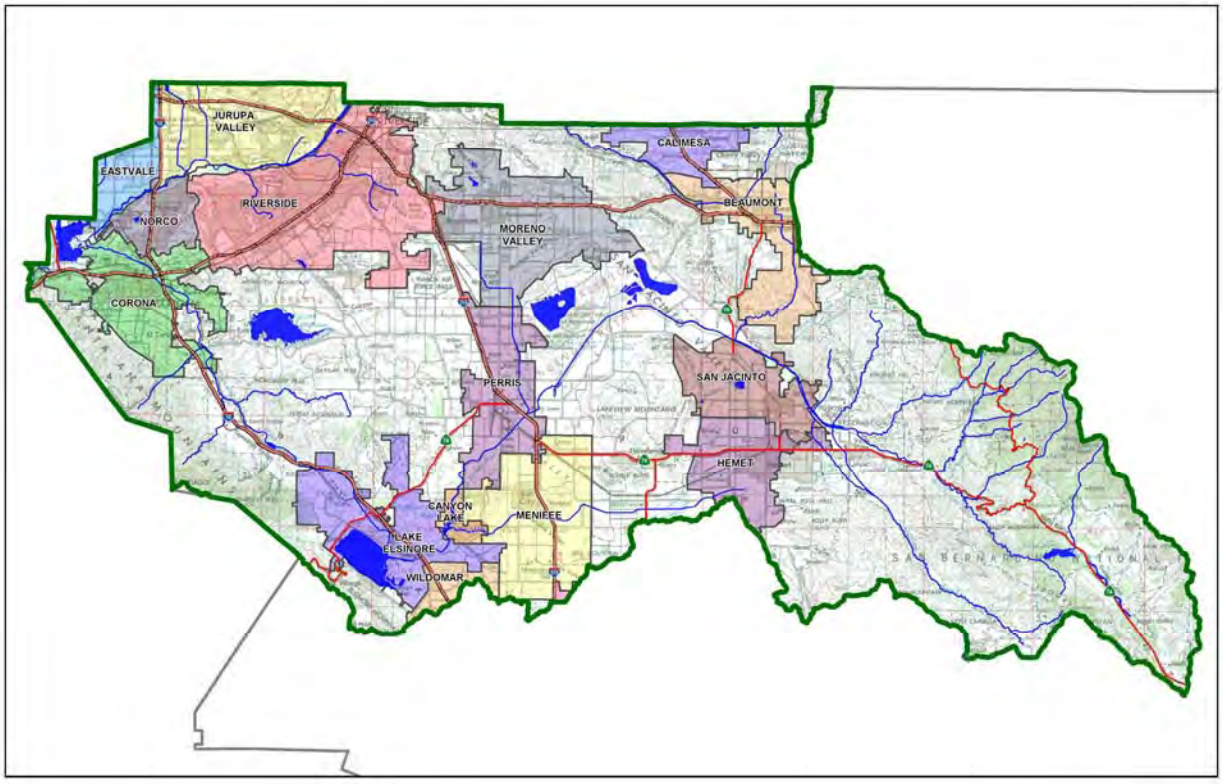
Project Specific Water Quality Management Plan

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

Project Title: Vortex Farm

Development No: Insert text here

Design Review/Case No: CUP 200014



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 11-18-20

Revision Date(s): Insert text here

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

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OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Brett Bailey by Civil Landworks Corp. for the Vortex Farm project.

This WQMP is intended to comply with the requirements of Riverside County for Water Quality Ordinance (Municipal Code Chapters 8.10) which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

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

"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
David Caron	Principal Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure: RCE #70066, Exp: 09/30/22

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Agricultural
Planning Area:	2.57 acres
Community Name:	Sage
Development Name:	Insert Planning Area / Community Name/ Development Name, if known
PROJECT LOCATION	
Latitude & Longitude (DMS): N 33d38'58" W 116d56'28"	
Project Watershed and Sub-Watershed: Lower San Jacinto River Watershed, Saint Johns Canyon sub-watershed (4802150000)	
Gross Acres: 9.06 acres	
APN(s): 470-070-043	
Map Book and Page No.: 871 E-6	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	AG-Agricultural Preserve
Proposed or Potential SIC Code(s)	0721
Area of Impervious Project Footprint (SF)	24,281 SF
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	24,281 SF
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	Insert text here describing how each included Site Design BMP will be implemented.
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 & D
What is the Water Quality Design Storm Depth for the project?	0.67 inches

A.1 Project Description, Maps and Site Plans

Vortex Farm is an agricultural project located southeast of the intersection of Minto Way and Sage Road, in the City of Hemet, County of Riverside.

The project site is approximately 9.06 acres of which only 2.57 acres will be used for the project. The rest of the area on the property are within a Multi-Species Habitat Conservation Plan (MSHCP). The area to be developed on the project site has a moderate slope from east to west. Other areas on the site to be undisturbed ranges in slope from moderate to steep, sloping east to west. The site is planned to be developed into an agricultural farm for the use of cultivating cannabis. Six green houses are proposed with a private DG driveway, a water tank, septic system, solar panels, underground storm water system, and retaining walls.

As part of the Water Quality requirement for the project, stormwater runoff from all disturb areas on site are to be collected and conveyed into a bioretention basin for treatment and detention. The site will maintain similar drainage pattern as the existing condition to the maximum extent practical.

Trash enclosure is proposed within the project site. Several outdoor storage areas are proposed and will be covered and locked. No car wash areas proposed for the project. More than half of the site are landscape areas, and runoff from all green house roofs will drain into landscaped areas before it drains into the bioretention basin for treatment and detention.

Typical activities associated with the proposed development are cultivating plants, and landscape maintenance.

Currently the site is 100% pervious. The increased impervious areas with the green houses are expected to increase runoff volumes and velocities downstream. The Riverside County's Municipal Separate Storm Sewer Systems Permit (MS4 Permit – Order No. R8-2010-0033) authorize discharge of runoff requirements. The MS4 Permit requires qualifying projects to implement Low Impact Development (LID) to the Maximum Extent Practical. LID minimizes downstream impacts by attempting to mimic pre-developed hydrological conditions by reducing runoff through BMP treatment system.

Various LID Best Management Practices (BMP) are proposed to meet the water quality requirements per the Riverside County WQMP guidelines. See WQMP exhibit for the drainage area and travel paths.

Given that all the impervious areas are from the green houses' roof, all storm water from the building's roof will drain directly to landscape areas prior to carry off to the bioretention basin. This will allow for percolation into the landscape areas or evapotranspiration, which meet the key LID practice to "disconnect impervious surfaces."

Harvest and use BMP (i.e. rain barrels, cisterns, etc.) are not proposed due to economic infeasibility. On average, the site is located in an area that receives less than 12 inches of rain per year. The collection of rainwater for irrigation usage is not a feasible option due to landscape to impervious area ratio. Harvest and use feasibility calculations are included within this WQMP as it has been determined that harvest and use is infeasible.

Lastly, the MS4 Permit requires each site to evaluate its susceptibility for hydromodification to downstream natural channels or water bodies. This site has been identified as being "susceptible" for hydromodification.

The proposed bioretention basin will function as a dual water quality and storm water reduction of peak flow rates for the post development.

The Project-Specific WQMP Maps and Site Plans are included in Appendix 1.

Construction Plans are included in Appendix 2.

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
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

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)* Grading Plan	☒ Y	☐ N

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

Section B: Optimize Site Utilization (LID Principles)

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

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

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

Site Optimization

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

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

Yes, the site will maintain the existing drainage pattern to the maximum extent practical. The final outfall location of the post development will remain the same as the existing site.

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

Yes, a portion of the site will be clear and grub for construction of this project. However, majority of this project lies in the MSHCP conservation preservation area, and will be protected as is.

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

No, construction of the DG road will require compaction equipment. However, all landscape areas, and even green houses area to be remain uncompacted to the maximum extent practical.

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

Yes, within the development envelope, the driveway widths are minimized to the acceptable County standard, in addition to making the driveway construct out of DG to minimize impervious areas onsite. As such, this is an agriculture project site with only the green houses being impervious.

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

Yes, all storm water from greenhouse roofs are to drain into landscape areas, prior to making its way to the treatment basin.

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][2]	Area (Sq. Ft.)	DMA Type
DMA 1	Mixed (roof, concrete, landscaping)	84,401	Mixed

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2]*If multi-surface provide back-up*

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA 2	17,663	Grass, gravel	Drip

Table C.3 Type 'B', Self-Retaining Areas - **NONE**

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 - **NONE**

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

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

DMA Name or ID	BMP Name or ID
DMA 1	BR-1 Bioretention Facility

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

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?	X	
If Yes, list affected DMAs: DMA 1		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

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

D.2 Harvest and Use Assessment

Please check what applies*:*

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

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

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

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility – NOT FEASIBLE

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: 1.121 ac

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

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

Total Area of Impervious Surfaces: 0.557 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: 1.16

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: 0.646 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)
0.646 ac	1.121 ac

Due to the economic costs involved with implementing a Irrigation Use System, such as installing a cistern, capturing and storing storm water, pump installation and all the additional plumbing required, it is not a feasible option for this agriculture project.

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: 4

Project Type: Agricultural

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

Total Area of Impervious Surfaces: 0.557 ac

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

Enter your TUTIA factor: 145

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: 80

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)
80	4

Due to the economic costs involved with implementing a Toilet Use System, such as installing a cistern, converting storm water to grey water, pump installation and all the additional plumbing required, it is not a feasible option for this agriculture project.

Other Non-Potable Use Feasibility – Not Applicable

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:

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:

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4:

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use:

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

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

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

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

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.

Although infiltration testing produced an infiltration rate of 1.9 in/hr, a recommended factor of safety of 3 was used per the Riverside County LID BMP Design Handbook. The result of a 0.6 in/hr does not meet the full infiltration BMP requirement. However, since the site does have some appreciable infiltration rate, partial infiltration will be implemented. Irrigation use system and toilet use system result in high cost of implementing a collection system, grey water conversion, pumps, and additional plumbing system made it economically infeasible. Therefore, a bioretention with partial infiltration was determined to be the best option for this site and has been implemented as the LID BMP.

All onsite improvements are to sheet flow toward the bioretention basin for treatment and detention. All roofs storm water will enter landscape or pervious surfaces before entering the bioretention basin. The landscape and pervious surfaces will provide some level of infiltration and undergo evapotranspiration.

D.5 LID BMP Sizing

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

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
DMA-1	*24,281*	*Roofs*	*1*	*.89*	*21658.7*			
DMA-1	*0*	*Concrete or Asphalt*	*1*	*.89*	*0*			
DMA-1	*11,302*	*Pervious Concrete / Porous Asphalt*	*0.1*	*.11*	*1248.4*			
DMA-1	*48,818*	*Ornamental Landscaping*	*0.1*	*.11*	*5392.3*			
						Design Storm Depth (in)	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	$A_T = \Sigma[A]$				Σ= [28,299.4]	[0.67]	$[F] = \frac{[D]x[E]}{12} = 1580$	[1670]

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

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

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

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 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 – N/A

Qualifying Project Categories	Credit Percentage[2]
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 – N/A

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

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

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
DMA-1	Nutrient	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			
Volume (Cubic Feet)			

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

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

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

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

The proposed development drains to a reservoir (Diamond Valley Lake), which is connected to Santa Margarita River via Warm Springs Creek. Therefore, mitigation not required.

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
Onsite Storm Drain Inlets	Mark all inlets with words "Only Rain in the 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 regularly, repaint or replace inlet markings. • Provide educational material to residents (good practices and discharge prohibitions)
Landscape/Outdoor Pesticide Use	• Preserve existing native trees, shrubs and ground cover to the maximum extent possible.	• Maintain landscaping using minimum or no pesticides. • Provide IPM information to new owners, lessees and

	• Where landscape areas are used to retain or detain stormwater, specify plants are tolerant of saturated soil conditions.	operators. • Do not dispose of collected vegetation into waterways or storm drainage systems.
Refuse Areas	• Trash enclosures are designed as not to discharge water out to the street. • Trash bins are enclosed and covered. • Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	• Trash is collected regularly to prevent vector problems. • Trash is to be covered at all times to prevent the introduction of rain water that could leach out of the trash bins. • Sweep around the trash enclosure areas and make sure that trash is kept inside the trash bins.

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)	BMP Location (Lat/Long)
BR-1	Bioretention Facility – design to retain Vbmp	Grading plans, WQMP DMA Layout	

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:

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

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

☒ Y ☐ N

During construction, the site developer, MMJ construction, shall be responsible for installing, inspecting and maintaining all BMPs. The developer will be responsible for the management of the project site plus implementation and maintenance of the BMPs required by the WQMP until such time as these responsibility have been transferred to another entity.

Post-construction, the owner of the project shall be responsible for inspecting and maintaining the BMPs.

Maintenance and inspection activities for the identified BMPs will be performed as indicated in Appendix 9.

The contact information for the responsible parties are provided below

Prior to transfer

Project owner: MMJ Construction
c/o Judy Bailey
39100 Airpark Drive
Temecula, CA 92592

Upon Transfer: New owner

MMJ Construction shall be responsible for funding the maintenance of the proposed BMPs included in this report until such time that responsibility for the project site is transferred to another entity.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

SITE LOCATION MAP

DATE: 9/30/2020	MINTO WAY AND SAGE ROAD	
SCALE: AS SHOWN		DRAWN BY: J. SANTOS

SITE VICINITY MAP

DATE: 9/30/20	MINTO WAY AND SAGE ROAD	
SCALE: AS SHOWN		DRAWN BY: J. SANTOS

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

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

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

0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
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

Project Site 0.67

Santa Ana River Watershed

Santa Margarita Watershed

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

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Caltrans Water Quality Planning Tool

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. **This application is being updated for digital accessibility and will continue to function while updates are in progress.**

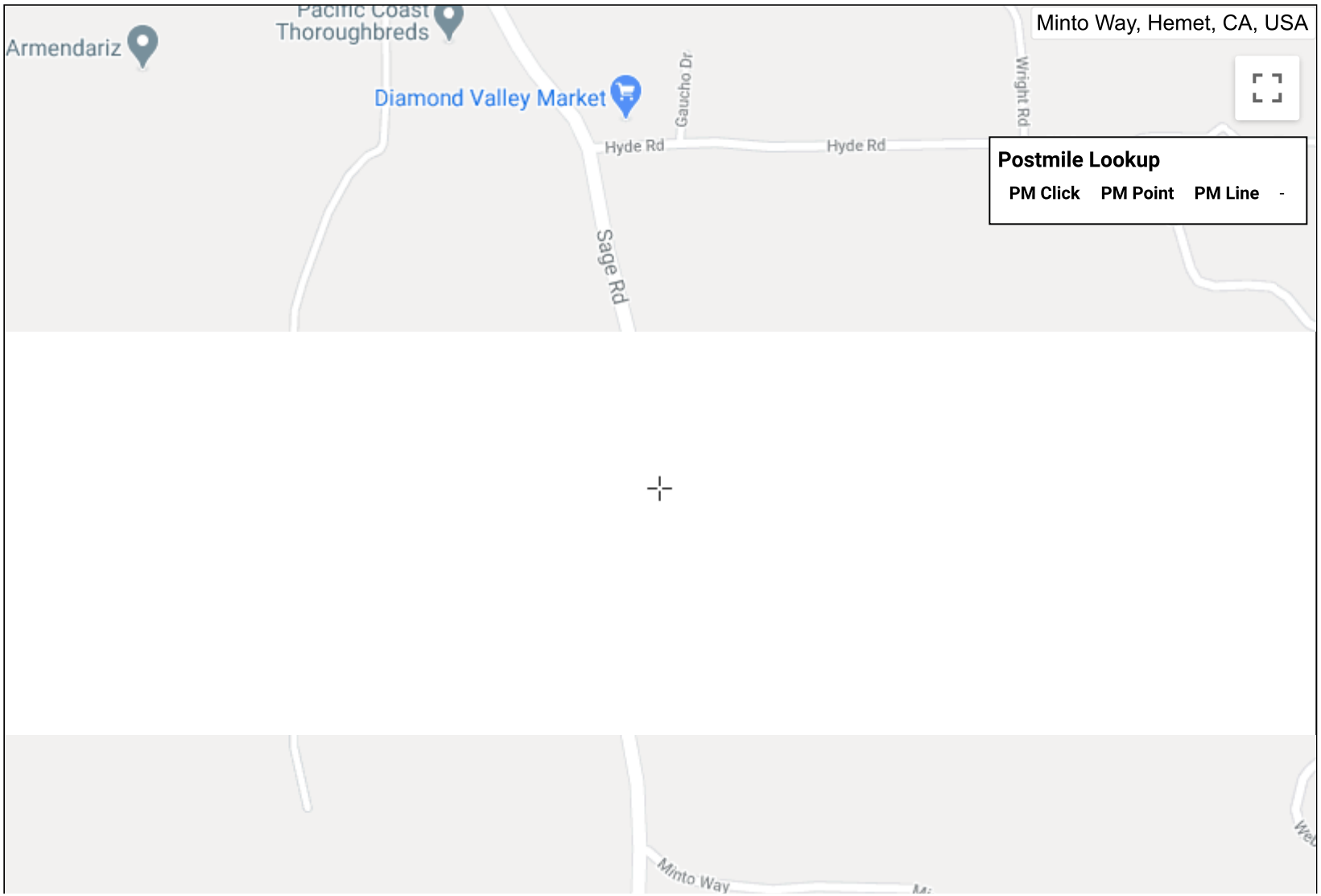
Layers

- 303(d) List and TMDLs 2014-2016 (Legend)
- Areas of Special Biological Significance
- Arid and Semi-Arid Regions
- Caltrans Districts
- Caltrans Facilities
- Caltrans Tier 1 Monitoring Sites
- Calwater Watersheds
- Coastal Zone
- Counties
- Geologic Map (Legend)
- High Risk Receiving Watersheds
- Monthly

Information

Hover over a layer name for a description. Additional information, tables, coordinates, and links are below the map.

Help



Watershed Information

CALWATER WATERSHED

Hydrologic Unit	SAN JACINTO VALLEY	Hydrologic Area	Perris	Hydrologic Sub-Area #	802.15
Hydrologic Sub-Area Name	Hemet	Planning Watershed	4802150000	HSA Area (acres)	49638
Latitude, Longitude	33.6495, -116.9412				

WATERSHED BOUNDARY DATASET

Watershed	Lower San Jacinto River	Subwatershed	Saint Johns Canyon	Hydrologic Unit Code	180702020301
Average Annual Precipitation (inches)	14				

TMDLs & 303(d) Listed Water Bodies (2014 - 2016 List)

Key: Water body on 303(d) list Water body with a TMDL

Name	Pollutant	Size	Status
No listings found.			

Water Quality Objectives

The following waterbodies are in or near HSA 802.15. Click on the waterbody to get information on water quality objectives and beneficial uses

Waterbody Name	Beneficial Uses	Sediment-Sensitive Waterbody
Auld	ALL	False
Bautista Creek - Headwaters to Debris Dam	AGR, COLD, GWR, MUN, REC1, REC2, WILD	False
Black Mountain Stream - Tributaries to Black Mountain Stream Creek	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Black Mountain Stream - Tributary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Coyote Creek (within Santa Ana Regional boundary) - San Gabriel River Drainage	MUN, REC1, REC2, WARM, WILD	False
Crown Valley	AGR, COLD, GWR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
Dana Point Harbor	COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, WILD	False
Del Mar Boat Basin	COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, WILD	False
Diamond Valley	AGR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
Fulmore, Lake	ALL	False

Goodhart Canyon	AGR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
Hurkey Stream - Tributaries to Black Hurkey Stream	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Indian Hurkey Stream - Trbutary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Indian Stream - Tributaries to Black Indian Stream	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Juaro Canyon Streams - Tributaries to Black Juaro Canyon Streams	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Juaro Canyon Streams - Tributary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Lake Fulmor - San Jacinto River Basin	AGR, COLD, MUN, REC1, REC2, WARM, WILD	False
Logan Stream - Tributaries to Logan Stream	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Logan Stream - Tributary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Mission Bay	COMM, EST, IND, MAR, MIGR, RARE, REC1, REC2, SHELL, WILD	False
Oceanside Harbor	COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, WILD	False
Offshore Zone - Water between Nearshore Zone and Limit of State Waters	COMM, IND, MAR, MUN, NAV, RARE, REC1, REC2, SPWN, WILD	False
Pacific Ocean	AQUA, BIOL, COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, WILD	False
Pixley Canyon	AGR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
Poppet Stream - Tributaries to Black Poppet Stream	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Poppet Stream - Tributary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Protrero Creeks - Tributaries to Black Protrero Creeks	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Protrero Creeks - Tributary to San Jacinto River	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
Rawson Canyon	AGR, COLD, GWR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
San Diego Bay	BIOL, COMM, EST, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, WILD	False
San Jacinto River	ALL	False
San Jacinto River	ALL	False
San Jacinto River Reach 4 - Nuevo Road to North-South Mid-Section Line, T4S/R1W-S8	AGR, GWR, REC1, REC2, WARM, WILD	False
San Jacinto River Reach 5 - North-South Mid-Section Line, T4S/R1W-S8, to Confluence with Poppet Cr	GWR, REC1, REC2, WARM, WILD	False
San Jacinto River Reach 5 - North-South Mid-Section Line, T4S/R1W-S8, to Confluence with Poppet Cr	AGR	False
San Jacinto River Reach 6 - Popper Creek to Cranston Bridge	AGR, GWR, MUN, REC1, REC2, WARM, WILD	False
San Jacinto River Reach 7 - Cranston Bridge to Lake Hemet	AGR, COLD, GWR, MUN, REC1, REC2, WILD	False
San Jacinto Wildlife Preseve Wetland (Inland)	BIOL, RARE, REC1, REC2, WARM, WILD	False
Stone Creek	AGR, COLD, GWR, MUN, REC1, REC2, WILD	False
Strawberry Creek and San Jacinto River, North Fork	AGR, COLD, GWR, MUN, REC1, REC2, WILD	False
Tucalota Canyon	AGR, COLD, GWR, IND, MUN, PROC, REC1, REC2, WILD	False
Tucalota Creek	AGR, COLD, GWR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False

Warm Springs Creek	AGR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False
Willow Canyon	AGR, COLD, GWR, IND, MUN, PROC, REC1, REC2, WARM, WILD	False

Caltrans Facilities

MAINTENANCE STATIONS

Name	Address
Hemet	1738 Juanita Street

FREEWAYS AND HIGHWAYS

Route	Length (miles)
74	6.9
79	0.5

PARK & RIDE LOTS

Name	District	County	Route	Post Mile

REST AREAS

Name	District	County	Route	Post Mile

Additional Information

Help for the Water Quality Planning Tool

TMDL information from the SWRCB

Construction General Permit information from the SWRCB

Groundwater Depth information from the California Department of Water Resouces

R Factor erosivity calculations

Appendix 2: Construction Plans

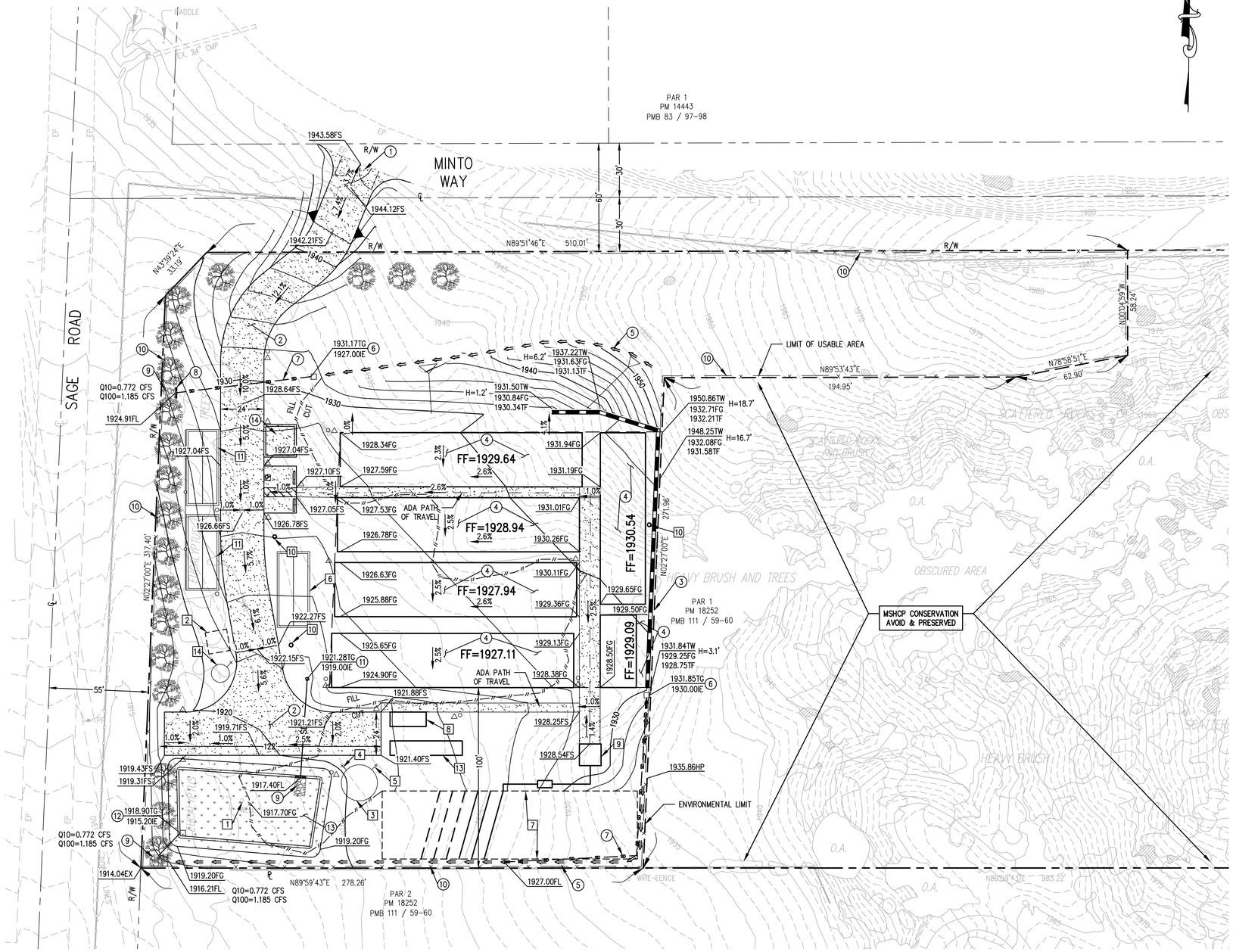
Grading and Drainage Plans

NOT FOR CONSTRUCTION

COUNTY OF RIVERSIDE

VORTEX FARMS, SAGE RD & MINTO WAY

CONDITION USE PERMIT NO. 200014



CONSTUCTION NOTES:

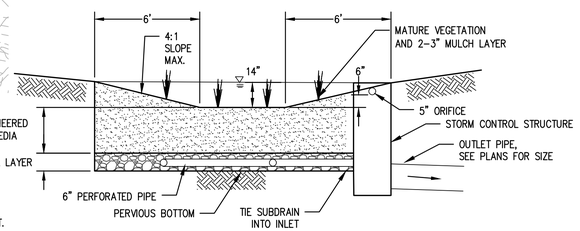
1. DRIVEWAY PER COUNTY OF RIVERSIDE STANDARD DRAWING NO. 302
2. DG ACCESS ROAD PER GEOTECHNCIAL RECOMENDATIONS
3. RETAINING WALL PER SEPARATE PERMIT
4. GREEN HOUSE
5. V-DITCH PER DETAIL THIS SHEET
6. 24" X 24" INLET BROOK BOX OR EQUIVALENT
7. 12" HDPE STORM DRAIN
8. HEADWALL
9. RIPRAP SEE DETAIL BELOW
10. 6' CHAIN LINK FENCE
11. 18" X 18" INLET BROOK BOX OR EQUIVALENT
12. 36" X 36" STORM CONTROL RISER
13. BIORETENTION BASIN
14. TRASH ENCLOSURE AREA. TRASH BIN TO HAVE LID COVER

SITE ELEMENT NOTES

1. EX. WELL TO REMAIN
2. TEMP. TOILET
3. 8000 GALLON RESERVE TANK
4. 2 1/2" WATER CONNECTION
5. 4" WATER FIRE CONNECTION
6. SECURED TRAILER, RESEARCH AND DEVELOPMENT
7. SEPTIC AND SOLAR PANEL AREA
8. AGRICULTURAL/SECURITY TRAILER WITH BREAK ROOM
9. BATHROOM
10. PROPOSED WATER WELL
11. REFRIGERATED MATERIAL STORAGE
12. SOLAR SECURITY LIGHT
13. TEMP REFRIGERATED SECURITY TRAILER
14. 2000 GALLONS DEDICATED WATER TANK WITH 4" FIRE HOSE CONNECTION

EARTHWORK	QUANTITIES CUT	FILL
CUT MATERIAL	3,580 CY	
FILL MATERIAL		4,030 CY
SHRINKAGE (10%)		403 CY
PROJECT EARTHWORK QUANTITIES	3,580 CY	4,433 CY
IMPORT MATERIAL		853 CY
EXPORT MATERIAL		

THESE QUANTITIES DO NOT INCLUDE ANY LOSSES DUE TO SHRINKAGE, SUBSIDENCE, OVEREXCAVATION, OR ANY SPECIAL REQUIREMENTS THAT MAY BE SPECIFIED IN THE PRELIMINARY SOILS REPORT. THESE QUANTITIES ARE FOR PERMIT PURPOSES ONLY. ALL CONTRACTORS BIDDING ON THIS PROJECT SHOULD MAKE THEIR OWN DETERMINATION OF EARTHWORK QUANTITIES PRIOR TO SUBMITTING A BID.



BIORETENTION BASIN

NOT TO SCALE

18" ENGINEERED SOIL:
ENGINEERED SOIL LAYER SHALL BE MINIMUM 18"DEEP THE MIX SHALL CONTAIN 70-80% SAND, 15-20% SILT, AND 5-10% CLAY. ENGINEERED MIX TO BE APPROVED BY CITY PRIOR TO PLACEMENT.

9" GRAVEL LAYER:
3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 9" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

40 0 40 80

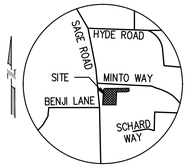
GRAPHIC SCALE
SCALE: 1"= 40'

REGISTERED PROFESSIONAL ENGINEER
DAVID V. CARON
No.C070066
EXP.09/30/22
CIVIL
STATE OF CALIFORNIA

CAUTION!!

EXISTING UNDERGROUND UTILITIES AND FACILITIES SHOWN ON THESE PLANS HAVE BEEN OBTAINED FROM AVAILABLE RECORDS WHICH IN MOST CASES ARE SCHEMATIC PLANS. THESE PLANS MAY NOT REFLECT ALL EXISTING UTILITIES. EXACT LOCATION AND DEPTH OF EXISTING UTILITIES ARE UNKNOWN. SUBCONTRACTOR TO CONFIRM THE LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF WORK, AND NOTIFY ENGINEER OF WORK OF ANY DISCREPANCIES.

11/30/20



VICINITY MAP

THOMAS BROS. MAP NO. PAGE 871 E6

Civil Landworks
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PROJECT FOR:
MMJ CONSTRUCTION

PROJECT NAME:
VORTEX FARMS

PROJECT ADDRESS:
HEMET, CA 92544

SHEET NO.:

SHEET 2 OF 2

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED VORTEX FARMS
SOUTHEAST OF SAGE ROAD AND MINTO WAY
RIVERSIDE, CALIFORNIA

Prepared for:

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1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

Construction Testing and Engineering, Inc. (CTE) has completed a geotechnical investigation and report providing conclusions and recommendations for the proposed Vortex Farms improvements in Riverside, California. It is understood that the proposed development is to consist of constructing numerous single-story greenhouse structures with a paved drive, stormwater BMP's, septic system, utilities, and other associated improvements. CTE has performed this work in general accordance with the terms of proposal G-5096B dated September 21, 2020. Preliminary geotechnical recommendations for excavations, fill placement, and foundation design for the proposed improvements are presented herein.

1.2 Scope of Services

The scope of services provided included:

- Review of readily available geologic and geotechnical reports.
- Coordination of utility mark-out and location.
- Percolation testing in accordance with Riverside County Low Impact Development BMP Design Handbook.
- Excavation of exploratory borings and soil sampling utilizing a truck-mounted drill rig and limited-access manual excavation equipment.
- Laboratory testing of selected soil samples.
- Description of site geology and evaluation of potential geologic hazards.
- Preparation of this preliminary geotechnical investigation report.

2.0 SITE DESCRIPTION

The subject site is located southeast of Sage Road and Minto Way in Riverside, California (Figure 1). The site is bounded by Sage Road to the west, Minto Way to the north, and undeveloped land to the south and east. Existing site conditions are illustrated on Figures 1 and 2. The proposed improvement area is currently undeveloped. Based on reconnaissance and review of site topography, the proposed structural improvement area generally descends to the southwest with elevations ranging from approximately 1,950 feet above mean sea level (msl) in the northeast to approximately 1,915 feet msl to the southwest.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

3.1 Field Investigation

CTE performed the recent subsurface investigation on September 30 and October 1, 2020 to evaluate underlying soil conditions. This fieldwork consisted of site reconnaissance, surface mapping of exposed geologic units on site slopes, and the excavation of five exploratory soil borings, three BMP percolation test holes, and four septic percolation test holes. The borings were advanced to a maximum explored depth of approximately 20 feet below ground surface (bgs). Bulk samples were collected from the cuttings, and relatively undisturbed samples were collected by driving Standard Penetration Test (SPT) and Modified California (CAL) samplers. Borings B-1through B-4 and the BMP percolation test holes were excavated with a CME-75 truck-mounted drill rig equipped with eight-inch-diameter, hollow-stem augers. Due to limited access, borings B-5 and B-6 and the septic test holes were advanced with a manually operated auger that extended to a maximum depth of

approximately 7.1 feet bgs. Approximate locations of the soil borings and percolation test holes are shown on the attached Figure 2.

Soils were logged in the field by a CTE Engineering Geologist, and were visually classified in general accordance with the Unified Soil Classification System. The field descriptions have been modified, where appropriate, to reflect laboratory test results. Boring logs, including descriptions of the soils encountered, are included in Appendix B.

3.2 Laboratory Testing

Laboratory tests were conducted on selected soil samples for classification purposes, and to evaluate physical properties and engineering characteristics. Laboratory tests included: In-place Moisture and Density, Modified Proctor, Expansion Index, Resistance "R"-Value, Grain Size Analysis, Consolidation, and Chemical Characteristics. Test descriptions and laboratory test results are included in Appendix C.

4.0 PERCOLATION TESTING

Three percolation tests were performed within the proposed BMP infiltration area. The percolation test holes were excavated to depths ranging from approximately 2.8 to 4.8 feet below the ground surface (bgs). The attached Figure 2 shows the approximate percolation test locations. The testing was performed in general accordance with the Riverside County – Low Impact Development BMP Design Handbook. Percolation testing of the septic holes was performed by others, and the results will be presented in a separate report.

4.1 Percolation Test Methods

The percolation tests were performed in general accordance with methods approved by Riverside County Low Impact Development BMP Design Handbook Appendix A after the required pre-soaking. Percolation test results and calculated infiltration rates are presented below in Table 4.2. Field Data and percolation to infiltration calculations are included in Appendix E.

4.2 Calculated Infiltrated Rate

As per the Riverside County Low Impact Development BMP Design Handbook Appendix-A, infiltration rates are to be evaluated using the Porchet Method. The intent of calculating the infiltration via the Porchet Method is to take into account bias inherent in percolation test borehole sidewall infiltration that would not occur at a basin bottom where such sidewalls are not present.

The infiltration rate (I_t) is derived by the equation:

$$I_t = \frac{\Delta H\ \pi r2\ 60}{\Delta t(\pi r2 + 2\pi r H_{avg})} = \frac{\Delta H\ 60\ r}{\Delta t(r + 2H_{avg})}$$

Where:

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
* r = effective radius of test hole
H_{avg} = average head over the time interval, inches

Given the measured percolation rates, the calculated infiltration rates are presented with and without a Factor of Safety applied in Table 4.2 below. The civil engineer of record should determine an appropriate factor of safety to be applied. CTE does not recommend using a factor of safety of less than 2.0.

TABLE 4.2
SUMMARY OF PERCOLATION AND INFILTRATION TEST RESULTS

Test Location	Soil Type	Riverside County Percolation Procedure	Depth (inches)	Percolation Rate (inches/hour)	Infiltration Rate (inches/hour)	Recommended Rate for Design* (inches/hour)
P-1	Qyf	Non Sandy	35	6.000	0.600	0.300
P-2	Qyf	Non Sandy	58	7.000	0.644	0.322
P-3	Qyf	Sandy	34	38.250	1.934	0.967

NOTES Water level was measured from a fixed point at the top of the hole.
Weather was sunny during percolation testing.
Qyf = Quaternary Young Alluvial Fan Deposits
The test holes were eight inches in diameter.

5.0 GEOLOGY

5.1 General Setting

The Riverside area is located within the Peninsular Ranges physiographic province that is characterized by northwest-trending mountain ranges, intervening valleys, and predominantly northwest trending regional faults. The region can be further subdivided into the coastal plain area, central mountain–valley area and eastern mountain and valley area. The site is located within the central mountain–valley area that is near the western edge of the Peninsular Range Batholith (PRB) and generally consists of Cretaceous igneous rocks and localized Jurassic igneous rocks. The PRB contains remnant blocks of pre-Cretaceous metamorphic rocks that are locally covered with post-Cretaceous volcanic rocks, and marine and non-marine deposits. Throughout the batholith, colluvium and alluvium are present on mountain slopes and intervening valleys.

5.2 Geologic Conditions

Regional geologic mapping by Morton and Matti (2005) indicates the near surface geologic unit underlying the site consists of Quaternary Young Alluvial Fan Deposits and Cretaceous Tonalite of Coahuila Valley. Based on the recent subsurface evaluation, Residual Soil was observed over the Tonalite. Descriptions of the geologic units encountered are presented below.

5.2.1 Quaternary Young Alluvial Fan Deposits

Quaternary Young Alluvial Fan Deposits were observed in borings B-1, B-2, and B-4. This material was generally found to consist of loose to medium dense, grayish brown, silty fine to medium grained sand. This unit was observed to a maximum depth of approximately 11.5 feet bgs. Isolated areas with deeper Young Alluvial Fan Deposits may be encountered during grading.

5.2.2 Residual Soil

Residual Soil was observed in borings B-3, B-5 and B-6. This material was generally found to consist of loose to medium dense, grayish brown clayey fine to medium grained sand. This unit is relatively thin and blankets the underlying tonalite bedrock.

5.2.2 Cretaceous Tonalite of the Coahuila Valley

Cretaceous Tonalite of the Coahuila Valley (Granitic Rock) was observed at depths ranging from approximately 0.9 to 11.5 feet bgs. This bedrock unit was generally found to consist of very dense, reddish gray tonalite that excavates to silty fine to medium grained sand. This unit is anticipated at depth throughout the site.

5.3 Groundwater Conditions

Groundwater was not encountered in the recent borings that were advanced to a maximum explored depth of approximately 20 feet bgs. While groundwater conditions may vary, especially following periods of sustained precipitation or irrigation, it is generally not anticipated to adversely affect shallow construction activities or the completed improvements, if irrigation is limited and proper site drainage is designed, installed, and maintained per the recommendations of the project civil engineer. However, groundwater could have the potential to perch on the underlying granitic bedrock, especially during or following the rainy season. Such occurrences could impact foundation excavations and grading.

5.4 Geologic Hazards

Geologic hazards that were considered to have potential impacts to site development were evaluated based on field observations, literature review, and laboratory test results. It appears that geologic hazards at the site are primarily limited to those caused by shaking from earthquake-generated ground motions. The following paragraphs discuss the geologic hazards considered and their potential risk to the site.

5.4.1 Surface Fault Rupture

In accordance with the Alquist-Priolo Earthquake Fault Zoning Act, (ACT), the State of California established Earthquake Fault Zones around known active faults. The purpose of the ACT is to regulate the development of structures intended for human occupancy near active fault traces in order to mitigate hazards associated with surface fault rupture.

According to the California Geological Survey (Special Publication 42, Revised 2018), a fault that has had surface displacement within the last 11,700 years is defined as a Holocene-active fault and is either already zoned or pending zonation in accordance with the ACT. There are several other definitions of fault activity that are used to regulate dams, power plants, and other critical facilities, and some agencies designate faults that are documented as older than Holocene (last 11,700 years) and younger than late Quaternary (1.6 million years) as potentially active faults that are subject to local jurisdictional regulations.

Based on the site reconnaissance and review of referenced literature, the site is not located within a local or State-designated Earthquake Fault Zone, no known active fault traces underlie or project toward the site, and no known potentially active fault traces project toward the site. Therefore fault surface rupture potential is considered to be low at the subject site.

5.4.2 Local and Regional Faulting

The United States Geological Survey (USGS), with support of State Geological Surveys, and reviewed published work by various researchers, have developed a Quaternary Fault and Fold Database of faults and associated folds that are believed to be sources of earthquakes with magnitudes greater than 6.0 that have occurred during the Quaternary (the past 1.6 million years). The faults and folds within the database have been categorized into four Classes (Class A-D) based on the level of evidence confirming that a Quaternary fault is of tectonic origin and whether the structure is exposed for mapping or inferred from fault

related deformational features. Class A faults have been mapped and categorized based on age of documented activity ranging from Historical faults (activity within last 150 years), Latest Quaternary faults (activity within last 15,000 years), Late Quaternary (activity within last 130,000 years), to Middle to late Quaternary (activity within last 1.6 million years). The Class A faults are considered to have the highest potential to generate earthquakes and/or surface rupture, and the earthquake and surface rupture potential generally increases from oldest to youngest. The evidence for Quaternary deformation and/or tectonic activity progressively decreases for Class B and Class C faults. When geologic evidence indicates that a fault is not of tectonic origin it is considered to be a Class D structure. Such evidence includes joints, fractures, landslides, or erosional and fluvial scarps that resemble fault features, but demonstrate a non-tectonic origin.

The nearest known Class A fault is the San Felipe Fault Zone (<1.6 million years), which is approximately 13.6 kilometers southwest of the site. The attached Figure 3 shows regional faults and seismicity with respect to the subject site.

5.4.3 Liquefaction and Seismic Settlement Evaluation

Liquefaction occurs when saturated fine-grained sands or silts lose their physical strengths during earthquake-induced shaking and behave like a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable

intensity and duration of ground shaking. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

Groundwater was not encountered in any of the borings that extended to a depth of 20 feet bgs, and the improvement area is generally underlain at shallow depths by medium dense alluvial fan deposits and very dense granitic rock. Based on these conditions, the potential for liquefaction or significant seismic settlement at the site is generally considered to be low.

5.4.4 Landsliding

According to mapping Morton and Matti (2005), no landslides are mapped in the site area and were not encountered during the recent field exploration. Based on the preliminary investigation findings, landsliding is not considered to be a significant geologic hazard at the site.

5.4.5 Flooding

Based on Federal Emergency Management Agency mapping (FEMA 2012), site improvement areas are located within Zone X, which is defined as: "Areas determined to be outside the 0.2% annual chance floodplain". Therefore, subject to the review of the project civil engineer, the potential for flooding at the site is generally considered to be low.

5.4.6 Compressible and Expansive Soils

The near surface soils are considered to be potentially compressible in their current condition. Therefore, it is recommended that these soils be overexcavated, where necessary,

and properly compacted beneath proposed improvement areas as recommended herein and as determined to be necessary during construction.

Based on observed site conditions and investigation findings, the shallow alluvial fan deposits may be marginally susceptible to hydro-collapse where exposed to increased moisture content. Recommendations provided herein are intended to minimize effects associated with potential consolidation of near surface soils.

Based on laboratory analysis, geologic observation, and the generally granular nature of site soils, the near-surface materials are generally anticipated to exhibit a very low expansion potential (Expansion Index of 20 or less). Verification of expansion potential should be performed during site excavations and grading.

5.4.7 Corrosive Soils

Testing of representative site area soils was performed to evaluate the potential corrosive effects on concrete foundations and buried metallic utilities. Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or pH levels less than 5.5. According to the American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO_4) in soil exceed 0.10 percent by weight. These guidelines include low water/cement ratios, increased compressive strength, and specific cement-type requirements. A minimum resistivity value

less than approximately 5,000 ohm-cm and/or soluble chloride levels in excess of 200 ppm generally indicate a corrosive environment for buried metallic utilities and untreated conduits.

Chemical test results indicate that near-surface soils at the site area generally present a negligible corrosion potential for Portland cement concrete. Based on resistivity testing, the soils have been interpreted to have a low corrosivity potential to buried metallic improvements. As such, it would likely be prudent for buried utilities to utilize plastic piping and/or conduits, where feasible. However, CTE does not practice corrosion engineering. Therefore, if corrosion of improvements is of more significant concern, a qualified corrosion engineer could be consulted.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

CTE concludes that the proposed improvements on the site are feasible from a geotechnical standpoint, provided the preliminary recommendations in this report are incorporated into the design and construction of the project. Recommendations for the proposed earthwork and improvements are included in the following sections and Appendix D. However, recommendations in the text of this report supersede those presented in Appendix D should conflicts exist. These preliminary recommendations should either be confirmed as appropriate or updated following required excavations and observations during site preparation.

6.2 Site Preparation

Prior to grading, areas to receive distress sensitive improvements should be cleared of existing debris and deleterious materials. Objectionable materials, such as vegetation not suitable for structural backfill should be properly disposed of off-site.

In the areas of proposed structures, overexcavation should extend to a minimum depth of three feet below the bottom of proposed foundations or to the depth of competent native materials, whichever is greatest. If loose or otherwise unsuitable materials are encountered at the base of overexcavations, additional excavation to the depth of suitable material may be necessary. Remedial excavations should extend laterally at least five feet beyond the limits of the proposed improvements or the distance resulting from a 1:1 (horizontal: vertical) extended down to suitable material, where feasible. If overexcavations encroach upon property lines the temporary excavation should generally be sloped at a 1:1 (horizontal to vertical) or flatter, to the prescribed overexcavation depth. Depending upon proximity and condition of exposed soils, overexcavation in slot cuts may be recommended by the geotechnical engineer.

Overexcavations for proposed surface improvement areas, such as pavement or flatwork should be conducted to a minimum depth of two feet below existing or proposed subgrade or to the depth of suitable material, whichever is shallower.

A geotechnical representative from CTE should observe the exposed ground surface prior to placement of compacted fill or improvements, to verify the competency of exposed subgrade materials. After approval by this office, the exposed subgrades to receive fill should be scarified a minimum of eight inches, moisture conditioned, and properly compacted prior to fill placement.

6.3 Site Excavation

Generally, excavation of site materials may be accomplished with heavy-duty construction equipment under normal conditions; however, the underlying weathered bedrock will become increasingly difficult to excavate with depth and deeper excavations may not be feasible with standard heavy-duty equipment. In addition, large hard and dense "core stones" could be encountered in weathered bedrock masses resulting in localized, very difficult to impenetrable excavation conditions that may require specialized equipment.

In addition, excavations within the Young Alluvial Fan Deposits could encounter zones that are sensitive to caving and/or erosion, and may not effectively remain standing vertical or near-vertical, even at shallow or minor heights and for short periods of time.

6.4 Fill Placement and Compaction

Following the recommended overexcavation and removal of loose or disturbed soils, areas to receive fills should be scarified approximately eight inches, moisture conditioned, and properly compacted. Fill and backfill should be compacted to a minimum relative compaction of 90 percent at above optimum moisture content, as evaluated by ASTM D 1557. The optimum lift thickness for fill soil

depends on the type of compaction equipment used. Generally, backfill should be placed in uniform, horizontal lifts not exceeding eight inches in loose thickness. Fill placement and compaction should be conducted in conformance with local ordinances, and should be observed and tested by a CTE geotechnical representative.

6.5 Fill Materials

Properly moisture conditioned, very low to low expansion potential soils derived from the on-site materials are considered suitable for reuse on the site as compacted fill. If used, these materials should be screened of organics and materials generally greater than three inches in maximum dimension. Irreducible materials greater than three inches in maximum dimension should not be used in shallow fills (within three feet of proposed grades). In utility trenches, adequate bedding should surround pipes.

Imported fill beneath structures and flatwork should have an Expansion Index of 20 or less (ASTM D 4829). Imported fill soils for use in structural or slope areas should be evaluated by the soils engineer before being imported to the site.

For retaining walls, backfill located within a 45-degree wedge extending up from the bottom of the heel foundation of the wall should consist of soil having an Expansion Index of 20 or less (ASTM D 4829) with less than 30 percent passing the No. 200 sieve. The upper 12 to 18 inches of wall backfill should consist of lower permeability soils, in order to reduce surface water infiltration behind walls.

The project structural engineer and/or architect should detail proper wall backdrains, including gravel drain zones, fills, filter fabric and perforated drain pipes. A conceptual wall drainage detail is provided in Figure 4.

6.6 Temporary Construction Slopes

The following recommended slopes should be relatively stable against deep-seated failure, but may experience localized sloughing. On-site soils are considered Type B and Type C soils with recommended slope ratios as set forth in Table 6.6.

TABLE 6.6
RECOMMENDED TEMPORARY SLOPE RATIOS

SOIL TYPE	SLOPE RATIO (Horizontal: vertical)	MAXIMUM HEIGHT
B (Granitic Rock)	1:1 (OR FLATTER)	10 Feet
C (Young Alluvial Fan Deposits and Residual Soil)	1.5:1 (OR FLATTER)	10 Feet

Actual field conditions and soil type designations must be verified by a "competent person" while excavations exist, according to Cal-OSHA regulations. In addition, the above sloping recommendations do not allow for surcharge loading at the top of slopes by vehicular traffic, equipment or materials. Appropriate surcharge setbacks must be maintained from the top of all unshored slopes.

6.7 Foundation and Slab Recommendations

The following recommendations are for preliminary design purposes only. These foundation recommendations should be re-evaluated after review of the project grading and foundation plans, and after completion of rough grading of the building pad areas. Upon completion of rough pad grading, Expansion Index of near surface soils should be verified, and these recommendations should be updated, if necessary.

6.7.1 Foundations

Foundation recommendations presented herein are based on the anticipated low expansion potential of near surface soils after remedial site grading is performed (Expansion Index of 50 or less).

Following the recommended preparatory grading, continuous and isolated spread footings are anticipated to be suitable for use at this site. Foundation dimensions and reinforcement should be based on allowable bearing values of 2,000 pounds per square foot (psf) for minimum 15-inch wide footings embedded a minimum of 24inches below lowest adjacent subgrade elevation. Isolated footings should be at least 24 inches in minimum dimension. The provided bearing value may be increased by 250 psf for each additional six inches of embedment up to a maximum static value of 2,500 psf. The allowable bearing value may be increased by one-third for short-duration loading, which includes the effects of wind or seismic forces. Based on the recommended preparatory grading, it is anticipated that all

footings will be founded entirely in properly compacted fill materials. Footings should not span cut to fill interfaces.

Minimum reinforcement for continuous footings should consist of four No. 5 reinforcing bars; two placed near the top and two placed near the bottom, or as per the project structural engineer. The structural engineer should design isolated footing reinforcement. An uncorrected subgrade modulus of 130 pounds per cubic inch is considered suitable for elastic foundation design.

The structural engineer should provide recommendations for reinforcement of any spread footings and footings with pipe penetrations. Footing excavations should generally be maintained at above optimum moisture content until concrete placement.

6.7.2 Foundation Settlement

The maximum total static settlement is expected to be on the order of 1.0 inch and the maximum differential settlement is expected to be on the order of 0.5 inch.

6.7.3 Foundation Setback

Footings for structures should be designed such that the horizontal distance from the face of adjacent slopes to the outer edge of the footing is at least 12 feet. In addition, footings should bear beneath a 1:1 plane extended up from the nearest bottom edge of adjacent trenches and/or excavations. Deepening of affected footings may be a suitable means of attaining the prescribed setbacks.

6.7.4 Interior Concrete Slabs

Lightly loaded interior concrete slabs for non-traffic areas should be a minimum of 5.0 inches thick. Minimum slab reinforcement should consist of #4 reinforcing bars placed on maximum 15-inch centers, each way, at or above mid-slab height, but with proper cover. More stringent recommendations per the project structural engineer supersede these recommendations, as applicable.

In moisture-sensitive floor areas, a suitable vapor retarder of at least 15-mil thickness (with all laps or penetrations sealed or taped) overlying a four-inch layer of consolidated aggregate base or gravel (with SE of 30 or more) should be installed. An optional maximum two-inch layer of similar material may be placed above the vapor retarder to help protect the membrane during steel and concrete placement. This recommended protection is generally considered typical in the industry. If proposed floor areas or coverings are considered especially sensitive to moisture emissions, additional recommendations from a specialty consultant could be obtained. CTE is not an expert at preventing moisture penetration through slabs. A qualified architect or other experienced professional should be contacted if moisture penetration is a more significant concern.

Slabs subjected to heavier loads, racking, or vehicular traffic will require thicker structural slab sections and/or increased reinforcement. A 110-pci subgrade modulus is considered suitable for elastic design of minimally embedded improvements such as slabs-on-grade.

Subgrade materials should be maintained or brought to a minimum of two percent or greater above optimum moisture content until slab underlayment and concrete are placed.

6.8 Seismic Design Criteria

The seismic ground motion values listed in the table below were derived in accordance with the ASCE 7-16 Standard that is incorporated into the 2019 California Building Code. This was accomplished by establishing the Site Class based on the soil properties at the site, and calculating site coefficients and parameters using the using the SEAOC-OSHPD U.S. Seismic Design Maps application. Seismic ground motion values are based on the approximate site coordinates of 33.6489° latitude and –116.9407° longitude. These values are intended for the design of structures to resist the effects of earthquake ground motions.

TABLE 6.8 SEISMIC GROUND MOTION VALUES (CODE-BASED) 2019 CBC AND ASCE 7-16		
PARAMETER	VALUE	2019 CBC/ASCE 7-16 REFERENCE
Site Class	C	ASCE 16, Chapter 20
Mapped Spectral Response Acceleration Parameter, S_S	1.500	Figure 1613.2.1 (1)
Mapped Spectral Response Acceleration Parameter, S_1	0.600	Figure 1613.2.1 (2)
Seismic Coefficient, F_a	1.200	Table 1613.2.3 (1)
Seismic Coefficient, F_v	1.400	Table 1613.2.3 (2)
MCE Spectral Response Acceleration Parameter, S_{MS}	1.800	Section 1613.2.3
MCE Spectral Response Acceleration Parameter, S_{M1}	0.840	Section 1613.2.3
Design Spectral Response Acceleration, Parameter S_{DS}	1.200	Section 1613.2.5(1)
Design Spectral Response Acceleration, Parameter S_{D1}	0.560	Section 1613.2.5 (2)
Peak Ground Acceleration PGA_M	0.740	ASCE 16, Section 11.8.3

6.9 Lateral Resistance and Earth Pressures

Lateral loads acting against structures may be resisted by friction between the footings and the supporting soil or passive pressure acting against structures. If frictional resistance is used, allowable coefficients of friction of 0.30 (total frictional resistance equals the coefficient of friction multiplied by the dead load) for concrete cast directly against compacted fill or native material is recommended. A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 2,000 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

If proposed, retaining walls backfilled using granular soils may be designed using the equivalent fluid unit weights given in Table 6.9 below.

TABLE 6.9
EQUIVALENT FLUID UNIT WEIGHTS (G_h)
(pounds per cubic foot)

WALL TYPE	LEVEL BACKFILL	SLOPE BACKFILL 2:1 (HORIZONTAL: VERTICAL)
CANTILEVER WALL (YIELDING)	45	55
RESTRAINED WALL	55	65

Lateral pressures on cantilever retaining walls (yielding walls) over six feet high due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral earth pressure against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$$P_{AE} = P_A + \Delta P_{AE}$$

For non-yielding (or "restrained") walls, the total lateral earth pressure may be similarly calculated based on work by Wood (1973):

$$P_{KE} = P_K + \Delta P_{KE}$$

Where P_A/b = Static Active Earth Pressure = $G_h H^2/2$

P_K/b = Static Restrained Wall Earth Pressure = $G_h H^2/2$

$\Delta P_{AE}/b$ = Dynamic Active Earth Pressure Increment = $(3/8)\ k_h\ \gamma H^2$

$\Delta P_{KE}/b$ = Dynamic Restrained Earth Pressure Increment = $k_h\ \gamma H^2$

b = unit length of wall (usually 1 foot)

k_h = 1/2* PGA_m (PGA_m given previously Table 6.8)

G_h = Equivalent Fluid Unit Weight (given previously Table 6.9)

H = Total Height of the retained soil

γ = Total Unit Weight of Soil $\approx$ 135 pounds per cubic foot

*It is anticipated that the 1/2 reduction factor will be appropriate for proposed walls that are not substantially sensitive to movement during the design seismic event. Proposed walls that are more sensitive to such movement could utilize a 2/3 reduction factor. If any proposed walls require minimal to no movement during the design seismic event, no reduction factor to the peak ground acceleration should be used. The project structural engineer of record should determine the appropriate reduction factor to use (if any) based on the specific proposed wall characteristics.

The static and increment of dynamic earth pressure in both cases may be applied with a line of action located at H/3 above the bottom of the wall (SEAOC, 2013).

These values assume non-expansive backfill and free-draining conditions. Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing should be as specified by the project architect.

6.10 Exterior Flatwork

Flatwork should be installed with crack-control joints at appropriate spacing as designed by the project architect to reduce the potential for cracking in exterior flatwork caused by minor movement of subgrade soils and concrete shrinkage. Additionally, it is recommended that flatwork be installed with at least number 4 reinforcing bars at 18-inch centers, each way, at or above mid-height of slab, but with proper concrete cover, or with other reinforcement per the applicable project designer. Flatwork that should be installed with crack control joints, includes driveways, sidewalks, and architectural features. All subgrades should be prepared according to the earthwork

recommendations previously given before placing concrete. Positive drainage should be established and maintained next to all flatwork. Subgrade materials should be maintained at a minimum of two percent above optimum moisture content until the time of concrete placement.

6.11 Vehicular Pavement

The proposed improvements include paved vehicle drive and parking areas. Presented in Table 6.11 are preliminary pavement sections utilizing laboratory determined Resistance "R" Value. Actual traffic area slab sections to be provided by the structural designer based on anticipated loading. Beneath proposed pavement areas, the upper 12 inches of subgrade and all base materials should be compacted to 95% relative compaction in accordance with ASTM D1557, and at a minimum of two percent above optimum moisture content.

TABLE 6.11
RECOMMENDED PAVEMENT THICKNESS

Traffic Area	Assumed Traffic Index	Preliminary Subgrade "R"-Value	Asphalt Pavements		Portland Cement Concrete Pavements, on Subgrade Soils (inches)
			AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	
Drive Areas	6.0	40+	4.0	5.0	7.0
Parking Areas	5.0	40+	3.0	4.0	6.5

* Caltrans Class 2 aggregate base
** Concrete should have a modulus of rupture of at least 600 psi

Following rough site grading, CTE laboratory testing of representative subgrade soils for as-graded "R"-Value should be performed to verify adequacy of pavement sections.

Asphalt paved areas should be designed, constructed, and maintained in accordance with the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction ("Greenbook") or Caltrans Standard Specifications may be referenced for pavement materials specifications.

6.12 Drainage

Surface runoff should be collected and directed away from improvements by means of appropriate erosion-reducing devices and positive drainage should be established around the proposed improvements. Positive drainage should be directed away from improvements at a gradient of at least two percent for a distance of at least five feet. However, the project civil engineers should evaluate the on-site drainage and make necessary provisions to keep surface water from affecting the site.

Generally, CTE recommends against allowing water to infiltrate building pads or adjacent to slopes. CTE understands that some agencies are encouraging the use of storm-water cleansing devices. Use of such devices tends to increase the possibility of adverse effects associated with high groundwater including slope instability and liquefaction. See Appendix E for further discussion of site infiltration.

6.13 Slopes

Based on anticipated soil strength characteristics slopes, if proposed, should be constructed at ratios of 2:1 (horizontal: vertical) or flatter. These slope inclinations should exhibit factors of safety greater than 1.5.

Although properly constructed slopes on this site should be grossly stable, the soils will be somewhat erodible. Therefore, runoff water should not be permitted to drain over the edges of slopes unless that water is confined to properly designed and constructed drainage facilities. Erosion-resistant vegetation should be maintained on the face of all slopes.

Typically, soils along the top portion of a fill slope face will creep laterally. CTE recommends against building distress-sensitive hardscape improvements within five feet of slope crests, and against using thickened edges in this area.

6.14 Controlled Low Strength Materials (CLSM)

Controlled Low Strength Materials (CLSM) may be used in deepened footing excavation areas, building pads, and/or adjacent to retaining walls or other structures, provided the appropriate following recommendations are also incorporated. Minimum overexcavation depths recommended herein beneath slabs, flatwork, and other areas may be applicable beneath CLSM if/where CLSM is to be used, and excavation bottoms should be observed by CTE prior to placement of CLSM. Prior to CLSM placement, the excavation should be free of debris, loose soil materials, and water. Once

specific areas to utilize CLSM have been determined, CTE should review the locations to determine if additional recommendations are appropriate.

CLSM should consist of a minimum three-sack cement/sand slurry with a minimum 28-day compressive strength of 100 psi (or equal to or greater than the maximum allowable short term soil bearing pressure provided herein, whichever is higher) as determined by ASTM D4832. If re-excavation is anticipated, the compressive strength of CLSM should generally be limited to a maximum of 150 psi per ACI 229R-99. Where re-excavation is required, two-sack cement/sand slurry may be used to help limit the compressive strength. The allowable soils bearing pressure and coefficient of friction provided herein should still govern foundation design. CLSM may not be used in lieu of structural concrete where required by the structural engineer.

6.15 Plan Review

CTE should be authorized to review the project grading and foundation plans prior to commencement of earthwork in order to provide additional recommendations, if necessary.

6.16 Construction Observation

The recommendations provided in this report are based on preliminary design information for the proposed construction and the subsurface conditions observed in the soil borings. The interpolated subsurface conditions should be confirmed by CTE during construction with respect to anticipated conditions. Upon completion of precise grading, if necessary, soil samples will be collected to evaluate as-built Expansion Index. Foundation recommendations may be revised upon completion

of grading, and as-built laboratory tests results. Additionally, soil samples should be taken in pavement subgrade areas upon rough grading to refine pavement recommendations as necessary.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthwork should be observed and tested in accordance with recommendations contained within this report. CTE should evaluate footing excavations before reinforcing steel placement.

7.0 LIMITATIONS OF INVESTIGATION

The field evaluation, laboratory testing and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report. Variations may exist and conditions not observed or described in this report may be encountered during construction. This report is prepared for the project as described. It is not prepared for any other property or party.

The recommendations provided herein have been developed in order to reduce the post-construction movement of site improvements related to soil settlement. However, even with the design and construction recommendations presented herein, some post-construction movement and associated distress may occur.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside CTE's involvement. Therefore, this report is subject to review and should not be relied upon after a period of three years.

CTE's conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, CTE should be notified and additional recommendations, if required, will be provided subject to CTE remaining as authorized geotechnical consultant of record. This report is for use of the project as described. It should not be utilized for any other project.

The percolation test results were obtained in accordance with regional standards and were performed with the standard of care practiced by other professionals practicing in the area. However, percolation test results can significantly vary laterally and vertically due to slight changes in soil type, degree of weathering, secondary mineralization, and other physical and chemical variabilities. As such, the test results are only considered as an estimate of percolation and converted infiltration rates for design purposes. No guarantee is made based on the percolation testing to the actual functionality or longevity of associated infiltration basins or other BMP devices designed from the presented infiltration rates.

CTE appreciates this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully submitted,

CONSTRUCTION TESTING & ENGINEERING, INC.

Dan T. Math, GE #2665
Principal Engineer

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Principal Engineering Geologist

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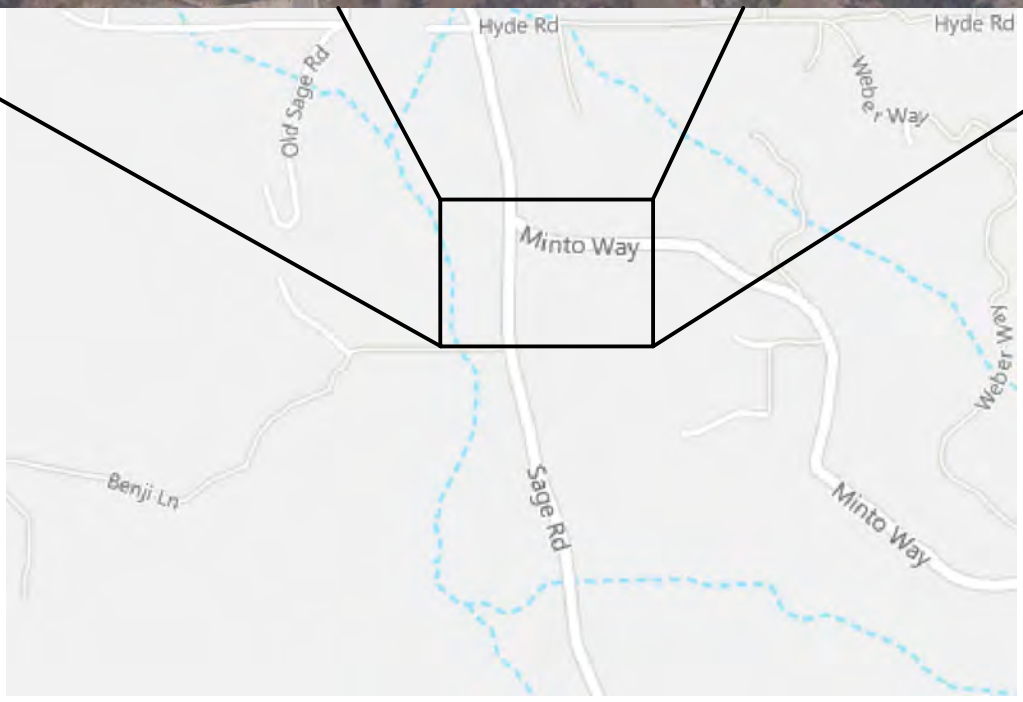
Certified Engineering Geologist

AJB/JFL/DTM:ach



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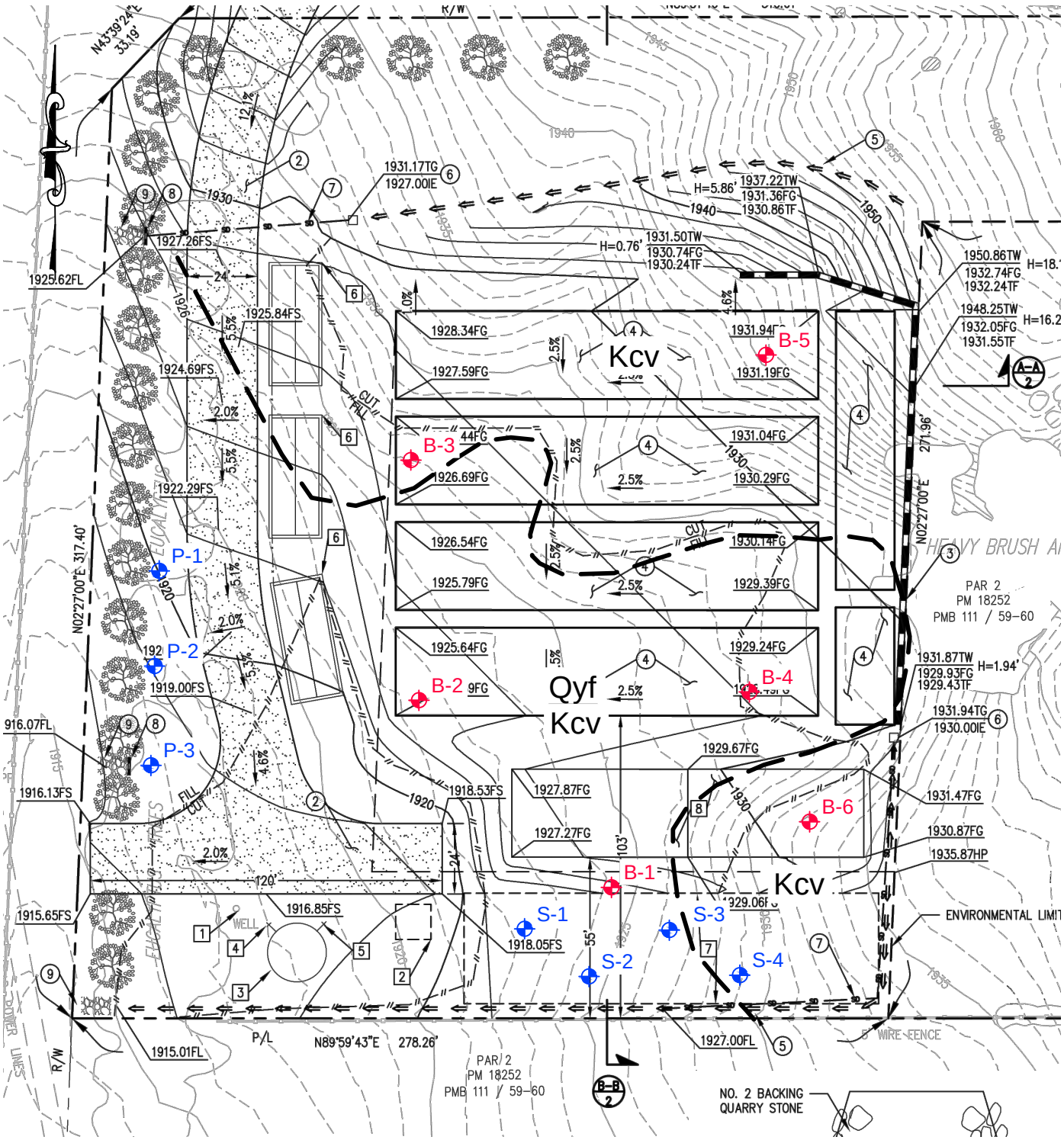
SITE INDEX MAP

PROPOSED VORTEX FARMS
SOUTHEAST OF SAGE ROAD AND MINTO WAY
RIVERSIDE, CALIFORNIA

SCALE:	DATE:
AS SHOWN	10/20
CTE JOB NO.:	FIGURE:
10-12390T	1



LEGEND

- B-1 — Approximate Boring Location
- P-3 — Approximate BMP Perc Test Location
- S-4 — Approximate Septic Perc Test Location
- Qyf / Kcv — Young Alluvial Fan Deposits over Tonalite of Coahuila Valley
- Approximate Geologic Contact

S:\Projects\10-15741G (Vortex Farms)\Figure 2.dwg

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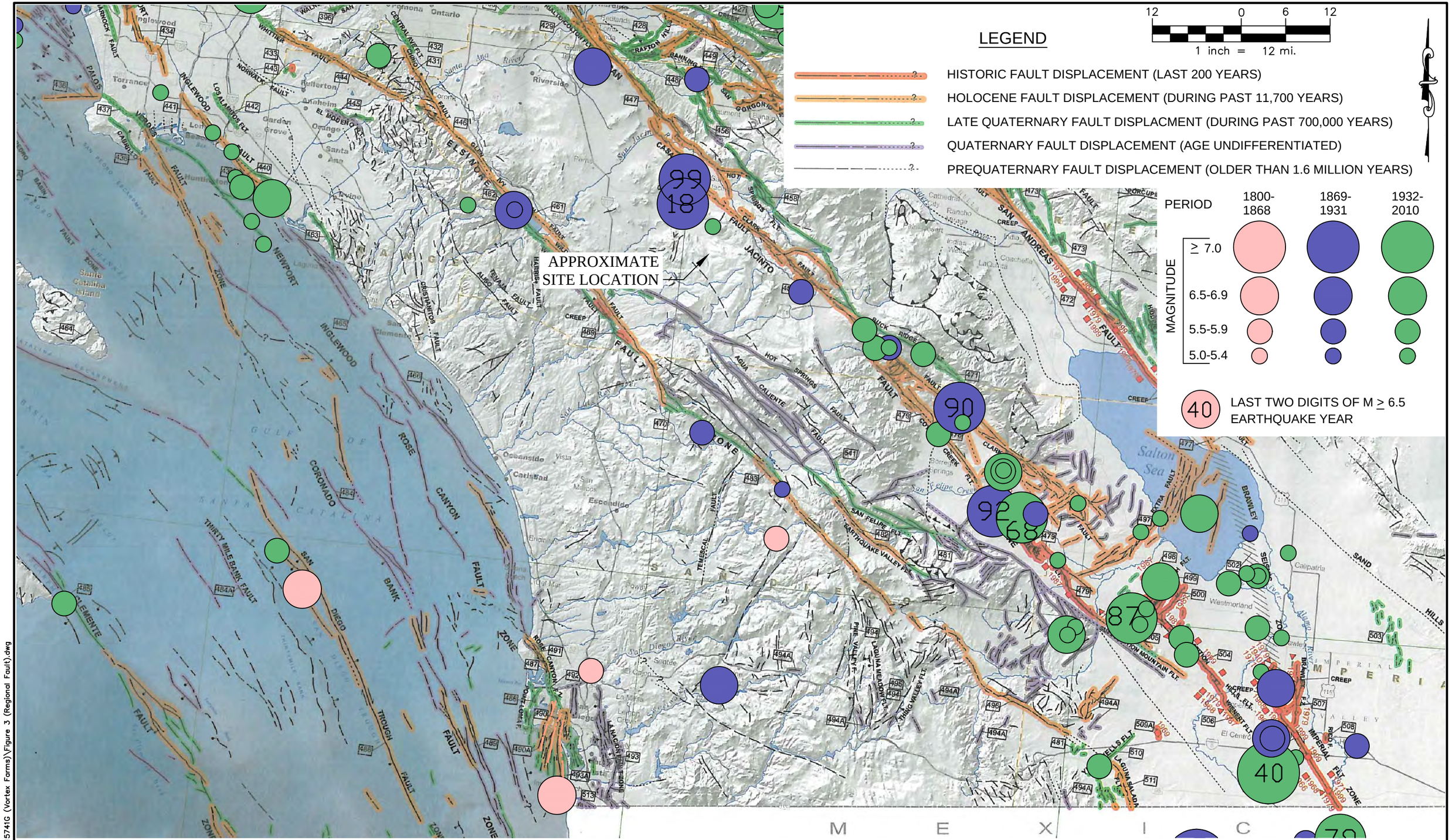
GEOLOGIC/EXPLORATION LOCATION MAP
PROPOSED VORTEX FARMS
SOUTHEAST CORNER OF SAGE ROAD AND MINTO WAY
RIVERSIDE, CALIFORNIA

SCALE:	DATE:
1"=50'	10/20
CTE JOB NO.: 10-15741G	FIGURE: 2



NOTES: FAULT ACTIVITY MAP OF CALIFORNIA, 2010, CALIFORNIA GEOLOGIC DATA MAP SERIES MAP NO. 6;
EPICENTERS OF AND AREAS DAMAGED BY M≥5 CALIFORNIA EARTHQUAKES, 1800–1999 ADAPTED AFTER TOPPOZADA, BRANUM, PETERSEN, HALLSTORM, CRAMER, AND REICHLE, 2000, CDMG MAP SHEET 49
REFERENCE FOR ADDITIONAL EXPLANATION; MODIFIED WITH CISN AND USGS SEISMIC MAPS

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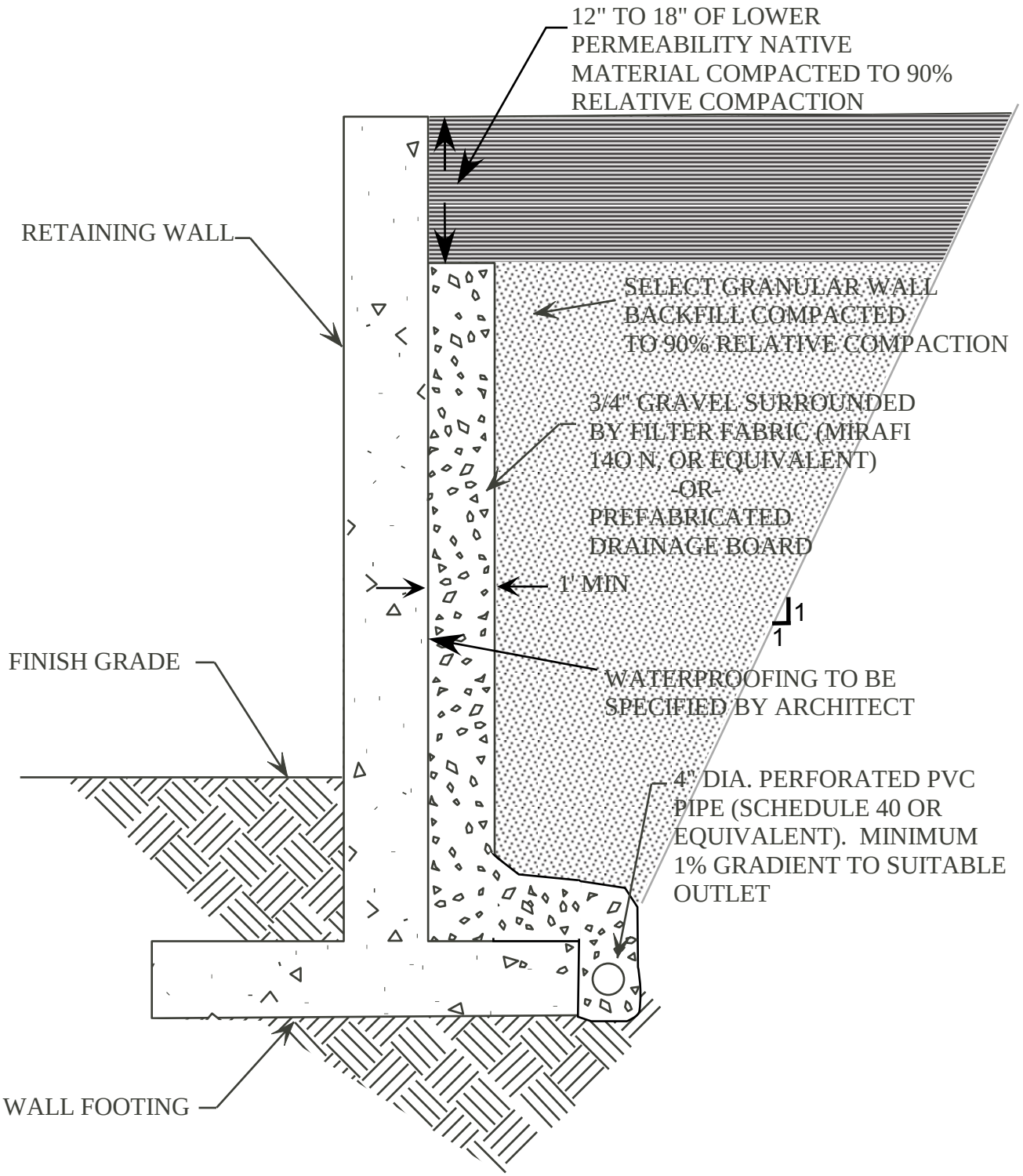
REGIONAL FAULT AND SEISMICITY MAP

PROPOSED VORTEX FARMS
SOUTHEAST OF SAGE RFOAD AND MINTO WAY
RIVERSIDE, CALIFORNIA

CTE JOB NO: 10-15741G
SCALE: 1 inch = 12 miles
DATE: 10/20
FIGURE: 3

S:\Projects\10-15741G (Vortex Farms)\Figure 3 (Regional Fault).dwg



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RETAINING WALL DRAINAGE DETAIL

CTE JOB NO:	10-15741G
SCALE:	NO SCALE
DATE:	10/20
FIGURE:	4

APPENDIX A

REFERENCES

REFERENCES

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APPENDIX B

BORING LOGS

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DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed
PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded
PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

FIGURE: BL1

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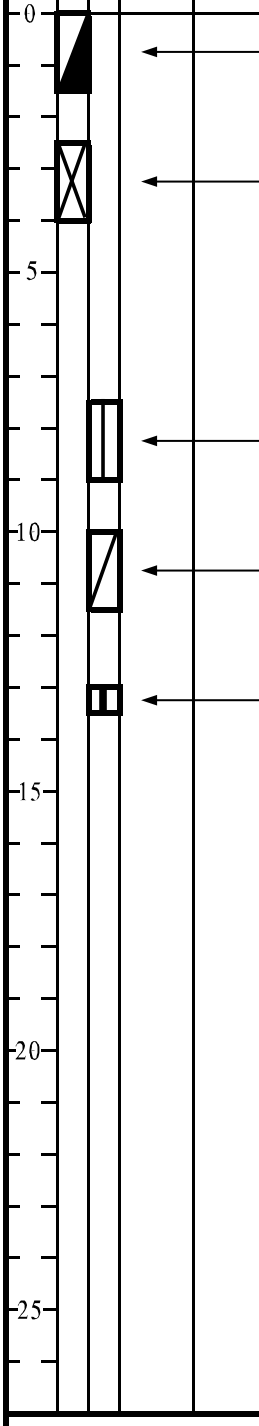
PROJECT: | DRILLER: | SHEET: of
CTE JOB NO: | DRILL METHOD: | DRILLING DATE:
LOGGED BY: | SAMPLE METHOD: | ELEVATION:

BORING LEGEND

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log | DESCRIPTION | Laboratory Tests



Block or Chunk Sample

Bulk Sample

Standard Penetration Test

Modified Split-Barrel Drive Sampler (Cal Sampler)

Thin Walled Army Corp. of Engineers Sample

Groundwater Table

Soil Type or Classification Change

? ——— ? ——— ? ——— ? ——— ? ——— ? ——— ? —

Formation Change [(Approximate boundaries queried (?)]

"SM"

Quotes are placed around classifications where the soils exist in situ as bedrock

FIGURE: BL2

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PROJECT:	VORTEX FARMS	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15741G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	9/30/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~1924 FEET

BORING: B-1

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**QUATERNARY YOUNG ALLUVIAL FAN DEPOSITS:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	
						"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	
5			28 29 50/6"						
10			50/6"						
15			50/2"					Total Depth: 15.2' No Groundwater Encountered	
20									
25									

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PROJECT:	VORTEX FARMS	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15741G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	9/30/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~1922 FEET

BORING: B-2

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**QUATERNARY YOUNG ALLUVIAL FAN DEPOSITS:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	EI, RV
5			8 11 13						GS
10			18 17 32			"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	MD, CN
15			50/3"						GS
20								Total Depth: 20' No Groundwater Encountered	
25									

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PROJECT:	VORTEX FARMS		DRILLER:	BAJA EXPLORATION	SHEET:	1	of 1
CTE JOB NO:	10-15741G		DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:		9/30/2020
LOGGED BY:	AJB		SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:		~1926 FEET

BORING: B-3

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**RESIDUAL SOIL:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	
						"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	
5		▮	14 31 50/4"						
								Total Depth: 6.4' No Groundwater Encountered	
10									
15									
20									
25									

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PROJECT:	VORTEX FARMS	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15741G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	9/30/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~1928 FEET

BORING: B-4

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**QUATERNARY YOUNG ALLUVIAL FAN DEPOSITS:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	MAX, CHM
5			13 10 13						
						"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	
10			50/6"						
15			50/3"						
								Total Depth: 15.3' No Groundwater Encountered	
20									
25									

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PROJECT:	VORTEX FARMS	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15741G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	9/30/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~1940 FEET

BORING: B-5

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SM		**RESIDUAL SOIL:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	
						"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	
								Total Depth: 1.4' 9Refusal in bedrock) No Groundwater Encountered	
5									
10									
15									
20									
25									

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PROJECT:	VORTEX FARMS		DRILLER:	BAJA EXPLORATION	SHEET:	1	of 1
CTE JOB NO:	10-15741G		DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:		9/30/2020
LOGGED BY:	AJB		SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:		~1932 FEET

BORING: B-6

Depth (Feet)	Sample Bulk	Sample Driven	Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X						SM		**QUATERNARY YOUNG ALLUVIAL FAN DEPOSITS:** Loose to medium dense, dry, grayish brown, silty fine to coarse grained SAND, friable, massive.	
5							"SM"		**CRETACEOUS TONALITE OF THE COAHUILA VALLEY:** Very dense, slightly moist, reddish gray tonalite that excavates to silty fine to medium grained SAND, oxidized, severely weathered.	
10									Total Depth: 7.1' (Refusal in bedrock) No Groundwater Encountered	
15										
20										
25										

APPENDIX C

LABORATORY METHODS AND RESULTS

APPENDIX C
LABORATORY METHODS AND RESULTS

Laboratory Testing Program

Laboratory tests were performed on representative soil samples to detect their relative engineering properties. Tests were performed following test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used.

Classification

Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples according to ASTM D2487. The soil classifications are shown on the Exploration Logs in Appendix B.

In-Place Moisture/Density

The in-place moisture content and dry unit weight of selected samples were determined using relatively undisturbed chunk soil samples.

Modified Proctor

Laboratory maximum dry density and optimum moisture content were evaluated according to ASTM D 1557, Method A. A mechanically operated rammer was used during the compaction process.

Expansion Index

Expansion testing was performed on selected samples of the matrix of the on-site soils according to ASTM D 4829.

Resistance "R" Value

The resistance "R"-value was measured by the California Test. 301. The graphically determined "R" value at an exudation pressure of 300 pounds per square inch is the value used for pavement section calculation.

Particle-Size Analysis

Particle-size analyses were performed on selected representative samples according to ASTM D 422.

Consolidation

To assess their compressibility and volume change behavior when loaded and wetted, relatively undisturbed samples of representative samples from the investigation were subject to consolidation tests in accordance with ASTM D 2435.

Chemical Analysis

Soil materials were collected with sterile sampling equipment and tested for Sulfate and Chloride content, pH, Corrosivity, and Resistivity.

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EXPANSION INDEX TEST

ASTM D 4829

LOCATION	DEPTH (feet)	EXPANSION INDEX	EXPANSION POTENTIAL
B-2	0-5	4	VERY LOW

IN-PLACE MOISTURE AND DENSITY

LOCATION	DEPTH (feet)	% MOISTURE	DRY DENSITY
B-2	10	2.8	115.8

RESISTANCE "R"-VALUE

CALTEST 301

LOCATION	DEPTH (feet)	R-VALUE
B-2	0-5	48

SULFATE

LOCATION	DEPTH (feet)	RESULTS ppm
B-4	0-5	200.31

CHLORIDE

LOCATION	DEPTH (feet)	RESULTS ppm
B-4	0-5	28.4

p.H.

LOCATION	DEPTH (feet)	RESULTS
B-4	0-5	6.4

RESISTIVITY

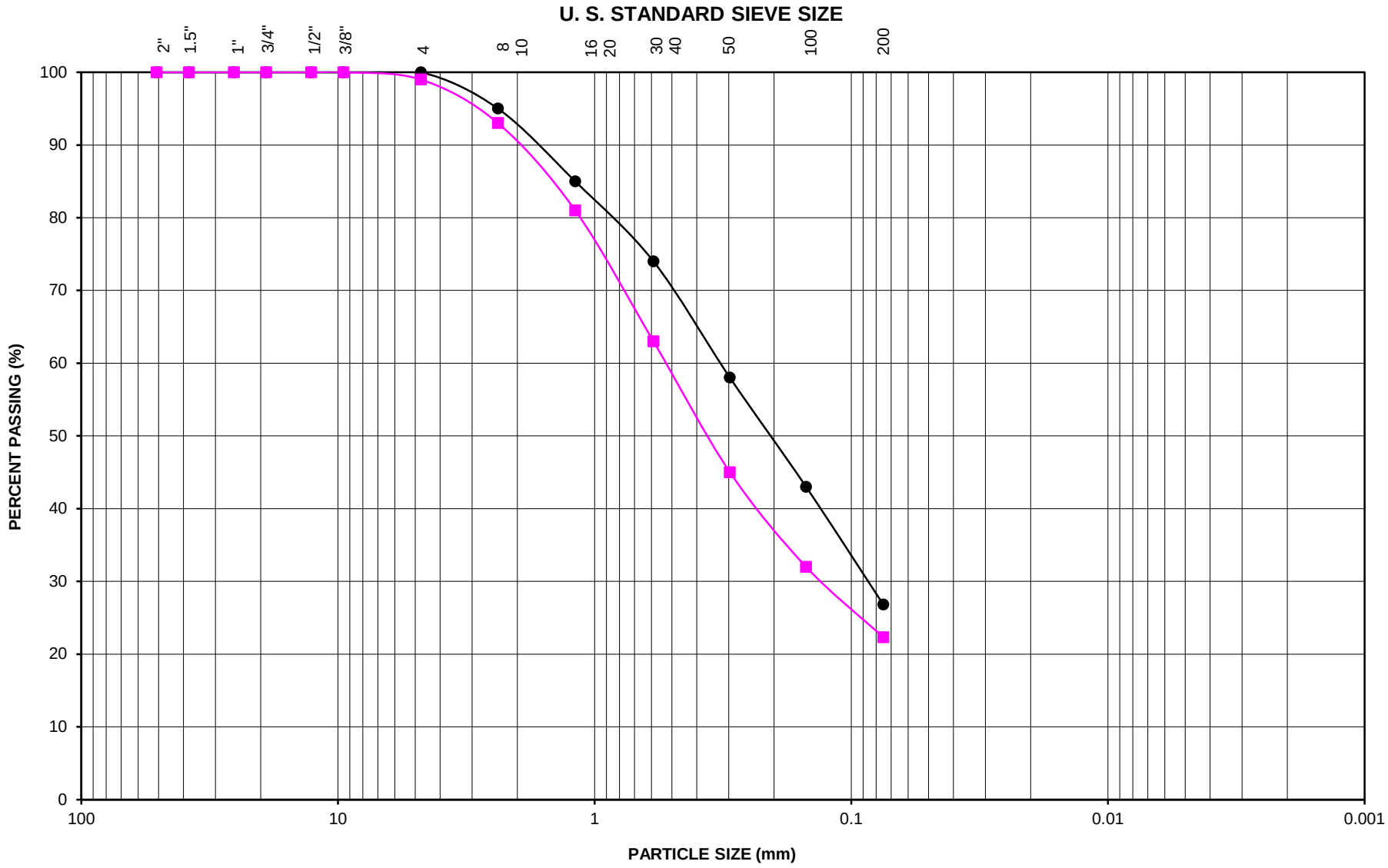
CALIFORNIA TEST 424

LOCATION	DEPTH (feet)	RESULTS ohms-cm
B-4	0-5	39500

MODIFIED PROCTOR

ASTM D 1557

LOCATION	DEPTH (feet)	MAXIUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)
B-4	0-6.5	119.5	8.4



PARTICLE SIZE ANALYSIS

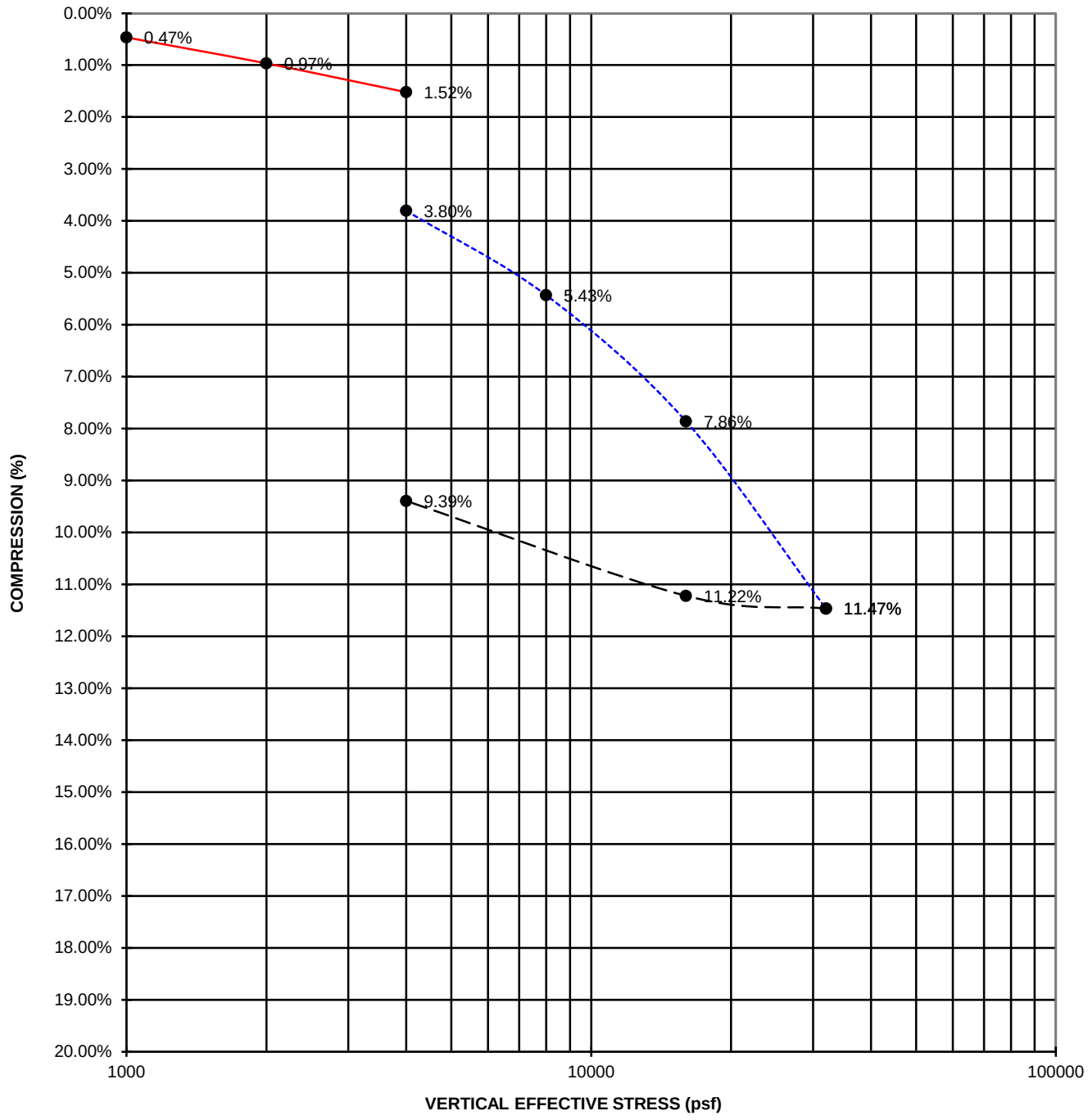
CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-2	5	●			SM
B-2	15	■			SM
CTE JOB NUMBER:		10-15741G		FIGURE:	C-1

CTE INC.

Construction Testing & Engineering, Inc.

Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying



Consolidation Test ASTM D2435

Project Name:	Vortex Farms				
Project Number:	10-15741G	Sample Date:	9/30/2020	Initial Moisture (%):	2.8
Lab Number:	31320	Test Date:	10/5/2020	Final Moisture (%):	9.0
Sample Location:	B-2 @ 10'	Tested By:	JH	Initial Dry Density (PCF):	115.8
Sample Description:	Moderate Brown (SM)			Final Dry Density (PCF):	127.8

APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING

Section 1 - General

Construction Testing & Engineering, Inc. presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner’s representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from

the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not

exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE's recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

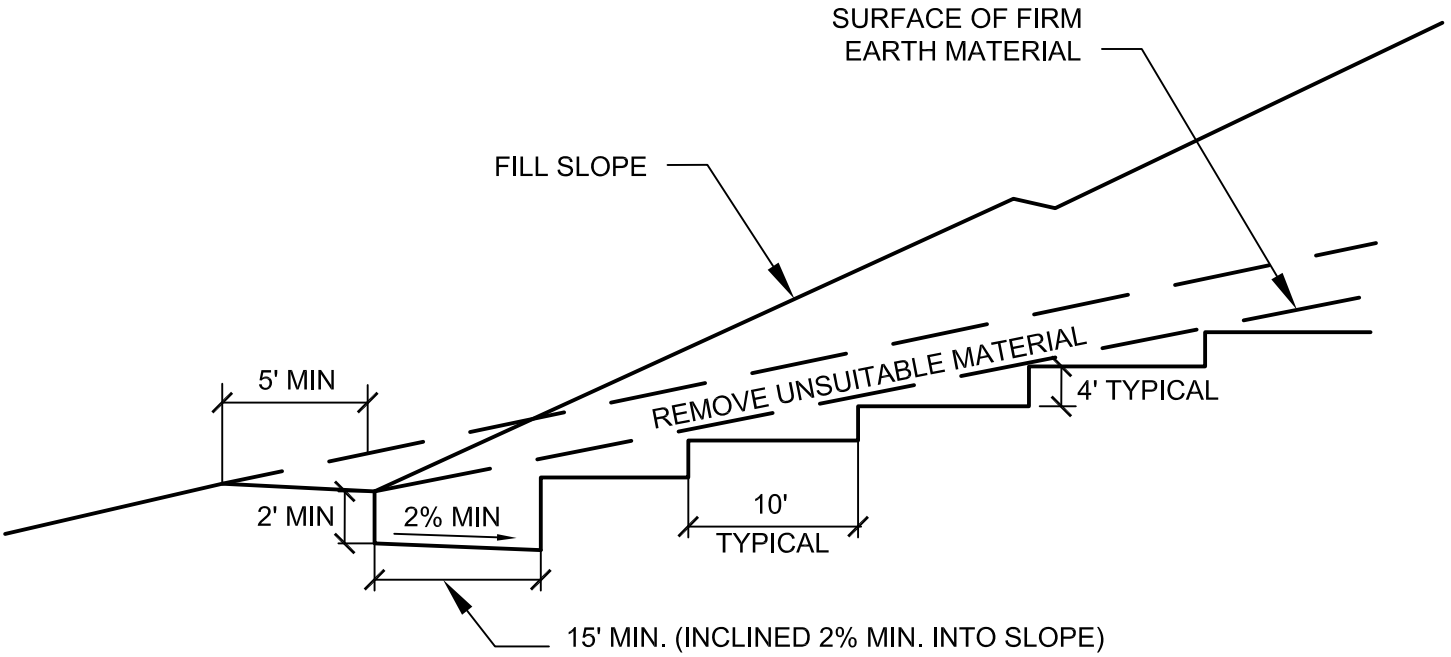
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

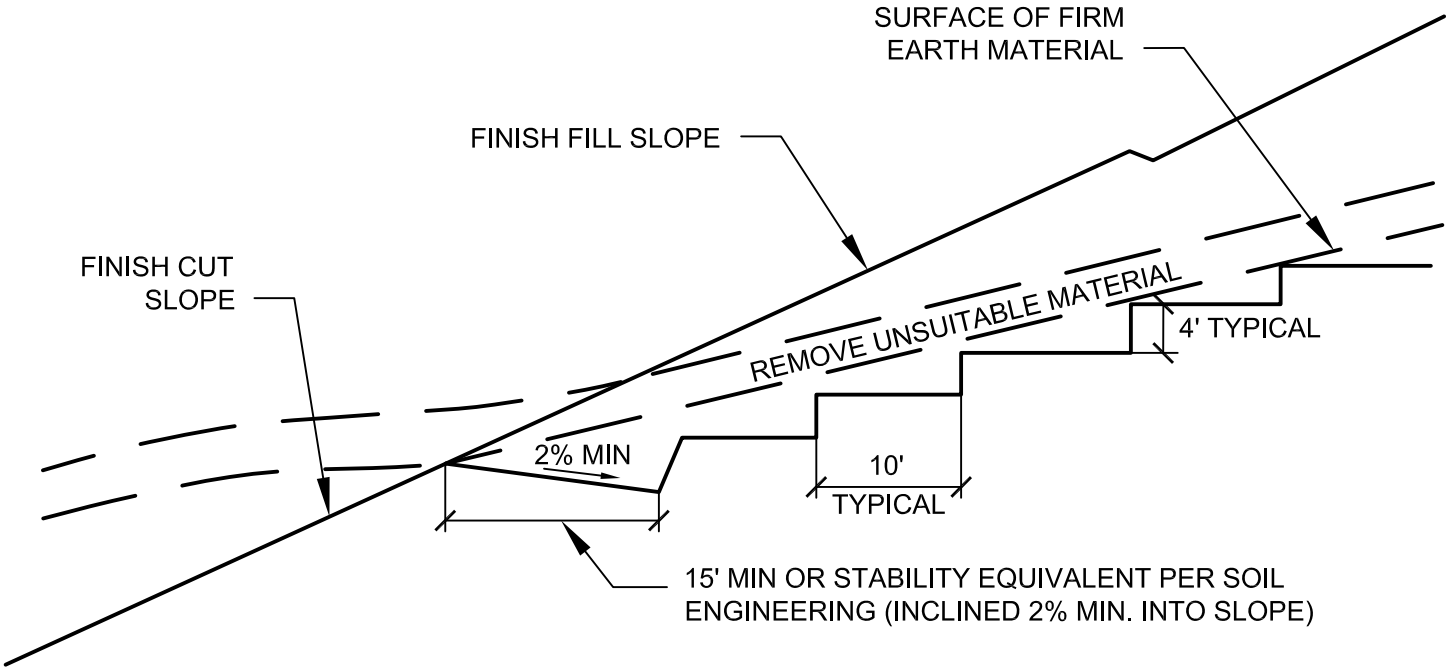
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

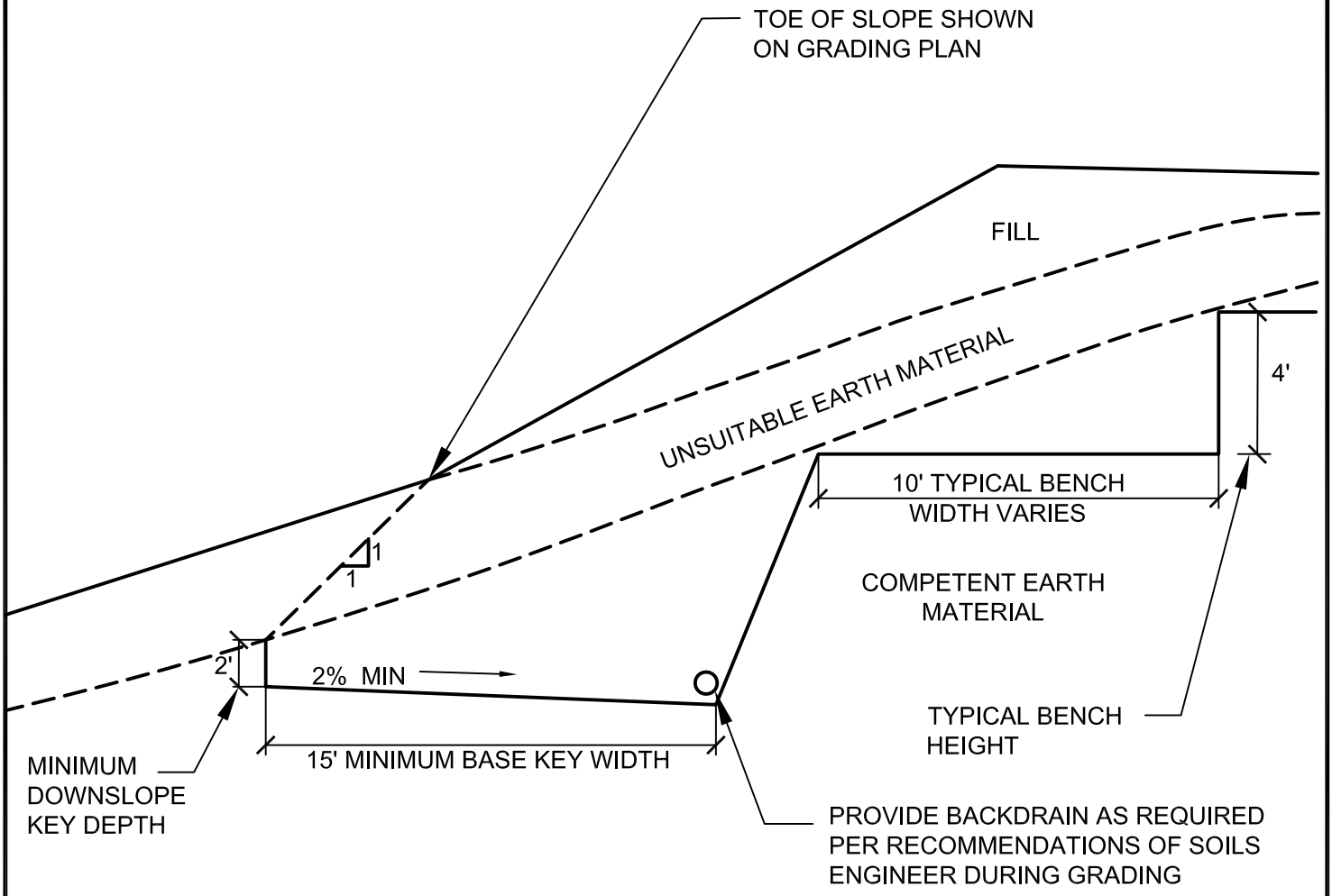


BENCHING FILL OVER CUT



NOT TO SCALE

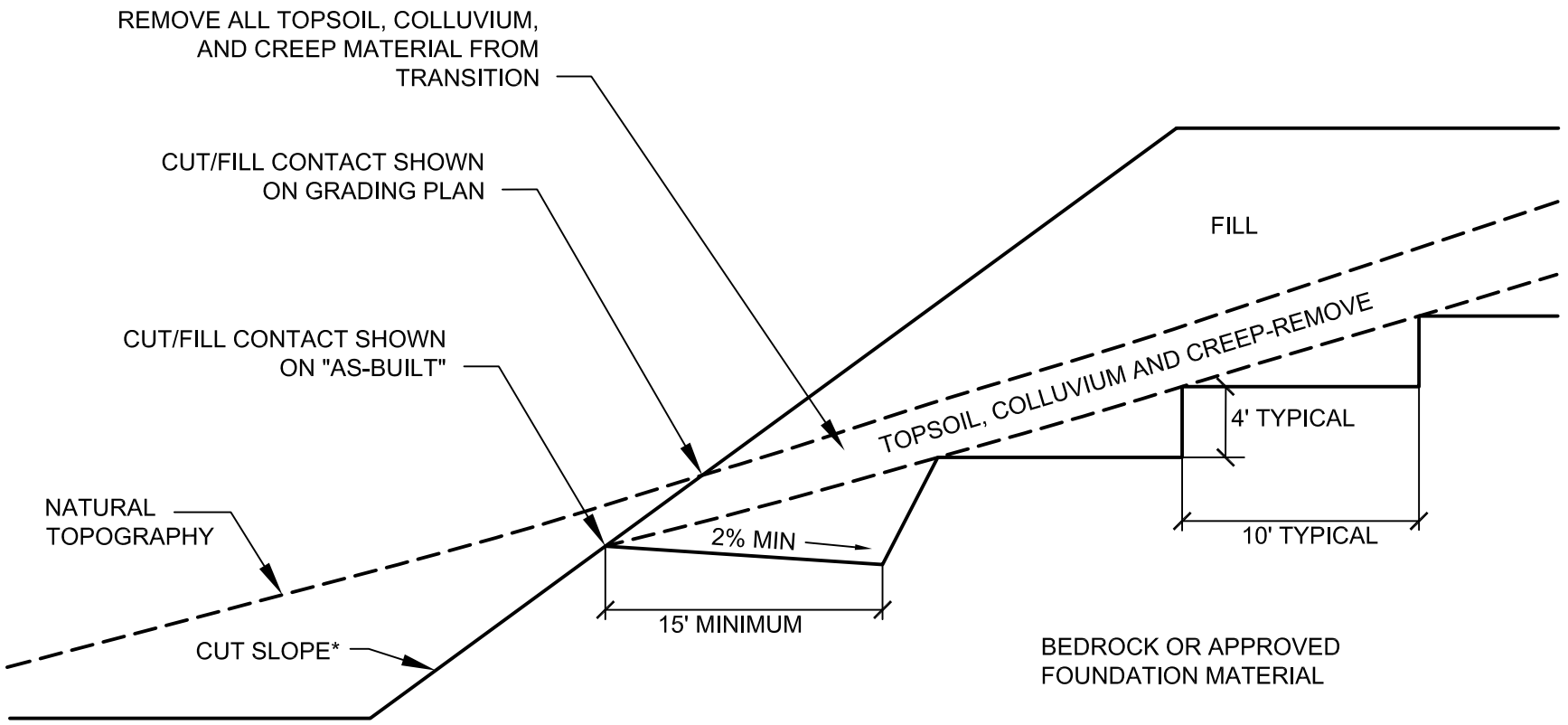
BENCHING FOR COMPACTED FILL DETAIL



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

NOT TO SCALE

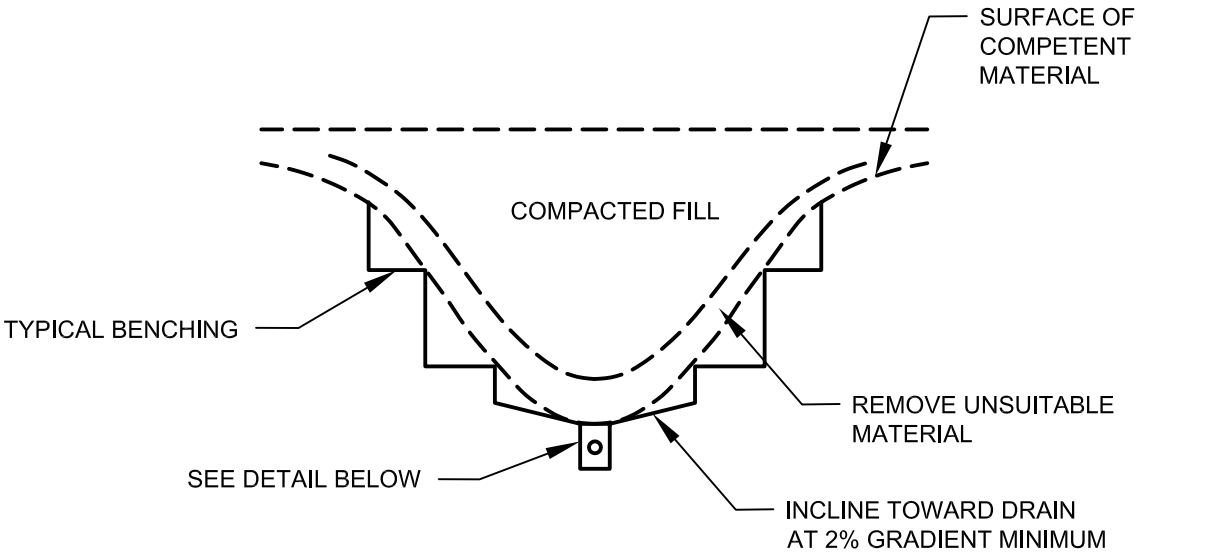
FILL SLOPE ABOVE NATURAL GROUND DETAIL



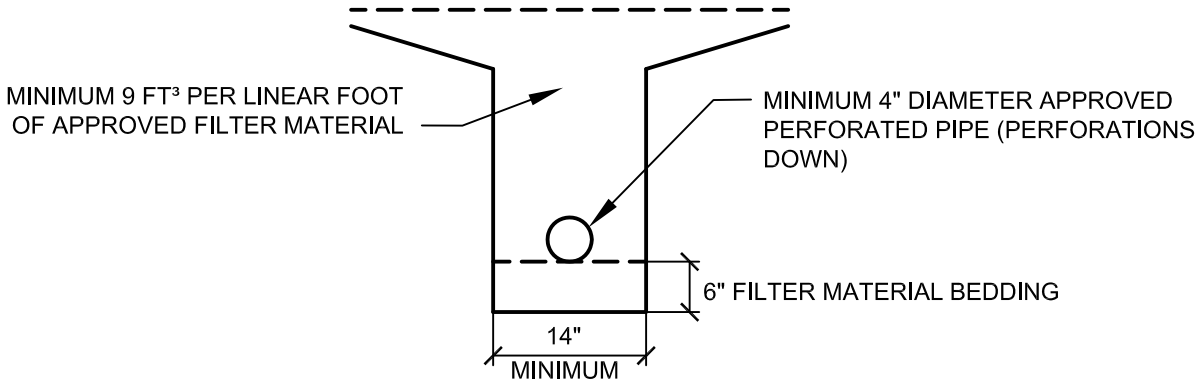
*NOTE: CUT SLOPE PORTION SHOULD BE MADE PRIOR TO PLACEMENT OF FILL

NOT TO SCALE

FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



CALTRANS CLASS 2 PERMEABLE MATERIAL
FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

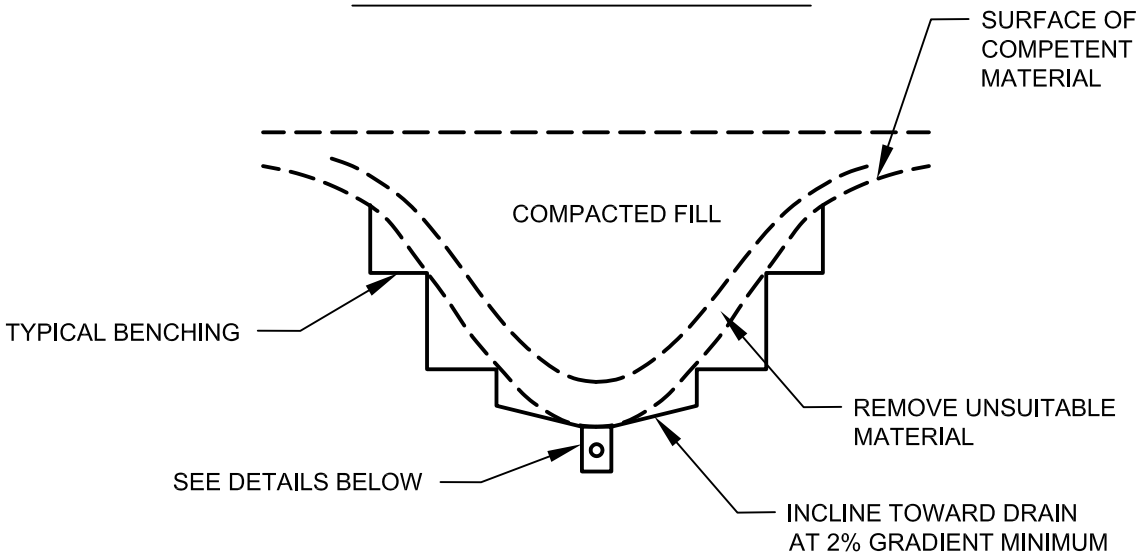
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

NOT TO SCALE

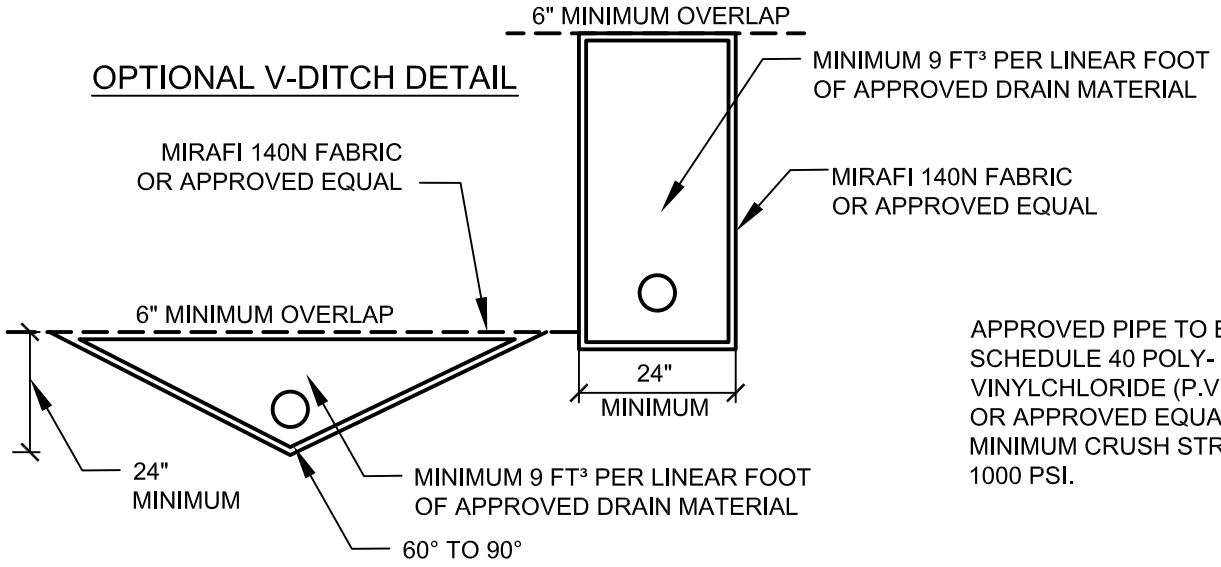
TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS

OPTIONAL V-DITCH DETAIL



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

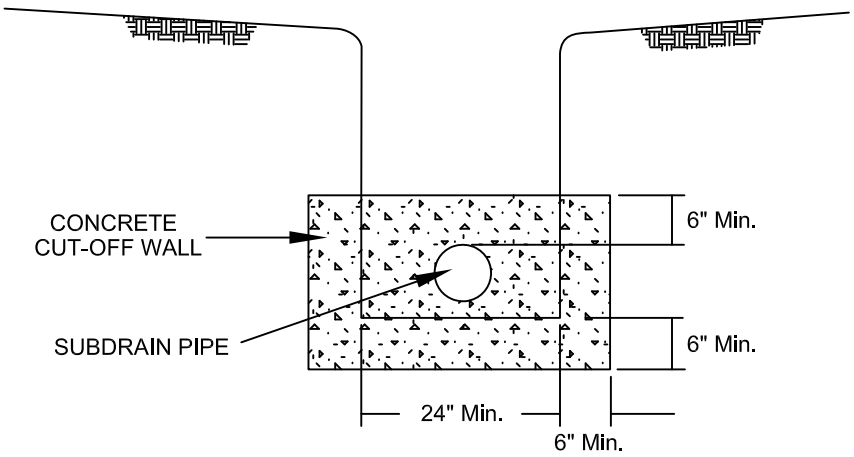
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

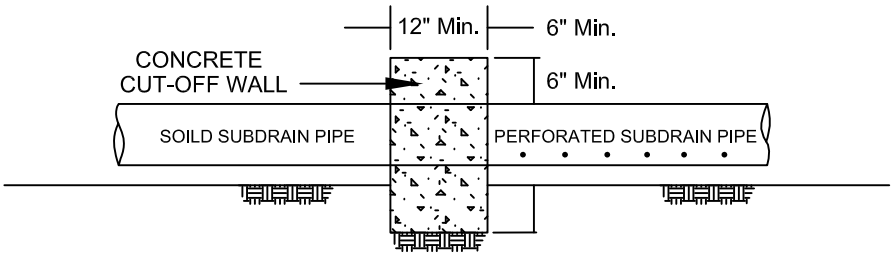
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



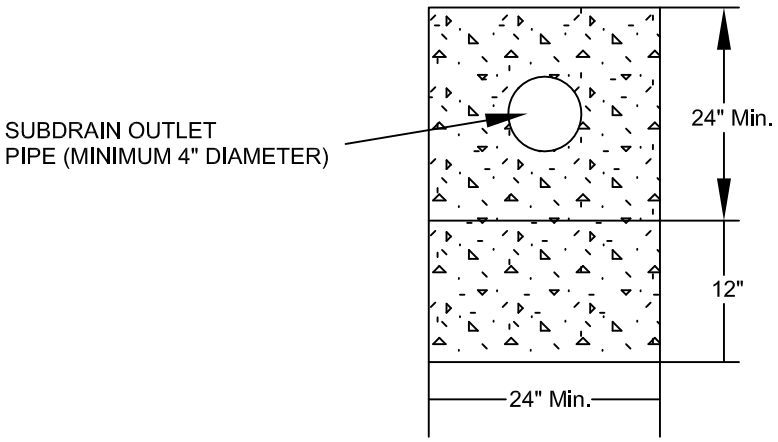
SIDE VIEW



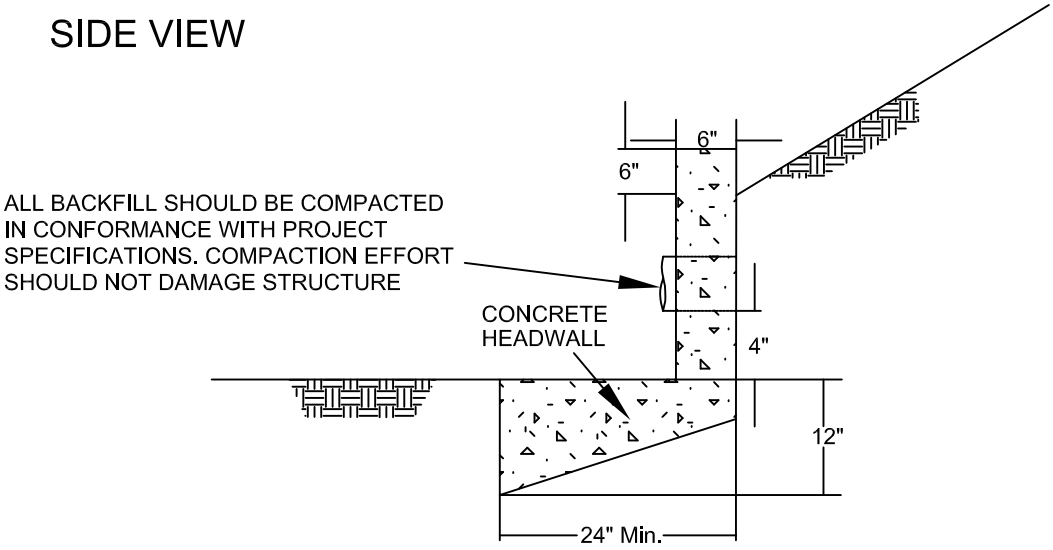
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



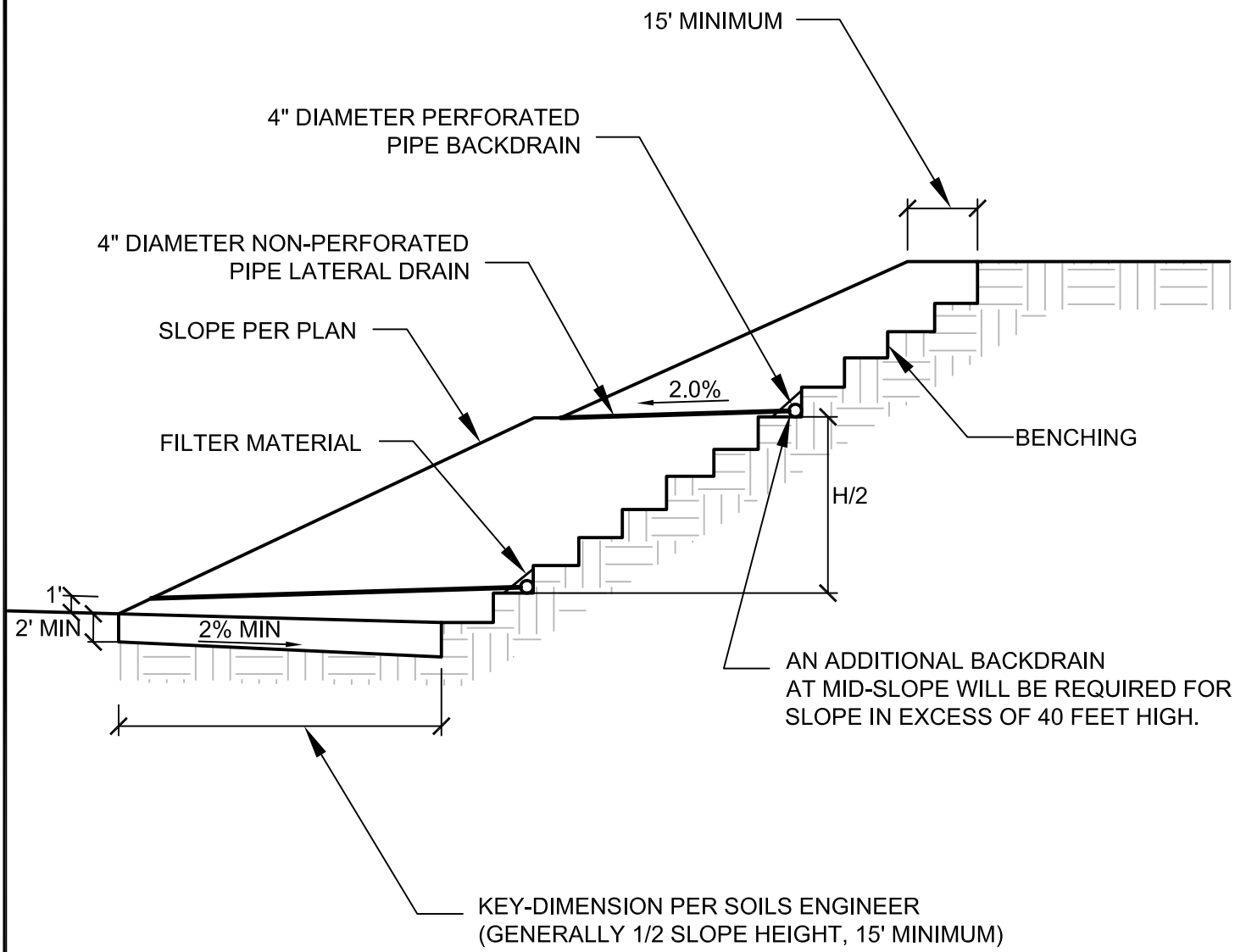
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE
OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE
MODIFIED DEPENDING UPON ENCOUNTERED
CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

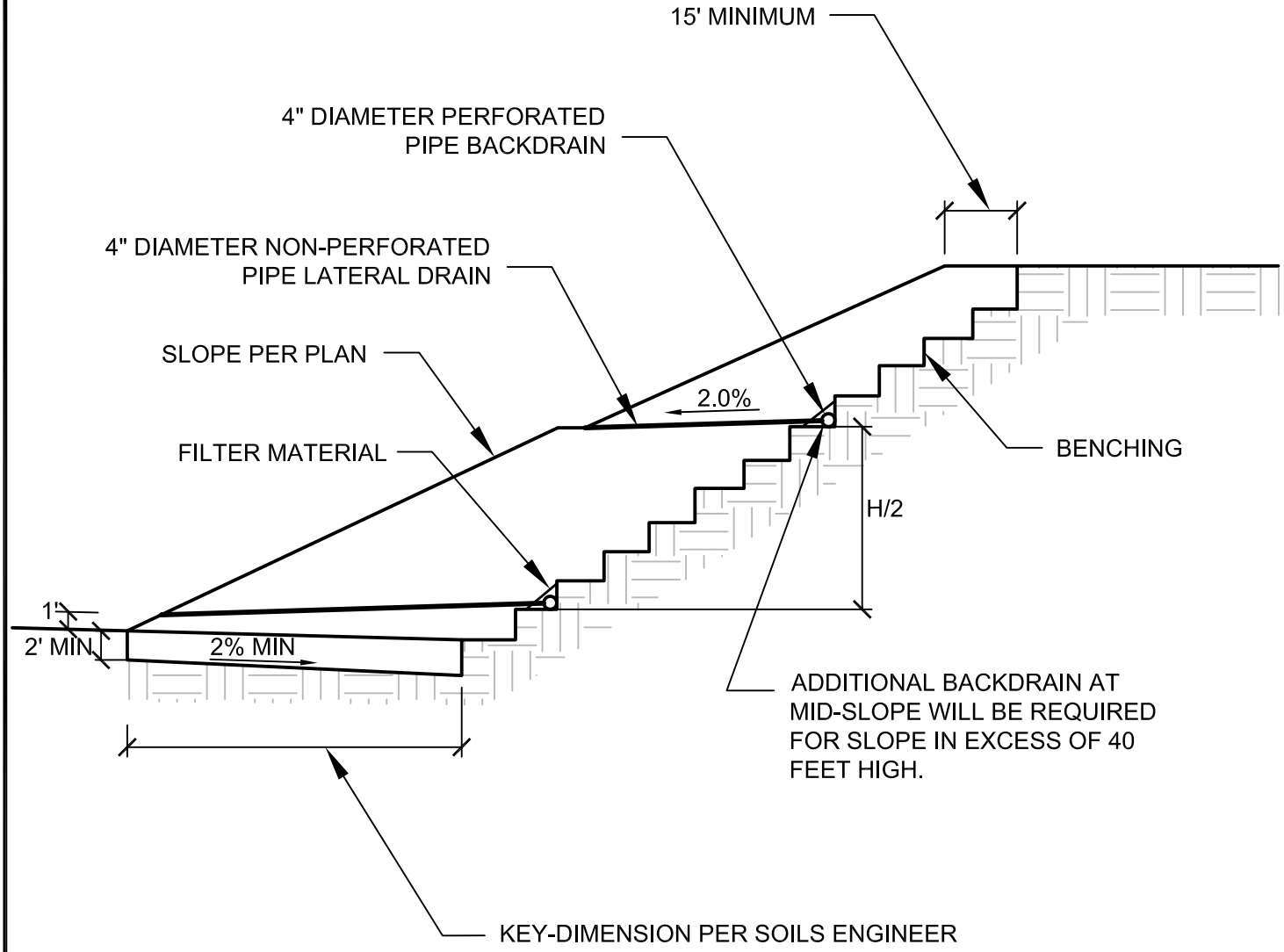
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

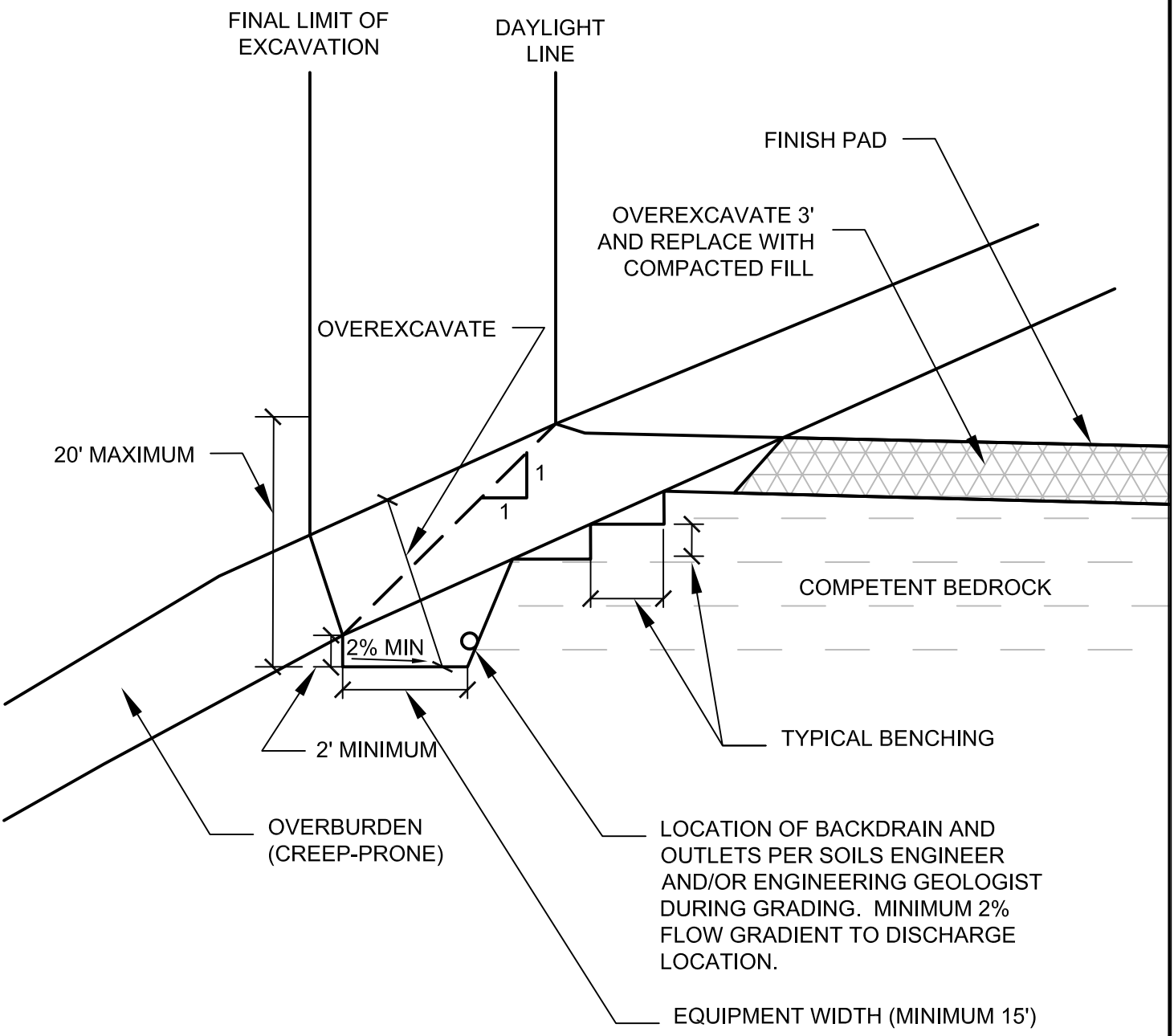
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

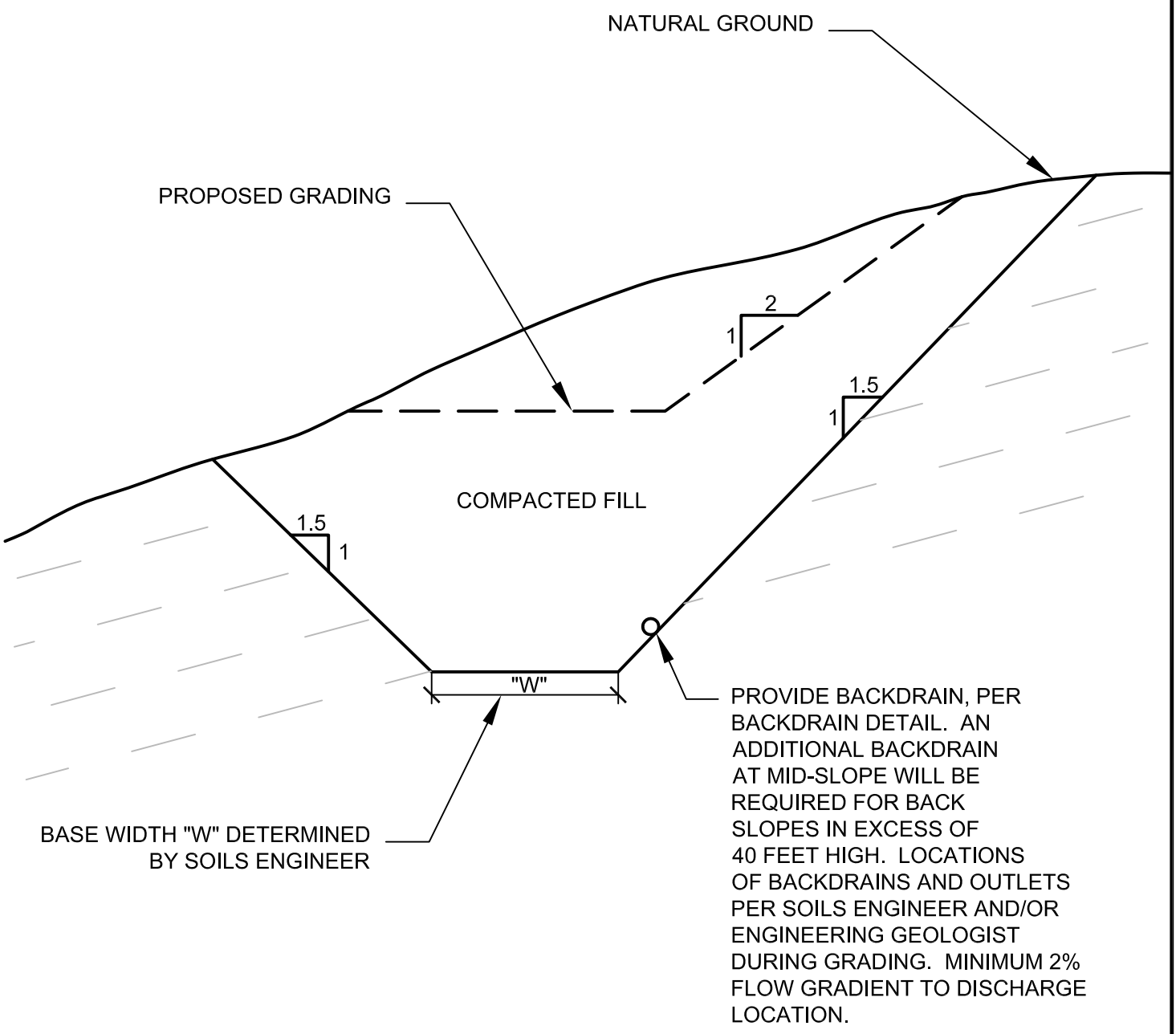
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL



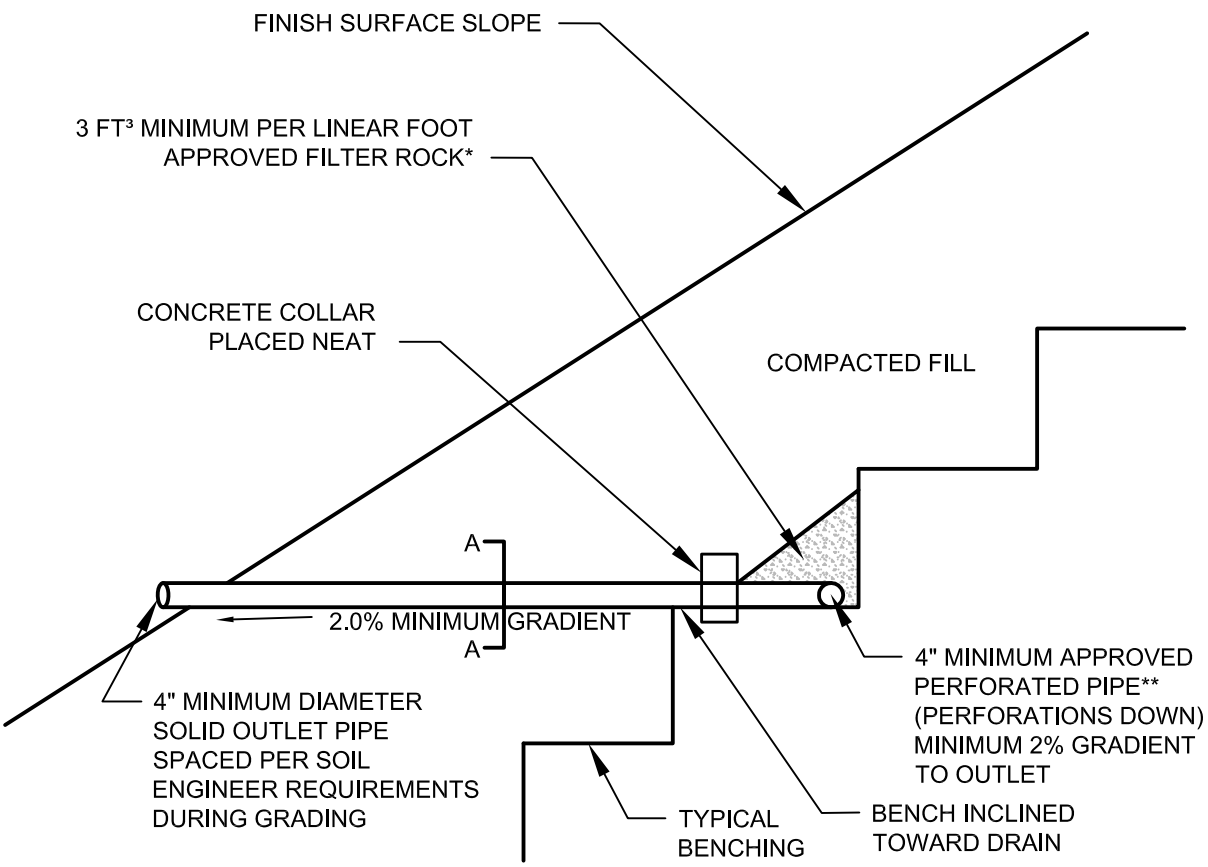
NOT TO SCALE

DAYLIGHT SHEAR KEY DETAIL

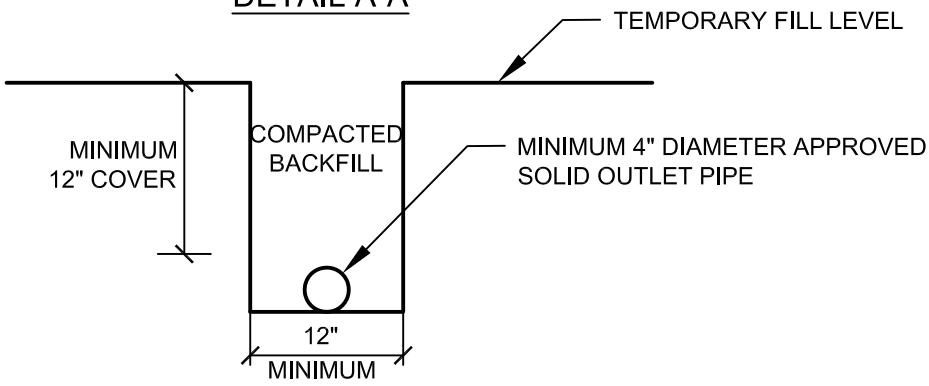


NOT TO SCALE

TYPICAL SHEAR KEY DETAIL



DETAIL A-A



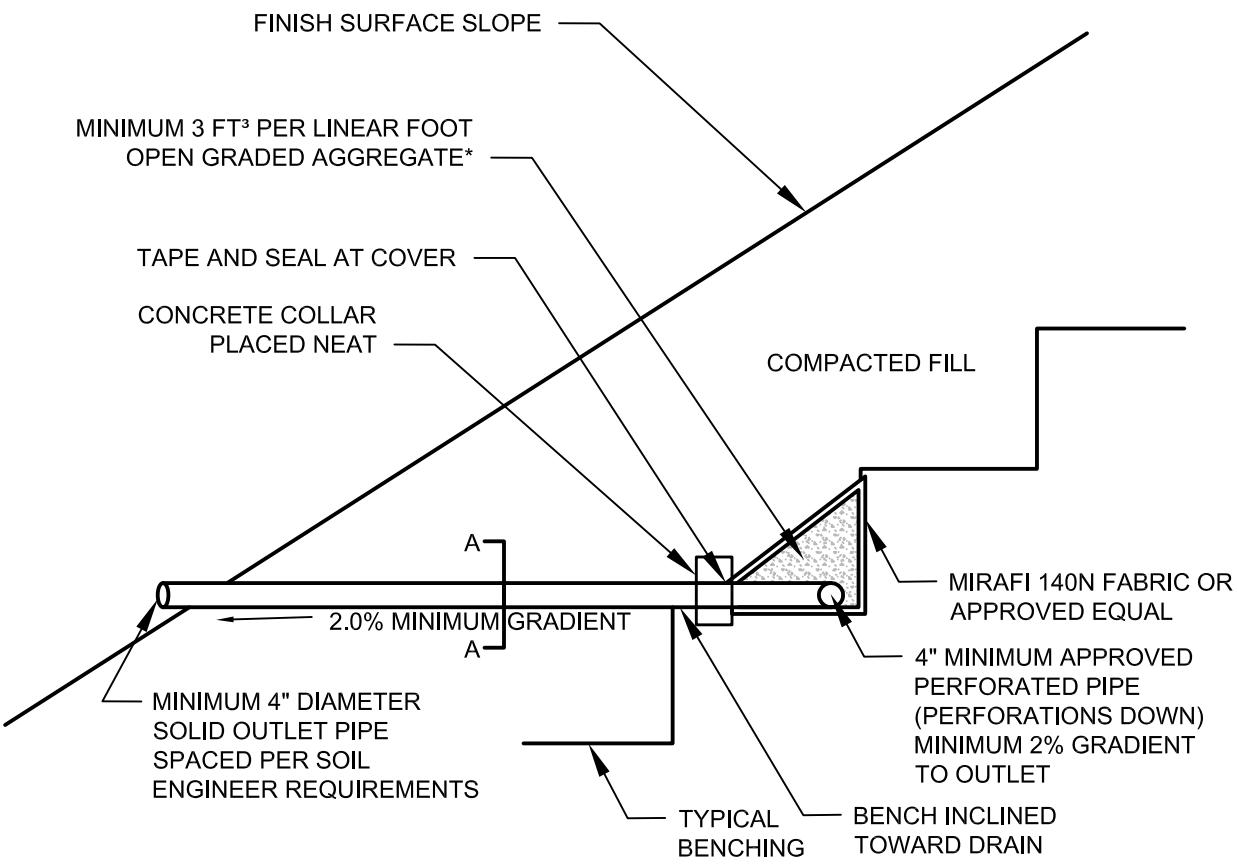
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

*FILTER ROCK TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

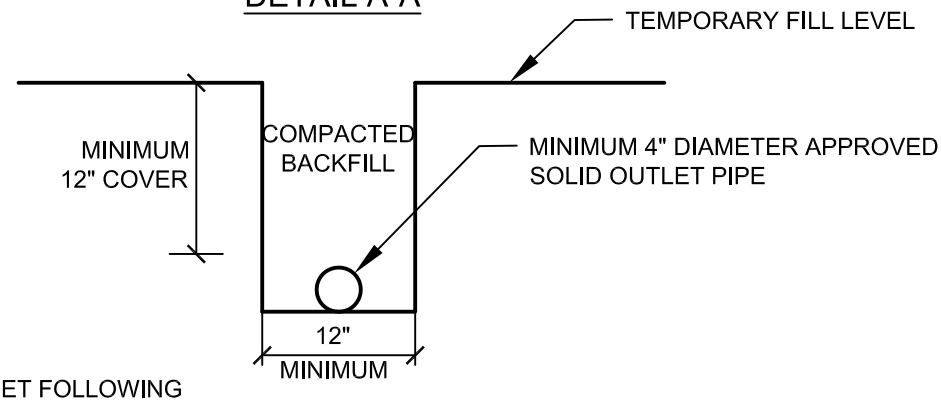
SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



DETAIL A-A

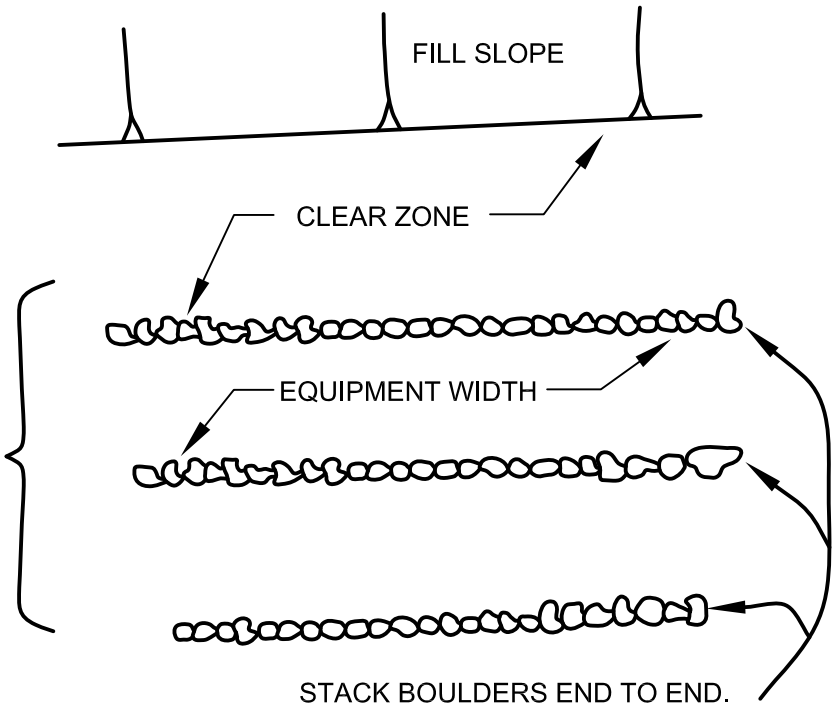


*NOTE: AGGREGATE TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

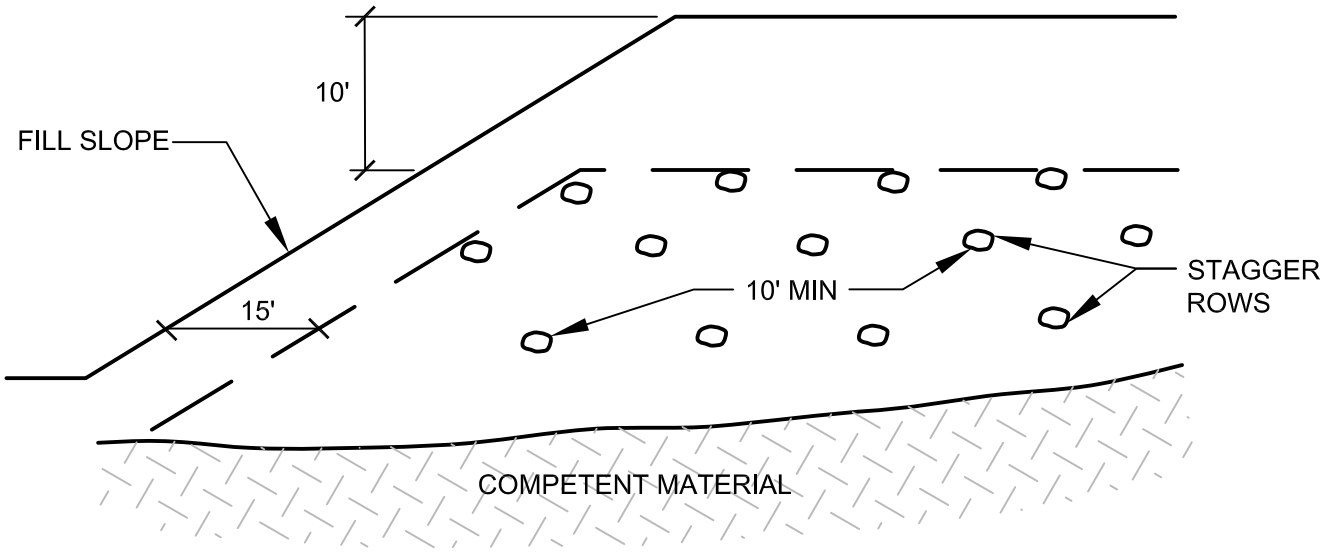
SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

BACKDRAIN DETAIL (GEOFRABIC)

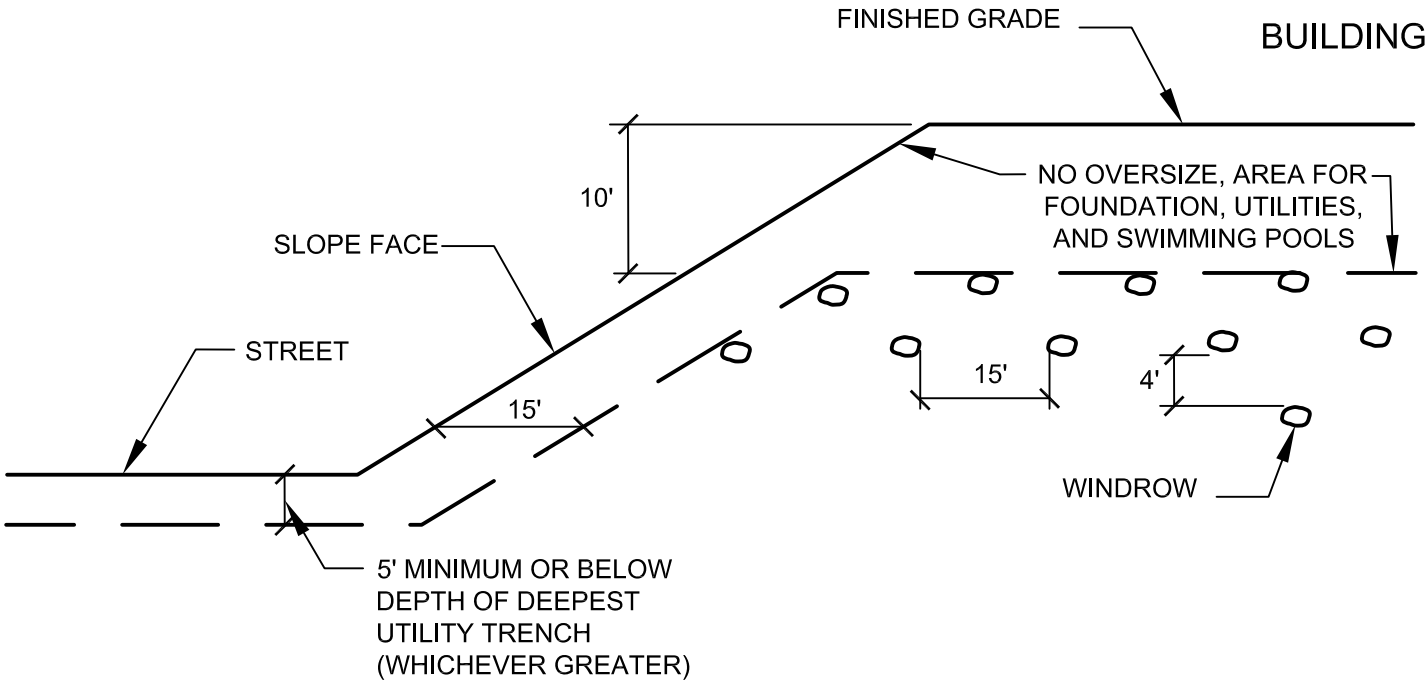


SOIL SHALL BE PUSHED OVER ROCKS AND FLOODED INTO VOIDS. COMPACT AROUND AND OVER EACH WINDROW.

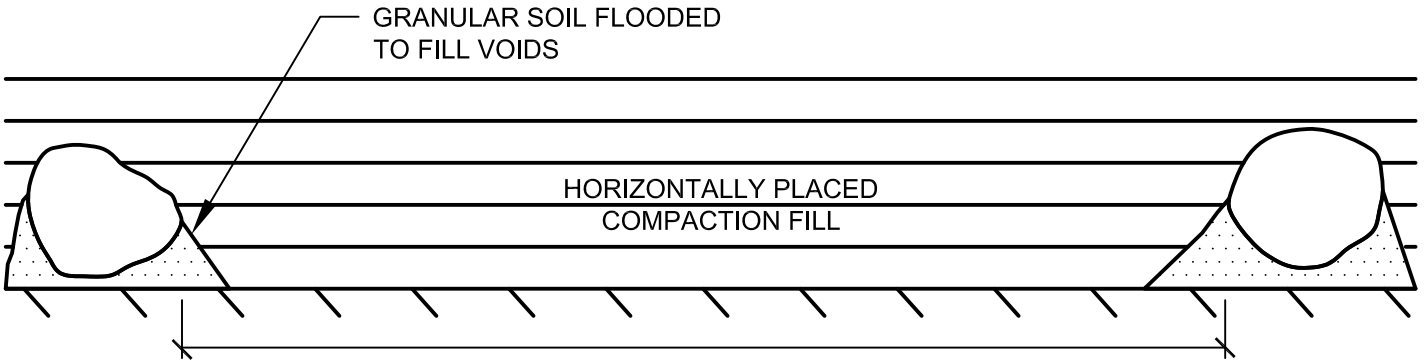


NOT TO SCALE

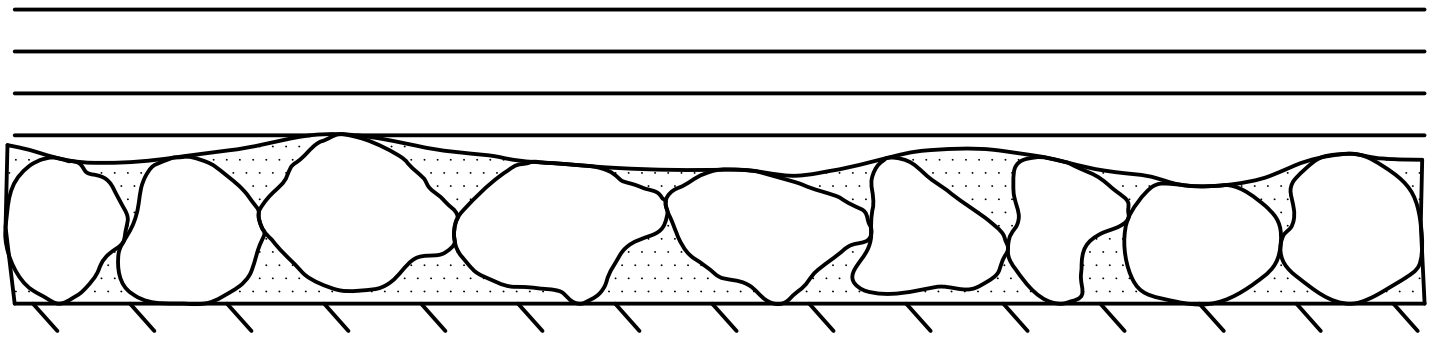
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

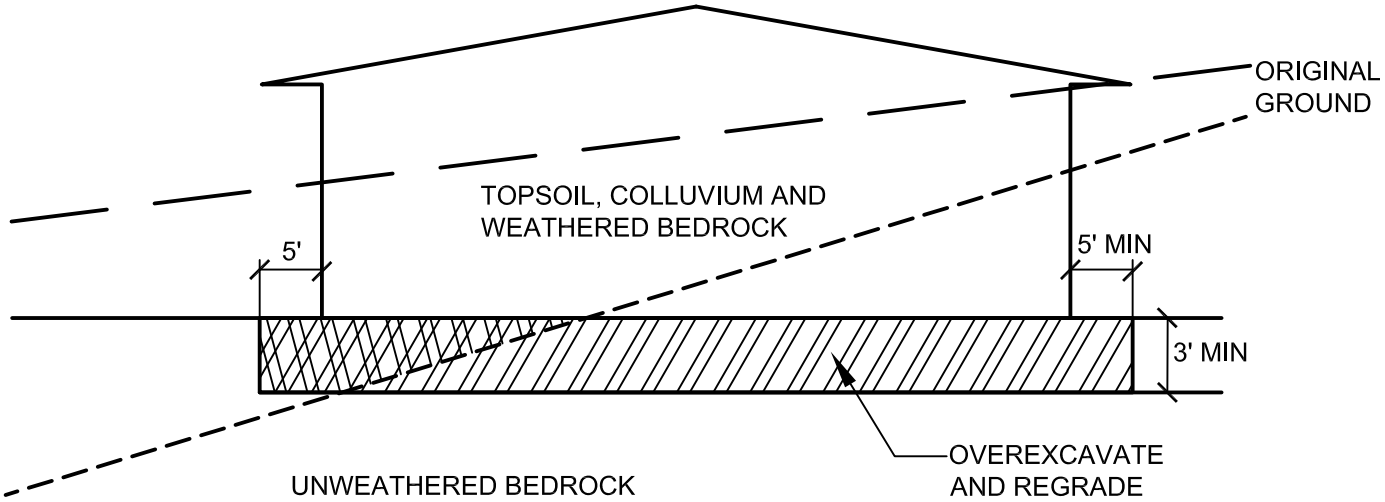


NOT TO SCALE

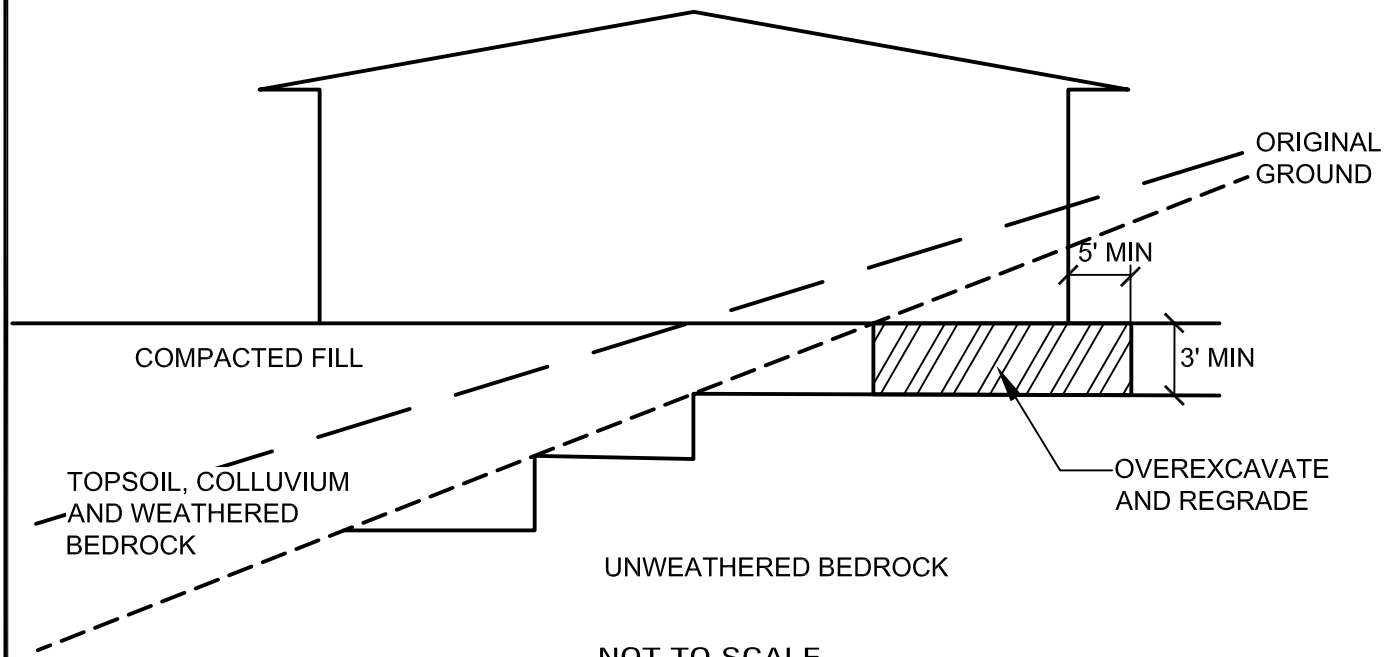
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL

APPENDIX E

PERCOLATION TO INFILTRATION CALCULATIONS AND FIELD DATA

Project:	Vortex Farms						
Project No.:	10-15741G						Tables P-1 - P-3

Percolation Field Data and Calculated Rates

P-1					Total Depth:	35 inches	
Time	Test Interval Time	Test Refill	Water Level Initial/Start	Water Level End/Final	Incremental Water Level Change	Percolation Rate	Percolation Rate
	(minutes)	Depth /Inches	Depth /Inches	Depth /Inches	(inches)	inches/minute	inches/hour
7:45:00	Initial	None	14.00	initial	-		
8:15:00	30	15.5	14.00	18.00	4.00	0.133	8.000
8:45:00	30	15.5	15.50	19.00	3.50	0.117	7.000
9:15:00	30	15.5	15.50	18.50	3.00	0.100	6.000
9:45:00	30	15.5	15.50	18.50	3.00	0.100	6.000
10:15:00	30	15.5	15.50	18.50	3.00	0.100	6.000
10:45:00	30	15.5	15.50	18.50	3.00	0.100	6.000
11:15:00	30	15.5	15.50	18.50	3.00	0.100	6.000
11:45:00	30	15.5	15.50	18.50	3.00	0.100	6.000
12:15:00	30	15.5	15.50	18.50	3.00	0.100	6.000
12:45:00	30	15.5	15.50	18.50	3.00	0.100	6.000
13:15:00	30	15.5	15.50	18.50	3.00	0.100	6.000
13:45:00	30	NO	15.50	18.50	3.00	0.100	6.000

P-2					Total Depth:	58 inches	
Time	Test Interval Time	Test Refill	Water Level Initial/Start	Water Level End/Final	Incremental Water Level Change	Percolation Rate	Percolation Rate
	(minutes)	Depth /Inches	Depth /Inches	Depth /Inches	(inches)	inches/minute	inches/hour
7:50:00	Initial	None	38.00	initial	-		
8:20:00	30	35.5	38.00	47.75	9.750	0.325	19.500
8:50:00	30	36.75	35.50	39.25	3.750	0.125	7.500
9:20:00	30	36.5	36.75	40.50	3.750	0.125	7.500
9:50:00	30	36.25	36.50	40.00	3.500	0.117	7.000
10:20:00	30	36.5	36.25	38.75	2.500	0.083	5.000
10:50:00	30	36.25	36.50	39.75	3.250	0.108	6.500
11:20:00	30	36.5	36.25	39.75	3.500	0.117	7.000
11:50:00	30	36.25	36.50	39.75	3.250	0.108	6.500
12:20:00	30	36.5	36.25	40.25	4.000	0.133	8.000
12:50:00	30	36.5	36.50	40.00	3.500	0.117	7.000
13:20:00	30	36.5	36.50	39.75	3.250	0.108	6.500
13:50:00	30	NO	36.50	40.00	3.500	0.117	7.000

P-3					Total Depth:	59.25 inches	
Time	Test Interval Time	Test Refill	Water Level Initial/Start	Water Level End/Final	Incremental Water Level Change	Percolation Rate	Percolation Rate
	(minutes)	Depth /Inches	Depth /Inches	Depth /Inches	(inches)	inches/minute	inches/hour
7:55:00	Initial	None	7.50	initial	-		
8:20:00	25	6.875	7.50	52.88	45.38	1.815	108.900
8:45:00	25	18.625	6.88	51.00	44.13	1.765	105.900
8:55:00	10	17.25	18.63	26.88	8.25	0.825	49.500
9:05:00	10	17.375	17.25	25.25	8.00	0.800	48.000
9:15:00	10	19.125	17.38	24.88	7.50	0.750	45.000
9:25:00	10	18.625	19.13	25.88	6.75	0.675	40.500
9:35:00	10	18.5	18.63	25.25	6.63	0.663	39.750
9:45:00	10	NO	18.50	24.88	6.38	0.638	38.250

Percolation Rate Conversion P-1

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	18.50
Test Hole Radius,	r =	4
Initial Depth to Water,	D_0 =	15.50
Total Depth of Test Hole,	D_T =	35

H_o =	19.5	in
H_f =	16.5	in
$\Delta H = \Delta D$ =	3	in
H_{avg} =	18	in
I_t =	0.600	in/hr

Percolation Rate Conversion P-2

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	40.00
Test Hole Radius,	r =	4
Initial Depth to Water,	D_0 =	36.50
Total Depth of Test Hole,	D_T =	58

H_o =	21.5	in
H_f =	18	in
$\Delta H = \Delta D$ =	3.5	in
H_{avg} =	19.75	in
I_t =	0.644	in/hr

Percolation Rate Conversion P-3

		Inches
Time Interval,	Δt =	10
Final Depth of Water,	D_f =	24.88
Test Hole Radius,	r =	4
Initial Depth to Water,	D_0 =	18.50
Total Depth of Test Hole,	D_T =	59.25

H_o =	40.75	in
H_f =	34.375	in
$\Delta H = \Delta D$ =	6.375	in
H_{avg} =	37.5625	in
I_t =	1.934	in/hr

TABLE 2.0

RESULTS OF PERCOLATION TESTING WITH MINIMUM FACTOR OF SAFETY APPLIED

Test Location	Test Depth (inches)	Soil Type* (USCS Classification)	Percolation Rate (inches per hour)	Infiltration Rate (inches per hour)	Infiltration Rate with FOS of 3 Applied (inches per hour)
P-1	35	Qya	6.00	0.600	0.300
P-2	58	Qya	7.00	0.644	0.322
P-3	59.25	Qya	38.25	1.934	0.967

Appendix 4: Historical Site Conditions

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

Appendix 5: LID Infeasibility

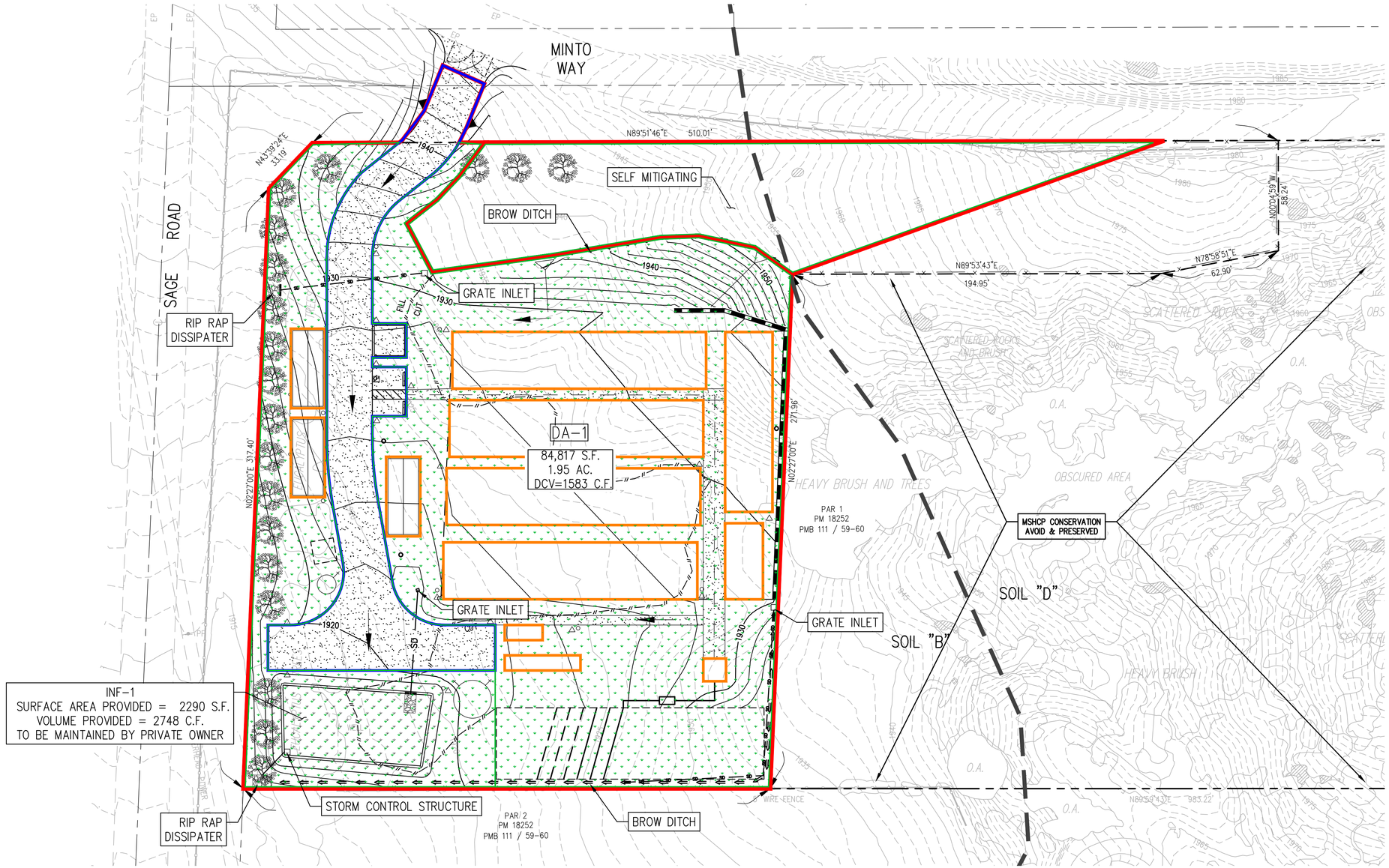
LID Technical Infeasibility Analysis

NOT APPLICABLE

Appendix 6: BMP Design Details

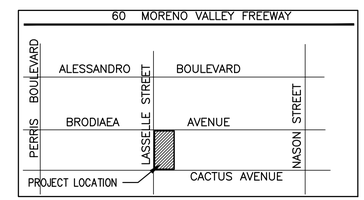
BMP Sizing, Design Details and other Supporting Documentation

WQMP – SITE PLAN



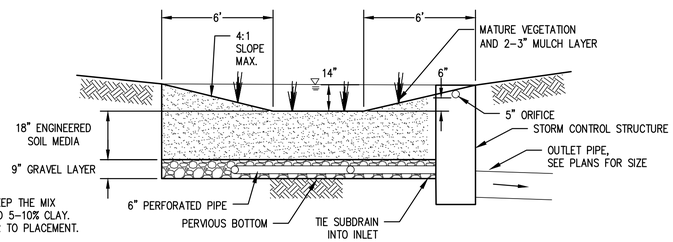
40 0 40 80

GRAPHIC SCALE
SCALE: 1"= 40'



VICINITY MAP

NO SCALE



BIORETENTION BASIN

NOT TO SCALE

18" ENGINEERED SOIL:
ENGINEERED SOIL LAYER SHALL BE MINIMUM 18"DEEP THE MIX SHALL CONTAIN 70-80% SAND, 15-20% SILT, AND 5-10% CLAY. ENGINEERED MIX TO BE APPROVED BY CITY PRIOR TO PLACEMENT.

9" GRAVEL LAYER:
3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 9" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

LEGEND

ITEM	SYMBOL
DRAINAGE AREA BOUNDARY	
DMA-AREA ROOF/HARDSCAPE	
DMA-AREA LANDSCAPE	
PERVIOUS PAVEMENT	
DIRECTION OF SURFACE FLOW	
DRAINAGE AREA DESIGNATION	DA-1
CATCH BASIN (C.B.) WITH FLOW-GARD INSERTS OR APPROVED EQUIAL	C.B.

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

NOT APPLICABLE

JURUPA VALLEY
EASTVALE
NORCO
RIVERSIDE
CORONA
PRADO DAM
LAKE MATHEWS
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 7
CALIMESA
BEAUMONT
BANNING
MORENO VALLEY
MYSTIC LAKE
SAN JACINTO
HEMET
PERRIS
MENIFEE
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA

Project Site
Drains to Diamond
Valley Lake

Legend

Stream Type
- Not Susceptible Stream Channels
- Potentially Susceptible Stream Channels
- Large River (Not Susceptible)
- Santa Ana River
- Adequate Sump

Watershed Areas
- Not Applicable Area
- Applicable Area
- Applicable Area Watershed Boundaries

- Flood Control and Water Conservation District Boundary
- Study Area
- County Boundary

0 1 2 3 4 Miles

HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

Appendix 8: Source Control

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
☒ 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.**

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
❑ 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.**
❑ 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.**

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
☒ 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 in 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/** ☒ **Provide IPM information to new owners, lessees and operators.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ E. **Pools, spas, ponds, decorative fountains, and other water features.**	❑ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environment 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.**

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
☒ 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**
☐ 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**

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 local 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**

❑ 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 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.**

❑ 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.

❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[1] 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 Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[1] **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.**

❑ 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**
❑ 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** ❑ **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.**	
❑ P. **Plazas, sidewalks, and parking lots.**			❑ **Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Collect debris from pressure washing shall be collected to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.**

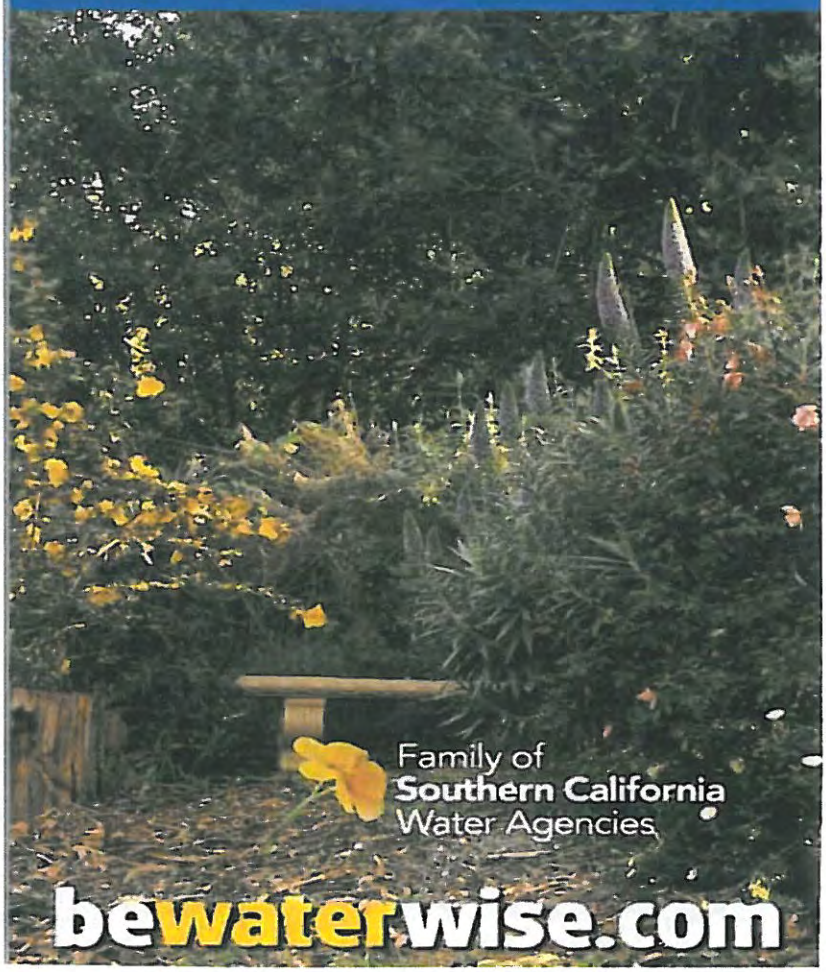
Appendix 9: O&M

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

Appendix 10: Educational Materials

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

10 Ways to Save Water Outdoors



TIP #1 The average homeowner uses twice the amount of water needed to keep plants healthy. Use the watering calculator and index at **bewaterwise.com** to know exactly how much water your plants need.

TIP #2 Check your sprinkler system for leaks, overspray and broken sprinkler heads. Update with drip or other more water-efficient sprinklers where appropriate.

TIP #3 This fall, plant a portion of your garden with beautiful native and California Friendly plants. Browse the plant database at **bewaterwise.com** to find just the right look for your outdoor spaces.

TIP #4 Reduce the amount of water-thirsty grass. Keep only what you need and replace the rest with less-thirsty plants or permeable paving.

TIP #5 For the grass you keep, set your lawnmower blade higher.

TIP #6 Adjust your sprinkler timer downward in September. Plants need less water when days are shorter.

TIP #7 Use a broom instead of the hose for cleaning sidewalks and patios.

TIP #8 Mulch! A layer of bark, gravel, compost, sawdust or low-growing groundcover evens out soil temperature and allows better water retention.

TIP #9 Check the list of invasive plants that hurt our environment at **caleppc.org** and remove any from your garden.

TIP #10 Share these tips with your gardener, neighbors and friends. Water conservation should be a part of every Southern Californian's lifestyle, but that doesn't mean we can't have lush and beautiful outdoor spaces.

bewaterwise.com

A Citizen's Guide to Understanding Stormwater

After the Storm

For more information contact:

or visit

www.epa.gov/npdes/stormwater

www.epa.gov/nps

EPA 833-B-03-002
January 2003
United States Environmental Protection Agency

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.

- Debris--plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.

- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater Pollution Solutions

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

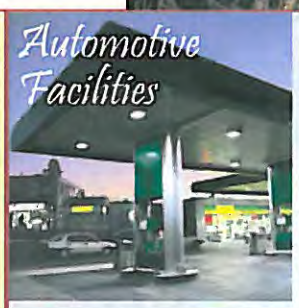
- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible

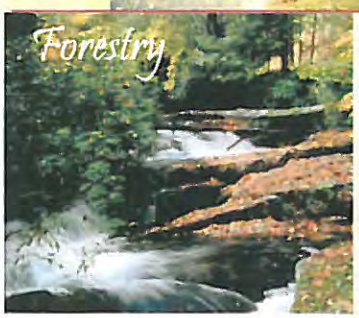
Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.



Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

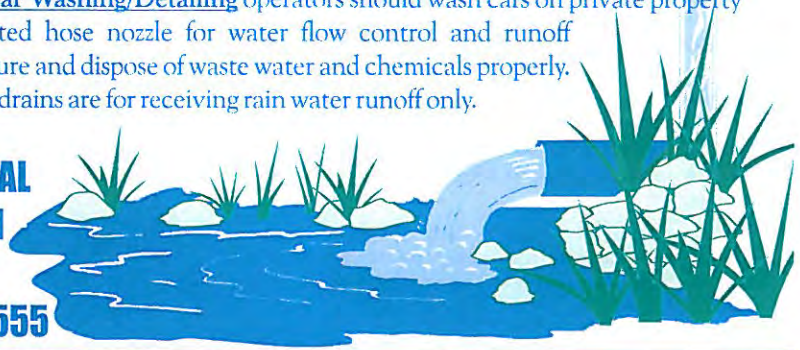
Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Don't waste another minute wasting water

bewaterwise.com®

5 Things to Know about California's Drought

1. It's one of the worst in California's history
2. Storage levels are dropping, preserve our reserves
3. Conservation is key in hot summer and fall
4. Limiting outdoor water use equals big savings
5. Do your part, go to bewaterwise.com® for water-saving tips and valuable rebates

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

WATER SAVING TIPS

Southern Californians have done a good job conserving water. But the multi-year drought has reduced our water reserve levels. More saving must be done to make sure there is water for the future. Be sure to check with your local water agency to find out about mandatory requirements that may be in place where you live.

Here are some helpful things you can do to save water:

Outdoor

- Water your yard early in the morning or later in the evening to reduce evaporation. Save up to 25 gallons a day.
- Keep mulch around plants to reduce evaporation and save hundreds of gallons a year.
- Use a broom instead of a hose to clean driveways, sidewalks and patios. You'll save 150 gallons a week.
- Fix sprinkler leaks, overspray and broken sprinkler heads. You'll save 500 gallons a month.
- Replace part of your lawn with California Friendly® plants and save thousands of gallons a month.

Indoor

- Turn off the water when you brush your teeth and shorten your showers to 5 minutes. Save up to 25 gallons a day.
- Fix leaking faucets and running toilets. Save 20 gallons a day.
- Wash only full loads of laundry and save between 15 and 50 gallons each time.
- Buy water-saving devices like high-efficiency toilets and clothes washers. These are eligible for rebates! Check bewaterwise.com®.
- Talk to your family and friends about saving water. If everyone does a little, we save a lot.

bewaterwise.com®

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA