FOR REVIEW ONLY

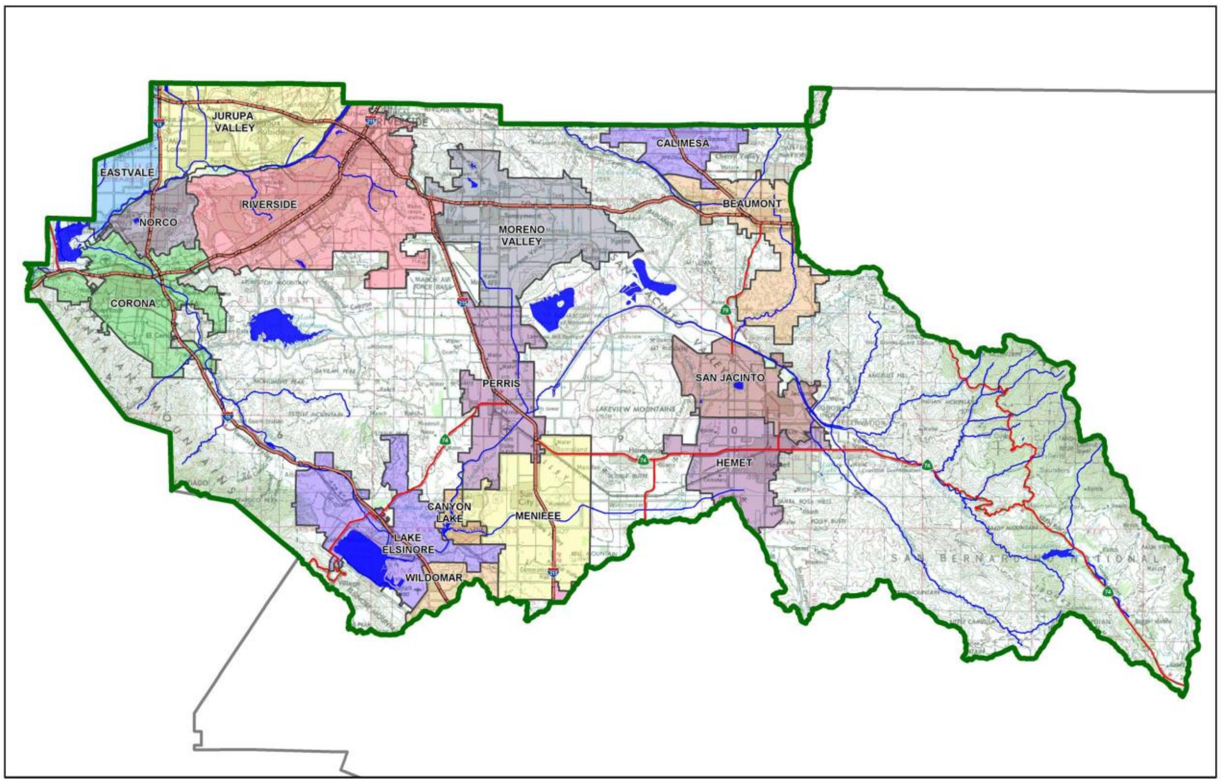
Project Specific Water Quality Management Plan

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

Project Title: Oak Valley North – Building 3

Development No: ________

Design Review/Case No: ________



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☒ **Preliminary**
☐ **Final**

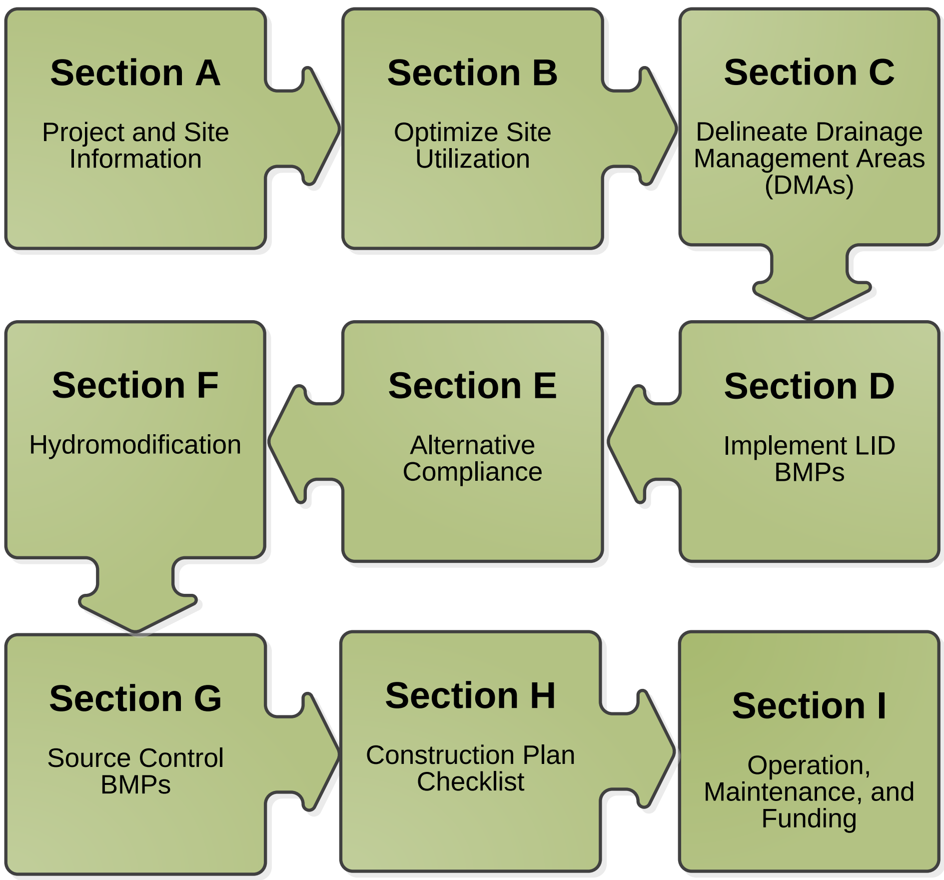
Original Date Prepared: November 2022

Revision Date(s): June 2023

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

A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for QR Birtcher Oak Valley Owner LLC by Albert A. Webb Associates for the Oak Valley North – Building 3 project.

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

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

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

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

PREPARER'S CERTIFICATION

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

DRAFT	______________________________
Preparer's Signature	Date
Sarah Kowalski, P.E.	Senior Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

Project Information	
Type of Project:	*Industrial/Business Park*
Planning Area:	*Oak Valley North*
Community Name:	
Development Name:	*Building 3*
Project Location	
Latitude & Longitude (DMS): *33°58'34" N / 117°02'28" W*	
Project Watershed and Sub-Watershed: *Santa Ana Watershed*	
APN(s): *Portion of 413-260-018; Portion of 413-280-030, -036, and -037*	
Map Book and Page No.: *Thomas Bros. Map Page 689, Grid J4; Page 690, Grid A3, A4, and B4*	
Project Characteristics	
Proposed or Potential Land Use(s)	*Industrial, Business Park*
Proposed or Potential SIC Code(s)	*1541 – General Contractors, Industrial Buildings and Warehouses; 1542 – General Contractors, Non-Residential Other than Industrial and Warehouses*
Area of Impervious Project Footprint (SF)	*553,000± SF*
Total Area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	*553,000± 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 <u>existing</u> Impervious Surfaces within the project limits (SF)	*0 SF*
Is the project located within any MSHCP Criteria Cell?	☐ *Y* ☒ *N*
If so, identify the Cell number:	*n/a*
Are there any natural hydrologic features on the project site?	☒ *Y* ☐ *N*
Is a Geotechnical Report attached?	☒ *Y* ☐ *N*
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	*B*
What is the Water Quality Design Storm Depth for the project?	*0.796 in*

Project Description

The Oak Valley North – Building 3 project proposes an industrial development in the City of Calimesa on approximately 14 acres of vacant land. The project site is bounded to the southwest, northwest, southeast, and northeast by currently vacant land. The surrounding areas are part of separate permit cases for future industrial development. Runoff from the onsite area and offsite areas north of the overall project area (consisting mainly of the San Bernardino Mountain Ranges) currently run through the site from northeast to southwest. This runoff is generally conveyed throughout the vacant site via existing, natural streambed areas that continue towards the southern boundary before ultimately discharging *into Caltrans culverts that cross Interstate-10 (I-10) highway before ultimately discharging into the San Timoteo Creek.*

For the proposed condition, runoff is captured through a series of catch basins and grate inlets located throughout the site at localized low points.

Based on a preliminary geotechnical investigation, an infiltration-based BMP is not feasible. This is due to poor infiltration capacities of the existing soil, as well as potentially collapsible soil being present throughout the site. Due to site constraints, Modular Wetland System (MWS) vaults are being proposed to treat onsite runoff for water quality requirements. The location and sizing of these MWS vaults throughout the site are based on the location of localized low points and subsequent area tributary to the inlet. Some smaller areas (mainly portions of the proposed driveways and adjacent slope areas) within the project boundary drain into the perimeter roadways. In this preliminary analysis, all areas within the project boundary have been considered in the QBMP calculations, upsizing some treatment devices to ensure the full project boundary is treated.

Captured flows are proposed to enter the MWS vaults for water quality treatment then discharge into the proposed underground detention system. Mitigated flows outlet to the existing Caltrans culverts. The proposed MWS vaults contain an internal bypass weir structure allowing for runoff from larger storm events to bypass the vaults and enter the onsite storm drain facilities.

The project is required to address increased runoff mitigation for the 2-year, 24-hour storm event to meet HCOC mitigation requirements. The project site does not meet the HCOC exemptions in Section F.1, therefore underground detention systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 2-year, 24-hour storm event to meet the condition in Section F.2. There are no offsite flows from the perimeter streets entering the project site. Therefore, the proposed underground detention and orifice system will only mitigate onsite flows.

A.1 Maps and Site Plans

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

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

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

A.2 Identify Receiving Waters

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

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 *(Yucaipa Creek to Headwaters)*	*Indicator Bacteria*	*GWR,* ***RARE****, REC1, REC2, WARM, WILD*	*2± miles*
San Timoteo Creek Reach 2 *(Gage at San Timoteo Creek to Yucaipa Creek)*	*Indicator Bacteria*	*GWR, REC1, REC2, WARM, WILD*	*Not designated as RARE*
San Timoteo Creek Reach 1B & 1A *(Santa Ana River Confluence to Barton Road to Gage at San Timoteo Creek)*	*Indicator Bacteria*	*AGR, GWR,* ***RARE****, REC1, REC2, WARM, WILD*	*7± miles*
Santa Ana River Reach 5 *(San Jacinto Fault in San Bernardino to Seven Oaks Dam)*	*Not Listed*	*AGR, GWR, MUN,* ***RARE****, REC1, REC2, WARM, WILD*	*17± miles*
Santa Ana River Reach 4 *(Mission Blvd. to San Jacinto Fault in San Bernardino)*	*Indicator Bacteria*	*GWR,* ***RARE****, REC1, REC2, SPWN, WARM, WILD*	*19± miles*
Santa Ana River Reach 3 *(Prado Dam to Mission Blvd.)*	*Copper, Indicator Bacteria, Lead*	*AGR, GWR,* ***RARE****, REC1, REC2, SPWN, WARM, WILD*	*22± miles*
Prado Basin Management Zone	*pH*	***RARE****, REC1, REC2, WARM, WILD*	*35± miles*

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

Table A.2 Other Applicable Permits

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

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

Section B: Optimize Site Utilization (LID Principles)

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

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

Site Optimization

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

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

Yes. The currently vacant site generally drains from northeast to southwest towards existing Caltrans culverts. In this existing condition, flows are generally conveyed via smaller streambed areas that run throughout the project site. These smaller streambed areas discharge flows south, offsite into the culverts.

In the developed condition, a network of catch basins and inlets will capture flows generated onsite. After being treated by proposed MWS vaults, flows are conveyed towards the existing culverts, similar to the existing condition.

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

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

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

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

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

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

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

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

Section C: Delineate Drainage Management Areas (DMAs)

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

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA 3-A	*Roofs*	*0*	*D*
	Hardscape	*55,786*	*D*
	Ornamental Landscaping	*19,729*	*D*
DMA 3-B	*Roofs*	*62,250*	*D*
	Hardscape	*51,920*	*D*
	Ornamental Landscaping	*0*	*D*
DMA 3-C	*Roofs*	*62,250*	*D*
	Hardscape	*58,655*	*D*
	Ornamental Landscaping	*2,879*	*D*
DMA 3-D	*Roofs*	*62,252*	*D*
	Hardscape	*47,589*	*D*
	Ornamental Landscaping	*0*	*D*
DMA 3-E	*Roofs*	*62,252*	*D*
	Hardscape	*60,449*	*D*
	Ornamental Landscaping	*6,327*	*D*
DMA 3-F	*Hardscape*	*29,582*	*D*
	Ornamental Landscaping	*12,623*	*D*

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

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

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

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

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

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

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

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

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

DMA Name or ID	BMP Name or ID
DMA 3-A	*MWS Vault (1 – 8'x12' vault)*
DMA 3-B	*MWS Vault (1 – 8'x20' vault)*
DMA 3-C	*MWS Vault (1 – 8'x20' vault)*
DMA 3-D	*MWS Vault (1 – 8'x16' vault)*
DMA 3-E	*MWS Vault (1 – 8'x20' vault)*
DMA 3-F	*MWS Vault (1 – 8'x8' vault)*

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

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

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

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

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

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

D.2 Harvest and Use Assessment

Please check what applies*:*

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

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

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

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

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: *n/a*

Type of Landscaping (Conservation Design or Active Turf): *n/a*

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

Total Area of Impervious Surfaces: n/a

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

Enter your EIATIA factor: *n/a*

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

Minimum required irrigated area: *n/a*

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

Minimum required irrigated area (Step 4)	**Available Irrigated Landscape (Step 1)**
n/a	*n/a*

Toilet Use Feasibility

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

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

Projected Number of Daily Toilet Users: n/a

Project Type: n/a

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

Total Area of Impervious Surfaces: n/a

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

Enter your TUTIA factor: n/a

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

Minimum number of toilet users: n/a

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

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

Other Non-Potable Use Feasibility

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

n/a

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

Average Daily Demand: n/a

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

Total Area of Impervious Surfaces: n/a

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

Enter the factor from Table 2-3: n/a

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

Minimum required use: n/a

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

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

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

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

D.5 LID BMP Sizing

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

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA 3-A*		
	[A]		[B]	[C]	[A] x [C]			
						Design Rainfall Intensity (in/hr)	*Design Flow Rate, **Q_{BMP}** (cfs)*	*Proposed Flow Rate (cfs)*
Roofs	*0*	*Roofs*	*1*	*0.89*	*0*			
Hardscape	*55,786*	*Concrete or Asphalt*	*1*	*0.89*	*49,761*			
Landscape	*19,729*	*Ornamental Landscaping*	*0.1*	*0.11*	*2,179*			
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{43{,}560}$	[G]
	75,515				*51,940*	*0.2*	*0.2*	*0.3*

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

Table D.4 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA 3-B*		
	[A]		[B]	[C]	[A] x [C]			
Roofs	*62,250*	*Roofs*	*1*	*0.89*	*55,527*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Hardscape	*51,920*	*Concrete or Asphalt*	*1*	*0.89*	*46,313*			
Landscape	*0*	*Ornamental Landscaping*	*0.1*	*0.11*	*0*			
	$A_T = \Sigma[A]$				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{43,560}$	[G]
	114,170				*101,840*	*0.2*	*0.5*	*0.6*

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

Table D.5 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA 3-C*		
	[A]		[B]	[C]	[A] x [C]			
Roofs	*62,250*	*Roofs*	*1*	*0.89*	*55,527*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Hardscape	*58,655*	*Concrete or Asphalt*	*1*	*0.89*	*52,320*			
Landscape	*2,879*	*Ornamental Landscaping*	*0.1*	*0.11*	*318*			
	$A_T = \Sigma[A]$				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{43,560}$	[G]
	123,784				*108,165*	*0.2*	*0.5*	*0.6*

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

Table D.6 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA 3-D*		
	[A]		[B]	[C]	[A] x [C]			
Roofs	*62,252*	*Roofs*	*1*	*0.89*	*55,529*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Hardscape	*47,589*	*Concrete or Asphalt*	*1*	*0.89*	*42,449*			
Landscape	*0*	*Ornamental Landscaping*	*0.1*	*0.11*	*0*			
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{43,560}$	[G]
	109,841				*97,978*	*0.2*	*0.4*	*0.5*

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

Table D.7 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA 3-E*		
	[A]		[B]	[C]	[A] x [C]			
Roofs	*62,252*	*Roofs*	*1*	*0.89*	*55,529*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Hardscape	*60,449*	*Concrete or Asphalt*	*1*	*0.89*	*53,921*			
Landscape	*6,327*	*Ornamental Landscaping*	*0.1*	*0.11*	*699*			
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{43,560}$	[G]
	129,028				*110,148*	*0.2*	*0.5*	*0.6*

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

Table D.8 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	DMA 3-F		
	[A]		[B]	[C]	[A] x [C]			
Hardscape	*29,582*	*Concrete or Asphalt*	*1*	*0.89*	*26,387*	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate, Q_{BMP} (cfs)*	*Proposed Flow Rate (cfs)*
Landscape	*12,623*	*Ornamental Landscaping*	*0.1*	*0.11*	*1,394*			
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{43{,}560}$	[G]
	42,205				*27,781*	*0.2*	*0.1*	*0.2*

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

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

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

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

n/a

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

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

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
n/a	*n/a*
Total Credit Percentage[1]	

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

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

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

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

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

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

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

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

If Yes, HCOC criteria do not apply.

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

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

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

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

Table F.1 Hydrologic Conditions of Concern Summary

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

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

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

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

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

n/a

F.2 HCOC Mitigation

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

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

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

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

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

The project site does not meet the HCOC exemptions in Section F.1, therefore underground detention systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 2-year, 24-hour storm event to meet the condition c in Section F.2. There are no offsite flows entering the project site. Therefore, the proposed underground detention and orifice systems will only mitigate onsite flows. The 2-year, 24-hour unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. For preliminary sizing during this entitlement phase, onsite underground detention system was sized for the proposed volume of the largest 100-year storm event. During final engineering, a routing analysis will need to be performed to determine the required orifice outlet sizing and to demonstrate that the proposed underground detention system has substantial volume needed to mitigate flows to existing condition flow rates. See Appendix 7 for the unit hydrography analysis details.

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

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

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

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

	local waste water treatment plant.	
Fuel Dispensing Areas		*The property owner shall dry sweep the fueling area routinely.* *See the Fact Sheet SD-30, "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com*

Section H: Construction Plan Checklist

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

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
*	*	*

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

** Section H will be completed and addressed during Final WQMP.*

Section I: Operation, Maintenance and Funding

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

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

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

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

Maintenance Mechanism: *Property Owner**

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

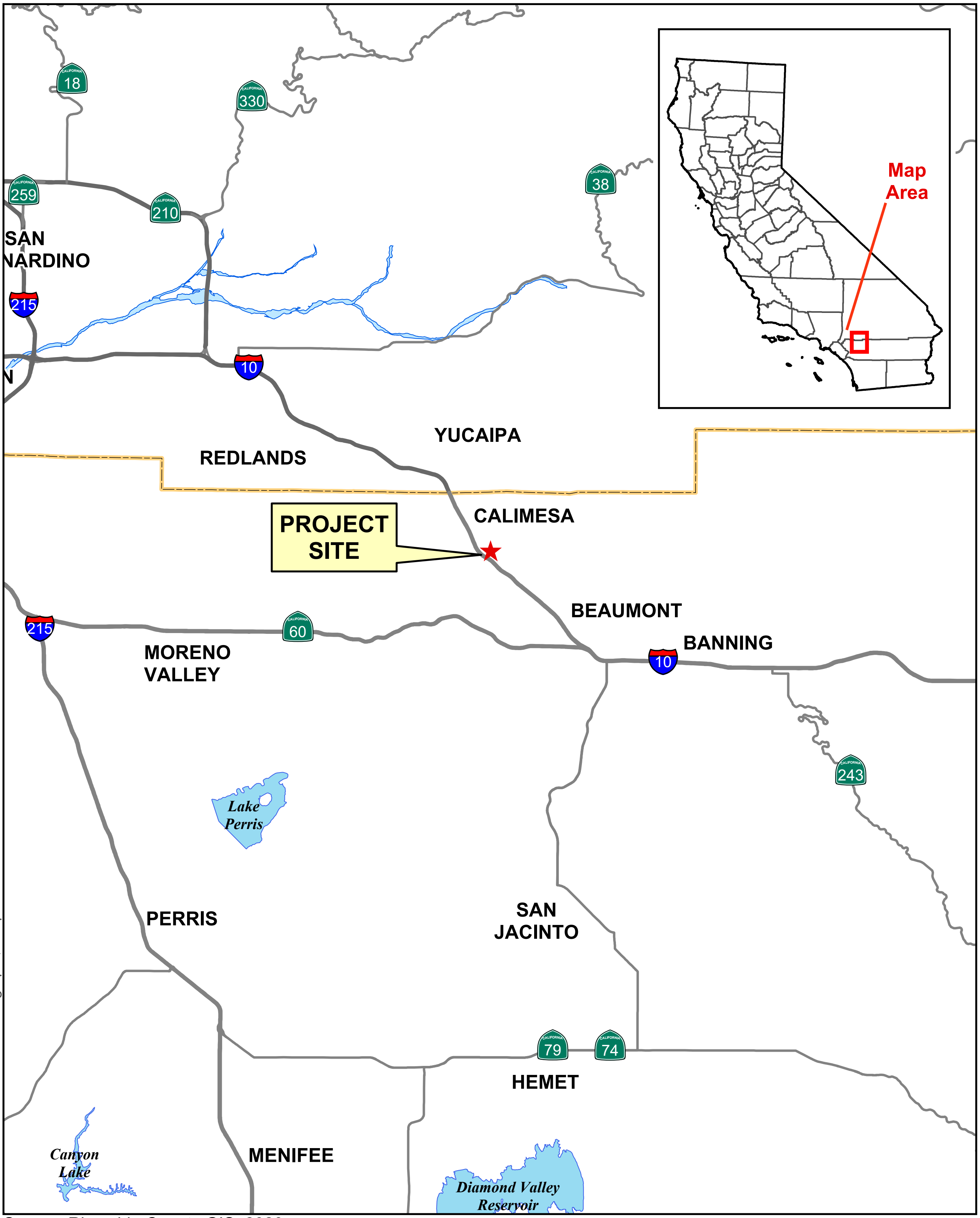
☒ Y ☐ N

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

** Section H will be completed and addressed during Final WQMP.*

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

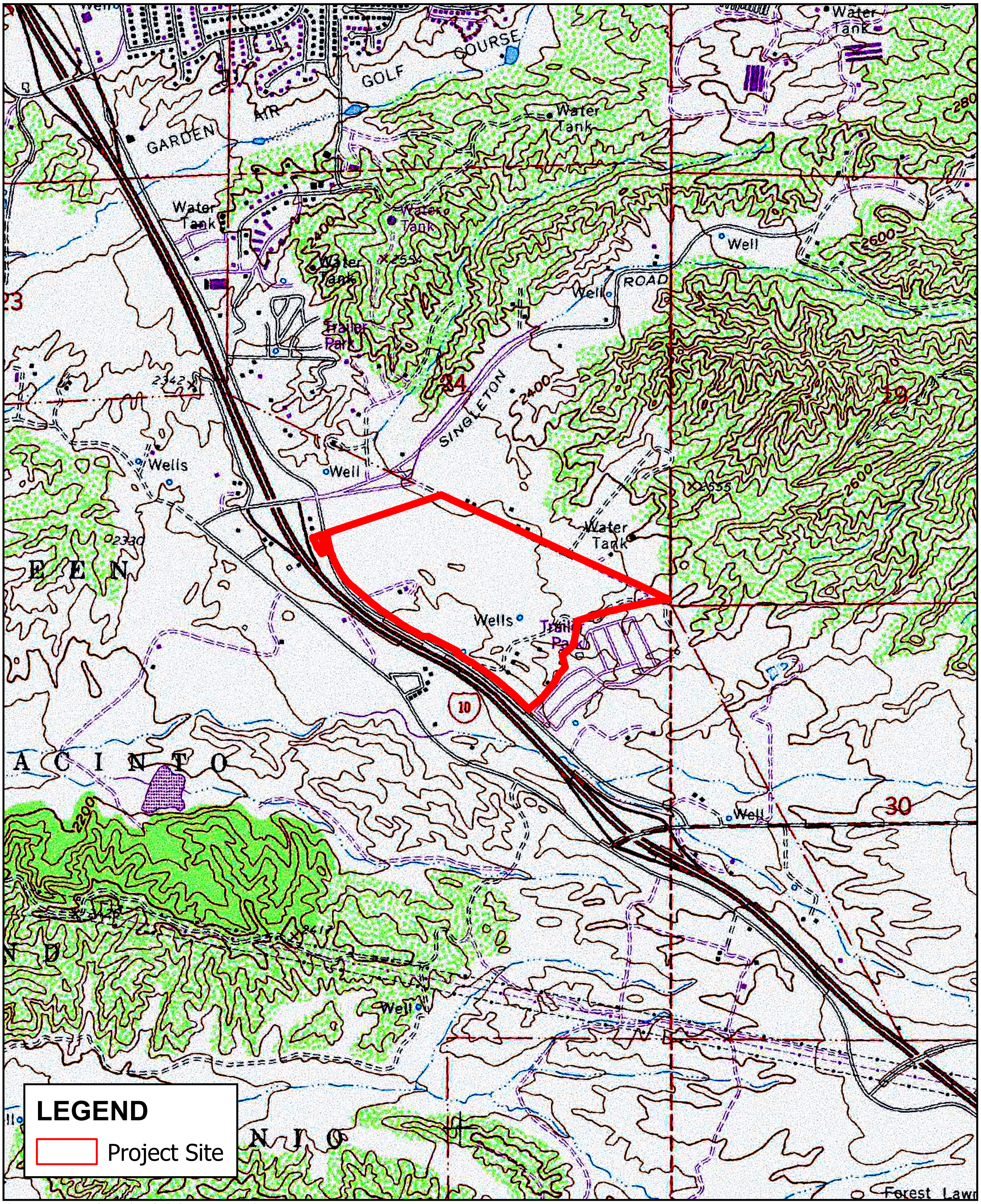


Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure – Vicinity Map

Calimesa Entitlement Birtcher



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Sources: ESRI / USGS 7.5min Quads

0 1,000 2,000 3,000 Feet

Figure - USGS Map

Calimesa Entitlement Birtcher

ALBERT A. WEBB ASSOCIATES

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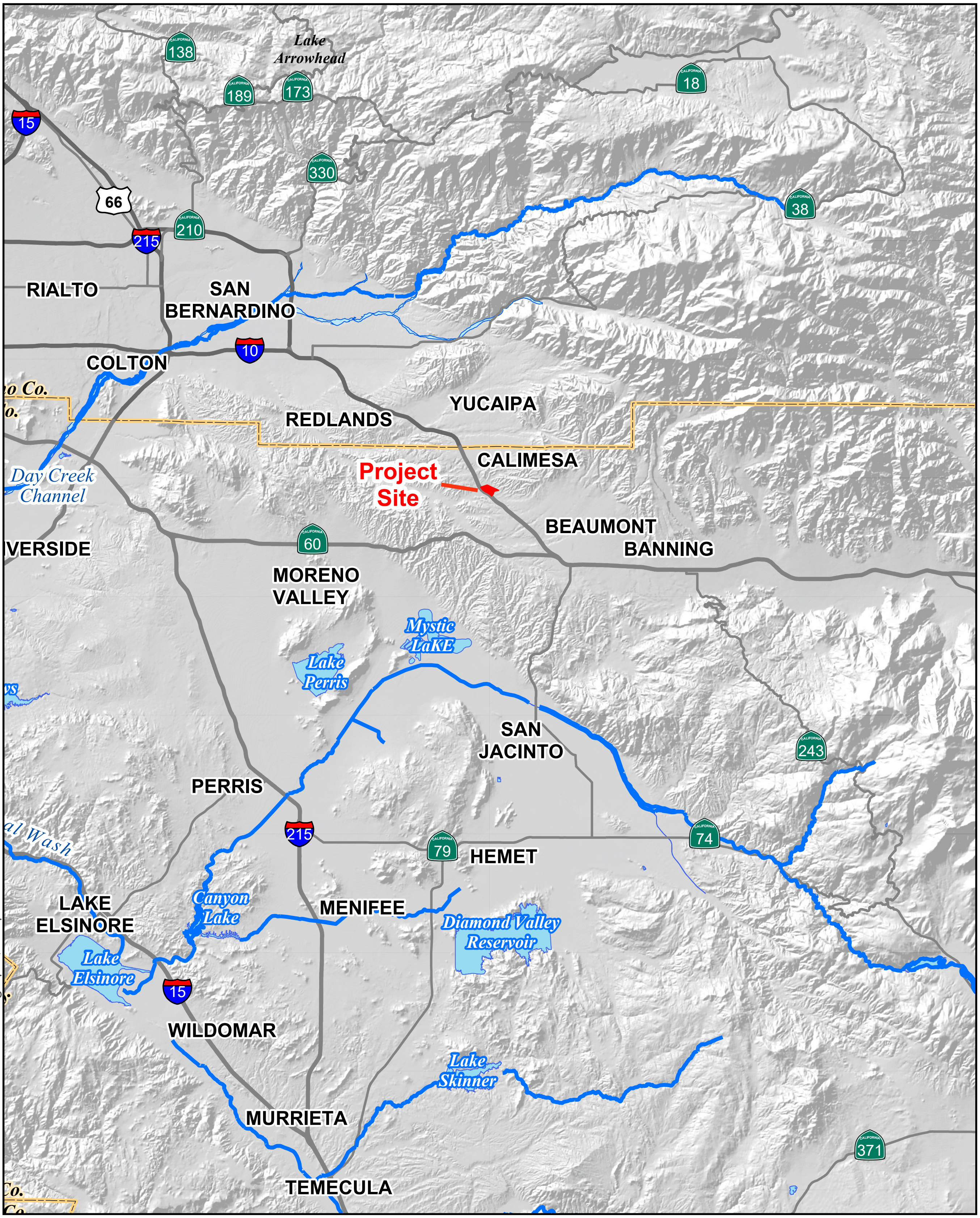
Source: Riverside Co. GIS, 2022.

Figure - Aerial Map

Calimesa Entitlement Birtcher

0 500 1,000 1,500 Feet

ALBERT A. WEBB ASSOCIATES

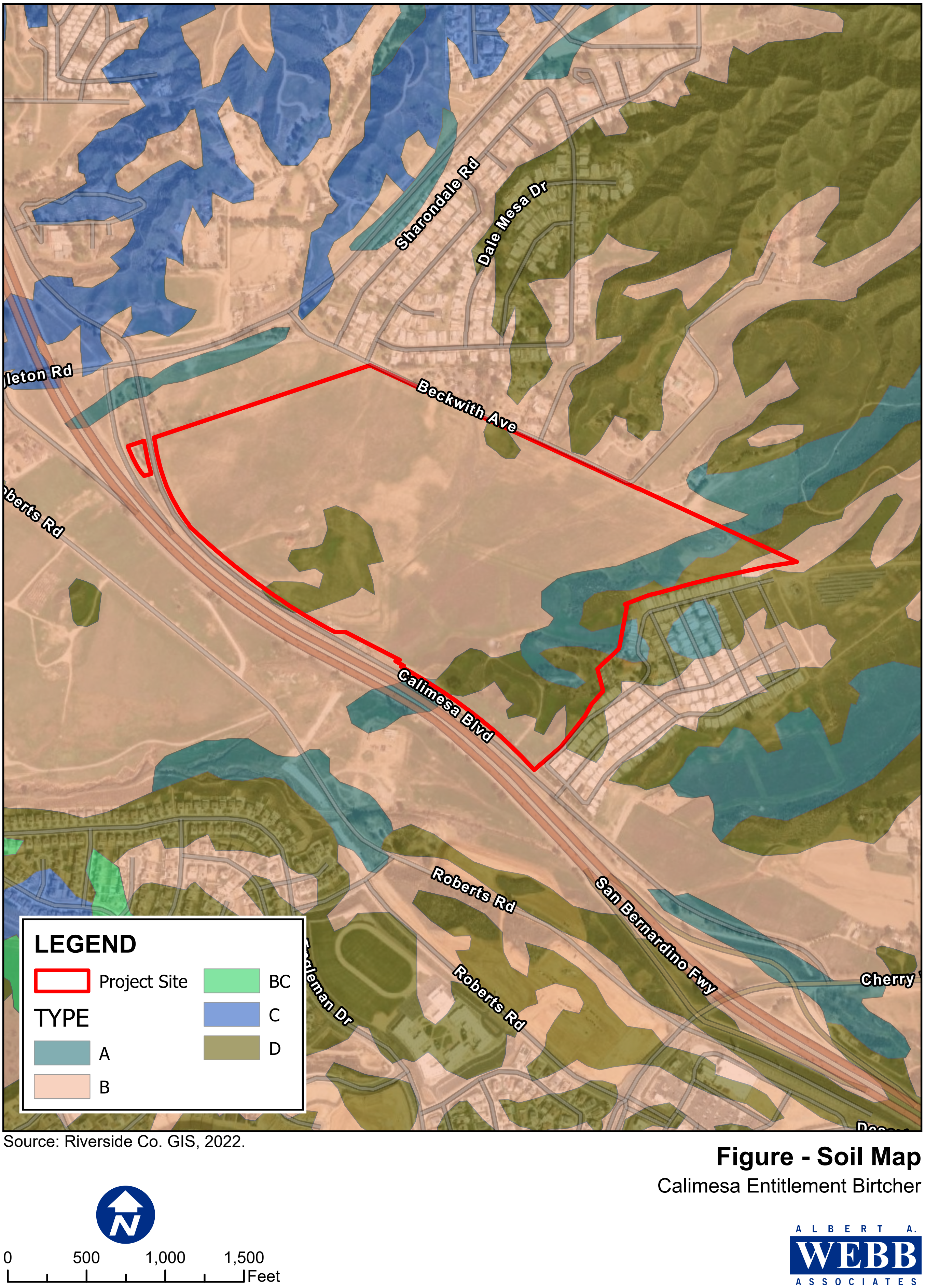


Sources: USGS DLG; USGS 30m DEM

Figure – Receiving Waterbodies

Calimesa Entitlement Birtcher

ALBERT A. WEBB ASSOCIATES



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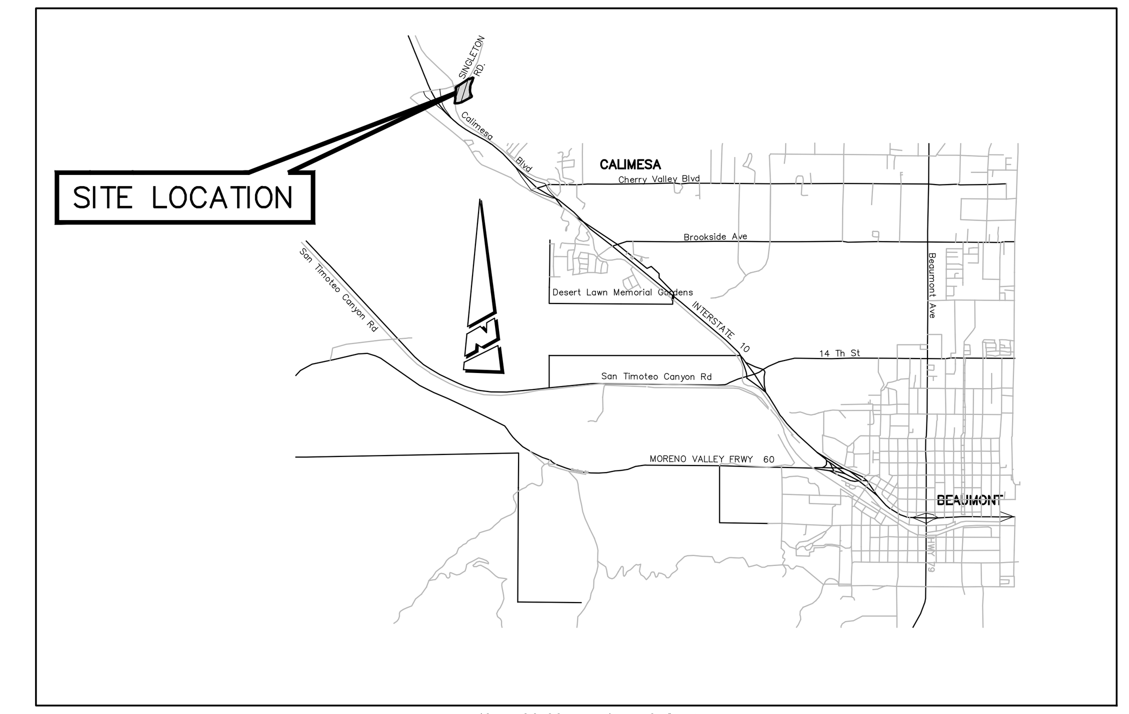
Source: Riverside Co. GIS, 2022.

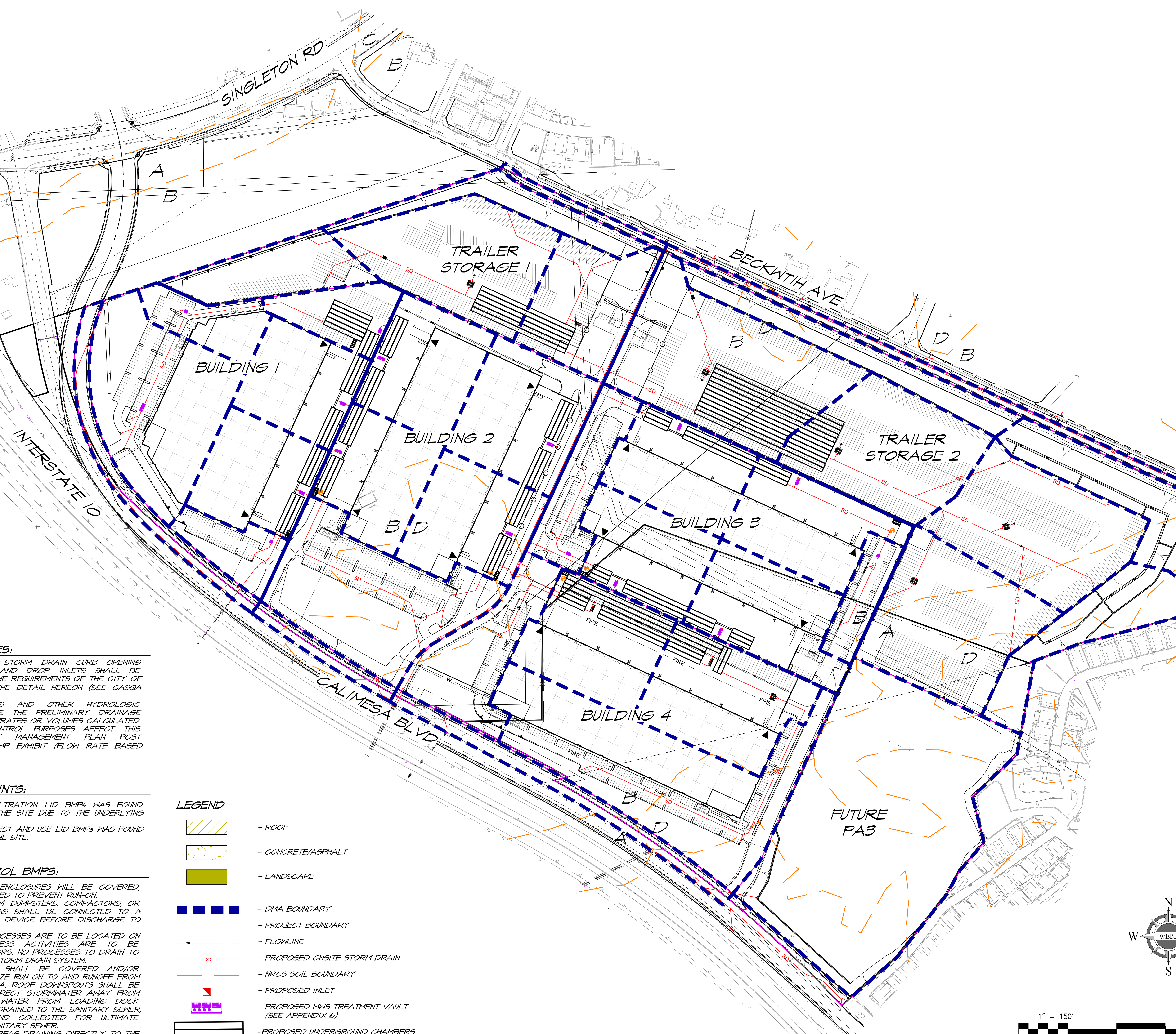
Figure - Soil Map

Calimesa Entitlement Birtcher

ALBERT A. WEBB ASSOCIATES



VICINITY MAP
N.T.S.
T2S, R2W, SECTION 24 & 25



GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL HEREON (SEE CASQA SD-13).
2. FOR FLOWRATES AND OTHER HYDROLOGIC INFORMATION, SEE THE PRELIMINARY DRAINAGE REPORT. NO FLOWRATES OR VOLUMES CALCULATED FOR FLOOD CONTROL PURPOSES AFFECT THIS WATER QUALITY MANAGEMENT PLAN POST CONSTRUCTION BMP EXHIBIT (FLOW RATE BASED TREATMENT).

SITE CONSTRAINTS:

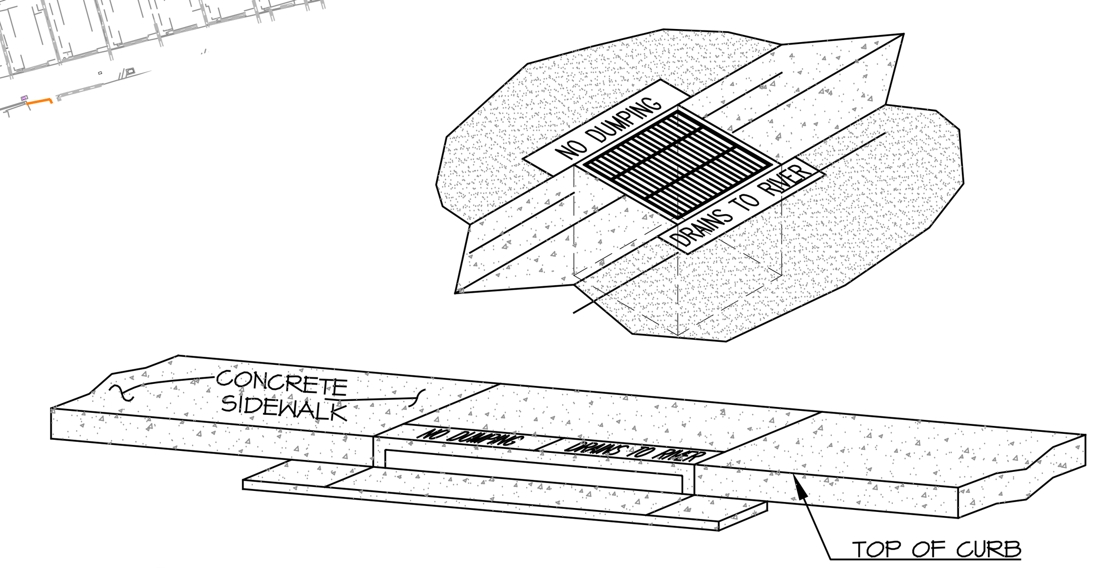
1. THE USE OF INFILTRATION LID BMPs WAS FOUND INFEASIBLE FOR THE SITE DUE TO THE UNDERLYING SOILS.
2. THE USE OF HARVEST AND USE LID BMPs WAS FOUND INFEASIBLE FOR THE SITE.

SOURCE CONTROL BMPS:

- OUTDOOR TRASH ENCLOSURES WILL BE COVERED, GRADED, AND PAVED TO PREVENT RUN-ON.
- ANY DRAINS FROM DUMPSTERS, COMPACTORS, OR TALLOW BIN AREAS SHALL BE CONNECTED TO A GREASE REMOVAL DEVICE BEFORE DISCHARGE TO SANITARY SEWER
- IF INDUSTRIAL PROCESSES ARE TO BE LOCATED ON SITE, ALL PROCESS ACTIVITIES ARE TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM.
- 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 LOADING AREA. WATER FROM LOADING DOCK AREAS SHALL BE DRAINED TO THE SANITARY SEWER, OR DIVERTED AND COLLECTED FOR ULTIMATE DISCHARGE TO SANITARY SEWER.
- LOADING DOCK AREAS DRAINING DIRECTLY TO THE SANITARY SEWER SHALL BE EQUIPPED

LEGEND

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



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

CATCH BASIN STENCILING DETAIL

NTS

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE			
OAK VALLEY NORTH POST-CONSTRUCTION BMP SITE PLAN PRELIMINARY WQMP EXHIBIT			
SCALE: 1" = 150'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 2022-0085
DATE: 11/13/2023			SHEET 1 OF 2 SHEETS
DESIGNED: ABE			
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

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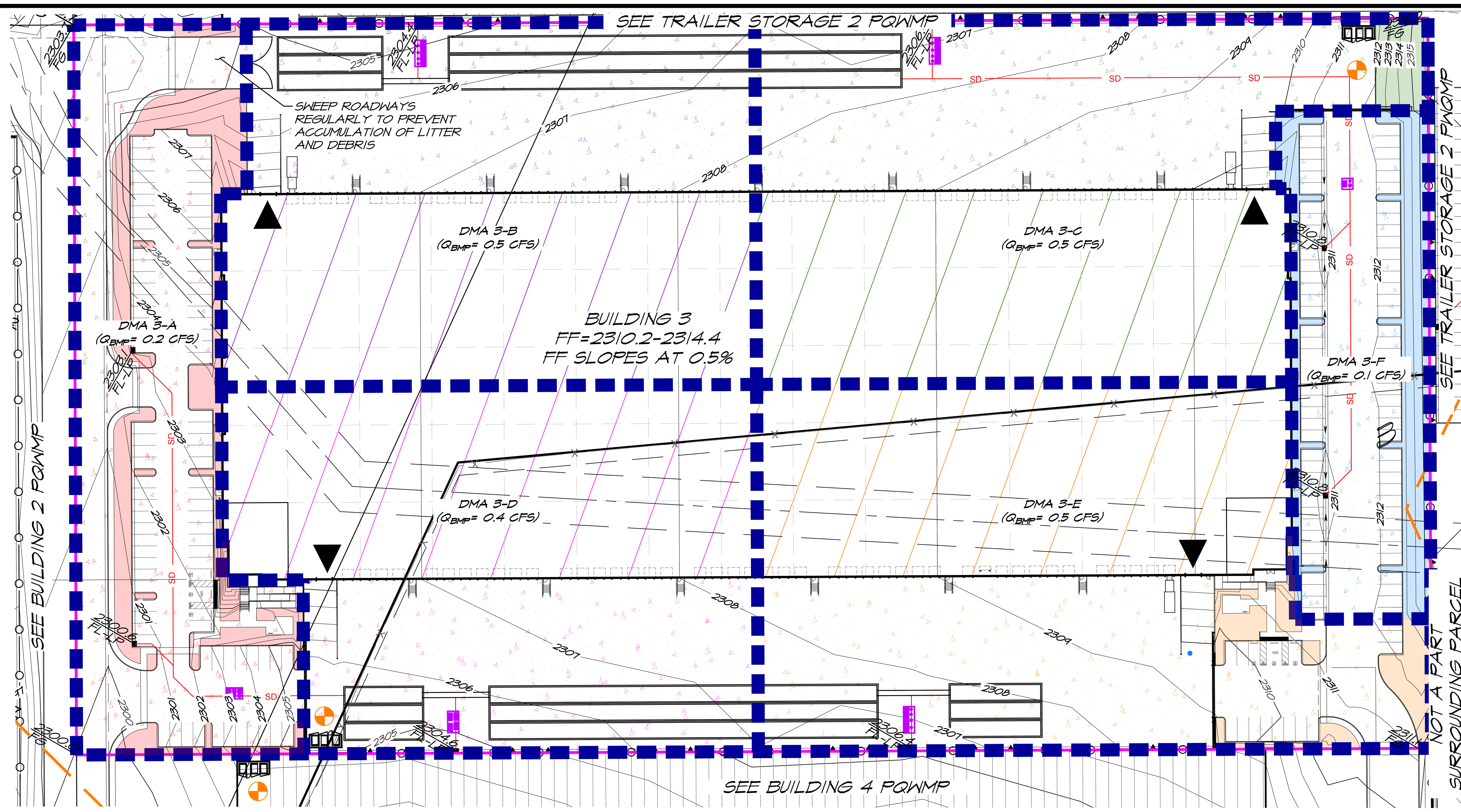

DMA AREA TABLE						
	DMA 3-A	DMA 3-B	DMA 3-C	DMA 3-D	DMA 3-E	DMA 3-F
ROOFS (SF)	-	62,250	62,250	62,252	62,023	-
HARDSCAPE (SF)	57,750	51,920	58,655	47,589	60,449	30,213
LANDSCAPE (SF)	17,776	-	2,879	-	6,534	12,708
QBMP (CFS)	0.2	0.5	0.5	0.4	0.5	0.1
QTREAT (CFS)	0.3	0.6	0.6	0.5	0.6	0.2

GENERAL NOTES:

1. ALL PROPOSED STORM DRAIN CURB OPENING CATCH BASINS AND DROP INLETS SHALL BE STENCILED PER THE REQUIREMENTS OF THE CITY OF CALIMESA AND THE DETAIL HEREON (SEE CASQA SD-13).
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LEGEND

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

N E S W WEBB

1" = 60'
60 0 60 120 180

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH – BUILDING 3
POST-CONSTRUCTION BMP SITE PLAN
PRELIMINARY WQMP EXHIBIT

SCALE: ########
DATE: 11/13/2023
DESIGNED: ABE
CHECKED: SKK
PLN CK REF:
F.B.

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

W.O. 2022-0085
SHEET 2 OF 2 SHEETS
DWG. NO.

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Appendix 2: Construction Plans

Grading and Drainage Plans

To be provided during Final Engineering.

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEOTECHNICAL INVESTIGATION PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

Calimesa Boulevard, Southeast of Singleton Road
Calimesa, California
for
Birtcher Development

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

November 16, 2022

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

Attention: Mr. Scott Mulkay
President of Construction

Project No.: **20G122-2**

Subject: **Geotechnical Investigation**
Proposed Commercial/Industrial Development
Calimesa Boulevard, Southeast of Singleton Road
Calimesa, California

Gentlemen:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Erick J. Aldrich, GE 2565
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
ERICK J. ALDRICH
No. 2565
GEOTECHNICAL
STATE OF CALIFORNIA

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- Significant grading will be necessary at this site. Based on the conceptual grading plan, fills of 20 to 30 feet and cuts on the order of 20 to 40± feet will be necessary to achieve the proposed site grades.
- Disturbed alluvium was encountered at the ground surface, at Boring Nos. B-7 through B-10, B-14 and B-18, extending to depths of 2½ to 7± feet below existing site grades. The disturbed alluvium generally consists of soils that were disturbed or moved, likely by farming operations and minor grading near the surface.
- The remainder of the borings encountered native alluvium. The native alluvium encountered at this site consists of younger alluvium and older alluvium. The younger alluvial soils possess low strengths and unfavorable consolidation/collapse characteristics. The older alluvial soils possess higher strengths and relative densities.
- Younger alluvium was encountered at the surface at Boring Nos. B-11, B-12, B-15, B-16, B-17 and B-19, or below the disturbed alluvium at Boring Nos. B-7 through B-10, B-14 and B-18, extending to the older alluvium depth, where encountered, or to the total depth explored in each boring.
- The older alluvium was encountered below the younger alluvium at depths of 8½, 6½ and 12 feet at Boring Nos. B-12, B-14 and B-18, respectively, and at the ground surface at Boring Nos. B-13, B-20, B-21 and B-22.
- The younger alluvial soils possess low relative densities and low strengths. The results of laboratory testing indicate that the younger alluvium is compressible when loaded and highly collapsible when inundated with water.
- Remedial grading is considered warranted to remove the disturbed alluvium and younger alluvium in its entirety from the proposed building areas.
- The older alluvium possesses relatively high strengths and high relative densities. These materials are generally considered to be suitable for the support of new fill soils and site improvements.
- Based on the anticipated site grading, significant slopes will be needed to achieve the new site grades. The slopes heights are on the order of 20 to 50± feet at various slope ratios less than 2:1 (horizontal:vertical). Retaining walls of unknown height are also planned for the site.
- The site is located within a mapped zone of low to moderate liquefaction susceptibility. However, the site is generally underlain by older alluvium and dense to very dense bedrock materials. Based on the recommended remedial grading recommendations, the upper portion of the loose, younger alluvial sediments that may be susceptible to liquefaction will be removed and replaced as compacted structural fill. In addition, there is no groundwater within the upper 50 feet at the site. Therefore, liquefaction is not considered to be a design concern for this project.
- The proposed development is considered to be feasible with respect to the geotechnical conditions encountered at the boring locations at the site. As discussed above, remedial

grading will be necessary in order to support the proposed structures on conventional shallow foundation systems.

Site Preparation Recommendations

- Initial site stripping should include removal of surficial vegetation. This should include weeds, grasses, shrubs, trees and tree roots. These materials should be disposed of off-site. The existing trash, construction debris, concrete rubble, pipes, existing structures and old slabs should also be removed in their entirety.
- Remedial grading will be necessary in the proposed building areas to remove the disturbed alluvium and highly compressible/collapsible younger alluvium soils in their entirety. At the boring locations, the disturbed and younger alluvial soils extend to depths of at least 35± feet, however, building pad grading will result in cuts in younger alluvium of up to 16± feet, which reduces the overexcavation depth below building pad subgrade elevations.
- Overexcavation removals are anticipated to extend to depths of 10 to 25± feet, or more, below building pad grades within the three building areas. A minimum building pad overexcavation of 8 to 10 feet is recommended in order mitigate cut/fill transitions. This includes areas where older alluvium is encountered at the building pad subgrades.
- The proposed foundation influence zones should be overexcavated to a depth of at least 3 feet below proposed foundation bearing grade.
- After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify additional soils that should be overexcavated, moisture conditioned, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.
- Fill soils placed at depths greater than 20 feet below proposed pad grade within the building pads should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density.

Foundation Design Parameters

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure. A greater foundation bearing pressure may be allowed based on the conditions that exist after remedial grading is completed.
- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings, due to the presence of potentially expansive soil. Additional reinforcement may be necessary for structural considerations

Building Floor Slab Recommendations

- Conventional Slab-on-Grade: minimum 6 inches thick.
- Modulus of Subgrade Reaction: k = 120 psi/in.
- Minimum slab reinforcement: Reinforcement of the floor slab should consist of No. 3 bars at 18-inches on center in both directions due to the presence of potentially expansive soils. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading and intended use.

Pavements

ASPHALT PAVEMENTS (R = 20)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	8	10	12	14	16
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 20)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	7	8½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 20P145-3R, dated October 6, 2022. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory geotechnical testing, and geotechnical engineering analysis to evaluate the geotechnical feasibility of the proposed development. This report also contains preliminary design criteria for building foundations, and building floor slabs. The evaluation of the environmental aspects of this site was beyond the scope of services for this feasibility study.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located on the northeast side of Calimesa Boulevard, 450± feet southeast of Singleton Road in Calimesa, California. The site is bounded to the northeast by Beckwith Avenue, to the northwest by a vacant lot, to the southwest by Calimesa Boulevard, and to the southeast by mobile homes and an undeveloped parcel.

The site consists of an irregular-shaped parcel, 95± acres in size. The site is predominately vacant and undeveloped. A single-family residence, approximately 1,600 ft^2 in size, is located in the west-central region of the site. The residence is a single-story structure of wood frame and stucco construction, presumably supported on conventional shallow foundations with a concrete slab-on-grade floor. The residence is located at the top of an isolated hill, generally surrounded by relatively level terrain in the western and central regions of the site. Two exposed concrete pads ranging from 1,600 to 2,100 ft^2 in size are located north of the residence. A 3±-foot-deep earthen drainage channel transects the central region of the site, trending northeast-southwest. The site topography in the eastern region of the site is comprised of moderately hilly terrain. The ground surface throughout the site consists of exposed soil with sparse to moderate native grass and weed growth with several large trees in the southeastern region of the property.

Topographic information was obtained from the preliminary conceptual grading plan prepared by Albert A. Webb Associates. The overall site topography generally slopes downward to the west at a gradient of approximately 3 percent. However, as previously discussed, the eastern region of the site is comprised of moderately hilly terrain. In addition, there is one (1) isolated hill in the west-central region of the site. The hills at the site generally range between 15 to 20± feet higher in elevation than the adjacent terrain that is relatively level. The hills throughout the site generally descend downward to the surrounding level terrain at inclinations of 3.5h:1v (horizontal to vertical) to 6h:1v.

3.2 Proposed Development

Based on a conceptual grading plan provided by Albert A. Webb Associates, the subject site will be developed with three (3) commercial/industrial buildings (identified for this project as the northern building, central building, and southern building). Based on the current plan, the proposed buildings will have footprints ranging from 333,384± ft^2 to 684,464± ft^2 in size, located within the central and western-most regions of the site. The buildings will be constructed with dock-high doors along the north and/or south sides of the buildings. Based on our experience with similar commercial/industrial developments, we expect that the buildings will be surrounded by asphaltic concrete pavements in parking areas and drive lanes and with Portland cement concrete pavements for the truck loading areas. Landscape planters and concrete flatwork may also be included throughout the site. In addition, the site will include the mass grading areas in the northeastern and southeastern areas of the site.

Detailed structural information was not available at the time of this report. It is assumed that the new buildings will be single-story structures of tilt-up concrete construction, typically supported on conventional shallow foundations with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

No significant amounts of below-grade construction, such as crawl spaces or basements, are expected to be included in the proposed development. Based on the grading plan, cuts up to 40± feet and fills of up to 30± feet are expected to be necessary to achieve the proposed site grades. Slopes and retaining walls will be constructed along the northeastern portion of the property. The slopes and retaining walls will be approximately 20 to 50± feet in height.

3.3 Previous Studies

SCG previously conducted a geotechnical feasibility study at the subject site. This study was performed in two parts and is referenced as:

Geotechnical Feasibility Study, Proposed Commercial/Industrial Development, Calimesa Boulevard, Southeast of Singleton Road, Calimesa, California, prepared for Birtcher Development, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 20G122-1, dated April 21, 2020.

Geotechnical Feasibility Study, Diocese of San Bernardino, Calimesa Boulevard, Southeast of Singleton Road, Calimesa, California, prepared for Birtcher Development, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 20G123-1, dated June 23, 2020.

As part of these studies, six (6) total borings were advanced to depths of 25 to 50± feet below existing site grades. The six boring logs and laboratory test results from the above mentioned reports are included in Appendix F.

Artificial fill soils were encountered at the ground surface at Boring Nos. B-4, B-5 and B-6, extending to depths of 2½ to 5½± feet below the existing site grades. The artificial fill soils generally consist of loose to medium dense silty fine sands with varying medium to coarse sand and varying clay and gravel content. Additional soils classified as possible fill were encountered beneath the artificial fill soils at Boring No. B-6, extending to a depth of 9½± feet below existing site grades. These materials are comprised of medium dense silty fine sands, with varying coarse sand and fine to coarse gravel content.

Soils classified as younger alluvium were encountered at the ground surface at the Boring Nos. B-1, B-2 and B-3, and beneath the possible fill soils at Boring No. B-6, extending to depths of 25 to 32± feet below existing site grades. The younger alluvium encountered at these boring locations generally consist of loose to medium dense silty fine sands and fine to coarse sands with varying silt and gravel content.

Soils classified as older alluvium were encountered beneath the younger alluvium at Boring Nos. B-1 and B-3, and beneath the fill soils at Boring Nos. B-4 and B-5. The older alluvial soils generally consist of medium dense to very dense silty fine sands, fine to coarse sands, clayey sands, and gravelly sands with varying silt and clay content. The older alluvial soils generally extend to depths of 25 to 50± feet at the boring locations.

Bedrock materials of the San Timoteo Formation were encountered beneath the older alluvium at Boring No. B-5. The weathered bedrock generally consists of very dense silty fine-grained sandstone, with little medium to coarse sand and some gravel content. The bedrock materials were generally weakly cemented and highly friable. The weathered silty fine-grained sandstone bedrock extended to the maximum depth explored of 50± feet below the existing site grades at Boring No. B-5.

Groundwater

Free water was not encountered during drilling of the previous borings. In addition, delayed readings taken within the open boreholes did not identify free water. Based on the lack of water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 50± feet at the time of the subsurface exploration.

As part of our previous research, we reviewed available groundwater data in order to evaluate the historic high groundwater level for the site. The primary reference used to evaluate the groundwater depths in this area is the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The website indicates that there is one monitoring well located within the limits of the Stearns property to the northwest of the Diocese site. Water level readings within this monitoring well indicates a high groundwater level of 84± feet in April 1999.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of sixteen (16) borings (identified as Boring Nos. B-7 through B-22) advanced to depths of 15 to 40± feet below the existing site grades. The borings were logged during drilling by a member of our staff. The six previous boring logs (Boring Nos. B-1 through B-6) and laboratory test results from the previous reports discussed above are included in Appendix F.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. Samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Geotechnical Map, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

The materials encountered at the boring locations for this investigation generally consist of disturbed and native alluvium. The native alluvial soils were classified as younger alluvium and older alluvium depending upon their apparent age, strengths, and relative densities. A description of the soil materials encountered at the boring locations is presented below.

Disturbed Alluvium

Disturbed alluvium was encountered at the ground surface, at Boring Nos. B-7 through B-10, B-14 and B-18, extending to depths of 2½ to 7± feet below existing site grades. The disturbed alluvium generally consists of soils that were disturbed or moved, likely by farming operations and minor grading near the surface. These materials are comprised of loose to medium dense silty fine sands, with varying coarse sand and fine to coarse gravel content. They possess varying densities and strengths and a disturbed appearance, resulting in their classification as disturbed alluvium.

Younger Alluvium

Younger alluvium was encountered at the surface at Boring Nos. B-11, B-12, B-15, B-16, B-17 and B-19, or below the disturbed alluvium at Boring Nos. B-7 through B-10, B-14 and B-18, extending to the older alluvium depth, where encountered, or to the total depth explored in each boring. The younger alluvial soils possess low strengths and unfavorable consolidation/collapse characteristics.

Older Alluvium

The older alluvium was encountered below the younger alluvium at depths of 8½, 6½ and 12 feet at Boring Nos. B-12, B-14 and B-18, respectively, and at the ground surface at Boring Nos. B-13, B-20, B-21 and B-22. The older alluvial soils possess higher strengths and relative densities. The older alluvial soils generally consist of medium dense to very dense silty fine sands, fine to coarse sands, clayey sands, and gravelly sands with varying silt and clay content. The older alluvial soils extend to the total depth explored at each boring location up to 40± feet.

Bedrock

Bedrock materials of the San Timoteo Formation were encountered in our previous investigation beneath the older alluvium at Boring No. B-5. The weathered bedrock generally consists of very dense silty fine-grained sandstone, with little medium to coarse sand and some gravel content. The bedrock materials were generally weakly cemented and highly friable. The weathered silty fine-grained sandstone bedrock extended to the maximum depth explored of 50± feet below the existing site grades at Boring No. B-5.

Groundwater

Free water was not encountered during drilling of the borings. In addition, delayed readings taken within the open boreholes did not identify free water. Based on the lack of water within the borings, and he moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 50± feet at the time of the subsurface exploration.

As part of our research, we reviewed available groundwater data in order to evaluate the historic high groundwater level for the site. The primary reference used to evaluate the groundwater depths in this area is the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The website indicates that there is one monitoring well located within the limits of the site. Water level readings within this monitoring well indicates a high groundwater level of 95± feet (Summer 1998).

4.3 Regional Geology

The subject site is located within the Peninsular Ranges province. The Peninsular Ranges province consists of several northwesterly-trending ranges in the southwestern California. The province is truncated to the north by the east-west trending Transverse Ranges. Prior to the mid-Mesozoic, the region was covered by seas and thick marine sedimentary and volcanic sequences were deposited. The bedrock geology that dominates the elevated areas of the Peninsular Ranges consists of high-grade metamorphic rocks intruded by Mesozoic plutons. During the Cretaceous, extensive mountain building occurred during the emplacement of the southern California batholith. The Peninsular Ranges have been significantly disrupted by Tertiary and Quaternary strike-slip faulting along the Elsinore and San Jacinto faults. This tectonic activity has resulted in the present terrain.

The subject site is located within at within the San Gorgonio Pass (SGP), where Quaternary-age contractional deformation in the SGP gives way to transtensional deformation associated with the right-lateral San Jacinto Fault. The major stratigraphic and structural events in this area consist of: 1) Upper Miocene (approximately 5 to 7 Ma) sedimentary unit (Mt. Eden Formation) sourced from nearby Peninsular Ranges rocks which where shed into adjacent alluvial channels and fans. These sedimentary units are offset by the San Andreas Fault (SAF) system. 2) The Plio-Pliestocene (approximately 1.3 to 5 Ma) sedimentary unit (San Timoteo Formation) was sourced from the San Gabriel Mountains rocks to the northwest and dispersed to the southeast on braided streams caused by the westernmost extend of the contractional San Gorgonio Pass Fault (SGPF) zone. 3) Prior to 1.3 MA, the developing San Timoteo Anticline disrupted the San Timoteo sedimentary deposits due to the multiple strands of the San Jacinto Fault (SJF) zone (Matti, 2016).

Regional geologic conditions were obtained from two geologic maps. The first map is the Geologic and Geophysical Maps of the El Casco 7.5' Quadrangle, Riverside County, California, with Accompanying Geologic-map Database, by Jonathan C. Matti and Douglas Morton, 2015 (Plate 3a). This map indicates that the site is located within seven (7) geologic units consisting of very young wash deposits (Qvywn, $Qvyw_1$, $Qvyw_2$), young axial-valley deposits (Qya_5), young alluvial fan deposits (Qyfu), old alluvial fan deposits (Qof_2) and very old alluvial fan deposits ($Qvof_3$). The very young and young alluvial deposits are indicated to consist of very slightly to slightly consolidated sands and gravels while the older alluvial deposits consist of moderately consolidated sands and gravels. The upper to middle Pliocene age San Timoteo Formation (Tstm) is mapped 1,000± feet northeast of the site. The San Timoteo Formation is indicated to consist of non-marine, light gray to white sandstone.

The second map is the Geologic Map of the El Casco 7.5' Quadrangle, Riverside County, California, by Thomas W. Dibblee, Jr., 2003 (Plate 3b). This map indicates that the site is underlain by alluvial sand and gravel (Qa) and older alluvial sediments (Qoa). The alluvium is indicated to consist of sand, gravel, and clay covered by residual soil and the older alluvium is indicated to consist of light reddish-brown sand and gravel of granitic and gneissic detritus of the San Bernardino Mountains. The San Timoteo Formation (QTsg) is mapped 900± feet northeast of the site. The San Timoteo Formation is indicated to consist of brownish-gray crudely bedded, of poorly-sorted clasts pf granitic and gneissic detritus in a sand matrix.

Based on the conditions encountered during drilling, and for the ease of purposes of discussion, the near-surface geologic conditions consist of younger alluvial soils (Qal) consisting of unconsolidated, loose to medium dense silty sands and sands and older alluvial soils (Qoa) consisting of medium dense to dense silty fine sands and sands. At greater depths, the alluvial and older alluvial soils are underlain by very dense silty fine-grained sandstone of the San Timoteo Formation.

4.4 Structural Geology

The main structural geologic feature near the subject site is the Cherry Valley fault (the westernmost portion of the SGPF zone) located approximately 1,000 feet northeast of the subject site. The SGPF zone is a thrust fault which dips north extending from Cabazon to Beaumont. Information presented in https://scedc.caltech.edu/significant/sangorgonio.html has assigned the following parameters to the SGPF zone:

- Length: 35 kilometers
- Slip Rate: Uncertain
- Probable Magnitudes: M_w 6.0-7.0
- Most Recent Rupture: Holocene; Late Quaternary along western extension
- Recurrence Interval: Uncertain

Another fault, San Timoteo fault, is mapped 1,600 to 2,000± feet southeast of the subject site. This fault is indicated to be buried by the overlying geologic units. The northeast side of the fault is considered the down-thrown block of the fault.

The Banning fault is mapped 5,400± feet northeast of the subject site. The Banning fault is a right-lateral strike-slip fault. Information presented in https://scedc.caltech.edu/significnt/banning.html has assigned the following parameters to the Banning fault.

- Length: 40 kilometers
- Slip Rate: Uncertain, part of complex fault system involving the SAF
- Probable Magnitudes: M_w 6.0-7.2
- Most Recent Rupture: Holocene
- Recurrence Interval: Uncertain

Although the site is located near active faults and fault zones (SGPF, San Timoteo, and Banning), no evidence of faulting (such as fault scarps, fault line scarps, drainage offsets, etc.) was observed at the subject site at the time of the investigation. In addition, the site is not located within a mapped fault hazard zone by either the State of California or the County of Riverside. Therefore, the possibility of significant fault rupture on the site is considered to be low.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to evaluate selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

Recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. Field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been evaluated for selected relatively undisturbed ring samples. These densities were evaluated in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are evaluated in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Consolidation

Selected soil samples have been tested to evaluate their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to evaluate their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-12 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

Two (2) representative bulk samples were tested for their maximum dry densities and optimum moisture contents. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Sheets C-13 and C-14 in Appendix C of this report. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Direct Shear

Direct shear tests were performed on representative samples of the near-surface soils to evaluate the shear strength parameters in accordance with ASTM D-3080. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Three samples are then loaded with different normal loads and the resulting shear strength is evaluated for that particular normal load. The shearing of the samples is performed at a rate slow enough to allow the dissipation of excess pore water pressure. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The results of the direct shear tests are presented on Plates C-15 and C-16 in Appendix C of this report

Soluble Sulfates

Representative samples of the near-surface soils were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	**Soluble Sulfates (%)**	**Sulfate Classification**
B-2 @ 0 to 5 feet (20G122-1)	<0.001	Not Applicable (S0)
B-4 @ 0 to 5 feet (20G122-1)	<0.001	Not Applicable (S0)
B-9 @ 0 to 5 feet	0.027	Not Applicable (S0)
B-16 @ 0 to 5 feet	0.012	Not Applicable (S0)
B-19 @ 0 to 5 feet	0.001	Not Applicable (S0)

Corrosivity Testing

Representative bulk samples of the near-surface soils were submitted to a subcontracted corrosion engineering laboratory to evaluate if the near-surface soils possess corrosive characteristics with respect to common construction materials. The corrosivity testing included an evaluation of the minimum electrical resistivity, pH, and chloride and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

Sample Identification	**Saturated Resistivity (ohm-cm)**	**pH**	**Chlorides (mg/kg)**	**Nitrates (mg/kg)**	**Sulfides (mg/kg)**	**Redox Potential (mV)**
B-2 @ 0 to 5 feet (20G122-1)	18,400	7.0	1.4	43	N/A	N/A
B-4 @ 0 to 5 feet (20G122-1)	5,200	6.8	2.8	22	N/A	N/A
B-9 @ 0 to 5 feet	12,730	8.8	223	5.1	0.69	122
B-16 @ 0 to 5 feet	4,556	8.1	85	56.5	0.90	163
B-19 @ 0 to 5 feet	6,365	7.9	19	9.5	1.86	152

Expansion Index

The expansion potential of the on-site soils was evaluated in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansion Potential
B-4 @ 0 to 5 (20G122-1)	2	Very Low
B-16 @ 0 to 5 feet	27	Low

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing, and geotechnical analysis, the proposed development, which will consist of a new commercial/industrial development. The recommendations contained in this report should be taken into the design, construction, and grading considerations. The recommendations are contingent upon grading and foundation construction activities being monitored by the geotechnical engineer of record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structure should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting, Seismicity, and Geologic Hazards

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. The Riverside County RCIT GIS website indicates that the subject site is not located within a county fault zone. Therefore, the possibility of significant fault rupture on the site is considered to be low.

Based on the preliminary remedial grading recommendations provided in a subsequent section of this report, the loose and potentially compressible and collapsible younger alluvial soil will be removed and replaced as compacted structural fill. Therefore, the potential for other geologic hazards such as seismically induced settlement, lateral spreading, and subsidence affecting the site is considered low.

The potential for hazards such as tsunamis, inundation and seiches is considered to be very low, because no significant bodies of water are present within several miles of the subject site.

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2019 edition of the California Building Code (CBC), which was adopted on January 1, 2020.

The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The tables below were created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report.

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception to the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." **Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structure at this site. However, the structural engineer should verify that this exception is applicable to the proposed structure.** Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	2.207
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.760
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	2.207
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	1.292
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.471
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.861

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1 obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed buildings at this site.

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Riverside County GIS website indicates that the subject site is located within a zone of low to moderate liquefaction susceptibility. However, the soil conditions encountered at the boring locations are not considered to be conducive to liquefaction. These conditions consist of surficial younger alluvial sediments underlain by medium dense to very dense older alluvium and dense to very dense weathered bedrock. In addition, there is no groundwater within the upper 50± feet below the ground surface. Based on these considerations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

Significant grading will be required at this site in order to facilitate the proposed development. Based on the preliminary plan provided to our office, cut and fills ranging from 20 to 40± feet from existing site grades will be necessary.

Disturbed alluvium soils were encountered at six (6) of the boring locations, extending to depths of 2½ to 7± feet. These materials are disturbed, non-uniform and possess unfavorable consolidation/collapse characteristics and therefore, are considered to be unsuitable for the support the proposed structures.

The younger alluvial soils encountered at the boring locations possess relatively low strengths and low relative densities. Based on the results of laboratory testing, these soils are subject to significant consolidation settlement upon loading and significant collapse when inundated with water. Based on these considerations, the younger alluvium, in its present condition, is not considered suitable for the support of new fill soils or new improvements. **Therefore, significant remedial grading will be necessary in order to remove the highly compressible/ collapsible younger alluvial soils and replace these materials as compacted structural fill.** Based on conditions encountered at the boring locations, these overexcavations are anticipated to extend to depths of 10 to 25± feet or more. The underlying older alluvium possess greater strengths and relative densities and are considered to be suitable to support new structural fill and improvements.

Borings excavated for this study were based on the anticipated cut and fill depths for the proposed building pad elevations as discussed in our proposal. However, several of the borings did not extend through the younger alluvium and into the older alluvium. As a result, the depths of younger alluvium in these boring locations are unknown. Therefore, we highly recommend additional subsurface exploration, lab testing and engineering analysis be performed at selected locations throughout the site within the proposed building footprints in order to evaluate the depth of younger alluvium at more locations. This will allow for better overexcavation depth estimates prior to grading.

Based on our review of the conceptual grading plans, cut and fill slopes on the order of 20 to 50± feet or more in height will be necessary to facilitate the grading and construction of a new development. Based on our slope stability analysis, new cut and fill slopes should have adequate safety factors. Slopes should not exceed an inclination of 2h:1v.

Some retaining walls are shown on the current site plan, however, the heights are not known at this time and we understand that the locations are preliminary and likely to change. Based on the requirements of the 2019 CBC, new retaining wall supporting more than 6± feet of soils should be designed to withstand seismic lateral earth pressures.

Settlement

As discussed above, the artificial fill soils and younger alluvial soils are subject to significant consolidation settlement upon loading and are potentially collapsible when wetted. The underlying older alluvial soils possess more favorable consolidation characteristics and no significant collapse potential. With remedial grading of the unsuitable younger alluvium, it is considered feasible to reduce the projected settlements within the building areas to within tolerable limits.

Deep Fill Areas

Based on the proposed site grading, cuts and fills of more than 20± feet will be required. In order to reduce the settlement potential of the newly-placed fill soils to acceptable levels and avoid excessive differential settlements, fill soils placed at depths greater than 20 feet below proposed pad grade within the building pads should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. This is a preliminary estimate. The actual standard of compaction should be evaluated at the time of the design level investigation.

Cut/Fill Transitions

Based on the existing site topography, it is likely that cut/fill transitions will be created within the proposed building and improvement areas. The differing support conditions of the native soils versus the newly compacted fill soils may result in excessive differential settlements if not mitigated. Remedial grading will be required to eliminate the cut/fill transitions which will occur at building pad and foundation bearing grades as well as to reduce the inclinations of the underlying cut/fill contacts.

Slope Stability

No evidence of landslides or deep-seated slope instability was noted during our investigation. However, the loose granular soils on sloping ground surfaces could be prone to surficial failures.

Newly constructed fill slopes, comprised of properly compacted engineered fill, at inclinations of 2h:1v or flatter will possess adequate gross stability, as discussed in the section below. In addition, cut slopes within alluvium with inclinations of 2h:1v or flatter are expected to possess adequate stability. Further evaluation of cut slope conditions should be evaluated during site grading. Slopes steeper than 2:1 are not recommended.

Cut slopes excavated within the existing granular alluvial soils may be subject to surficial instability due to the lack of cohesion within these materials. Therefore, stability fills may be required within these areas. This condition may affect the proposed cut slopes at the site. The need for stability fills should be evaluated by SCG as part of the future detailed grading plan review and during site grading.

Slope Stability Analysis

SCG completed a slope stability analysis for a proposed 50-foot-high cut slope, which is the highest anticipated slope at the subject site. The cross-section analyzed has an inclination of 2 (horizontal) to 1 (vertical), which is the steepest slope that should be constructed at the site. The slope stability analyses were performed using PCSTABL5M2, a limit equilibrium slope stability analysis program developed by Purdue University. Analyses were performed for both static and pseudo–static (seismic) conditions. The results of our analysis are presented in Appendix G.

The slope stability analyses were performed using shear strength parameters developed from the laboratory tests discussed previously. The slope stability analyses were conducted for potential circular-type failure surfaces. The stability analyses indicate acceptable factors of safety (in excess of 1.5 for static conditions and above 1.1 for pseudo-static conditions) for cut slopes 50 feet high or less at a slope ratio of 2h:1v or flatter. Similar fill slopes should also have acceptable factors of safety.

Surficial slope stability analyses were not conducted for areas of the slope that are immediately underlain by alluvial materials. The on-site alluvial materials possess cohesion values of at least 150 lbs/ft^2 which would result in adequate factors of safety with regard to surficial slope stability.

The slope stability analysis discussed above assumes that the proposed cut slopes will be comprised of native alluvial soils. The alluvium encountered throughout the site, especially within the upper 5 to 6 feet of the subsurface profile generally possesses low strengths and loose relative densities. Therefore, it is recommended that the condition of the cut slopes be assessed during grading by the geotechnical engineer of record to evaluate the need for a stability fill, as discussed in the previous section above.

Expansion

The near-surface on-site soils have been evaluated to possess a very low to low expansion potential (EI = 2 to 27). Based on the presence of expansive soils, adequate moisture conditioning of the subgrade soils and fill soils will be necessary during grading, and special care must be taken to maintaining moisture content of these soils at 0 to 4 percent above the Modified Proctor optimum. This will require the contractor to frequently moisture condition these soils throughout the grading process, unless grading occurs during a period of relatively wet weather. It should be noted that some of the deeper soil layers contain clay that could potentially have a higher expansion potential. We recommend additional testing during grading or after the building pads are completed, as appropriate, to confirm the conditions assumed above.

Soluble Sulfates

The result of the soluble sulfate testing indicates that the tested soil sample possesses a level of soluble sulfates that is considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building areas.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possess saturated minimum resistivity values ranging from 4,556 to 18,400 ohm-cm, and pH values ranging from 6.8 to 8.8. The soils possess a redox potential of 122 to 163 mV and sulfide concentrations of 0.69 to 1.86 parts per million. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity, pH, sulfide concentration, redox potential, and moisture content the five factors that enter into the evaluation procedure. Based on these factors, the on-site soils are considered to have a low corrosion potential to ductile iron pipe. Therefore, corrosion protection is not expected to be required for cast iron or ductile iron pipes.

A relatively low concentration (1.4 to 223 mg/kg) of chlorides was detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of any significant chlorides in the tested samples, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

It should be noted that SCG does not practice in the field of corrosion engineering. Therefore, the client may wish to contact a corrosion engineer to provide a more thorough evaluation.

Nitrates

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested sample possesses a nitrate concentration of 5.1 to 56.5 mg/kg. Based on these test result, the on-site soils are considered to be mildly corrosive to copper pipe. Since SCG does not practice in the area of corrosion engineering, the client should contact a corrosion engineer to provide a more thorough evaluation and appropriate recommendations.

Shrinkage/Subsidence

Removal and recompaction of the disturbed alluvium and younger native alluvial soils is estimated to result in an average shrinkage of 10 to 20 percent. Removal and recompaction of the underlying older alluvium is estimate to result in an average shrinkage value of 3 to 10 percent. Shrinkage estimates for the individual samples range between 2 and 22 percent based on the results of density testing and the assumption that the onsite soils will be compacted to about 92 percent of the ASTM D-1557 maximum dry density. It should be noted that the shrinkage estimate is based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are evaluated using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1 to 0.15± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

As discussed previously, detailed grading and foundation plans were not available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report and future geotechnical investigations.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations and our understanding of the proposed development, which will consist of a new industrial development. These recommendations are general in nature, and should be confirmed as part of the design-level geotechnical investigation.

Site Stripping and Demolition

Initial site stripping and demolition should include removal of surficial vegetation, structures, foundations, underground utilities, concrete slabs and other existing site improvements. The stripping should include removal of weeds, grasses, trees and tree root systems. The actual extent of site stripping should be evaluated in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Demolition of the existing building and improvements including concrete foundations, slabs and driveways, asphalt pavement, utilities and other associated improvements will be necessary to facilitate the construction of the proposed buildings and pavement areas. Debris resultant from demolition should be disposed of off-site. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2-inch particle size, uniformly well-mixed with the on-site sandy soils, and incorporated into new structural fills.

Treatment of Existing Soils: Building Pads

Remedial grading should be performed within the proposed building pad areas in order to remove the existing disturbed alluvium and younger alluvial soils. As discussed above, the younger alluvial soils possess relatively low strengths and are subject to significant collapse upon wetting and consolidation upon loading. **It is therefore recommended that these younger alluvial soils, within the building areas, be removed and replaced in order to reduce the potential for excessive settlement of the proposed improvements.** The existing soils within the proposed building area are also recommended to be overexcavated to a depth of at least 8 to 10 feet below proposed building pad grade, as discussed below, and to a depth of at least 3 feet below proposed bearing grade, whichever is greater.

Overexcavation removals are anticipated to extend to depths of 10 to 25± feet, or more, below building pad subgrades within the three building areas. At the boring locations, the disturbed and younger alluvial soils extend to depths of at least 35± feet. However, based on topographic information shown on Plate 2, provided by the project civil engineer, building pad grading will result in cuts within the younger alluvium of up to 16± feet, which will reduce the overexcavation depth below building pad subgrade elevations.

The Geologic Map, included as Plate 2 with this report, identifies the approximate extents of the younger alluvium and older alluvium present within the proposed building pad areas. Greater depths of unsuitable soils may be present in unexplored areas of the site. The disturbed alluvium soils encountered at the boring locations are expected to be removed as part of the younger alluvial overexcavation described above. The removals should extend to a depth of firm, competent older alluvium deposits or weathered bedrock/formational soils.

In order to reduce the potential for excessive differential settlement due to the differing support conditions provided by the older alluvium native soils and the newly placed fill soils, the cut portion of the building pads should also be overexcavated. The depth of overexcavation in the cut portions of the building pad area will be dependent upon the depths of the fill and the steepness of the cut/fill transition. **A minimum building pad overexcavation of 8 to 10 feet below pad subgrade is recommended in order mitigate cut/fill transitions. The recommended depth should be based on the deepest thickness of fill for each pad divided by a factor of 3, for example, a 30-foot-thick fill will require a 10-foot minimum overexcavation below the building pad subgrade. This includes areas where older alluvium is encountered.** In order to avoid a steep transition between the cut and fill portions of the pad, benching into competent native soils within the cut portion of the pad is recommended to be performed at a slope of 3h:1v (horizontal to vertical) or flatter.

Following completion of the overexcavation, the exposed soils should be evaluated by the geotechnical engineer to confirm their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling with a heavy rubber-tired vehicle and probing to identify soft, loose or otherwise unstable soils that must be removed. The materials exposed at the base of overexcavations should possess a minimum relative compaction of 85 percent of the maximum dry density as evaluated by ASTM D-1557 maximum dry density. Some localized areas of deeper excavation may be required if loose, porous, or low-density soils are encountered at the bottom of the overexcavation. The exposed subgrade soils should then be scarified to a depth of 12 inches, moisture conditioned to 0 to 4 percent above optimum moisture content, and recompacted.

Treatment of Existing Soils: Retaining Walls and Site Walls

Retaining walls are expected to be necessary in order to facilitate the development of this site. Overexcavation will also be necessary in these areas to remove lower-strength potentially compressible/collapsible younger alluvium.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing near-surface existing soils in new parking and drive areas is not considered warranted, with the exception of areas underlain by younger alluvial soils or where lower strength or otherwise unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify areas of additional unsuitable soils. Such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above the optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of debris to the satisfaction of the geotechnical engineer.
- Grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Calimesa and/or the County of Riverside.
- Fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Fill soils placed at depths greater than 20 feet below proposed pad grade within the building pads should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Utility Trench Backfill

In general, utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Calimesa and/or the county of Riverside. Utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

Based on the presence of predominantly granular soils near the surface, minor caving of shallow excavations may occur. Flattened excavation slopes may be sufficient to mitigate caving of shallow excavations. On a preliminary basis, temporary excavation slopes should be made no steeper than 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. Excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Dense to very dense older alluvium was encountered at some the exploratory borings at relatively shallow depths. These materials are expected to be rippable with heavy grading equipment.

Moisture Sensitive Subgrade Soils

Some of the near surface soils possess appreciable silt and clay content and may become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. In addition, based on their granular content, some of the on-site soils will also be susceptible to erosion. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

If the construction schedule dictates that site grading will occur during a period of wet weather, allowances should be made for costs and delays associated with drying the on-site soils or import of a drier, less moisture sensitive fill material. Grading during wet or cool weather may also increase the depth of overexcavation in the pad area as well as the need for mechanical stabilization. If subgrade stability problems develop, the geotechnical engineer should be contacted to provide stabilization recommendations.

Slope Planting and Maintenance

The natural slopes and manufactured slopes that will be created on site should be planted immediately after construction is completed, to achieve well-established and deep-rooted vegetation. The slopes should be planted with shrubs that will develop root systems to depths of

5 feet or more, such as ground acacia. Intervening areas should be planted with lightweight surface plantings with shallower root systems. Wherever possible, the selected plantings should be lightweight and drought tolerant. Due to its high weight, the use of iceplant is not recommended. It is recommended that a landscape architect be consulted to determine the actual planting materials.

Reasonable precautions should be taken to minimize deep soil moisture penetration within the slope soils. The volume of slope irrigation should be the minimum that is required to maintain plant growth. Surface water runoff from the slopes should be diverted away from the top of the proposed retaining walls. The condition of the slope must be continually maintained to reduce the potential for surficial failures. This includes maintenance of the drainage pathways, diversion structures, maintenance of the vegetation, and repair of rodent damage.

Groundwater

The static groundwater table at this site is considered to exist at a depth greater than 50± feet. Therefore, the groundwater table is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design Recommendations

Based on the preceding geotechnical design considerations and preliminary grading recommendations, it is assumed that the new buildings will be underlain by newly placed structural fill soils. Based on the assumed construction and structural loads discussed in Section 3.2 of this report, we expect the proposed structures will be supported on conventional spread footing foundations.

Spread Footing Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars.
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across exterior doorways. Flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

General Foundation Design Recommendations

The allowable bearing pressures presented above may be increased by one-third when considering short duration wind or seismic loads. Additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Unsuitable materials should be removed to a depth of suitable bearing compacted structural fill or suitable native older alluvium, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process

Estimated Foundation Settlements

Post-construction total and differential static settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively, under static conditions. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 275 lbs/ft^3
- Friction Coefficient: 0.30

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the assumed construction and the anticipated grading which will occur at this site, we expect that the floors for the new structures will consist of conventional slabs-on-grade. Based on geotechnical considerations, the floor slabs may be preliminarily designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 120 psi/in.

- Minimum slab reinforcement: No. 3 bars at 18-inches on-center, in both directions, due to presence of potentially expansive soils at this site. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading, and the potential liquefaction-induced settlements.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire slab area where such moisture sensitive floor coverings are expected. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated and moisture transmission through the slab is acceptable, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Several retaining walls may be required to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used for preliminary design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The on-site soils generally consist of silty sands and sandy silts. Based on their classification, these materials are expected to possess a friction angle of at least 30 degrees. The design parameters provided below are based on the assumed friction angle and should be confirmed during the design-level geotechnical investigation.

The select fill material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type On-Site Silty Sands and Sandy Silts
Internal Friction Angle (ϕ)		30°
Unit Weight		125 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	42 lbs/ft^3
	Active Condition (2h:1v backfill)	67 lbs/ft^3
	At-Rest Condition (level backfill)	63 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 275 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. The recommended seismic pressure distribution is triangular in shape, assumed to occur at the top of the wall, decreasing to 0 at the base of the wall. For a level backfill condition behind the top of the wall, the seismic lateral earth pressure is 40H lbs/ft^2, where H is the overall height of the wall. Where the ground surface above the wall consists of a 2h:1v (horizontal to vertical) sloping condition, the seismic lateral earth pressure is 66H lbs/ft^2. The seismic pressure distribution is based on the Mononobe-Okabe equation, utilizing a design acceleration of 0.661g. The 2019 CBC does not provide definitive guidance on determination of the design acceleration to be used in generating the seismic lateral earth pressure. In accordance with standard geotechnical practice, we have calculated the design acceleration as $^2/_3$ of the PGA_M. However, for combinations of high ground motion and steep slopes above the wall, the Mononobe-Okabe equation gives unrealistic high estimates of active earth pressures. Therefore, the seismic earth pressure for the sloping condition presented above was derived using a design acceleration equal to 50% of the PGA_M.

Backfill Material

Retaining wall backfill soils should consist of on-site sands and silty sands or imported granular soils possessing an expansion index less than 20. On-site low to medium expansive soils are not recommended for use as retaining wall backfill. Backfill material placed within 3 feet of the back-wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, may be used against the back of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. This material should be approved by the geotechnical engineer. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils.

Retaining wall backfill should be placed and compacted under engineering observed conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as evaluated by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

6.8 Pavement Design Parameters Recommendations

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either

PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of silty sands with limited amounts of clay. These soils are generally considered to possess moderate pavement support characteristics with estimated R-values ranging from 20 to 35. The subsequent pavement design is therefore based upon an assumed R-value of 20. Fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering observed conditions. It is recommended that R-value testing be performed after completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20 year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35
9.0	93

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. The traffic indices above allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 20)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	8	10	12	14	16
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as evaluated by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 20)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	7	8½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness.

7.0 GENERAL COMMENTS

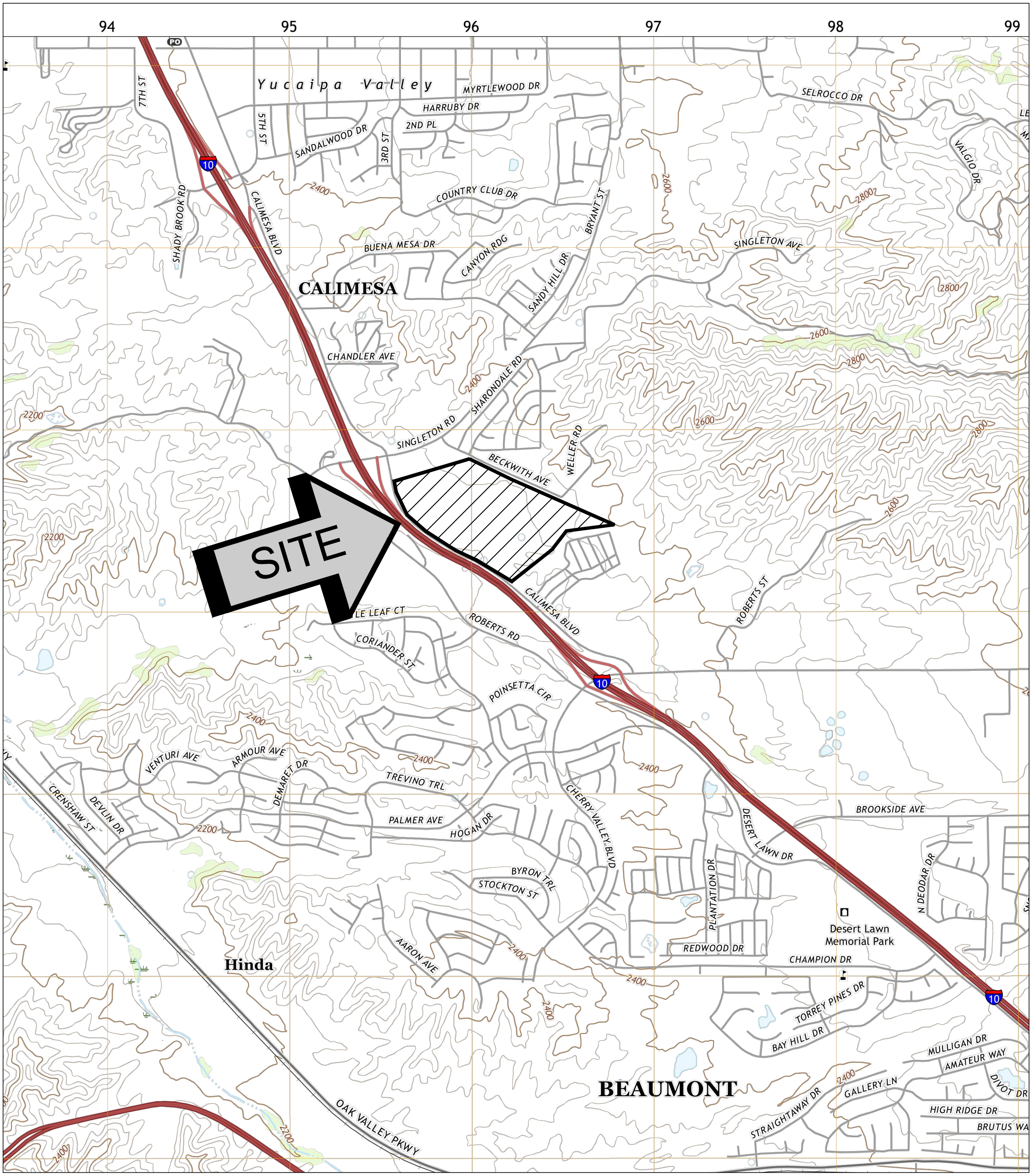
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to confirm that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to confirm that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE EL CASCO QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2022.

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

SCALE: 1" = 2500'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: AG CHKD: RGT	
SCG PROJECT 20G122-2	
PLATE 1	

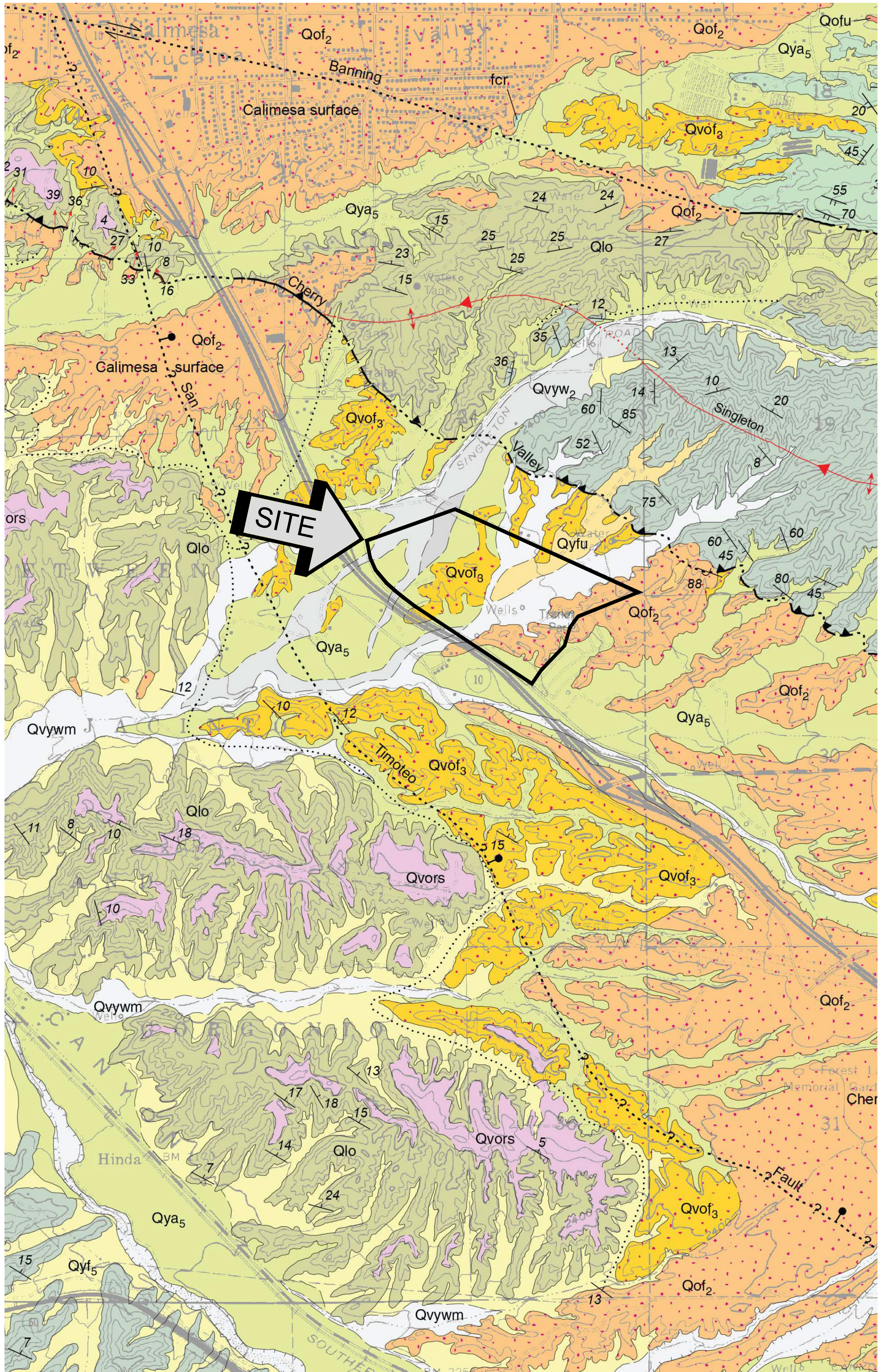
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

22885 Savi Ranch Parkway
Suite E
Yorba Linda, CA 92887
Phone: (714) 685-1115
Fax: (714) 685-1118
www.socalgeo.com

SCALE: 1" = 120'
DRAWN: OS
CHKD: RGT
SCG PROJECT 20G122-2

GEOTECHNICAL MAP
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT
CALIMESA, CALIFORNIA

PLATE 2



DESCRIPTION OF MAP UNITS

VERY YOUNG SURFICIAL MATERIALS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, in ephemeral lakes, and on hillslopes. Soil-profile development non-existent to weak. Includes:

Very young wash deposits (uppermost Holocene)—Sandy and gravelly sediment associated with stream channels and arroyos that are the sites of very recent sediment transport and deposition. Includes:

Qvywm — **Very young wash deposits, modern**—Very slightly to slightly consolidated sandy and gravelly sediment in active channels

Qvyw2 — **Very young wash deposits, unit 2**—Very slightly to slightly consolidated sandy and gravelly sediment that locally forms slightly elevated terraces along the margins of San Timoteo Creek

Qvyw1 — **Very young wash deposits, unit 1**—Very slightly to slightly consolidated sandy and gravelly sediment that locally forms slightly elevated terraces along the margins of San Timoteo Creek; surface supports mature trees and thin A horizons

Qvyfu — **Very young alluvial-fan deposits, undifferentiated (uppermost Holocene)**—Very slightly to slightly consolidated, undissected deposits of sandy and gravelly sediment that form actively sedimented parts of alluvial fans; occurs only locally

Qvylm — **Very young lacustrine deposits, modern (uppermost Holocene)**—Unconsolidated to slightly consolidated muddy and fine sandy sediment deposited in ephemeral lakes formed in lowlands by overbank flooding of San Jacinto River

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are very slightly to moderately consolidated and slightly to moderately dissected. Alluvial-fan deposits (Qyf series) typically are sandy, but include subordinate gravelly sediment; axial-valley deposits (Qya series) are dominated by sandy sediment, with minor gravelly sediment and uncommon muddy sediment. Upper surfaces capped by slight to moderately developed pedogenic-soil profiles (A/AC to A/AC/Bcambic profiles having oxidized upper C horizon). Soil groups mapped by Knecht (1971) mainly are the Hanford and San Emigdio series, but include the Metz, Tujunga, and Grangeville series:

Young axial-valley deposits (Holocene and uppermost Pleistocene)—Slightly to moderately consolidated sandy, muddy, and gravelly sediment deposited by through-going streams of axial valleys; subunits distinguished on the basis of soil-profile development, relative position in the local terrace-riser succession, and degree of erosional dissection. Includes:

Qya5 — **Young axial-valley deposits, unit 5 (uppermost Holocene)**

Qya4 — **Young axial-valley deposits, unit 4 (upper Holocene)**

Qya3 — **Young axial-valley deposits, unit 3 (middle Holocene)**

Young alluvial-fan deposits (Holocene & uppermost Pleistocene)—Slightly to moderately consolidated sandy, gravelly, and muddy sediment deposited by streams flowing on alluvial-fan landforms. Units distinguished on the basis of soil-profile development and relative position in local terrace-riser succession. Includes:

Qyf5 — **Young alluvial-fan deposits, unit 5 (uppermost Holocene)**

Qyf4 — **Young alluvial-fan deposits, unit 4 (upper Holocene)**

Qyf3 — **Young alluvial-fan deposits, unit 3 (middle Holocene)**

Qyf1 — **Young alluvial-fan deposits, unit 1 (lower Holocene & uppermost Pleistocene)**

Qyfu — **Young alluvial-fan deposits, undifferentiated (lower Holocene & uppermost Pleistocene)**

Qyls — **Young landslide deposits (Holocene & uppermost Pleistocene)**—Slightly dissected slope-movement deposits. Locally may include old landslide material

Qyl5 — **Young lacustrine deposits, unit 5 (uppermost Holocene)**—Unconsolidated to slightly consolidated muddy and fine sandy sediment deposited in an ephemeral lake formed by flooding of San Jacinto River

OLD SURFICIAL DEPOSITS—Sedimentary units (Qof series, Qoa series) that are moderately consolidated, sandy and gravelly, and slightly to moderately dissected. Upper surfaces capped by moderately to well-developed pedogenic soils (A/AB/B/Cox profiles and Bt horizons as much as 1 to 2 m thick and maximum hues typically in the range of 10YR 5/4 and 6/4 [yellowish brown and light yellowish brown] through 7.5YR 6/4 to 4/4 [light brown to dark brown] but reaching 5YR 5/6 [yellowish red]). Soil groups mapped by Knecht (1971) include Greenfield series and weaker soils of Monserate and Ramona series. Includes:

Qosu — **Old surficial deposits, undifferentiated (upper to middle Pleistocene)**—Sandy and gravelly sediment of unspecified genesis

Old axial-valley deposits (upper to middle Pleistocene)—Moderately consolidated sandy and silty sediment and subordinate gravelly sediment deposited by through-going streams of axial valleys

Qoau — **Old axial-valley deposits, undifferentiated (upper to middle Pleistocene)**

Old alluvial-fan deposits (upper to middle Pleistocene)—Sandy, gravelly, and silty sediment deposited by streams that formed alluvial-fan landforms; subunits distinguished on the basis of soil-profile development, relative position in the local terrace-riser succession, and degree of erosional dissection. Includes:

Qof3 — **Old alluvial-fan deposits, unit 3 (upper Pleistocene)**

Qof2 — **Old alluvial-fan deposits, unit 2 (upper to middle Pleistocene)**

Qof1 — **Old alluvial-fan deposits, unit 1 (upper to middle Pleistocene)**

Qofu — **Old alluvial-fan deposits, undifferentiated (upper to middle Pleistocene)**

Qols — **Old landslide deposits (upper to middle Pleistocene)**—Moderately dissected slope-movement deposits. Probably inactive under current climatic and tectonic conditions

VERY OLD SURFICIAL DEPOSITS—Sedimentary units (Qvo series) that are moderately consolidated and moderately to well dissected. Consists mainly of alluvial-fan deposits (Qvof units) that typically are sandy and gravelly, but locally includes muddy sediment. Upper surfaces capped by moderate to well-developed pedogenic soils (A/AB/B/Cox profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range of 7.5YR 6/4 to 4/4 [light brown to dark brown] to 2.5YR 5/6 [red]). Soil groups mapped by Knecht (1971) include stronger soils of the Ramona and Placentia series. Includes:

Qvors — **Very old residuum and (or) pedogenic soil (middle to lower Pleistocene)**—Consists of residuum and (or) pedogenic-soil profile developed on Sedimentary deposits of Live Oak Canyon (unit Qlo); has mature A/AB/B soil profile having Bt horizon as much as 3 m thick, and commonly laced with stringers, nodules, and irregular seams of $CaCO_3$ (caliche)

Very old alluvial-fan deposits (middle to lower Pleistocene)—Sandy and gravelly deposits having subunits distinguished from each other on the basis of soil-profile development and relative position in local terrace-riser succession. Includes:

Qvof3 — **Very old alluvial-fan deposits, unit 3 (middle Pleistocene)**

Qvofu — **Very old alluvial-fan deposits, undifferentiated (middle Pleistocene)**

CENOZOIC SEDIMENTARY MATERIALS

Qlo — **Sedimentary deposits of Live Oak Canyon (Pleistocene)**—Unconsolidated and consolidated nonmarine sedimentary material; sediment typically moderately consolidated, rock well consolidated to lithified. Mainly consists of gravelly and conglomeratic material interbedded with subequal sandy sediment and rock; muddy sediment and mudrock minor

San Timoteo formation of Frick (1921) (Pleistocene & Pliocene)—Nonmarine sediment and sedimentary rock referred to by Frick (1921, p. 283, 317) as his "San Timoteo formation" or "Upper San Timoteo Deposition". Sandy and conglomeratic rocks contain clasts derived from crystalline rocks of Transverse Ranges-type; clasts of Peninsular Ranges-type do not occur. Throughout its regional extent, formation ranges in age from Pliocene to early Pleistocene (Albright, 1999). Until a type section is designated and described, map unit is classified informally. Subdivided into:

Tstm — **Middle member (upper and middle Pliocene)**—Forms middle part of San Timoteo formation. Consists of four principal lithologies that recur throughout sequence: (1) thick sheet-like layers of conglomeratic rock; (2) light-gray to white sandstone and slightly conglomeratic sandstone; (3) reddish mudstone and sandstone; and (4) locally significant but minor grayish-green mudrock. Lithologies (1) and (3) distinguish middle member from other members of formation. Lower contact transitional across intervals as thick as 50 m, and unit appears to interfinger southeastward and eastward with underlying lower member; upper contact not exposed in quadrangle, but in adjacent Sunnymead quadrangle the middle member is transitional with overlying upper member. Pliocene age (Blancan) based on magnetostratigraphic correlation and stratigraphic relations with underlying and overlying units that contain vertebrate fossils (Albright, 1999).

Lower member (lower Pliocene)—Forms lower part of San Timoteo formation of Frick (1921). Subdivided into:

Tstls — **Sandstone unit (lower Pliocene)**—Consists dominantly of sandy rock interbedded with sparse conglomeratic rock, mudrock minor, except in stratigraphic sequence west of Moreno Valley strand of San Jacinto Fault at west edge of quadrangle. Rock is well consolidated to lithified, with some intervals cemented by calcareous and (or) siliceous cement. Contact with overlying middle member (unit Tstm) is transitional across stratigraphic interval as much as 50 m thick

Tstlr — **Ripple-laminated unit (lower Pliocene)**—Consists of two distinctive interbedded lithologies: (1) ledge-forming ripple-laminated sandstone and (2) recessive greenish-gray mudstone

Tstlf — **Fine-grained unit (lower Pliocene)**—Mainly light-gray to grayish-brown mudstone and calcareous mudstone that are fissil- and chippy-weathering, and that form recessive slopes. Rock texturally massive to faintly laminated, locally has mudcracks and rain-drop impressions, and locally contains thin nodules, needles, and seams if gypsum. Early Pliocene age (Blancan) based on magnetostratigraphic correlation and stratigraphic relations with underlying and overlying units that contain vertebrate fossils (Albright, 1999)

Mt. Eden formation of Frick (1921), revised herein (upper Miocene)—Nonmarine sedimentary rock referred to by Frick (1921, p. 283, 317) as his "Eden formation" or "Lower San Timoteo Deposition". Upper part of formation is late Miocene in age (late Hemphillian) on the basis of vertebrate fossils collected from the Mt. Eden area (Frick, 1921; May and Repenning, 1982; Albright, 1999). Until a type section is designated, unit is classified informally. Subdivided into:

Tmeh — **Heterogeneous member (upper Miocene)**—In Mt. Eden area, forms upper part of "Eden formation" of Frick (1921). Includes several lithotypes, two of which Frick (1921) emphasized in his original characterization: (1) slope-forming, greenish-gray mudstone, and (2) white nodular and lenticular limestone. Also includes (3) lithic arkosic sandstone and conglomeratic sandstone, and (4) greenish-gray siltstone and fine biotitic sandstone. These lithotypes occur in variable proportions throughout the member, although the finer grained rocks occur mainly in its upper part. Sandy and conglomeratic rocks contain clasts derived exclusively from crystalline rocks of Peninsular Ranges-type. Most of the vertebrate fossils collected by Frick (1921) are from this member where it crops out on the north slope of Mt. Eden.

Tmea — **Arkosic and lithic member (upper Miocene)**—Forms most of Mt. Eden formation in both Mt. Eden area and Laborde Canyon. At any specified location unit is fairly homogeneous in lithology; however, the unit in Mt. Eden area tends to be more brownish than in Laborde Canyon area, where rock tends to be more grayish. In all instances, rock is well consolidated to lithified, is recessive and slope-forming rather than ledgeforming, is thin- to very thick bedded to crudely stratified, and contains angular to subrounded particles derived exclusively from crystalline rocks of Peninsular Ranges-type (aplite, gneiss, metaquartzite, marble, schist, and granitoids). Sandy rock predominates over conglomeratic rock. Depositional fabrics mainly texturally massive, less commonly crudely flat laminated; cross laminations (shallow trough laminations, small-scale tabular laminations) present but not common; sedimentary structures better developed in finer grained rock than coarser-grained rock

Tmeb — **Boulder conglomerate member (upper Miocene)**—Lenticular bodies of monolithologic conglomerate interstratified with unit Tmea. Particle size ranges from pebbles to boulders as much as 6 m in dimension, with larger particles surrounded by grusy sand- and granule-size matrix; particles consist of biotite-hornblende tonalite identical to tonalite of Lamb Canyon (unit Ktlc)

EXPLANATION OF MAP SYMBOLS

Contact—Separates geologic-map units. Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard; dotted where concealed

Contact—Separates terraced alluvial units where younger unit is incised into older unit; hachures at base of slope, point toward topographically lower surface. Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard.

Landslide crown scarp—Demarcates pull-away zone at head of landslide mass; may not meet map-accuracy standard. May form geologic contact between landslide mass and bedrock, or may separate discrete landslide masses. Hachures point downslope. Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard

Fault—Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard. Dotted where concealed by mapped covering unit; queried where existence uncertain. Hachures indicate scarp, with hachures on down-dropped block. Paired arrows indicate relative movement; single arrow indicates direction and amount of fault-plane dip. Bar and ball on down-thrown block

Thrust fault—Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard. Dotted where concealed by mapped covering unit; queried where existence uncertain. Sawteeth on upper plate; hachures at base of slope on downthrown block of fault scarp

Fault—Interpreted from seismic imaging; no locational accuracy implied (from Park and others, 1995)

Fold axial plane—Solid where meets map-accuracy standard; dashed where may not meet map-accuracy standard. Dotted where concealed by mapped covering unit

Anticline, showing plunge direction

Syncline, showing plunge direction

Ground fissure

Geomorphic surface (Mt. Eden surface)

Fault-name abbreviations

SJF — **San Jacinto Fault**

Strike and dip of sedimentary layering

Inclined

Vertical

Overturned

Strike and dip of foliation of mineral grains, inclusions, or schlieren in igneous rocks

Inclined

Mineral foliation and (or) compositional layering in metamorphic rocks

Inclined

Vertical

Foliation in cataclastic and (or) mylonitic rocks

Inclined

Vertical

Azimuth and plunge of lineations

lineation, unspecified

SOURCE: "GEOLOGIC AND GEOPHYSICAL MAPS OF THE EL CASCO 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, WITH ACCOMPANYING GEOLOGIC-MAP DATABASE" MATTI AND MORTON, 2015

GEOLOGIC MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

SCALE: 1" =2000'

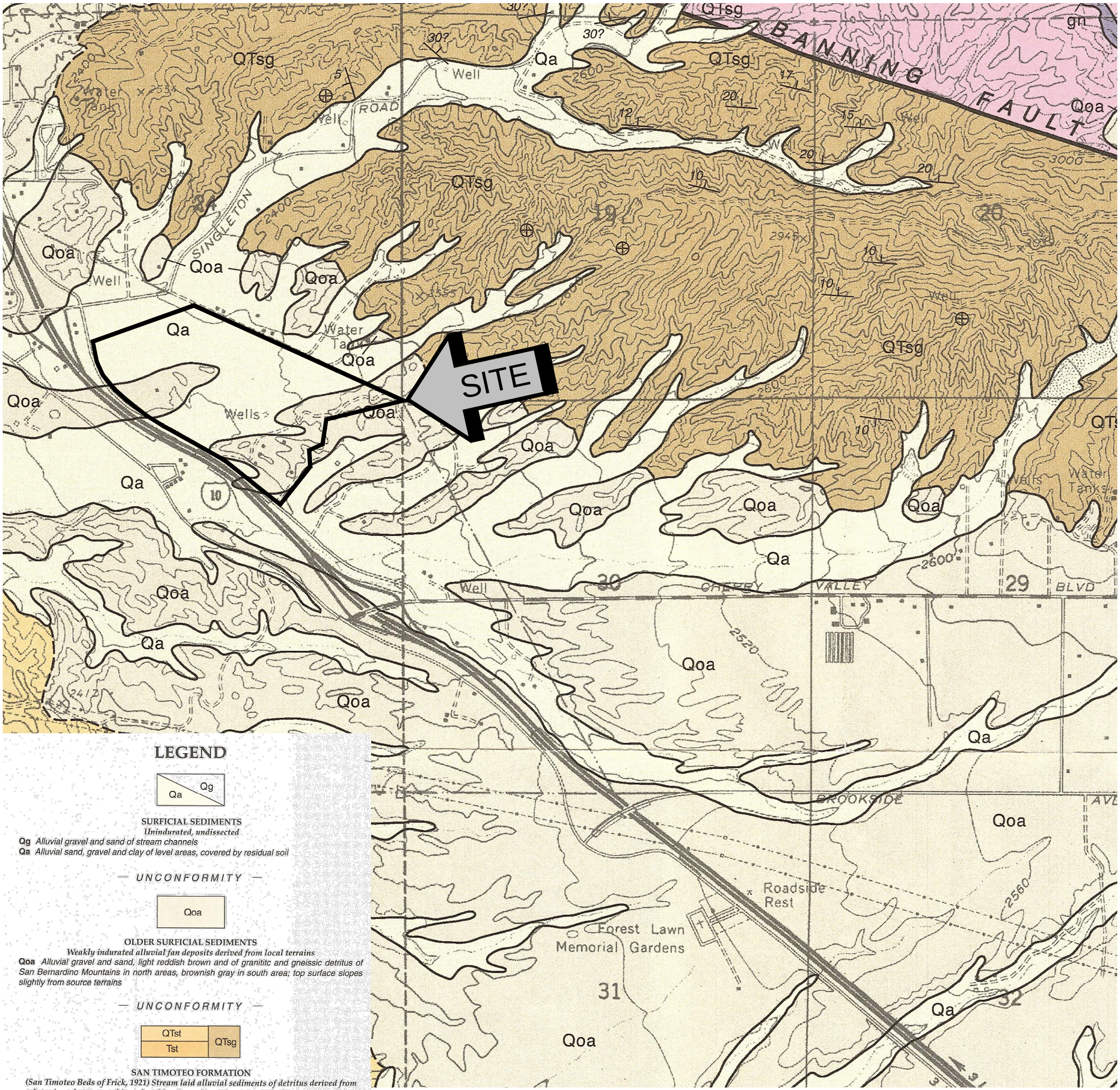
DRAWN: OS
CHKD: RGT

SCG PROJECT
20G122-2

PLATE 3a

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



LEGEND

Qa | Qg

SURFICIAL SEDIMENTS

Unindurated, undissected

Qg *Alluvial gravel and sand of stream channels*

Qa *Alluvial sand, gravel and clay of level areas, covered by residual soil*

— *UNCONFORMITY* —

Qoa

OLDER SURFICIAL SEDIMENTS

Weakly indurated alluvial fan deposits derived from local terrains

Qoa *Alluvial gravel and sand, light reddish brown and of granititc and gneissic detritus of San Bernardino Mountains in north areas, brownish gray in south area; top surface slopes slightly from source terrains*

— *UNCONFORMITY* —

QTst / Tst | QTsg

SAN TIMOTEO FORMATION

(San Timoteo Beds of Frick, 1921) Stream laid alluvial sediments of detritus derived from plutonic and metamorphic rocks of San Bernadino Mountains NE of Banning Fault and deposited on plutonic and meta-sedimentary rocks of Peninsular Ranges NE of San Jacinto Fault zone; weakly indurated; upper part yielded verterbrate fauna diagnostic of Blancan Stage, Plio-Pleistocene (Frick, 1921, Savage et. al. 1954) or Irvingtonian Stage, earliest Pleistocene, (Repennimga 1987) lower or main part inferred to be of Pliocene age (Morton and Matti, 2001)

QTst *Upper part, sandstone, light gray to tan. fine to coarse grained arkosic and minor conglomerate of mostly granitic detritus, some gneissic and quartzitic detritus; includes thin layers of soft greenish to light reddish silty claystone, overlain by older alluvium*

QTsg *Conglomerate/fanglomerate, brownish gray, crudely bedded, of poorly sorted subrounded clasts of granitic and gneissic detritus in sandy matrix, base unexposed, overlain by older alluvium; probably proximal facies of upper part (**Qtst**); exposed adjacent to Banning fault*

Tst *Main part (middle part of Morton and Matti, 2001) sandstone, minor conglomerate and claystone, similar to those of upper part; comformably overlain by upper part (**QTst**), conformably underlain by Mount Eden Formation (Tme), but thins and buttresses eastward onto basement rocks as shown.*

GEOLOGIC SYMBOLS

not all symbols shown on each map

FORMATION CONTACT *dashed where inferred or indefinite dotted where concealed*

MEMBER CONTACT *between units of a formation* .... **Prominent bed**

CONTACT BETWEEN SURFICIAL SEDIMENTS *located only approximately in places*

FAULT: *Dashed where indefinite or inferred, dotted where concealed, queried where existence is doubtful. Parallel arrows indicate inferred relative lateral movement. Relative vertical movement is shown by U/D (U=upthrown side, D=downthrown side). Short arrow indicates dip of fault plane. Sawteeth are on upper plate of low angle thrust fault.* U D 25 ?

FOLDS: *overturned* **ANTICLINE** **SYNCLINE**

arrow on axial trace of fold indicates direction of plunge; dotted where concealed by surficial sediments

Strike and dip of Sedimentary rocks: 18 *inclined*; 20 3 *inclined (approximate)*; 80 *overturned*; *horizontal*; *vertical*

Strike and dip of metamorphic or igneous rock foliation or flow banding or compositional layers: 75 *inclined*; *inclined (approximate)*; *vertical*; 80 *overturned*

SOURCE: "GEOLOGIC MAP OF THE EL CASCO 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA" DIBBLEE, 2003.

GEOLOGIC MAP

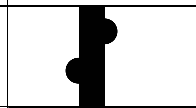
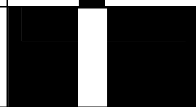
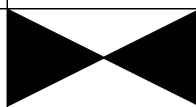
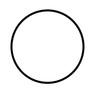
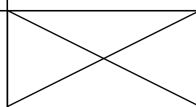
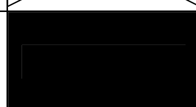
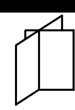
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

SCALE: 1" = 2000'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: OS CHKD: RGT	
SCG PROJECT 20G122-2	
PLATE 3b	

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3” indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING NO. B-7

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2303.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					DISTURBED ALLUVIUM: Brown Silty fine Sand, little medium to coarse Sand, trace fine to coarse Gravel, occasional Cobbles, trace fine root fibers, medium dense-dry to damp							
	X	28				111	2					
	X	28				115	4					
					ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry to damp							
5	X	17				107	2					
					Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, medium dense-damp							
	X	21				105	4					
					Brown Silty fine Sand to fine Sandy Silt, trace medium to coarse Sand, trace fine Gravel, trace fine root fibers, medium dense-dry to damp							
	X	22				100	2					
10												
					Light Brown Silty fine Sand, trace to little medium to coarse Sand, medium dense-damp							
	X	18					3					
15					Boring Terminated at 15'							

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 14 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2314.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	6			DISTURBED ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, loose-dry to damp		2					
	X	17			DISTURBED ALLUVIUM: Brown Silty fine to coarse Sand, little fine to coarse Gravel, medium dense-dry to damp		2					
5	X	9			ALLUVIUM: Gray Brown fine to coarse Sand, trace Silt, trace fine Gravel, loose-damp		2					
	X	7			Brown Silty fine Sand to fine Sandy Silt, little medium to coarse Sand, trace fine to coarse Gravel, loose-damp to moist		7					
10												
	X	14			Brown Silty fine to coarse Sand to fine to coarse Sandy Silt, trace fine Gravel, medium dense-damp		4					
15												
	X	14			Brown fine Sandy Silt, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp to moist		7					
20					Boring Terminated at 20'							

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

BORING NO. B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

SURFACE ELEVATION: 2327.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0				DISTURBED ALLUVIUM: Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, medium dense-damp							
5	X	16			112	3					
7				ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-damp							
10	X	23			109	3					
12				Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp to moist							
15	X	23			109	3					
	X	20			106	9					
	X	33		Light Gray Brown fine to coarse Sand, trace Silt, little fine to coarse Gravel, medium dense-damp	111	3					
20	X	19			95	3					
				Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
	X	32		Light Gray Brown fine to coarse Sand, little fine Gravel, medium dense-damp	111	3					
25	X	28			105	4					
				Brown Silty fine Sand, trace medium Sand, medium dense-damp to moist							
30	X	27			105	7					

Boring Terminated at 30'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 26 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2330.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					<u>DISTURBED ALLUVIUM:</u> Brown Silty fine Sand, trace medium to coarse Sand, loose-damp							
5	X	13				100	5					EI = 2 @ 0 to 5 feet
					<u>ALLUVIUM:</u> Light Gray Brown fine to coarse Sand, trace Silt, trace fine Gravel, medium dense-damp							
10	X	20				117	2					
					Brown Silty fine Sand, trace to little medium to coarse Sand, medium dense-damp to moist							
15	X	16				117	5					
20	X	28			@ 19 feet, little medium to coarse Sand, trace fine Gravel	118	8					
					Light Gray Brown fine to medium Sand, trace coarse Sand, trace Silt, medium dense-damp							
25	X	20				113	3					
					Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
					Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp to moist							
30	X	29				110	7					
					Light Gray Brown fine to coarse Sand, trace Silt, trace fine Gravel, medium dense-damp							
	X	37			Boring Terminated at 35'	121	3					

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

SURFACE ELEVATION: 2302.0 feet MSL

DEPTH (FEET)	BLOW COUNT	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
			ALLUVIUM: Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, trace fine root fibers, loose-damp							
	11			100	4					
	10			82	5					
5	16	2.5	Brown Clayey Silt, trace fine root fibers, stiff-damp	86	7					
	11		Gray Brown fine to medium Sand, trace Silt, trace coarse Sand, loose-damp	99	3					
	13		Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, loose-damp	106	6					
10										
			Brown fine Sandy Silt, trace medium Sand, loose-moist							
	8				9					
15										

Boring Terminated at 15'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-12

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/12/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 16 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2291.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	34			ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace to little fine Gravel, dense-damp		5					
	X	68/11"			Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, very dense-damp		3					
5	X	48			Light Gray Brown fine to coarse Sand, trace Silt, trace fine to coarse Gravel, dense-damp		2					
	X	60			OLDER ALLUVIUM: Red Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, very dense-moist		11					
10												
	X	52					9					
15												
	X	55	4.5		Red Brown Clayey Silt, little fine Sand, trace coarse Sand, slightly cemented, hard-damp to moist		10					
20												

Boring Terminated at 20'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-13

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 13 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2307.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	53	3.5		OLDER ALLUVIUM: Brown Silty Clay, trace fine to coarse Sand, cemented, hard-damp		5					
5	X	40	4.0		Brown Clayey Silt, trace medium Sand, very stiff-damp		8					
	X	32	4.5		Brown Clayey Silt to Silty Clay, little fine Sand, trace medium Sand, very stiff to hard-moist		13					
10	X	18	4.5				13					
15	X	25	4.5		Brown Clayey Silt, little fine Sand, little Iron oxide staining, very stiff-moist		12					
					Boring Terminated at 15'							

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-14

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/12/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 2313.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
		27			DISTURBED ALLUVIUM: Brown fine Sandy Silt, trace medium Sand, medium dense-damp	88	5					
		40			ALLUVIUM: Brown fine Sandy Silt, trace to little Clay, trace medium to coarse Sand, slightly cemented, loose to medium dense-damp	113	5					
5		14				94	6					
		43	4.5		OLDER ALLUVIUM: Brown fine Sandy Clay, some Silt, little medium Sand, slightly cemented, hard-damp	119	7					
		39	4.5		Brown fine to medium Sandy Clay, trace coarse Sand, trace fine Gravel, very stiff-damp	117	7					
10												
		31			Brown fine Sandy Silt, trace to little Clay, little medium Sand, dense-damp		8					
15												
		84			Brown fine Sandy Silt, trace medium to coarse Sand, very dense-damp to moist		9					
20												

Boring Terminated at 20'

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-15

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2319.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown fine Sandy Silt, trace to little Clay, cemented, medium dense-damp							
	X	18					6					
5												
					Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-dry to damp							
	X	13					2					
	X	19			@ 8½ feet, little fine Gravel		2					
10												
	X	12			Brown fine to medium Sand, little Silt, trace coarse Sand, trace fine Gravel, medium dense-damp		3					
	X	8			Brown Silty fine Sand to fine Sandy Silt, trace medium to coarse Sand, loose-damp		5					
15												
					Brown fine Sandy Clay, some Silt, stiff-moist							
	X	13	4.5				12					
20												
					Brown fine Sandy Silt, trace to little medium to coarse Sand, trace Clay, medium dense-very moist							
	X	15					15					
25												
					Boring Terminated at 25'							

TEST BORING LOG

BORING NO. B-16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/12/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2304.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Gray Brown fine Sandy Silt, trace to little medium to coarse Sand, some Clay, trace fine root fibers, loose to medium dense-damp							
	X	9				83	5					EI = 27 @ 0 to 5 feet
	X	15			@ 3 feet, little Clay	105	5					
5	X	12				94	6					
	X	14			Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace coarse Sand, trace fine Gravel, loose-damp	106	4					
	X	15			Brown fine to medium Sandy Silt, trace coarse Sand, trace fine Gravel, medium dense-damp to very moist	96	7					
10												
15	X	10				105	14					
					Brown Clayey Silt to Silty Clay, little fine Sand, little Calcareous veining, medium stiff-moist							
20	X	11	3.5			106	13					

Boring Terminated at 20'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-17

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (SURFACE ELEVATION: 2319.0 feet MSL)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown fine to medium Sandy Silt, trace coarse Sand, little Clay, sightly porous, medium dense-damp							
5	X	25				110	5					
10	X	18			@ 9 feet, little coarse Sand, trace fine Gravel	107	5					
15	X	21				118	6					
20	X	18			@ 19 feet, trace fine to coarse Gravel, moist	103	9					
					Brown fine to coarse Sand, trace Silt, little fine to coarse Gravel, medium dense-dry to damp							
25	X	25			Brown fine to medium Sandy Silt, little coarse Sand, trace fine Gravel, medium dense-dry	115	2					

Boring Terminated at 25'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-18

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 14 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2295.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					DISTURBED ALLUVIUM: Dark Brown fine Sandy Silt, trace medium to coarse Sand, trace fine root fibers, medium dense-damp							
	X	26				103	5					
					ALLUVIUM: Brown fine Sandy Silt, little medium to coarse Sand, trace fine Gravel, loose-damp to moist							
	X	10				109	7					
5	X	8				100	9					
	X	12			@ 7 to 10 feet, trace medium to coarse Sand	106	10					
	X	12				106	9					
10												
					OLDER ALLUVIUM: Light Gray Brown Silty fine to medium Sand, little coarse Sand, trace to little fine Gravel, very dense-moist							
	X	77/10"				123	9					
15												
					Light Gray Brown fine to coarse Sand, trace Silt, very dense-damp							
	X	50/5"					3					
20												

Boring Terminated at 20'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-19

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

SURFACE ELEVATION: 2324.5 feet MSL

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Gray fine SAndy Silt, little medium to coarse Sand, trace fine to coarse Gravel, loose to medium dense-damp							
5	X	6					4					
10	X	12			@ 8½ to 15 feet, trace fine Gravel		5					
15	X	10			@ 13½ feet, occasional Cobbles		3					
	■	16			@ 16 feet, fine to coarse Gravel, damp	107	8					
	■	15			Light Brown Silty fine to corse Sand, some fine to coarse Gravel, medium dense-damp	114	3					
20	■	18			Brown fine to medium Sandy Silt, medium dense-damp	103	7					
	■	26			Brown Silty fine to coarse, trace fine Gravel, medium dense-damp	110	5					
25	■	19			Brown Silty fine Sand, little medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp to moist	102	7					
					Gray Silty fine to medium Sand, trace coarse Sand, medium dense-moist to very moist							
30	X	15					13					

Boring Terminated at 30'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-20

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 32 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2335.0 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					OLDER ALLUVIUM: Light Brown to Brown fine Sandy Silt, trace medium to coarse Sand, trace Clay, slightly cemented, very dense-damp							
5	X	75					4					
10	X	87/11"					6					
12					Brown Silty fine Sand, little medium Sand, trace coarse Sand, dense-damp							
15	X	41					5					
17					Brown Silty fine to coarse Sand, little fine Gravel, very dense-damp							
20	X	76					3					
25	X	69					4					
27					Brown fine to coarse Sand, trace Silt, trace fine Gravel, very dense-damp							
30	X	50/4"					3					
30					Brown Silty fine to coarse Sand, little fine to coarse Gravel, very dense-moist							
	X	70/10"					8					
33					Brown Silty fine to medium Sand, trace coarse Sand, very dense-damp							
	X	57					5					

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-20

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 32 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION (Continued)	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
					Brown fine to coarse Sand, little fine Gravel, trace Silt, very dense-damp							
	X	50/5"					3					
	X	52					4					
40												
					Boring Terminated at 40'							

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-21

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2349.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Brown fine Sandy Silt, trace medium to coarse Sand, slightly porous, medium dense-moist							
	X	44				111	12					
5	X	65/10"			Brown Silty fine to coarse Sand, little fine to coarse Gravel, very dense-damp to moist	107	7					
	X	71			Brown Silty fine to medium Sand, little coarse Sand, trace fine to coarse Gravel, very dense-damp	115	3					
					Brown Silty fine Sand, very dense-damp @ 9 feet, trace medium to coarse Sand, trace fine Gravel							
10	X	83				127	3					
	X	88/10"				127	3					
15												
					Brown fine Sandy Silt, trace medium Sand, very dense-moist to very moist							
	X	74/11"				120	10					
20												
	X	72			@ 24 feet, Red Brown, little coarse Sand	119	14					
25												
					Red Brown Clayey Silt, little fine Sand, hard-moist							
	X	94/10"	4.5			125	12					

Boring Terminated at 28'

TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-22

JOB NO.: 20G122-2
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/11/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

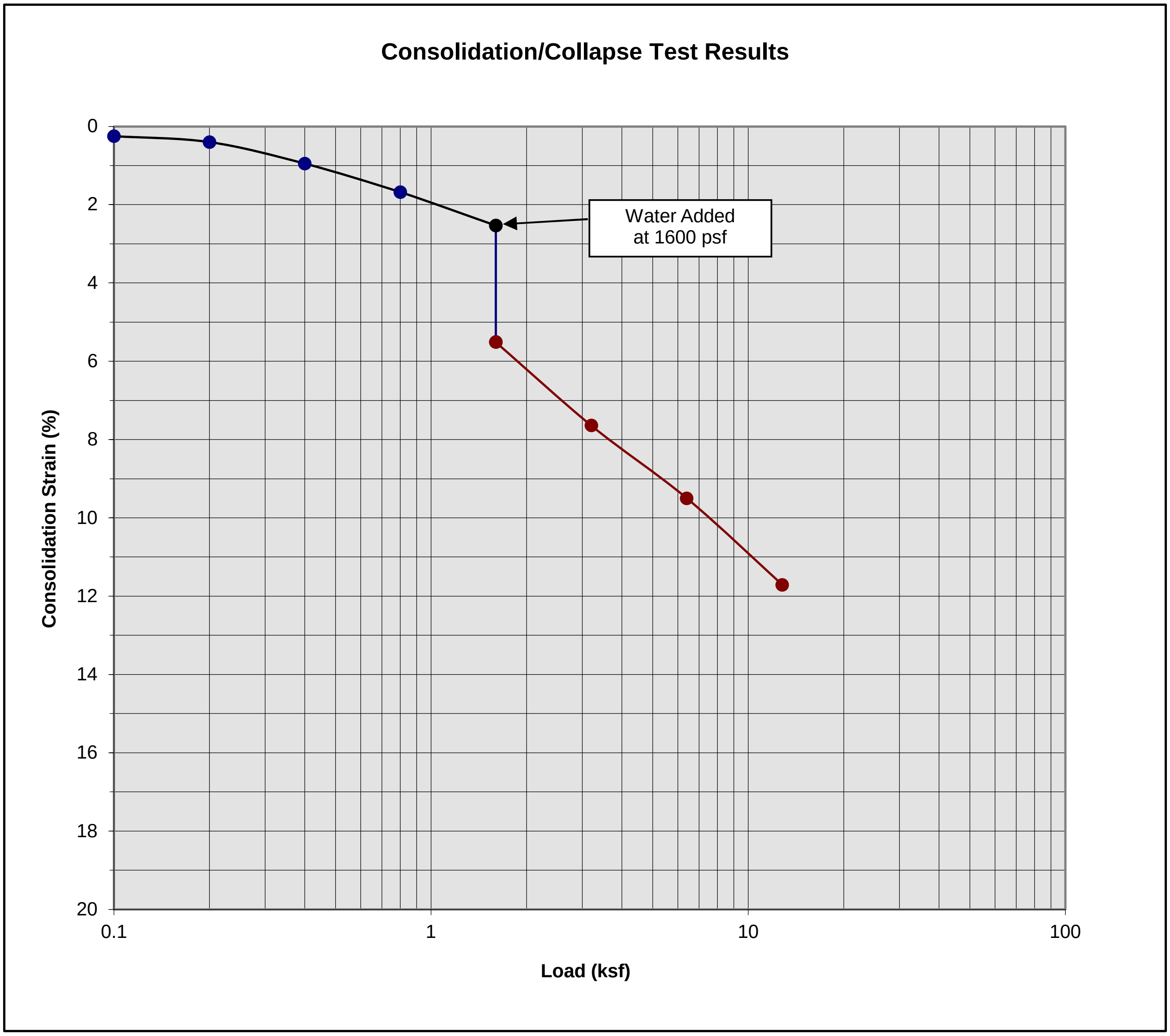
WATER DEPTH: Dry
CAVE DEPTH: 14 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 2381.0 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		48			OLDER ALLUVIUM: Light Brown Silty fine Sand, trace medium to coarse Sand, slightly porous, cemented, dense-damp	117	6					
		36			Red Brown fine Sandy Silt, trace to little medium to coarse Sand, trace fine Gravel, cemented, medium dense-moist	109	9					
5		27	4.5		Red Brown fine Sandy Clay, little Silt, trace medium to coarse Sand, trace fine Gravel, cemented, very stiff-damp to moist	117	10					
		28			Brown fine Sandy Silt, trace medium Sand, medium dense-damp	121	6					
		43			@ 9 feet, trace coarse Sand	118	7					
10												
		33			Light Brown Silty fine Sand, trace medium to coarse Sand, dense-moist to very moist		12					
15												
		42					7					
20												
		93/11"			Brown fine to coarse Sand, little fine Gravel, trace Silt, very dense-damp		3					
25												

Boring Terminated at 25'

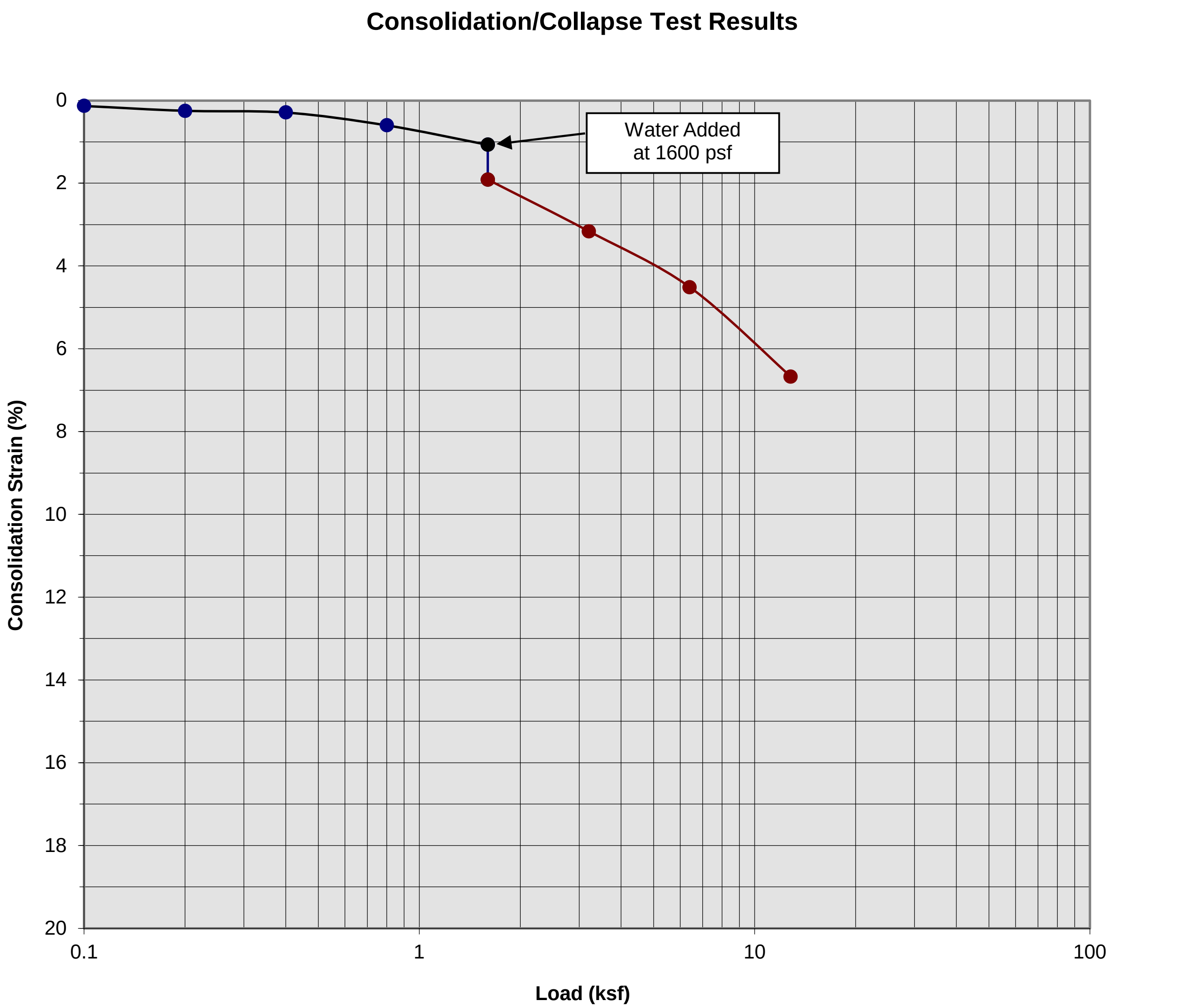
TBL 20G122-2.GPJ SOCALGEO.GDT 11/16/22

APPENDIX C



Classification: Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel

Boring Number:	B-9	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	16 to 17	Initial Dry Density (pcf)	108.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.98



Classification: Light Gray Brown fine to coarse Sand, trace Silt, little fine to coarse Gravel

Boring Number:	B-9	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	18 to 19	Initial Dry Density (pcf)	112.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.84

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 2

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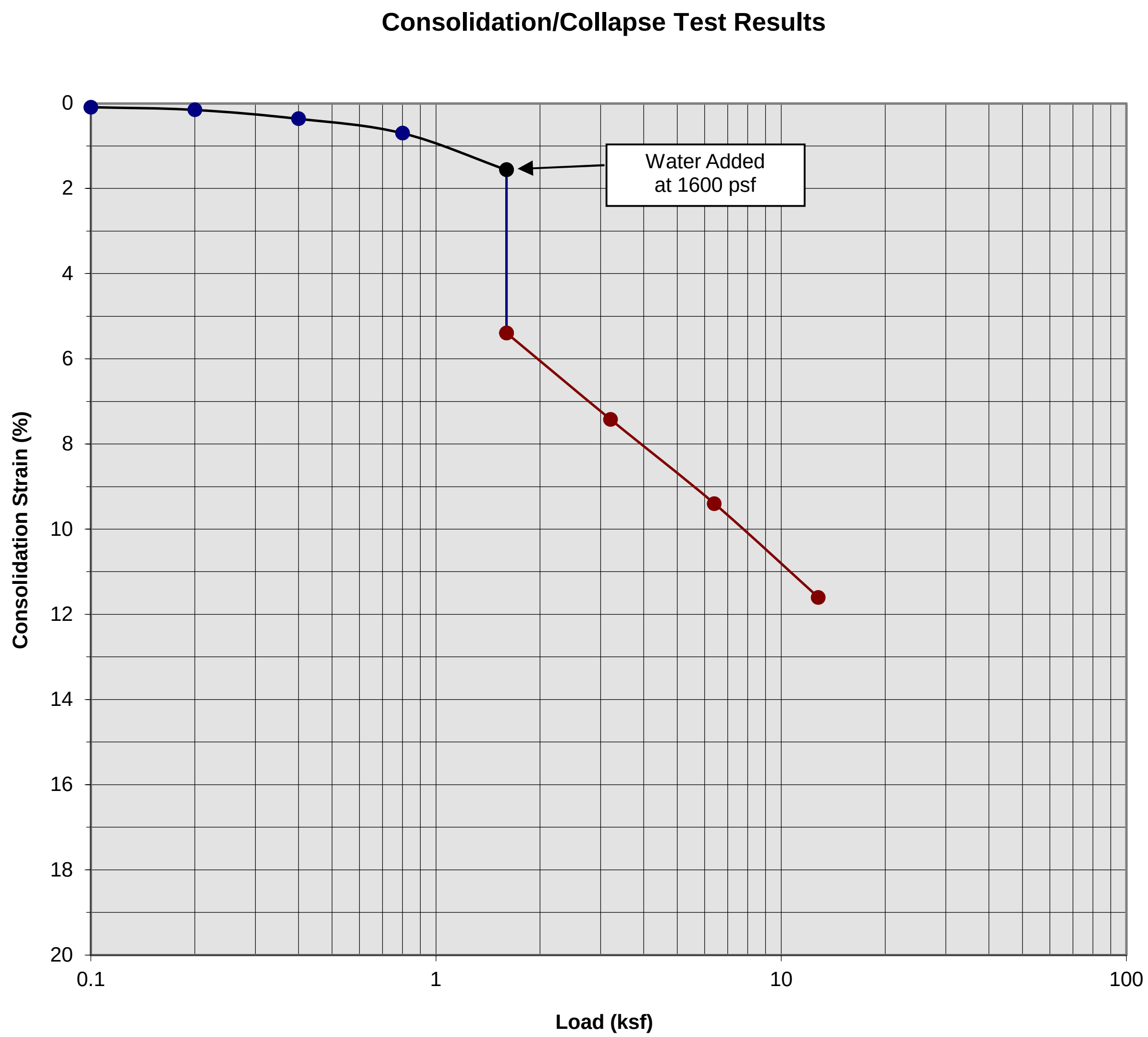


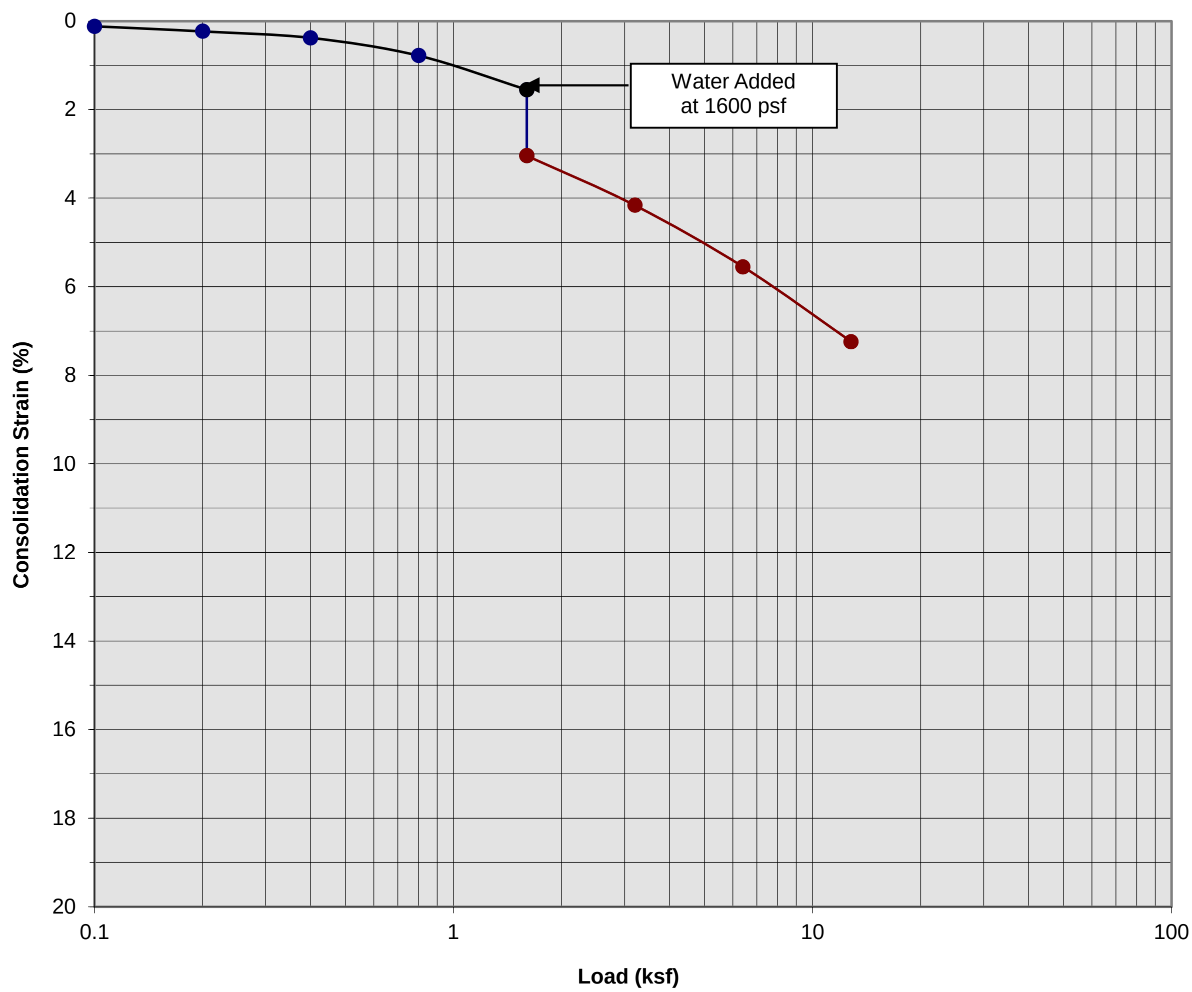
Classification: Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-9	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	20 to 21	Initial Dry Density (pcf)	96.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	108.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.83

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Gray Brown fine to coarse Sand, little fine Gravel

Boring Number:	B-9	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	22 to 23	Initial Dry Density (pcf)	106.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.49

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 4

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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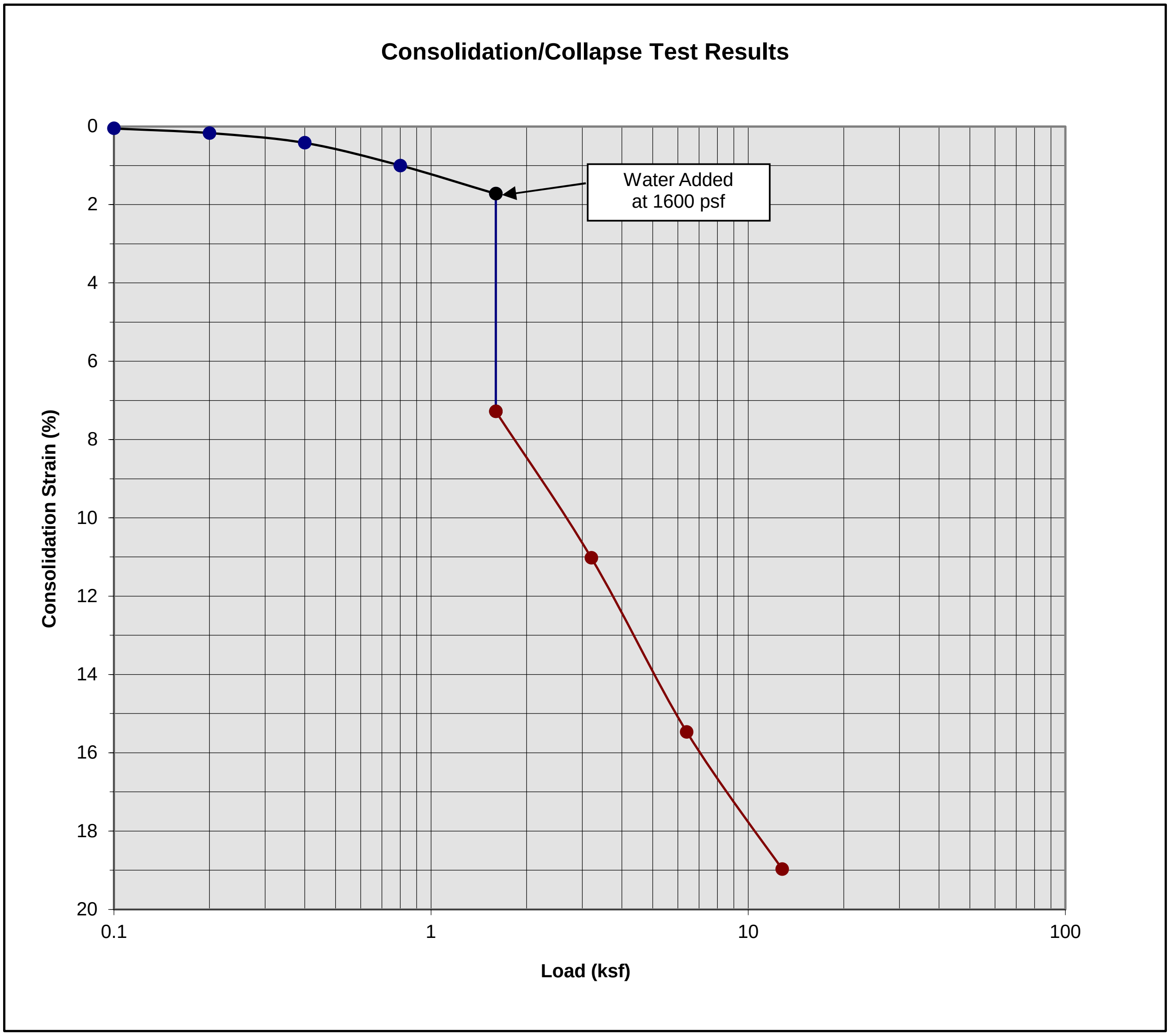

Classification: Brown Silty fine Sand to fine Sandy Silt, trace medium Sand

Boring Number:	B-11	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	25
Depth (ft)	3 to 4	Initial Dry Density (pcf)	85.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	103.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 5

SOUTHERN CALIFORNIA GEOTECHNICAL
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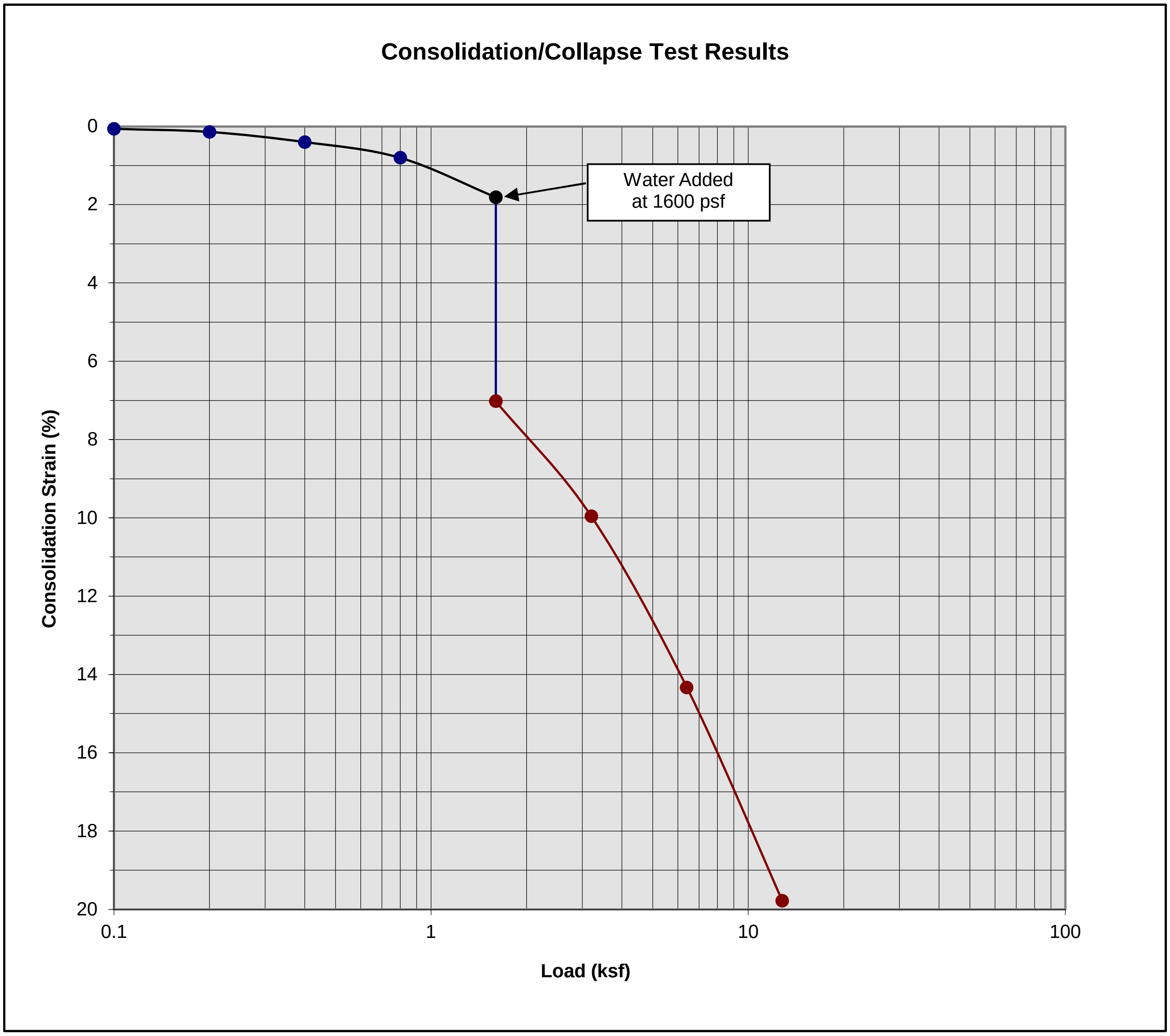

Classification: Brown Clayey Silt

Boring Number:	B-11	Initial Moisture Content (%)	6
Sample Number:	---	Final Moisture Content (%)	26
Depth (ft)	5 to 6	Initial Dry Density (pcf)	85.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	105.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.21

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 6

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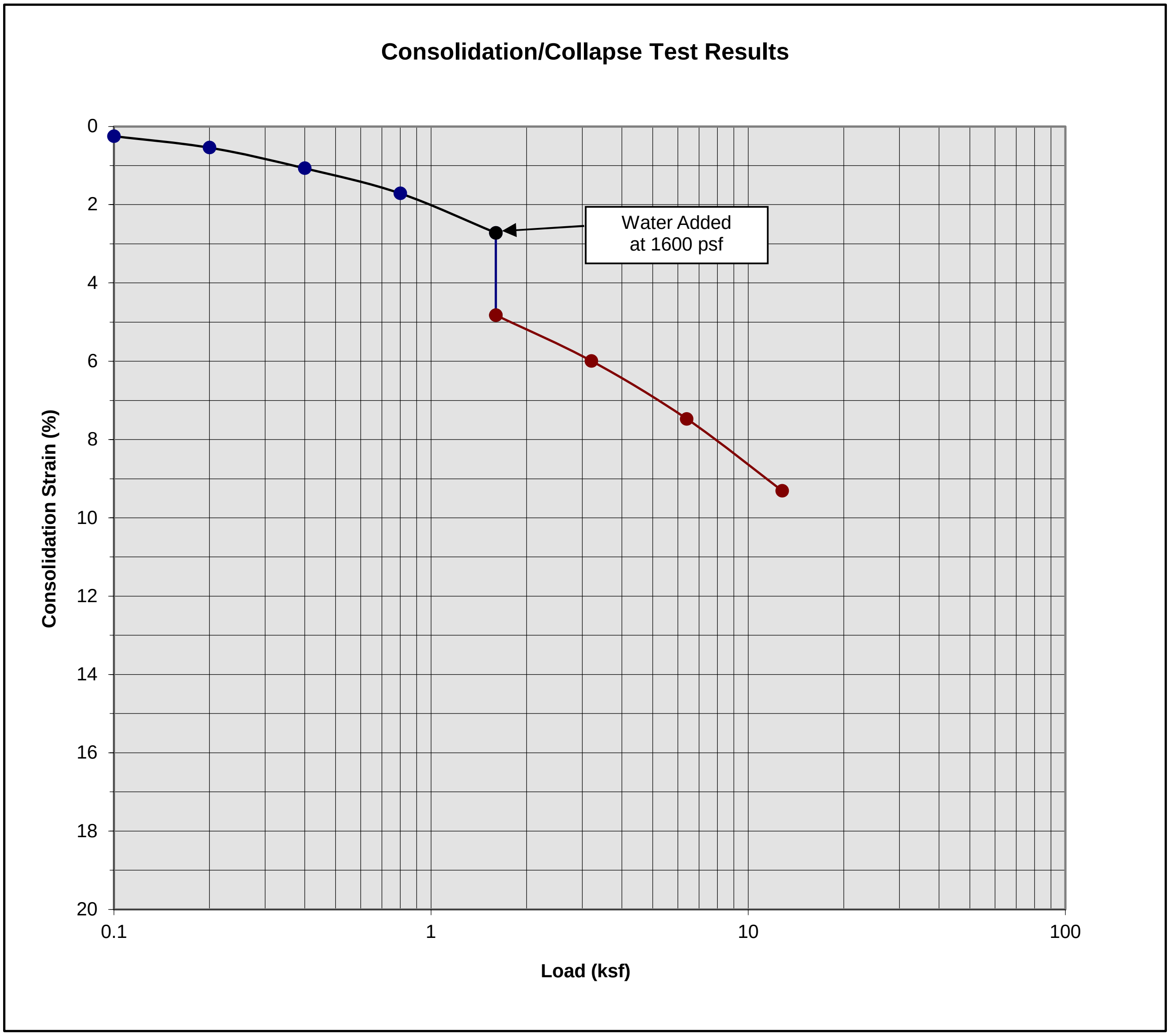

Classification: Gray Brown fine to medium Sand, trace Silt, trace coarse Sand

Boring Number:	B-11	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	10
Depth (ft)	7 to 8	Initial Dry Density (pcf)	94.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	111.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.10

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 7

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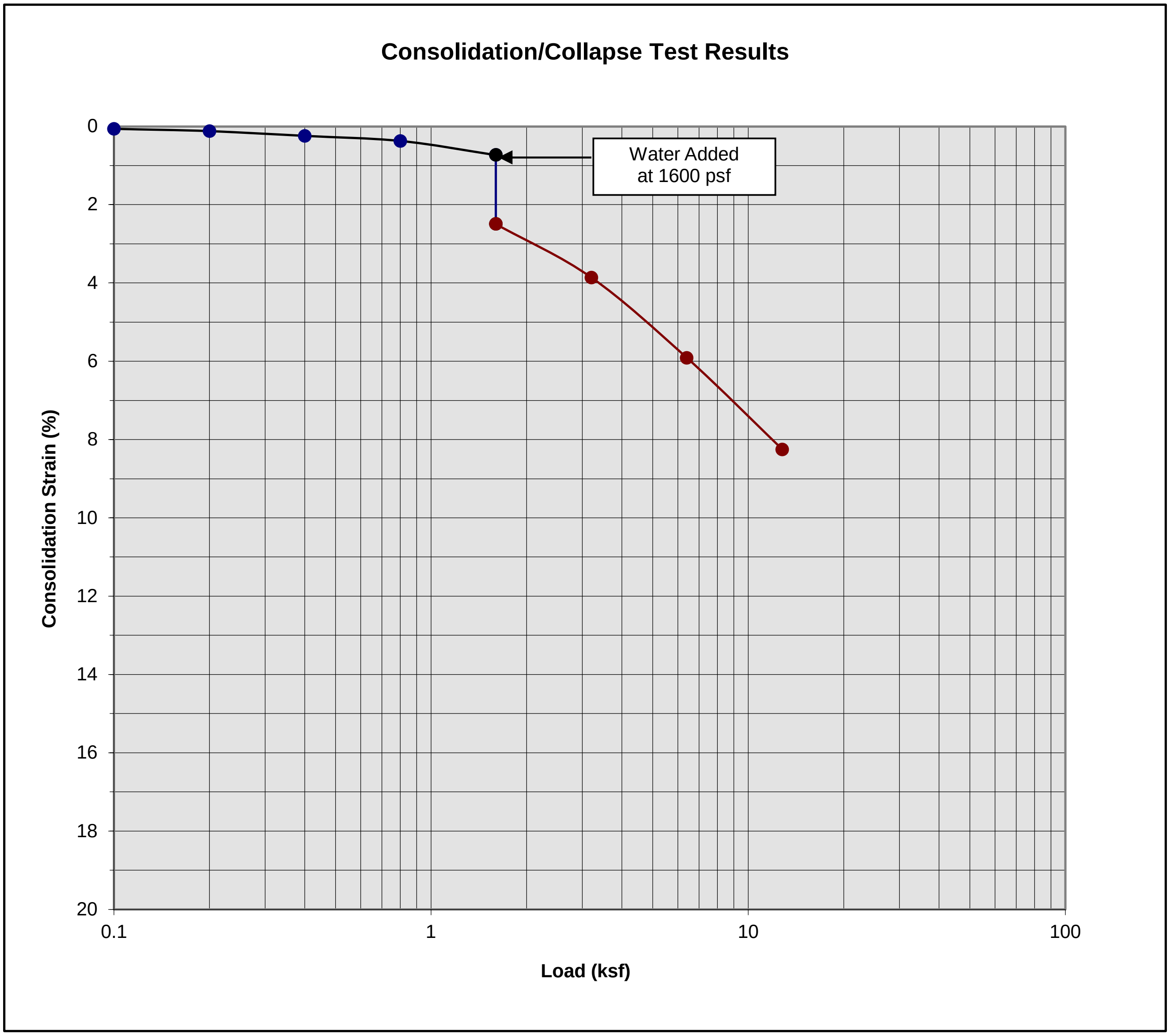


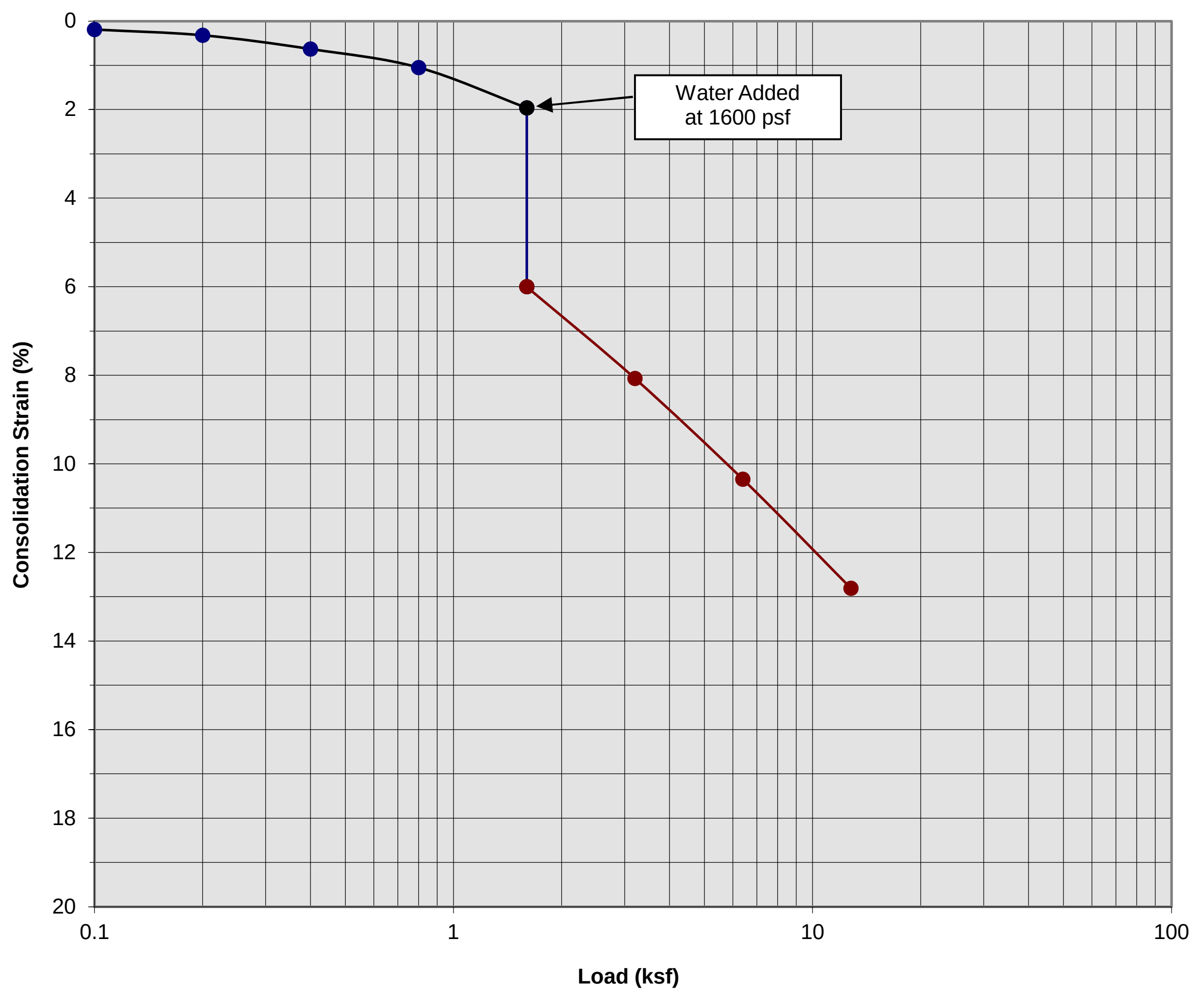
Classification: Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel

Boring Number:	B-11	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	9
Depth (ft)	9 to 10	Initial Dry Density (pcf)	106.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.76

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 8

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

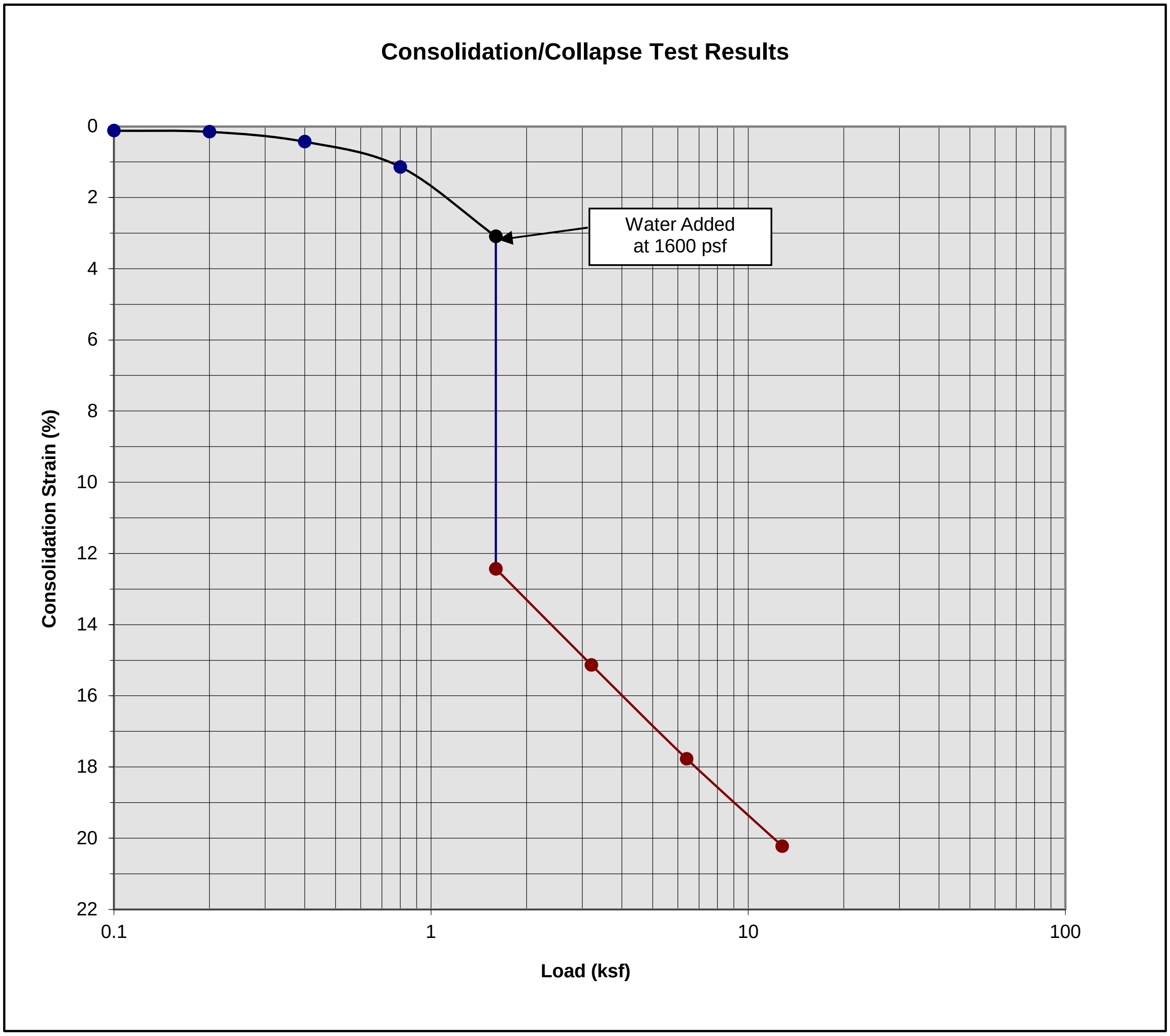


Classification: Brown fine Sandy Silt, little medium to coarse Sand, trace fine Gravel

Boring Number:	B-18	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3 to 4	Initial Dry Density (pcf)	109.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.04

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 9

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



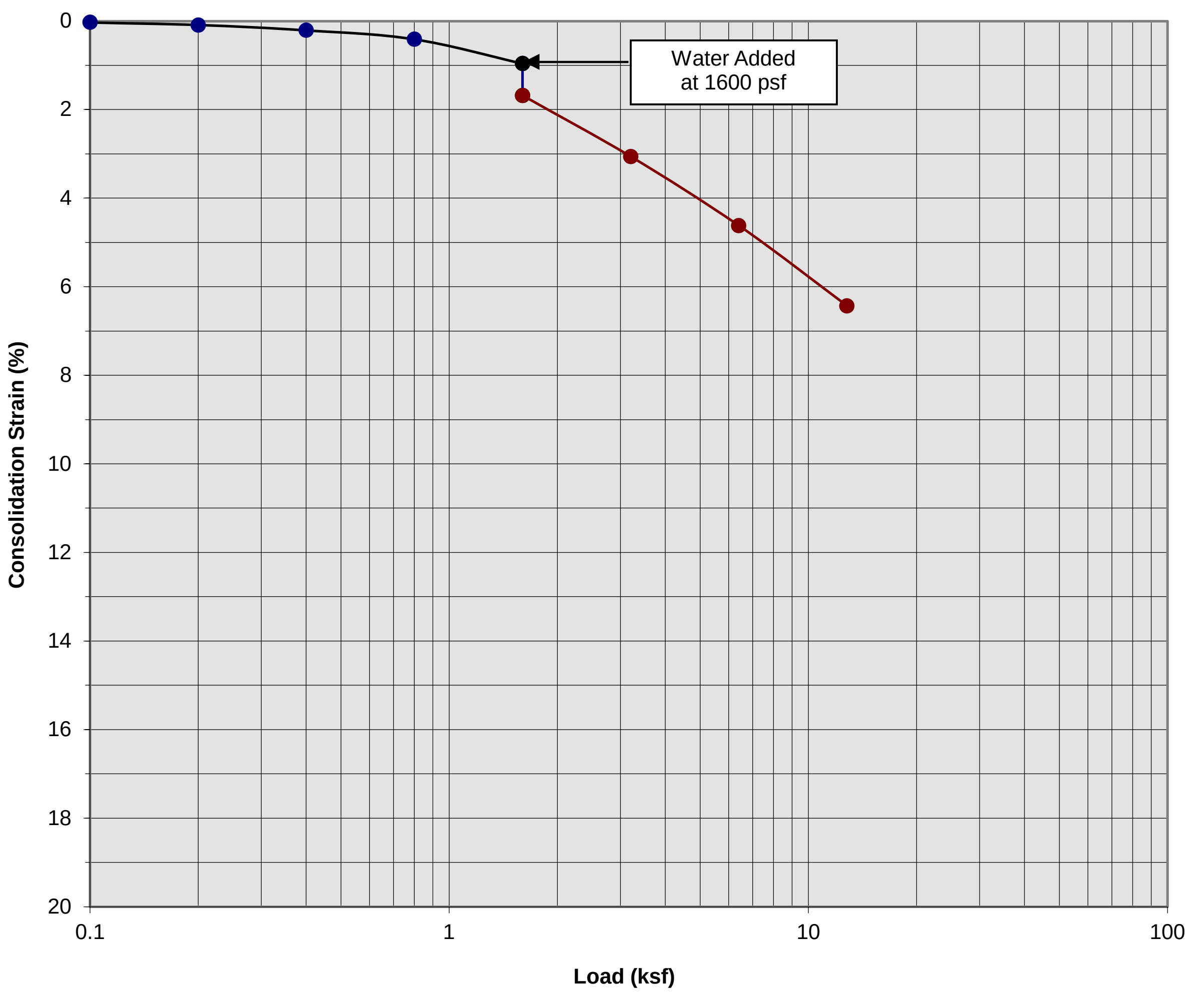
Classification: Brown fine Sandy Silt, little medium to coarse Sand, trace fine Gravel

Boring Number:	B-18	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	5 to 6	Initial Dry Density (pcf)	100.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	9.34

Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 10

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

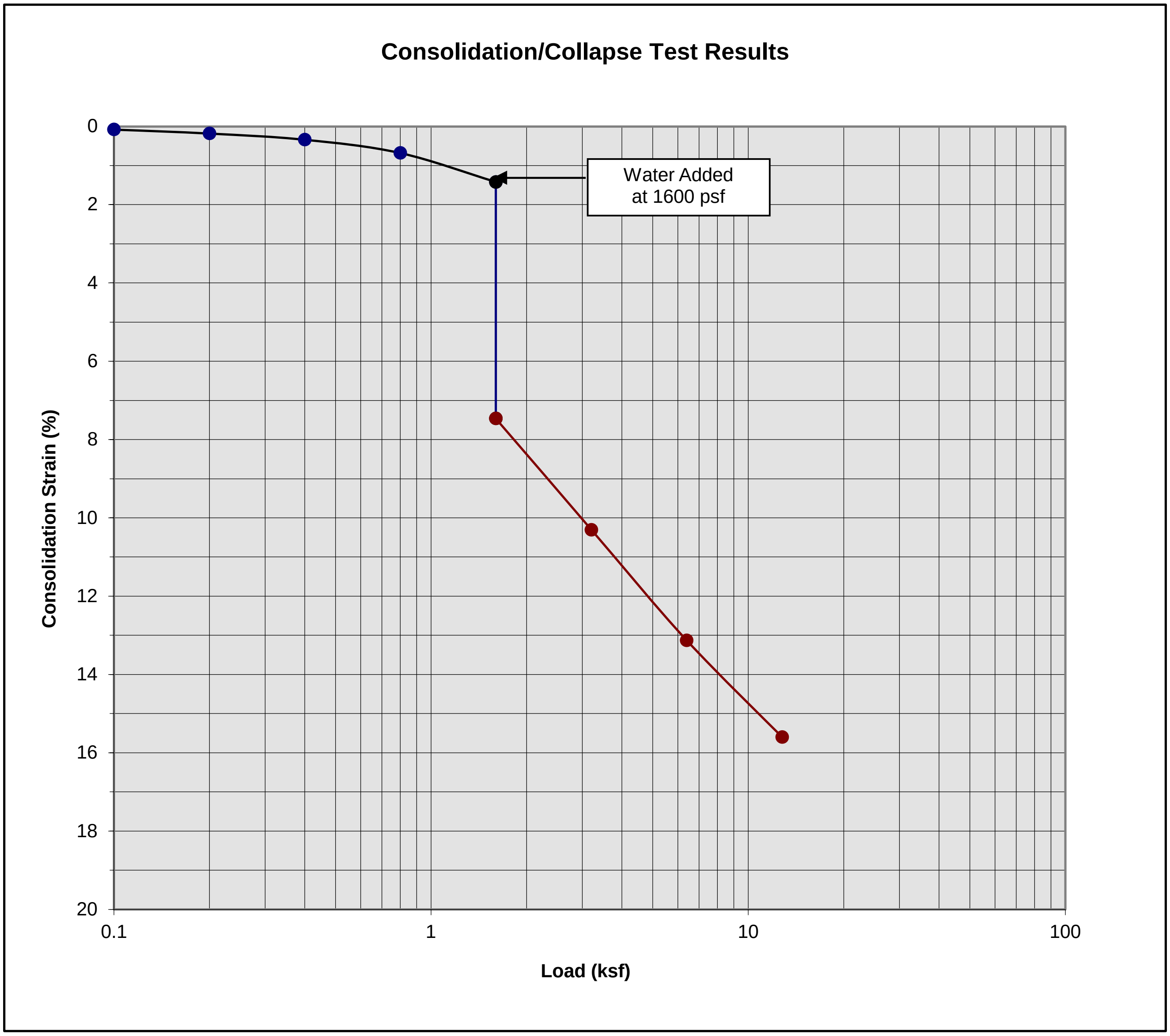


Classification: Brown fine Sandy Silt, trace medium to coarse Sand

Boring Number:	B-18	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	7 to 8	Initial Dry Density (pcf)	111.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	119.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.72

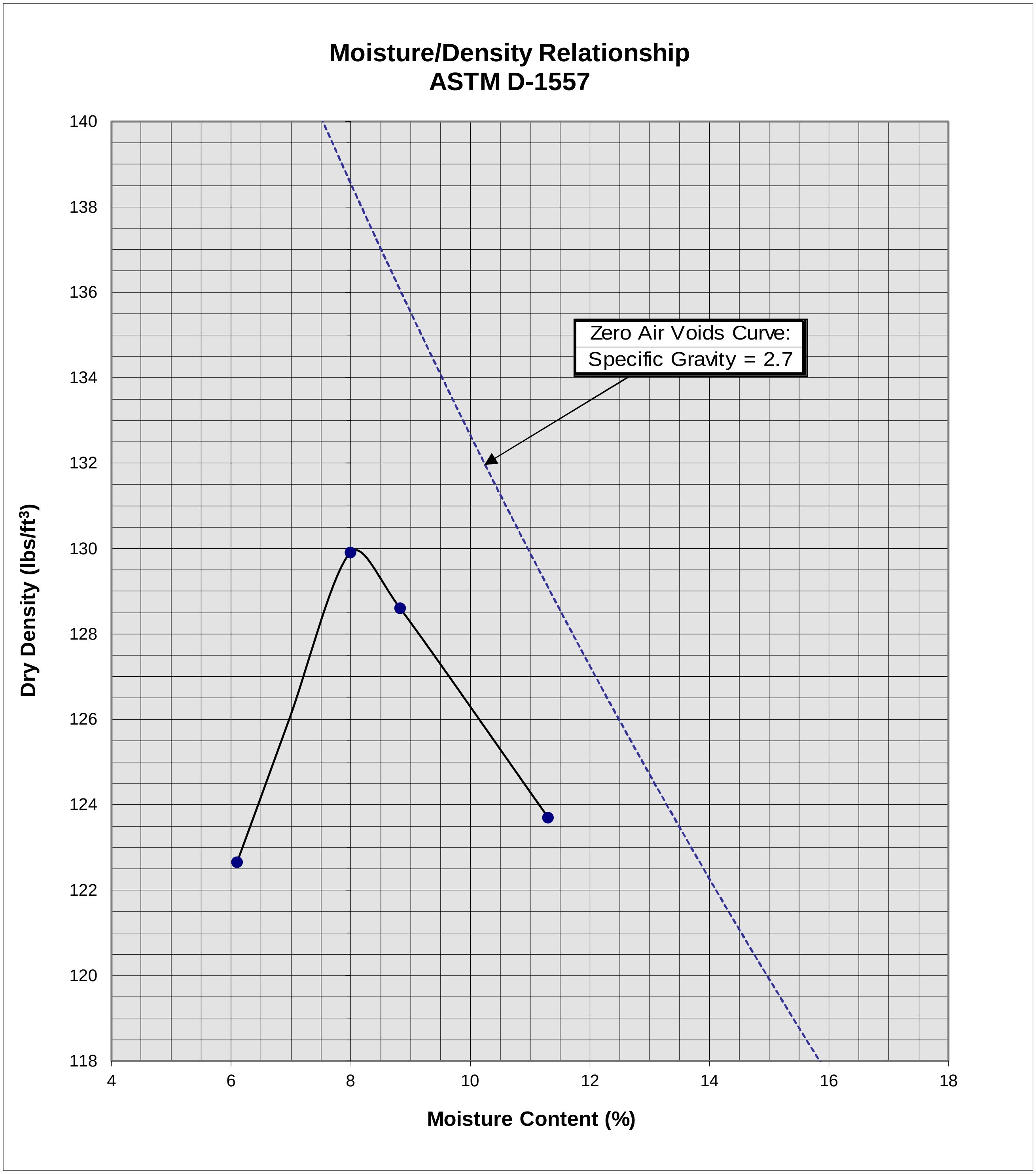
Proposed Commercial/Industrial Development
Calimesa, California
Project No. 20G122-2
PLATE C- 11

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Classification: Brown fine Sandy Silt, trace medium to coarse Sand

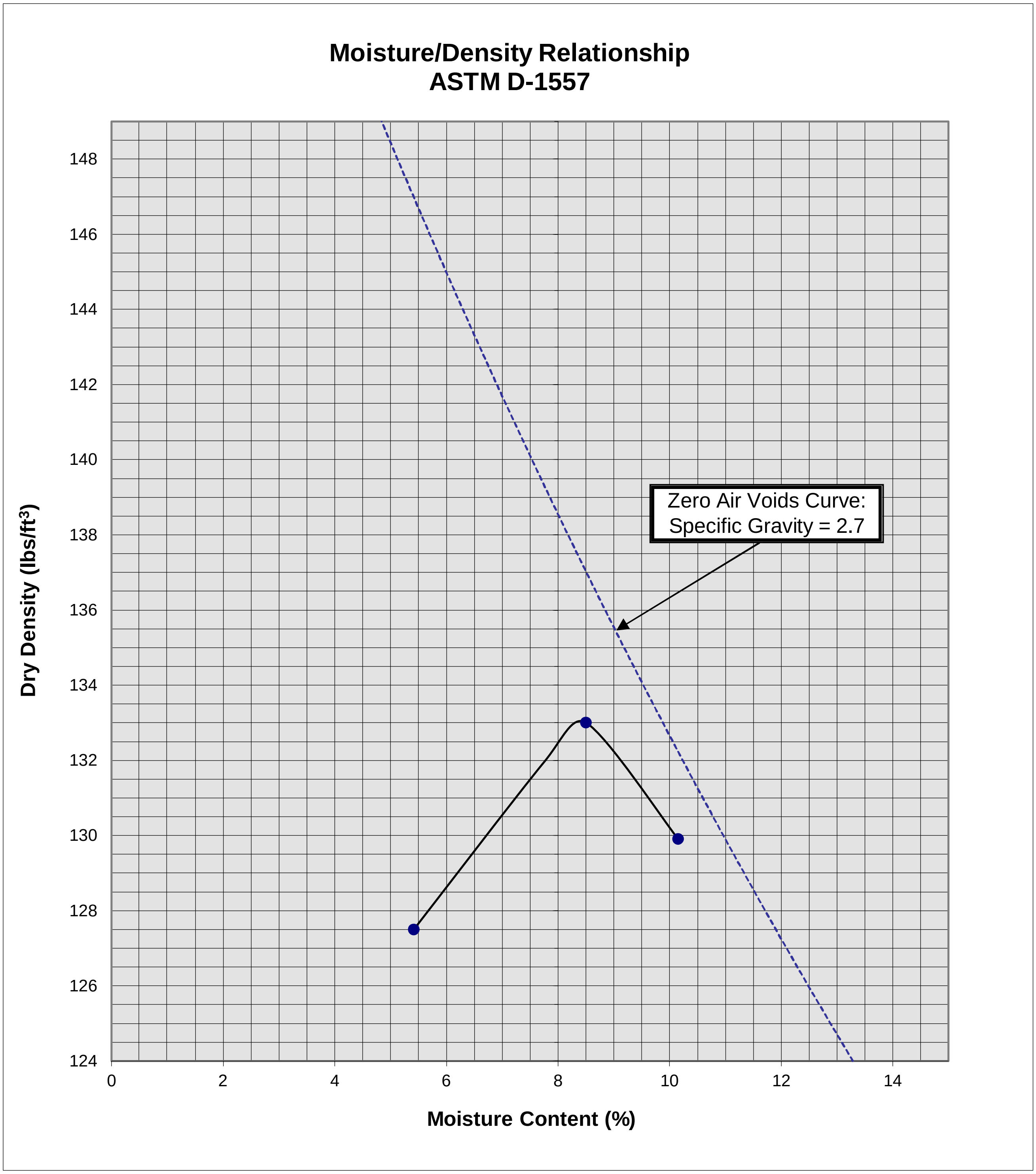
Boring Number:	B-18	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	9 to 10	Initial Dry Density (pcf)	105.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	6.04



Soil ID Number		B-9 @ 0-5'
Optimum Moisture (%)		8
Maximum Dry Density (pcf)		130
Soil Classification	Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel	

Proposed C/I Development
Calimesa, California
Project No. 20G122-2
PLATE C-13

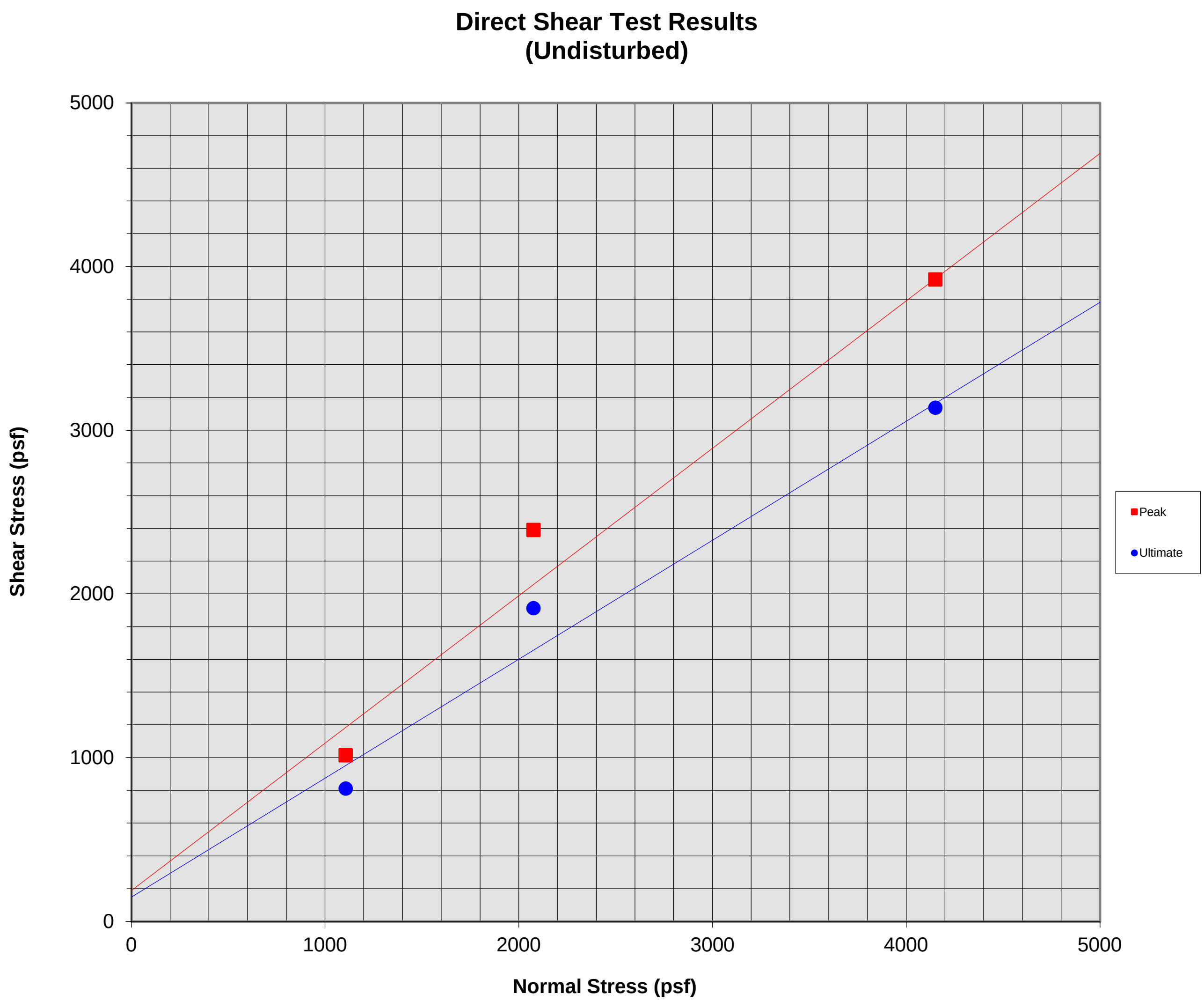
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-22 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	133
Soil Classification	Light brown to Red Brown Silty fine Sand to fine Sandy Silt, trace to little med. to coarse Sand

Proposed C/I Development
Calimesa, California
Project No. 20G122-2
PLATE C-14

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Sample Description: B-17 @ 19 to 20 feet

Classification: Brown fine to medium Sandy Silt, trace fine to coarse Gravel

Sample Data

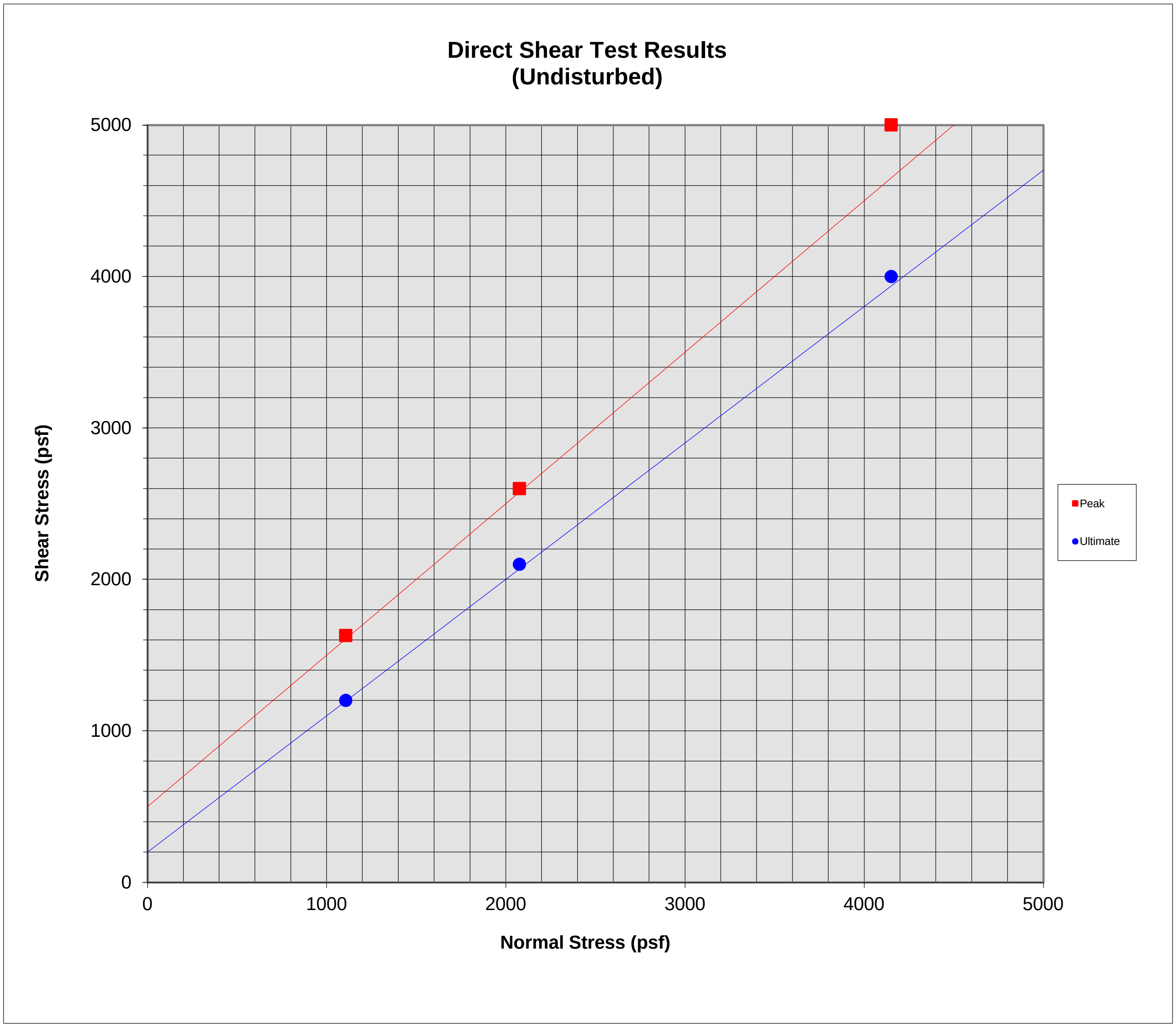
Initial Moisture Content	9.0
Final Moisture Content	16.0
Initial Dry Density	103.0
Final Dry Density	---
Specimen Diameter (in)	2.4
Specimen Thickness (in)	1.0

Test Results

	Peak	Ultimate
ϕ (°)	42.0	36.0
C (psf)	190	150

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-2
PLATE C-15

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL A California Corporation



Sample Description: B-21 @ 24 to 25 feet

Classification: Red Brown fine Sandy Silt, little course Sand

Sample Data		Test Results	Peak	Ultimate
Initial Moisture Content	14.0			
Final Moisture Content	18.0			
Initial Dry Density	119.0	ϕ (°)	45.0	42.0
Final Dry Density	---	C (psf)	500	200
Specimen Diameter (in)	2.4			
Specimen Thickness (in)	1.0			

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-2
PLATE C-16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.
- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.
- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.
- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.
- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.
- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.
- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

<u>Compacted Fills</u>

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as “contaminated,” and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

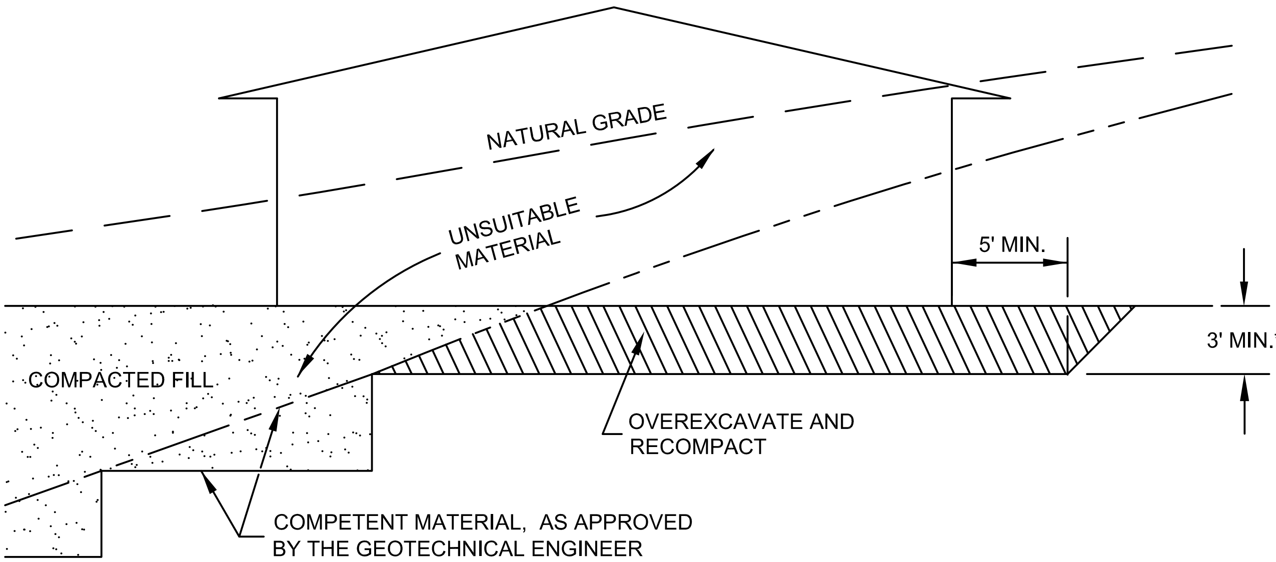
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

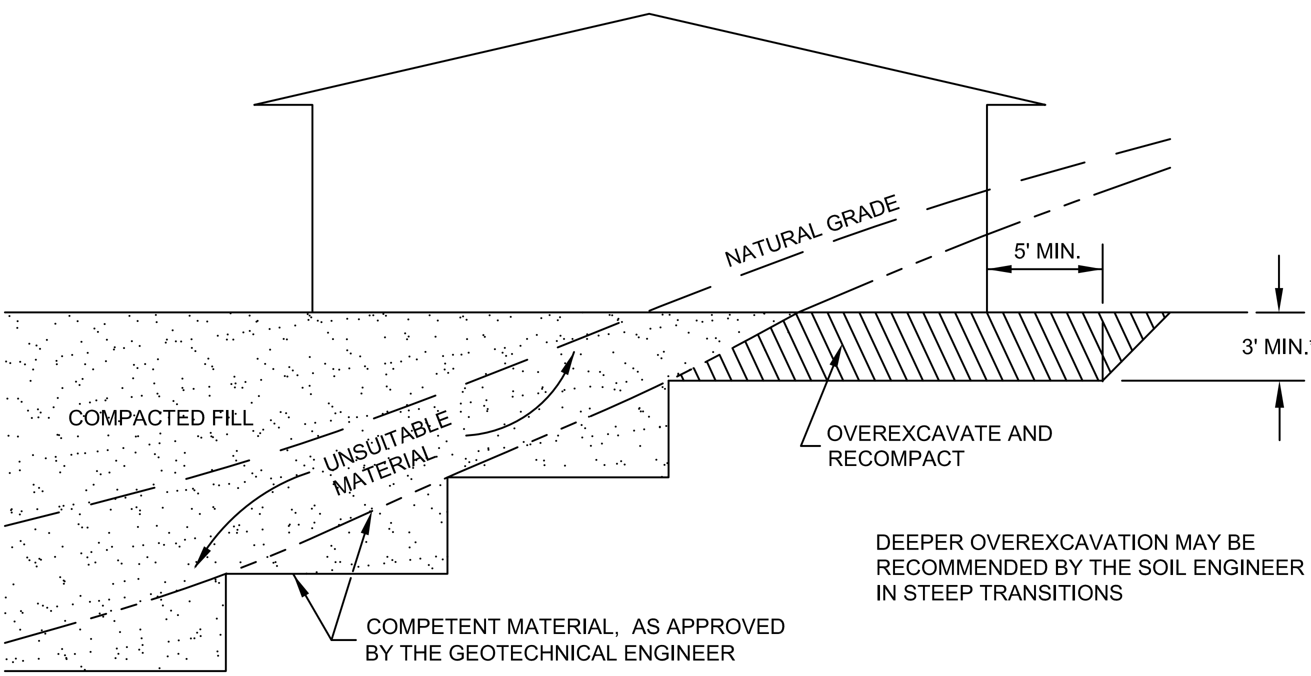
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION.
ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

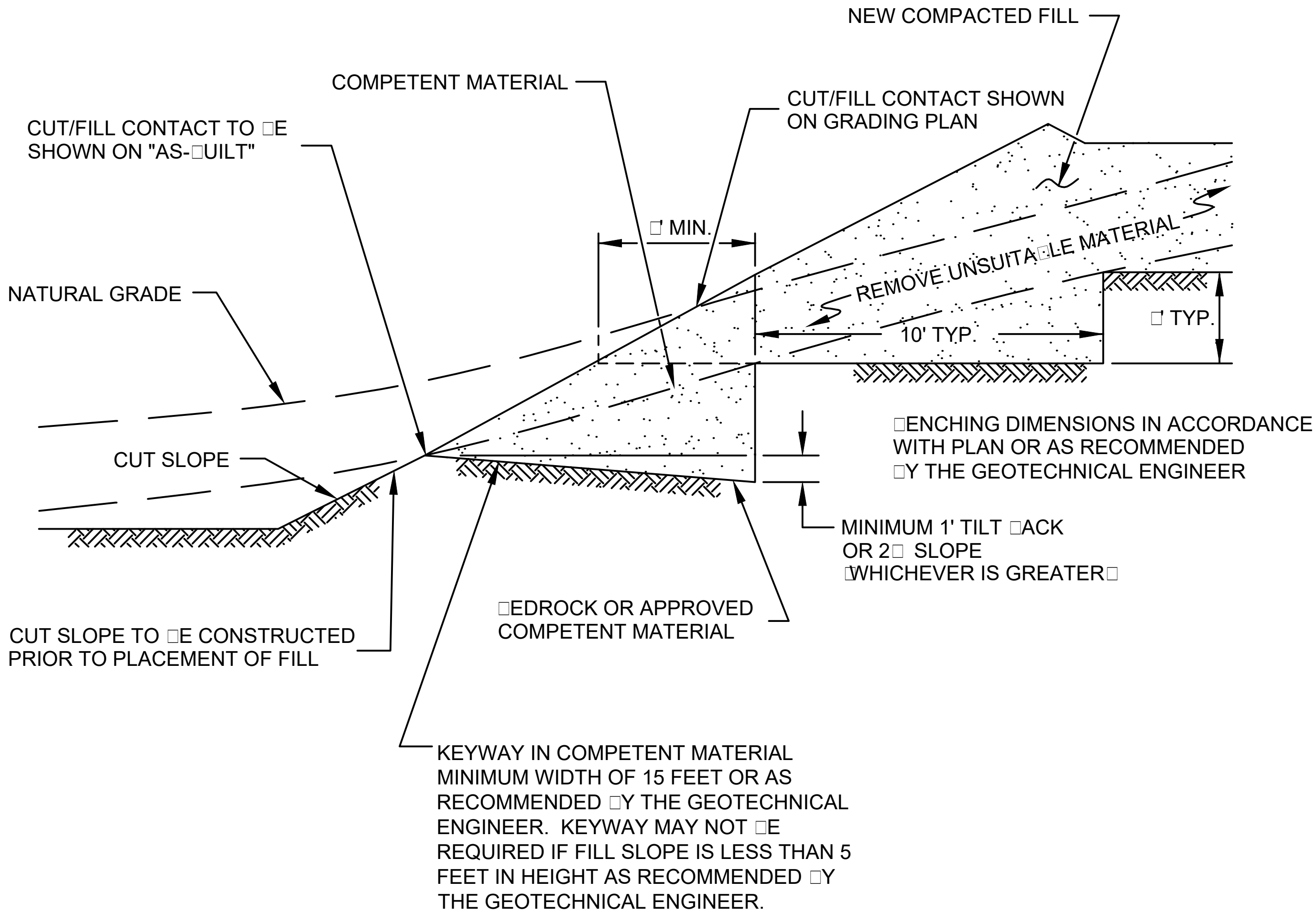
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

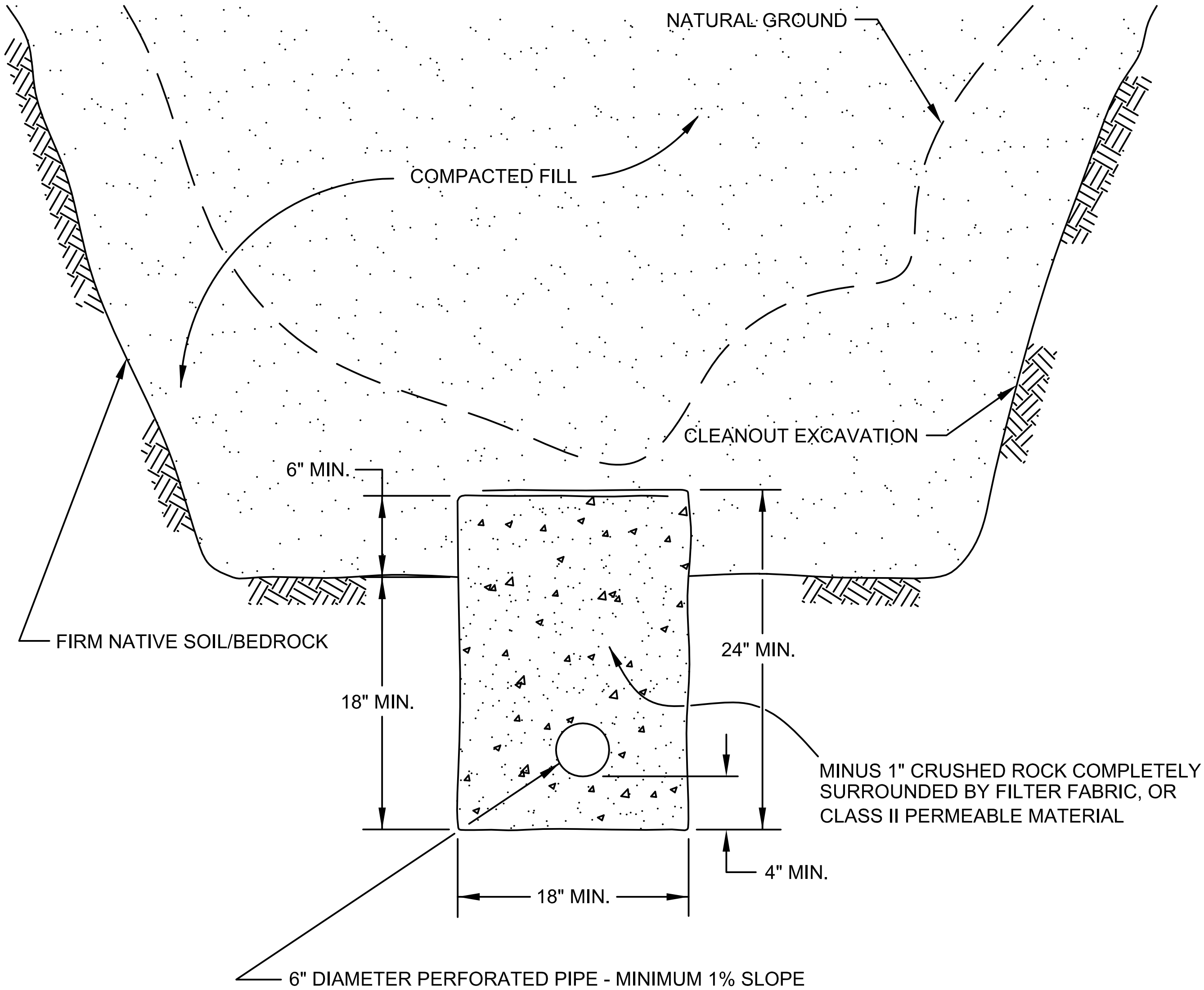
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

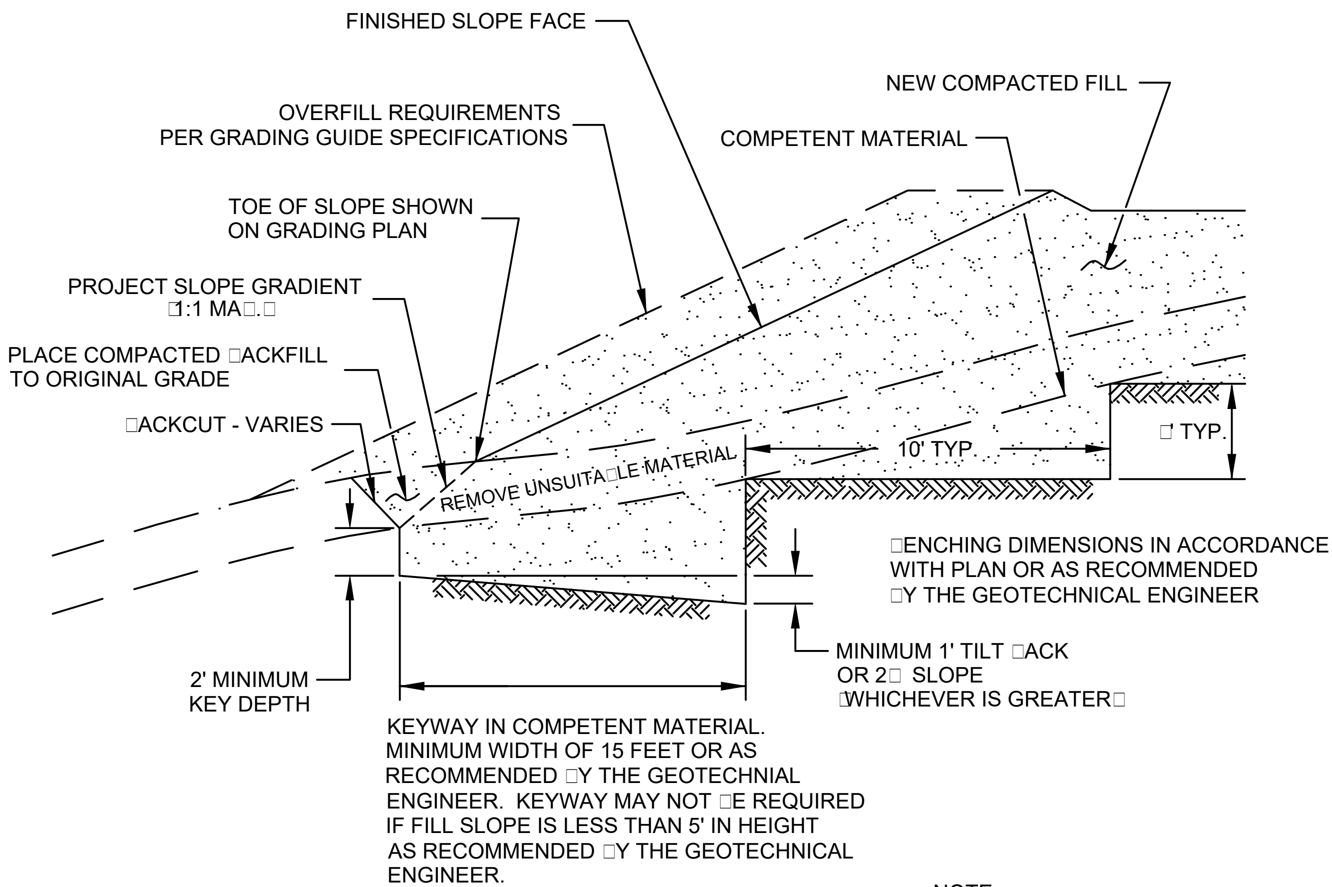
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
□ENCHING SHALL □E REQUIRED
WHEN NATURAL SLOPES ARE
EQUAL TO OR STEEPER THAN 5:1
OR WHEN RECOMMENDED □Y
THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

GRADING GUIDE SPECIFICATIONS

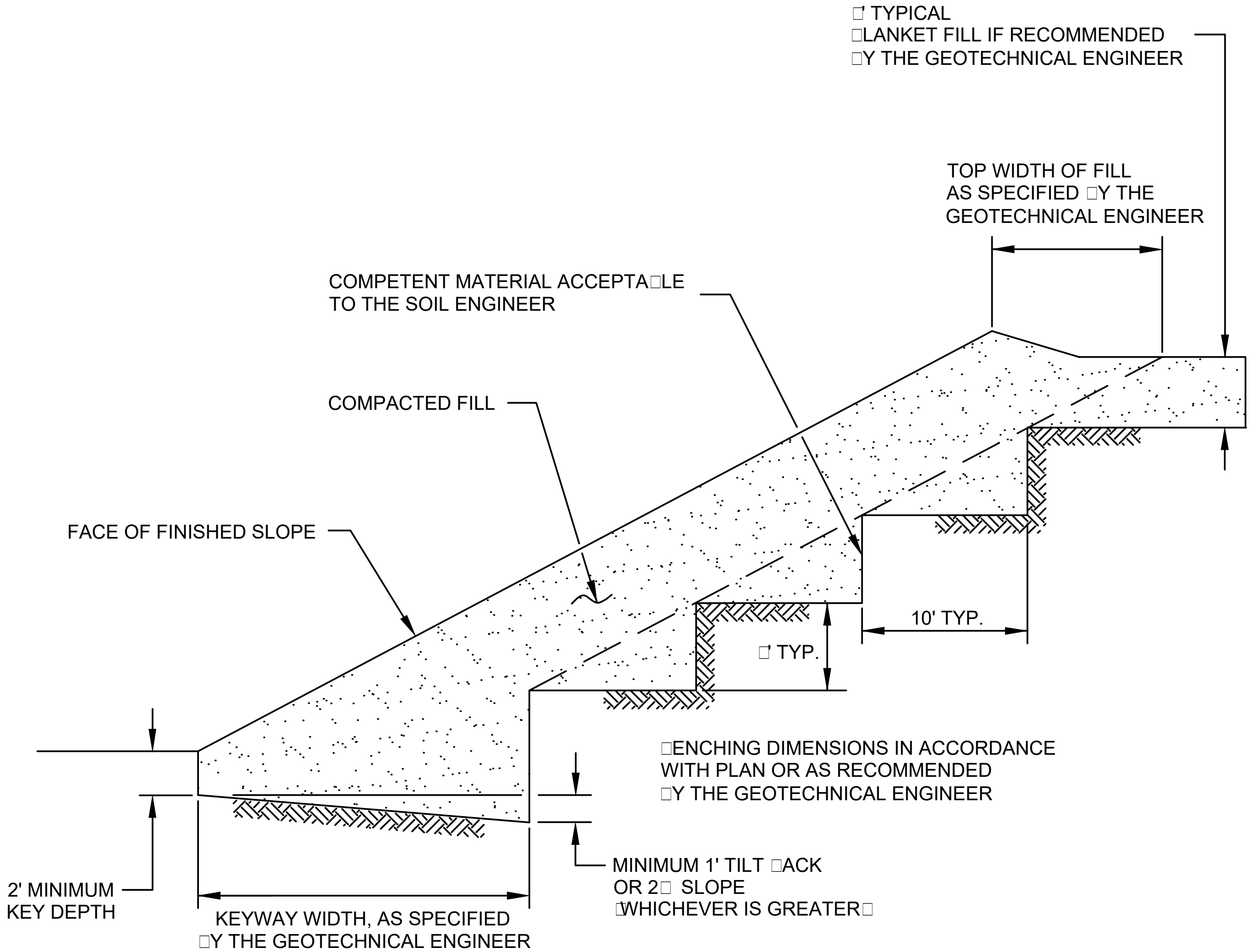
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

GRADING GUIDE SPECIFICATIONS

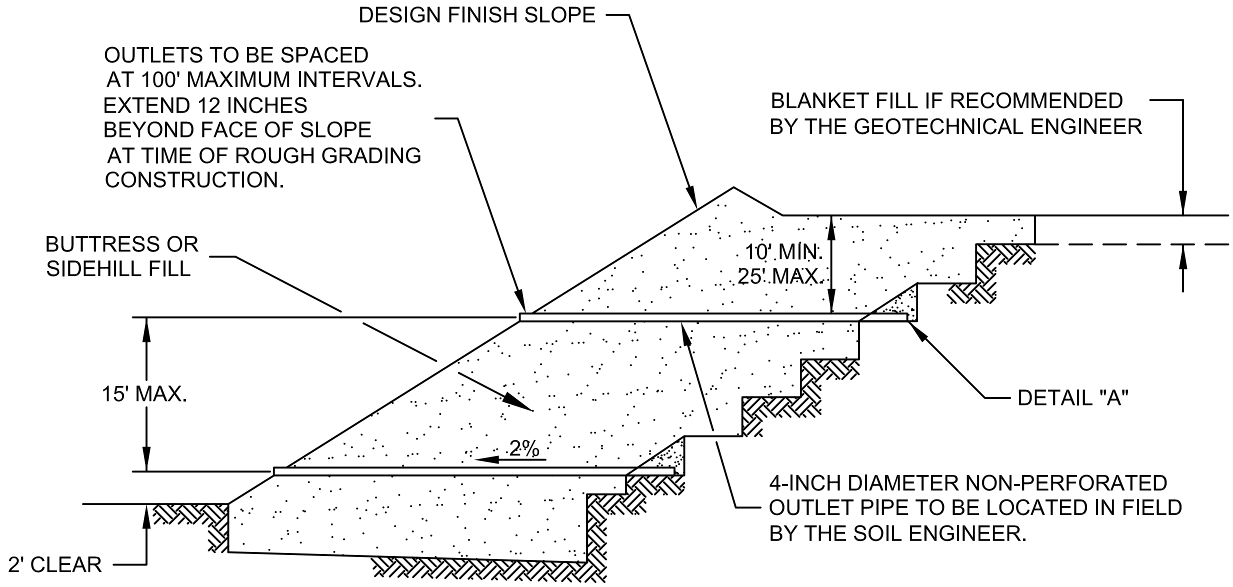
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



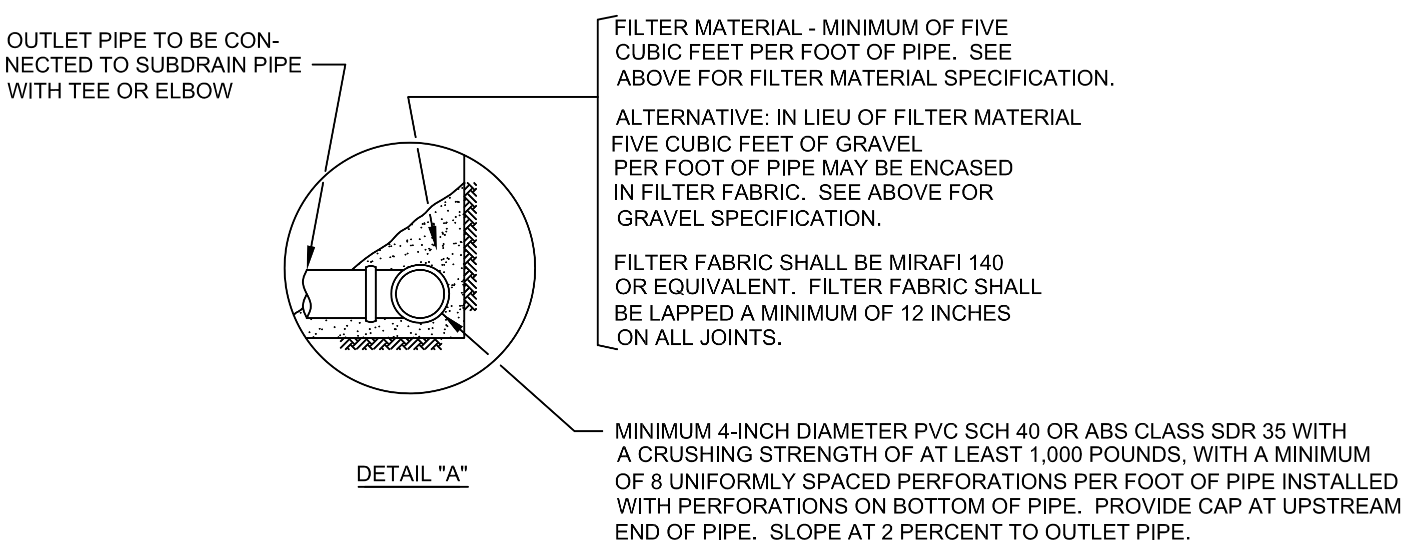
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

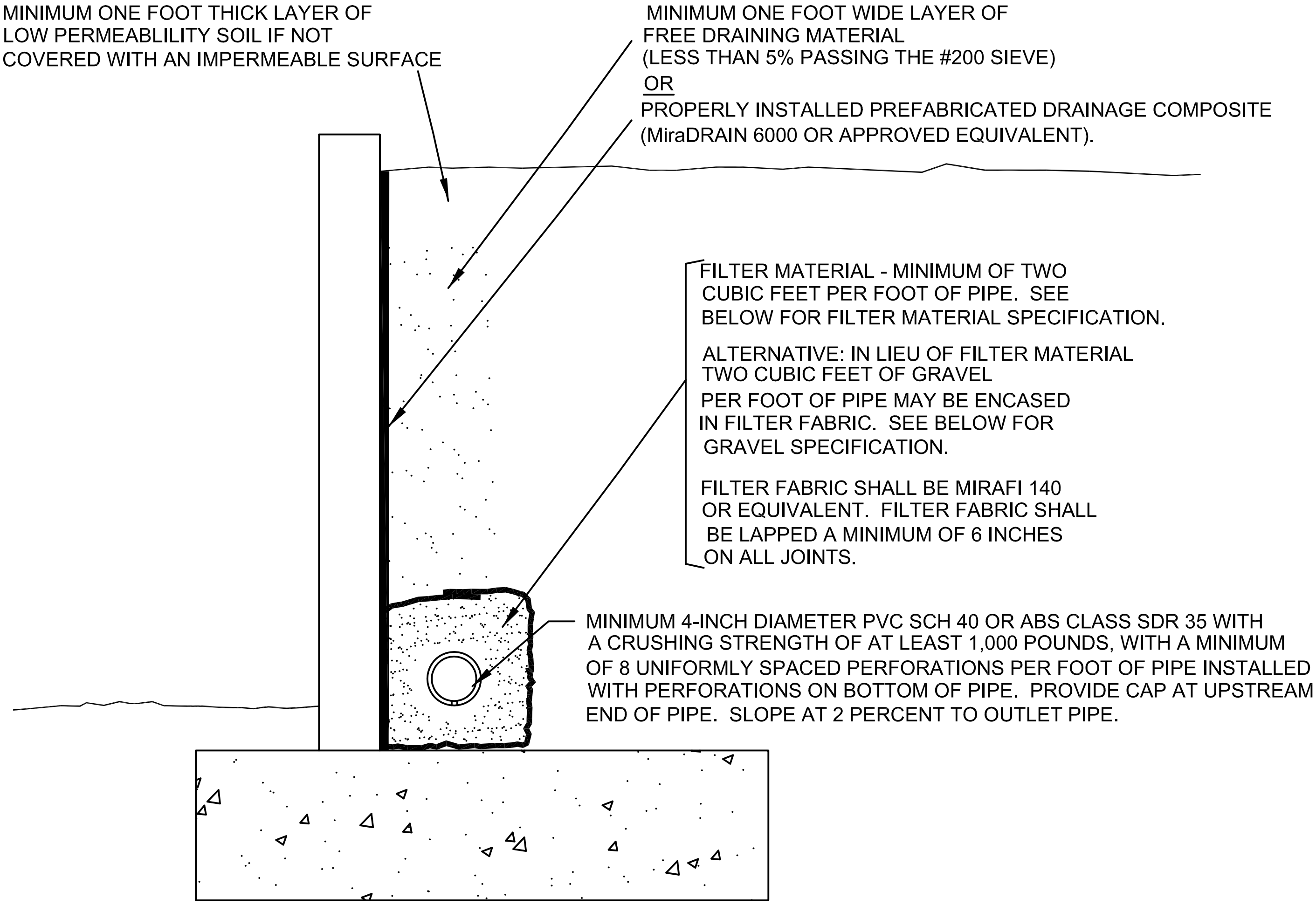
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

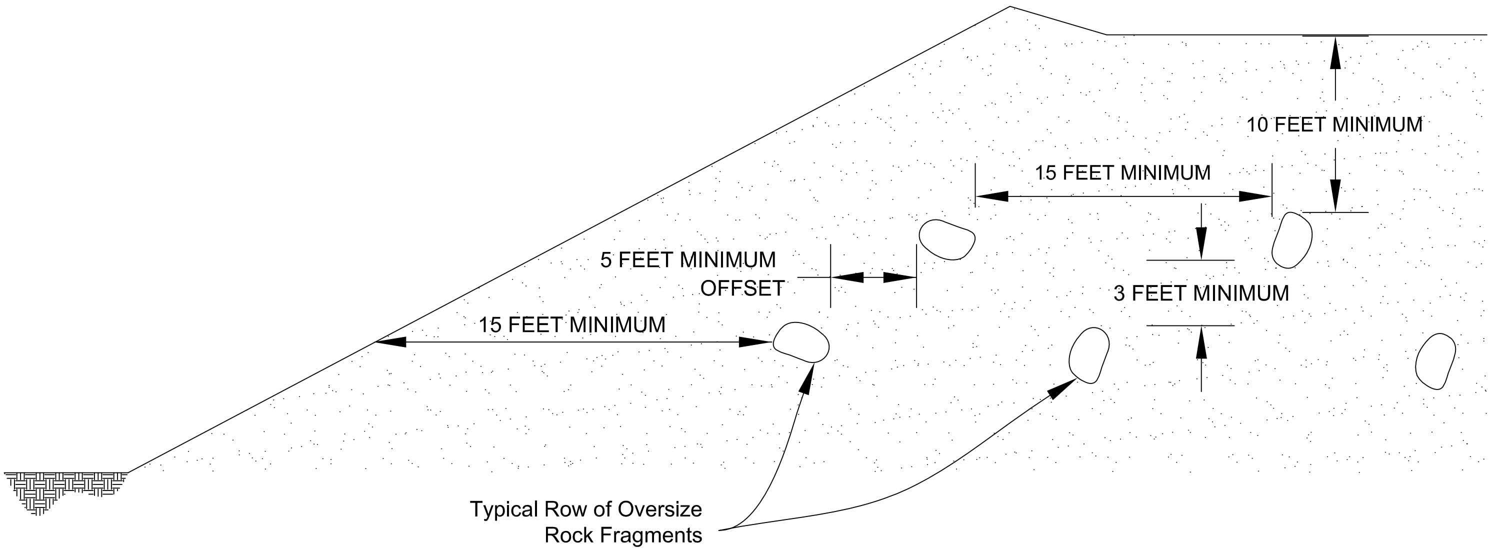
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

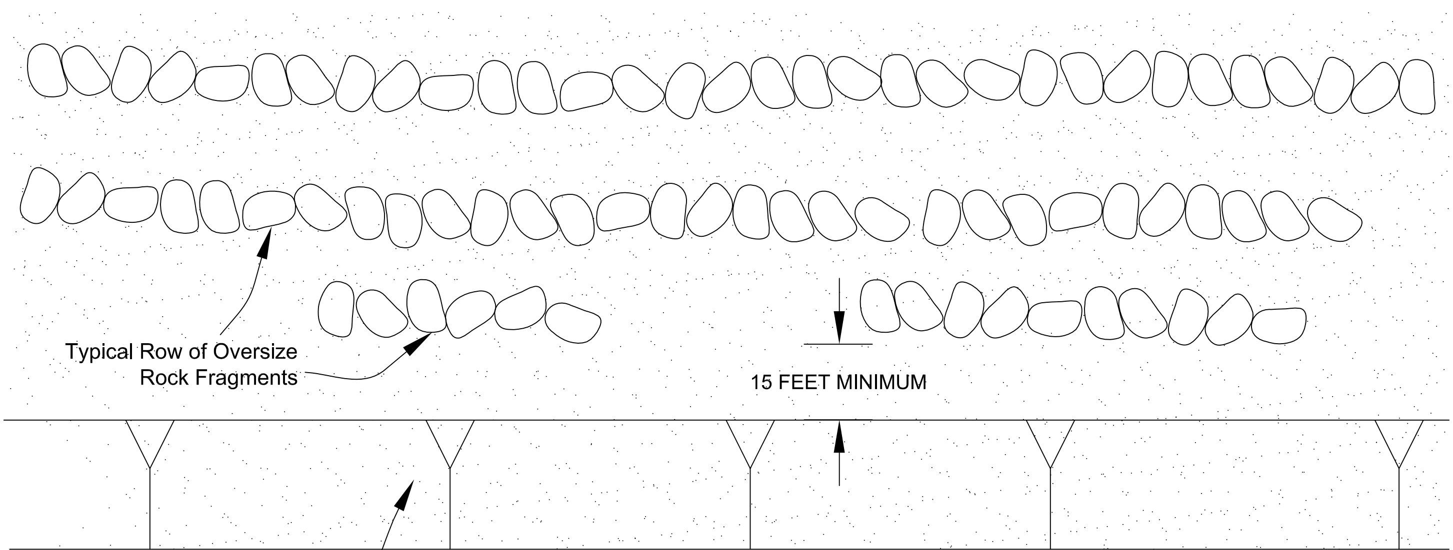
DRAWN: JAS
CHKD: GKM

PLATE D-7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

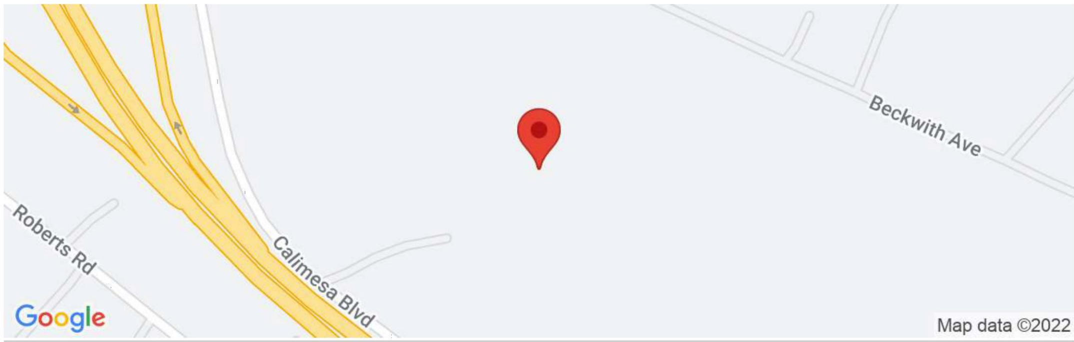
DRAWN: PM
CHKD: GKM

PLATE D-8

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

Latitude, Longitude: 33.97709117, -117.04391889



Date	11/2/2022, 8:42:22 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.207	MCE_R ground motion. (for 0.2 second period)
S_1	0.76	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.207	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.471	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.902	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.992	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.249	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.458	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.207	Factored deterministic acceleration value. (0.2 second)
S1RT	0.872	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.981	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.76	Factored deterministic acceleration value. (1.0 second)
PGAd	0.902	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.968	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.915	Mapped value of the risk coefficient at short periods
C_{R1}	0.889	Mapped value of the risk coefficient at a period of 1 s
C_V	1.5	Vertical coefficient

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

DRAWN: AG
CHKD: RGT

SCG PROJECT
20G122-2

PLATE E-1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX F

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 20G122-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 32 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2300 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine root fibers, trace fine Gravel, loose-damp							
	X	5					6					
	X	9					5					
5												
					Light Brown fine to medium Sand, trace coarse Sand, trace fine Gravel, little Silt, medium dense-damp							
	X	11					2					
					Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, medium dense-damp							
	X	13					5					
10												
	X	15					5					
15												
	X	17					5					
20												
	X	22					5					
25												
					OLDER ALLUVIUM: Light Gray Brown fine to medium Sand, trace to little Silt, trace coarse Sand, trace to little fine to coarse Gravel, dense-damp							
	X	36					3					
30												
	X	45					3					

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 20G122-1	DRILLING DATE: 3/10/20	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 32 feet
LOCATION: Calimesa, California	LOGGED BY: Ryan Bremer	READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					<u>OLDER ALLUVIUM:</u> Light Gray Brown fine to medium Sand, trace to little Silt, trace coarse Sand, trace to little fine to coarse Gravel, dense-damp							
					Red Brown Silty fine Sand, little medium to coarse Sand, trace fine to coarse Gravel, very dense-moist							
	X	50/6"					9					
40												
					Light Brown Silty fine to coarse Sand, trace fine Gravel, very dense-damp							
	X	71					6					
45												
					Light Red Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, very dense-damp							
	X	50/6"					7					
50												
					Boring Terminated at 50'							

DRAFT

TBL 20G122-1.GPJ SOCALGEO.GDT 4/22/20

SOUTHERN CALIFORNIA GEOTECHNICAL
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BORING NO. B-2

JOB NO.: 20G122-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/9/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2321 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand, trace to little fine to coarse Gravel, trace fine root fibers, loose-damp							
		8				101	4					
		9				100	5					
5		12				102	4					
		6				101	4					
10		14				99	4					
					Light Brown Silty fine Sand, [illegible] to medium dense-damp to moist							
15		16				97	7					
20		12				104	9					
					Light Brown fine Sand, little Silt, medium dense-damp							
25		14					6					
					Boring Terminated at 25'							

SOUTHERN CALIFORNIA GEOTECHNICAL
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BORING NO. B-3

JOB NO.: 20G122-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/9/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 37 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2340 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	4			ALLUVIUM: Brown Silty fine Sand, trace fine to coarse Gravel, trace medium to coarse Sand, loose-damp		7					
	X	9					5					
5	X	10					6					
	X	14			Light Gray Brown fine to coarse Sand, little fine to coarse Gravel, trace to little Silt, medium dense-damp		5					
10					Brown Silty fine to medium Sand, trace Clay, trace fine to coarse Gravel, trace coarse Sand, loose-moist							
	X	8					9					
15					Brown to Red Brown Silty fine Sand, trace to little Clay, trace medium to coarse Sand, trace fine Gravel, loose to medium dense-moist							
	X	10					10					
20	X	13					9					
25	X	8					11					
30	■	12				115	11					
	X	35			OLDER ALLUVIUM: Light Red Brown Clayey fine Sand, some Silt, trace fine to coarse Gravel, trace to little medium to coarse Sand, dense to very dense-very moist		15					

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TBL 20G122-1.GPJ SOCALGEO.GDT 4/22/20

TEST BORING LOG

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 20G122-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/9/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 37 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					<u>OLDER ALLUVIUM:</u> Light Red Brown Clayey fine Sand, some Silt, trace fine to coarse Gravel, trace to little medium to coarse Sand, dense-very moist							
	X	45					12					
40												
	X	65					10					
45												
					Boring Terminated at 45'							

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

A California Corporation

BORING NO. B-4

JOB NO.: 20G122-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/9/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2289.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	17			FILL: Gray Brown Silty fine Sand, trace to little Clay, trace medium to coarse Sand, trace fine Gravel, medium dense-damp	100	5					EI = 2 @ 0 to 5 feet
	X	43			OLDER ALLUVIUM: Light Brown fine to coarse Sand, some Silt, some Clay, trace fine Gravel, medium dense-damp	117	4					
5	X	71			Light Brown Gravelly fine to coarse Sand, little Clay, dense-damp	117	4					
	X	60			@ 7 feet, trace to little Silt	118	5					
10	X	55			Light Brown fine to coarse Sand, trace to little Silt, trace Clay, dense to very dense-damp	113	6					
15	X	81				110	5					
					Red Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, dense-moist to very moist							
20	X	58				121	12					
					Light Brown Silty fine Sand, trace to little Clay, little medium to coarse Sand, trace fine Gravel, dense-damp							
25	X	69				122	6					

Boring Terminated at 25'

TBL 20G122-1.GPJ SOCALGEO.GDT 4/22/20

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
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BORING NO. B-5

JOB NO.: 20G123-1	DRILLING DATE: 3/10/20	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 36 feet
LOCATION: Calimesa, California	LOGGED BY: Ryan Bremer	READING TAKEN: At Completion

SURFACE ELEVATION: 2305 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0				FILL: Dark Red Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine to coarse Gravel, trace fine root fibers, loose-damp to moist							
1	X	6				7					
3.5	X	7				10					
5.5				OLDER ALLUVIUM: Red Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, medium dense to dense-moist							
6	X	22				9					
8.5	X	33				8					
12				Light Brown fine to coarse S[illegible] trace [illegible] litt[illegible] tra[illegible] fine Gravel, very dense-dam[illegible]							
14				Brown Silty fi[illegible]d, tr[illegible] mediu[illegible] coarse Sand, trace fine Grav[illegible] very de[illegible]e-m[illegible]st							
14	X	50/6"				4 9					
18.5	X	60				11					
22				SAN TIMOTEO FORMATION BEDROCK (Tstm): Light Brown Silty fine-grained Sandstone, little medium to coarse Sand, little fine to coarse Gravel, weathered, weakly cemented friable, very dense-damp							
24	X	50/5"				6					
29	X	50/6"				5					
34	X	50/5"				5					

TBL 20G123-1.GPJ SOCALGEO.GDT 4/22/20

SOUTHERN CALIFORNIA GEOTECHNICAL
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BORING NO. B-5

JOB NO.: 20G123-1
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 3/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 36 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	(Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					SAN TIMOTEO FORMATION BEDROCK (Tstm): Light Brown Silty fine-grained Sandstone, little medium to coarse Sand, little fine to coarse Gravel, weathered, weakly cemented friable, very dense-damp							
	X	50/3"					4					
40												
	X	50/2"					4					
45												
	X	50/3"										No Sample Recovery
50					Boring Terminated at 50'							

SOUTHERN CALIFORNIA GEOTECHNICAL
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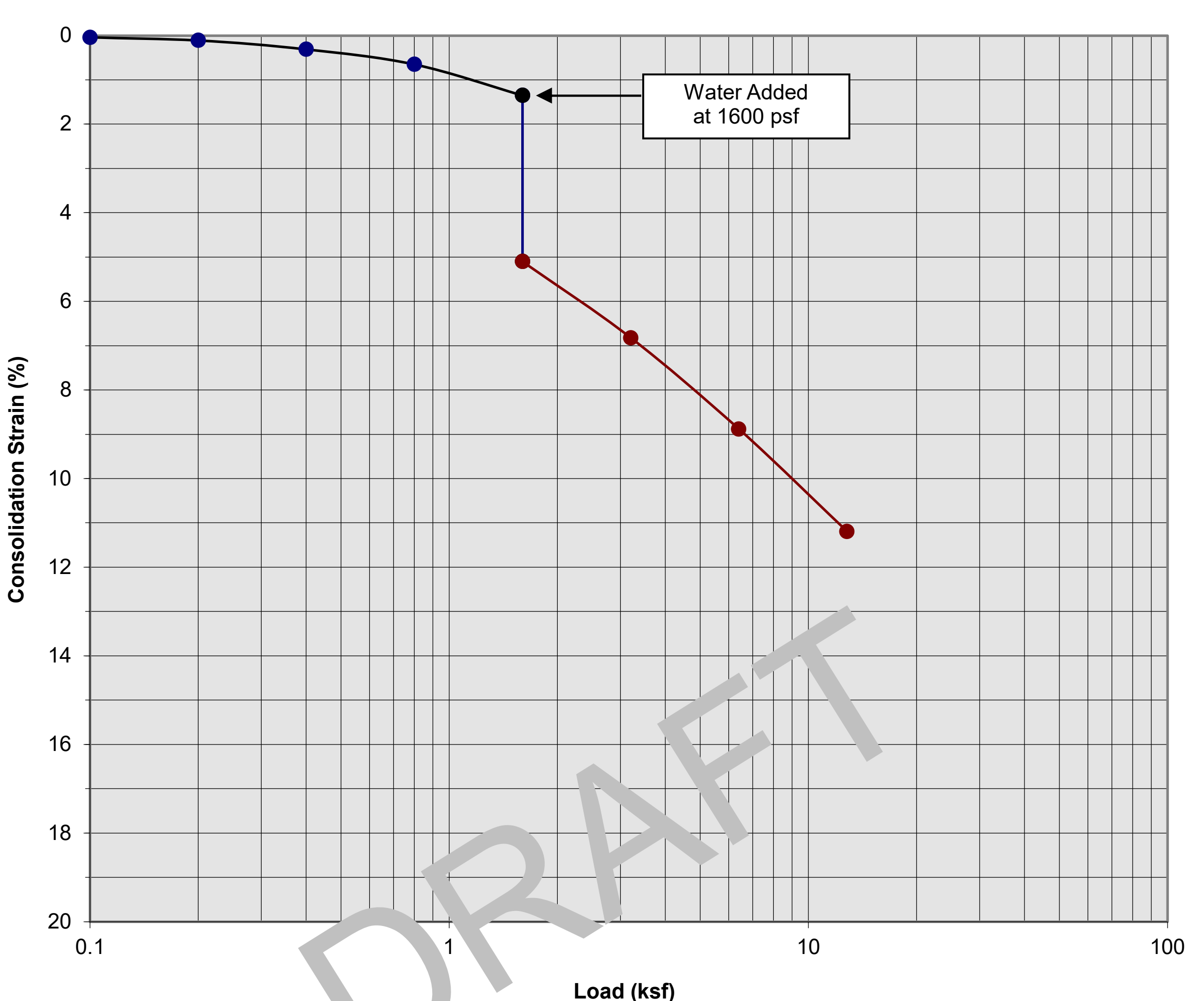
BORING NO. B-6

JOB NO.: 20G123-1 | DRILLING DATE: 3/9/20 | WATER DEPTH: Dry
PROJECT: Proposed C/I Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 20 feet
LOCATION: Calimesa, California | LOGGED BY: Ryan Bremer | READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 2304 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Dark Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace fine root fibers, loose-damp							
	X	13				99	5					
	X	12				97	5					
					POSSIBLE FILL: Gray Brown Silty fine Sand, trace medium to coarse Sand, little fine to coarse Gravel, medium dense-damp							
5	X	22				102	3					
	X	28				96	5					
	X	22				99	5					
10					ALLUVIUM: Light Brown fine to medium Sand, little Silt, trace fine Gravel, medium dense-damp							
15	X	21				104	5					
20	X	21				106	5					
					Brown Silty fine Sand, trace to little Clay, trace medium Sand, trace fine Gravel, medium dense-moist							
25	X	20				115	11					
					Boring Terminated at 25'							

Consolidation/Collapse Test Results



Classification: Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-2	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	3 to 4	Initial Dry Density (pcf)	100.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.75

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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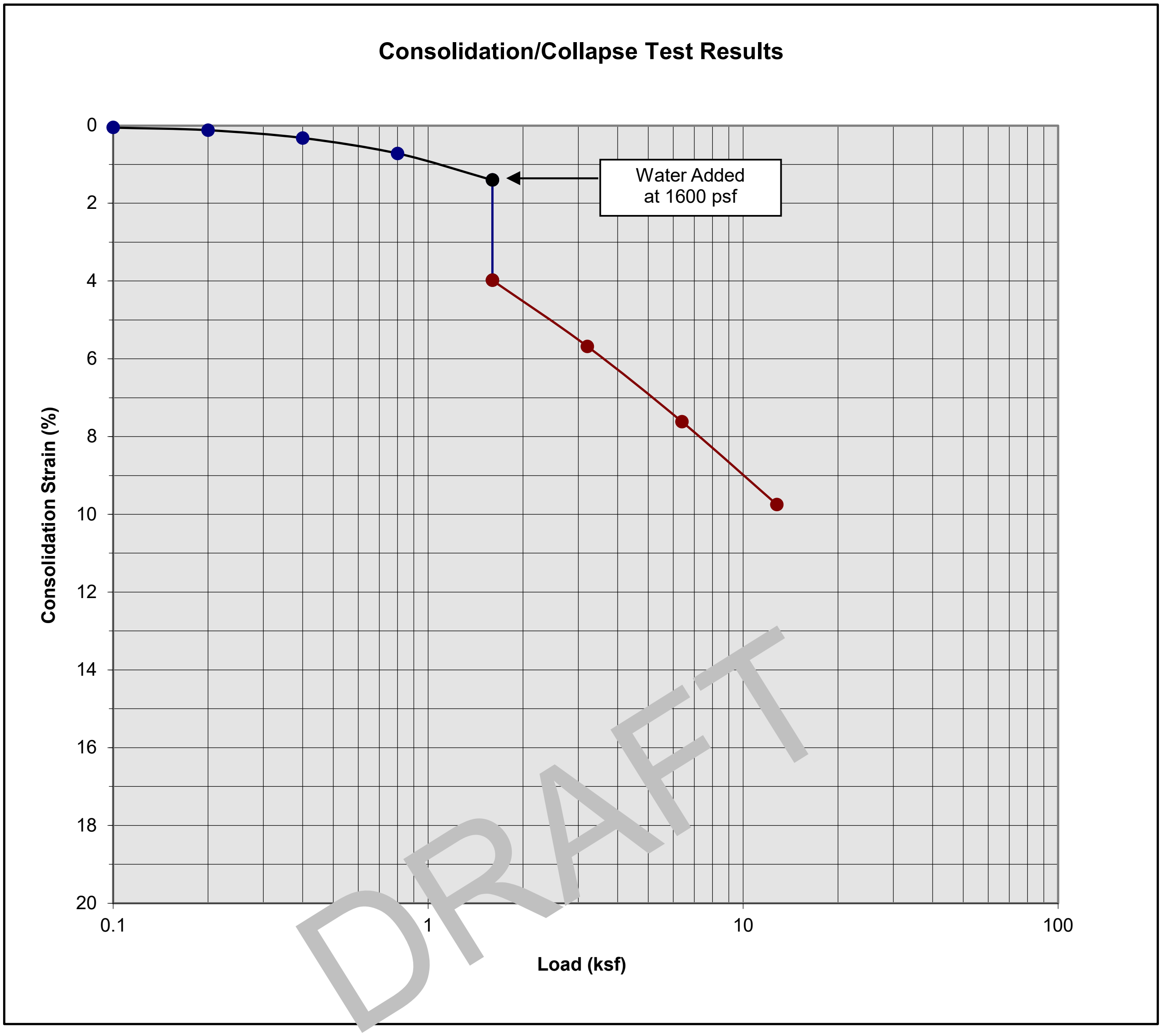

Classification: Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-2	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	5 to 6	Initial Dry Density (pcf)	102.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.58

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C- 2

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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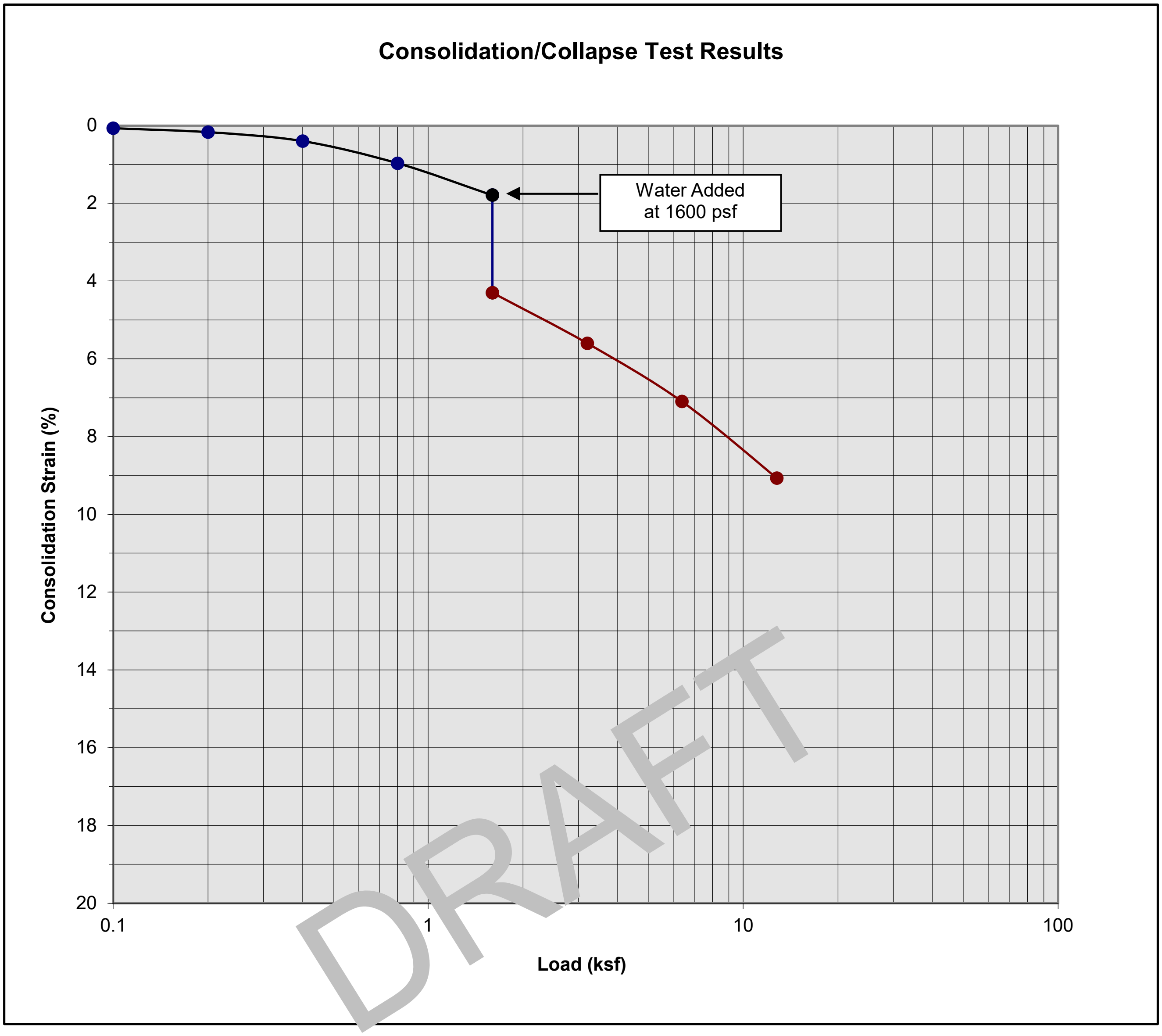

Classification: Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-2	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	7 to 8	Initial Dry Density (pcf)	101.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	111.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.51

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C- 3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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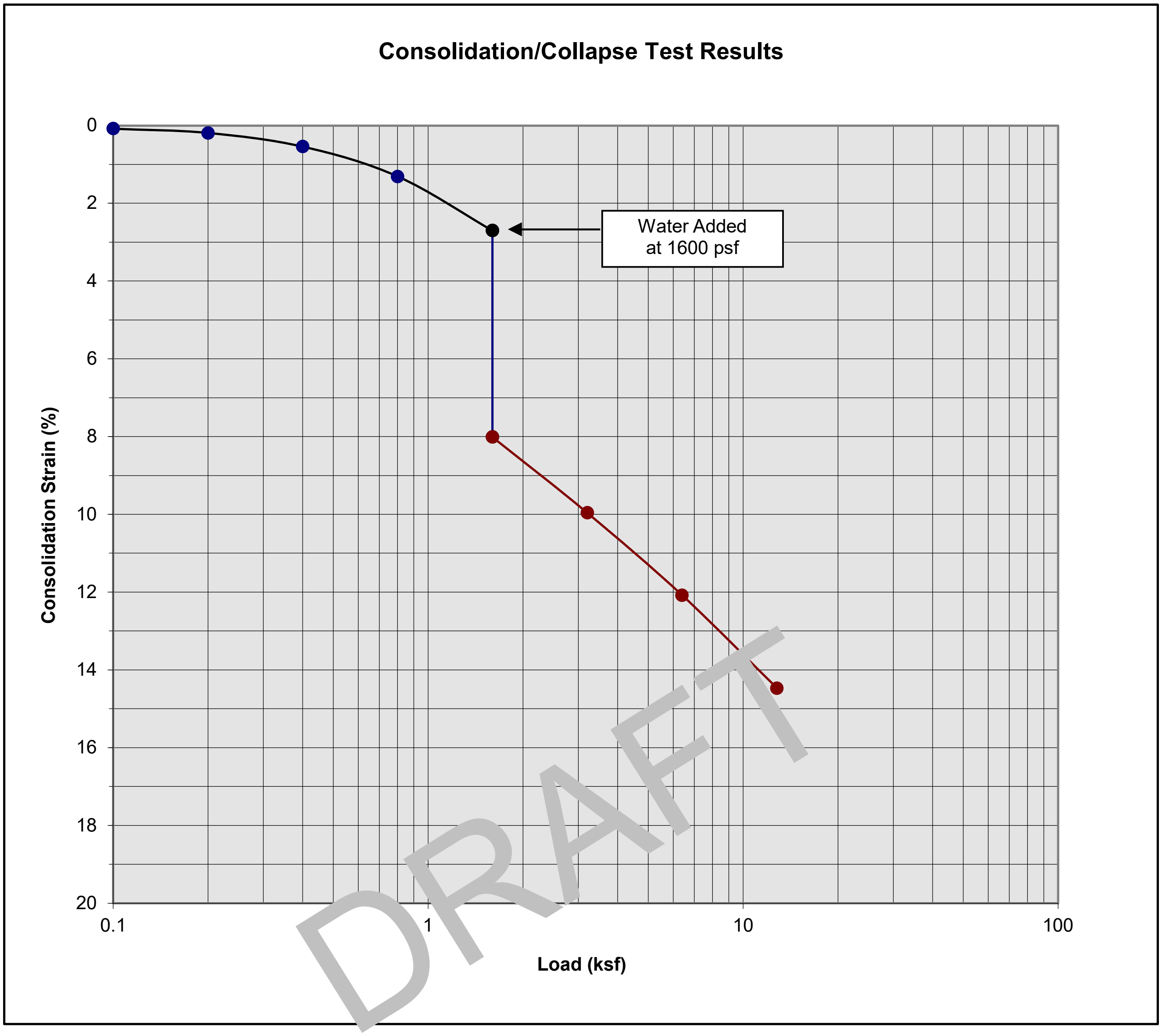

Classification: Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-2	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	9 to 10	Initial Dry Density (pcf)	99.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	115.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.31

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1

PLATE C- 4

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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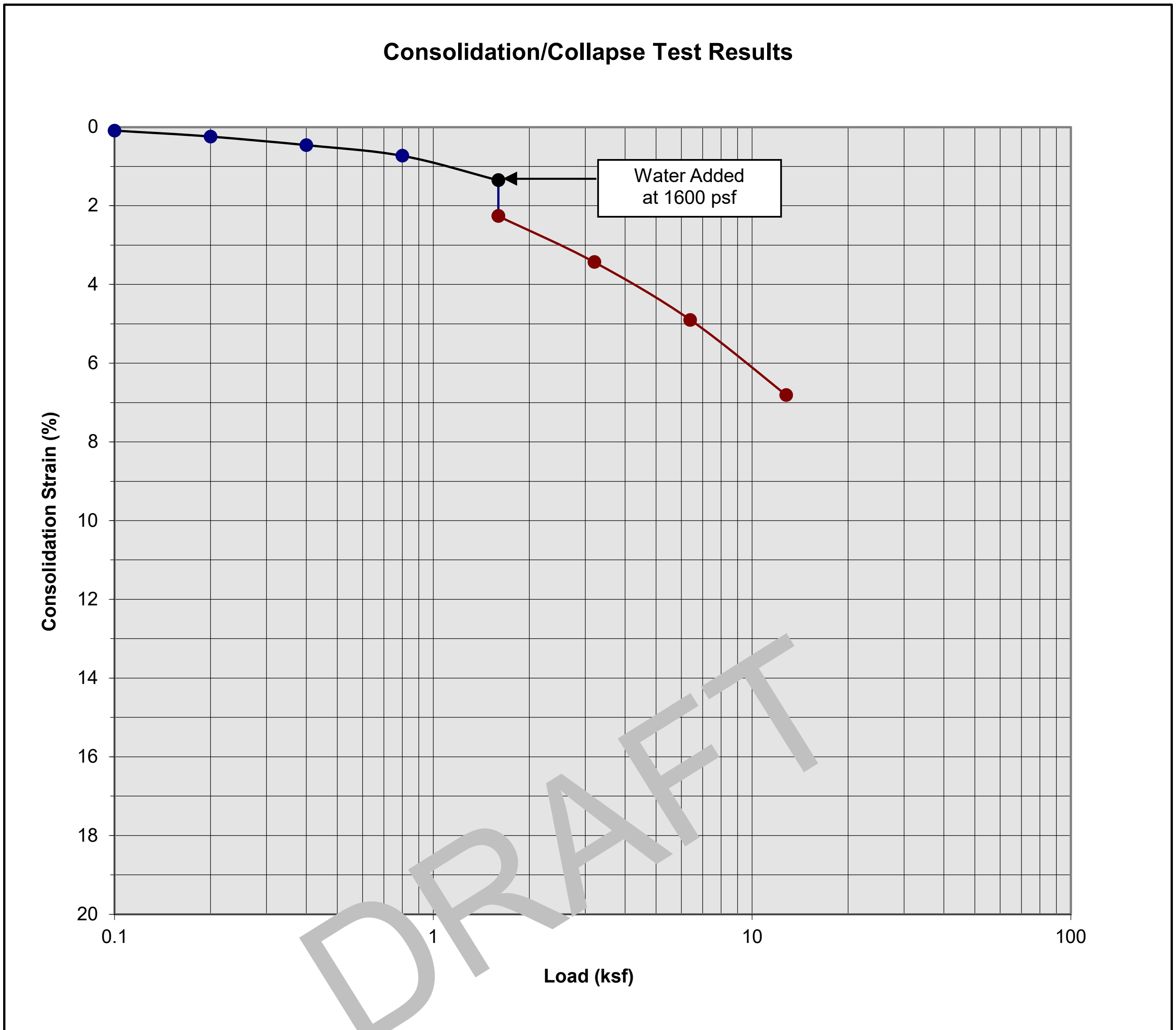

Classification: Light Brown Silty fine Sand

Boring Number:	B-2	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	14 to 15	Initial Dry Density (pcf)	97.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	104.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.91

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C- 5

SOUTHERN CALIFORNIA GEOTECHNICAL
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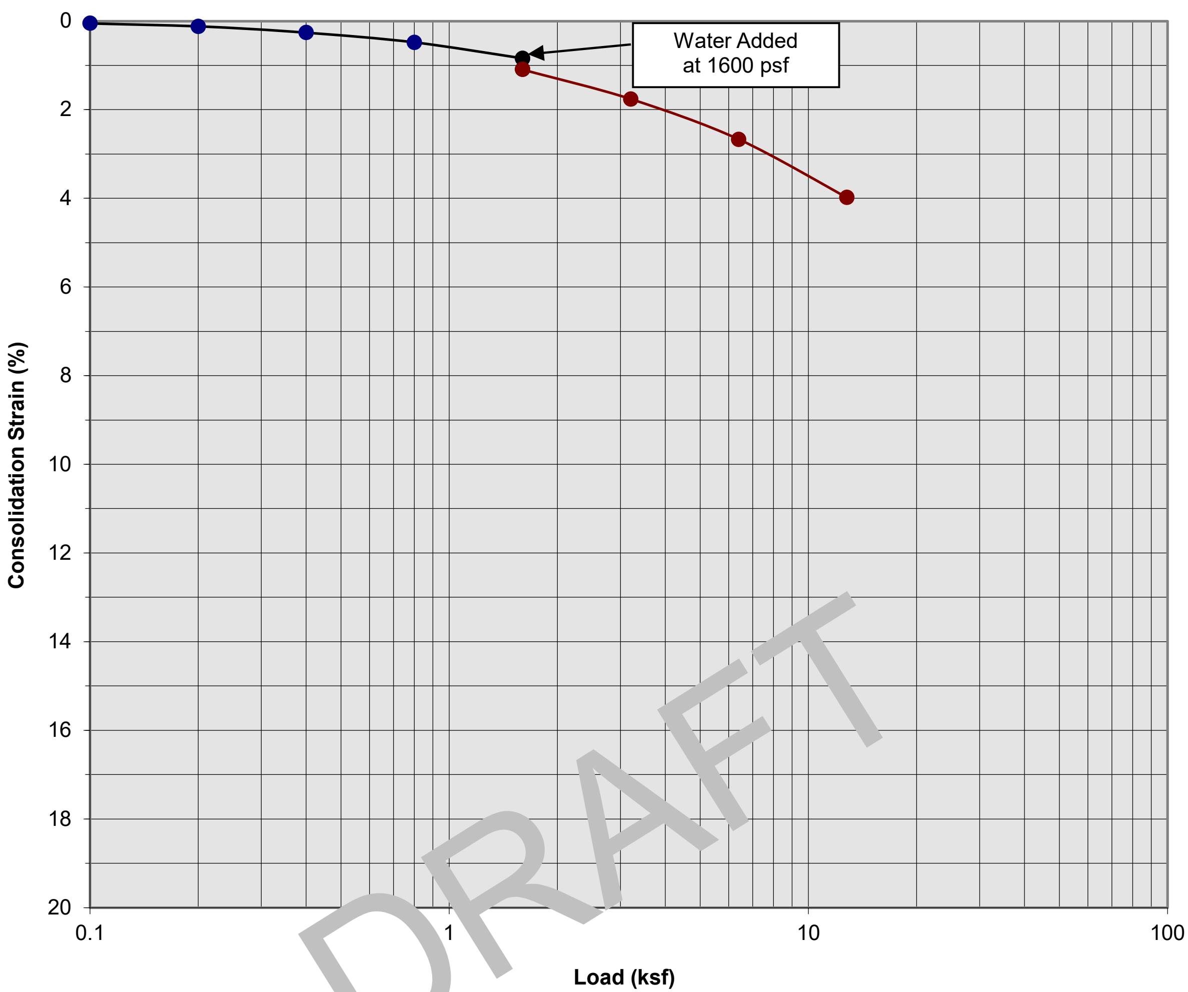
Consolidation/Collapse Test Results

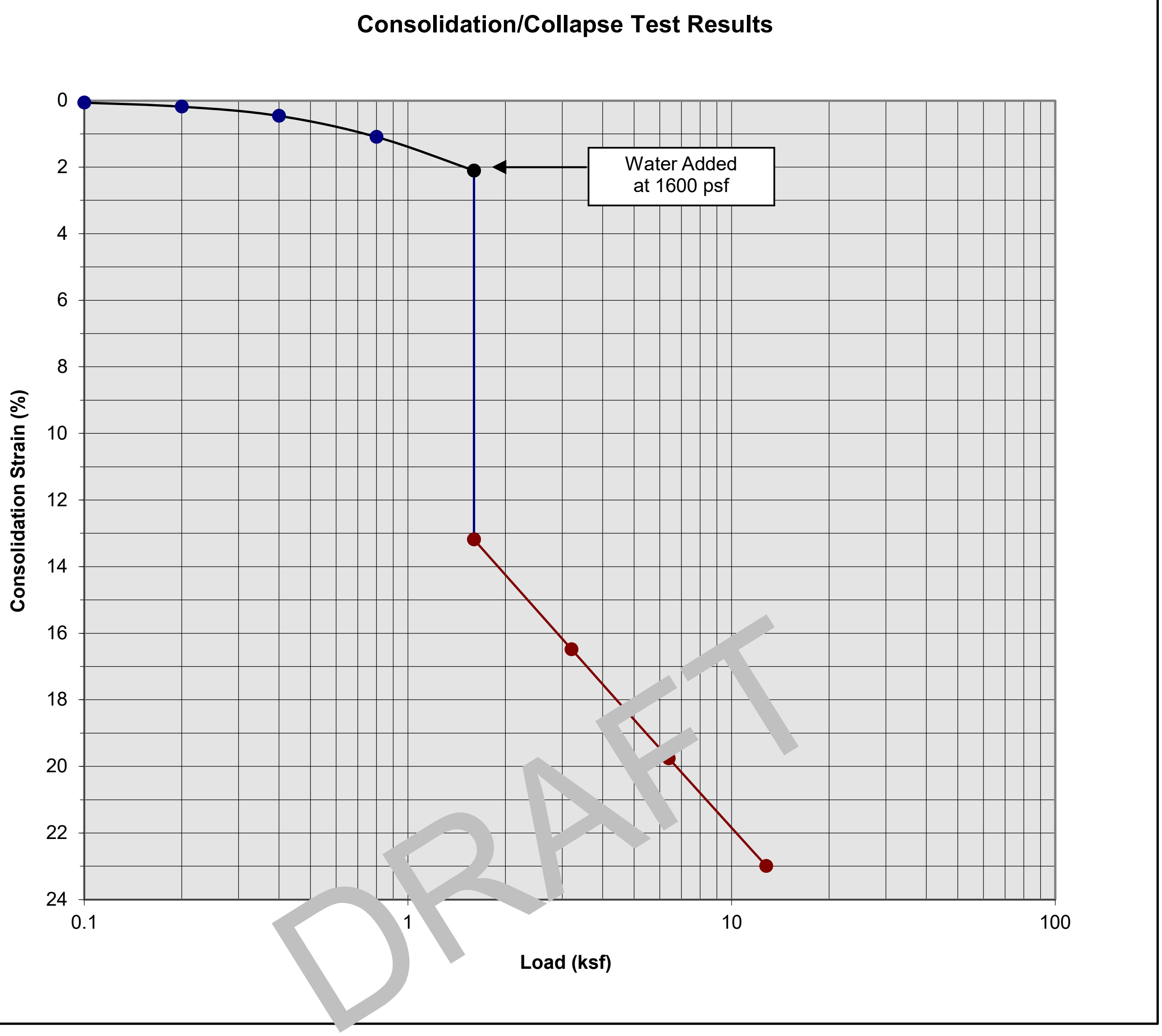


Classification: Light Brown Silty fine Sand

Boring Number:	B-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	19 to 20	Initial Dry Density (pcf)	104.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	108.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.25

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C- 6

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Classification: FILL: Dark Gray Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3 to 4	Initial Dry Density (pcf)	97.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	11.08

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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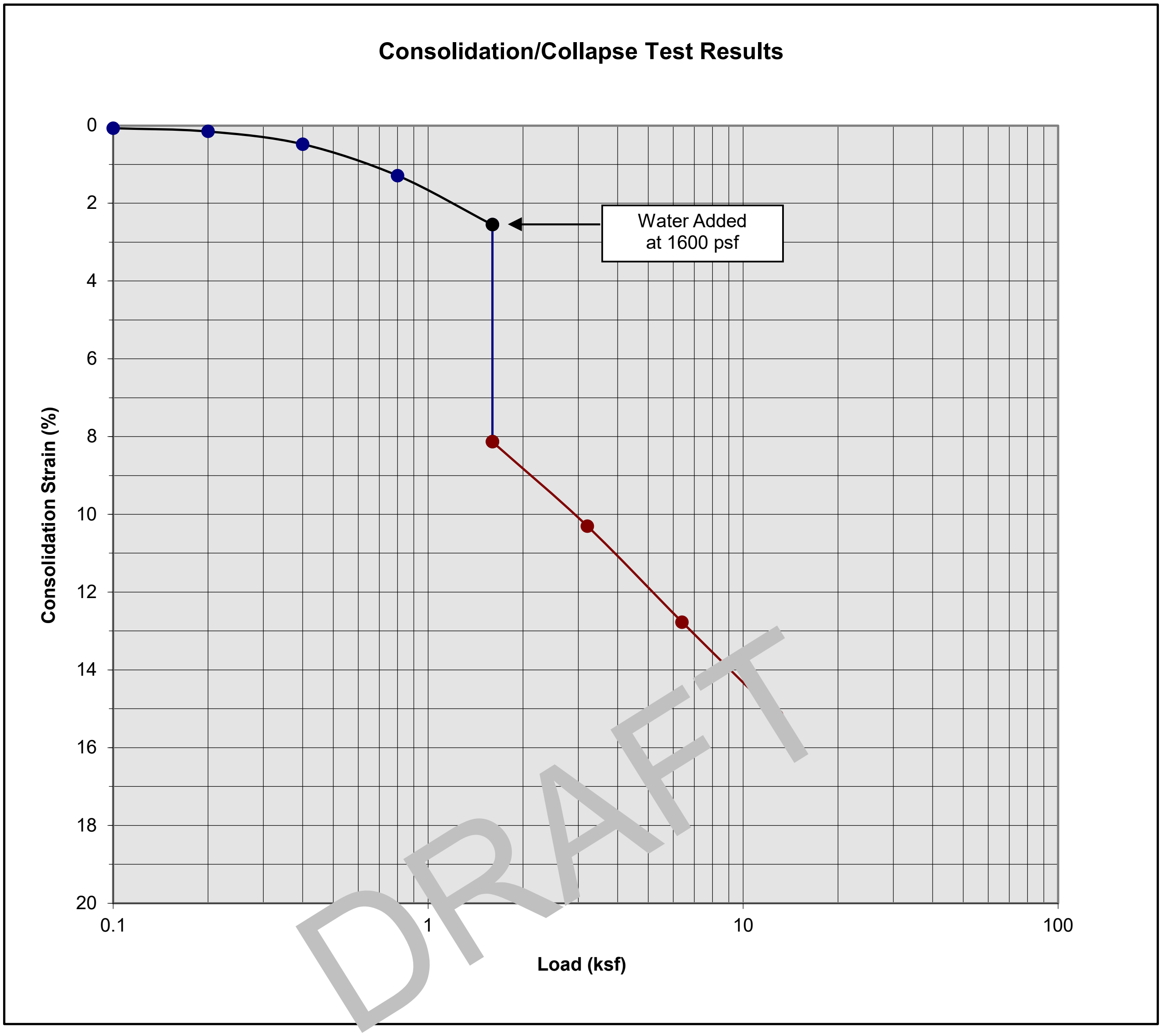

Classification: POSSIBLE FILL: Gray Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	5 to 6	Initial Dry Density (pcf)	102.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.58

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 8

SOUTHERN CALIFORNIA GEOTECHNICAL
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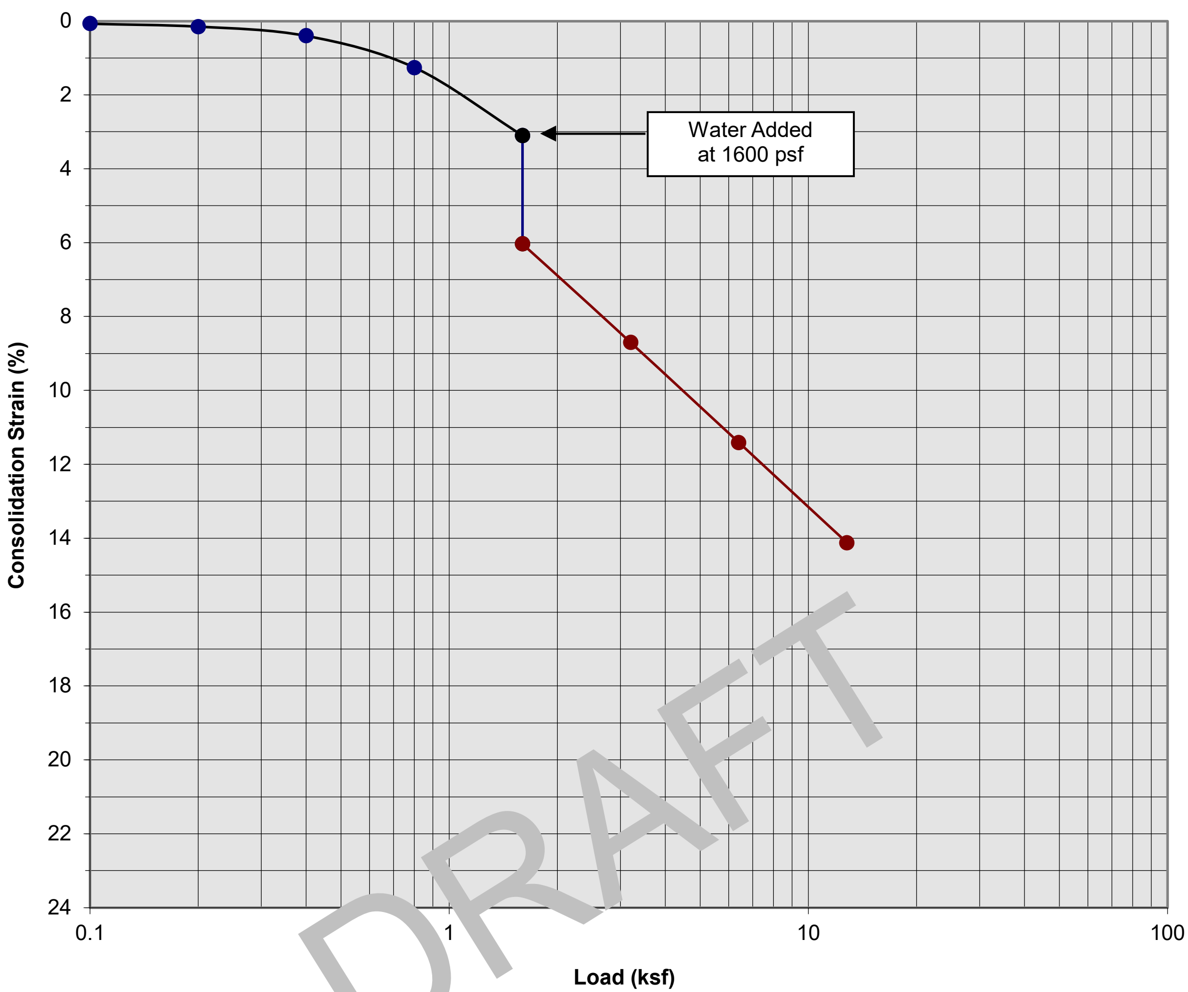
Consolidation/Collapse Test Results



Classification: POSSIBLE FILL: Gray Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	7 to 8	Initial Dry Density (pcf)	96.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	111.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.93

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 9

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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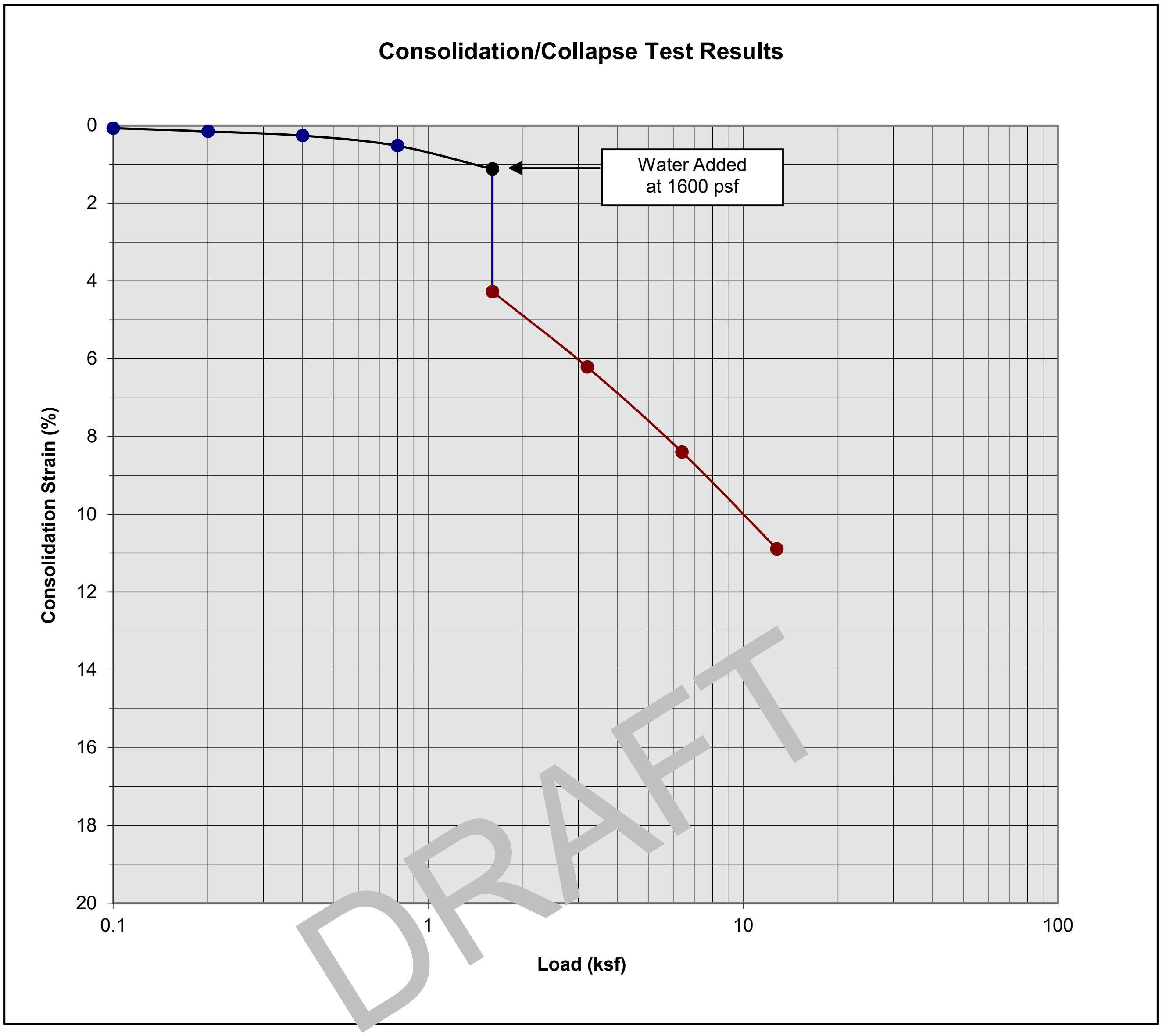

Classification: POSSIBLE FILL: Gray Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	9 to 10	Initial Dry Density (pcf)	99.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	111.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.15

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 10

SOUTHERN CALIFORNIA GEOTECHNICAL
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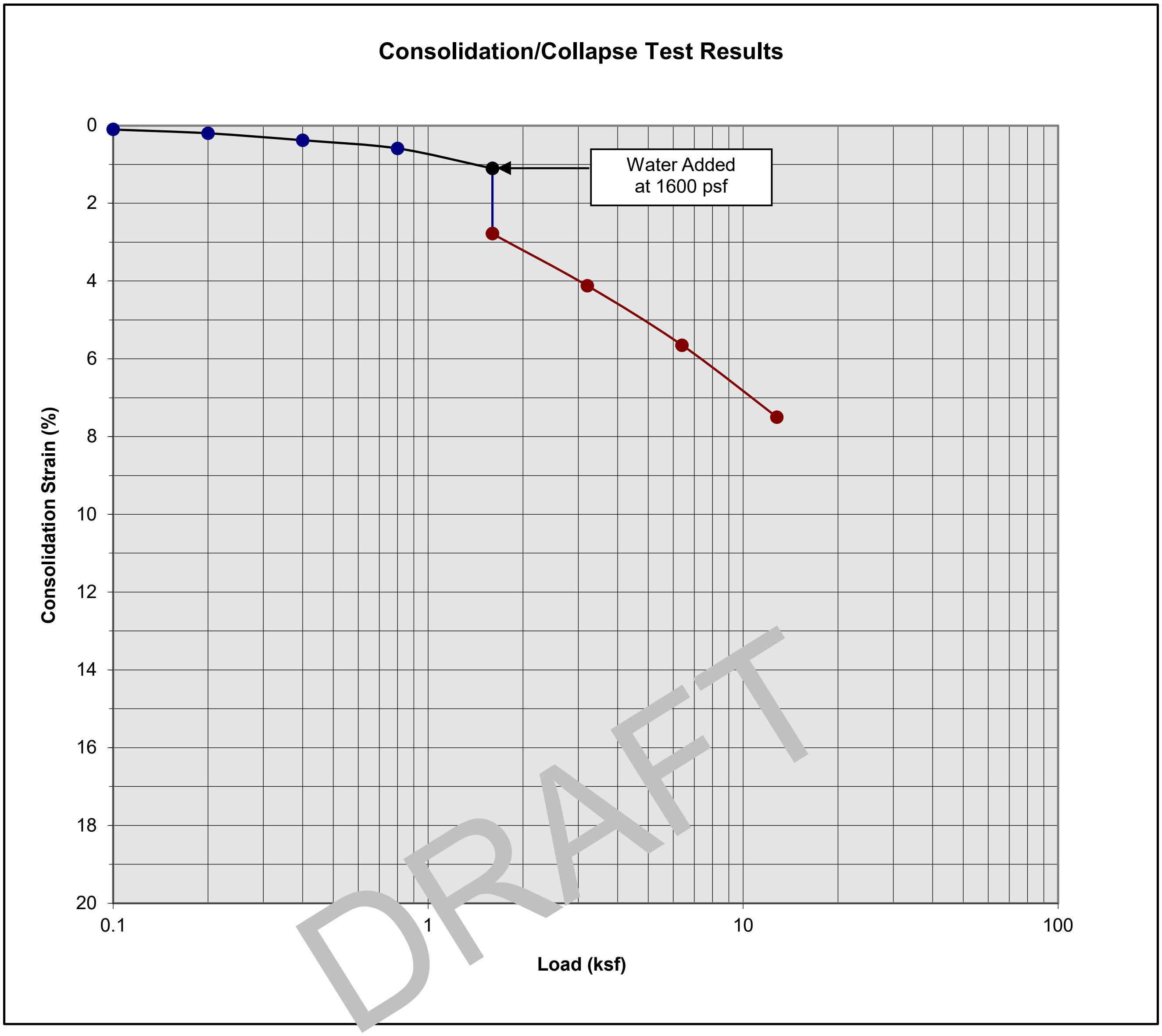

Classification: Light Brown fine to medium Sand, little Silt, trace fine Gravel

Boring Number:	B-6	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	14 to 15	Initial Dry Density (pcf)	104.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.68

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 11

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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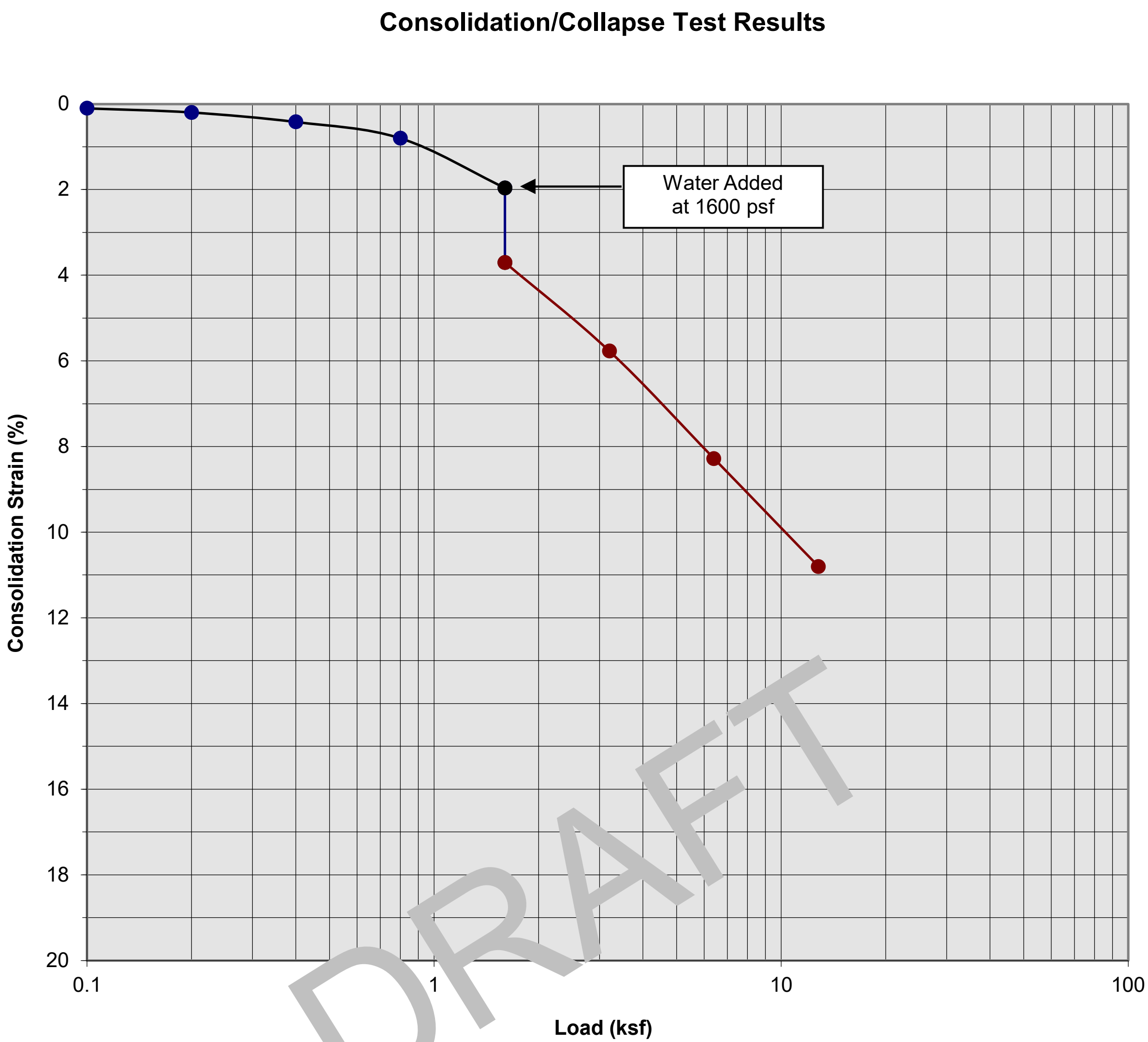

Classification: Light Brown fine to medium Sand, little Silt, trace fine Gravel

Boring Number:	B-6	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	19 to 20	Initial Dry Density (pcf)	106.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.74

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1
PLATE C- 12

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
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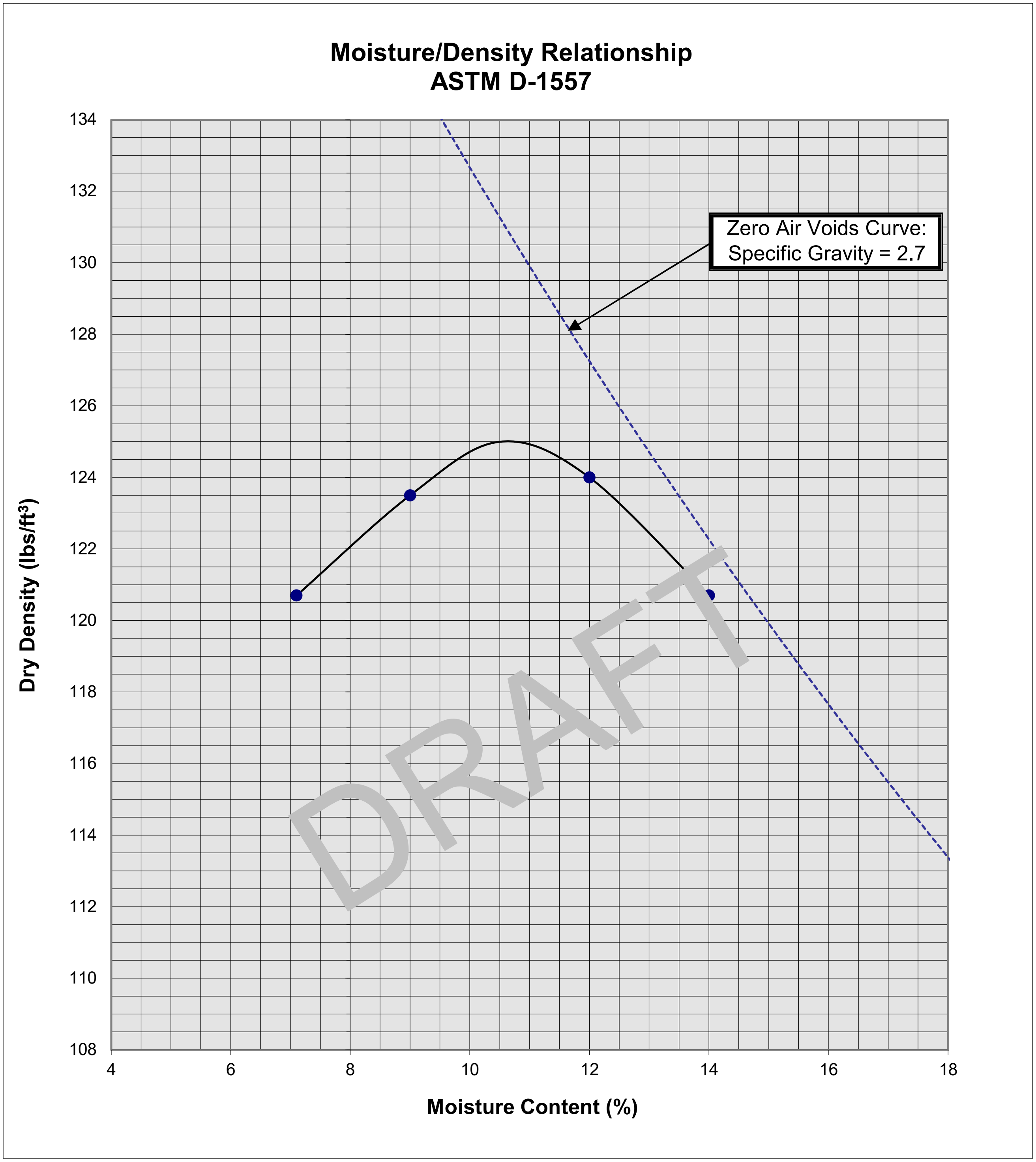

Soil ID Number	B-2 @ 0 to 5'
Optimum Moisture (%)	10.5
Maximum Dry Density (pcf)	125
Soil Classification	Light Gray Brown Silty fine Sand, trace to little medium to coarse Sand, trace to little fine Gravel

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-1
PLATE C-13

SOUTHERN CALIFORNIA GEOTECHNICAL
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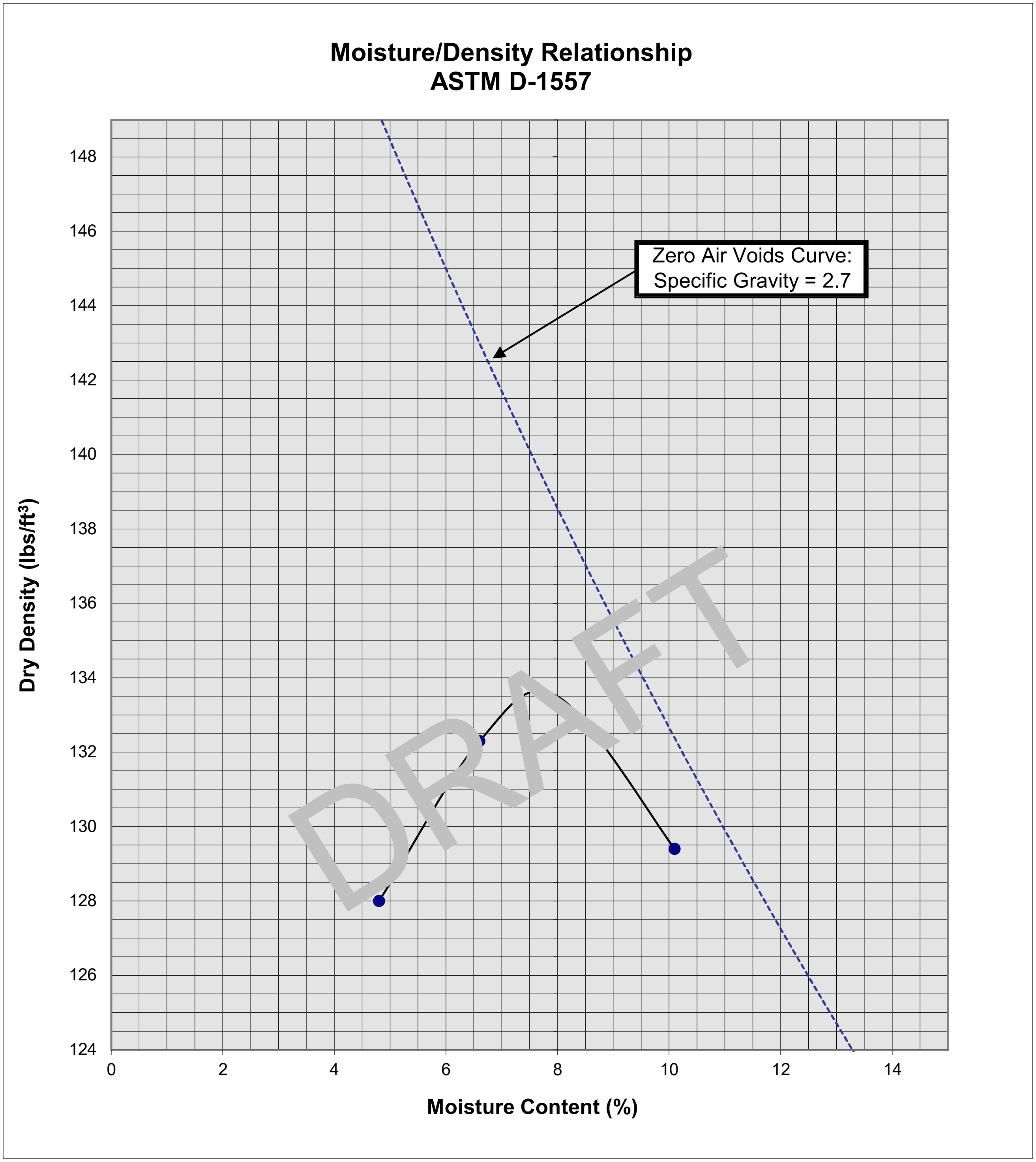


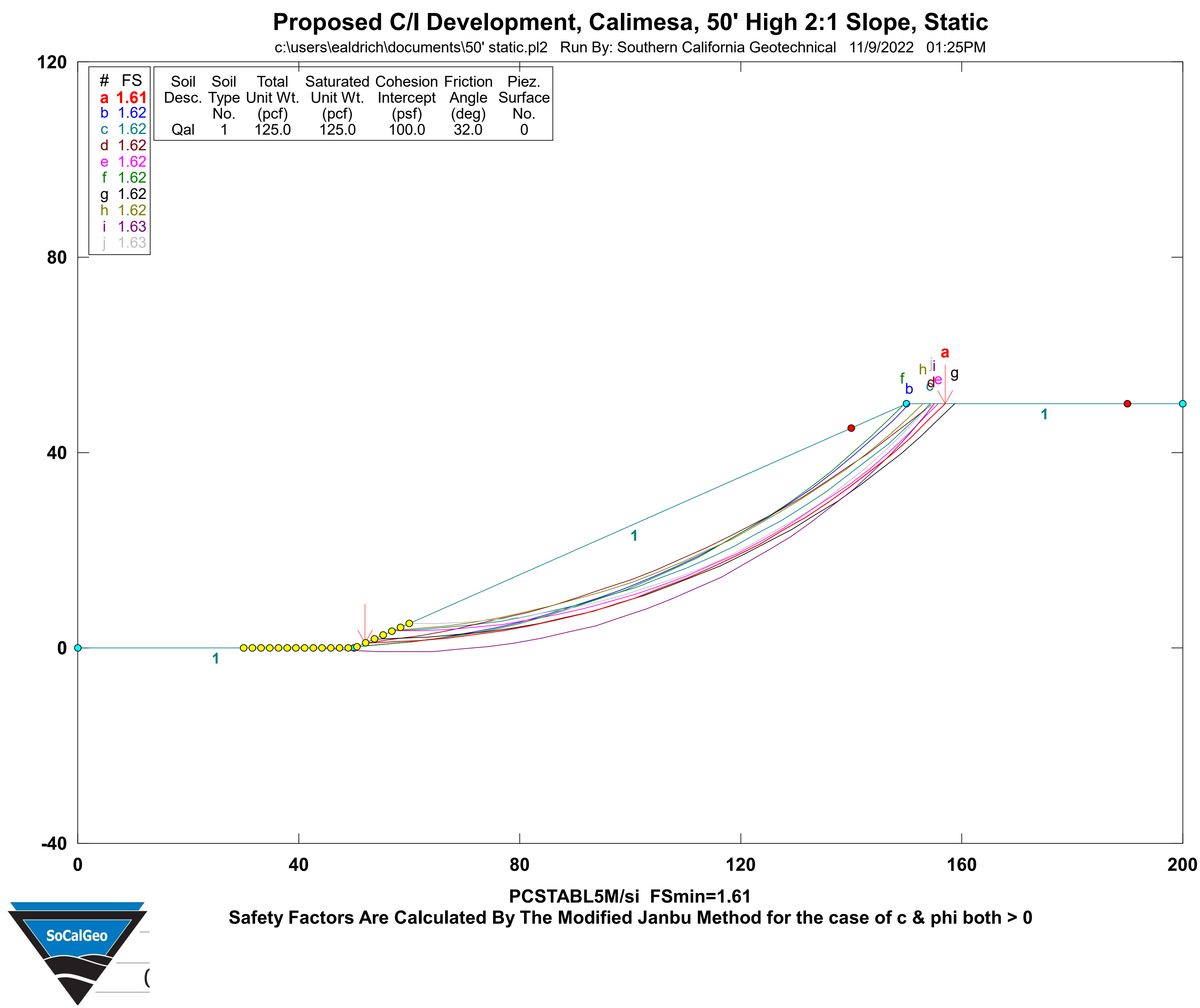
Soil ID Number		B-6 @ 0 to 5'
Optimum Moisture (%)		8
Maximum Dry Density (pcf)		133.5
Soil Classification	Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel	

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G123-1

PLATE C-14

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX G



Proposed C/I Development, Calimesa, 50' High 2:1 Slope, Static
c:\users\ealdrich\documents\50' static.pl2 Run By: Southern California Geotechnical 11/9/2022 01:25PM
FS
a 1.61
b 1.62
c 1.62
d 1.62
e 1.62
f 1.62
g 1.62
h 1.62
i 1.63
j 1.63
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Qal | 1 | 125.0 | 125.0 | 100.0 | 32.0 | 0
120
80
40
0
-40
0
40
80
120
160
200
PCSTABL5M/si FSmin=1.61
Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0
SoCalGeo

**** PCSTABL5M ****

by

Purdue University

--Slope Stability Analysis--

Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 11/9/2022
Time of Run: 01:25PM
Run By: Southern California Geotechnical
Input Data Filename: C:50' Static.in
Output Filename: C:50' Static.OUT
Unit: ENGLISH
Plotted Output Filename: C:50' Static.PLT
PROBLEM DESCRIPTION Proposed C/I Development, Calimesa,
50' High 2:1 Slope, Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and -40.00 to Y-values listed.

3 Top Boundaries
3 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	40.00	50.00	40.00	1
2	50.00	40.00	150.00	90.00	1
3	150.00	90.00	200.00	90.00	1

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	100.0	32.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
2000 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 30.00 ft. and X = 60.00 ft.
Each Surface Terminates Between X = 140.00 ft. and X = 190.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.
5.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.11	41.05
2	57.10	41.18
3	62.09	41.49
4	67.07	41.98
5	72.03	42.64
6	76.95	43.49
7	81.85	44.51
8	86.70	45.70
9	91.51	47.07
10	96.27	48.61
11	100.97	50.32
12	105.60	52.20
13	110.17	54.24
14	114.65	56.45
15	119.06	58.81
16	123.38	61.34
17	127.60	64.01
18	131.73	66.84
19	135.75	69.81

20	139.66	72.92
21	143.46	76.18
22	147.13	79.56
23	150.69	83.08
24	154.11	86.72
25	156.98	90.00

*** 1.609 ***

Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	740.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	5.0	2160.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	5.0	3456.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5.0	4622.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	4.9	5654.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	4.9	6548.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	4.9	7302.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4.8	7915.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	4.8	8386.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	4.7	8717.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	4.6	8909.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4.6	8967.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	4.5	8895.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	4.4	8698.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	4.3	8382.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	4.2	7956.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	4.1	7428.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	4.0	6808.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	3.9	6104.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	3.8	5330.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	3.7	4495.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	2.9	2974.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.7	624.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	3.4	2183.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	2.9	587.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.53	40.26
2	55.51	40.69
3	60.47	41.29
4	65.41	42.06
5	70.32	42.99
6	75.20	44.10
7	80.04	45.37
8	84.83	46.80
9	89.56	48.40
10	94.24	50.16
11	98.86	52.08
12	103.41	54.16
13	107.89	56.39
14	112.28	58.77
15	116.59	61.30
16	120.82	63.98
17	124.95	66.80
18	128.98	69.76
19	132.90	72.85
20	136.72	76.08
21	140.42	79.44
22	144.01	82.92
23	147.48	86.52
24	150.60	90.00

*** 1.615 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.84	43.42
2	61.84	43.68

3	66.82	44.13
4	71.78	44.76
5	76.71	45.57
6	81.61	46.56
7	86.47	47.74
8	91.28	49.10
9	96.04	50.63
10	100.74	52.34
11	105.37	54.22
12	109.93	56.27
13	114.42	58.48
14	118.81	60.87
15	123.12	63.41
16	127.32	66.11
17	131.43	68.97
18	135.42	71.97
19	139.30	75.13
20	143.07	78.42
21	146.70	81.85
22	150.21	85.41
23	153.59	89.10
24	154.35	90.00

*** 1.615 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.11	41.05
2	57.06	41.75
3	61.99	42.58
4	66.89	43.55
5	71.77	44.65
6	76.61	45.89
7	81.42	47.26
8	86.19	48.77
9	90.92	50.40
10	95.59	52.17
11	100.22	54.06
12	104.79	56.08
13	109.31	58.23
14	113.76	60.50
15	118.15	62.89
16	122.48	65.41
17	126.73	68.04
18	130.90	70.79
19	135.00	73.65
20	139.02	76.63
21	142.95	79.72
22	146.80	82.91
23	150.56	86.21
24	154.22	89.61
25	154.62	90.00

*** 1.618 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.84	43.42
2	61.84	43.49
3	66.84	43.75
4	71.81	44.21
5	76.77	44.87
6	81.70	45.72
7	86.59	46.76
8	91.43	48.00
9	96.22	49.43
10	100.95	51.05
11	105.62	52.85
12	110.21	54.84
13	114.71	57.00
14	119.13	59.34
15	123.45	61.86

16	127.67	64.54
17	131.78	67.39
18	135.78	70.40
19	139.65	73.56
20	143.39	76.87
21	147.00	80.33
22	150.47	83.93
23	153.80	87.66
24	155.72	90.00

*** 1.618 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.53	40.26
2	55.51	40.63
3	60.48	41.17
4	65.43	41.89
5	70.35	42.79
6	75.23	43.86
7	80.08	45.11
8	84.87	46.53
9	89.61	48.13
10	94.29	49.89
11	98.90	51.83
12	103.44	53.92
13	107.90	56.18
14	112.27	58.60
15	116.56	61.18
16	120.75	63.90
17	124.84	66.78
18	128.82	69.80
19	132.69	72.97
20	136.45	76.27
21	140.08	79.70
22	143.59	83.27
23	146.97	86.95
24	149.24	89.62

*** 1.619 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.68	41.84
2	58.68	41.94
3	63.68	42.21
4	68.66	42.67
5	73.61	43.30
6	78.55	44.12
7	83.45	45.11
8	88.31	46.27
9	93.13	47.61
10	97.89	49.13
11	102.60	50.81
12	107.25	52.66
13	111.82	54.68
14	116.32	56.86
15	120.74	59.20
16	125.07	61.70
17	129.31	64.35
18	133.45	67.16
19	137.48	70.11
20	141.41	73.20
21	145.22	76.44
22	148.92	79.81
23	152.49	83.31
24	155.93	86.93
25	158.64	90.00

*** 1.620 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	56.84	43.42
2	61.82	43.88
3	66.78	44.51
4	71.72	45.31
5	76.62	46.28
6	81.49	47.42
7	86.32	48.72
8	91.10	50.19
9	95.82	51.82
10	100.49	53.62
11	105.09	55.57
12	109.63	57.68
13	114.08	59.94
14	118.46	62.36
15	122.75	64.93
16	126.96	67.64
17	131.06	70.49
18	135.07	73.48
19	138.97	76.61
20	142.76	79.87
21	146.43	83.26
22	149.99	86.77
23	153.04	90.00

*** 1.621 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	44.21	40.00
2	49.19	39.51
3	54.18	39.23
4	59.18	39.16
5	64.18	39.31
6	69.16	39.66
7	74.13	40.23
8	79.07	41.01
9	83.97	42.00
10	88.83	43.20
11	93.63	44.60
12	98.36	46.20
13	103.02	48.01
14	107.61	50.01
15	112.10	52.20
16	116.49	54.59
17	120.78	57.15
18	124.96	59.90
19	129.02	62.83
20	132.95	65.92
21	136.74	69.18
22	140.39	72.59
23	143.90	76.16
24	147.24	79.87
25	150.43	83.72
26	153.45	87.71
27	155.04	90.00

*** 1.625 ***

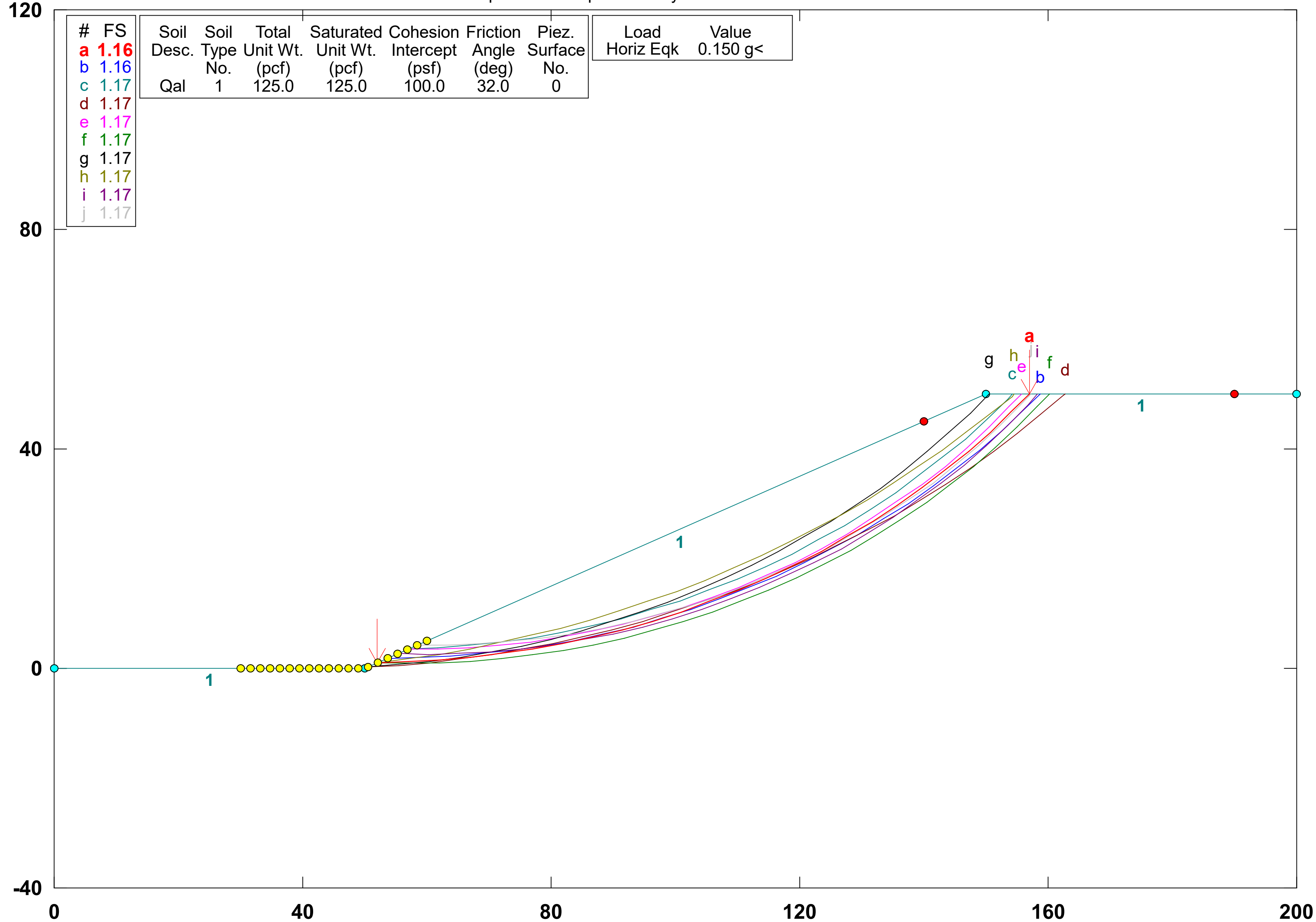
Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	45.00
2	65.00	45.00
3	70.00	45.22
4	74.98	45.65
5	79.94	46.29
6	84.86	47.15
7	89.75	48.21
8	94.58	49.48
9	99.36	50.96
10	104.07	52.64
11	108.70	54.52
12	113.25	56.60

13		117.70	58.87
14		122.06	61.33
15		126.30	63.98
16		130.43	66.80
17		134.43	69.80
18		138.30	72.96
19		142.03	76.29
20		145.62	79.77
21		149.05	83.41
22		152.32	87.19
23		154.56	90.00
	***	1.625	***

Proposed C/I Development, Calimesa, 50' High 2:1 Slope, Pseudo-Static

c:\users\ealdrich\documents\50' pseudostatic.pl2 Run By: Southern California Geotechnical 11/9/2022 01:27PM



PCSTABL5M/si FSmin=1.16

Safety Factors Are Calculated By The Modified Janbu Method for the case of c & phi both > 0

SoCalGeo

**** PCSTABL5M ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 11/9/2022
Time of Run: 01:27PM
Run By: Southern California Geotechnical
Input Data Filename: C:50' PseudoStatic.in
Output Filename: C:50' PseudoStatic.OUT
Unit: ENGLISH
Plotted Output Filename: C:50' PseudoStatic.PLT
PROBLEM DESCRIPTION Proposed C/I Development, Calimesa,
50' High 2:1 Slope, Pseudo-Static

BOUNDARY COORDINATES
Note: User origin value specified.
Add 0.00 to X-values and -40.00 to Y-values listed.

3 Top Boundaries
3 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	40.00	50.00	40.00	1
2	50.00	40.00	150.00	90.00	1
3	150.00	90.00	200.00	90.00	1

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	100.0	32.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned
Cavitation Pressure = 0.0 (psf)
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
2000 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 30.00 ft.
and X = 60.00 ft.
Each Surface Terminates Between X = 140.00 ft.
and X = 190.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.
5.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Janbu Method * *
Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.11	41.05
2	57.10	41.18
3	62.09	41.49
4	67.07	41.98
5	72.03	42.64
6	76.95	43.49
7	81.85	44.51
8	86.70	45.70
9	91.51	47.07
10	96.27	48.61
11	100.97	50.32
12	105.60	52.20
13	110.17	54.24

14	114.65	56.45
15	119.06	58.81
16	123.38	61.34
17	127.60	64.01
18	131.73	66.84
19	135.75	69.81
20	139.66	72.92
21	143.46	76.18
22	147.13	79.56
23	150.69	83.08
24	154.11	86.72
25	156.98	90.00

*** 1.157 ***

Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	740.4	0.0	0.0	0.0	0.0	111.1	0.0	0.0
2	5.0	2160.4	0.0	0.0	0.0	0.0	324.1	0.0	0.0
3	5.0	3456.4	0.0	0.0	0.0	0.0	518.5	0.0	0.0
4	5.0	4622.7	0.0	0.0	0.0	0.0	693.4	0.0	0.0
5	4.9	5654.6	0.0	0.0	0.0	0.0	848.2	0.0	0.0
6	4.9	6548.7	0.0	0.0	0.0	0.0	982.3	0.0	0.0
7	4.9	7302.6	0.0	0.0	0.0	0.0	1095.4	0.0	0.0
8	4.8	7915.2	0.0	0.0	0.0	0.0	1187.3	0.0	0.0
9	4.8	8386.2	0.0	0.0	0.0	0.0	1257.9	0.0	0.0
10	4.7	8717.0	0.0	0.0	0.0	0.0	1307.5	0.0	0.0
11	4.6	8909.6	0.0	0.0	0.0	0.0	1336.4	0.0	0.0
12	4.6	8967.5	0.0	0.0	0.0	0.0	1345.1	0.0	0.0
13	4.5	8895.2	0.0	0.0	0.0	0.0	1334.3	0.0	0.0
14	4.4	8698.1	0.0	0.0	0.0	0.0	1304.7	0.0	0.0
15	4.3	8382.8	0.0	0.0	0.0	0.0	1257.4	0.0	0.0
16	4.2	7956.9	0.0	0.0	0.0	0.0	1193.5	0.0	0.0
17	4.1	7428.9	0.0	0.0	0.0	0.0	1114.3	0.0	0.0
18	4.0	6808.1	0.0	0.0	0.0	0.0	1021.2	0.0	0.0
19	3.9	6104.9	0.0	0.0	0.0	0.0	915.7	0.0	0.0
20	3.8	5330.2	0.0	0.0	0.0	0.0	799.5	0.0	0.0
21	3.7	4495.8	0.0	0.0	0.0	0.0	674.4	0.0	0.0
22	2.9	2974.9	0.0	0.0	0.0	0.0	446.2	0.0	0.0
23	0.7	624.2	0.0	0.0	0.0	0.0	93.6	0.0	0.0
24	3.4	2183.7	0.0	0.0	0.0	0.0	327.6	0.0	0.0
25	2.9	587.9	0.0	0.0	0.0	0.0	88.2	0.0	0.0

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.68	41.84
2	58.68	41.94
3	63.68	42.21
4	68.66	42.67
5	73.61	43.30
6	78.55	44.12
7	83.45	45.11
8	88.31	46.27
9	93.13	47.61
10	97.89	49.13
11	102.60	50.81
12	107.25	52.66
13	111.82	54.68
14	116.32	56.86
15	120.74	59.20
16	125.07	61.70
17	129.31	64.35
18	133.45	67.16
19	137.48	70.11
20	141.41	73.20
21	145.22	76.44
22	148.92	79.81
23	152.49	83.31
24	155.93	86.93

25	158.64	90.00

*** 1.163 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.84	43.42
2	61.84	43.68
3	66.82	44.13
4	71.78	44.76
5	76.71	45.57
6	81.61	46.56
7	86.47	47.74
8	91.28	49.10
9	96.04	50.63
10	100.74	52.34
11	105.37	54.22
12	109.93	56.27
13	114.42	58.48
14	118.81	60.87
15	123.12	63.41
16	127.32	66.11
17	131.43	68.97
18	135.42	71.97
19	139.30	75.13
20	143.07	78.42
21	146.70	81.85
22	150.21	85.41
23	153.59	89.10
24	154.35	90.00

*** 1.165 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.53	40.26
2	55.51	40.62
3	60.49	41.12
4	65.45	41.76
5	70.39	42.54
6	75.30	43.46
7	80.19	44.53
8	85.04	45.73
9	89.86	47.07
10	94.63	48.55
11	99.36	50.17
12	104.05	51.92
13	108.68	53.81
14	113.25	55.82
15	117.77	57.97
16	122.22	60.25
17	126.60	62.65
18	130.92	65.18
19	135.16	67.83
20	139.32	70.60
21	143.40	73.49
22	147.39	76.50
23	151.30	79.62
24	155.12	82.85
25	158.84	86.18
26	162.47	89.63
27	162.84	90.00

*** 1.165 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	56.84	43.42
2	61.84	43.49
3	66.84	43.75
4	71.81	44.21
5	76.77	44.87
6	81.70	45.72

7	86.59	46.76
8	91.43	48.00
9	96.22	49.43
10	100.95	51.05
11	105.62	52.85
12	110.21	54.84
13	114.71	57.00
14	119.13	59.34
15	123.45	61.86
16	127.67	64.54
17	131.78	67.39
18	135.78	70.40
19	139.65	73.56
20	143.39	76.87
21	147.00	80.33
22	150.47	83.93
23	153.80	87.66
24	155.72	90.00

*** 1.165 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.11	41.05
2	57.10	40.96
3	62.10	41.05
4	67.10	41.33
5	72.07	41.80
6	77.03	42.46
7	81.96	43.30
8	86.85	44.33
9	91.70	45.54
10	96.51	46.93
11	101.25	48.50
12	105.94	50.25
13	110.55	52.17
14	115.09	54.27
15	119.55	56.53
16	123.92	58.97
17	128.19	61.56
18	132.37	64.31
19	136.43	67.22
20	140.39	70.28
21	144.22	73.49
22	147.94	76.84
23	151.52	80.32
24	154.97	83.94
25	158.29	87.69
26	160.18	90.00

*** 1.168 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.53	40.26
2	55.51	40.69
3	60.47	41.29
4	65.41	42.06
5	70.32	42.99
6	75.20	44.10
7	80.04	45.37
8	84.83	46.80
9	89.56	48.40
10	94.24	50.16
11	98.86	52.08
12	103.41	54.16
13	107.89	56.39
14	112.28	58.77
15	116.59	61.30
16	120.82	63.98
17	124.95	66.80
18	128.98	69.76

19	132.90	72.85
20	136.72	76.08
21	140.42	79.44
22	144.01	82.92
23	147.48	86.52
24	150.60	90.00

*** 1.168 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.11	41.05
2	57.06	41.75
3	61.99	42.58
4	66.89	43.55
5	71.77	44.65
6	76.61	45.89
7	81.42	47.26
8	86.19	48.77
9	90.92	50.40
10	95.59	52.17
11	100.22	54.06
12	104.79	56.08
13	109.31	58.23
14	113.76	60.50
15	118.15	62.89
16	122.48	65.41
17	126.73	68.04
18	130.90	70.79
19	135.00	73.65
20	139.02	76.63
21	142.95	79.72
22	146.80	82.91
23	150.56	86.21
24	154.22	89.61
25	154.62	90.00

*** 1.168 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.26	42.63
2	60.26	42.57
3	65.26	42.70
4	70.25	43.03
5	75.22	43.56
6	80.17	44.28
7	85.09	45.20
8	89.96	46.31
9	94.79	47.61
10	99.56	49.10
11	104.27	50.78
12	108.91	52.64
13	113.47	54.69
14	117.95	56.91
15	122.34	59.30
16	126.63	61.87
17	130.82	64.60
18	134.90	67.50
19	138.85	70.56
20	142.69	73.77
21	146.39	77.12
22	149.96	80.62
23	153.39	84.26
24	156.68	88.03
25	158.26	90.00

*** 1.168 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.42	44.21
2	63.42	44.24

3	68.42	44.47
4	73.40	44.90
5	78.36	45.53
6	83.29	46.35
7	88.19	47.36
8	93.04	48.57
9	97.84	49.97
10	102.58	51.56
11	107.25	53.34
12	111.85	55.30
13	116.37	57.44
14	120.80	59.75
15	125.14	62.24
16	129.37	64.90
17	133.50	67.73
18	137.51	70.72
19	141.39	73.86
20	145.16	77.16
21	148.78	80.60
22	152.27	84.18
23	155.61	87.90
24	157.36	90.00

*** 1.170 ***

November 16, 2022

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

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

Attention: Mr. Scott Mulkay
President of Construction

Project No.: **20G122-3**

Subject: **Results of Infiltration Testing**
Proposed Commercial/Industrial Development
Calimesa Boulevard, Southeast of Singleton Road
Calimesa, California

References: 1) Geotechnical Investigation, Proposed Commercial/Industrial Development, Calimesa Boulevard, Southeast of Singleton Road, Calimesa, California, prepared by Southern California Geotechnical, Inc. (SCG), prepared for Birtcher Development, SCG Project No. 20G122-2, dated November 16, 2022.

2) Geotechnical Feasibility Study, Proposed Commercial/Industrial Development, Calimesa Boulevard, Southeast of Singleton Road, Calimesa, California, prepared by SCG, prepared for Birtcher Development, SCG Project No. 20G122-1, dated April 21, 2020.

3) Geotechnical Feasibility Study, Proposed Commercial/Industrial Development, Calimesa Boulevard, Southeast of Singleton Road, Calimesa, California, prepared by SCG, prepared for Birtcher Development, SCG Project No. 20G123-1, dated June 23, 2020.

Mr. Mulkay:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 20P145-3R, dated October 6, 2022. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with the guidelines published in Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A, prepared for the Riverside County Department of Environmental Health (RCDEH), dated December, 2013.

Site and Project Description

The subject site is located on the northeast side of Calimesa Boulevard, 450± feet southeast of Singleton Road in Calimesa, California. The site is bounded to the northeast by Beckwith Avenue, to the northwest by a vacant lot, to the southwest by Calimesa Boulevard, and to the southeast by mobile homes and an undeveloped parcel. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of an irregular-shaped parcel, 95± acres in size. The site is predominately vacant and undeveloped. A single-family residence, approximately 1,600 ft^2 in size, is located in the west-central region of the site. The residence is a single-story structure of wood frame and stucco construction, presumably supported on conventional shallow foundations with a concrete slab-on-grade floor. The residence is located at the top of an isolated hill, generally surrounded by relatively level terrain in the western and central regions of the site. Two exposed concrete pads ranging from 1,600 to 2,100 ft^2 in size are located north of the residence. A 3±-foot-deep earthen drainage channel transects the central region of the site, trending northeast-southwest. The site topography in the eastern region of the site is comprised of moderately hilly terrain. The ground surface throughout the site consists of exposed soil with sparse to moderate native grass and weed growth with several large trees in the southeastern region of the property.

Topographic information was obtained from the preliminary conceptual grading plan prepared by Albert A. Webb Associates. The overall site topography generally slopes downward to the west at a gradient of approximately 3 percent. However, as previously discussed, the eastern region of the site is comprised of moderately hilly terrain. In addition, there is one (1) isolated hill in the west-central region of the site. The hills at the site generally range between 15 to 20± feet higher in elevation than the adjacent terrain that is relatively level. The hills throughout the site generally descend downward to the surrounding level terrain at inclinations of 3.5h:1v (horizontal to vertical) to 6h:1v.

Proposed Development

Based on a conceptual grading plan provided by Albert A. Webb Associates, the subject site will be developed with three (3) commercial/industrial buildings (identified for this project as the northern building, central building, and southern building). Based on the current plan, the proposed buildings will have footprints ranging from 333,384± ft^2 to 684,464± ft^2 in size, located within the central and western-most regions of the site. The buildings will be constructed with dock-high doors along the north and/or south sides of the buildings. Based on our experience with similar commercial/industrial developments, we expect that the buildings will be surrounded by asphaltic concrete pavements in parking areas and drive lanes and with Portland cement concrete pavements for the truck loading areas. Landscape planters and concrete flatwork may also be included throughout the site. In addition, the site will include the mass grading areas in the northeastern and southeastern areas of the site.

The proposed development will include on-site storm water infiltration. Based on email correspondence with the project civil engineer, the proposed infiltration systems will consist of the following:

Infiltration System	Infiltration Location	Approximate Depth (feet)
"A"	North	27 to 30
"B"	Northeast	20 to 25½
"C"	East	40

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site (Reference No. 1). As part of this study, sixteen (16) borings (identified as Boring Nos. B-7 through B-22) were advanced to depths of 15 to 40± feet below the existing site grades. Younger alluvium was encountered at the ground surface or beneath the disturbed alluvium at most of the boring locations in the central and western areas of the site. The younger alluvium consists of loose to medium dense silty fine sands and fine to coarse sands with varying silt and gravel content. The older alluvium was encountered at the boring locations at the ground surface or beneath the younger alluvium at several of the boring locations extending to depths of 25 to 40± feet. The older alluvial soils generally consist of medium dense to very dense silty fine sands, fine to coarse sands, clayey sands, and gravelly sands with varying silt and clay content.

Previous Studies

SCG previously conducted a geotechnical feasibility study at the subject site. This study was performed in two parts (Reference Nos. 2 and 3).

As part of these studies, six (6) total borings were advanced to depths of 25 to 50± feet below existing site grades. Artificial fill soils were encountered at the ground surface at some of the borings, extending to depths of 2½ to 5½± feet below the existing site grades. The artificial fill soils generally consist of loose to medium dense silty fine sands with varying medium to coarse sand and varying clay and gravel content. Possible fill materials were encountered at one boring location comprised of medium dense silty fine sands, with varying coarse sand and fine to coarse gravel content. Soils classified as younger alluvium were encountered at the ground surface at some of the boring locations, extending to depths of 25 to 32± feet below existing site grades. The younger alluvium encountered at these boring locations generally consist of loose to medium dense silty fine sands and fine to coarse sands with varying silt and gravel content. Soils classified as older alluvium were encountered beneath the younger alluvium or fill soils at most of the boring locations. The older alluvial soils generally consist of medium dense to very dense silty fine sands, fine to coarse sands, clayey sands, and gravelly sands with varying silt and clay content. The older alluvial soils generally extend to depths of 25 to 50± feet at the boring locations. Bedrock materials of the San Timoteo Formation were encountered beneath the older alluvium at Boring No. B-5. The weathered bedrock generally consists of very dense silty fine-grained sandstone, with little medium to coarse sand and some gravel content. The bedrock materials were generally weakly cemented and highly friable. The weathered silty fine-grained sandstone bedrock extended to the maximum depth explored of 50± feet below the existing site grades at Boring No. B-5.

Groundwater

Free water was not encountered during drilling of the borings in the concurrent or previous studies. In addition, delayed readings taken within the open boreholes did not identify free water. Based on the lack of water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 50± feet at the time of the subsurface explorations.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of six (6) infiltration test borings, advanced to depths ranging from 20 to 40± feet below the existing site grades. The infiltration borings were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers and were logged during drilling by a member of our staff. The approximate locations of the infiltration test borings (identified as Infiltration Test Nos. I-1 through I-6) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of the infiltration borings, the bottom of each test boring was covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Younger alluvium was encountered at the ground surface at all infiltration test locations, extending to 27± feet below site grades at Infiltration Test No. I-6, and at least the maximum explored depth at all of the other test locations. The younger alluvium consists of loose to medium dense silty fine to coarse sands, fine to medium sandy silts, and silty fine sands. Medium dense fine sandy silts also were encountered in the younger alluvial strata.

Older alluvium was encountered beneath the younger alluvium at Infiltration Test No. I-6, extending to at least the maximum explored depth of 40± feet below existing site grades. The older alluvium consists of very dense fine sandy silts and very dense silty fine to coarse sands with trace quantities of clay. The Boring Logs, which illustrate the conditions encountered at each of the boring location as well as some of the lab testing, are included with this report.

Groundwater

Free water was not encountered during drilling of the infiltration borings. Based on the lack of water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 40± feet at the time of the subsurface exploration.

As part of our previous research, we reviewed available groundwater data in order to evaluate the historic high groundwater level for the site. The primary reference used to evaluate the groundwater depths in this area is the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The website indicates that there is one monitoring well located within the limits of the Stearns property to the northwest of the Diocese site. Water level readings within this monitoring well indicates a high groundwater level of 84± feet in April 1999.

Infiltration Testing

The infiltration testing was performed in general accordance with the Riverside County guidelines: Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A.

Pre-soaking

In accordance with the county infiltration standards all of the infiltration test borings were pre-soaked prior to the infiltration testing. The pre-soaking process consisted of filling the test borings by inverting a full 5-gallon bottle of clear water supported over each hole so that the water level reaches a level of at least 5 times the hole's radius above the gravel at the bottom of each hole. The pre-soaking was completed after all of the water had percolated through each test hole or after 15 hours since initiating the pre-soak. Based on the results of the pre-soaking process, different infiltration procedures were used during the infiltration testing at the infiltration boring locations.

Infiltration Testing

Following the pre-soaking process of the infiltration test borings, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of each test hole, and less than or equal to the water level used during the pre-soaking process. In accordance with the Riverside County guidelines, since "non-sandy soils" (where 6 inches of water did not infiltrate into the surrounding soils for two consecutive 25-minute readings) were encountered at the bottom of Infiltration Test Boring Nos. I-3 through I-6, readings were taken at 30-minute intervals. The remaining infiltration test borings encountered "sandy soils" (where 6 inches of water infiltrated into the surrounding soils for two consecutive 25-minute readings), therefore readings were taken at 10-minute intervals. After each reading, the borings were refilled to the correct water level above the gravel at the bottom of each test hole. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates from the test are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used as the design infiltration rate. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-1	29	ALLUVIUM: Brown Silty fine to medium Sand	2.3
I-2	27	ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel	1.5
I-3	20	ALLUVIUM: Brown Silty fine to coarse Sand	0.1
I-4	25½	ALLUVIUM: Brown Silty fine to coarse Sand	0.1
I-5	40	ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel	1.4
I-6	40	OLDER ALLUVIUM: Brown Silty fine to coarse Sand, trace Clay	0.2

Design Recommendations

Six (6) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations are 0.1 to 2.3 inches per hour. Based on the results of infiltration tests, we recommend the following:

Infiltration System	Infiltration System Location	Infiltration System Type	Design Infiltration Rate (inches/hour)
"A"	Northern	Chamber	1.9*
"B"	Northeastern	Chamber	**0.1 (Infiltration Not Recommended)**
"C"	Eastern	Chamber	0.8*

*NOTE: Infiltration rates based on an average infiltration rate.

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the infiltration basin or chamber bottom. It should be confirmed that the soils at the base of the proposed infiltration system corresponds with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of the proposed storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Calimesa and/or County of Riverside guidelines. **However, it is recommended that the systems be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the effective infiltration rates. It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rate recommended above assumes that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rate is based on infiltration testing at six (6) discrete locations, and the overall infiltration rate of the storm water infiltration system could vary considerably.

Infiltration Rate Considerations

The infiltration rate presented herein was determined in accordance with the Riverside County guidelines and is considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the basins. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Infiltration Chamber Maintenance

The proposed project may include infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the chamber subgrade soils. **Therefore, a formal chamber maintenance program**

should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party’s sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

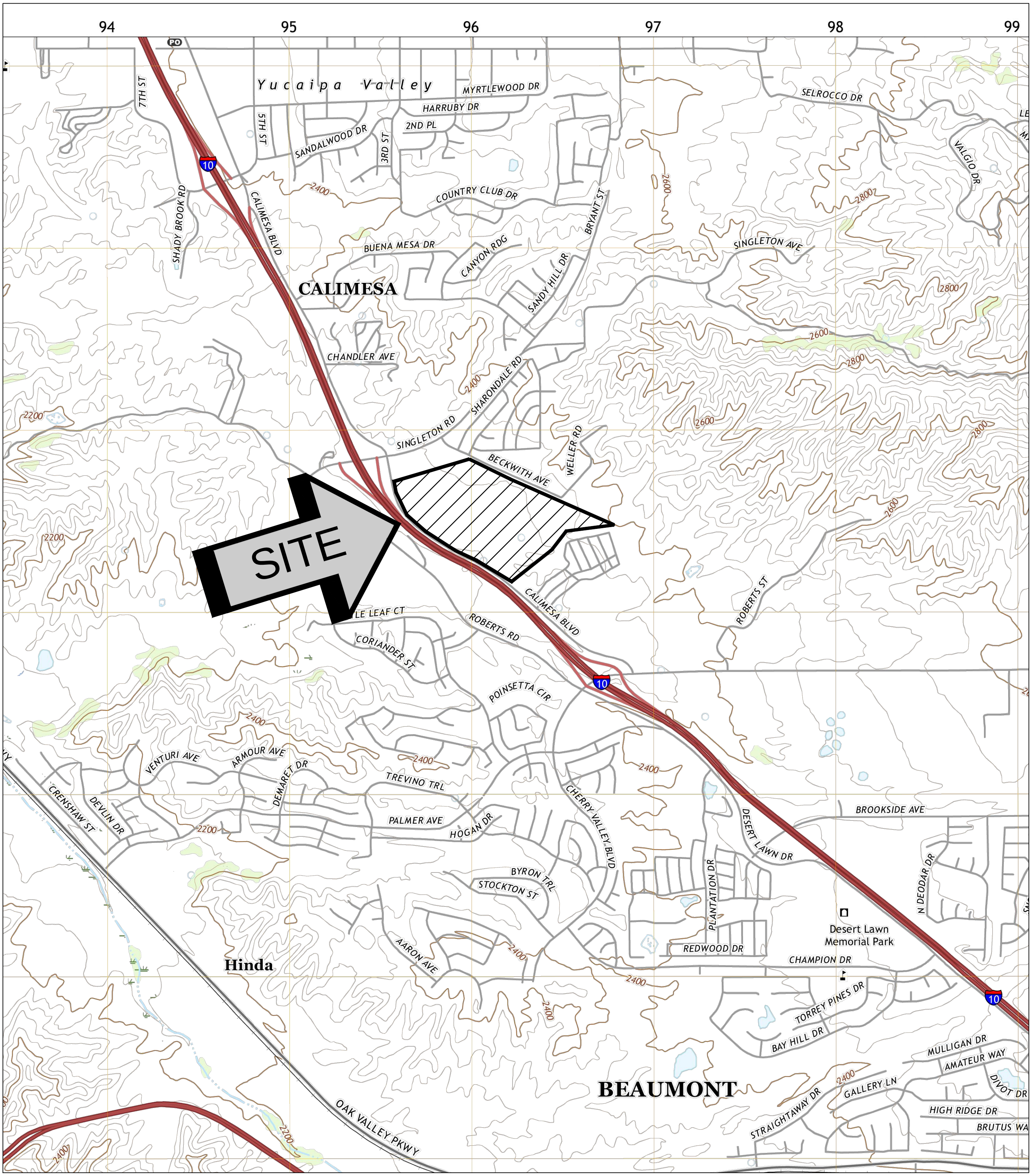
Ryan Bremer
Staff Geologist

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER ROBERT TRAZO No. 2655 GEOTECHNICAL STATE OF CALIFORNIA

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (10 pages)
Infiltration Test Results Spreadsheets (6 pages)
Grain Size Distribution Graphs (6 pages)



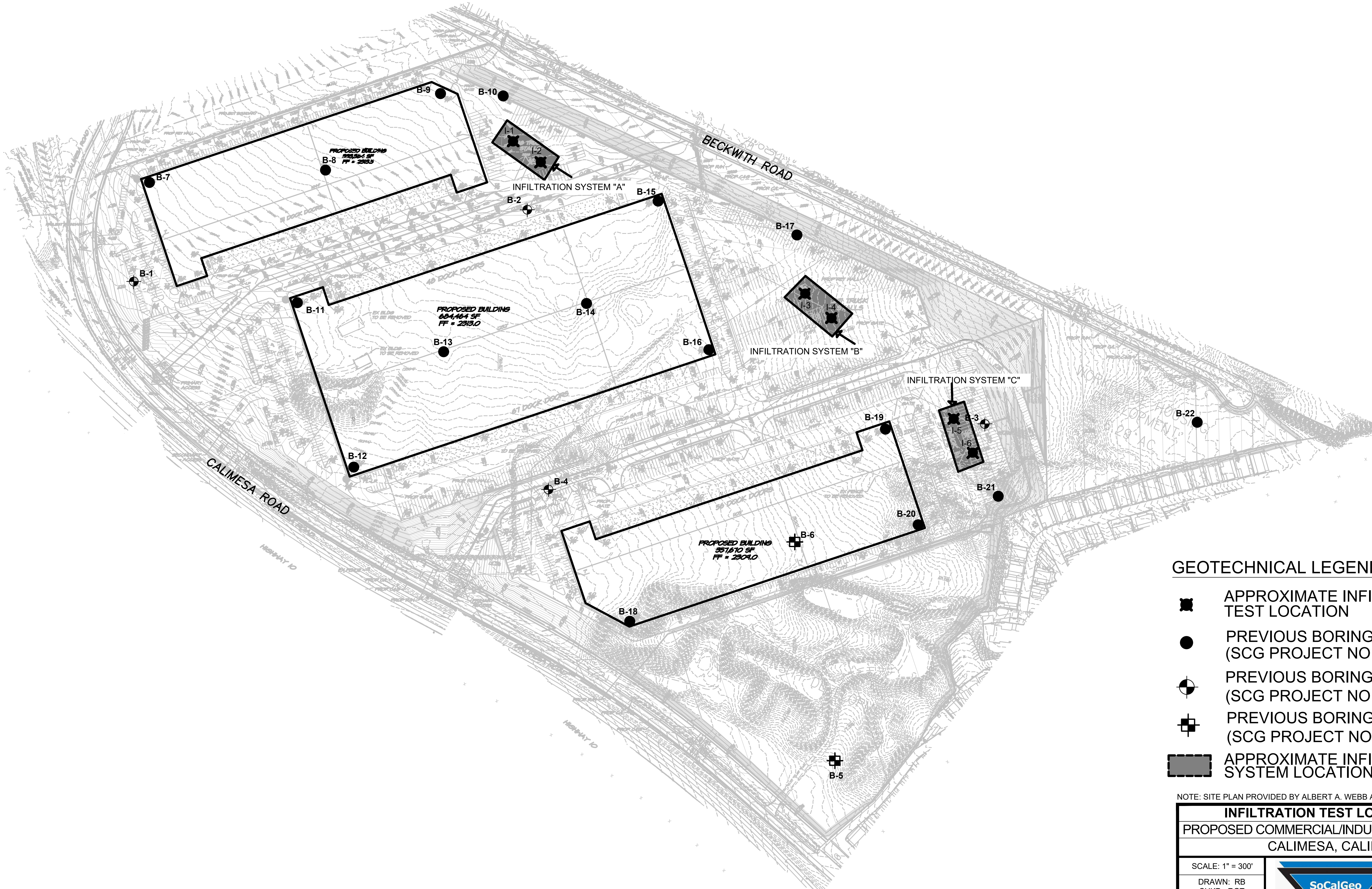
SOURCE: USGS TOPOGRAPHIC MAP OF THE EL CASCO QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2022.

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

SCALE: 1" = 2500'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: AG CHKD: RGT	
SCG PROJECT 20G122-3	
PLATE 1	



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 20G122-2)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 20G122-1)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 20G123-1)
- APPROXIMATE INFILTRATION SYSTEM LOCATION

NOTE: SITE PLAN PROVIDED BY ALBERT A. WEBB ASSOCIATES

INFILTRATION TEST LOCATION PLAN

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

CALIMESA, CALIFORNIA

SCALE: 1" = 300'

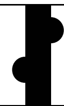
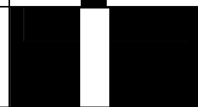
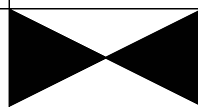
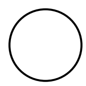
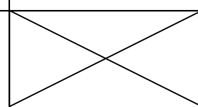
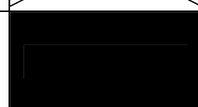
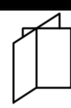
DRAWN: RB
CHKD: RGT

SCG PROJECT
20G122-3

PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry							
5	X	18					1					
					Brown fine to medium Sandy Silt, trace coarse Sand, medium dense-damp							
10	X	12					7					
					Brown Silty fine to medium Sand, medium dense-damp							
15	X	12					7					
20	X	11			@ 18½ feet, trace coarse Sand		5					
					Brown Silty fine to coarse Sand, little fine to coarse Gravel, medium dense-dry to damp							
25	X	21					3					
					Brown Silty fine to medium Sand, medium dense-moist							
	X	13					11			43.7		

Boring Terminated at 29'

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown Silty fine to medium Sand, loose-damp							
5	X	9					4					
10	X	11			@ 8½ feet, trace coarse Sand, medium dense		4					
					Brown Silty fine Sand, little medium Sand, trace coarse Sand, loose-moist							
15	X	9					12					
					Brown fine Sandy Silt to Silty fine Sand, medium dense-moist							
20	X	15					10					
					Brown Silty fine Sand, trace medium Sand, medium dense-moist							
25	X	18					10					
	X	17			Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp		7			35.4		
					Boring Terminated at 27'							

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

BORING NO. I-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown fine to medium Sandy Silt, trace coarse Sand, medium dense-damp to moist							
5	X	20					4					
10	X	13					4					
15	X	9			@ 13½ feet, loose		10					
					Brown Silty fine to coarse Sand, loose-moist							
20	X	8					9			45.2		
					Boring Terminated at 20'							

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

BORING NO. I-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					<u>ALLUVIUM:</u> Brown Silty fine to medium Sand, trace coarse Sand, loose to medium dense-damp							
5	X	8					4					
10	X	14					7					
					Brown Silty fine to coarse Sand, trace fine Gravel, loose-damp							
15	X	8					4					
					Brown fine Sandy Silt, trace to little Clay, medium dense-moist							
20	X	10					9					
					Brown Silty fine to coarse Sand, loose-moist							
25	X	7					10			39.2		
					Boring Terminated at 25½'							

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

BORING NO. I-5

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, loose-damp							
5	X	9					4					
10	X	9					6					
12					Brown fine to coarse Sandy Silt to Silty fine to coarse Sand, trace fine to coarse Sand, medium dense-damp							
15	X	13					6					
17					Brown Silty fine to coarse Sand, medium dense-damp							
20	X	18					4					
22					Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
25	X	13					8					
27					Brown fine Sandy Silt, trace medium Sand, loose-very moist							
30	X	9					14					
32					Brown fine to medium Sandy Silt, medium dense-moist							
34	X	14					14					

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG **PLATE B-5a**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-5

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION (Continued)	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown fine to medium Sandy Silt, medium dense-moist							
					Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-moist							
	X	12					10			37.9		
40												
					Boring Terminated at 40'							

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-6

JOB NO.: 20G122-3	DRILLING DATE: 10/14/22	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: ---
LOCATION: Calimesa, California	LOGGED BY: Ryan Bremer	READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown fine Sandy Silt, little medium to coarse Sand, loose to medium dense-damp to moist							
5	X	16					5					
10	X	7					9					
15	X	8			@ 13½ feet, trace to little medium to coarse Sand, trace fine Gravel		10					
20	X	7			@ 18½ feet, no fine Gravel		10					
25	X	15			@ 23½ feet, trace to little Clay, trace fine Gravel		11					
					OLDER ALLUVIUM: Brown fine Sandy Silt, trace medium to coarse Sand, very dense-moist							
30	X	71/9"					9					
	X	81/11"					9					

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-6

JOB NO.: 20G122-3
PROJECT: Proposed C/I Development
LOCATION: Calimesa, California

DRILLING DATE: 10/14/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown fine Sandy Silt, trace medium to coarse Sand, very dense-moist							
					Brown Silty fine to coarse Sand, trace Clay, very dense-damp							
	X	50/4"					5			45.0		
40												
					Boring Terminated at 40'							

TBL 20G122-3.GPJ SOCALGEO.GDT 11/16/22

TEST BORING LOG

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	29.00	(ft)

Infiltration Test Hole	I-1

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	9:23 AM	25.00	25.80	15.72	YES	SANDY SOILS
	Final	9:48 AM		27.11			
2	Initial	9:54 AM	25.00	25.80	14.40	YES	SANDY SOILS
	Final	10:19 AM		27.00			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	10:28 AM	10.00	25.80	0.55	2.93	2.13
	Final	10:38 AM		26.35			
2	Initial	10:40 AM	10.00	25.80	0.58	2.91	2.26
	Final	10:50 AM		26.38			
3	Initial	10:51 AM	10.00	25.80	0.56	2.92	2.18
	Final	11:01 AM		26.36			
4	Initial	11:02 AM	10.00	25.80	0.58	2.91	2.26
	Final	11:12 AM		26.38			
5	Initial	11:14 AM	10.00	25.80	0.60	2.90	2.35
	Final	11:24 AM		26.40			
6	Initial	11:24 AM	10.00	25.80	0.59	2.91	2.30
	Final	11:34 AM		26.39			

Per County Standards, Infiltration Rate calculated as follows:

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

Where: Q = Infiltration Rate (in inches per hour)

ΔH = Change in Height (Water Level) over the time interval

r = Test Hole (Borehole) Radius

Δt = Time Interval

H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	27.05	(ft)

Infiltration Test Hole	I-2

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	10:46 AM	25.00	24.50	14.76	YES	SANDY SOILS
	Final	11:11 AM		25.73			
2	Initial	11:17 AM	25.00	24.50	13.80	YES	SANDY SOILS
	Final	11:42 AM		25.65			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	11:52 AM	10.00	24.50	0.40	2.35	1.91
	Final	12:02 PM		24.90			
2	Initial	12:03 PM	10.00	24.50	0.36	2.37	1.70
	Final	12:13 PM		24.86			
3	Initial	12:15 PM	10.00	24.50	0.34	2.38	1.60
	Final	12:25 PM		24.84			
4	Initial	12:26 PM	10.00	24.50	0.32	2.39	1.50
	Final	12:36 PM		24.82			
5	Initial	12:37 PM	10.00	24.50	0.31	2.40	1.45
	Final	12:47 PM		24.81			
6	Initial	12:48 PM	10.00	24.50	0.31	2.40	1.45
	Final	12:58 PM		24.81			

Per County Standards, Infiltration Rate calculated as follows:

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

Where:
- Q = Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	20.10	(ft)

Infiltration Test Hole	I-3

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	9:00 AM	25.00	17.00	1.20	NO	NON-SANDY SOILS
	Final	9:25 AM		17.10			
2	Initial	9:30 AM	25.00	17.00	1.80	NO	NON-SANDY SOILS
	Final	9:55 AM		17.15			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	10:00 AM	30.00	17.00	0.08	3.06	0.10
	Final	10:30 AM		17.08			
2	Initial	10:30 AM	30.00	17.00	0.08	3.06	0.10
	Final	11:00 AM		17.08			
3	Initial	11:00 AM	30.00	17.00	0.07	3.07	0.09
	Final	11:30 AM		17.07			
4	Initial	11:30 AM	30.00	17.00	0.08	3.06	0.10
	Final	12:00 PM		17.08			
5	Initial	12:00 PM	30.00	17.00	0.07	3.07	0.09
	Final	12:30 PM		17.07			
6	Initial	12:30 PM	30.00	17.00	0.07	3.07	0.09
	Final	1:00 PM		17.07			

Per County Standards, Infiltration Rate calculated as follows:

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

Where:
- Q = Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	24.70	(ft)

Infiltration Test Hole	I-4

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	8:48 AM	25.00	22.00	4.32	NO	NON-SANDY SOILS
	Final	9:13 AM		22.36			
2	Initial	9:18 AM	25.00	22.00	0.60	NO	NON-SANDY SOILS
	Final	9:43 AM		22.05			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	9:50 AM	30.00	22.00	0.07	2.67	0.10
	Final	10:20 AM		22.07			
2	Initial	10:20 AM	30.00	22.00	0.05	2.68	0.07
	Final	10:50 AM		22.05			
3	Initial	10:50 AM	30.00	22.00	0.06	2.67	0.08
	Final	11:20 AM		22.06			
4	Initial	11:20 AM	30.00	22.00	0.07	2.67	0.10
	Final	11:50 AM		22.07			
5	Initial	11:51 AM	30.00	22.00	0.06	2.67	0.08
	Final	12:21 PM		22.06			
6	Initial	12:21 PM	30.00	22.00	0.07	2.67	0.10
	Final	12:51 PM		22.07			

Per County Standards, Infiltration Rate calculated as follows:

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

Where: Q = Infiltration Rate (in inches per hour)

ΔH = Change in Height (Water Level) over the time interval

r = Test Hole (Borehole) Radius

Δt = Time Interval

H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	40.00	(ft)

Infiltration Test Hole	I-5

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	7:05 AM	25.00	37.00	13.80	YES	SANDY SOILS
	Final	7:30 AM		38.15			
2	Initial	7:35 AM	25.00	37.00	9.84	YES	SANDY SOILS
	Final	8:00 AM		37.82			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	8:06 AM	10.00	37.00	0.42	2.79	1.70
	Final	8:16 AM		37.42			
2	Initial	8:17 AM	10.00	37.00	0.37	2.82	1.49
	Final	8:27 AM		37.37			
3	Initial	8:28 AM	10.00	37.00	0.35	2.83	1.40
	Final	8:38 AM		37.35			
4	Initial	8:39 AM	10.00	37.00	0.36	2.82	1.45
	Final	8:49 AM		37.36			
5	Initial	8:50 AM	10.00	37.00	0.35	2.83	1.40
	Final	9:00 AM		37.35			
6	Initial	9:00 AM	10.00	37.00	0.35	2.83	1.40
	Final	9:10 AM		37.35			

Per County Standards, Infiltration Rate calculated as follows:

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

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Commercial/Industrial Development
Project Location	Calimesa, California
Project Number	20G122-3
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	40.20	(ft)

Infiltration Test Hole	I-6

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	11:49 AM	25.00	37.40	2.52	NO	NON-SANDY SOILS
	Final	12:14 PM		37.61			
2	Initial	12:20 PM	25.00	37.40	1.92	NO	NON-SANDY SOILS
	Final	12:45 PM		37.56			

Test Data

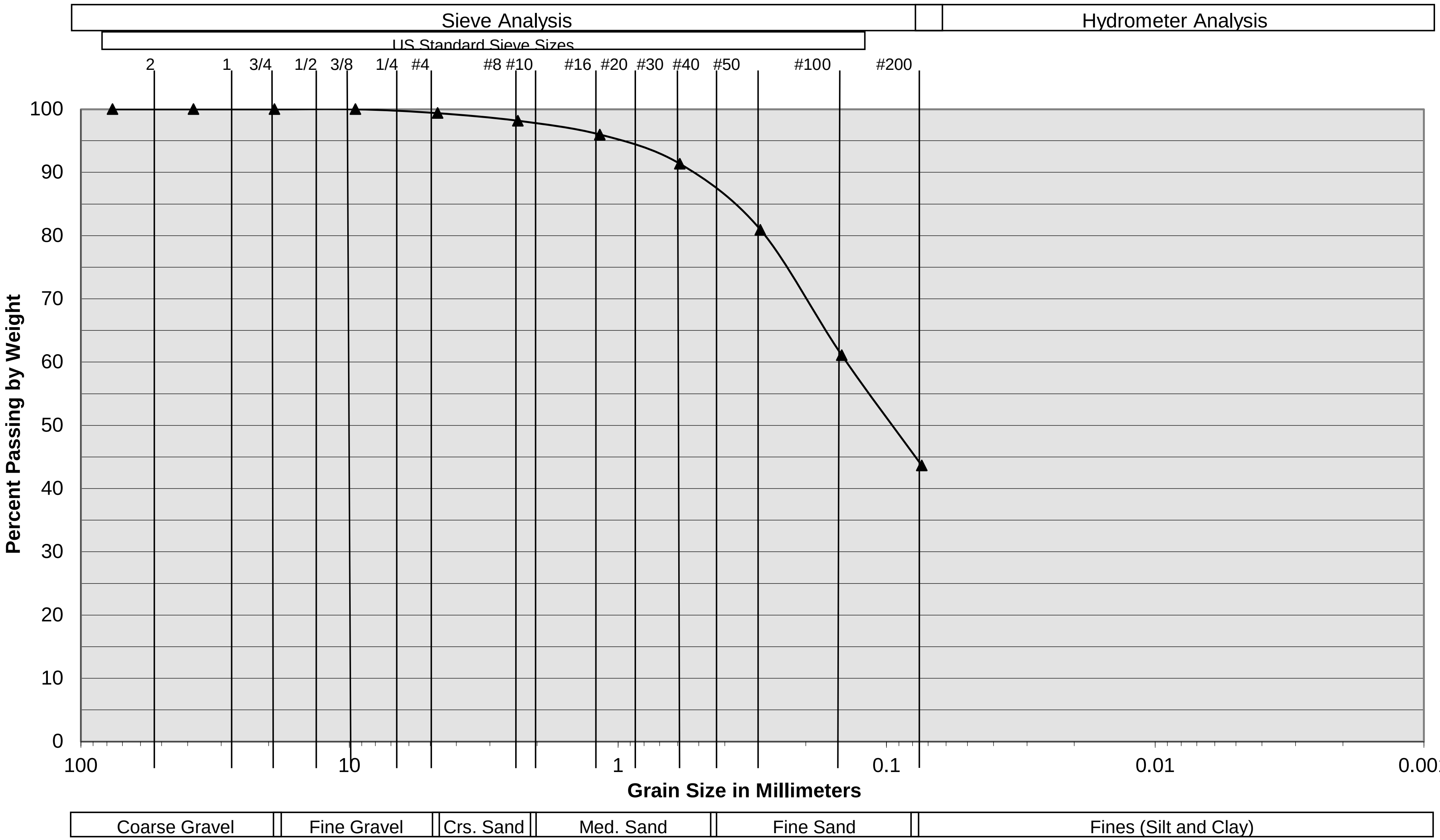
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	12:50 PM	30.00	37.40	0.19	2.71	0.26
	Final	1:20 PM		37.59			
2	Initial	1:20 PM	30.00	37.40	0.19	2.71	0.26
	Final	1:50 PM		37.59			
3	Initial	1:51 AM	30.00	37.40	0.18	2.71	0.25
	Final	2:21 AM		37.58			
4	Initial	2:21 AM	30.00	37.40	0.17	2.72	0.24
	Final	2:51 AM		37.57			
5	Initial	2:51 AM	30.00	37.40	0.15	2.73	0.21
	Final	3:21 AM		37.55			
6	Initial	3:21 AM	30.00	37.40	0.15	2.73	0.21
	Final	3:51 AM		37.55			

Per County Standards, Infiltration Rate calculated as follows:

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

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval
H_{avg} = Average Head Height over the time interval

Grain Size Distribution

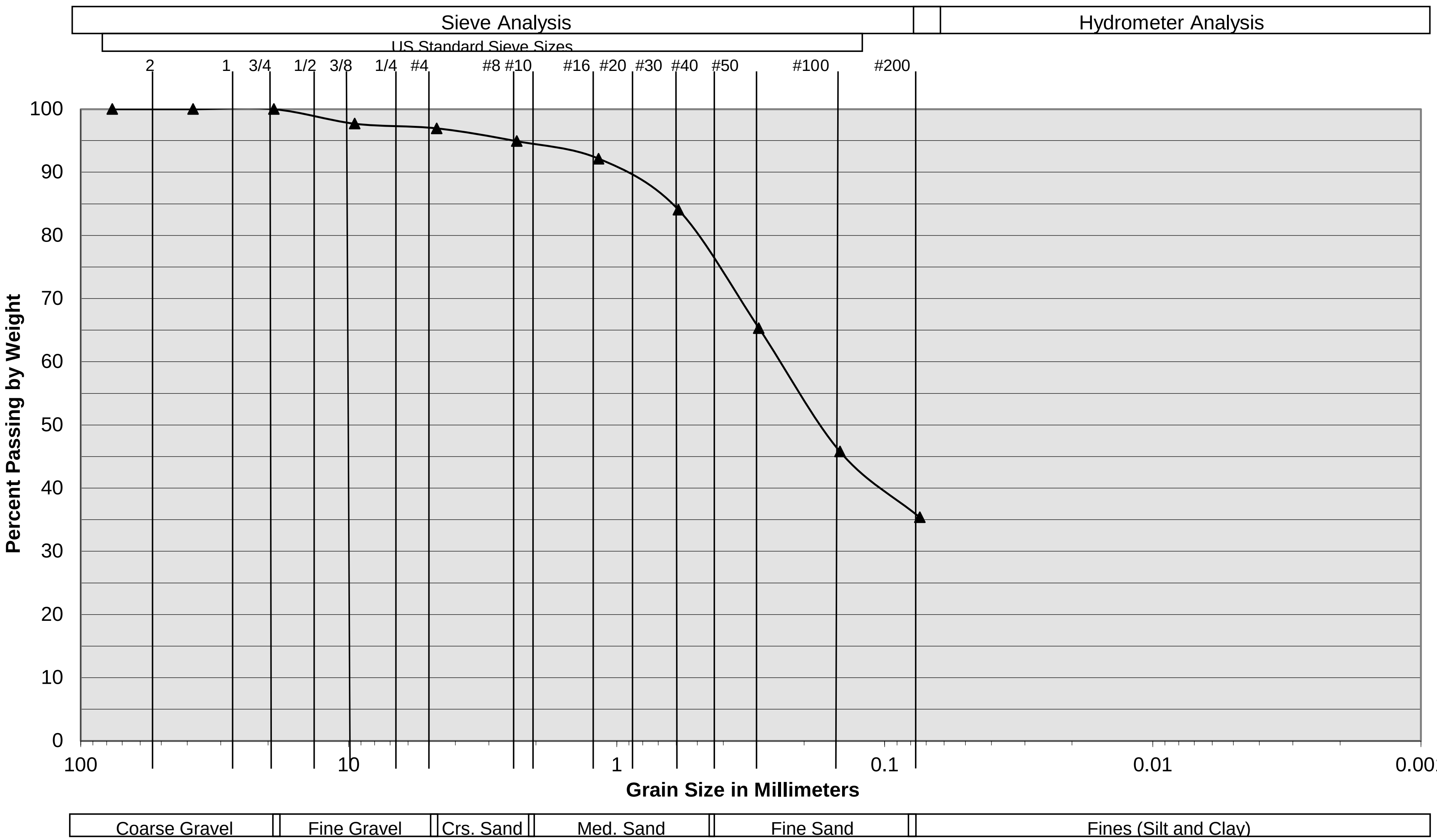


Sample Description	I-1 @ 27½ to 29 feet
Soil Classification	ALLUVIUM: Brown Silty fine to medium Sand

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

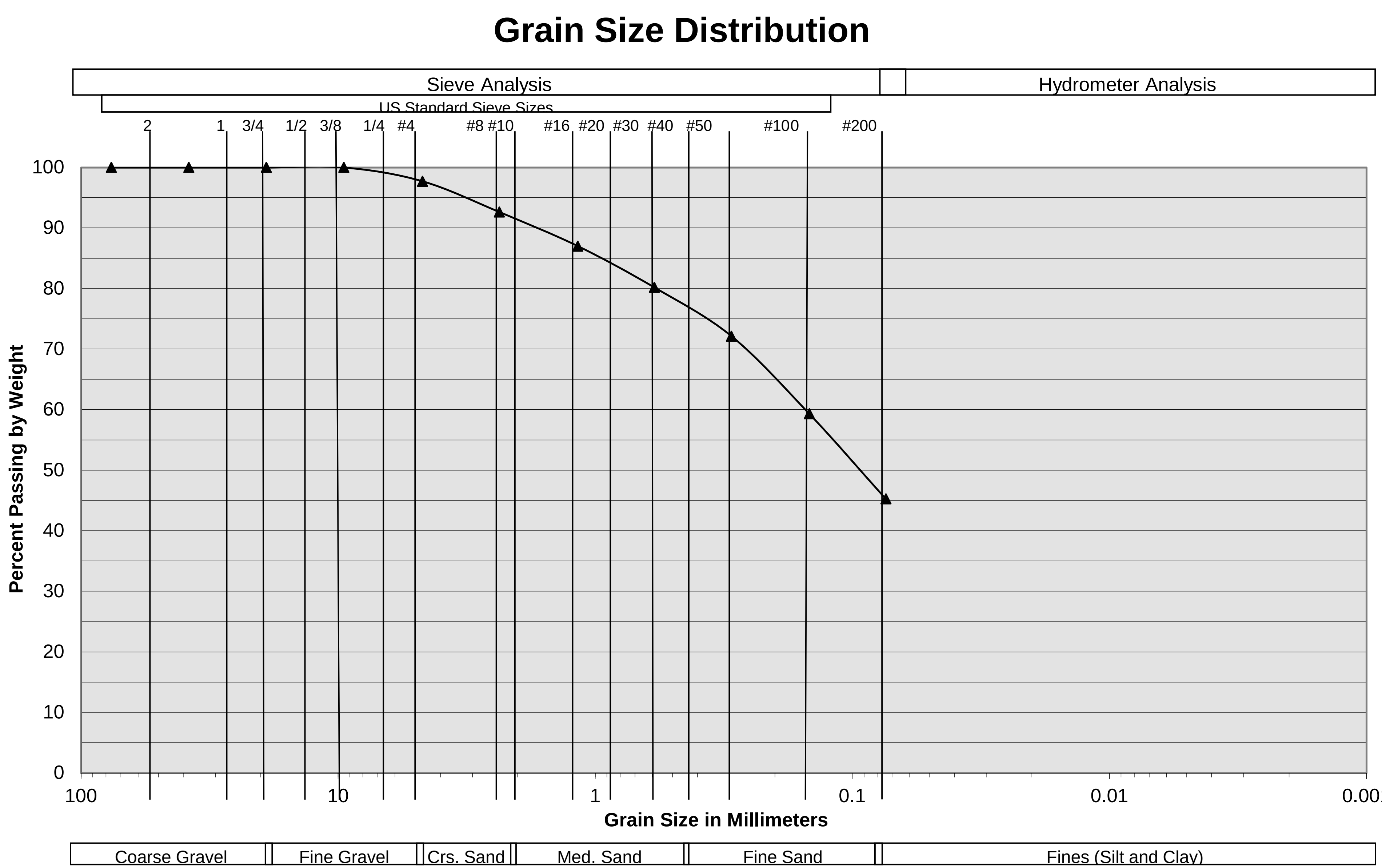
Grain Size Distribution



Sample Description	I-2 @ 25½ to 27 feet
Soil Classification	ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

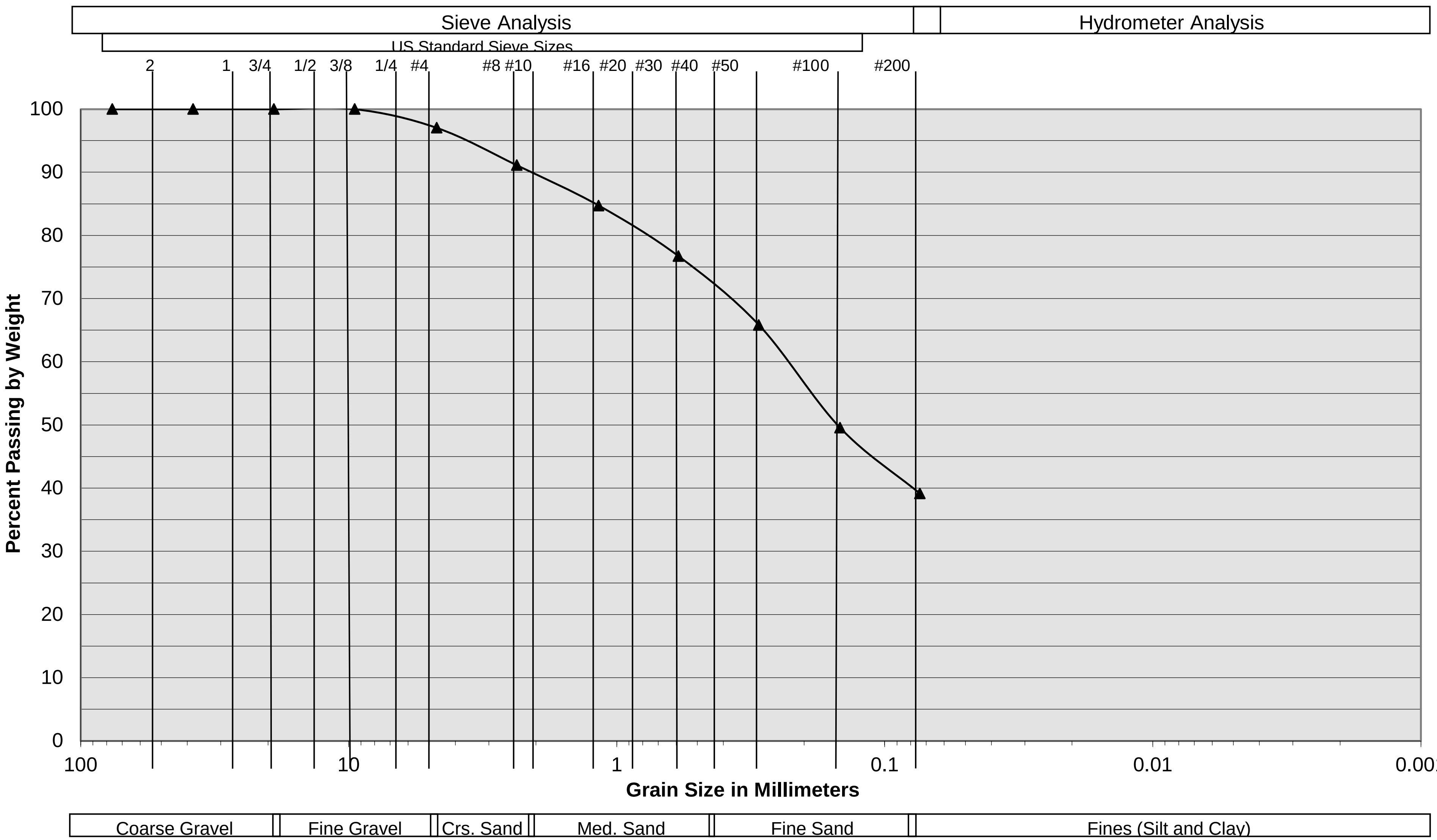


Sample Description	I-3 @ 18½ to 20 feet
Soil Classification	ALLUVIUM: Brown Silty fine to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

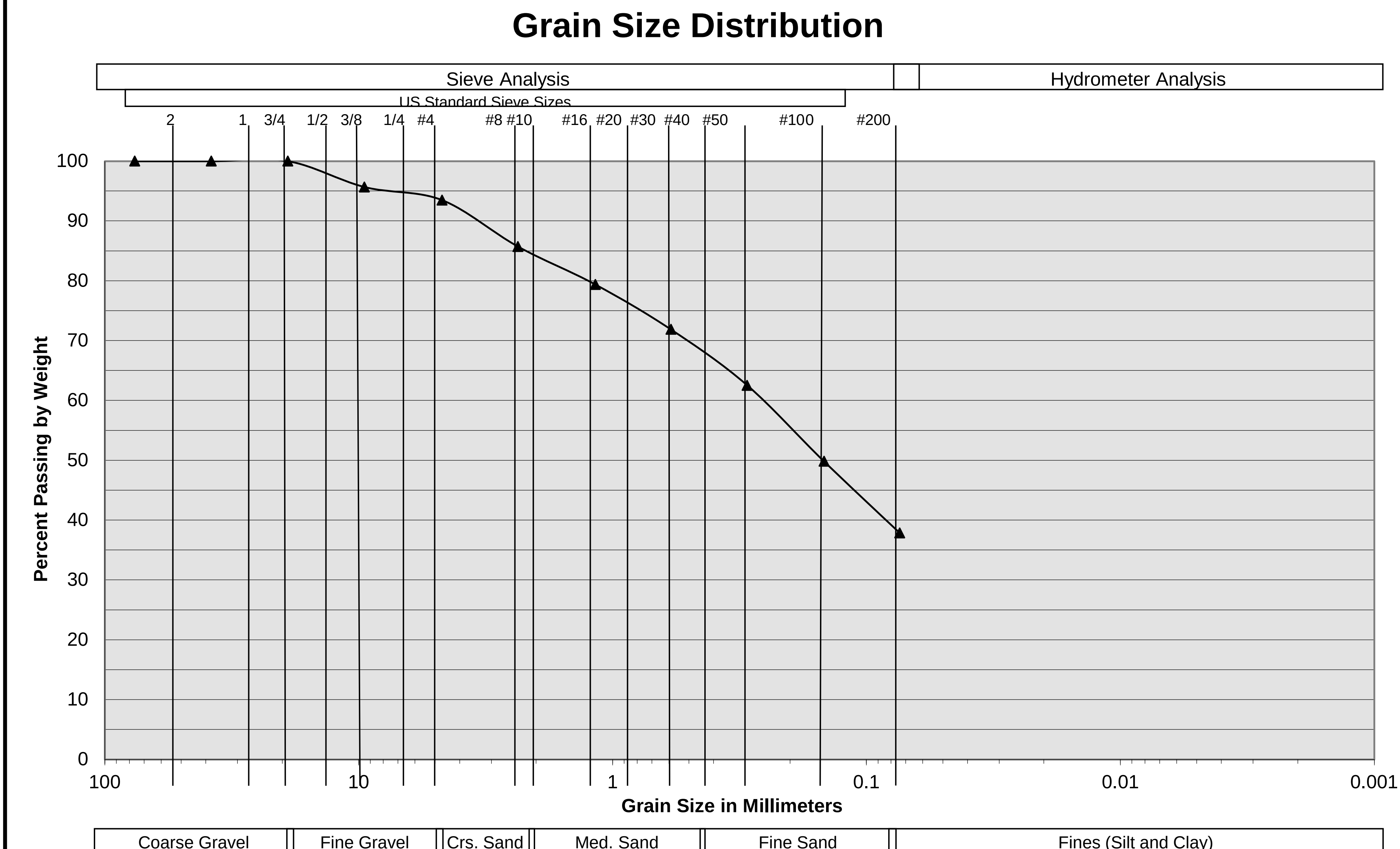
Grain Size Distribution



Sample Description	I-4 @ 24 to 25½ feet
Soil Classification	ALLUVIUM: Brown Silty fine to coarse Sand

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

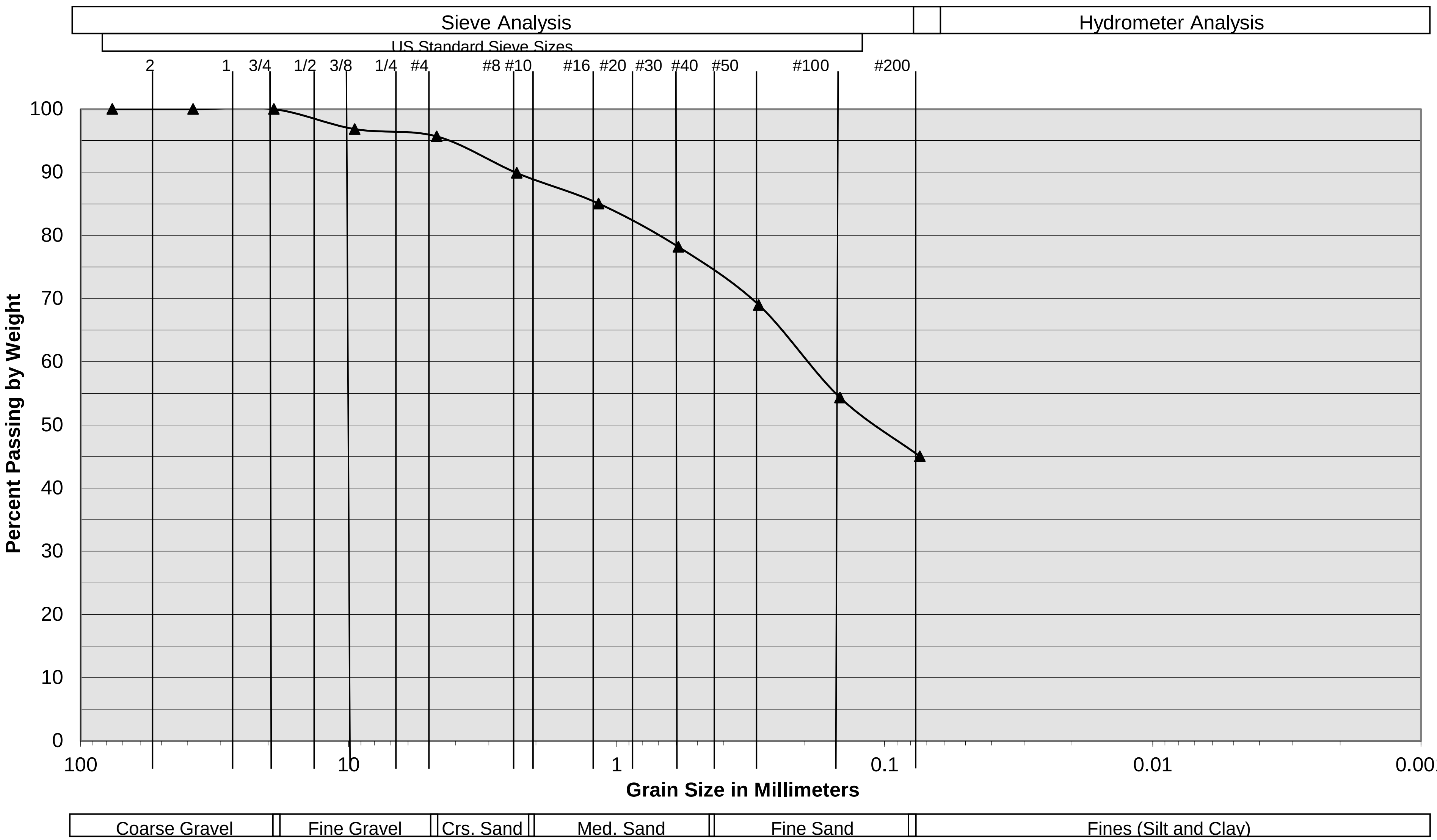


Sample Description	I-5 @ 38½ to 40 feet
Soil Classification	ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 5

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-6 @ 38½ to 40 feet
Soil Classification	OLDER ALLUVIUM: Brown Silty fine to coarse Sand, trace Clay

Proposed Commercial/Industrial Development
Calimesa, CA
Project No. 20G122-3
PLATE C- 6

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix 4: Historical Site Conditions

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

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates
Date: 6/13/2023
Designed by: ABE
Case No:
Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

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

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
Roofs	*0*	*Roofs*	*1*	*0.89*	*0*			
Hardscape	*55786*	*Concrete or Asphalt*	*1*	*0.892*	*49761.1*			
Landscape	*19729*	*Ornamental Landscaping*	*0.1*	*0.11046*	*2179.2*			
	75515	**Total**			**51940.3**	**0.20**	**0.2**	**0.3**

Notes: *1 - 8'x12' MWS Vault*

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP} (Rev. 10-2011)	Legend:	Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates — Date: 6/13/2023
Designed by: ABE — Case No:
Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

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

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*Roofs*	*62250*	*Roofs*	*1*	*0.89*	*55527*			
	Hardscape	*51920*	*Concrete or Asphalt*	*1*	*0.892*	*46312.6*			
	Landscape	*0*	*Ornamental Landscaping*	*0.1*	*0.11046*	*0*			
		114170	***Total***			**101839.6**	**0.20**	***0.5***	***0.6***

Notes: *1 - 8'x20' MWS Vault*

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates — Date: 6/13/2023

Designed by: ABE — Case No:

Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-C

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

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

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*Roofs*	*62250*	*Roofs*	*1*	*0.89*	*55527*			
	Hardscape	*58655*	*Concrete or Asphalt*	*1*	*0.892*	*52320.3*			
	Landscape	*2879*	*Ornamental Landscaping*	*0.1*	*0.11046*	*318*			
		123784	***Total***			**108165.3**	**0.20**	***0.5***	***0.6***

Notes: *1 - 8'x20' MWS Vault*

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates | Date: 6/13/2023

Designed by: ABE | Case No:

Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-D

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
Roofs	*62252*	*Roofs*	*1*	*0.89*	*55528.8*			
Hardscape	*47589*	*Concrete or Asphalt*	*1*	*0.892*	*42449.4*			
Landscape	*0*	*Ornamental Landscaping*	*0.1*	*0.11046*	*0*			
	109841	**Total**			**97978.2**	**0.20**	**0.4**	**0.5**

DMAs

Notes: *1 - 8'x16' MWS Vault*

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates — Date: 6/13/2023

Designed by: ABE — Case No:

Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-E

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.20 in/hr

Drainage Management Area Tabulation

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imprevious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
Roofs	*62252*	*Roofs*	*1*	*0.89*	*55528.8*			
Hardscape	*60449*	*Concrete or Asphalt*	*1*	*0.892*	*53920.5*			
Landscape	*6327*	*Ornamental Landscaping*	*0.1*	*0.11046*	*698.9*			
	129028	***Total***			**110148.2**	**0.20**	***0.5***	***0.6***

DMAs

Notes: *1 - 8'x20' MWS Vault*

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Albert A. Webb Associates
Date: 6/13/2023
Designed by: ABE
Case No:
Company Project Number/Name: Oak Valley North (Birtcher Calimesa) - Building 3

BMP Identification

BMP NAME / ID: DMA 3-F

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

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

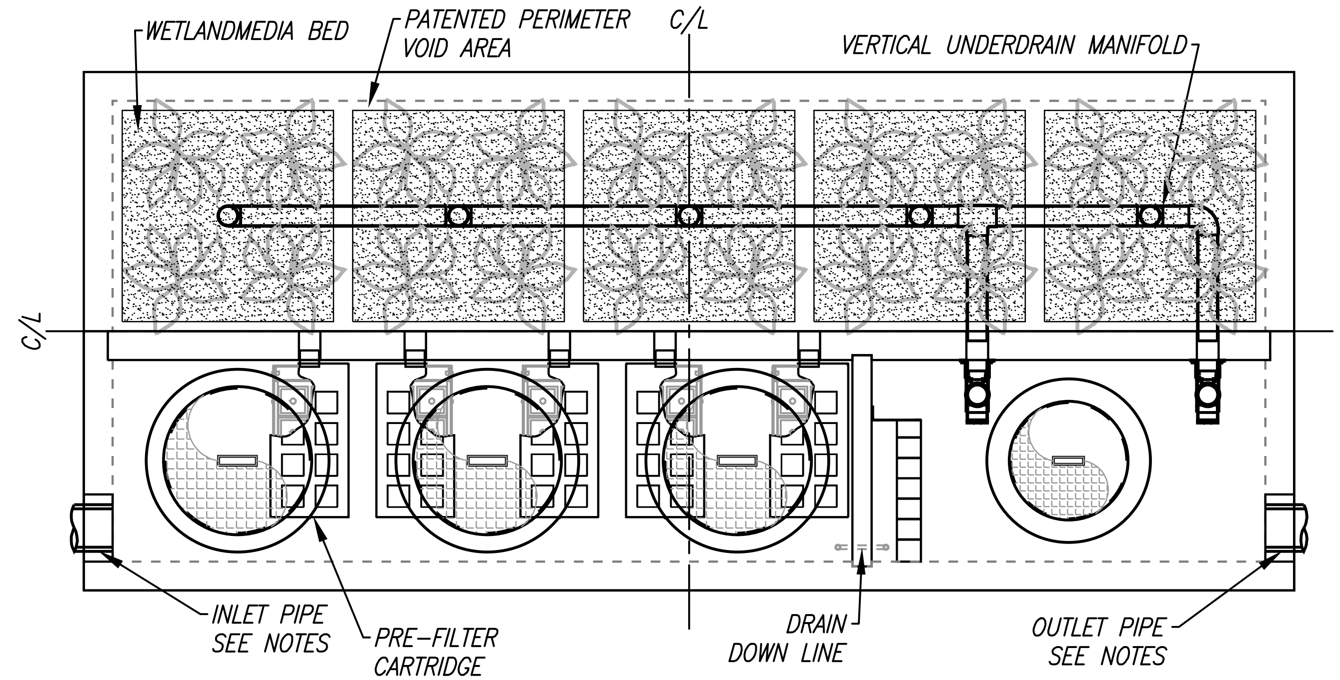
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
Hardscape	*29582*	*Concrete or Asphalt*	*1*	*0.89*	*26387.1*			
Landscape	*12623*	*Ornamental Landscaping*	*0.1*	*0.11046*	*1394.3*			
	42205	**Total**			**27781.4**	**0.20**	**0.1**	**0.2**

DMAs

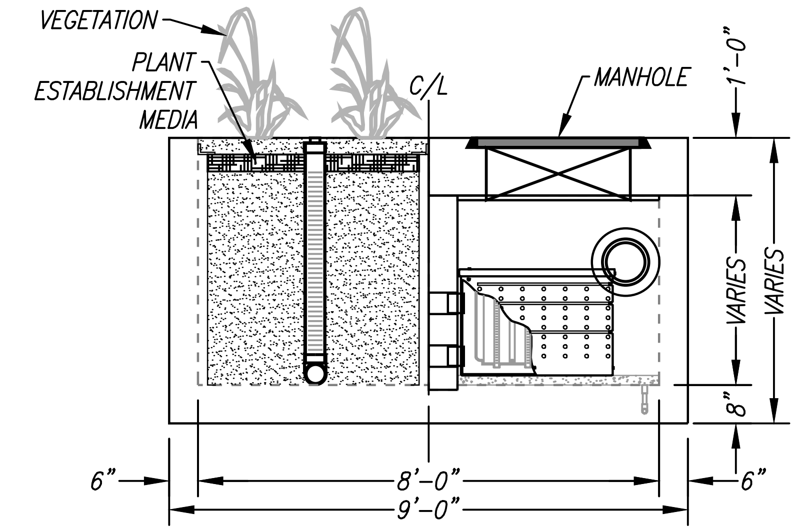
Notes: *1 - 8'x8' MWS Vault*

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



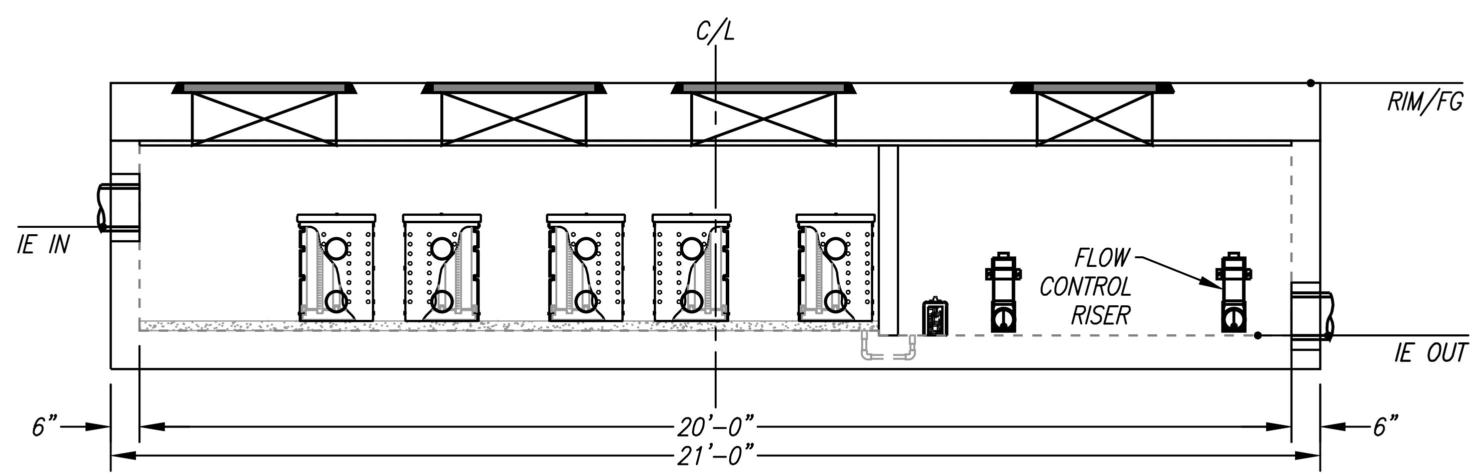
PLAN VIEW



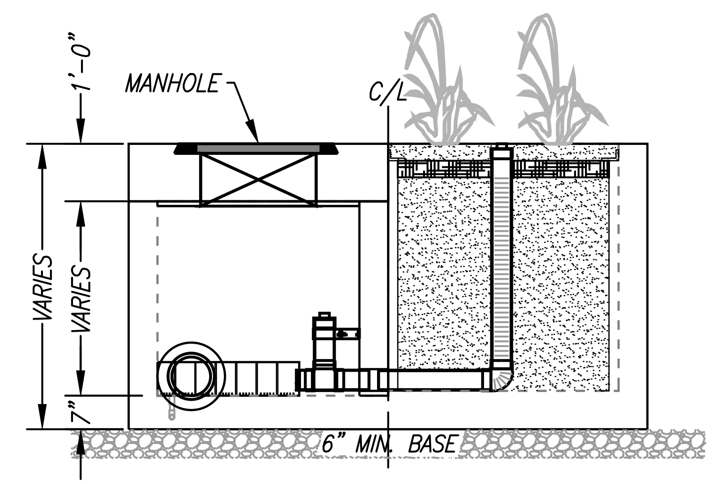
LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.



ELEVATION VIEW



RIGHT END VIEW

GENERAL NOTES

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

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

5/23/19TOLFF

Bio Clean
A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

OVERVIEW

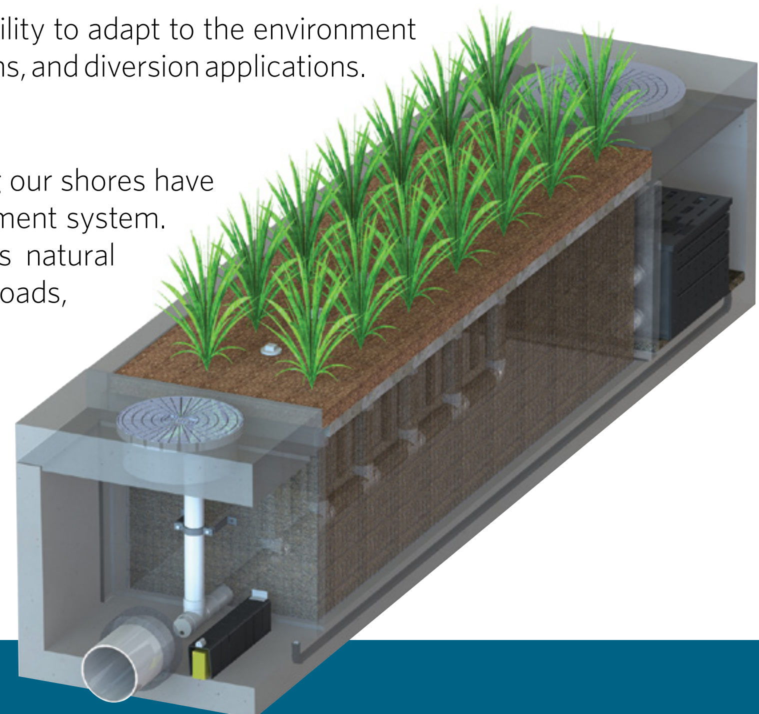
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	69% REMOVAL OF TOTAL ZINC	38% REMOVAL OF DISSOLVED COPPER	64% REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	50% REMOVAL OF TOTAL COPPER	95% REMOVAL OF MOTOR OIL	67% REMOVAL OF ORTHO PHOSPHORUS	85% REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved
The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification
The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment
The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD
Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation
The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP
Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

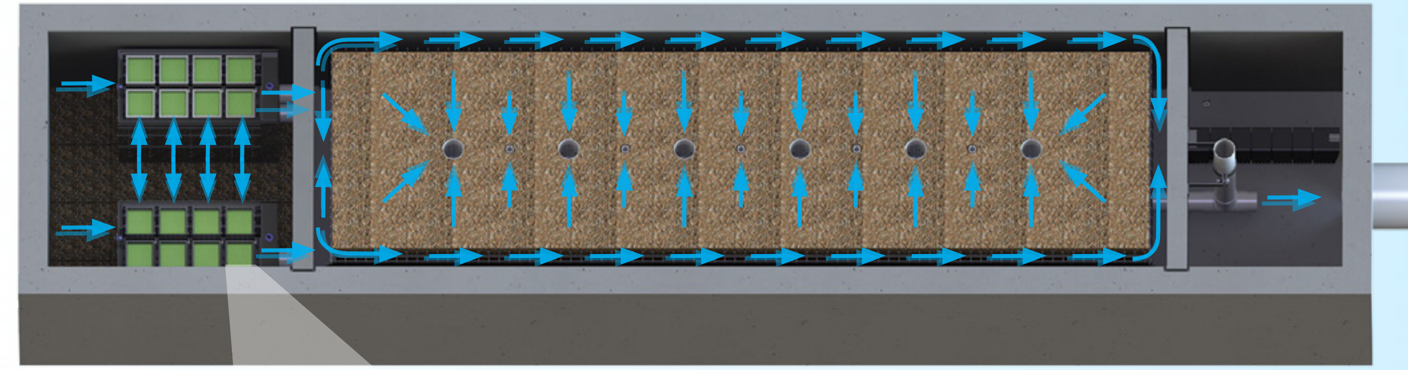


Figure 2, Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

2 BIOFILTRATION

HORIZONTAL FLOW

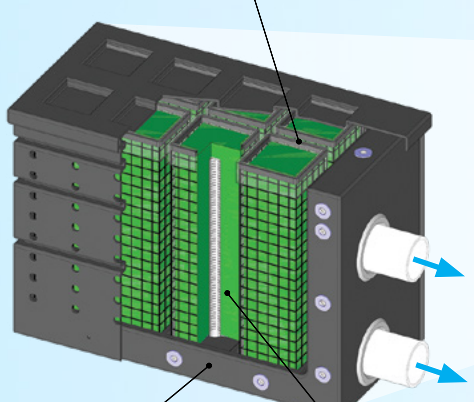
- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight



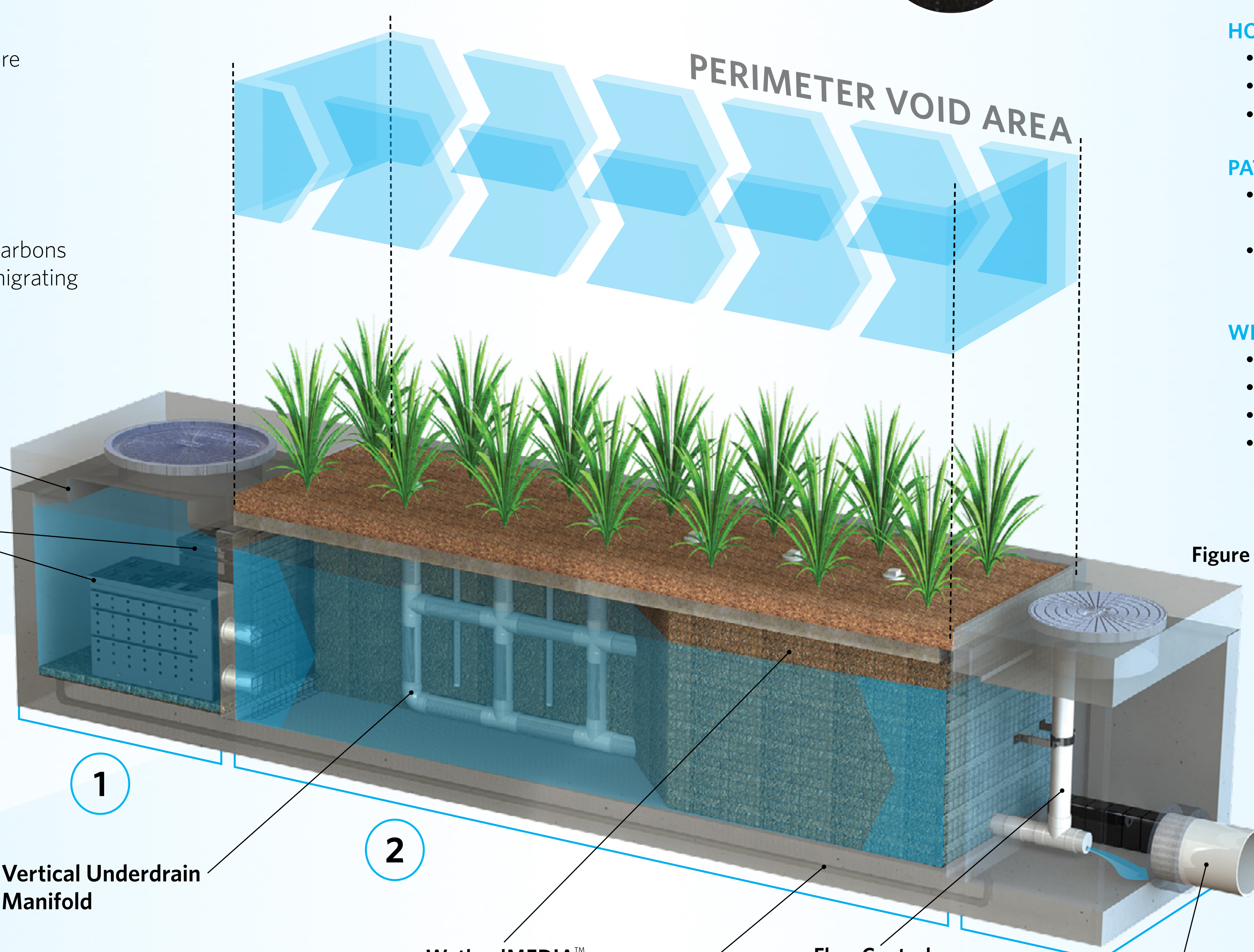


Figure 1

3 DISCHARGE

FLOW CONTROL

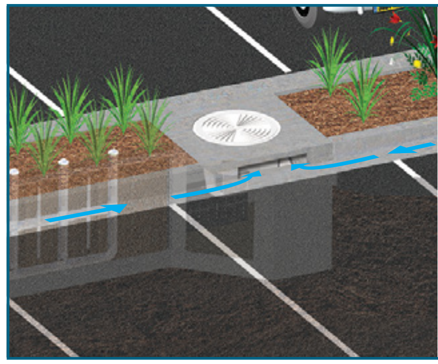
- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

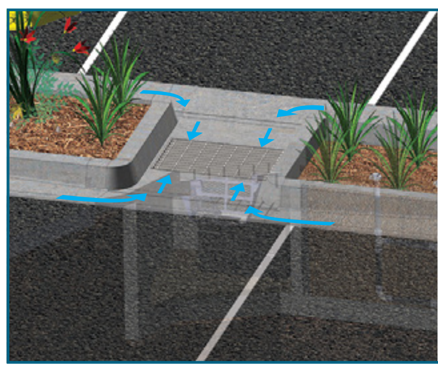
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



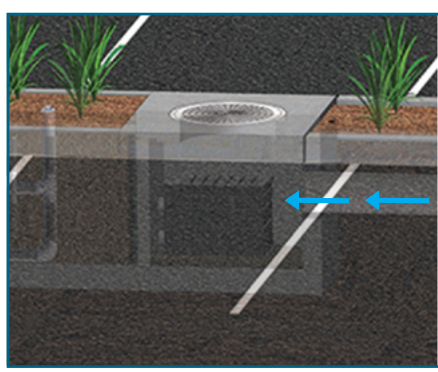
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

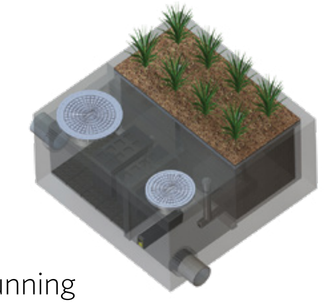
The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

DOWNSPOUT TYPE

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

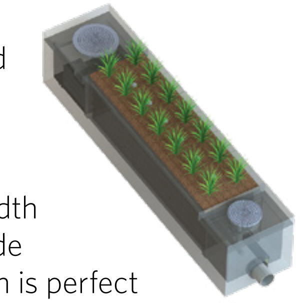
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

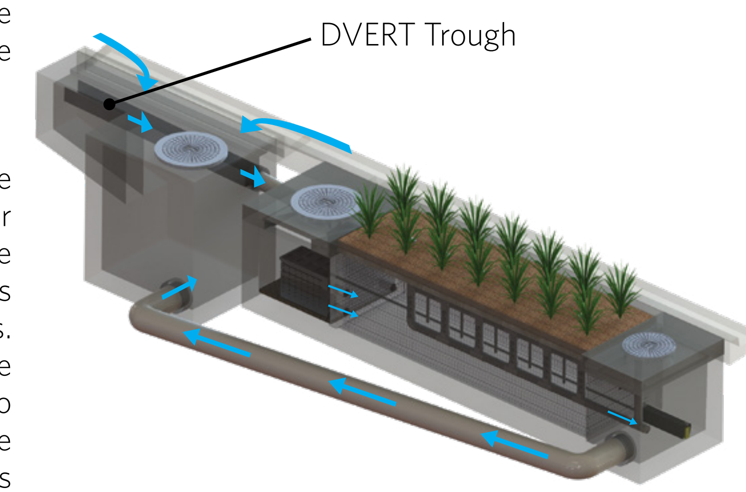
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

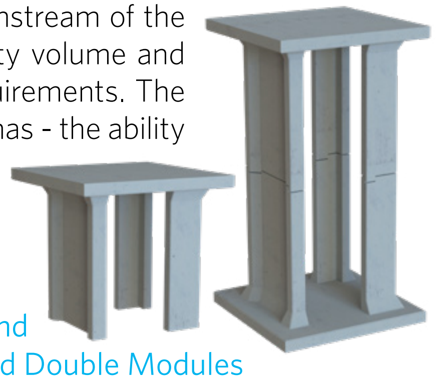
MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10′ x 20′	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE

MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

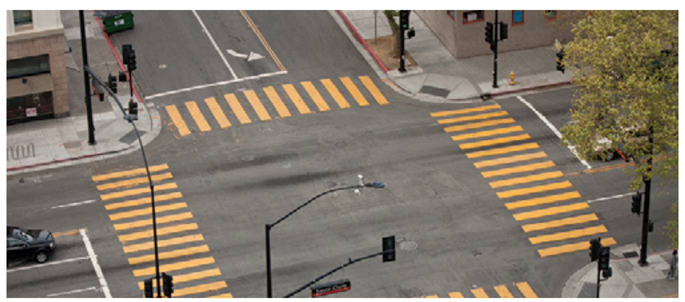
The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.

RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.

MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE

Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.

Bio Clean
A Forterra Company

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Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

EXISTING UNIT HYDROGRAPH

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

Study date 06/07/23 File: B3ONSITEPRE242.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0085 - OAK VALLEY NORTH BUILDING 3
ONSITE UNIT HYDROGRAPH ANALYSIS
EXISITNG CONDITION, 2-YEAR 24-HOUR
FN: B3ONSITEPRE242.OUT- AV

Drainage Area = 13.70(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.70(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 850.00(Ft.)
Length along longest watercourse measured to centroid = 370.00(Ft.)
Length along longest watercourse = 0.161 Mi.
Length along longest watercourse measured to centroid = 0.070 Mi.
Difference in elevation = 30.40(Ft.)
Slope along watercourse = 188.8376 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.048 Hr.
Lag time = 2.90 Min.
25% of lag time = 0.73 Min.
40% of lag time = 1.16 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.70	2.40	32.88

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.70	6.50	89.05

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.700	78.00	0.000

Total Area Entered = 13.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

78.0	60.6	0.464	0.000	0.464	1.000	0.464
					Sum (F) =	0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464
Minimum soil loss rate ((In/Hr)) = 0.232
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	172.206	36.217	5.001
2	0.167	344.413	52.541	7.254
3	0.250	516.619	9.302	1.284
4	0.333	688.825	1.568	0.216
5	0.417	861.031	0.372	0.051
			Sum = 100.000	Sum= 13.807

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.822)	0.017	0.002
2	0.17	0.07	0.019	(0.819)	0.017	0.002
3	0.25	0.07	0.019	(0.815)	0.017	0.002
4	0.33	0.10	0.029	(0.812)	0.026	0.003
5	0.42	0.10	0.029	(0.809)	0.026	0.003
6	0.50	0.10	0.029	(0.806)	0.026	0.003
7	0.58	0.10	0.029	(0.803)	0.026	0.003
8	0.67	0.10	0.029	(0.800)	0.026	0.003
9	0.75	0.10	0.029	(0.796)	0.026	0.003
10	0.83	0.13	0.038	(0.793)	0.035	0.004
11	0.92	0.13	0.038	(0.790)	0.035	0.004
12	1.00	0.13	0.038	(0.787)	0.035	0.004
13	1.08	0.10	0.029	(0.784)	0.026	0.003
14	1.17	0.10	0.029	(0.781)	0.026	0.003
15	1.25	0.10	0.029	(0.778)	0.026	0.003
16	1.33	0.10	0.029	(0.775)	0.026	0.003
17	1.42	0.10	0.029	(0.772)	0.026	0.003
18	1.50	0.10	0.029	(0.769)	0.026	0.003
19	1.58	0.10	0.029	(0.765)	0.026	0.003
20	1.67	0.10	0.029	(0.762)	0.026	0.003
21	1.75	0.10	0.029	(0.759)	0.026	0.003
22	1.83	0.13	0.038	(0.756)	0.035	0.004
23	1.92	0.13	0.038	(0.753)	0.035	0.004
24	2.00	0.13	0.038	(0.750)	0.035	0.004
25	2.08	0.13	0.038	(0.747)	0.035	0.004
26	2.17	0.13	0.038	(0.744)	0.035	0.004
27	2.25	0.13	0.038	(0.741)	0.035	0.004
28	2.33	0.13	0.038	(0.738)	0.035	0.004
29	2.42	0.13	0.038	(0.735)	0.035	0.004
30	2.50	0.13	0.038	(0.732)	0.035	0.004
31	2.58	0.17	0.048	(0.729)	0.043	0.005
32	2.67	0.17	0.048	(0.726)	0.043	0.005
33	2.75	0.17	0.048	(0.723)	0.043	0.005
34	2.83	0.17	0.048	(0.720)	0.043	0.005
35	2.92	0.17	0.048	(0.717)	0.043	0.005
36	3.00	0.17	0.048	(0.714)	0.043	0.005
37	3.08	0.17	0.048	(0.711)	0.043	0.005
38	3.17	0.17	0.048	(0.708)	0.043	0.005
39	3.25	0.17	0.048	(0.705)	0.043	0.005
40	3.33	0.17	0.048	(0.702)	0.043	0.005
41	3.42	0.17	0.048	(0.699)	0.043	0.005
42	3.50	0.17	0.048	(0.697)	0.043	0.005
43	3.58	0.17	0.048	(0.694)	0.043	0.005
44	3.67	0.17	0.048	(0.691)	0.043	0.005
45	3.75	0.17	0.048	(0.688)	0.043	0.005

46	3.83	0.20	0.058	(0.685)	0.052	0.006
47	3.92	0.20	0.058	(0.682)	0.052	0.006
48	4.00	0.20	0.058	(0.679)	0.052	0.006
49	4.08	0.20	0.058	(0.676)	0.052	0.006
50	4.17	0.20	0.058	(0.673)	0.052	0.006
51	4.25	0.20	0.058	(0.670)	0.052	0.006
52	4.33	0.23	0.067	(0.668)	0.060	0.007
53	4.42	0.23	0.067	(0.665)	0.060	0.007
54	4.50	0.23	0.067	(0.662)	0.060	0.007
55	4.58	0.23	0.067	(0.659)	0.060	0.007
56	4.67	0.23	0.067	(0.656)	0.060	0.007
57	4.75	0.23	0.067	(0.653)	0.060	0.007
58	4.83	0.27	0.077	(0.651)	0.069	0.008
59	4.92	0.27	0.077	(0.648)	0.069	0.008
60	5.00	0.27	0.077	(0.645)	0.069	0.008
61	5.08	0.20	0.058	(0.642)	0.052	0.006
62	5.17	0.20	0.058	(0.639)	0.052	0.006
63	5.25	0.20	0.058	(0.637)	0.052	0.006
64	5.33	0.23	0.067	(0.634)	0.060	0.007
65	5.42	0.23	0.067	(0.631)	0.060	0.007
66	5.50	0.23	0.067	(0.628)	0.060	0.007
67	5.58	0.27	0.077	(0.626)	0.069	0.008
68	5.67	0.27	0.077	(0.623)	0.069	0.008
69	5.75	0.27	0.077	(0.620)	0.069	0.008
70	5.83	0.27	0.077	(0.617)	0.069	0.008
71	5.92	0.27	0.077	(0.615)	0.069	0.008
72	6.00	0.27	0.077	(0.612)	0.069	0.008
73	6.08	0.30	0.086	(0.609)	0.078	0.009
74	6.17	0.30	0.086	(0.606)	0.078	0.009
75	6.25	0.30	0.086	(0.604)	0.078	0.009
76	6.33	0.30	0.086	(0.601)	0.078	0.009
77	6.42	0.30	0.086	(0.598)	0.078	0.009
78	6.50	0.30	0.086	(0.596)	0.078	0.009
79	6.58	0.33	0.096	(0.593)	0.086	0.010
80	6.67	0.33	0.096	(0.590)	0.086	0.010
81	6.75	0.33	0.096	(0.588)	0.086	0.010
82	6.83	0.33	0.096	(0.585)	0.086	0.010
83	6.92	0.33	0.096	(0.582)	0.086	0.010
84	7.00	0.33	0.096	(0.580)	0.086	0.010
85	7.08	0.33	0.096	(0.577)	0.086	0.010
86	7.17	0.33	0.096	(0.574)	0.086	0.010
87	7.25	0.33	0.096	(0.572)	0.086	0.010
88	7.33	0.37	0.106	(0.569)	0.095	0.011
89	7.42	0.37	0.106	(0.567)	0.095	0.011
90	7.50	0.37	0.106	(0.564)	0.095	0.011
91	7.58	0.40	0.115	(0.561)	0.104	0.012
92	7.67	0.40	0.115	(0.559)	0.104	0.012
93	7.75	0.40	0.115	(0.556)	0.104	0.012
94	7.83	0.43	0.125	(0.554)	0.112	0.012
95	7.92	0.43	0.125	(0.551)	0.112	0.012
96	8.00	0.43	0.125	(0.549)	0.112	0.012
97	8.08	0.50	0.144	(0.546)	0.130	0.014
98	8.17	0.50	0.144	(0.543)	0.130	0.014
99	8.25	0.50	0.144	(0.541)	0.130	0.014
100	8.33	0.50	0.144	(0.538)	0.130	0.014
101	8.42	0.50	0.144	(0.536)	0.130	0.014
102	8.50	0.50	0.144	(0.533)	0.130	0.014
103	8.58	0.53	0.154	(0.531)	0.138	0.015
104	8.67	0.53	0.154	(0.528)	0.138	0.015
105	8.75	0.53	0.154	(0.526)	0.138	0.015
106	8.83	0.57	0.163	(0.523)	0.147	0.016
107	8.92	0.57	0.163	(0.521)	0.147	0.016
108	9.00	0.57	0.163	(0.518)	0.147	0.016
109	9.08	0.63	0.182	(0.516)	0.164	0.018
110	9.17	0.63	0.182	(0.514)	0.164	0.018
111	9.25	0.63	0.182	(0.511)	0.164	0.018
112	9.33	0.67	0.192	(0.509)	0.173	0.019
113	9.42	0.67	0.192	(0.506)	0.173	0.019
114	9.50	0.67	0.192	(0.504)	0.173	0.019
115	9.58	0.70	0.202	(0.501)	0.181	0.020
116	9.67	0.70	0.202	(0.499)	0.181	0.020
117	9.75	0.70	0.202	(0.497)	0.181	0.020
118	9.83	0.73	0.211	(0.494)	0.190	0.021
119	9.92	0.73	0.211	(0.492)	0.190	0.021
120	10.00	0.73	0.211	(0.489)	0.190	0.021

121	10.08	0.50	0.144	(0.487)	0.130	0.014
122	10.17	0.50	0.144	(0.485)	0.130	0.014
123	10.25	0.50	0.144	(0.482)	0.130	0.014
124	10.33	0.50	0.144	(0.480)	0.130	0.014
125	10.42	0.50	0.144	(0.478)	0.130	0.014
126	10.50	0.50	0.144	(0.475)	0.130	0.014
127	10.58	0.67	0.192	(0.473)	0.173	0.019
128	10.67	0.67	0.192	(0.471)	0.173	0.019
129	10.75	0.67	0.192	(0.468)	0.173	0.019
130	10.83	0.67	0.192	(0.466)	0.173	0.019
131	10.92	0.67	0.192	(0.464)	0.173	0.019
132	11.00	0.67	0.192	(0.462)	0.173	0.019
133	11.08	0.63	0.182	(0.459)	0.164	0.018
134	11.17	0.63	0.182	(0.457)	0.164	0.018
135	11.25	0.63	0.182	(0.455)	0.164	0.018
136	11.33	0.63	0.182	(0.453)	0.164	0.018
137	11.42	0.63	0.182	(0.450)	0.164	0.018
138	11.50	0.63	0.182	(0.448)	0.164	0.018
139	11.58	0.57	0.163	(0.446)	0.147	0.016
140	11.67	0.57	0.163	(0.444)	0.147	0.016
141	11.75	0.57	0.163	(0.441)	0.147	0.016
142	11.83	0.60	0.173	(0.439)	0.156	0.017
143	11.92	0.60	0.173	(0.437)	0.156	0.017
144	12.00	0.60	0.173	(0.435)	0.156	0.017
145	12.08	0.83	0.240	(0.433)	0.216	0.024
146	12.17	0.83	0.240	(0.431)	0.216	0.024
147	12.25	0.83	0.240	(0.428)	0.216	0.024
148	12.33	0.87	0.250	(0.426)	0.225	0.025
149	12.42	0.87	0.250	(0.424)	0.225	0.025
150	12.50	0.87	0.250	(0.422)	0.225	0.025
151	12.58	0.93	0.269	(0.420)	0.242	0.027
152	12.67	0.93	0.269	(0.418)	0.242	0.027
153	12.75	0.93	0.269	(0.416)	0.242	0.027
154	12.83	0.97	0.278	(0.413)	0.251	0.028
155	12.92	0.97	0.278	(0.411)	0.251	0.028
156	13.00	0.97	0.278	(0.409)	0.251	0.028
157	13.08	1.13	0.326	(0.407)	0.294	0.033
158	13.17	1.13	0.326	(0.405)	0.294	0.033
159	13.25	1.13	0.326	(0.403)	0.294	0.033
160	13.33	1.13	0.326	(0.401)	0.294	0.033
161	13.42	1.13	0.326	(0.399)	0.294	0.033
162	13.50	1.13	0.326	(0.397)	0.294	0.033
163	13.58	0.77	0.221	(0.395)	0.199	0.022
164	13.67	0.77	0.221	(0.393)	0.199	0.022
165	13.75	0.77	0.221	(0.391)	0.199	0.022
166	13.83	0.77	0.221	(0.389)	0.199	0.022
167	13.92	0.77	0.221	(0.387)	0.199	0.022
168	14.00	0.77	0.221	(0.385)	0.199	0.022
169	14.08	0.90	0.259	(0.383)	0.233	0.026
170	14.17	0.90	0.259	(0.381)	0.233	0.026
171	14.25	0.90	0.259	(0.379)	0.233	0.026
172	14.33	0.87	0.250	(0.377)	0.225	0.025
173	14.42	0.87	0.250	(0.375)	0.225	0.025
174	14.50	0.87	0.250	(0.373)	0.225	0.025
175	14.58	0.87	0.250	(0.371)	0.225	0.025
176	14.67	0.87	0.250	(0.370)	0.225	0.025
177	14.75	0.87	0.250	(0.368)	0.225	0.025
178	14.83	0.83	0.240	(0.366)	0.216	0.024
179	14.92	0.83	0.240	(0.364)	0.216	0.024
180	15.00	0.83	0.240	(0.362)	0.216	0.024
181	15.08	0.80	0.230	(0.360)	0.207	0.023
182	15.17	0.80	0.230	(0.358)	0.207	0.023
183	15.25	0.80	0.230	(0.356)	0.207	0.023
184	15.33	0.77	0.221	(0.355)	0.199	0.022
185	15.42	0.77	0.221	(0.353)	0.199	0.022
186	15.50	0.77	0.221	(0.351)	0.199	0.022
187	15.58	0.63	0.182	(0.349)	0.164	0.018
188	15.67	0.63	0.182	(0.347)	0.164	0.018
189	15.75	0.63	0.182	(0.346)	0.164	0.018
190	15.83	0.63	0.182	(0.344)	0.164	0.018
191	15.92	0.63	0.182	(0.342)	0.164	0.018
192	16.00	0.63	0.182	(0.340)	0.164	0.018
193	16.08	0.13	0.038	(0.339)	0.035	0.004
194	16.17	0.13	0.038	(0.337)	0.035	0.004
195	16.25	0.13	0.038	(0.335)	0.035	0.004

196	16.33	0.13	0.038	(0.333)	0.035	0.004
197	16.42	0.13	0.038	(0.332)	0.035	0.004
198	16.50	0.13	0.038	(0.330)	0.035	0.004
199	16.58	0.10	0.029	(0.328)	0.026	0.003
200	16.67	0.10	0.029	(0.327)	0.026	0.003
201	16.75	0.10	0.029	(0.325)	0.026	0.003
202	16.83	0.10	0.029	(0.323)	0.026	0.003
203	16.92	0.10	0.029	(0.322)	0.026	0.003
204	17.00	0.10	0.029	(0.320)	0.026	0.003
205	17.08	0.17	0.048	(0.319)	0.043	0.005
206	17.17	0.17	0.048	(0.317)	0.043	0.005
207	17.25	0.17	0.048	(0.315)	0.043	0.005
208	17.33	0.17	0.048	(0.314)	0.043	0.005
209	17.42	0.17	0.048	(0.312)	0.043	0.005
210	17.50	0.17	0.048	(0.311)	0.043	0.005
211	17.58	0.17	0.048	(0.309)	0.043	0.005
212	17.67	0.17	0.048	(0.308)	0.043	0.005
213	17.75	0.17	0.048	(0.306)	0.043	0.005
214	17.83	0.13	0.038	(0.304)	0.035	0.004
215	17.92	0.13	0.038	(0.303)	0.035	0.004
216	18.00	0.13	0.038	(0.301)	0.035	0.004
217	18.08	0.13	0.038	(0.300)	0.035	0.004
218	18.17	0.13	0.038	(0.299)	0.035	0.004
219	18.25	0.13	0.038	(0.297)	0.035	0.004
220	18.33	0.13	0.038	(0.296)	0.035	0.004
221	18.42	0.13	0.038	(0.294)	0.035	0.004
222	18.50	0.13	0.038	(0.293)	0.035	0.004
223	18.58	0.10	0.029	(0.291)	0.026	0.003
224	18.67	0.10	0.029	(0.290)	0.026	0.003
225	18.75	0.10	0.029	(0.289)	0.026	0.003
226	18.83	0.07	0.019	(0.287)	0.017	0.002
227	18.92	0.07	0.019	(0.286)	0.017	0.002
228	19.00	0.07	0.019	(0.284)	0.017	0.002
229	19.08	0.10	0.029	(0.283)	0.026	0.003
230	19.17	0.10	0.029	(0.282)	0.026	0.003
231	19.25	0.10	0.029	(0.280)	0.026	0.003
232	19.33	0.13	0.038	(0.279)	0.035	0.004
233	19.42	0.13	0.038	(0.278)	0.035	0.004
234	19.50	0.13	0.038	(0.277)	0.035	0.004
235	19.58	0.10	0.029	(0.275)	0.026	0.003
236	19.67	0.10	0.029	(0.274)	0.026	0.003
237	19.75	0.10	0.029	(0.273)	0.026	0.003
238	19.83	0.07	0.019	(0.272)	0.017	0.002
239	19.92	0.07	0.019	(0.270)	0.017	0.002
240	20.00	0.07	0.019	(0.269)	0.017	0.002
241	20.08	0.10	0.029	(0.268)	0.026	0.003
242	20.17	0.10	0.029	(0.267)	0.026	0.003
243	20.25	0.10	0.029	(0.266)	0.026	0.003
244	20.33	0.10	0.029	(0.264)	0.026	0.003
245	20.42	0.10	0.029	(0.263)	0.026	0.003
246	20.50	0.10	0.029	(0.262)	0.026	0.003
247	20.58	0.10	0.029	(0.261)	0.026	0.003
248	20.67	0.10	0.029	(0.260)	0.026	0.003
249	20.75	0.10	0.029	(0.259)	0.026	0.003
250	20.83	0.07	0.019	(0.258)	0.017	0.002
251	20.92	0.07	0.019	(0.257)	0.017	0.002
252	21.00	0.07	0.019	(0.256)	0.017	0.002
253	21.08	0.10	0.029	(0.255)	0.026	0.003
254	21.17	0.10	0.029	(0.254)	0.026	0.003
255	21.25	0.10	0.029	(0.253)	0.026	0.003
256	21.33	0.07	0.019	(0.252)	0.017	0.002
257	21.42	0.07	0.019	(0.251)	0.017	0.002
258	21.50	0.07	0.019	(0.250)	0.017	0.002
259	21.58	0.10	0.029	(0.249)	0.026	0.003
260	21.67	0.10	0.029	(0.248)	0.026	0.003
261	21.75	0.10	0.029	(0.247)	0.026	0.003
262	21.83	0.07	0.019	(0.246)	0.017	0.002
263	21.92	0.07	0.019	(0.246)	0.017	0.002
264	22.00	0.07	0.019	(0.245)	0.017	0.002
265	22.08	0.10	0.029	(0.244)	0.026	0.003
266	22.17	0.10	0.029	(0.243)	0.026	0.003
267	22.25	0.10	0.029	(0.242)	0.026	0.003
268	22.33	0.07	0.019	(0.242)	0.017	0.002
269	22.42	0.07	0.019	(0.241)	0.017	0.002
270	22.50	0.07	0.019	(0.240)	0.017	0.002

271	22.58	0.07	0.019	(0.239)	0.017	0.002
272	22.67	0.07	0.019	(0.239)	0.017	0.002
273	22.75	0.07	0.019	(0.238)	0.017	0.002
274	22.83	0.07	0.019	(0.238)	0.017	0.002
275	22.92	0.07	0.019	(0.237)	0.017	0.002
276	23.00	0.07	0.019	(0.236)	0.017	0.002
277	23.08	0.07	0.019	(0.236)	0.017	0.002
278	23.17	0.07	0.019	(0.235)	0.017	0.002
279	23.25	0.07	0.019	(0.235)	0.017	0.002
280	23.33	0.07	0.019	(0.234)	0.017	0.002
281	23.42	0.07	0.019	(0.234)	0.017	0.002
282	23.50	0.07	0.019	(0.233)	0.017	0.002
283	23.58	0.07	0.019	(0.233)	0.017	0.002
284	23.67	0.07	0.019	(0.233)	0.017	0.002
285	23.75	0.07	0.019	(0.232)	0.017	0.002
286	23.83	0.07	0.019	(0.232)	0.017	0.002
287	23.92	0.07	0.019	(0.232)	0.017	0.002
288	24.00	0.07	0.019	(0.232)	0.017	0.002
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	2.9

Flood volume = Effective rainfall 0.24(In)
times area 13.7(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 2.16(In)
Total soil loss = 2.466(Ac.Ft)
Total rainfall = 2.40(In)
Flood volume = 11935.1 Cubic Feet
Total soil loss = 107416.1 Cubic Feet

Peak flow rate of this hydrograph = 0.451(CFS)

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                    24 - H O U R    S T O R M
               R u n o f f      H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5      0.0001      0.01  Q         |         |         |         |
  0+10      0.0002      0.02  Q         |         |         |         |
  0+15      0.0004      0.03  Q         |         |         |         |
  0+20      0.0006      0.03  Q         |         |         |         |
  0+25      0.0009      0.04  Q         |         |         |         |
  0+30      0.0012      0.04  Q         |         |         |         |
  0+35      0.0014      0.04  Q         |         |         |         |
  0+40      0.0017      0.04  Q         |         |         |         |
  0+45      0.0020      0.04  Q         |         |         |         |
  0+50      0.0023      0.04  Q         |         |         |         |
  0+55      0.0026      0.05  Q         |         |         |         |
  1+ 0      0.0030      0.05  Q         |         |         |         |
  1+ 5      0.0033      0.05  Q         |         |         |         |
  1+10      0.0036      0.04  Q         |         |         |         |
  1+15      0.0039      0.04  Q         |         |         |         |
  1+20      0.0042      0.04  Q         |         |         |         |
  1+25      0.0044      0.04  Q         |         |         |         |
  1+30      0.0047      0.04  Q         |         |         |         |
  1+35      0.0050      0.04  Q         |         |         |         |
  1+40      0.0053      0.04  Q         |         |         |         |
  1+45      0.0055      0.04  Q         |         |         |         |
  1+50      0.0058      0.04  Q         |         |         |         |
  1+55      0.0062      0.05  Q         |         |         |         |
  2+ 0      0.0066      0.05  Q         |         |         |         |
  2+ 5      0.0069      0.05  QV        |         |         |         |
  2+10      0.0073      0.05  QV        |         |         |         |
  2+15      0.0077      0.05  QV        |         |         |         |
  2+20      0.0080      0.05  QV        |         |         |         |
  2+25      0.0084      0.05  QV        |         |         |         |
  2+30      0.0088      0.05  QV        |         |         |         |
  2+35      0.0092      0.06  QV        |         |         |         |
  2+40      0.0096      0.06  QV        |         |         |         |
  2+45      0.0101      0.07  QV        |         |         |         |
  2+50      0.0105      0.07  QV        |         |         |         |
  2+55      0.0110      0.07  QV        |         |         |         |
  3+ 0      0.0114      0.07  QV        |         |         |         |
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3+ 5       0.0119      0.07  QV         |         |         |         |
3+10       0.0123      0.07  QV         |         |         |         |
3+15       0.0128      0.07  QV         |         |         |         |
3+20       0.0133      0.07  QV         |         |         |         |
3+25       0.0137      0.07  Q  V       |         |         |         |
3+30       0.0142      0.07  Q  V       |         |         |         |
3+35       0.0146      0.07  Q  V       |         |         |         |
3+40       0.0151      0.07  Q  V       |         |         |         |
3+45       0.0155      0.07  Q  V       |         |         |         |
3+50       0.0160      0.07  Q  V       |         |         |         |
3+55       0.0166      0.08  Q  V       |         |         |         |
4+ 0       0.0171      0.08  Q  V       |         |         |         |
4+ 5       0.0177      0.08  Q  V       |         |         |         |
4+10       0.0182      0.08  Q  V       |         |         |         |
4+15       0.0188      0.08  Q  V       |         |         |         |
4+20       0.0193      0.08  Q  V       |         |         |         |
4+25       0.0200      0.09  Q  V       |         |         |         |
4+30       0.0206      0.09  Q   V      |         |         |         |
4+35       0.0212      0.09  Q   V      |         |         |         |
4+40       0.0219      0.09  Q   V      |         |         |         |
4+45       0.0225      0.09  Q   V      |         |         |         |
4+50       0.0232      0.10  Q   V      |         |         |         |
4+55       0.0239      0.10  Q   V      |         |         |         |
5+ 0       0.0246      0.11  Q   V      |         |         |         |
5+ 5       0.0253      0.10  Q   V      |         |         |         |
5+10       0.0259      0.08  Q   V      |         |         |         |
5+15       0.0264      0.08  Q   V      |         |         |         |
5+20       0.0270      0.08  Q   V      |         |         |         |
5+25       0.0276      0.09  Q    V     |         |         |         |
5+30       0.0283      0.09  Q    V     |         |         |         |
5+35       0.0289      0.10  Q    V     |         |         |         |
5+40       0.0297      0.10  Q    V     |         |         |         |
5+45       0.0304      0.11  Q    V     |         |         |         |
5+50       0.0311      0.11  Q    V     |         |         |         |
5+55       0.0319      0.11  Q    V     |         |         |         |
6+ 0       0.0326      0.11  Q    V     |         |         |         |
6+ 5       0.0334      0.11  Q    V     |         |         |         |
6+10       0.0342      0.12  Q    V     |         |         |         |
6+15       0.0350      0.12  Q     V    |         |         |         |
6+20       0.0358      0.12  Q     V    |         |         |         |
6+25       0.0366      0.12  Q     V    |         |         |         |
6+30       0.0374      0.12  Q     V    |         |         |         |
6+35       0.0383      0.12  Q     V    |         |         |         |
6+40       0.0392      0.13  Q     V    |         |         |         |
6+45       0.0401      0.13  Q     V    |         |         |         |
6+50       0.0410      0.13  Q     V    |         |         |         |
6+55       0.0419      0.13  Q      V   |         |         |         |
7+ 0       0.0429      0.13  Q      V   |         |         |         |
7+ 5       0.0438      0.13  Q      V   |         |         |         |
7+10       0.0447      0.13  Q      V   |         |         |         |
7+15       0.0456      0.13  Q      V   |         |         |         |
7+20       0.0465      0.14  Q      V   |         |         |         |
7+25       0.0475      0.14  Q      V   |         |         |         |
7+30       0.0485      0.15  Q       V  |         |         |         |
7+35       0.0496      0.15  Q       V  |         |         |         |
7+40       0.0507      0.16  Q       V  |         |         |         |
7+45       0.0518      0.16  Q       V  |         |         |         |
7+50       0.0529      0.16  Q       V  |         |         |         |
7+55       0.0541      0.17  Q       V  |         |         |         |
8+ 0       0.0553      0.17  Q        V |         |         |         |
8+ 5       0.0565      0.18  Q        V |         |         |         |
8+10       0.0579      0.20  Q        V |         |         |         |
8+15       0.0592      0.20  Q        V |         |         |         |
8+20       0.0606      0.20  Q        V |         |         |         |
8+25       0.0620      0.20  Q         V|         |         |         |
8+30       0.0633      0.20  Q         V|         |         |         |
8+35       0.0647      0.20  Q         V|         |         |         |
8+40       0.0662      0.21  Q         V|         |         |         |
8+45       0.0676      0.21  Q         V|         |         |         |
8+50       0.0691      0.22  Q          V         |         |         |
8+55       0.0707      0.22  Q          V         |         |         |
9+ 0       0.0722      0.23  Q          V         |         |         |
9+ 5       0.0738      0.23  Q          V         |         |         |
9+10       0.0756      0.25  Q          |V        |         |         |
9+15       0.0773      0.25 |Q          |V        |         |         |
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 9+20       0.0791      0.26  |Q        |V        |         |         |
 9+25       0.0809      0.26  |Q        |V        |         |         |
 9+30       0.0827      0.26  |Q        | V       |         |         |
 9+35       0.0846      0.27  |Q        | V       |         |         |
 9+40       0.0865      0.28  |Q        | V       |         |         |
 9+45       0.0884      0.28  |Q        | V       |         |         |
 9+50       0.0903      0.28  |Q        |  V      |         |         |
 9+55       0.0923      0.29  |Q        |  V      |         |         |
10+ 0       0.0943      0.29  |Q        |  V      |         |         |
10+ 5       0.0961      0.26  |Q        |   V     |         |         |
10+10       0.0976      0.21  Q         |   V     |         |         |
10+15       0.0989      0.20  Q         |   V     |         |         |
10+20       0.1003      0.20  Q         |   V     |         |         |
10+25       0.1017      0.20  Q         |   V     |         |         |
10+30       0.1031      0.20  Q         |    V    |         |         |
10+35       0.1046      0.22  Q         |    V    |         |         |
10+40       0.1064      0.26  |Q        |    V    |         |         |
10+45       0.1082      0.26  |Q        |    V    |         |         |
10+50       0.1100      0.26  |Q        |     V   |         |         |
10+55       0.1118      0.27  |Q        |     V   |         |         |
11+ 0       0.1137      0.27  |Q        |     V   |         |         |
11+ 5       0.1155      0.26  |Q        |     V   |         |         |
11+10       0.1172      0.25  |Q        |      V  |         |         |
11+15       0.1189      0.25  |Q        |      V  |         |         |
11+20       0.1207      0.25  |Q        |      V  |         |         |
11+25       0.1224      0.25  |Q        |      V  |         |         |
11+30       0.1241      0.25  |Q        |       V |         |         |
11+35       0.1258      0.24  Q         |       V |         |         |
11+40       0.1274      0.23  Q         |       V |         |         |
11+45       0.1289      0.23  Q         |       V |         |         |
11+50       0.1305      0.23  Q         |        V|         |         |
11+55       0.1322      0.24  Q         |        V|         |         |
12+ 0       0.1338      0.24  Q         |        V|         |         |
12+ 5       0.1357      0.27  |Q        |        V|         |         |
12+10       0.1379      0.32  |Q        |         V         |         |
12+15       0.1402      0.33  |Q        |         V         |         |
12+20       0.1425      0.34  |Q        |         V         |         |
12+25       0.1448      0.34  |Q        |         |V        |         |
12+30       0.1472      0.34  |Q        |         |V        |         |
12+35       0.1497      0.35  |Q        |         |V        |         |
12+40       0.1522      0.37  |Q        |         | V       |         |
12+45       0.1547      0.37  |Q        |         | V       |         |
12+50       0.1573      0.38  |Q        |         | V       |         |
12+55       0.1600      0.38  |Q        |         |  V      |         |
13+ 0       0.1626      0.38  |Q        |         |  V      |         |
13+ 5       0.1654      0.41  |Q        |         |   V     |         |
13+10       0.1685      0.44  |Q        |         |   V     |         |
13+15       0.1716      0.45  |Q        |         |    V    |         |
13+20       0.1747      0.45  |Q        |         |    V    |         |
13+25       0.1778      0.45  |Q        |         |    V    |         |
13+30       0.1809      0.45  |Q        |         |     V   |         |
13+35       0.1836      0.40  |Q        |         |     V   |         |
13+40       0.1859      0.32  |Q        |         |      V  |         |
13+45       0.1880      0.31  |Q        |         |      V  |         |
13+50       0.1901      0.31  |Q        |         |      V  |         |
13+55       0.1922      0.31  |Q        |         |       V |         |
14+ 0       0.1943      0.31  |Q        |         |       V |         |
14+ 5       0.1965      0.32  |Q        |         |       V |         |
14+10       0.1989      0.35  |Q        |         |        V|         |
14+15       0.2014      0.36  |Q        |         |        V|         |
14+20       0.2038      0.35  |Q        |         |        V|         |
14+25       0.2062      0.35  |Q        |         |         V         |
14+30       0.2086      0.35  |Q        |         |         V         |
14+35       0.2110      0.34  |Q        |         |         V         |
14+40       0.2133      0.34  |Q        |         |         |V        |
14+45       0.2157      0.34  |Q        |         |         |V        |
14+50       0.2181      0.34  |Q        |         |         |V        |
14+55       0.2203      0.33  |Q        |         |         | V       |
15+ 0       0.2226      0.33  |Q        |         |         | V       |
15+ 5       0.2249      0.33  |Q        |         |         | V       |
15+10       0.2271      0.32  |Q        |         |         |  V      |
15+15       0.2293      0.32  |Q        |         |         |  V      |
15+20       0.2314      0.31  |Q        |         |         |  V      |
15+25       0.2336      0.31  |Q        |         |         |   V     |
15+30       0.2357      0.31  |Q        |         |         |   V     |
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15+35       0.2376      0.29  |Q        |         |         |   V     |
15+40       0.2394      0.26  |Q        |         |         |   V     |
15+45       0.2411      0.25  |Q        |         |         |    V    |
15+50       0.2429      0.25  |Q        |         |         |    V    |
15+55       0.2446      0.25  |Q        |         |         |    V    |
16+ 0       0.2463      0.25  |Q        |         |         |    V    |
16+ 5       0.2476      0.18  Q         |         |         |     V   |
16+10       0.2481      0.08  Q         |         |         |     V   |
16+15       0.2485      0.06  Q         |         |         |     V   |
16+20       0.2489      0.05  Q         |         |         |     V   |
16+25       0.2492      0.05  Q         |         |         |     V   |
16+30       0.2496      0.05  Q         |         |         |     V   |
16+35       0.2499      0.05  Q         |         |         |     V   |
16+40       0.2502      0.04  Q         |         |         |     V   |
16+45       0.2505      0.04  Q         |         |         |     V   |
16+50       0.2508      0.04  Q         |         |         |     V   |
16+55       0.2510      0.04  Q         |         |         |     V   |
17+ 0       0.2513      0.04  Q         |         |         |     V   |
17+ 5       0.2517      0.05  Q         |         |         |     V   |
17+10       0.2521      0.06  Q         |         |         |     V   |
17+15       0.2525      0.07  Q         |         |         |     V   |
17+20       0.2530      0.07  Q         |         |         |     V   |
17+25       0.2535      0.07  Q         |         |         |      V  |
17+30       0.2539      0.07  Q         |         |         |      V  |
17+35       0.2544      0.07  Q         |         |         |      V  |
17+40       0.2548      0.07  Q         |         |         |      V  |
17+45       0.2553      0.07  Q         |         |         |      V  |
17+50       0.2557      0.06  Q         |         |         |      V  |
17+55       0.2561      0.05  Q         |         |         |      V  |
18+ 0       0.2564      0.05  Q         |         |         |      V  |
18+ 5       0.2568      0.05  Q         |         |         |      V  |
18+10       0.2572      0.05  Q         |         |         |      V  |
18+15       0.2575      0.05  Q         |         |         |      V  |
18+20       0.2579      0.05  Q         |         |         |      V  |
18+25       0.2583      0.05  Q         |         |         |      V  |
18+30       0.2586      0.05  Q         |         |         |      V  |
18+35       0.2590      0.05  Q         |         |         |      V  |
18+40       0.2593      0.04  Q         |         |         |      V  |
18+45       0.2595      0.04  Q         |         |         |      V  |
18+50       0.2598      0.04  Q         |         |         |      V  |
18+55       0.2600      0.03  Q         |         |         |      V  |
19+ 0       0.2602      0.03  Q         |         |         |      V  |
19+ 5       0.2604      0.03  Q         |         |         |       V |
19+10       0.2606      0.04  Q         |         |         |       V |
19+15       0.2609      0.04  Q         |         |         |       V |
19+20       0.2612      0.04  Q         |         |         |       V |
19+25       0.2616      0.05  Q         |         |         |       V |
19+30       0.2619      0.05  Q         |         |         |       V |
19+35       0.2623      0.05  Q         |         |         |       V |
19+40       0.2625      0.04  Q         |         |         |       V |
19+45       0.2628      0.04  Q         |         |         |       V |
19+50       0.2631      0.04  Q         |         |         |       V |
19+55       0.2633      0.03  Q         |         |         |       V |
20+ 0       0.2634      0.03  Q         |         |         |       V |
20+ 5       0.2637      0.03  Q         |         |         |       V |
20+10       0.2639      0.04  Q         |         |         |       V |
20+15       0.2642      0.04  Q         |         |         |       V |
20+20       0.2645      0.04  Q         |         |         |       V |
20+25       0.2647      0.04  Q         |         |         |       V |
20+30       0.2650      0.04  Q         |         |         |       V |
20+35       0.2653      0.04  Q         |         |         |       V |
20+40       0.2656      0.04  Q         |         |         |       V |
20+45       0.2658      0.04  Q         |         |         |       V |
20+50       0.2661      0.03  Q         |         |         |       V |
20+55       0.2663      0.03  Q         |         |         |       V |
21+ 0       0.2665      0.03  Q         |         |         |       V |
21+ 5       0.2667      0.03  Q         |         |         |       V |
21+10       0.2669      0.04  Q         |         |         |       V |
21+15       0.2672      0.04  Q         |         |         |        V|
21+20       0.2674      0.03  Q         |         |         |        V|
21+25       0.2676      0.03  Q         |         |         |        V|
21+30       0.2678      0.03  Q         |         |         |        V|
21+35       0.2680      0.03  Q         |         |         |        V|
21+40       0.2683      0.04  Q         |         |         |        V|
21+45       0.2686      0.04  Q         |         |         |        V|
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21+50	0.2688	0.03	Q	|	|	|	V|
21+55	0.2690	0.03	Q	|	|	|	V|
22+ 0	0.2692	0.03	Q	|	|	|	V|
22+ 5	0.2694	0.03	Q	|	|	|	V|
22+10	0.2697	0.04	Q	|	|	|	V|
22+15	0.2699	0.04	Q	|	|	|	V|
22+20	0.2702	0.03	Q	|	|	|	V|
22+25	0.2704	0.03	Q	|	|	|	V|
22+30	0.2706	0.03	Q	|	|	|	V|
22+35	0.2707	0.03	Q	|	|	|	V|
22+40	0.2709	0.03	Q	|	|	|	V|
22+45	0.2711	0.03	Q	|	|	|	V|
22+50	0.2713	0.03	Q	|	|	|	V|
22+55	0.2715	0.03	Q	|	|	|	V|
23+ 0	0.2717	0.03	Q	|	|	|	V|
23+ 5	0.2718	0.03	Q	|	|	|	V|
23+10	0.2720	0.03	Q	|	|	|	V|
23+15	0.2722	0.03	Q	|	|	|	V|
23+20	0.2724	0.03	Q	|	|	|	V|
23+25	0.2726	0.03	Q	|	|	|	V|
23+30	0.2728	0.03	Q	|	|	|	V|
23+35	0.2729	0.03	Q	|	|	|	V|
23+40	0.2731	0.03	Q	|	|	|	V|
23+45	0.2733	0.03	Q	|	|	|	V|
23+50	0.2735	0.03	Q	|	|	|	V|
23+55	0.2737	0.03	Q	|	|	|	V|
24+ 0	0.2739	0.03	Q	|	|	|	V|
24+ 5	0.2740	0.02	Q	|	|	|	V|
24+10	0.2740	0.00	Q	|	|	|	V|
24+15	0.2740	0.00	Q	|	|	|	V|
24+20	0.2740	0.00	Q	|	|	|	V|

PROPOSED UNIT HYDROGRAPH

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

Study date 06/12/23 File: B3ONSITEPROP242.out

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

Program License Serial Number 4010

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

English Units used in output format

22-0085 - OAK VALLEY NORTH BUILDING 3
ONSITE UNIT HYDROGRAPH ANALYSIS
PROPOSED CONDITION, 2-YEAR 24-HOUR
FN: B3ONSITEPROP242.OUT- ABE

Drainage Area = 13.70(Ac.) = 0.021 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.70(Ac.) = 0.021 Sq. Mi.
Length along longest watercourse = 800.00(Ft.)
Length along longest watercourse measured to centroid = 350.00(Ft.)
Length along longest watercourse = 0.152 Mi.
Length along longest watercourse measured to centroid = 0.066 Mi.
Difference in elevation = 23.10(Ft.)
Slope along watercourse = 152.4600 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.024 Hr.
Lag time = 1.45 Min.
25% of lag time = 0.36 Min.
40% of lag time = 0.58 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.70	2.40	32.88

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.70	6.50	89.05

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.400(In)
Area Averaged 100-Year Rainfall = 6.500(In)

Point rain (area averaged) = 2.400(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.400(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.700	56.00	0.900

Total Area Entered = 13.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

56.0	36.0	0.706	0.900	0.134	1.000	0.134
					Sum (F) =	0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134
Minimum soil loss rate ((In/Hr)) = 0.067
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

U n i t H y d r o g r a p h
FOOTHILL S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	345.619	62.604	8.644
2	0.167	691.238	36.258	5.006
3	0.250	1036.857	1.138	0.157
			Sum = 100.000	Sum= 13.807

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.019	(0.238)	0.003	0.016
2	0.17	0.07	0.019	(0.237)	0.003	0.016
3	0.25	0.07	0.019	(0.236)	0.003	0.016
4	0.33	0.10	0.029	(0.235)	0.005	0.024
5	0.42	0.10	0.029	(0.234)	0.005	0.024
6	0.50	0.10	0.029	(0.233)	0.005	0.024
7	0.58	0.10	0.029	(0.232)	0.005	0.024
8	0.67	0.10	0.029	(0.231)	0.005	0.024
9	0.75	0.10	0.029	(0.230)	0.005	0.024
10	0.83	0.13	0.038	(0.230)	0.007	0.031
11	0.92	0.13	0.038	(0.229)	0.007	0.031
12	1.00	0.13	0.038	(0.228)	0.007	0.031
13	1.08	0.10	0.029	(0.227)	0.005	0.024
14	1.17	0.10	0.029	(0.226)	0.005	0.024
15	1.25	0.10	0.029	(0.225)	0.005	0.024
16	1.33	0.10	0.029	(0.224)	0.005	0.024
17	1.42	0.10	0.029	(0.223)	0.005	0.024
18	1.50	0.10	0.029	(0.222)	0.005	0.024
19	1.58	0.10	0.029	(0.222)	0.005	0.024
20	1.67	0.10	0.029	(0.221)	0.005	0.024
21	1.75	0.10	0.029	(0.220)	0.005	0.024
22	1.83	0.13	0.038	(0.219)	0.007	0.031
23	1.92	0.13	0.038	(0.218)	0.007	0.031
24	2.00	0.13	0.038	(0.217)	0.007	0.031
25	2.08	0.13	0.038	(0.216)	0.007	0.031
26	2.17	0.13	0.038	(0.215)	0.007	0.031
27	2.25	0.13	0.038	(0.214)	0.007	0.031
28	2.33	0.13	0.038	(0.214)	0.007	0.031
29	2.42	0.13	0.038	(0.213)	0.007	0.031
30	2.50	0.13	0.038	(0.212)	0.007	0.031
31	2.58	0.17	0.048	(0.211)	0.009	0.039
32	2.67	0.17	0.048	(0.210)	0.009	0.039
33	2.75	0.17	0.048	(0.209)	0.009	0.039
34	2.83	0.17	0.048	(0.208)	0.009	0.039
35	2.92	0.17	0.048	(0.208)	0.009	0.039
36	3.00	0.17	0.048	(0.207)	0.009	0.039
37	3.08	0.17	0.048	(0.206)	0.009	0.039
38	3.17	0.17	0.048	(0.205)	0.009	0.039
39	3.25	0.17	0.048	(0.204)	0.009	0.039
40	3.33	0.17	0.048	(0.203)	0.009	0.039
41	3.42	0.17	0.048	(0.202)	0.009	0.039
42	3.50	0.17	0.048	(0.202)	0.009	0.039
43	3.58	0.17	0.048	(0.201)	0.009	0.039
44	3.67	0.17	0.048	(0.200)	0.009	0.039
45	3.75	0.17	0.048	(0.199)	0.009	0.039
46	3.83	0.20	0.058	(0.198)	0.010	0.047
47	3.92	0.20	0.058	(0.197)	0.010	0.047

48	4.00	0.20	0.058	(0.197)	0.010	0.047
49	4.08	0.20	0.058	(0.196)	0.010	0.047
50	4.17	0.20	0.058	(0.195)	0.010	0.047
51	4.25	0.20	0.058	(0.194)	0.010	0.047
52	4.33	0.23	0.067	(0.193)	0.012	0.055
53	4.42	0.23	0.067	(0.192)	0.012	0.055
54	4.50	0.23	0.067	(0.192)	0.012	0.055
55	4.58	0.23	0.067	(0.191)	0.012	0.055
56	4.67	0.23	0.067	(0.190)	0.012	0.055
57	4.75	0.23	0.067	(0.189)	0.012	0.055
58	4.83	0.27	0.077	(0.188)	0.014	0.063
59	4.92	0.27	0.077	(0.187)	0.014	0.063
60	5.00	0.27	0.077	(0.187)	0.014	0.063
61	5.08	0.20	0.058	(0.186)	0.010	0.047
62	5.17	0.20	0.058	(0.185)	0.010	0.047
63	5.25	0.20	0.058	(0.184)	0.010	0.047
64	5.33	0.23	0.067	(0.183)	0.012	0.055
65	5.42	0.23	0.067	(0.183)	0.012	0.055
66	5.50	0.23	0.067	(0.182)	0.012	0.055
67	5.58	0.27	0.077	(0.181)	0.014	0.063
68	5.67	0.27	0.077	(0.180)	0.014	0.063
69	5.75	0.27	0.077	(0.179)	0.014	0.063
70	5.83	0.27	0.077	(0.179)	0.014	0.063
71	5.92	0.27	0.077	(0.178)	0.014	0.063
72	6.00	0.27	0.077	(0.177)	0.014	0.063
73	6.08	0.30	0.086	(0.176)	0.016	0.071
74	6.17	0.30	0.086	(0.175)	0.016	0.071
75	6.25	0.30	0.086	(0.175)	0.016	0.071
76	6.33	0.30	0.086	(0.174)	0.016	0.071
77	6.42	0.30	0.086	(0.173)	0.016	0.071
78	6.50	0.30	0.086	(0.172)	0.016	0.071
79	6.58	0.33	0.096	(0.172)	0.017	0.079
80	6.67	0.33	0.096	(0.171)	0.017	0.079
81	6.75	0.33	0.096	(0.170)	0.017	0.079
82	6.83	0.33	0.096	(0.169)	0.017	0.079
83	6.92	0.33	0.096	(0.169)	0.017	0.079
84	7.00	0.33	0.096	(0.168)	0.017	0.079
85	7.08	0.33	0.096	(0.167)	0.017	0.079
86	7.17	0.33	0.096	(0.166)	0.017	0.079
87	7.25	0.33	0.096	(0.165)	0.017	0.079
88	7.33	0.37	0.106	(0.165)	0.019	0.087
89	7.42	0.37	0.106	(0.164)	0.019	0.087
90	7.50	0.37	0.106	(0.163)	0.019	0.087
91	7.58	0.40	0.115	(0.162)	0.021	0.094
92	7.67	0.40	0.115	(0.162)	0.021	0.094
93	7.75	0.40	0.115	(0.161)	0.021	0.094
94	7.83	0.43	0.125	(0.160)	0.022	0.102
95	7.92	0.43	0.125	(0.159)	0.022	0.102
96	8.00	0.43	0.125	(0.159)	0.022	0.102
97	8.08	0.50	0.144	(0.158)	0.026	0.118
98	8.17	0.50	0.144	(0.157)	0.026	0.118
99	8.25	0.50	0.144	(0.157)	0.026	0.118
100	8.33	0.50	0.144	(0.156)	0.026	0.118
101	8.42	0.50	0.144	(0.155)	0.026	0.118
102	8.50	0.50	0.144	(0.154)	0.026	0.118
103	8.58	0.53	0.154	(0.154)	0.028	0.126
104	8.67	0.53	0.154	(0.153)	0.028	0.126
105	8.75	0.53	0.154	(0.152)	0.028	0.126
106	8.83	0.57	0.163	(0.151)	0.029	0.134
107	8.92	0.57	0.163	(0.151)	0.029	0.134
108	9.00	0.57	0.163	(0.150)	0.029	0.134
109	9.08	0.63	0.182	(0.149)	0.033	0.150
110	9.17	0.63	0.182	(0.149)	0.033	0.150
111	9.25	0.63	0.182	(0.148)	0.033	0.150
112	9.33	0.67	0.192	(0.147)	0.035	0.157
113	9.42	0.67	0.192	(0.147)	0.035	0.157
114	9.50	0.67	0.192	(0.146)	0.035	0.157
115	9.58	0.70	0.202	(0.145)	0.036	0.165
116	9.67	0.70	0.202	(0.144)	0.036	0.165
117	9.75	0.70	0.202	(0.144)	0.036	0.165
118	9.83	0.73	0.211	(0.143)	0.038	0.173
119	9.92	0.73	0.211	(0.142)	0.038	0.173
120	10.00	0.73	0.211	(0.142)	0.038	0.173
121	10.08	0.50	0.144	(0.141)	0.026	0.118
122	10.17	0.50	0.144	(0.140)	0.026	0.118

123	10.25	0.50	0.144	(0.140)	0.026	0.118
124	10.33	0.50	0.144	(0.139)	0.026	0.118
125	10.42	0.50	0.144	(0.138)	0.026	0.118
126	10.50	0.50	0.144	(0.138)	0.026	0.118
127	10.58	0.67	0.192	(0.137)	0.035	0.157
128	10.67	0.67	0.192	(0.136)	0.035	0.157
129	10.75	0.67	0.192	(0.136)	0.035	0.157
130	10.83	0.67	0.192	(0.135)	0.035	0.157
131	10.92	0.67	0.192	(0.134)	0.035	0.157
132	11.00	0.67	0.192	(0.134)	0.035	0.157
133	11.08	0.63	0.182	(0.133)	0.033	0.150
134	11.17	0.63	0.182	(0.132)	0.033	0.150
135	11.25	0.63	0.182	(0.132)	0.033	0.150
136	11.33	0.63	0.182	(0.131)	0.033	0.150
137	11.42	0.63	0.182	(0.130)	0.033	0.150
138	11.50	0.63	0.182	(0.130)	0.033	0.150
139	11.58	0.57	0.163	(0.129)	0.029	0.134
140	11.67	0.57	0.163	(0.128)	0.029	0.134
141	11.75	0.57	0.163	(0.128)	0.029	0.134
142	11.83	0.60	0.173	(0.127)	0.031	0.142
143	11.92	0.60	0.173	(0.126)	0.031	0.142
144	12.00	0.60	0.173	(0.126)	0.031	0.142
145	12.08	0.83	0.240	(0.125)	0.043	0.197
146	12.17	0.83	0.240	(0.125)	0.043	0.197
147	12.25	0.83	0.240	(0.124)	0.043	0.197
148	12.33	0.87	0.250	(0.123)	0.045	0.205
149	12.42	0.87	0.250	(0.123)	0.045	0.205
150	12.50	0.87	0.250	(0.122)	0.045	0.205
151	12.58	0.93	0.269	(0.121)	0.048	0.220
152	12.67	0.93	0.269	(0.121)	0.048	0.220
153	12.75	0.93	0.269	(0.120)	0.048	0.220
154	12.83	0.97	0.278	(0.120)	0.050	0.228
155	12.92	0.97	0.278	(0.119)	0.050	0.228
156	13.00	0.97	0.278	(0.118)	0.050	0.228
157	13.08	1.13	0.326	(0.118)	0.059	0.268
158	13.17	1.13	0.326	(0.117)	0.059	0.268
159	13.25	1.13	0.326	(0.117)	0.059	0.268
160	13.33	1.13	0.326	(0.116)	0.059	0.268
161	13.42	1.13	0.326	(0.115)	0.059	0.268
162	13.50	1.13	0.326	(0.115)	0.059	0.268
163	13.58	0.77	0.221	(0.114)	0.040	0.181
164	13.67	0.77	0.221	(0.114)	0.040	0.181
165	13.75	0.77	0.221	(0.113)	0.040	0.181
166	13.83	0.77	0.221	(0.113)	0.040	0.181
167	13.92	0.77	0.221	(0.112)	0.040	0.181
168	14.00	0.77	0.221	(0.111)	0.040	0.181
169	14.08	0.90	0.259	(0.111)	0.047	0.213
170	14.17	0.90	0.259	(0.110)	0.047	0.213
171	14.25	0.90	0.259	(0.110)	0.047	0.213
172	14.33	0.87	0.250	(0.109)	0.045	0.205
173	14.42	0.87	0.250	(0.109)	0.045	0.205
174	14.50	0.87	0.250	(0.108)	0.045	0.205
175	14.58	0.87	0.250	(0.107)	0.045	0.205
176	14.67	0.87	0.250	(0.107)	0.045	0.205
177	14.75	0.87	0.250	(0.106)	0.045	0.205
178	14.83	0.83	0.240	(0.106)	0.043	0.197
179	14.92	0.83	0.240	(0.105)	0.043	0.197
180	15.00	0.83	0.240	(0.105)	0.043	0.197
181	15.08	0.80	0.230	(0.104)	0.041	0.189
182	15.17	0.80	0.230	(0.104)	0.041	0.189
183	15.25	0.80	0.230	(0.103)	0.041	0.189
184	15.33	0.77	0.221	(0.103)	0.040	0.181
185	15.42	0.77	0.221	(0.102)	0.040	0.181
186	15.50	0.77	0.221	(0.102)	0.040	0.181
187	15.58	0.63	0.182	(0.101)	0.033	0.150
188	15.67	0.63	0.182	(0.101)	0.033	0.150
189	15.75	0.63	0.182	(0.100)	0.033	0.150
190	15.83	0.63	0.182	(0.100)	0.033	0.150
191	15.92	0.63	0.182	(0.099)	0.033	0.150
192	16.00	0.63	0.182	(0.099)	0.033	0.150
193	16.08	0.13	0.038	(0.098)	0.007	0.031
194	16.17	0.13	0.038	(0.098)	0.007	0.031
195	16.25	0.13	0.038	(0.097)	0.007	0.031
196	16.33	0.13	0.038	(0.097)	0.007	0.031
197	16.42	0.13	0.038	(0.096)	0.007	0.031

198	16.50	0.13	0.038	(0.096)	0.007	0.031
199	16.58	0.10	0.029	(0.095)	0.005	0.024
200	16.67	0.10	0.029	(0.095)	0.005	0.024
201	16.75	0.10	0.029	(0.094)	0.005	0.024
202	16.83	0.10	0.029	(0.094)	0.005	0.024
203	16.92	0.10	0.029	(0.093)	0.005	0.024
204	17.00	0.10	0.029	(0.093)	0.005	0.024
205	17.08	0.17	0.048	(0.092)	0.009	0.039
206	17.17	0.17	0.048	(0.092)	0.009	0.039
207	17.25	0.17	0.048	(0.091)	0.009	0.039
208	17.33	0.17	0.048	(0.091)	0.009	0.039
209	17.42	0.17	0.048	(0.090)	0.009	0.039
210	17.50	0.17	0.048	(0.090)	0.009	0.039
211	17.58	0.17	0.048	(0.089)	0.009	0.039
212	17.67	0.17	0.048	(0.089)	0.009	0.039
213	17.75	0.17	0.048	(0.089)	0.009	0.039
214	17.83	0.13	0.038	(0.088)	0.007	0.031
215	17.92	0.13	0.038	(0.088)	0.007	0.031
216	18.00	0.13	0.038	(0.087)	0.007	0.031
217	18.08	0.13	0.038	(0.087)	0.007	0.031
218	18.17	0.13	0.038	(0.086)	0.007	0.031
219	18.25	0.13	0.038	(0.086)	0.007	0.031
220	18.33	0.13	0.038	(0.086)	0.007	0.031
221	18.42	0.13	0.038	(0.085)	0.007	0.031
222	18.50	0.13	0.038	(0.085)	0.007	0.031
223	18.58	0.10	0.029	(0.084)	0.005	0.024
224	18.67	0.10	0.029	(0.084)	0.005	0.024
225	18.75	0.10	0.029	(0.084)	0.005	0.024
226	18.83	0.07	0.019	(0.083)	0.003	0.016
227	18.92	0.07	0.019	(0.083)	0.003	0.016
228	19.00	0.07	0.019	(0.082)	0.003	0.016
229	19.08	0.10	0.029	(0.082)	0.005	0.024
230	19.17	0.10	0.029	(0.082)	0.005	0.024
231	19.25	0.10	0.029	(0.081)	0.005	0.024
232	19.33	0.13	0.038	(0.081)	0.007	0.031
233	19.42	0.13	0.038	(0.080)	0.007	0.031
234	19.50	0.13	0.038	(0.080)	0.007	0.031
235	19.58	0.10	0.029	(0.080)	0.005	0.024
236	19.67	0.10	0.029	(0.079)	0.005	0.024
237	19.75	0.10	0.029	(0.079)	0.005	0.024
238	19.83	0.07	0.019	(0.079)	0.003	0.016
239	19.92	0.07	0.019	(0.078)	0.003	0.016
240	20.00	0.07	0.019	(0.078)	0.003	0.016
241	20.08	0.10	0.029	(0.078)	0.005	0.024
242	20.17	0.10	0.029	(0.077)	0.005	0.024
243	20.25	0.10	0.029	(0.077)	0.005	0.024
244	20.33	0.10	0.029	(0.077)	0.005	0.024
245	20.42	0.10	0.029	(0.076)	0.005	0.024
246	20.50	0.10	0.029	(0.076)	0.005	0.024
247	20.58	0.10	0.029	(0.076)	0.005	0.024
248	20.67	0.10	0.029	(0.075)	0.005	0.024
249	20.75	0.10	0.029	(0.075)	0.005	0.024
250	20.83	0.07	0.019	(0.075)	0.003	0.016
251	20.92	0.07	0.019	(0.074)	0.003	0.016
252	21.00	0.07	0.019	(0.074)	0.003	0.016
253	21.08	0.10	0.029	(0.074)	0.005	0.024
254	21.17	0.10	0.029	(0.073)	0.005	0.024
255	21.25	0.10	0.029	(0.073)	0.005	0.024
256	21.33	0.07	0.019	(0.073)	0.003	0.016
257	21.42	0.07	0.019	(0.073)	0.003	0.016
258	21.50	0.07	0.019	(0.072)	0.003	0.016
259	21.58	0.10	0.029	(0.072)	0.005	0.024
260	21.67	0.10	0.029	(0.072)	0.005	0.024
261	21.75	0.10	0.029	(0.072)	0.005	0.024
262	21.83	0.07	0.019	(0.071)	0.003	0.016
263	21.92	0.07	0.019	(0.071)	0.003	0.016
264	22.00	0.07	0.019	(0.071)	0.003	0.016
265	22.08	0.10	0.029	(0.071)	0.005	0.024
266	22.17	0.10	0.029	(0.070)	0.005	0.024
267	22.25	0.10	0.029	(0.070)	0.005	0.024
268	22.33	0.07	0.019	(0.070)	0.003	0.016
269	22.42	0.07	0.019	(0.070)	0.003	0.016
270	22.50	0.07	0.019	(0.069)	0.003	0.016
271	22.58	0.07	0.019	(0.069)	0.003	0.016
272	22.67	0.07	0.019	(0.069)	0.003	0.016

273	22.75	0.07	0.019	(0.069)	0.003	0.016
274	22.83	0.07	0.019	(0.069)	0.003	0.016
275	22.92	0.07	0.019	(0.069)	0.003	0.016
276	23.00	0.07	0.019	(0.068)	0.003	0.016
277	23.08	0.07	0.019	(0.068)	0.003	0.016
278	23.17	0.07	0.019	(0.068)	0.003	0.016
279	23.25	0.07	0.019	(0.068)	0.003	0.016
280	23.33	0.07	0.019	(0.068)	0.003	0.016
281	23.42	0.07	0.019	(0.068)	0.003	0.016
282	23.50	0.07	0.019	(0.068)	0.003	0.016
283	23.58	0.07	0.019	(0.067)	0.003	0.016
284	23.67	0.07	0.019	(0.067)	0.003	0.016
285	23.75	0.07	0.019	(0.067)	0.003	0.016
286	23.83	0.07	0.019	(0.067)	0.003	0.016
287	23.92	0.07	0.019	(0.067)	0.003	0.016
288	24.00	0.07	0.019	(0.067)	0.003	0.016

(Loss Rate Not Used)

Sum = 100.0 Sum = 23.6

Flood volume = Effective rainfall 1.97(In)
times area 13.7(Ac.)/[(In)/(Ft.)] = 2.2(Ac.Ft)
Total soil loss = 0.43(In)
Total soil loss = 0.493(Ac.Ft)
Total rainfall = 2.40(In)
Flood volume = 97868.0 Cubic Feet
Total soil loss = 21483.2 Cubic Feet

Peak flow rate of this hydrograph = 3.697(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0009	0.14	Q	|	|	|	|
0+10	0.0024	0.22	Q	|	|	|	|
0+15	0.0039	0.22	Q	|	|	|	|
0+20	0.0059	0.29	VQ	|	|	|	|
0+25	0.0081	0.32	VQ	|	|	|	|
0+30	0.0104	0.33	VQ	|	|	|	|
0+35	0.0126	0.33	VQ	|	|	|	|
0+40	0.0149	0.33	VQ	|	|	|	|
0+45	0.0171	0.33	VQ	|	|	|	|
0+50	0.0198	0.39	VQ	|	|	|	|
0+55	0.0228	0.43	VQ	|	|	|	|
1+ 0	0.0258	0.43	VQ	|	|	|	|
1+ 5	0.0283	0.37	VQ	|	|	|	|
1+10	0.0306	0.33	VQ	|	|	|	|
1+15	0.0328	0.33	VQ	|	|	|	|
1+20	0.0351	0.33	VQ	|	|	|	|
1+25	0.0373	0.33	VQ	|	|	|	|
1+30	0.0396	0.33	VQ	|	|	|	|
1+35	0.0418	0.33	VQ	|	|	|	|
1+40	0.0441	0.33	VQ	|	|	|	|
1+45	0.0463	0.33	VQ	|	|	|	|
1+50	0.0490	0.39	VQ	|	|	|	|
1+55	0.0520	0.43	VQ	|	|	|	|
2+ 0	0.0550	0.43	VQ	|	|	|	|
2+ 5	0.0580	0.43	|Q	|	|	|	|
2+10	0.0610	0.43	|Q	|	|	|	|
2+15	0.0640	0.43	|Q	|	|	|	|
2+20	0.0670	0.43	|Q	|	|	|	|
2+25	0.0700	0.43	|Q	|	|	|	|
2+30	0.0730	0.43	|Q	|	|	|	|
2+35	0.0765	0.50	|VQ	|	|	|	|
2+40	0.0802	0.54	|VQ	|	|	|	|
2+45	0.0839	0.54	|VQ	|	|	|	|
2+50	0.0877	0.54	|VQ	|	|	|	|
2+55	0.0914	0.54	|VQ	|	|	|	|
3+ 0	0.0952	0.54	|VQ	|	|	|	|
3+ 5	0.0989	0.54	|VQ	|	|	|	|
3+10	0.1027	0.54	|VQ	|	|	|	|

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3+15       0.1064      0.54  |VQ       |         |         |         |
3+20       0.1101      0.54  |VQ       |         |         |         |
3+25       0.1139      0.54  | Q       |         |         |         |
3+30       0.1176      0.54  | Q       |         |         |         |
3+35       0.1214      0.54  | Q       |         |         |         |
3+40       0.1251      0.54  | Q       |         |         |         |
3+45       0.1289      0.54  | Q       |         |         |         |
3+50       0.1331      0.61  | Q       |         |         |         |
3+55       0.1376      0.65  | Q       |         |         |         |
4+ 0       0.1421      0.65  | Q       |         |         |         |
4+ 5       0.1466      0.65  | Q       |         |         |         |
4+10       0.1510      0.65  | Q       |         |         |         |
4+15       0.1555      0.65  | Q       |         |         |         |
4+20       0.1605      0.72  | Q       |         |         |         |
4+25       0.1657      0.76  | VQ      |         |         |         |
4+30       0.1710      0.76  |  Q      |         |         |         |
4+35       0.1762      0.76  |  Q      |         |         |         |
4+40       0.1815      0.76  |  Q      |         |         |         |
4+45       0.1867      0.76  |  Q      |         |         |         |
4+50       0.1924      0.83  |  Q      |         |         |         |
4+55       0.1984      0.87  |  Q      |         |         |         |
5+ 0       0.2044      0.87  |  Q      |         |         |         |
5+ 5       0.2094      0.73  | QV      |         |         |         |
5+10       0.2140      0.65  | QV      |         |         |         |
5+15       0.2184      0.65  | QV      |         |         |         |
5+20       0.2234      0.72  | QV      |         |         |         |
5+25       0.2286      0.76  |  QV     |         |         |         |
5+30       0.2339      0.76  |  QV     |         |         |         |
5+35       0.2396      0.83  |  QV     |         |         |         |
5+40       0.2456      0.87  |  QV     |         |         |         |
5+45       0.2516      0.87  |  QV     |         |         |         |
5+50       0.2576      0.87  |  QV     |         |         |         |
5+55       0.2636      0.87  |  QV     |         |         |         |
6+ 0       0.2695      0.87  |  QV     |         |         |         |
6+ 5       0.2760      0.94  |  QV     |         |         |         |
6+10       0.2827      0.98  |  Q V    |         |         |         |
6+15       0.2895      0.98  |  Q V    |         |         |         |
6+20       0.2962      0.98  |  Q V    |         |         |         |
6+25       0.3030      0.98  |  Q V    |         |         |         |
6+30       0.3097      0.98  |  Q V    |         |         |         |
6+35       0.3169      1.05  |   QV    |         |         |         |
6+40       0.3244      1.09  |   QV    |         |         |         |
6+45       0.3319      1.09  |   QV    |         |         |         |
6+50       0.3394      1.09  |   Q V   |         |         |         |
6+55       0.3469      1.09  |   Q V   |         |         |         |
7+ 0       0.3543      1.09  |   Q V   |         |         |         |
7+ 5       0.3618      1.09  |   Q V   |         |         |         |
7+10       0.3693      1.09  |   Q V   |         |         |         |
7+15       0.3768      1.09  |   Q V   |         |         |         |
7+20       0.3848      1.16  |   Q V   |         |         |         |
7+25       0.3930      1.19  |   Q V   |         |         |         |
7+30       0.4012      1.20  |   Q  V  |         |         |         |
7+35       0.4099      1.26  |    Q V  |         |         |         |
7+40       0.4189      1.30  |    Q V  |         |         |         |
7+45       0.4279      1.30  |    Q V  |         |         |         |
7+50       0.4374      1.37  |    Q V  |         |         |         |
7+55       0.4471      1.41  |    Q V  |         |         |         |
8+ 0       0.4568      1.41  |    Q  V |         |         |         |
8+ 5       0.4675      1.55  |     Q V |         |         |         |
8+10       0.4787      1.63  |     Q V |         |         |         |
8+15       0.4900      1.63  |     Q V |         |         |         |
8+20       0.5012      1.63  |     Q V |         |         |         |
8+25       0.5124      1.63  |     Q  V|         |         |         |
8+30       0.5237      1.63  |     Q  V|         |         |         |
8+35       0.5354      1.70  |     Q  V|         |         |         |
8+40       0.5473      1.74  |     Q  V|         |         |         |
8+45       0.5593      1.74  |     Q  V|         |         |         |
8+50       0.5718      1.81  |      Q  V         |         |         |
8+55       0.5845      1.85  |      Q  V         |         |         |
9+ 0       0.5972      1.85  |      Q  V         |         |         |
9+ 5       0.6109      1.98  |      Q  V         |         |         |
9+10       0.6251      2.06  |       Q |V        |         |         |
9+15       0.6393      2.07  |       Q |V        |         |         |
9+20       0.6540      2.13  |       Q |V        |         |         |
9+25       0.6690      2.17  |       Q |V        |         |         |
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 9+30       0.6840      2.17  |       Q | V       |         |         |
 9+35       0.6994      2.24  |       Q | V       |         |         |
 9+40       0.7151      2.28  |        Q| V       |         |         |
 9+45       0.7309      2.28  |        Q|  V      |         |         |
 9+50       0.7471      2.35  |        Q|  V      |         |         |
 9+55       0.7635      2.39  |        Q|  V      |         |         |
10+ 0       0.7800      2.39  |        Q|  V      |         |         |
10+ 5       0.7932      1.92  |      Q  |   V     |         |         |
10+10       0.8045      1.64  |     Q   |   V     |         |         |
10+15       0.8157      1.63  |     Q   |   V     |         |         |
10+20       0.8270      1.63  |     Q   |   V     |         |         |
10+25       0.8382      1.63  |     Q   |   V     |         |         |
10+30       0.8494      1.63  |     Q   |    V    |         |         |
10+35       0.8630      1.97  |      Q  |    V    |         |         |
10+40       0.8779      2.17  |       Q |    V    |         |         |
10+45       0.8929      2.17  |       Q |    V    |         |         |
10+50       0.9079      2.17  |       Q |     V   |         |         |
10+55       0.9229      2.17  |       Q |     V   |         |         |
11+ 0       0.9379      2.17  |       Q |     V   |         |         |
11+ 5       0.9524      2.11  |       Q |     V   |         |         |
11+10       0.9666      2.07  |       Q |      V  |         |         |
11+15       0.9808      2.07  |       Q |      V  |         |         |
11+20       0.9951      2.07  |       Q |      V  |         |         |
11+25       1.0093      2.07  |       Q |      V  |         |         |
11+30       1.0235      2.07  |       Q |       V |         |         |
11+35       1.0368      1.93  |      Q  |       V |         |         |
11+40       1.0496      1.85  |      Q  |       V |         |         |
11+45       1.0623      1.85  |      Q  |       V |         |         |
11+50       1.0755      1.92  |      Q  |        V|         |         |
11+55       1.0890      1.96  |      Q  |        V|         |         |
12+ 0       1.1024      1.96  |      Q  |        V|         |         |
12+ 5       1.1192      2.43  |        Q|        V|         |         |
12+10       1.1379      2.71  |         Q         V         |         |
12+15       1.1566      2.72  |         Q         V         |         |
12+20       1.1758      2.79  |         |Q        V         |         |
12+25       1.1953      2.83  |         |Q        |V        |         |
12+30       1.2147      2.83  |         |Q        |V        |         |
12+35       1.2351      2.96  |         |Q        |V        |         |
12+40       1.2561      3.04  |         | Q       | V       |         |
12+45       1.2771      3.04  |         | Q       | V       |         |
12+50       1.2985      3.11  |         | Q       |  V      |         |
12+55       1.3202      3.15  |         | Q       |  V      |         |
13+ 0       1.3419      3.15  |         | Q       |  V      |         |
13+ 5       1.3660      3.49  |         |  Q      |   V     |         |
13+10       1.3914      3.69  |         |   Q     |   V     |         |
13+15       1.4169      3.70  |         |   Q     |    V    |         |
13+20       1.4423      3.70  |         |   Q     |    V    |         |
13+25       1.4678      3.70  |         |   Q     |     V   |         |
13+30       1.4933      3.70  |         |   Q     |     V   |         |
13+35       1.5136      2.95  |         |Q        |     V   |         |
13+40       1.5309      2.51  |         Q         |      V  |         |
13+45       1.5481      2.50  |         Q         |      V  |         |
13+50       1.5653      2.50  |         Q         |      V  |         |
13+55       1.5826      2.50  |         Q         |       V |         |
14+ 0       1.5998      2.50  |         Q         |       V |         |
14+ 5       1.6189      2.77  |         |Q        |       V |         |
14+10       1.6391      2.93  |         |Q        |        V|         |
14+15       1.6593      2.94  |         |Q        |        V|         |
14+20       1.6790      2.87  |         |Q        |        V|         |
14+25       1.6985      2.83  |         |Q        |         V         |
14+30       1.7180      2.83  |         |Q        |         V         |
14+35       1.7375      2.83  |         |Q        |         V         |
14+40       1.7569      2.83  |         |Q        |         |V        |
14+45       1.7764      2.83  |         |Q        |         |V        |
14+50       1.7954      2.76  |         |Q        |         |V        |
14+55       1.8141      2.72  |         Q         |         | V       |
15+ 0       1.8329      2.72  |         Q         |         | V       |
15+ 5       1.8511      2.65  |         Q         |         | V       |
15+10       1.8691      2.61  |         Q         |         |  V      |
15+15       1.8871      2.61  |         Q         |         |  V      |
15+20       1.9046      2.54  |         Q         |         |  V      |
15+25       1.9218      2.50  |         Q         |         |   V     |
15+30       1.9390      2.50  |         Q         |         |   V     |
15+35       1.9544      2.23  |       Q |         |         |   V     |
15+40       1.9687      2.07  |       Q |         |         |    V    |
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15+45       1.9829      2.07  |       Q |         |         |    V    |
15+50       1.9971      2.07  |       Q |         |         |    V    |
15+55       2.0113      2.07  |       Q |         |         |    V    |
16+ 0       2.0256      2.07  |       Q |         |         |     V   |
16+ 5       2.0328      1.04  |   Q     |         |         |     V   |
16+10       2.0359      0.45  |Q        |         |         |     V   |
16+15       2.0389      0.43  |Q        |         |         |     V   |
16+20       2.0419      0.43  |Q        |         |         |     V   |
16+25       2.0449      0.43  |Q        |         |         |     V   |
16+30       2.0479      0.43  |Q        |         |         |     V   |
16+35       2.0504      0.37  |Q        |         |         |     V   |
16+40       2.0527      0.33  |Q        |         |         |     V   |
16+45       2.0549      0.33  |Q        |         |         |     V   |
16+50       2.0571      0.33  |Q        |         |         |     V   |
16+55       2.0594      0.33  |Q        |         |         |     V   |
17+ 0       2.0616      0.33  |Q        |         |         |     V   |
17+ 5       2.0648      0.46  |Q        |         |         |     V   |
17+10       2.0686      0.54  | Q       |         |         |     V   |
17+15       2.0723      0.54  | Q       |         |         |     V   |
17+20       2.0760      0.54  | Q       |         |         |     V   |
17+25       2.0798      0.54  | Q       |         |         |      V  |
17+30       2.0835      0.54  | Q       |         |         |      V  |
17+35       2.0873      0.54  | Q       |         |         |      V  |
17+40       2.0910      0.54  | Q       |         |         |      V  |
17+45       2.0948      0.54  | Q       |         |         |      V  |
17+50       2.0980      0.48  |Q        |         |         |      V  |
17+55       2.1010      0.44  |Q        |         |         |      V  |
18+ 0       2.1040      0.43  |Q        |         |         |      V  |
18+ 5       2.1070      0.43  |Q        |         |         |      V  |
18+10       2.1100      0.43  |Q        |         |         |      V  |
18+15       2.1130      0.43  |Q        |         |         |      V  |
18+20       2.1160      0.43  |Q        |         |         |      V  |
18+25       2.1190      0.43  |Q        |         |         |      V  |
18+30       2.1220      0.43  |Q        |         |         |      V  |
18+35       2.1245      0.37  |Q        |         |         |      V  |
18+40       2.1268      0.33  |Q        |         |         |      V  |
18+45       2.1290      0.33  |Q        |         |         |      V  |
18+50       2.1308      0.26  |Q        |         |         |      V  |
18+55       2.1323      0.22  Q         |         |         |      V  |
19+ 0       2.1338      0.22  Q         |         |         |      V  |
19+ 5       2.1358      0.29  |Q        |         |         |       V |
19+10       2.1380      0.32  |Q        |         |         |       V |
19+15       2.1403      0.33  |Q        |         |         |       V |
19+20       2.1430      0.39  |Q        |         |         |       V |
19+25       2.1460      0.43  |Q        |         |         |       V |
19+30       2.1490      0.43  |Q        |         |         |       V |
19+35       2.1515      0.37  |Q        |         |         |       V |
19+40       2.1538      0.33  |Q        |         |         |       V |
19+45       2.1560      0.33  |Q        |         |         |       V |
19+50       2.1578      0.26  |Q        |         |         |       V |
19+55       2.1593      0.22  Q         |         |         |       V |
20+ 0       2.1608      0.22  Q         |         |         |       V |
20+ 5       2.1628      0.29  |Q        |         |         |       V |
20+10       2.1650      0.32  |Q        |         |         |       V |
20+15       2.1672      0.33  |Q        |         |         |       V |
20+20       2.1695      0.33  |Q        |         |         |       V |
20+25       2.1717      0.33  |Q        |         |         |       V |
20+30       2.1740      0.33  |Q        |         |         |       V |
20+35       2.1762      0.33  |Q        |         |         |       V |
20+40       2.1785      0.33  |Q        |         |         |       V |
20+45       2.1807      0.33  |Q        |         |         |       V |
20+50       2.1825      0.26  |Q        |         |         |       V |
20+55       2.1840      0.22  Q         |         |         |       V |
21+ 0       2.1855      0.22  Q         |         |         |       V |
21+ 5       2.1875      0.29  |Q        |         |         |       V |
21+10       2.1897      0.32  |Q        |         |         |       V |
21+15       2.1920      0.33  |Q        |         |         |        V|
21+20       2.1937      0.26  |Q        |         |         |        V|
21+25       2.1952      0.22  Q         |         |         |        V|
21+30       2.1967      0.22  Q         |         |         |        V|
21+35       2.1987      0.29  |Q        |         |         |        V|
21+40       2.2009      0.32  |Q        |         |         |        V|
21+45       2.2032      0.33  |Q        |         |         |        V|
21+50       2.2050      0.26  |Q        |         |         |        V|
21+55       2.2065      0.22  Q         |         |         |        V|
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  22+ 0       2.2080      0.22  Q         |         |         |        V|
  22+ 5       2.2099      0.29  |Q        |         |         |        V|
  22+10       2.2122      0.32  |Q        |         |         |        V|
  22+15       2.2144      0.33  |Q        |         |         |        V|
  22+20       2.2162      0.26  |Q        |         |         |        V|
  22+25       2.2177      0.22  Q         |         |         |        V|
  22+30       2.2192      0.22  Q         |         |         |        V|
  22+35       2.2207      0.22  Q         |         |         |        V|
  22+40       2.2222      0.22  Q         |         |         |        V|
  22+45       2.2237      0.22  Q         |         |         |        V|
  22+50       2.2252      0.22  Q         |         |         |        V|
  22+55       2.2267      0.22  Q         |         |         |        V|
  23+ 0       2.2282      0.22  Q         |         |         |        V|
  23+ 5       2.2297      0.22  Q         |         |         |        V|
  23+10       2.2312      0.22  Q         |         |         |        V|
  23+15       2.2327      0.22  Q         |         |         |        V|
  23+20       2.2342      0.22  Q         |         |         |        V|
  23+25       2.2357      0.22  Q         |         |         |        V|
  23+30       2.2372      0.22  Q         |         |         |        V|
  23+35       2.2387      0.22  Q         |         |         |        V|
  23+40       2.2402      0.22  Q         |         |         |        V|
  23+45       2.2417      0.22  Q         |         |         |        V|
  23+50       2.2432      0.22  Q         |         |         |        V|
  23+55       2.2447      0.22  Q         |         |         |        V|
  24+ 0       2.2462      0.22  Q         |         |         |        V|
  24+ 5       2.2467      0.08  Q         |         |         |        V|
  24+10       2.2467      0.00  Q         |         |         |         V
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ROUTING

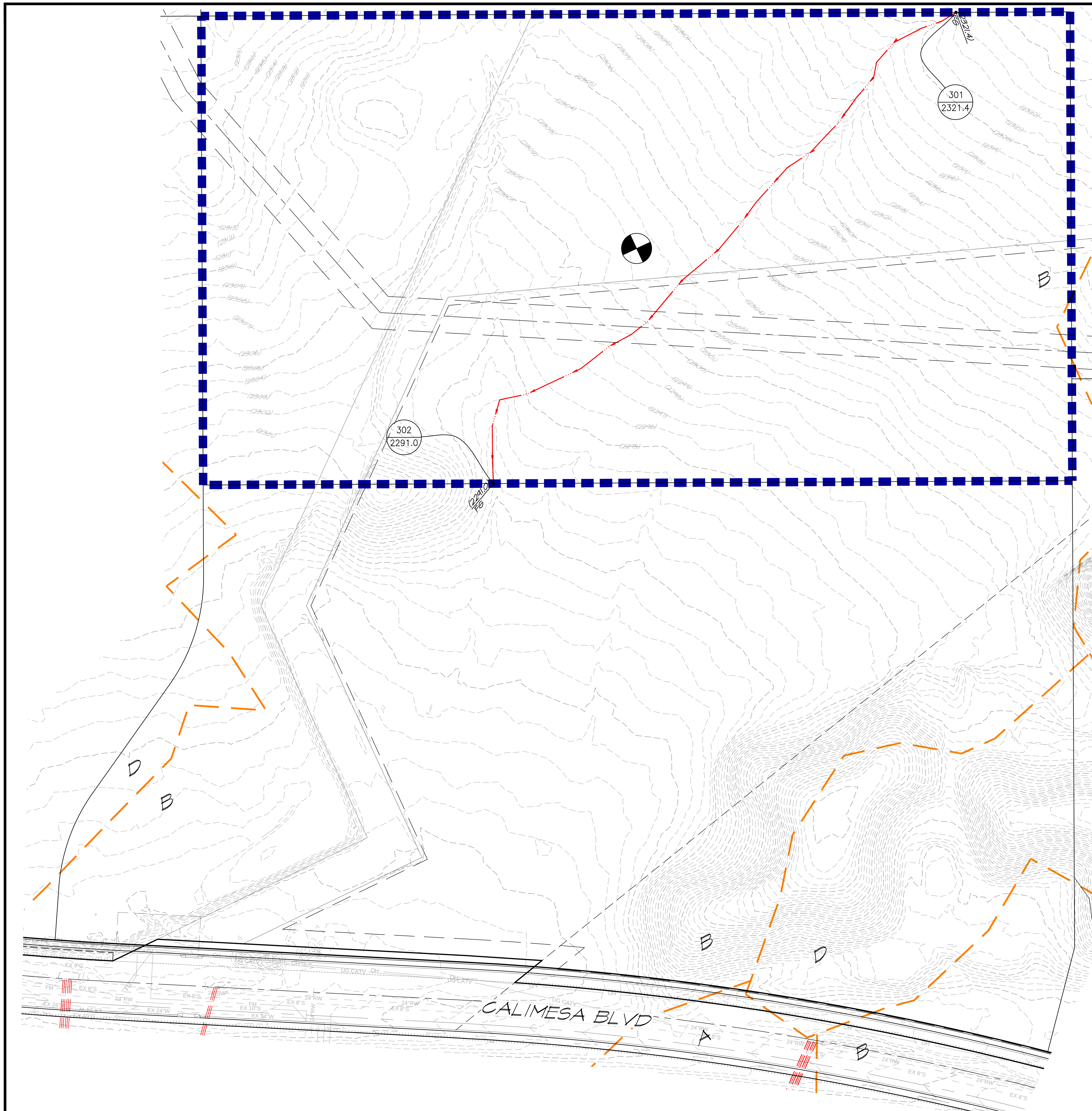
To be provided during Final Engineering

SUMMARY TABLES

Building 3	**2 year – 24 hour**		
	Pre-condition	**Post-condition**	**Difference**
Volume (cf)	*11,935*	*97,868*	*85,933*
Peak Flow Rage (cfs)	*0.450*	*3.700*	*3.250*

At this preliminary stage, underground detention chambers are sized to detain the entire volume of the largest post-development storm event (24-hour, 100-year). In final engineering, storm drain lift stations and/or orifice plates will be designed to outlet onsite flows per the existing capacity of the culverts and to meet HCOC mitigation requirements.

UNIT HYDROGRAPH MAPS



LEGEND

Symbol	Description
NODE / ELEV	- NODE NUMBER - ELEVATION (FT)
AC / FT	- AREA (AC) - LENGTH (FT)
	- DRAINAGE AREA BOUNDARY
	- FLOWLINE (PROPOSED)
	- PROJECT BOUNDARY
	- NRCS SOIL BOUNDARY

EXISTING CONDITION	
DRAINAGE AREA	3
TOTAL AREA (AC)	13.7
L_T (FT)	850
L_{CA} (FT)	370
Δ H	30.4

SOIL TYPE (%)	
A	0
B	100
C	0
D	0

N E W S

1" = 60'

60 0 60 120 180

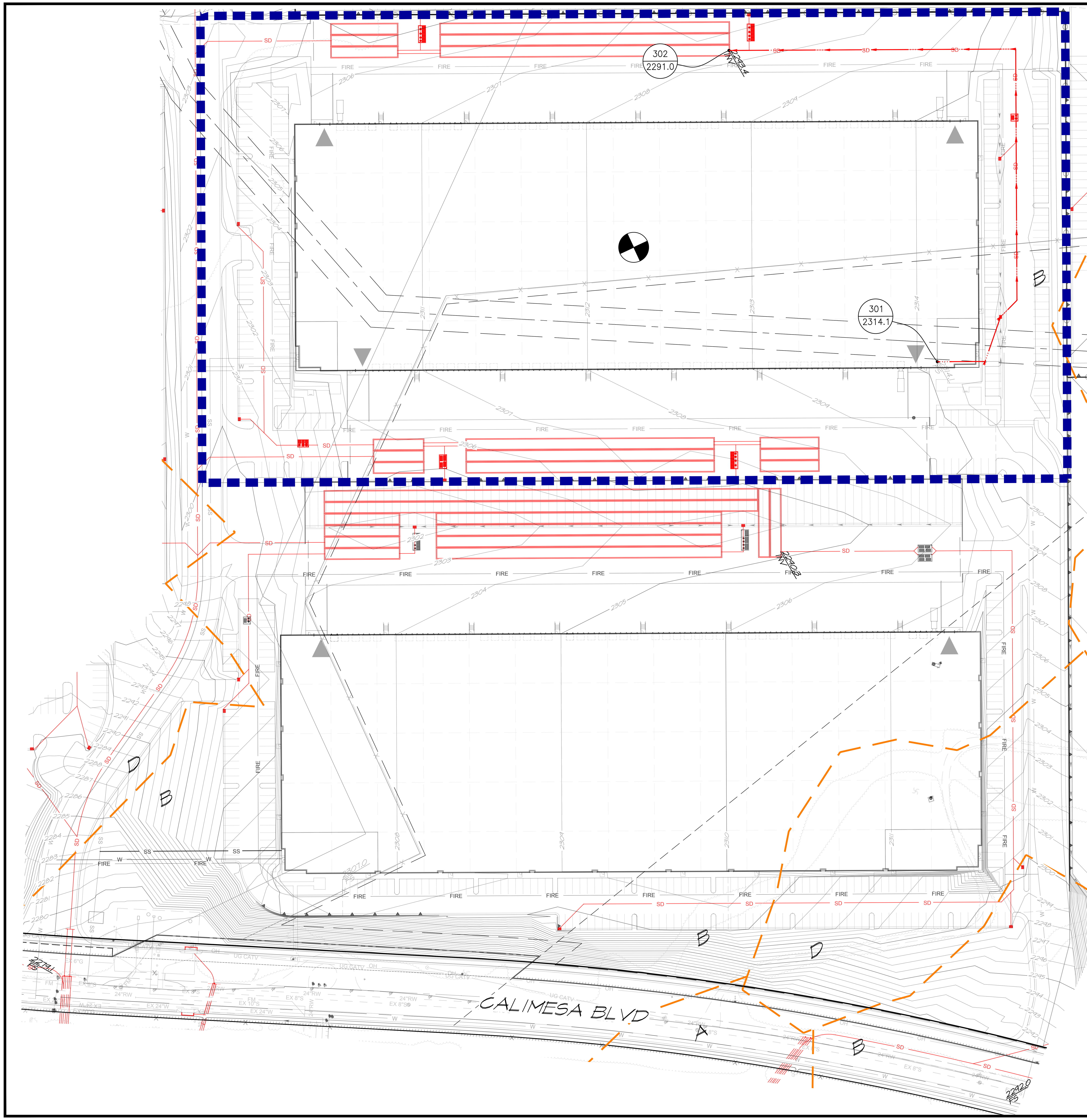
PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH – BUILDING 3
PRELIMINARY UNIT HYDROGRAPH EXHIBIT
EXISTING CONDITION

SCALE: 1" = 60'	ALBERT A. WEBB ASSOCIATES	W.O. 2022–0085
DATE: 5/18/2023	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686–1070 FAX (951) 788–1256	SHEET 2 OF 2 SHEETS
DESIGNED: AV		
CHECKED: SKK		
PLN CK REF:		DWG. NO.
F.B.		

H:\2022\22–0085\DRAINAGE\HYD\DWG FOLDER\22–0085–C–PHYD–UH.DWG 5/18/2023 11:10:15 AM Adrianv

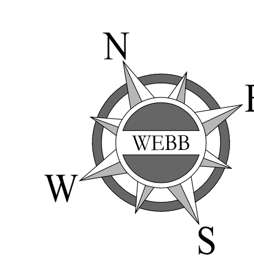


LEGEND

- NODE / ELEV - NODE NUMBER - ELEVATION (FT)
- AC / FT - AREA (AC) - LENGTH (FT)
- DRAINAGE AREA BOUNDARY
- FLOWLINE (PROPOSED)
- PROJECT BOUNDARY
- NRCS SOIL BOUNDARY

EXISTING CONDITION	
DRAINAGE AREA	3
TOTAL AREA (AC)	13.7
L_T (FT)	800
L_{CA} (FT)	350
Δ H	23.1

SOIL TYPE (%)	
A	0
B	100
C	0
D	0



1" = 60'
60 0 60 120 180

PRELIMINARY

CITY OF CALIMESA, COUNTY OF RIVERSIDE

OAK VALLEY NORTH – BUILDING 3
PRELIMINARY UNIT HYDROGRAPH EXHIBIT
DEVELOPED CONDITION

SCALE: 1" = 60'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686–1070 FAX (951) 788–1256	W.O. 2022–0085
DATE: 6/14/2023			SHEET 2 OF 2 SHEETS
DESIGNED: AV			
CHECKED: SKK			
PLN CK REF:			DWG. NO.
F.B.			

H:\2022\22–0085\DRAINAGE\HYD\DWG FOLDER\22–0085–C–PHYD–UH–POSTDEV.DWG 6/14/2023 1:36:16 PM Allisone

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

To be provided during Final Engineering.

Appendix 9: O&M

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

To be provided during Final Engineering.

Appendix 10: Educational Materials

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

To be provided during Final Engineering.