	ALLUVIUM (BRACKETED WHERE BURIED)
B-5	APPROXIMATE LOCATION OF HOLLOW STEM AUGER BORING
P-2	APPROXIMATE LOCATION OF INFILTRATION TEST
T-11	APPROXIMATE LOCATION OF BACKHOE TRENCH
—— ——	APPROXIMATE LOCATION OF GEOLOGIC CONTACT
— — — —	LIMITS OF REPORT

SITE INFORMATION
Address: Brodiaea Ave
APN(s): 478-080-003, -004, -005 and 478-070-013, -014-, -015
City: Moreno Valley
County: Riverside County
Current Zoning: R-3 (3 du/ac)
Proposed Zoning: R-10 (10 du/ac)

R-10 SFD DEVELOPMENT STANDARDS
Min Lot Size: 4500sf
Min Lot Width: 45'
Lot Depth: 85'
Setbacks:
- Front: 20'
- Side: 5'
- Corner Side: 10'
- Rear: 15'
- Coverage: 50%

SITE SUMMARY
Site Area: ±14.4 ac (627,000sf)

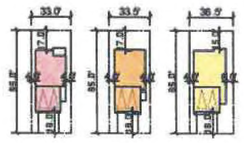
Units:
- 47 units - P1 (1702gsf, 3bd + loft/bed4, 2.5ba)
- 47 units - P2 (1975gsf, 4bd + loft, 2.5ba)
- 49 units - P3 (2119gsf, up to 5bed, 3.5ba)

143 units - Total

Density: ±9.9 du/ac

Parking Provided:
- 286 spaces - Garages
- 286 spaces - Driveways
- 59 spaces - Open

631 spaces - Total (4.4 sp/unit)



ktgy
Architecture + Planning
17911 Von Karman Ave,
Suite 200
Irvine, CA 92614
949.851.2133
ktgy.com

Warmington
95 ROOTED IN THE PAST MAKING FOR THE FUTURE
Warmington Residential
3090 Pullman Street
Costa Mesa, CA 92626

BRODIAEA AVENUE
MORENO VALLEY, CA #2024-0351

OPTION 2
CONCEPTUAL DENSITY STUDY
APRIL 19, 2024

1" = 60'-0"
0 30 60 120

PLATE 1

ALTA CALIFORNIA GEOTECHNICAL, INC.
170 N. MAPLE STREET, STE 108, CORONA, CA 92880
TELEPHONE: (951) 509-7090
PROJECT NUMBER: 1-0550 DATE: Sept. 2024

Appendix 4: Historical Site Conditions

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

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

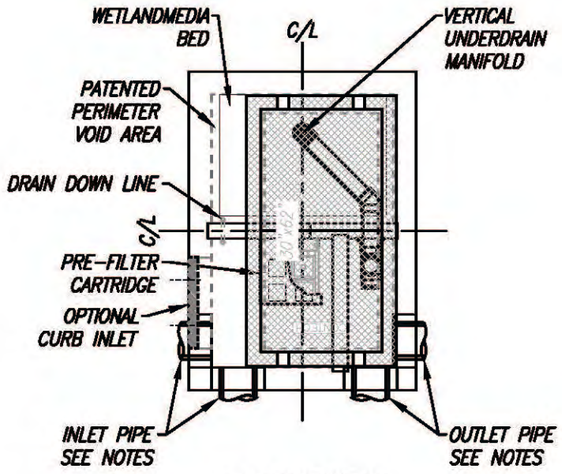
Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

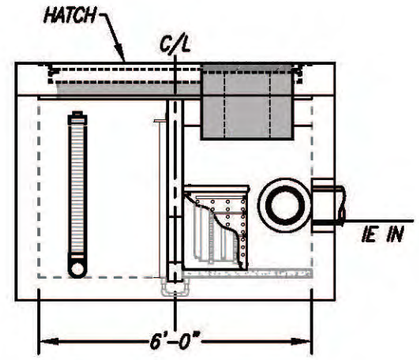
SITE SPECIFIC DATA

PROJECT NUMBER		TTM NO. 39162	
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.073
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

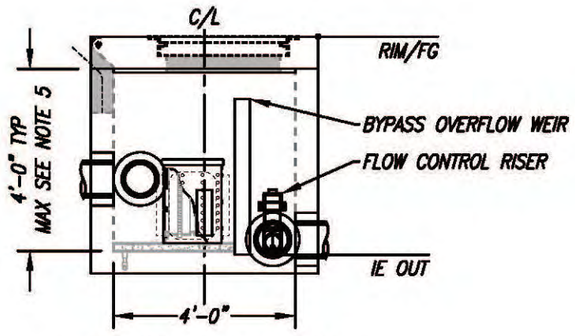
* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



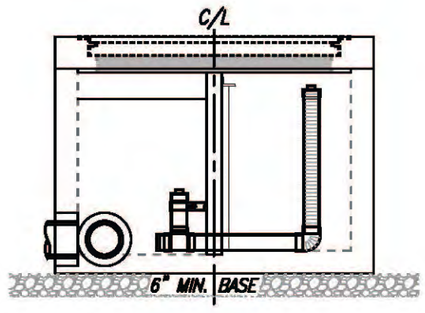
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

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5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.

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MWS-L-4-6-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER		TTM NO. 39162	
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.147
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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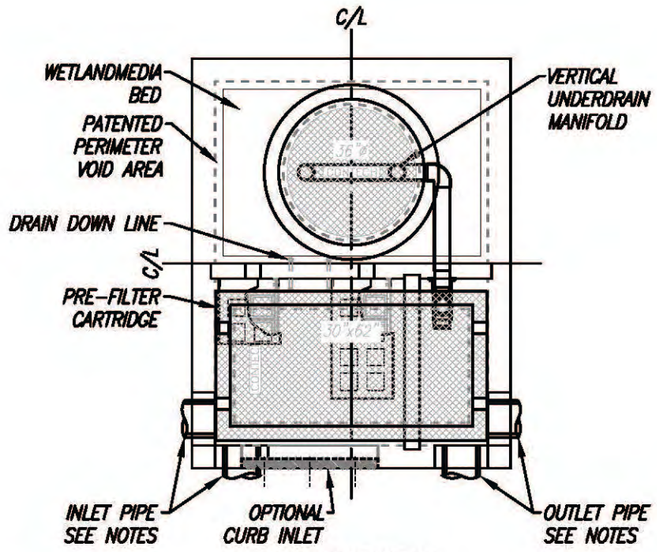
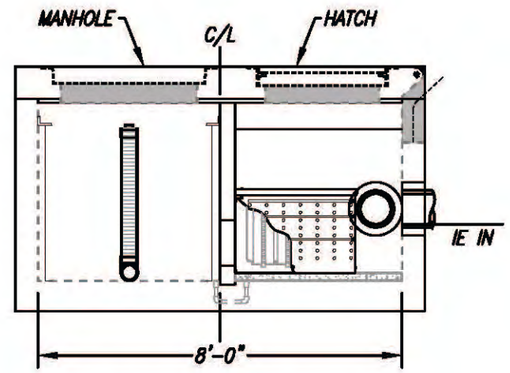


PLAN VIEW



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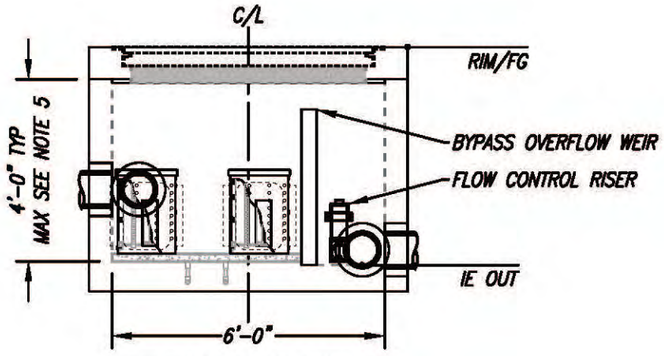
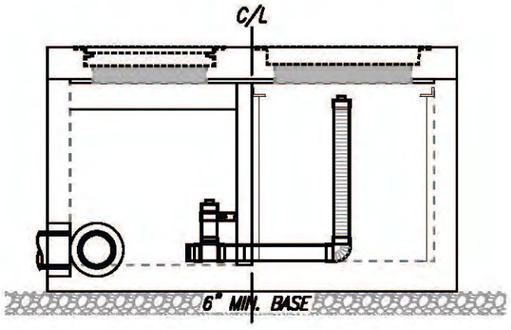


ELEVATION VIEW



RIGHT END VIEW

MWS-L-6-8-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

10/10/23\SCOTT.SEIFRIG\

SITE SPECIFIC DATA

PROJECT NUMBER		TTM NO. 39162	
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.231
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			____(CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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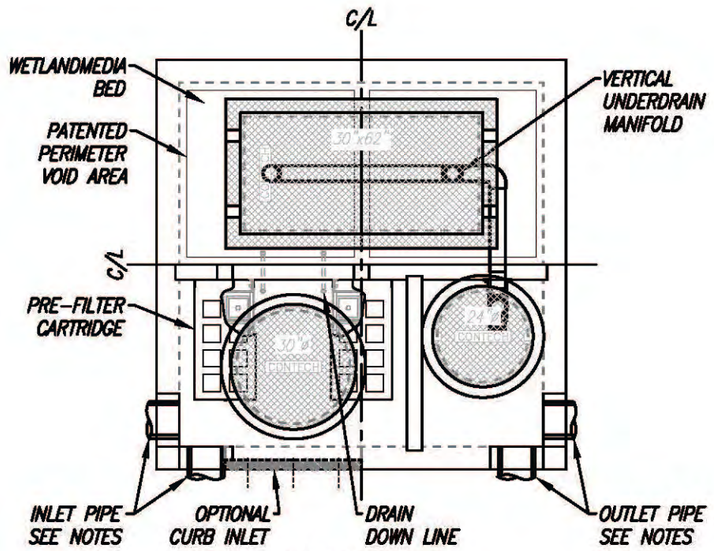
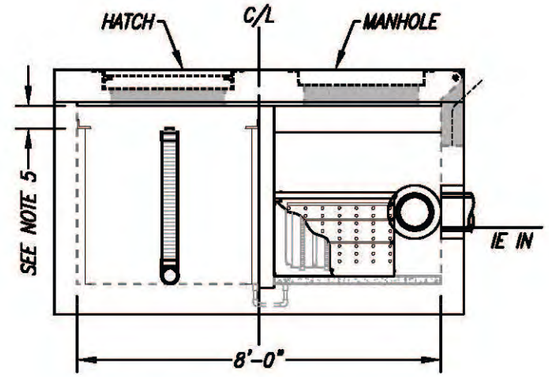
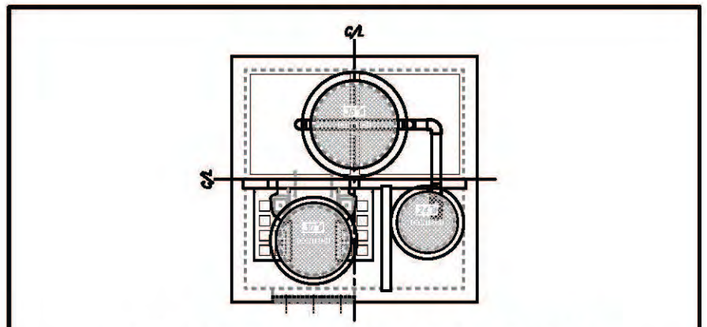


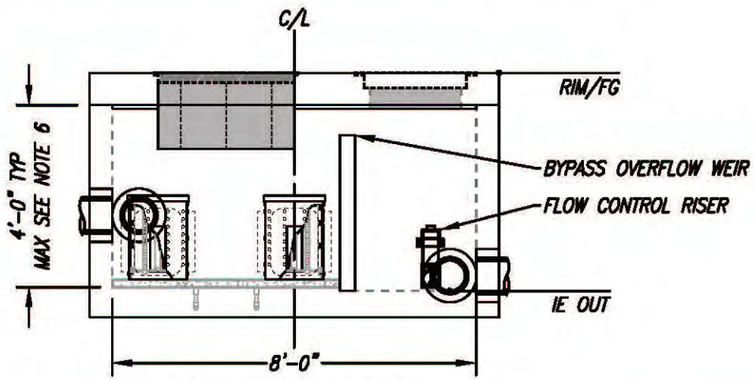
PLAN VIEW



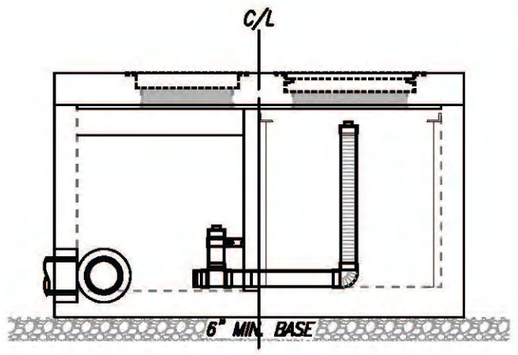
LEFT END VIEW



ALTERNATE DEEP ORIENTATION



ELEVATION VIEW



RIGHT END VIEW

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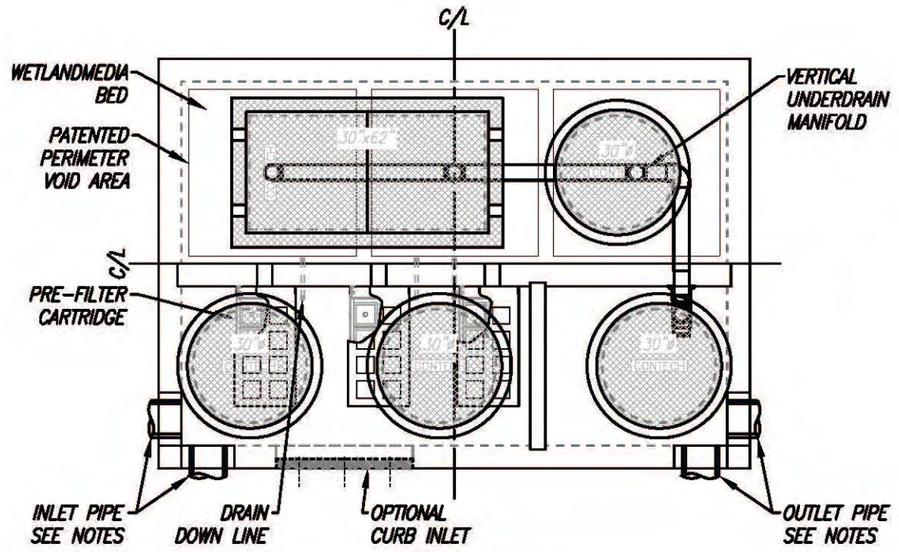
5. ALTERNATE DEEP FRAME & COVER ORIENTATION USED WHEN CEILING TO MEDIA DISTANCE IS 2.5' OR GREATER.
6. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.

MWS-L-8-8-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

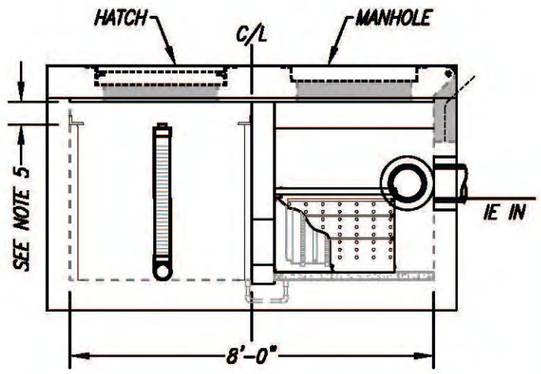
SITE SPECIFIC DATA

PROJECT NUMBER	TTM NO. 39162		
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.346
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

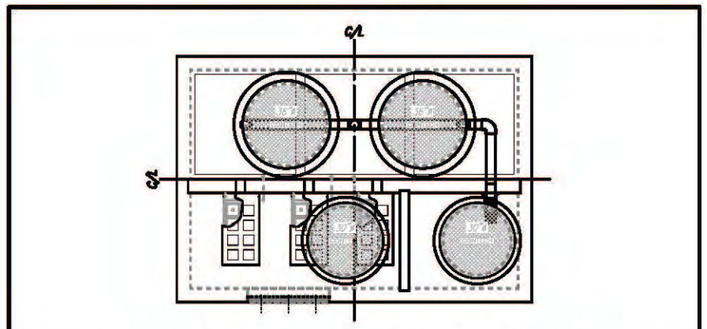
* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



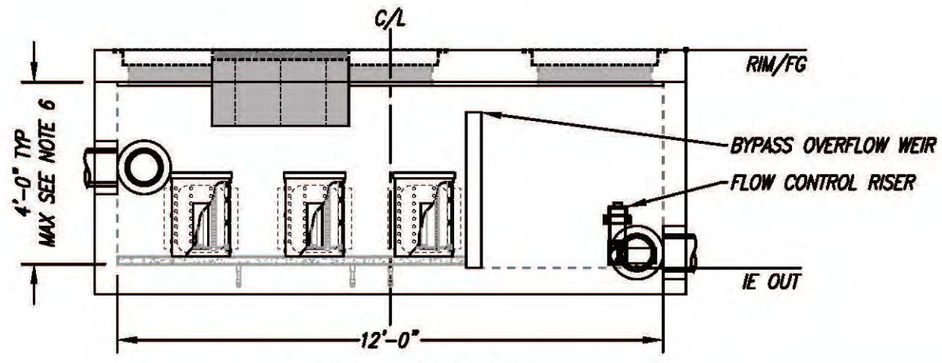
PLAN VIEW



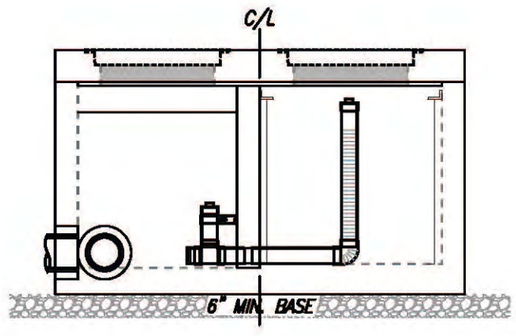
LEFT END VIEW



ALTERNATE DEEP ORIENTATION



ELEVATION VIEW



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6. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.

MWS-L-8-12-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

8/14/23SCOTT.SERTICH

SITE SPECIFIC DATA

PROJECT NUMBER		TTM NO. 39162	
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.462
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			____ (CFS)
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

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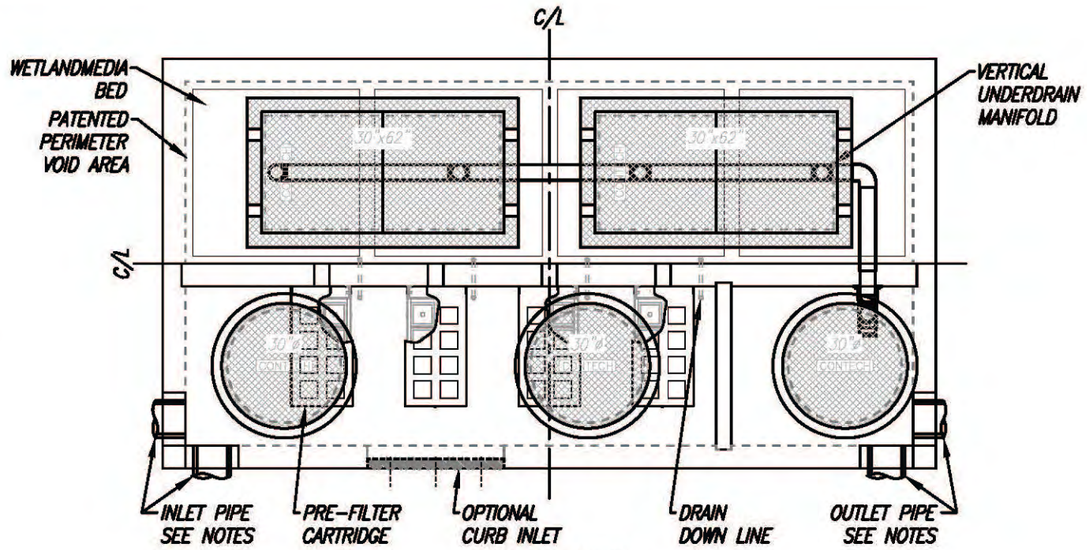
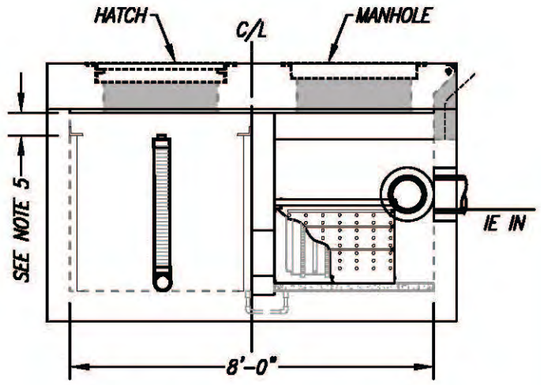
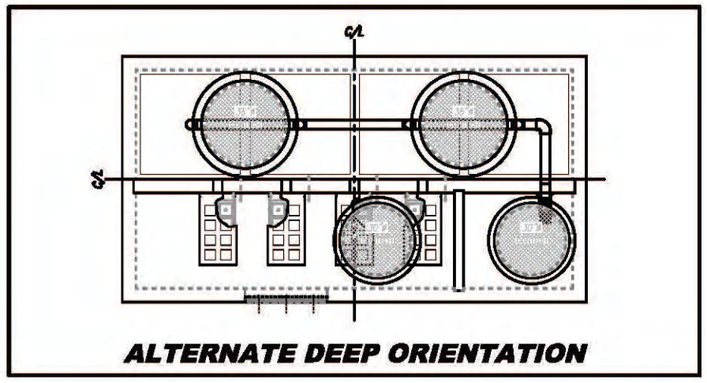


PLAN VIEW



LEFT END VIEW



ALTERNATE DEEP ORIENTATION

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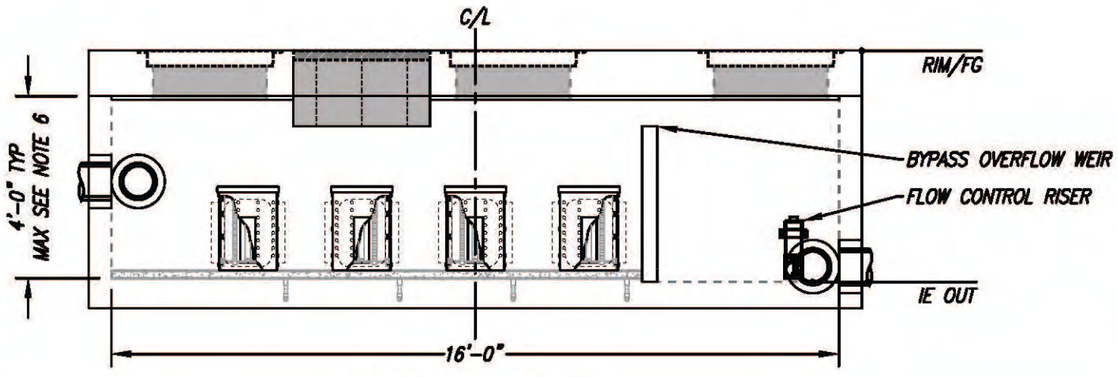
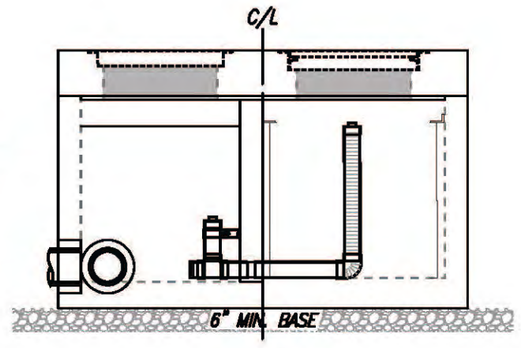


ELEVATION VIEW



RIGHT END VIEW

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

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-8-16-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

CONTECH
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Stormwater Biofiltration

The experts you need to solve your stormwater challenges

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

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

Your Contech Team

STORMWATER CONSULTANT

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

STORMWATER DESIGN ENGINEER

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

REGULATORY MANAGER

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

SALES ENGINEER

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

Contech is your partner in stormwater management solutions

Restoring Nature's Presence in Urban Areas – Modular Wetlands® Linear

As cities grow, there is less space for natural solutions to treat stormwater. Contech understands this and is committed to providing compact, Low Impact Development (LID) solutions like the Modular Wetlands Linear to protect our nation's waterways.

The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a small footprint, high treatment capacity, and design versatility. It is also the only biofiltration system that can be routinely installed downstream of storage for additional volume control and treatment.

With numerous regulatory approvals, the system's aesthetic appeal and superior pollutant removal make it the ideal solution for a wide range of stormwater applications, including urban development projects, commercial parking lots, residential streets, mixed-use developments, streetscapes, and more.

MODULAR WETLANDS

How the Modular Wetlands® Linear Works

1 **PRETREATMENT** | Stormwater enters the pretreatment chamber where total suspended solids settle, and trash and debris are contained within the chamber. Stormwater then travels through the pretreatment filter boxes that provide additional treatment.

2 **BIOFILTRATION** | As water enters the biofiltration chamber, it fills the void space in the chamber's perimeter. Horizontal forces push the water inward through the biofiltration media, where nutrients and metals are captured. The water then enters the drain pipe to be discharged.

3 **DISCHARGE** | The specially designed vertical drain pipe and orifice control plate control the flow of water through the media to a level lower than the media's capacity, ensuring media effectiveness. The water then enters the horizontal drain pipe to be discharged.

4 **BYPASS** | During peak flows, an internal weir in the side-by-side configuration allows high flows to bypass treatment, eliminating flooding and the need for a separate bypass structure. Bypass is not provided in the end-to end configuration.

Using horizontal flow to improve performance

Modular Wetlands® Linear Features and Benefits

FEATURE	BENEFITS
Pretreatment chamber	Enhanced pollutant removal, faster maintenance
Horizontal flow biofiltration	Greater filter surface area
Performance verified by both the WA DOE and NJ DEP	Superior pollutant capture with confidence
Built-in high flow bypass	Eliminates flooding and the need for a separate bypass structure
Available in multiple configurations and sizes	Flexibility to meet site-specific needs

The Modular Wetlands system offers many different configurations.

Select Modular Wetlands® Linear Approvals

Modular Wetlands Linear is approved through numerous local, state and federal programs, including but not limited to:

- Washington State Department of Ecology TAPE
- California Water Resources Control Board, Full Capture Certification
- Virginia Department of Environmental Quality (VA DEQ)
- New Jersey Department of Environmental Protection (NJDEP)
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Rhode Island Department of Environmental Management BMP
- Texas Commission on Environmental Quality (TCEQ)
- Atlanta Regional Commission Certification

Modular Wetlands® Performance

The Modular Wetlands® Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, and hydrocarbons. The Modular Wetlands® Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

POLLUTANT OF CONCERN	MEDIAN REMOVAL EFFICIENCY	MEDIAN EFFLUENT CONCENTRATION (MG/L)
Total Suspended Solids (TSS)	89%	12
Total Phosphorus - TAPE (TP)	61%	0.041
Nitrogen (TN)	23%	1
Total Copper (TCu)	50%	0.006
Total Dissolved Copper	37%	0.006
Total Zinc (TZn)	66%	0.019
Dissolved Zinc	60%	0.0148
Motor Oil	79%	0.8

Sources:
TAPE Field Study - 2012
TAPE Field Study - 2013

Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.

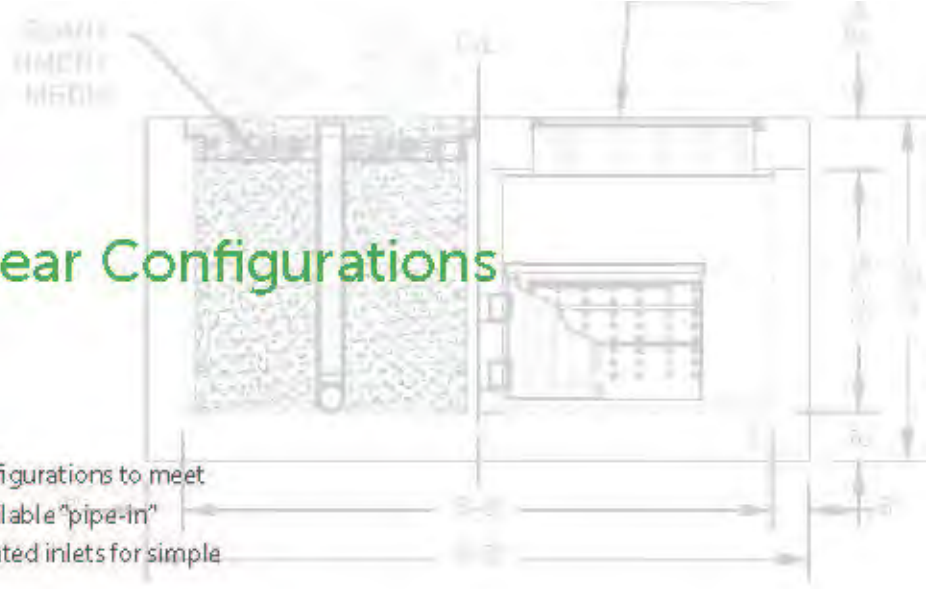
Modular Wetlands® Linear Maintenance

The Modular Wetlands® Linear is a self-contained treatment train. Maintenance requirements for the unit consist of five simple steps that can be completed using a vacuum truck. The system can also be cleaned by hand.

- Remove trash from the screening device
- Remove sediment from the separation chamber
- Periodically replace the pretreatment cartridge filter media
- Replace the drain down filter media
- Trim vegetation

Most Modular Wetland Linear systems can be cleaned in about thirty minutes.

Multiple configurations allow for easy site integration



Modular Wetlands® Linear Configurations

Multiple system configurations integrate with site hydraulic design and layout ...

The Modular Wetlands Linear is offered in multiple configurations to meet site specific needs. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.

Curb Inlet

The Curb Inlet configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions.

Vault

The Vault configuration can be used in end-of-the-line installations. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).

Downspout

The Downspout configuration is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

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

THE CONTECH WAY

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

TAKE THE NEXT STEP

For more information: www.ContechES.com

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Santa Ana Watershed

V_{BMP} and Q_{BMP} worksheets

These worksheets are to be used to determine the required

Design Capture Volume (V_{BMP})
or the
Design Flow Rate (Q_{BMP})

for BMPs in the Santa Ana Watershed

To verify which watershed your project is located within, visit

www.rcflood.org/npdes

and use the 'Locate my Watershed' tool

If your project is not located in the Santa Ana Watershed,

Do not use these worksheets! Instead visit

www.rcflood.org/npdes/developers.aspx

To access worksheets applicable to your watershed

Use the tabs across the bottom
to access the worksheets for the Santa Ana Watershed

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	C&V Consulting, Inc.	Date	5/12/2025
Designed by	Ka Hei Lam	Case No	
Company Project Number/Name	WARM-022		

BMP Identification

BMP NAME / ID: Preliminary Site

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}= 0.66 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)
SITE	501548.3	Concrete or Asphalt	1	0.89	447381.1			
SITE	125387.1	Ornamental Landscaping	0.1	0.11	13850			
	626935.4	Total			461231.1	0.66	25367.7	34128.8

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A1	*67045.8*	*Concrete or Asphalt*	*1*	*0.89*	*59804.9*			
A1	*16761.5*	*Ornamental Landscaping*	*0.1*	*0.11*	*1851.4*			
	83807.3		***Total***		**61656.3**	**0.20**	***0.283***	***0.346***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A2	*27009.1*	*Concrete or Asphalt*	*1*	*0.89*	*24092.1*			
A2	*6752.3*	*Ornamental Landscaping*	*0.1*	*0.11*	*745.8*			
	33761.4		**Total**		**24837.9**	**0.20**	**0.114**	**0.147**

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A3	*33746.5*	*Concrete or Asphalt*	*1*	*0.89*	*30101.9*			
A3	*8436.6*	*Ornamental Landscaping*	*0.1*	*0.11*	*931.9*			
	42183.1		***Total***		**31033.8**	**0.20**	***0.142***	***0.147***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A4	*63204.7*	*Concrete or Asphalt*	*1*	*0.89*	*56378.6*			
A4	*15801.2*	*Ornamental Landscaping*	*0.1*	*0.11*	*1745.4*			
	79005.9	***Total***			58124	0.20	*0.267*	*0.346*

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A5

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A5	*71517*	*Concrete or Asphalt*	*1*	*0.89*	*63793.2*			
A5	*17879.2*	*Ornamental Landscaping*	*0.1*	*0.11*	*1974.9*			
	89396.2		***Total***		**65768.1**	**0.20**	***0.302***	***0.346***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A6

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A6	*28191.4*	*Concrete or Asphalt*	*1*	*0.89*	*25146.7*			
A6	*7047.8*	*Ornamental Landscaping*	*0.1*	*0.11*	*778.5*			
	35239.2		***Total***		**25925.2**	**0.20**	***0.119***	***0.147***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. Date: 5/12/2025

Designed by: Ka Hei Lam Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A7

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A7	*89078.8*	*Concrete or Asphalt*	*1*	*0.89*	*79458.3*			
A7	*22269.7*	*Ornamental Landscaping*	*0.1*	*0.11*	*2459.9*			
	111348.5	***Total***			81918.2	0.20	*0.376*	*0.462*

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A8

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A8	*53045.4*	*Concrete or Asphalt*	*1*	*0.89*	*47316.5*			
A8	*13261.3*	*Ornamental Landscaping*	*0.1*	*0.11*	*1464.8*			
	66306.7		***Total***		**48781.3**	**0.20**	***0.224***	***0.231***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. Date: 5/12/2025

Designed by: Ka Hei Lam Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A9

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*A9*	*23915.9*	*Concrete or Asphalt*	*1*	*0.89*	*21333*			
	A9	*5979*	*Ornamental Landscaping*	*0.1*	*0.11*	*660.4*			
		29894.9	***Total***			21993.4	0.20	**0.101**	**0.147**

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc. | Date: 5/12/2025

Designed by: Ka Hei Lam | Case No:

Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A10

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A10	*12708.3*	*Concrete or Asphalt*	*1*	*0.89*	*11335.8*			
A10	*3177.1*	*Ornamental Landscaping*	*0.1*	*0.11*	*350.9*			
	15885.4		***Total***		11686.7	**0.20**	***0.054***	***0.073***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: C&V Consulting, Inc.
Date: 5/12/2025
Designed by: Ka Hei Lam
Case No:
Company Project Number/Name: WARM-022

BMP Identification

BMP NAME / ID: A11

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
A11	*19751.3*	*Concrete or Asphalt*	*1*	*0.89*	*17618.2*			
A11	*4937.8*	*Ornamental Landscaping*	*0.1*	*0.11*	*545.4*			
	24689.1	***Total***			18163.6	**0.20**	***0.083***	***0.147***

Notes:

Effective Impervious Fraction

Developed Cover Types	Effective Impervious Fraction
Roofs	1.00
Concrete or Asphalt	1.00
Grouted or Gapless Paving Blocks	1.00
Compacted Soil (e.g. unpaved parking)	0.40
Decomposed Granite	0.40
Permeable Paving Blocks w/ Sand Filled Gap	0.25
Class 2 Base	0.30
Gravel or Class 2 Permeable Base	0.10
Pervious Concrete / Porous Asphalt	0.10
Open and Porous Pavers	0.10
Turf block	0.10
Ornamental Landscaping	0.10
Natural (A Soil)	0.03
Natural (B Soil)	0.15
Natural (C Soil)	0.30
Natural (D Soil)	0.40
Mixed Surface Types	

Use this table to determine the effective impervious fraction for the V_{BMP} and Q_{BMP} calculation sheets

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Apr 24 2025

Offsite Public Improvement - Grass Swale

Trapezoidal

Bottom Width (ft)	= 3.50
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.200

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.10

Highlighted

Depth (ft)	= 0.14
Q (cfs)	= 0.100
Area (sqft)	= 0.57
Velocity (ft/s)	= 0.18
Wetted Perim (ft)	= 4.65
Crit Depth, Yc (ft)	= 0.03
Top Width (ft)	= 4.62
EGL (ft)	= 0.14

Worksheet 2

Design Procedure Form for Design Flow

Uniform Intensity Design Flow

Designer:	C&V Consulting, Inc.
Company:	C&V Consulting, Inc.
Date:	4/24/2025
Project:	WARM-022
Location:	Moreno Valley

1. Determine Impervious Percentage		
a. Determine total tributary area	A_{total} = 0.61 acres	***(1)***
b. Determine Impervious %	i = 90 %	***(2)***
2. Determine Runoff Coefficient Values Use **Table 4** and impervious % found in step 1		
a. A Soil Runoff Coefficient	C_a = 0.82	***(3)***
b. B Soil Runoff Coefficient	C_b =	***(4)***
c. C Soil Runoff Coefficient	C_c =	***(5)***
d. D Soil Runoff Coefficient	C_d =	***(6)***
3. Determine the Area decimal fraction of each soil type in tributary area		
a. Area of A Soil / ***(1)*** =	A_a = 1	***(7)***
b. Area of B Soil / ***(1)*** =	A_b =	***(8)***
c. Area of C Soil / ***(1)*** =	A_c =	***(9)***
d. Area of D Soil / ***(1)*** =	A_d =	***(10)***
4. Determine Runoff Coefficient		
a. C = ***(3)x(7)*** + ***(4)x(8)*** + ***(5)x(9)*** + ***(6)x(10)*** =	C = 0.82	***(11)***
5. Determine BMP Design flow		
a. Q_{BMP} = C x I x A = ***(11)*** x 0.2 x ***(1)***	Q_{BMP} = 0.10 $\frac{ft^3}{s}$	***(12)***

Grassed Swales

General

A Grass swale is a wide, shallow densely vegetated channel that treats stormwater runoff as it is slowly conveyed into a downstream system. These swales have very shallow slopes in order to allow maximum contact time with the vegetation. The depth of water of the design flow should be less than the height of the vegetation. Contact with vegetation improves water quality by plant uptake of pollutants, removal of sediment, and an increase in infiltration. Overall the effectiveness of a grass swale is limited and it is recommended that they are used in combination with other BMPs.

This BMP is not appropriate for industrial sites or locations where spills occur. Important factors to consider when using this BMP include: natural channelization should be avoided to maintain this BMP's effectiveness, large areas must be divided and treated with multiple swales, thick cover is required to function properly, impractical for steep topography, and not effective with high flow velocities.

Grass Swale Design Criteria:

Design Parameter	Unit	Design Criteria
Design Flow	cfs	Q_{BMP}
Minimum bottom width	ft	2 ft [2]
Maximum channel side slope	H:V	3:1 [2]
Minimum slope in flow direction	%	0.2 (provide underdrains for slopes < 0.5) [1]
Maximum slope in flow direction	%	2.0 (provide grade-control checks for slopes >2.0) [1]
Maximum flow velocity	ft/sec	1.0 (based on Manning n = 0.20) [1]
Maximum depth of flow	inches	3 to 5 (1 inch below top of grass) [1]
Minimum contact time	minutes	7 [1]
Minimum length	ft	Sufficient length to provide minimum contact time [1]
Vegetation	-	Turf grass or approved equal [1]
Grass height	inches	4 to 6 (mow to maintain height) [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Grass Swale Design Procedure

1. Design Flow
   Use Worksheet 2 - Design Procedure Form for Design Flow Rate, Q_{BMP}.

2. Swale Geometry
   a. Determine bottom width of swale (must be at least 2 feet).
   b. Determine side slopes (must not be steeper than 3:1; flatter is preferred).
   c. Determine flow direction slope (must be between 0.2% and 2%; provide underdrains for slopes less than 0.5% and provide grade control checks for slopes greater than 2.0%

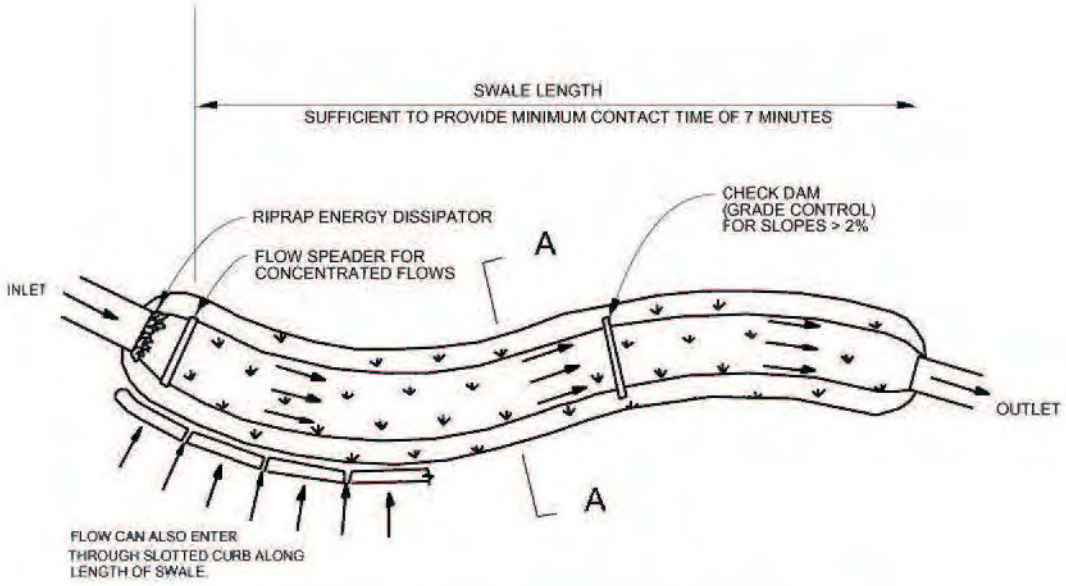
3. Flow Velocity
   Maximum flow velocity should not exceed 1.0 ft/sec based on a Mannings n = 0.20

4. Flow Depth
   Maximum depth of flow should not exceed 3 to 5 inches based on a Manning n = 0.20

5. Swale Length
   Provide length in the flow direction sufficient to yield a minimum contact time of 7 minutes.
   L = (7 min) x (flow velocity ft/s) x (60 sec/min)

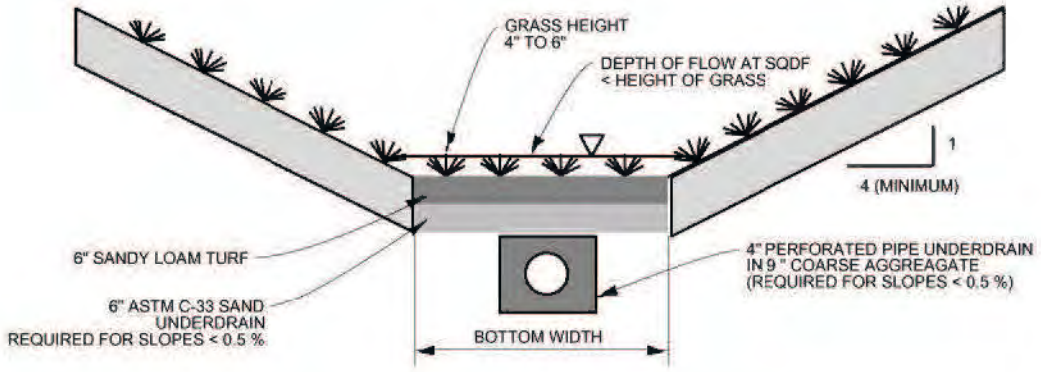
6. Vegetation
   Provide irrigated perennial turf grass to yield full, dense cover. Mow to maintain height of 4 to 6 inches.

7. Provide sufficient flow depth for flood event flows to avoid flooding of critical areas or structures.



TRAPEZOIDAL GRASS SWALE PLAN

NOT TO SCALE



TRAPEZOIDAL GRASS SWALE SECTION

NOT TO SCALE

Figure 11: Grassed Swale

Source: Ventura County Guidance Manual

Worksheet 9

Design Procedure Form for Grassed Swale

Designer: C&V Consulting, Inc.
Company: C&V Consulting, Inc.
Date: 4/24/2025
Project: WARM-022
Location: Moreno Valley

1. Determine Design Flow (Use Worksheet 2)	Q_{BMP} = 0.10 cfs
2. Swale Geometry a. Swale bottom width (b) b. Side slope (z) c. Flow direction slope (s)	b = 3.5 ft z = 4:1 s = 1 %
3. Design flow velocity (Manning n = 0.2)	v = 0.18 ft/s
4. Depth of flow (D)	D = 0.14 ft
5. Design Length (L) L = (7 min) x (flow velocity, ft/sec) x 60	L = 75.6 ft
6. Vegetation (describe)	
8. Outflow Collection (check type used or describe "other")	___ Grated Inlet' ___ Infiltration Trench ✓ Underdrain ___ Other

Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

WQMP Report

County of Riverside Stormwater Project

Santa Ana River Watershed Geodatabase

Report generated: Thu Jan 30 2025 20:22:19 GMT-0800 (Pacific Standard Time)

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification. All searches will include any data found within 200 feet of the provided coordinates unless otherwise noted.

Center Point	33.91512530816327, -117.17087924480438
Map	
Parcel Number(s)	478080004, 478090011, 478080002, 478080003, 478070006, 478070013, 478322001, 478322005, 478070011, 478322018, 478070012, 478070017,

	478070015, 478080005, 478320001, 478322031, 478070008, 478080007, 478070014, 478080012, 478322006, 478070010, 478322004, 478322029, 478320002, 478322008, 478322003, 478070016, 478322007, 478322030, 478070007, 478070005, 478322019, 478322020, 478322002
Site Acreage	14.24
Watershed(s)	SANTA ANA
Cities (within 1 mile)	MORENO VALLEY

Hydrologic Units

HUC Number	HUC Name
180702020304	Moreno Valley

The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site

WBID Number	WBID Name
CAL8021100019990208151525	Canyon Lake (Railroad Canyon Reservoir)
CAL8023100019990208151100	Lake Elsinore

These 303d listed water bodies and TMDLs have the following Pollutants of Concern (POC)

Category	Pollutants
Bacterial Indicators	Pathogens
Nutrients	Nutrients
Nutrients	Organic Enrichment/Low Dissolved Oxygen

Category	Pollutants
Other Organics	PCBs (Polychlorinated biphenyls)
Toxicity	Sediment Toxicity
Toxicity	Unknown Toxicity

Is the Project Site subject to Hydromodification?	NO

Limitations of Infiltration

Onsite Soils Group(s)	A
Known Groundwater Contamination Plumes (within 1000 ft)	NO
Adjacent Water Wells	NO - Please contact your local water agency for more information.
Local Supplier	EASTERN MUNICIPAL W.D.
Wholesale Supplier	METROPOLITAN WATER DISTRICT

Environmentally Sensitive Areas within 200 feet

Fish and Wildlife Habitat/Species	• None found
CVMSHCP	• None found
WRMSHCP	• Burrowing Owl Survey Required Area

	• Steven's Kangaroo Rat
Groundwater Elevation from Mean Sea Level	1524 ft.
85th Percentile Design Storm Depth	0.659 in.
Groundwater Basin	Perris-North
MSHCP / CVMSHCP Criteria Cell(s)	No data
Retention Ordinance Information	**City** | **Ordinance** | **Description** | **Storm Event (Required Design Capture Volume)** No ordinances found
Related Studies and Reports	• CNRP_Final_1-28-2013.pdf • IBI Scores - Southern Cal.pdf • bulletin118_4-sc.pdf • WaterFacts2022.pdf • SAR Hydromodificatio_03262024.pdf • Moreno MDP.pdf • EMWD GMA Annual Report_2020.pdf • Moreno ADP_Report.pdf • Moreno ADP_Map.pdf

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.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☑ **P.** Plazas, sidewalks, and parking lots.			☑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

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

To Be Provided during Final Engineering

CONTECH
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Operations & Maintenance Manual

MODULAR WETLANDS

MODULAR WETLANDS LINEAR
OPERATION & MAINTENANCE MANUAL

TABLE OF CONTENTS

Overview 3
Safety Notice & Personal Safety Equipment 4
Modular Wetlands Linear Components List 5
Inspection Summary & Equipment List 6
Inspection & Maintenance Notes 7
Inspection Process 7
Maintenance Indicators 9
Maintenance Summary & Equipment List 9
Maintenance Instructions 11
Replacing Biofiltration Media if Required 14
Replacing Drain Down Filter Media (Only on Older California Models) 16
Notes 17
Inspection Report 18
Cleaning & Maintenance Report 19

OVERVIEW

This operation and maintenance (O&M) manual is for the Modular Wetlands Linear Biofilter (MWL). Please read the instructions and equipment lists closely prior to starting. It is important to follow all necessary safety procedures associated with state and local regulations. Please contact Contech for more information on pre-authorized third-party service providers who can provide inspection and maintenance services in your area. For a list of service providers in your area, please visit www.conteches.com/maintenance.

WARNING

Confined space entry may be required. Contractor to obtain all equipment and training to meet applicable local and OSHA regulations regarding confined space entry. It is the Contractor's or entry personnel's responsibility to always proceed safely.

SAFETY NOTICE & PERSONAL SAFETY EQUIPMENT

Job site safety is a topic and a practice addressed comprehensively by others. The inclusions here are merely reminders to whole areas of Safety Practice that are the responsibility of the Owner(s), Manager(s), and Service Provider(s). OSHA and Canadian OSH, Federal, State/Provincial, and Local Jurisdiction Safety Standards apply on any given site or project. The knowledge and applicability of those responsibilities is the Service Provider's responsibility and outside the scope of Contech Engineered Solutions.

Safety Boots

Gloves

Hard Hat

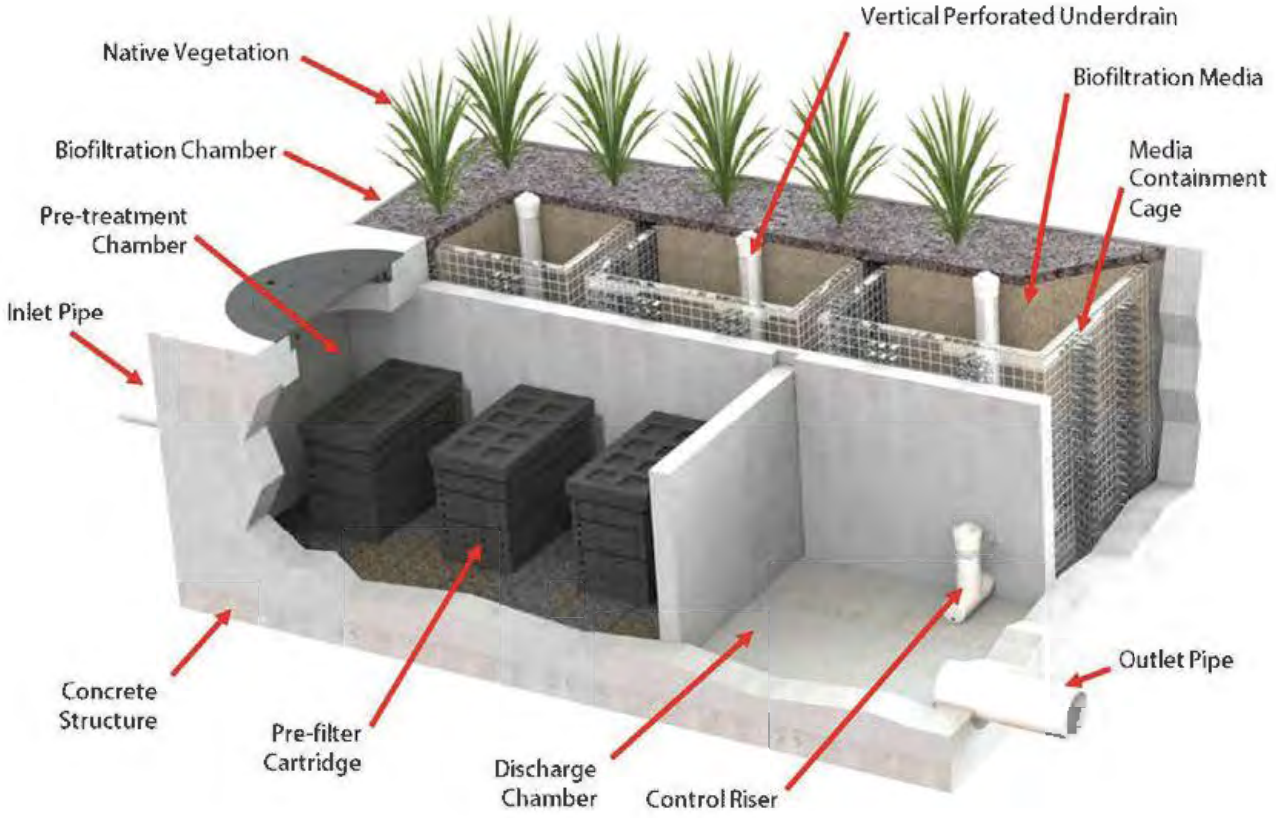
Eye Protection

Maintenance and Protection of Traffic Plan

MODULAR WETLANDS LINEAR COMPONENTS LIST

The MWL system comes in multiple sizes and configurations, including side by side or end to end layouts, both as open planters or underground systems. See shop drawings (plans) for project specific details.

The standard MWL system is comprised of the following components:



INSPECTION SUMMARY & EQUIPMENT LIST

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 MWL:

Modular Wetlands Linear Inspection Form

Flashlight

Tape Measure

Access Cover Hook

Ratchet
& 7/16" Socket
(if required for older pre-filter cartridges that have two bolts holding the lids on)

INSPECTION & 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 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 pre-filter 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 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 control riser (if applicable), 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 condition 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.
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 pre-treatment chamber in which the length and width of the chamber is fully impacted more than 18".
- Excessive accumulation of sediment in the pre-treatment chamber of more than 6" in depth.
- 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.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models).
- Overgrown vegetation.

MAINTENANCE SUMMARY & EQUIPMENT LIST

The time has come to maintain your MWL. 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 maintenance equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.
    - A gas meter should be used to detect the presence of any hazardous gases prior to entering the system. If hazardous gases are present, do not enter the vault. Following appropriate confined space procedures, take steps such as utilizing a venting system to address the hazard. Once it is determined to be safe, enter the system utilizing appropriate entry equipment such as a ladder and tripod with harness.

The following is a list of equipment required for maintenance of the MWL:

Modular Wetlands Linear Maintenance Form

Flashlight

Access Cover Hook

Ratchet & 7/16" Socket (if required for older pre-filter cartridges that have two bolts holding the lids on)

Vacuum Assisted Truck with Pressure Washer

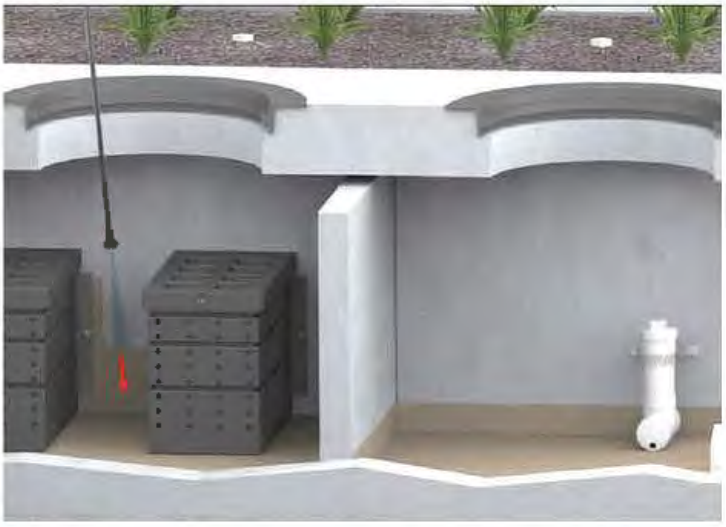
Replacement BioMediaGREEN (If Required)

(order BioMediaGREEN from Contech's Maintenance Team members at https://www.conteches.com/maintenance)

MAINTENANCE INSTRUCTIONS

1. ACCESS COVER REMOVAL

Upon determining that the vault is safe for entry, remove all access cover(s) and position the vacuum truck accordingly.

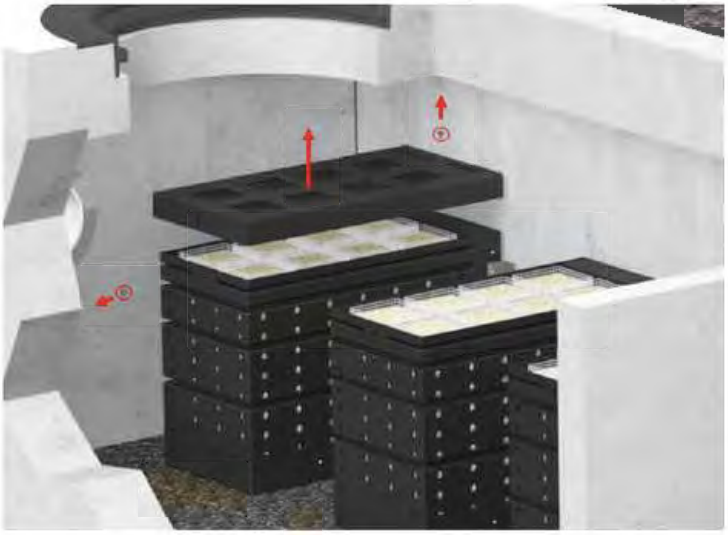


2. PRESSURE WASH SYSTEM CHAMBERS

With the pressure washer, spray down pollutants accumulated on the walls and floors of the pre-treatment and discharge chambers. Then wash any accumulated sediment from the pre-filter cartridge(s).

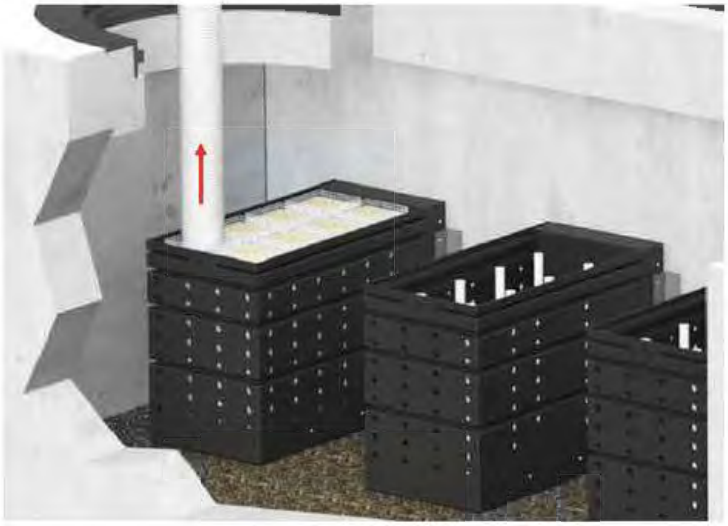
3. VACUUM SYSTEM CHAMBERS

Vacuum out pre-treatment and discharge chambers and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the pre-treatment floor until the pervious pavers are visible and clean. **(MWL systems outside of California may or may not have pervious pavers on the floor in the pre-treatment chamber)** If pre-filter cartridges require media replacement, proceed to **Step 4**. If not, replace the access cover(s) and proceed to **Step 7**.



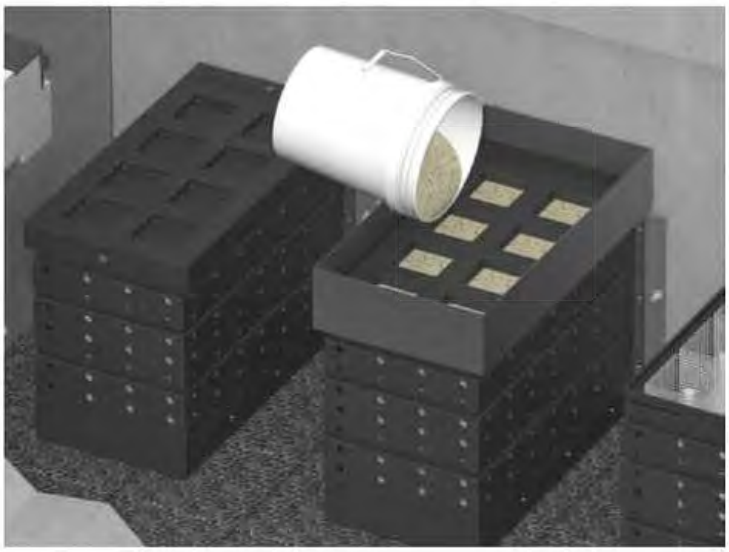
4. PRE-FILTER CARTRIDGE LID REMOVAL

After successfully cleaning out the pre-treatment chamber, enter the chamber and remove the lid(s) from the pre-filter cartridge(s) by removing the two thumb screws. (Older pre-filter cartridges have two bolts holding the lids on that require a 7/16" socket to remove)



5. VACUUM EXISTING PRE-FILTER MEDIA

Utilize the vacuum truck hose or hose extension to remove the filter media from each of the individual media cages. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and its 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.



6. PRE-FILTER MEDIA REPLACEMENT

Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. The easiest way to fill the media cages is to utilize a refilling tray that can also be sourced from the manufacturer. Place the refilling tray on top of the cartridge and fill with new bulk media shaking it down into the cages. Using your hands, lightly compact the media into each filter cage. Once the cages are full (each cartridge will hold five heaping 5gal buckets of bulk media), remove the refilling tray and replace the cartridge top, ensuring fasteners are properly tightened.

7. MAINTAINING VEGETATION

In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The MWL utilizes vegetation similar to surrounding landscape areas, therefore, trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.

8. INSPECT UNDERDRAIN SYSTEM

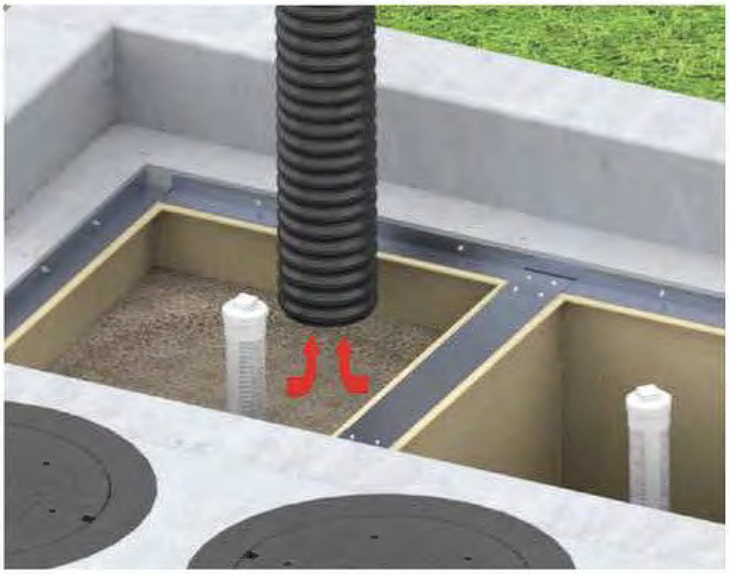
Each vertical under drain on the biofiltration chamber has a removable threaded cap that can be taken off to check for any blockages or root growth. Once removed, a jetting attachment to the pressure washer can be used to clean out the under drain and orifice riser if needed.

9. REPLACE ACCESS COVERS

Once maintenance is complete, replace all access cover(s)

REPLACING BIOFILTRATION MEDIA IF REQUIRED

As with all biofilter systems, at some point the biofiltration media will need to be replaced, either due to physical clogging or sorptive exhaustion (for dissolved pollutants) 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, so replacing the biofiltration media should not be a common occurrence. In the event that the biofiltration media requires replacement, contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new biofiltration media. 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 1,000 and 2,000 lbs. Biofiltration media replacement can be done following the steps below:



1. VACUUM EXISTING BIOFILTRATION MEDIA

Remove the mulch and vegetation to access the biofiltration media, and then position the vacuum truck accordingly. Utilize the vacuum truck to vacuum out all the media. Once all media is removed, use the pressure washer to spray down all the netting and underdrain systems on the inside of the media containment cage. Vacuum out any remaining debris after spraying down netting. Inspect the netting for any damage or holes. If the netting is damaged, it can be repaired or replaced with guidance by the manufacturer.

2. INSTALLING NEW BIOFILTRATION MEDIA

Ensure that the chamber is fully cleaned prior to installation of new media into the media containment cage(s). Media will be provided in super sacks for easy installation. A lifting apparatus (forklift, backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Add media in lifts to ensure that the riser pipes remain vertical. Be sure to only fill the media cage(s) up to the same level as the old media.

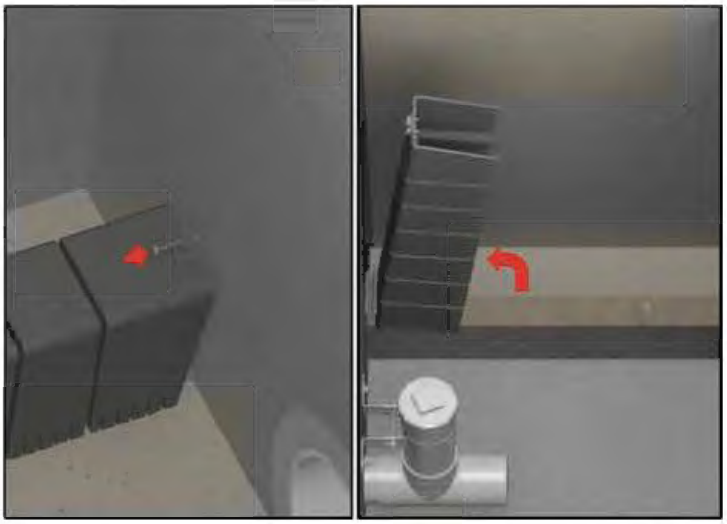
3. REPLANT VEGETATION

Once the media has been replaced, replant the vegetation and cover biofiltration chamber with approved mulch (if applicable). If the existing vegetation is not being reused, and new vegetation is being planted, you will need to acquire new plant establishment media that will be installed just below the mulch layer at each plant location. (see plan drawings for details). Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new plant establishment media.

REPLACING DRAIN DOWN FILTER MEDIA (ONLY ON OLDER CALIFORNIA MODELS)

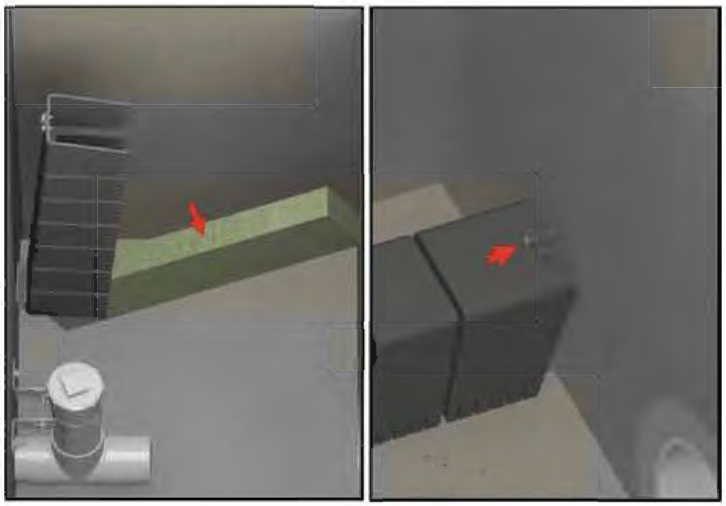
NOTE: The drain down filter is only found on units installed in California prior to 2023

If during inspection it was determined that the drain down filter media requires replacement, contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new media.



1. REMOVE EXISTING DRAIN DOWN MEDIA

Pull knob back to unlock the locking mechanism and lift the drain down filter housing to remove the used BioMediaGREEN filter block.



2. INSTALL NEW DRAIN DOWN MEDIA

Ensure that the chamber and housing are fully cleaned prior to installation of new media, and then insert the new BioMediaGREEN filter block. The media filter block should fit snugly between the chamber walls and be centered under the filter housing. Lower the housing over the filter block and secure the locking mechanism.

NOTES

CONTECH ENGINEERED SOLUTIONS

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 _____

For Office Use Only
(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 ENGINEERED SOLUTIONS

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

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

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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SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

ModWetLinear OM Manual 03/24

Appendix 10: Educational Materials

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

To Be Provided during Final Engineering