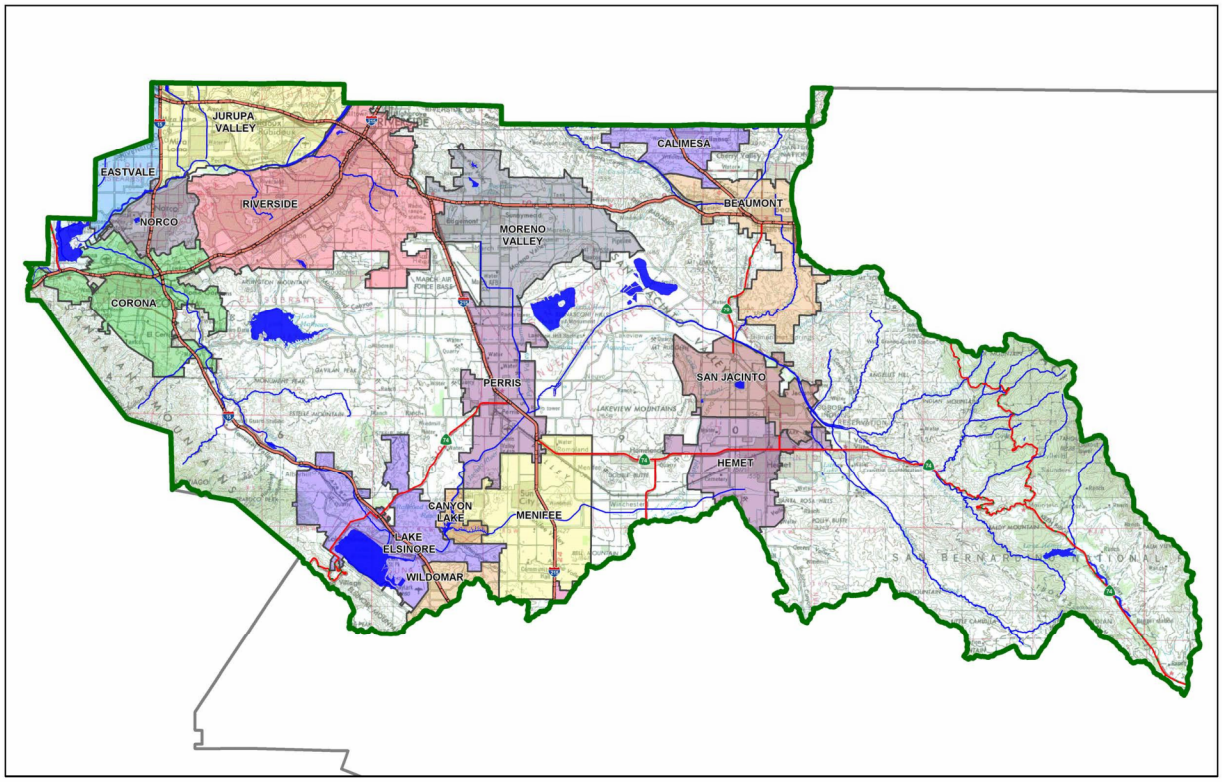
Project Specific Water Quality Management Plan

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

Project Title: Fitwell Health Campus Menifee

Development No: Parcel 3 of Parcel Map 18039

Design Review/Case No: PR22-0226



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 06/09/2025

Revision Date(s):

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

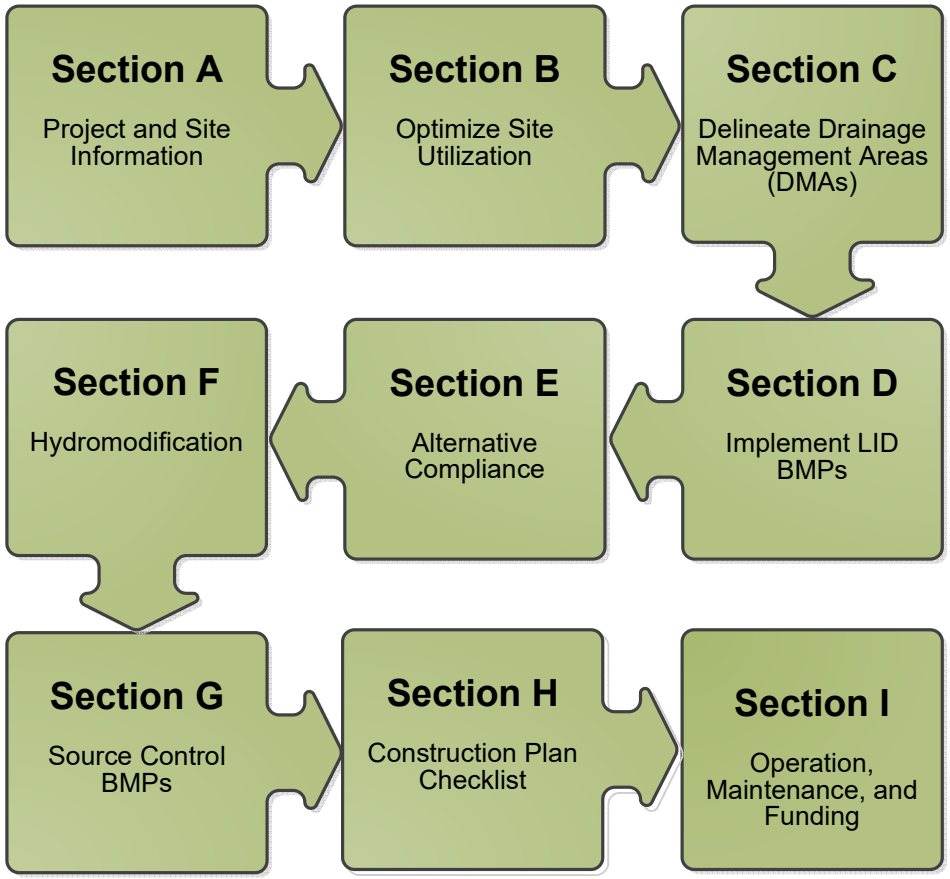
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A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for NT Thomas Construction, Inc by Advanced Civil Group, Inc. for the Tract Map No. XXXXX project.

This WQMP is intended to comply with the requirements of the City of Menifee for Regional Water Quality Control Board Order R8-2002-0011, 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 the City of Menifee Water Quality Ordinance (Municipal Code Ordinance No. 2009-32).

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

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

PREPARER'S CERTIFICATION

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

Preparer's Signature	June 9, 2025 Date
R. Steven Austin, PE Preparer's Printed Name	Principal Engineer Preparer's Title/Position

Preparer's Licensure: Registered Professional Engineer Civil No. 68795 Exp. 9-30-2025

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Commercial
Planning Area:	N/A
Community Name:	N/A
Development Name:	Fitwell Health Campus Menifee
PROJECT LOCATION	
Latitude & Longitude (DMS): 33Degrees39'11" North 117Degrees10'20"	
Project Watershed and Sub-Watershed: Santa Ana and San Jacinto River Sub-Watershed, Menifee Reach	
APN(s): 360-350-014	
Map Book and Page No.: Book 48 Page 44	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial
Proposed or Potential SIC Code(s)	7991
Area of Impervious Project Footprint (SF)	281,809 sf
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	281,809 sf
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (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)	Report Attached
What is the Water Quality Design Storm Depth for the project?	0.58 inches

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
Salt Creek	N/A	N/A	N/A
Canyon Lake	Pathogens (TMDL to be Determined) Nutrients (TMDL to be Determined)	Water Contact Recreation Warm Fresh Water Habitat	N/A
San Jacinto River Reach 1	N/A	N/a	N/a
Lake Elsinore	Ambient Bioassays Mercury Sediment Bioassays Sedimentation/siltation PCBs (Polychlorinated biphenyls) Nutrients Organic Enrichment/Low Dissolved Oxygen	Warm Freshwater Habitat Com or rec collection of fish Warm Freshwater Habitat Warm Freshwater Habitat Com or rec collection of fish Warm Freshwater Habitat Warm Freshwater Habitat	N/a

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

Table A.2 Other Applicable Permits

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

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

The existing site is farmland that is tilled on a regular schedule. There is no existing vegetation to protect.

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

Pervious areas are spread throughout the site to help mimic the existing natural infiltration.

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

Yes, landscaped pervious areas are mixed between the impervious areas and are used for surface flow treatment.

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

Yes. The site was designed to disperse runoff to pervious areas around the site.

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
D-1 (Roofs)	Roofs	72,405	Type D
D-2 (Driveways, Walkways, & Patios)	Concrete	32,115	Type D
D-3 (Roads, Curbs, Gutters & Sidewalks)	Concrete and Asphalt	177,289	Type D
D-4 (Landscaped with Irrigation Area)	Ornamental Landscaping	78,614	Type D

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

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

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

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

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

$$= \quad + \frac{\cdot}{\qquad}$$

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

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

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

DMA Name or ID	BMP Name or ID
D-1 (Roofs)	BMP-1 Biofiltration
D-2 (Driveways, Walkways, & Patios)	BMP-1 Biofiltration
D-3 (Roads, Curbs, Gutters & Sidewalks)	BMP-1 Biofiltration
D-4 (Landscaped with Irrigation Area)	BMP-1 Biofiltration

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:		

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: 29,808 sf

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

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

Total Area of Impervious Surfaces: 330,615 sf

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

Enter your EIATIA factor: 0.79

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

Minimum required irrigated area: 261,189 sf

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)
261,189 sf	29,808 sf

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: 100

Project Type: COMMERCIAL

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

Total Area of Impervious Surfaces: 330,615 sf = 7.59 ACRES

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: 98

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: 744

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)
744	100

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: Projected Average Daily Use (gpd)

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: Insert Area (Acres)

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: Enter Value

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: Minimum use required (gpd)

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)**
Minimum use required (gpd)	Projected Average Daily Use (gpd)

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	
D-1	☐	☐	☐	☒	☐
D-2	☐	☐	☐	☒	☐
D-3	☐	☐	☐	☒	☐
D-4	☐	☐	☐	☒	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

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

N/A

D.5 LID BMP Sizing

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

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
D-1	*72,405*	*Roofs*	*1.0*	*0.89*	*64,440*			
D-2	*32,115*	*Concrete*	*1.0*	*0.89*	*28,582*			
D-3	*177,289*	*Concrete & Asphalt*	*1.0*	*0.89*	*157,787*			
D-4	*78,614*	*Landscaping*	*0.1*	*0.11*	*8,648*			
						Design Storm Depth (in)	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	360,423				259,458	0.58	10,516	10,750

[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]
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]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$F = \frac{D \times E}{G}$	[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]
BMP-1 Biofiltration Basin	Bacterial Indicators Nutrients Pesticides Sediments Trash & Debris Oil & Gas	Medium Medium Unknown Medium High 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	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

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

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

F.2 HCOC Mitigation

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

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

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

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

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

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
Onsite Storm Dain Inlet	Mark all inlets with "Only Rain in the Storm Drain" or similar	Maintain and periodically repaint or replace inlet markings
Need for Future Indoor & Outdoor Pest Control	Design buildings and feature that discourage use and entry by pests	Provide integrated pest management information to owners, lessees and operators
Landscape/Outdoor Pesticide Use	Design landscaping to minimize irrigation and runoff, to promote surface infiltration and to minimize discharge of pesticides	Maintain landscaping using minimal or no pesticides.
Roofing, Gutters and Trim	Avoid using unprotected metal	

Section H: Construction Plan Checklist

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

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
BMP No. 1	BMP-1 Detention Basin	TBD
BMP No. 2	Storm Drain Marking	TBD
BMP No. 3	Design Buildings and Structures to Discourage Use and Entry by Pests	TBD
BMP No. 4	Design Landscaping to Minimize Irrigation and Runoff to Promote Surface Infiltration and to Minimize Discharge of Pesticides	TBD

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

Section I: Operation, Maintenance and Funding

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

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

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

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

Maintenance Mechanism: The proposed Home Owners' Association for the project will be the maintenance mechanism that will be used for the continued maintenance of the BMPs.

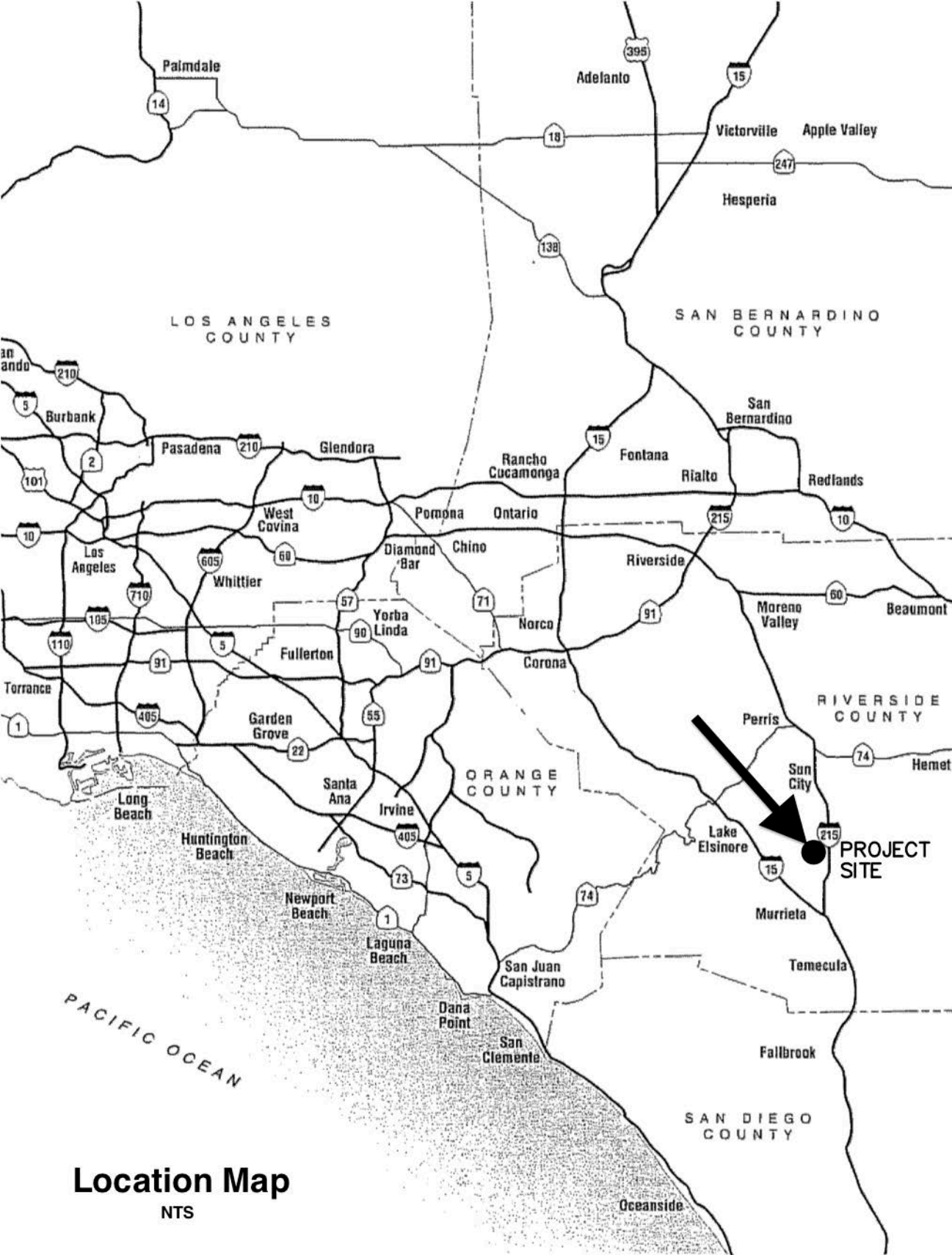
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

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

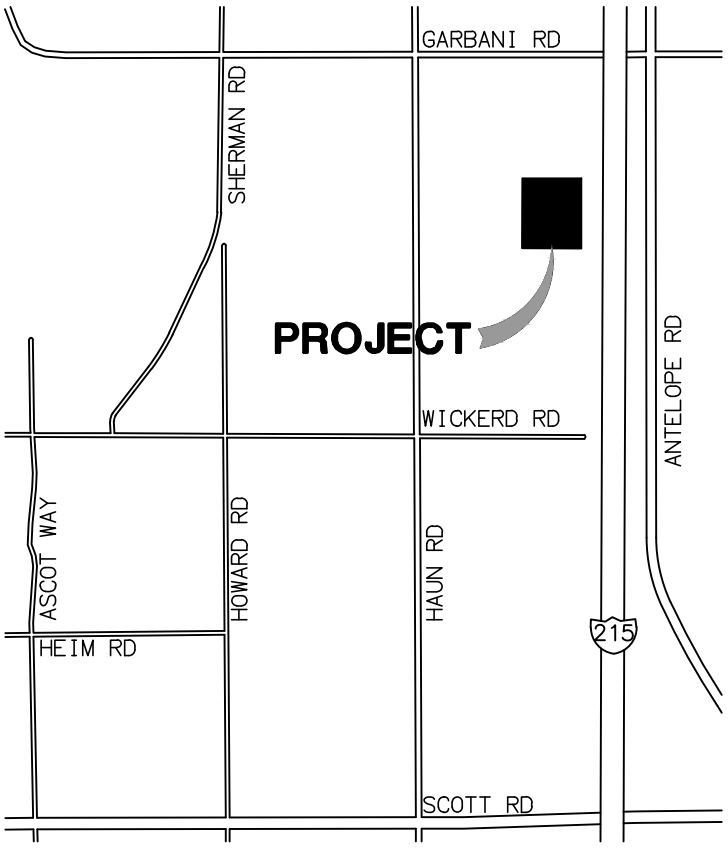
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



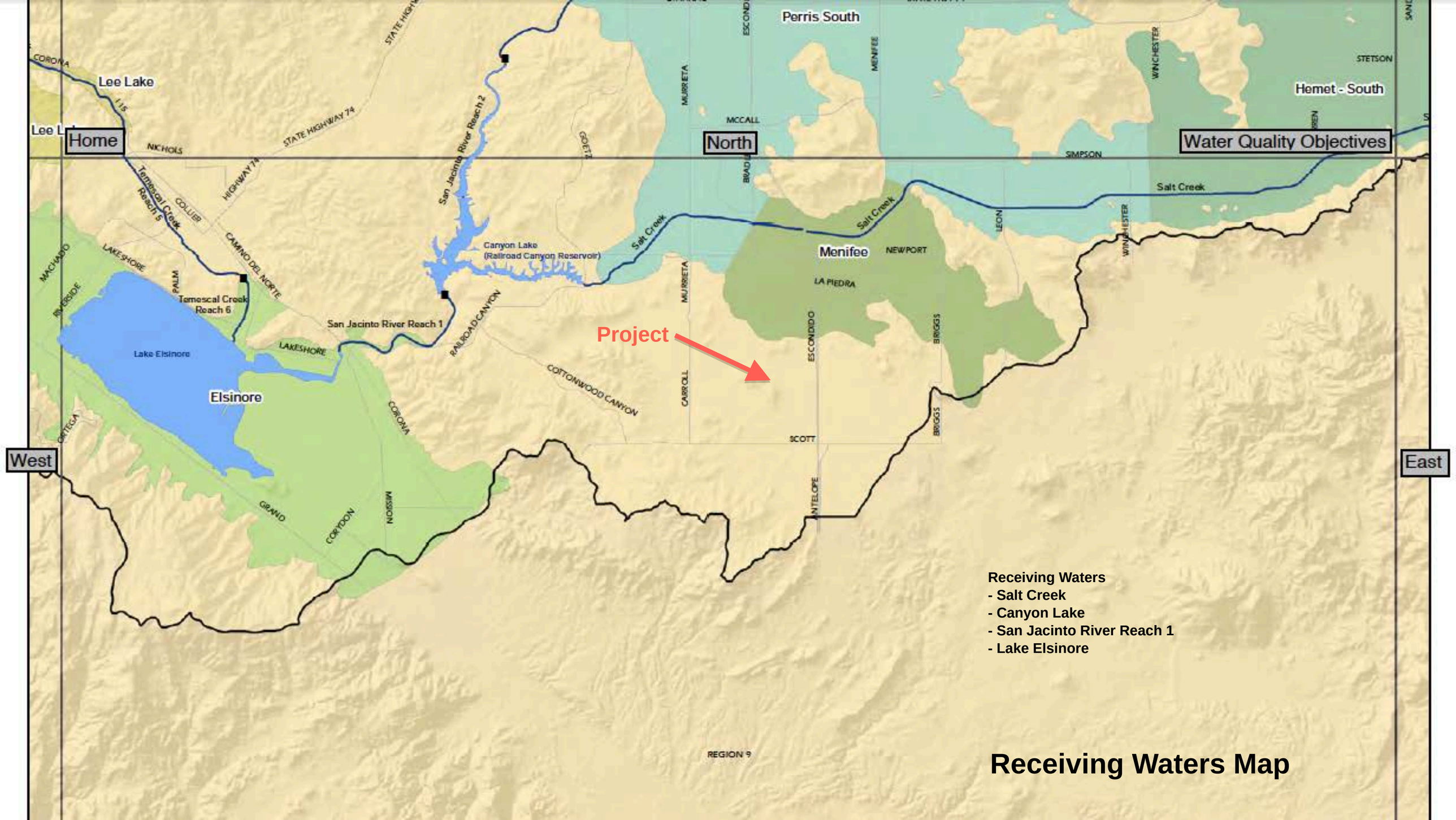
Location Map

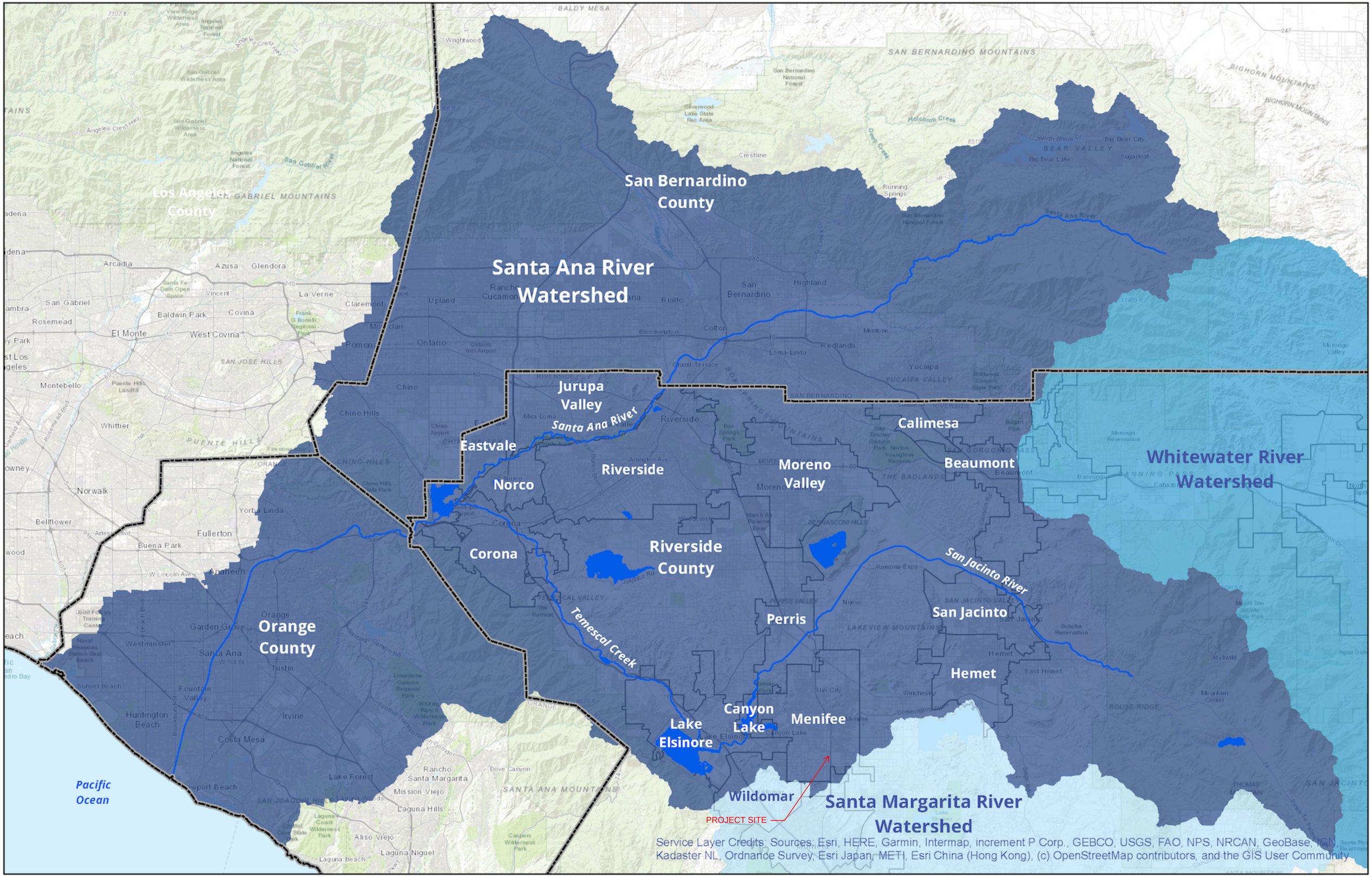
NTS



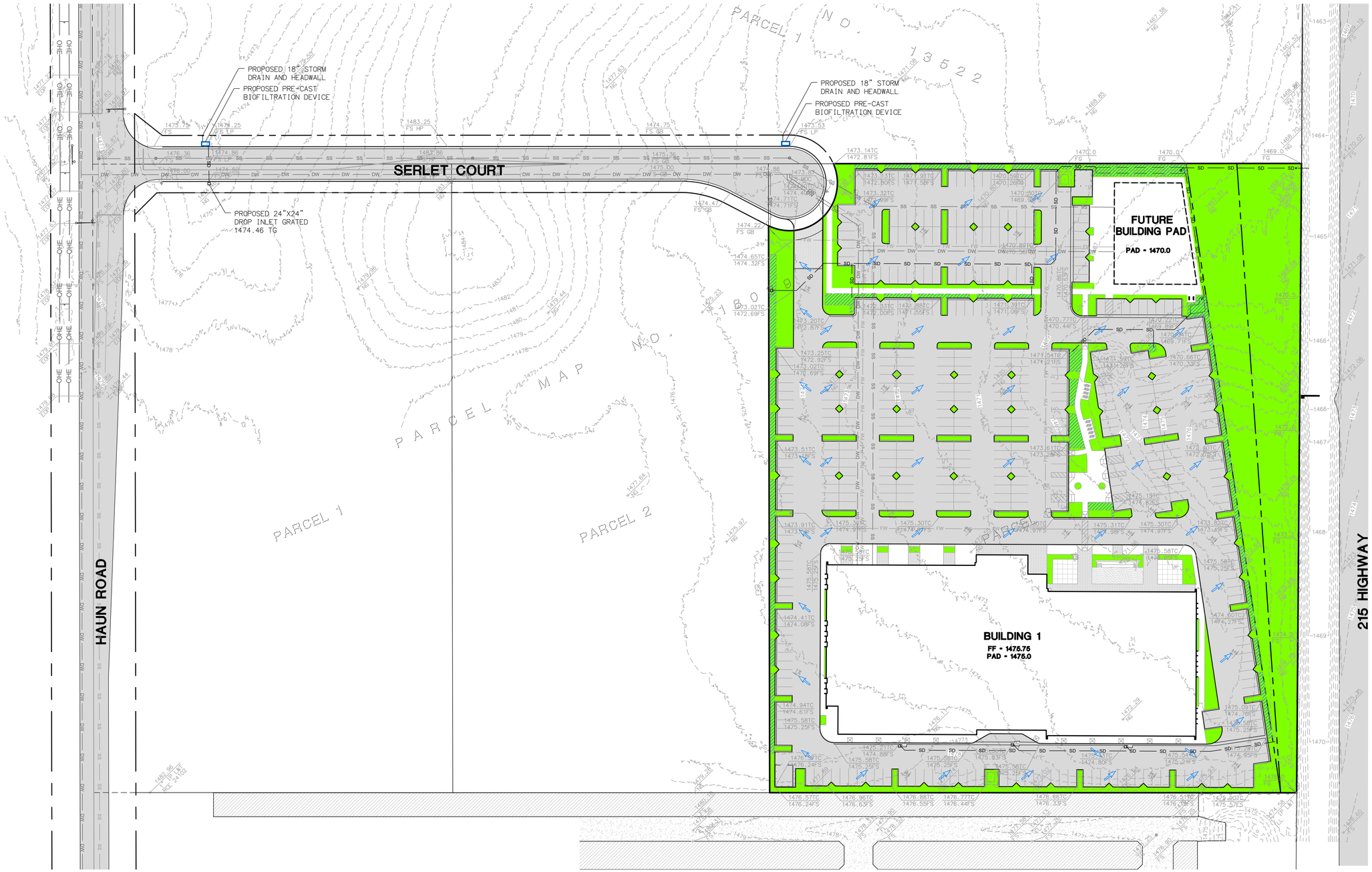
VICINITY MAP

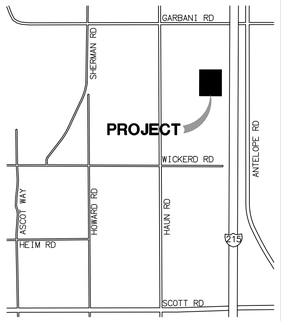
NTS


Home
North
Water Quality Objectives
West
East
Project
Receiving Waters
- Salt Creek
- Canyon Lake
- San Jacinto River Reach 1
- Lake Elsinore
Receiving Waters Map
Perris South
Hemet - South
Lee Lake
Canyon Lake
(Railroad Canyon Reservoir)
Menifee
Elsinore
Lake Elsinore
Salt Creek
San Jacinto River Reach 2
San Jacinto River Reach 1
Temescal Creek
Reach 6
Temescal Creek
Reach 5
STATE HIGHWAY 74
HIGHWAY 74
I-15
NICHOLS
MCCALL
SIMPSON
NEWPORT
LA PIEDRA
COTTONWOOD CANYON
RAILROAD CANYON
CAMINO DEL NORTE
LAKESHORE
COLLIER
MURRIETA
MENIFEE
WINCHESTER
LEON
ESCONDIDO
BRIGGS
CARROLL
ANTELOPE
SCOTT
CORONA
GRAND
CORYDON
MISSION
ORTEGA
MACHADO
RIVERSIDE
PALM
REGION 9


San Bernardino County
Santa Ana River Watershed
Los Angeles County
Orange County
Riverside County
Jurupa Valley
Eastvale
Norco
Corona
Riverside
Moreno Valley
Calimesa
Beaumont
Perris
San Jacinto
Hemet
Lake Elsinore
Canyon Lake
Menifee
Wildomar
Whitewater River Watershed
Santa Margarita River Watershed
Santa Ana River
San Jacinto River
Temescal Creek
Pacific Ocean
PROJECT SITE
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

FITWELL HEALTH CAMPUS MENIFEE
PRELIMINARY WQMP SITE PLAN





VICINITY MAP
NTS

LEGEND:

- EX PALM TREE
- EX TREE
- EX SEWER MANHOLE
- EX STREETLIGHT
- EX FIRE HYDRANT
- EX UTILITY BOX
- EX STORM DRAIN MANHOLE
- EX CATCH BASIN
- EX POWER POLE
- EX TRAFFIC LIGHT
- EX UNDERGROUND UTILITY VAULT
- EX IRRIGATION METER
- EX ELECTRICAL METER
- EX WATER VALVE COVER
- EX WATER METER
- EX MANHOLE
- EX STREET SIGN
- EX BOLLARD
- EX FREEWAY SIGN
- EX TRANSFORMER
- EX FIRE WATER STRUCTURE
- EX GAS STRUCTURE
- EX GAS VALVE
- EX PROPERTY BOUNDARY
- EX STREET CENTERLINE
- EX RIGHT-OF-WAY
- EX PROPERTY LINE
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- SS EX SEWER LINE
- DW EX DOMESTIC WATER LINE
- FW EX FIRE WATER LINE
- RW EX RECYCLED WATER LINE
- SD EX STORM DRAIN LINE
- OHE EX OVERHEAD ELECTRIC
- UE EX UNDERGROUND ELECTRIC
- EX GAS LINE
- EX IRON FENCE
- EX CHAIN LINK FENCE
- EX WOOD FENCE
- EX BLOCK WALL
- EX PLANTER WALL
- EX RETAINING WALL
- EX CURB AND GUTTER
- EX SLOPE
- EX CONCRETE
- EX STRUCTURE FOOTPRINT
- EX ASPHALT
- EX POOL
- EX TENNIS COURT
- EX STRIPING
- PR CURB
- PR EDGE OF PAVEMENT
- PR BUILDING FOOTPRINT
- PROPOSED ASPHALT

GENERAL WQMP NOTES

1. BMP INFILTRATION TEST COMPLETED BY LOR GEOTECHNICAL GROUP, INC. USING THE PORCHET METHOD. RESULTS WERE 0.03 IN/HR PER APRIL 4, 2023 REPORT. PER RESULTS, INFILTRATION BMPS ARE NOT FEASIBLE.
2. BMP ANALYSIS OF HARVEST AND REUSE COMPLETED AND SHOWS THAT HARVEST AND REUSE IS NOT FEASIBLE BECAUSE AREA OF IRRIGATED LANDSCAPE IS TOO SMALL FOR THE VOLUME OF POTENTIAL WATER TO BE CAPTURED AND USED.
3. BMP TO BE USED FOR PROJECT IS BIOFILTRATION. SITE HAS BEEN DESIGNED TO DRAIN TO LANDSCAPE AREAS WITH BIOFILTRATION SWALES.

WQMP LEGEND:

- PROPOSED PERVIOUS AREAS
- SURFACE FLOW DIRECTION
- BIOFILTRATION SWALE
- BIOFILTRATION DEVICE (PRE-FAB)

PERVIOUS/IMPERVIOUS AREA TABLE

PROPOSED PERVIOUS AREAS	78,614 SF
PROPOSED IMPERVIOUS AREAS	281,809 SF
TOTAL AREA	360,423 SF

WQMP BMP AREA

PROPOSED BIOFILTRATION SWALE AREA	8,917 SF
PROPOSED BIOFILTRATION SWALE VOLUME	13,376 CF

IMPERVIOUS AREAS

BUILDING IMPERVIOUS AREAS	64,097 SF
FUTURE BUILDING IMPERVIOUS AREAS	8,308 SF
ASPHALT IMPERVIOUS AREAS	177,289 SF
CONCRETE IMPERVIOUS AREAS	32,115 SF
TOTAL IMPERVIOUS AREAS	281,809 SF

PERVIOUS AREAS

BIOFILTRATION AREAS	8,917 SF
PLANTERS	69,697 SF
TOTAL PERVIOUS AREAS	78,614 SF

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

SCALE 1"=50'

50 25 0 50 100 150
SCALE: 1"=50'

ADVANCED CIVIL GROUP

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SEAL–ENGINEER

REGISTERED PROFESSIONAL ENGINEER
R. STEVEN AUSTIN
No. 68795
CIVIL
STATE OF CALIFORNIA

FITWELL HEALTH CAMPUS MENIFEE
PRELIMINARY WQMP SITE PLAN
APN: 360-350-014
MENIFEE, CA

DRAWN BY: JRW
DESIGNED BY: JRW
CHECKED BY: RSA
APPROVED BY: RSA
DATE: 6/9/2025
REVISIONS:

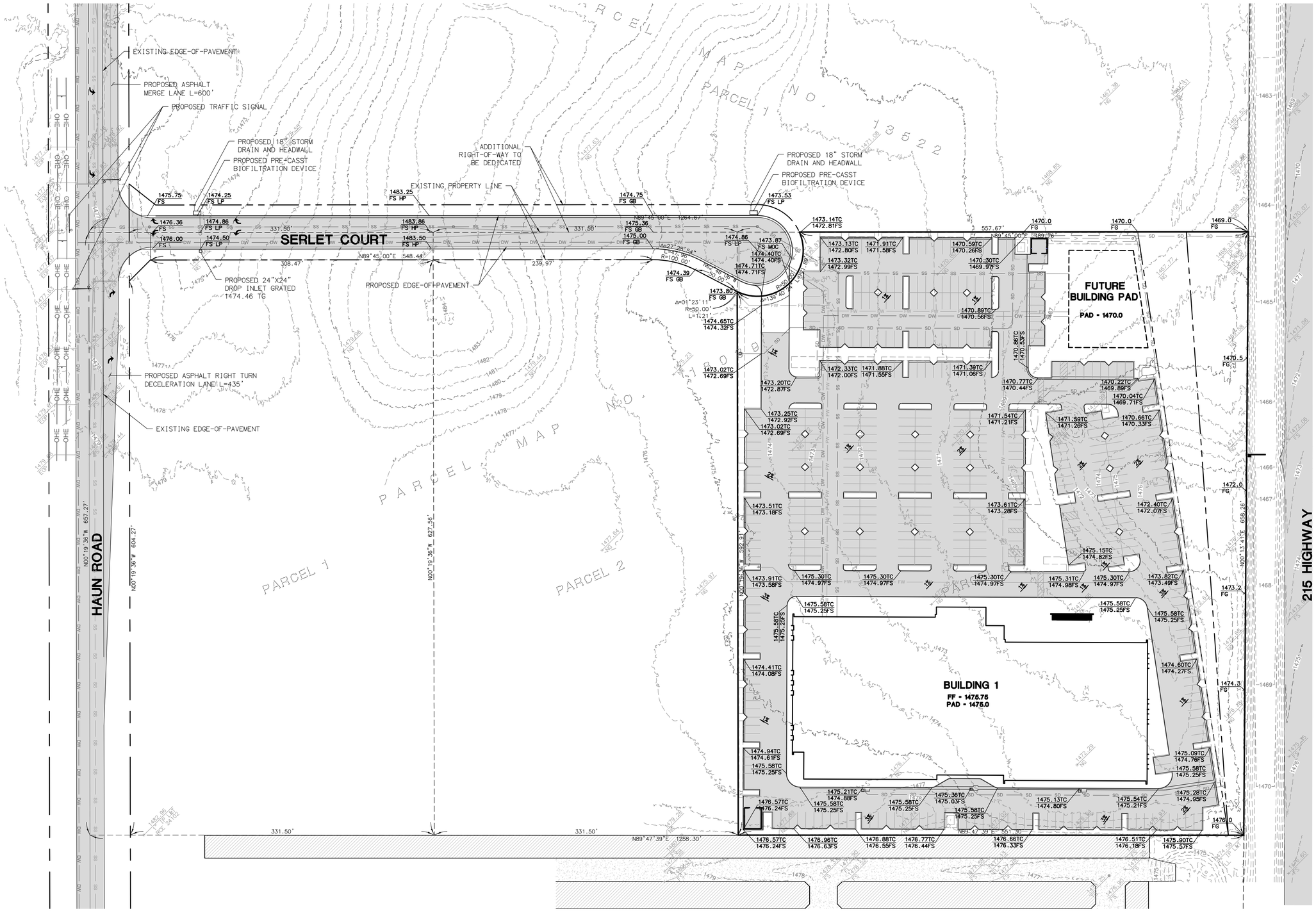
PROJECT NUMBER: 1010602

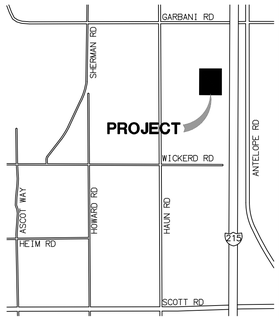
SHEET NO.
C-5
5 OF 6

Appendix 2: Construction Plans

Grading and Drainage Plans

FITWELL HEALTH CAMPUS MENIFEE
PRELIMINARY GRADING AND DRAINAGE PLAN





VICINITY MAP
NTS

LEGEND:

- EX PALM TREE
- EX TREE
- EX SEWER MANHOLE
- EX STREETLIGHT
- EX FIRE HYDRANT
- EX UTILITY BOX
- EX STORM DRAIN MANHOLE
- EX CATCH BASIN
- EX POWER POLE
- EX TRAFFIC LIGHT
- EX UNDERGROUND UTILITY VAULT
- EX IRRIGATION METER
- EX ELECTRICAL METER
- EX WATER VALVE COVER
- EX WATER METER
- EX MANHOLE
- EX STREET SIGN
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- EX MINOR CONTOUR
- EX SEWER LINE
- EX DOMESTIC WATER LINE
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- EX RECYCLED WATER LINE
- EX STORM DRAIN LINE
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- EX UNDERGROUND ELECTRIC
- EX GAS LINE
- EX IRON FENCE
- EX CHAIN LINK FENCE
- EX WOOD FENCE
- EX BLOCK WALL
- EX PLANTER WALL
- EX RETAINING WALL
- EX CURB AND GUTTER
- EX SLOPE
- EX CONCRETE
- EX STRUCTURE FOOTPRINT
- EX ASPHALT
- EX POOL
- EX TENNIS COURT
- EX STRIPING
- PR CURB
- PR EDGE OF PAVEMENT
- PR BUILDING FOOTPRINT
- PROPOSED ASPHALT

SCALE: 1"=50'

BENCHMARK:

DESCRIBED BY RIVERSIDE COUNTY CALIFORNIA 1968
7.5 MI N FROM MURRIETA. 0.2 MILES SOUTH ON WASHINGTON AVE. FROM THE POST OFFICE IN MURRIETA, 2.4 MILES EAST ON LOS ALAMOS RD., 4.8 MILES NORTH ON HWY. 395, 0.1 MILE WEST ON SCOTT RD., 78 FT. SOUTH-EAST OF POWER POLE 312098-S, 60 FT. SOUTH OF SCOTT RD., 4 FT. NORTH-WEST OF THE NORTH-EAST CORNER OF A PUMP HOUSE, 2 FT. WEST OF A MARKER POST. SET A BRASS DISK IN THE TOP OF A CONCRETE POST.

ELEV: 1520.00'

BASIS OF BEARINGS:

CENTERLINE OF HAUN ROAD N00°19'36"W PER PARCEL MAP NO. 18039 RECORDED IN THE COUNTY OF RIVERSIDE, BOOK 83 PAGES 75 AND 76.

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING

IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

ADVANCED CIVIL GROUP

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SEAL-ENGINEER

REGISTERED PROFESSIONAL ENGINEER
R. STEVEN AUSTIN
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STATE OF CALIFORNIA

FITWELL HEALTH CAMPUS MENIFEE
PRELIMINARY GRADING AND DRAINAGE PLAN
APN: 360-350-014
MENIFEE, CA

DRAWN BY: JRW
DESIGNED BY: JRW
CHECKED BY: RSA
APPROVED BY: RSA
DATE: 3/28/2025
REVISIONS:
PROJECT NUMBER: 1010602

SHEET NO.
C-4
4 OF 6

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

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

PRELIMINARY GEOTECHNICAL AND INFILTRATION FEASIBILITY INVESTIGATION PROPOSED FITWELL CAMPUS APN 360-350-014 MENIFEE, CALIFORNIA

PROJECT NO. 13906.1
APRIL 4, 2023

Prepared For:

N.T. Thomas Construction, Inc.
P.O. Box 5810
Orange, California 92863

Attention: Mr. Nick Thomas, LEED, AP

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

April 4, 2023

N.T. Thomas Construction, Inc.
P.O. Box 5810
Orange, California 92863

Project No. 13906.1

Attention: Mr. Nick Thomas, LEED AP

Subject: Preliminary Geotechnical and Infiltration Feasibility Investigation, Proposed Fitwell Campus, APN 360-350-014, Menifee, California.

LOR Geotechnical Group, Inc., is pleased to present this report of our geotechnical investigation for the subject project. In summary, it is our opinion that the proposed development is feasible from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction. However, the contents of this summary should not be solely relied upon.

To provide adequate support for the proposed structures and structural improvements, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. Any undocumented fill material and any loose, compressible alluvial materials should be removed from structural areas and areas to receive engineered compacted fills. The data developed during this investigation indicates that removals ranging from approximately 2 to 7 feet will be required from currently planned development areas. The given removal depths are preliminary and the actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Low expansion potential and poor R-value quality content generally characterize the upper onsite materials tested. Near completion and/or at the completion of site grading, additional foundation and subgrade soils should be tested, as necessary, to verify their expansion potential, soluble sulfate content, and R-value quality.

Non-conducive infiltration rates were obtained for the earth materials tested.

LOR Geotechnical Group, Inc.

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INTRODUCTION

During March and April of 2023, a Preliminary Geotechnical and Infiltration Feasibility Investigation was performed by LOR Geotechnical Group, Inc., for the proposed Fitwell Campus project, Assessor's Parcel Number (APN) 360-350-014, in Menifee, California. The purpose of this investigation was to provide a technical evaluation of the geologic setting of the site and to provide geotechnical design recommendations for the proposed development. The scope of our services included:

- Review of available geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Interpretation of aerial photographs of the site and surrounding regions dated 1938 through 2022;
- Geologic field reconnaissance mapping to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed;
- A subsurface field investigation to determine the physical soil conditions pertinent to the proposed development;
- Percolation testing via the borehole test method to determine Infiltration characteristics;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of geotechnical recommendations for site grading and foundation design; and
- Preparation of this report summarizing our findings, and providing conclusions and recommendations for site development.

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

PROJECT CONSIDERATIONS

To orient our investigation at the site, a Conceptual Plan prepared by AO Architecture, dated September 15, 2022, and an Ortho Photo with Boundary map, prepared by Advanced Civil Group, Inc., and dated February 28. 2023, were furnished for our use. The current site conditions and elevations were reflected in the topographic map while the

proposed building configuration and associated driveway, parking, and landscape areas were indicated on the Conceptual Plan. A composite of these two drawings was utilized as a base map for our field investigation and is presented as Enclosure A-2, within Appendix A.

As noted on the conceptual site development plan, proposed improvements to the 8.38 acre parcel include a 65,200 square foot (sf) gym, an 80,000 sf event center, a 5,000 sf museum, a 22,000 sf health and wellness office building, asphalt concrete/Portland cement concrete paved parking including 475 spaces, and landscaping. Although no site grading or construction drawings are currently available, we understand that the buildings will likely be one to two stories in height and of masonry, steel, and/or wood frame construction. In addition, infiltration of onsite runoff waters for WQMP purposes is proposed for within the northeast portion of the site.

AERIAL PHOTO ANALYSIS

The aerial photographs reviewed consisted of vertical aerial photograph images of varying scales. We reviewed imagery available from Google Earth Pro (2023) computer software and from online Historic Aerials (2023).

To summarize briefly, the site remained vacant land from prior to 1938 through today. The site was utilized for the majority of this time for farming (mostly dry land farming) purposes and evidence for minor disturbances to the property due to plowing and removal of surface rocks is apparent on some of the photographs reviewed. No evidence for the presence of faults traversing the site area or mass movement features was noted during our review of the photographs covering the site and nearby vicinity.

EXISTING SITE CONDITIONS

The approximately10-acre site is located east of Haun Road and south of Garbani Road in the Menifee area of Riverside County, Riverside. The property consists of the southeast portion of a large area of vacant, dry-farmed land that currently extends north to Garbani Road and west Haun Road. Other than a few piles of soils and rocks in the central-northeastern portion, the site is absent of apparent man-made features. A remnant drainage course traverses the site from the southeast corner, toward the central portion, and then in a northeast direction before exiting the property. Near the center of the site, a lone tree is present in this drainage area. Otherwise, the site is covered by a recently planted, dry-farmed crop. Topographically, the property consists of gently rolling terrain with local highs in the southwest and central-eastern portions and low lying areas generally

present west of the onsite drainage. The site is bordered on the south by a self-storage facility and on the east by the 215 freeway.

SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on March 7, 2023. The work consisted of advancing a total of 12 exploratory borings using a truck-mounted drill rig equipped with 8-inch diameter hollow stem augers. In addition, two borehole percolation tests were conducted in general accordance with the Shallow Percolation Test procedure as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The approximate locations of our exploratory borings and percolation tests are presented on Enclosure A-2, within Appendix A.

The subsurface conditions encountered in the exploratory borings were logged by a State licensed geologist from this firm. The borings were drilled to depths ranging from 6.5 and 26.5 feet below the existing ground surface. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 5 feet, and returned to our geotechnical laboratory in sealed containers for further testing and evaluation.

Percolation test borings were drilled to the requested depth of approximately 3 feet below the existing ground surface at the requested locations on March 8, 2023.

A detailed description of the subsurface field exploration program and the boring logs is presented in Appendix B, while a detailed description of our borehole percolation testing program and the test results are presented in Appendix C.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to geotechnical laboratory testing to evaluate their physical and engineering properties. Laboratory testing included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, Atterberg limits, consolidation, and corrosion. Physical testing was conducted in our geotechnical laboratory and chemical testing was conducted by our subconsultant, Project X Corrosion Engineering. A detailed description of the geotechnical laboratory testing program and the test results are presented in Appendix D.

GEOLOGIC CONDITIONS

Regional Geologic Setting

The subject site is located upon the Perris block within the Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges Geomorphic Province is a very large mass of crystalline igneous rocks of Cretaceous age and pre-batholithic metasedimentary and metavolcanic rocks of older ages, and is characterized by northwest-southeast trending fault zones which separate elongated structural blocks. These active fault zones typically consist of high angle, right-lateral, strike slip faults. The Perris block has a series of erosional surfaces, marked by low topographic relief and capped with unconsolidated alluvial sediments that have been eroded from the surrounding highlands. The subject site is situated in Menifee Valley, one of many alluviated valley within the Perris Block. While the Perris block is considered to be a relatively stable structural block, it is bounded by active faults. These include the Elsinore fault zone on the southwest, the San Jacinto fault zone on the northeast, and the Cucamonga fault zone on the north. The southeast boundary of the Perris Block is vague, but is believed to coincide with a complex group of faults extending southeast from Murrieta. The nearest is the Elsinore fault zone located approximately 11 kilometers (6.8 miles) to the southwest. The San Jacinto fault zone is located approximately 22 kilometers (13.7 miles) to the northeast while the San Andreas fault is located approximately 47 kilometers (29.5 miles) to the northeast and the Cucamonga fault is located approximately 63 kilometers (39 miles) to the north.

The geology of the site and surrounding region as mapped by Morton (2003) is shown on the attached Regional Geologic Map, Enclosure A-3 within Appendix A. As shown, the site in underlain by young and old alluvial fan deposits as well as igneous bedrock.

Site Geologic Conditions

As noted during this investigation, the subject site contains minor, local fill soils overlying older alluvial materials, and granitic bedrock locally at shallow to moderate depths. These units are described in further detail in the following sections.

Fill: As observed during our investigation, minor fill soils are present locally within the central-eastern portion of the site. This mainly consists of a pile of soils and rocks on the northwest side of an elevated knob in the east-central area and there is evidence that fill soils have been placed within the drainage course that traverses the site roughly from south to north. The rocks range from gravel to boulder size (up to about 3 feet in diameter)

and are mixed within the soil materials. The soils appear to be mostly onsite derived, however, we noted that there are minor areas that include concrete and rock materials that were imported from offsite areas. The fill materials are loose and exist in an non-engineered manner.

Older Alluvium: Beneath the vast majority of the site, older alluvial materials were encountered. The older alluvium was noted to be composed primarily of silty sand, sandy silt with clay, and sandy lean clay of low plasticity. The older alluvial materials were mostly moist, generally brown to reddish-brown in color, and generally massive to poorly layered. Based on our field observations, in-situ density tests, and Standard Penetration Test (SPT) data, it was noted that the older alluvium is generally in a loose/soft to medium dense/stiff state. In addition, expansion index testing performed on a clayey sample of older alluvium showed that these units have a low expansion potential.

Granitic Bedrock

Granitic bedrock was encountered within all of our exploratory borings at depths ranging from 1.5 to 23 feet beneath the surface. The bedrock ranges from monzogranite to granodiorite in composition and is generally fine to coarse grained, yellowish-brown to grayish-brown in color, and typically had a 1 to 3 foot thick weathered and slightly decomposed surface that gradually became fresher with increasing depth. Bedrock was found to be the shallowest below the surficial fill and/or older alluvial soils within the eastern and southwestern-southern portions and deepest in the southwest-central portions.

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

Details and results of our laboratory testing program are presented within Appendix D of this report.

Groundwater Hydrology

Within the site area, groundwater was encountered within several of our borings as water locally perched upon the underlying bedrock. In our exploratory borings, bedrock ranged in depth from approximately 1 to 23 feet beneath the surface. In the lower portions of the property, the perched groundwater was encountered at depths ranging from approximately 14 to 19 feet. However, there is no true groundwater table present at the subject property. Groundwater flow direction is likely variable, but is likely to the northeast.

According to the Department of Water Resources online Water Data Library (2023), the closest groundwater well to the subject property is located approximately 1.1 miles to the south-southeast. This groundwater well, State Well No. 06S03W23E001S, has one groundwater level measurement from December 1993 at approximately 21 feet bgs. Online GeoTracker (2023) records for the GTE-Murrieta Plant Yard at 32477 Haun Road, a Leaking Underground Storage Tank site located approximately 0.25 mile southwest of the subject property, had four groundwater monitoring wells with groundwater levels ranging from approximately 13 to 17 feet bgs during the time period from June to December 1998. Groundwater flow direction at this GTE site was estimated from north-northeast to northeast. Bedrock (decomposed granite) encountered in the borings for these groundwater monitoring wells ranged from approximately 12 to 27.5 feet bgs.

Mass Movement

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

Faulting

No active or potentially active faults are known to exist at the subject site. In addition, the subject site does not lie within a current State of California Earthquake Fault Zone (Hart and Bryant, 2003) nor does the site lie within a County of Riverside fault zone. No evidence of faulting projecting into or crossing the site was noted during our aerial photograph review or our review of published geologic maps.

As previously mentioned, the Elsinore fault zone is the closest active fault and it is located approximately 11 kilometers (6.8 miles) to the southwest. Two significant faults are located to the northeast and these are the San Jacinto and the San Andreas faults, located approximately 22 kilometers (13.7 miles) and approximately 47 kilometers (29.5 miles) to the northeast. In addition, the Cucamonga fault is located approximately 63 kilometers (39 miles) to the north.

The Elsinore fault zone is one of the largest in southern California. The primary sense of slip along the Elsinore fault is right lateral strike-slip. It is believed that the Elsinore fault zone is capable of producing an earthquake magnitude on the order of 6.5 to 7.5.

The San Jacinto fault is one of the major tectonic features in the region, second only to the San Andreas in terms of length, slip rate, and potential earthquakes. The fault extends from the east end of the San Gabriel Mountains southeast into Mexico. Within the Peninsular Ranges Province, this fault serves as the eastern boundary of the aforementioned Perris Block. It is one of the most active faults in California. It is believed that the San Jacinto fault is capable of producing an earthquake magnitude on the order of 6.7 or greater.

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

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

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

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search website of the U.S.G.S. (2022). This website conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto a map. At the time of our search, the database contained data from January 1, 1932 through March 28, 2023.

In our first search, the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of

moderate to large events. As depicted on Enclosure A-4, within Appendix A, the site lies within a relatively active region associated with the San Andreas fault and various Mojave Desert fault to the east.

In the second search, the micro seismicity of the area lying within a 15 kilometer (9.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 1.0 and greater since 1978. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the time period for the events on the detail map is to enhance the accuracy of the map. Events recorded prior to the mid to late1970's are generally considered to be less accurate due to advancements in technology. As depicted on this map, Enclosure A-5, a few events are present in the area, none appear to be associated with any known faults.

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

Secondary Seismic Hazards

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

Liquefaction: The potential for liquefaction generally occurs during strong ground shaking within granular loose sediments where the depth to groundwater is usually less than 50 feet below the ground surface. Although shallow groundwater in the form of water perched upon the underlying bedrock is known to exist at the site, hard bedrock is present at shallow depth. In addition, the remedial grading recommendations outlined in subsequent portions of this report are anticipated to mitigate any near surface loose (soft) soil conditions. Therefore, the possibility for liquefaction to be a potential hazard at the site is considered nil.

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

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

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

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

Seismically-Induced Settlement: Settlement generally occurs within areas of loose, granular soils with relatively low density. Since the site is underlain by relatively dense to alluvial materials, the potential for settlement is considered very low. In addition, the recommended earthwork operations to be conducted during the development of the site should mitigate any near surface loose (soft) soil conditions.

SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2022)

Design requirements for structures can be found within Chapter 16 of the 2022 California Building Code (CBC) based on building type, use, and/or occupancy. The classification of use and occupancy of all proposed structures at the site, shall be the responsibility of the building official.

Site Classification

Chapter 20 of the ASCE 7-16 defines six possible site classes for earth materials that underlie any given site. Bedrock is assigned one of three of these six site classes and these are: A, B, or C. Soil is assigned as C, D, E, or F. Per ASCE 7-16, Site Class A and Site Class B shall be measured on-site or estimated by a geotechnical engineer, engineering geologist or seismologist for competent rock with moderate fracturing and weathering. Site Class A and Site Class B shall not be used if more than 10 feet of soil is between the rock surface and bottom of the spread footing or mat foundation. Site Class C can be used for very dense soil and soft rock with Ñ values greater than 50 blows per foot. Site Class D can be used for stiff soil with Ñ values ranging from 15 to 50 blows per foot. Site Class E is for soft clay soils with Ñ values less than 15 blows per foot. Our investigation, mapping by others, and our experience in the site region indicates that the materials beneath the site are considered Site Class C, very dense soil and soft rock.

CBC Earthquake Design Summary

Earthquake design criteria have been formulated in accordance with the 2022 CBC and ASCE 7-16 for the site based on the results of our investigation to determine the Site Class and an assumed Risk Category II. However, these values should be reviewed and the final design should be performed by a qualified structural engineer familiar with the region. In addition, the building official should confirm the Risk Category utilized in our design (Risk Category II). Our design values are provided below:

CBC 2022 SEISMIC DESIGN SUMMARY* Site Location (USGS WGS84) 33.6533, -117.1726, Risk Category II	
Site Class Definition Chapter 20 ASCE 7	C
$\mathbf{S_s}$ Mapped Spectral Response Acceleration at 0.2s Period	1.389
$\mathbf{S_1}$ Mapped Spectral Response Acceleration at 1s Period	0.514
$\mathbf{S_{MS}}$ Adjusted Spectral Response Acceleration at 0.2s Period	1.667
$\mathbf{S_{M1}}$Adjusted Spectral Response Acceleration at 1s Period	0.764
$\mathbf{S_{DS}}$ Design Spectral Response Acceleration at 0.2s Period	1.111
$\mathbf{S_{D1}}$ Design Spectral Response Acceleration at 1s Period	0.510
$\mathbf{F_a}$ Short Period Site Coefficient at 0.2s Period	1.200
$\mathbf{F_v}$ Long Period Site Coefficient at 1s Period	1.486
$\mathbf{PGA_M}$ Site Modified Peak Ground Acceleration	0.71
Seismic Design Category	D
*values obtained from OSHPD Seismic Design Maps	

CONCLUSIONS

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

It should be noted that the subsurface conditions encountered in our exploratory borings are indicative of the locations explored and the subsurface conditions may vary. If conditions are encountered during the construction of the project that differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided.

Foundation Support

To provide adequate support for the proposed structures, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. The construction of this compacted fill mat will allow for the removal of any existing fill material that is present locally.

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

Soil Expansiveness

Our expansion index testing of a representative sample of the on-site soils indicates a low expansion potential. For low expansive soils, specialized construction procedures to resist expansive soil activity are considered necessary and are provided within the following sections of this report.

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

Corrosion Screening

Select representative samples from our borings were taken to Project X Corrosion Engineering for full corrosion series testing. Results from soil corrosivity testing completed by Project X Corrosion Engineering are presented within Appendix D.

The corrosivity test results indicate that soluble sulfate concentrations in the samples was less than 0.10 percent by weight. These concentrations indicate an exposure class S0 for sulfate (ACI 318). No special mitigation methods are considered necessary.

The corrosivity test results indicate that chloride concentrations were below 500 ppm. This concentration indicates an exposure class C1 for chloride (ACI 318). Special mitigation measures are not considered necessary.

Soil pH for the samples was 8.0 to 8.1, slightly basic. Therefore, the need for specialized design is not anticipated.

Concentrations of ammonium and nitrate indicate the soil may be aggressive towards copper.

Resistivity results for the samples were in the mildly corrosive to corrosive range.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer could be consulted.

Infiltration

The results of our field investigation and percolation test data indicate that the site soils/bedrock materials at the depths and locations tested are not conducive to infiltration. Based on the results of this investigation, acceptable infiltration is also not anticipated to occur at other locations and depths due to the amount of silty/clayey fines present in much of the onsite soils, and/or the presence of hard, relatively impervious bedrock.

Geologic Mitigations

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

Seismicity

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

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

considered less significant than the faults described above from a ground motion standpoint.

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

No secondary seismic hazards are anticipated to impact the proposed development.

RECOMMENDATIONS

Geologic Recommendations

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

General Site Grading

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

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

All areas to be graded should be stripped of significant vegetation and other deleterious materials.

Any undocumented fill encountered during grading should be completely removed, cleaned of significant deleterious materials, and may be reused as compacted fill. It is our recommendation that any existing fills under any proposed flatwork and paved areas be

removed and replaced with engineered compacted fill. If this is not done, premature structural distress (settlement) of the flatwork and pavement may occur.

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

Initial Site Preparation

The existing fill material and any loose, compressible alluvial soils should be removed from all proposed structural and/or fill areas. The data developed during this investigation indicates that removals on the order of 2 to 7 feet deep will be required from proposed development areas in order to encounter competent alluvium or bedrock upon which engineered compacted fill can be placed. The given removal depths are preliminary. Deeper fills may be present locally. Removals should expose alluvial materials with an in-situ relative compaction of at least 85 percent (ASTM D 1557) or relatively fresh bedrock. The actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Preparation of Fill Areas

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

Engineered Compacted Fill

The onsite soils and bedrock materials should provide adequate quality fill material, provided they are free from oversized and/or organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills.

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

8-inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Preparation of Foundation Areas

All footings should rest upon at least 24 inches of properly compacted fill material placed over competent alluvium or bedrock. In areas where the required fill thickness is not accomplished by the recommended removals or by site rough grading, the footing areas should be further subexcavated to a depth of at least 24 inches below the proposed footing base grade, with the subexcavation extending at least 5 feet beyond the footing lines. The bottom of all excavations should be scarified to a depth of 12 inches, brought to near optimum moisture content, and recompacted to at least 90 percent relative compaction (ASTM D 1557) prior to the placement of compacted fill.

Concrete floor slabs should bear on a minimum of 24 inches of compacted soil. This should be accomplished by the recommendations provided above. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Short-Term Excavations

Following the California Occupational and Safety Health Act (CAL-OSHA) requirements, excavations 5 feet deep and greater should be sloped or shored. All excavations and shoring should conform to CAL-OSHA requirements. Short-term excavations of 5 feet deep and greater shall conform to Title 8 of the California Code of Regulations, Construction Safety Orders, Section 1504 and 1539 through 1547. Based on our exploratory borings, it appears that Type C soils and stable rock are the predominant type of soil on the project and all short-term excavations should be based on this type of soil.

Deviation from the standard short-term slopes are permitted using option 4, Design by a Registered Professional Engineer (Section 1541.1).

Short-term excavation construction and maintenance are the responsibility of the contractor and should be a consideration of his methods of operation and the actual soil and/or bedrock conditions encountered.

Slope Construction

Preliminary data indicates that cut and fill slopes should be constructed no steeper than two horizontal to one vertical. Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction, then roll the final slopes to provide dense, erosion-resistant surfaces.

Slope Protection

Since the site soil materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after completion. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Soil Expansiveness

Some of the alluvial materials encountered during this investigation were tested and found to have a low expansion potential. Therefore, specialized construction procedures to specifically resist expansive soil activity are anticipated at this time and are provided within the following sections of this report.

Additional evaluation of on-site and any imported soils for their expansion potential should be conducted following completion of the grading operation.

Foundation Design (Expansion Index 20-50)

If the site is prepared as recommended, the proposed buildings may be safely supported on conventional shallow foundations, either individual spread footings and/or continuous wall footings, bearing entirely on a minimum of 24 inches of engineered compacted fill placed over competent alluvial materials. All foundations should have a minimum width of 12 inches. Footings placed upon very low and low expansive soils should be established a minimum of 12 inches below lowest adjacent grade.

For the minimum width and depth, spread foundations may be designed using an allowable bearing pressure of 2,000 psf. This bearing pressure may be increased by 200 psf for each

additional foot of width, and by 500 psf for each additional foot of depth, up to a maximum of 4,000 psf. For example, a footing 2 feet wide and embedded 2 feet will have an allowable bearing pressure of 2,700 psf.

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

The resultant of the combined vertical and lateral seismic loads should act within the middle one-third of the footing width. The maximum calculated edge pressure under the toe of foundations subjected to eccentric loads or overturning should not exceed the increased allowable pressure.

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footings bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of 300 pounds per square foot per foot of depth. Base friction may be computed at 0.30 times the normal load. Base friction and passive earth pressure may be combined without reduction. These values are for dead load plus live load and may be increased by one-third for wind or seismic loading.

Footings on low expansive soils should be reinforced with a minimum of four # 4 rebars, two near the top and two near the bottom of the footings.

The preceding recommendations to counteract low expansive soil activity should be considered preliminary and should be revised upon the completion of the site grading. More stringent parameters for design of foundations on expansive soils can be specified by a structural engineer experienced in these matters.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly,

primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Building Area Slab-on-Grade

To provide adequate support, concrete floor slabs-on-grade should bear on a minimum of 24 inches of engineered fill compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces.

Prior to placing concrete, the upper 12-inches of the subgrade soil should be pre-saturated to 2 to 4 percent over optimum moisture content.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor retarder/barrier. We recommend that a vapor retarder/barrier be designed and constructed according to the American Concrete Institute 302.1R, Concrete Floor and Slab Construction, which addresses moisture vapor retarder/barrier construction. At a minimum, the vapor retarder/barrier should comply with ASTM E1745 and have a nominal thickness of at least 10 mils. The vapor retarder/barrier should be properly sealed, per the manufacturer's recommendations, and protected from punctures and other damage. Per the Portland Cement Association, for slabs with vapor-sensitive coverings, a layer of dry, granular material (sand) should be placed under the vapor retarder/barrier.

For slabs in humidity-controlled areas, a layer of dry, granular material (sand) should be placed above the vapor retarder/barrier.

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

Exterior Flatwork

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

To resist expansive soil forces, flatwork supported by low expansive soils should be reinforced with a minimum of # 3 rebar at 18 inches each way. Flatwork areas should be pre-saturated to 2 to 4 percent over optimum prior to placing concrete.

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

Wall Pressures

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

For design of retaining walls unrestrained against movement at the top, we recommend an active pressure of 55 pounds per square foot (psf) per foot of depth be used. This assumes level backfill consisting of compacted, non-expansive, soils placed against the structures and within the back cut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

Retaining structures subject to uniform surcharge loads within a horizontal distance behind the structures equal to the structural height should be designed to resist additional lateral loads equal to 0.50 times the surcharge load. Any isolated or line loads from adjacent foundations or vehicular loading will impose additional wall loads and should be considered individually.

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

Wall pressures should be verified prior to construction, when the actual backfill materials and conditions have been determined. Recommended pressures are applicable only to level, non-expansive, properly drained backfill with no additional surcharge loadings. If inclined backfills are proposed, this firm should be contacted to develop appropriate active earth pressure parameters.

Preliminary Pavement Design

Testing and design for preliminary onsite pavement was conducted in accordance with the California Highway Design Manual and the Guild for the Design and Construction of Concrete Parking Lot (ACI33OR).

Based upon our preliminary sampling and testing, and upon an assumed Traffic Index generally used for similar projects, it appears that the structural sections tabulated below should provide satisfactory pavements for the subject on-site pavement improvements:

AREA	T.I.	DESIGN R-VALUE	PRELIMINARY SECTION
On site vehicular parking with occasional truck traffic (ADTT=10)	6.0	15	0.25’ AC / 0.85' AB or 5" JPCP / 4" AB
Light to moderate truck traffic (ADTT=25)	7.0	15	0.30'AC / 1.05'AB or 6" JPCP / 4" AB
Moderate to Heavy Truck Traffic (ADTT=100)	--	15	6.5"JPCP/4"AB
AC - Asphalt Concrete AB - Class 2 Aggregate Base JPCP - Jointed Plain Concrete Pavement with MR ≥ 550 psi			

The above structural sections are predicated upon 90 percent relative compaction (ASTM D 1557) of all utility trench backfills and 95 percent relative compaction (ASTM D 1557) of the upper 12 inches of pavement subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

The recommended concrete pavement sections should have a minimum modulus of rupture (MR) of 550 pounds per square inch (psi). Transverse joints should be sawcut in the pavement at approximately 12 to 15-foot intervals within 4 to 6 hours of concrete placement, or preferably sooner. Sawcut depth should be equal to approximately one quarter of slab thickness. Construction joints should be constructed such that adjacent sections butt directly against each other and are keyed into each other. Parallel pavement sections should also be keyed into each other.

It should be noted that all of the above pavement design was based upon the results of preliminary sampling and testing, and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Infiltration

The results of our field investigation and percolation test data indicates the site earth materials at the depths and locations tested are not conducive to acceptable infiltration. Therefore, water quality storm water systems should not incorporate on-site infiltration when determining storm water treatment capacity.

Corrosion Protection

Based on the test results, this soil is classified as mildly corrosive to corrosive to ferrous metals and potentially aggressive towards copper. The laboratory data above should be reviewed and corrosion design should be completed by a qualified corrosion engineer.

In lieu of corrosion design for metal piping, ABS/PVC may be used. Soil corrosion is not considered a factor with ABS/PVC materials. ABS/PVC is considered suitable for use due to the corrosion potential of the on-site soils with respect to metals.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer could be consulted.

Construction Monitoring

Post investigative services are an important and necessary continuation of this investigation. Project plans and specifications should be reviewed by the project geotechnical consultant prior to construction to confirm that the intent of the recommendations presented in this report have been incorporated into the design.

Additional R-value, expansion, and soluble sulfate content testing may be needed after/during site rough grading.

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

1. Site preparation-stripping and removals.

2. Excavations, including approval of the bottom of excavations prior to the processing and preparation of the bottom areas for fill placement.

3. Scarifying and compacting prior to fill placement.

4. Foundation excavations.

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

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

LIMITATIONS

This report contains geotechnical conclusions and recommendations developed solely for use by N.T. Thomas Construction, Inc., and their design consultants for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance.

The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. If conditions are encountered during the construction of the project, which differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

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

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

TIME LIMITATIONS

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

CLOSURE

It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

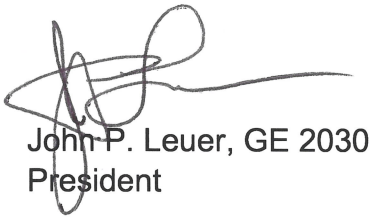
Should you have any questions regarding this report, please do not hesitate to contact our office at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.



Robert M. Markoff, CEG
Engineering Geologist





John P. Leuer, GE 2030
President



RMM:JPL:ss

Distribution: Addressee (2) and via email nick@ntthomas.com

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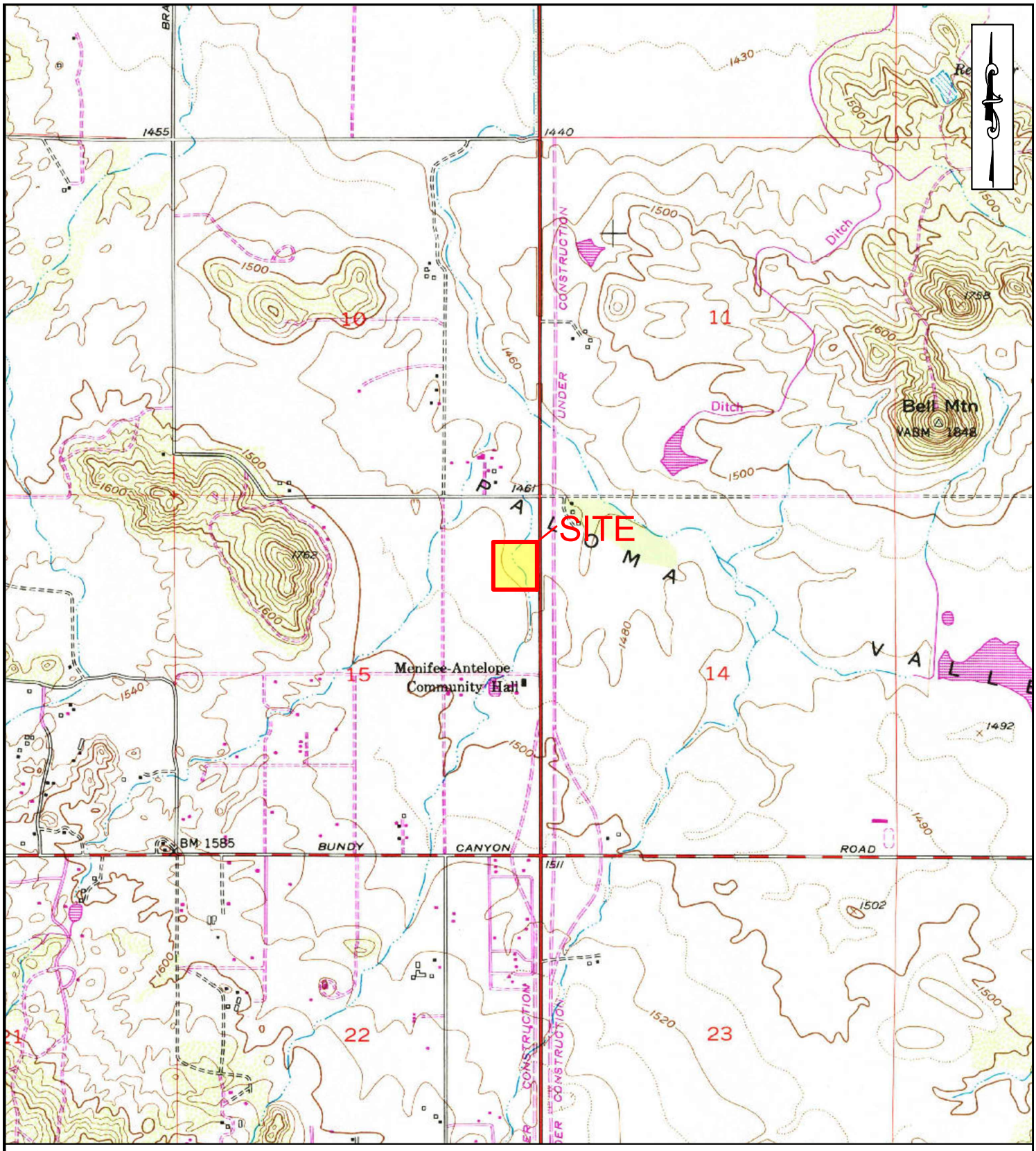
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APPENDIX A

Index Map, Site Plan, Regional Geologic Map, and Historical Seismicity Maps



INDEX MAP

PROJECT:	Proposed Fitwell Campus	**PROJECT NO.:**	13906.1
CLIENT:	N.T. Thomas Construction, Inc.	**ENCLOSURE:**	A-1
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	April 2023
		SCALE:	1" ≈ 2,000'

Legend

(Locations Approximate)

Map Symbols

- **B-12** - Exploratory Boring
- **Qoa** - Older Alluvium
- **Kpvg** - Granitic Bedrock
- - Approximate Geologic Contact

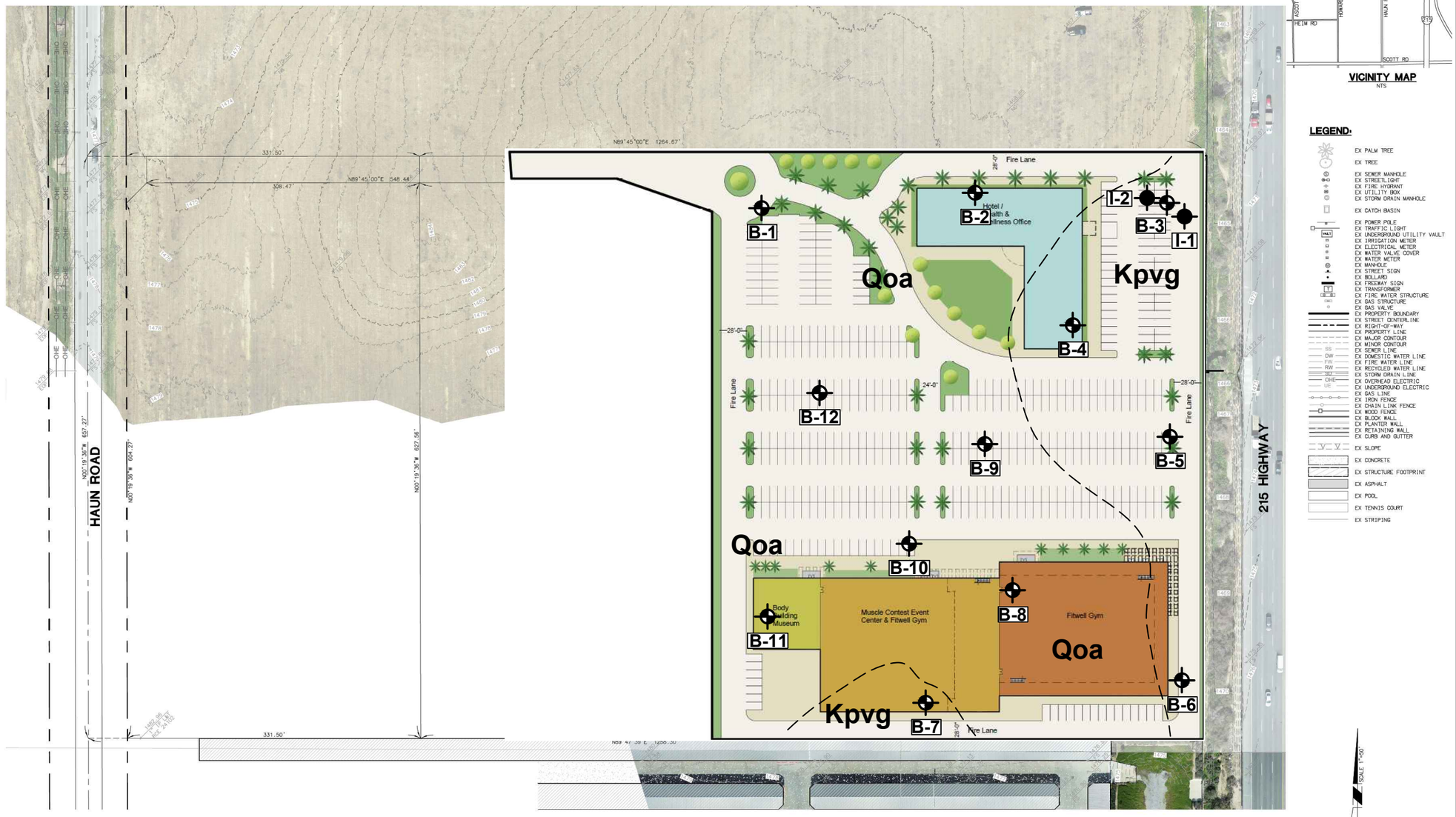
BASIS OF BEARINGS:

CENTERLINE OF HAUN ROAD N00°19'36"W PER PARCEL MAP NO. 18039 RECORDED IN THE COUNTY OF RIVERSIDE, BOOK 83 PAGES 75 AND 76.

BENCHMARK:

DESCRIBED BY RIVERSIDE COUNTY CALIFORNIA 1968
7.5 MI N FROM MURRIETA. 0.2 MILES SOUTH ON WASHINGTON AVE. FROM THE POST OFFICE IN MURRIETA. 2.4 MILES EAST ON LOS ALAMOS RD., 4.8 MILES NORTH ON HWY. 395, 0.1 MILE WEST ON SCOTT RD., 78 FT. SOUTH-EAST OF POWER POLE 31209B-5, 60 FT. SOUTH OF SCOTT RD., 4 FT. NORTH-WEST OF THE NORTH-EAST CORNER OF A PUMP HOUSE, 2 FT. WEST OF A MARKER POST. SET A BRASS DISK IN THE TOP OF A CONCRETE POST.

ELEV: 1520.00'



VICINITY MAP
NTS

LEGEND:

- EX PALM TREE
- EX TREE
- EX SEWER MANHOLE
- EX STREETLIGHT
- EX FIRE HYDRANT
- EX UTILITY BOX
- EX STORM DRAIN MANHOLE
- EX CATCH BASIN
- EX POWER POLE
- EX TRAFFIC LIGHT
- EX UNDERGROUND UTILITY VAULT
- EX IRRIGATION METER
- EX ELECTRICAL METER
- EX WATER VALVE COVER
- EX WATER METER
- EX MANHOLE
- EX STREET SIGN
- EX BOLLARD
- EX FREEWAY SIGN
- EX TRANSFORMER
- EX FIRE WATER STRUCTURE
- EX GAS STRUCTURE
- EX GAS VALVE
- EX PROPERTY BOUNDARY
- EX STREET CENTERLINE
- EX RIGHT-OF-WAY
- EX PROPERTY LINE
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- EX SEWER LINE
- EX DOMESTIC WATER LINE
- EX FIRE WATER LINE
- EX RECYCLED WATER LINE
- EX STORM DRAIN LINE
- EX OVERHEAD ELECTRIC
- EX UNDERGROUND ELECTRIC
- EX GAS LINE
- EX IRON FENCE
- EX CHAIN LINK FENCE
- EX WOOD FENCE
- EX BLOCK WALL
- EX PLANTER WALL
- EX RETAINING WALL
- EX CURB AND GUTTER
- EX SLOPE
- EX CONCRETE
- EX STRUCTURE FOOTPRINT
- EX ASPHALT
- EX POOL
- EX TENNIS COURT
- EX STRIPING

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ORTHO PHOTO W/ BOUNDARY
360-350-014
MENIFEE, CA

DRAWN BY: JRW
DESIGNED BY: JRW
CHECKED BY: RSA
APPROVED BY: RSA
DATE: 2/28/2023
REVISIONS:

PROJECT NUMBER: 1010602

SHEET NO.
C-2
2 OF 2

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

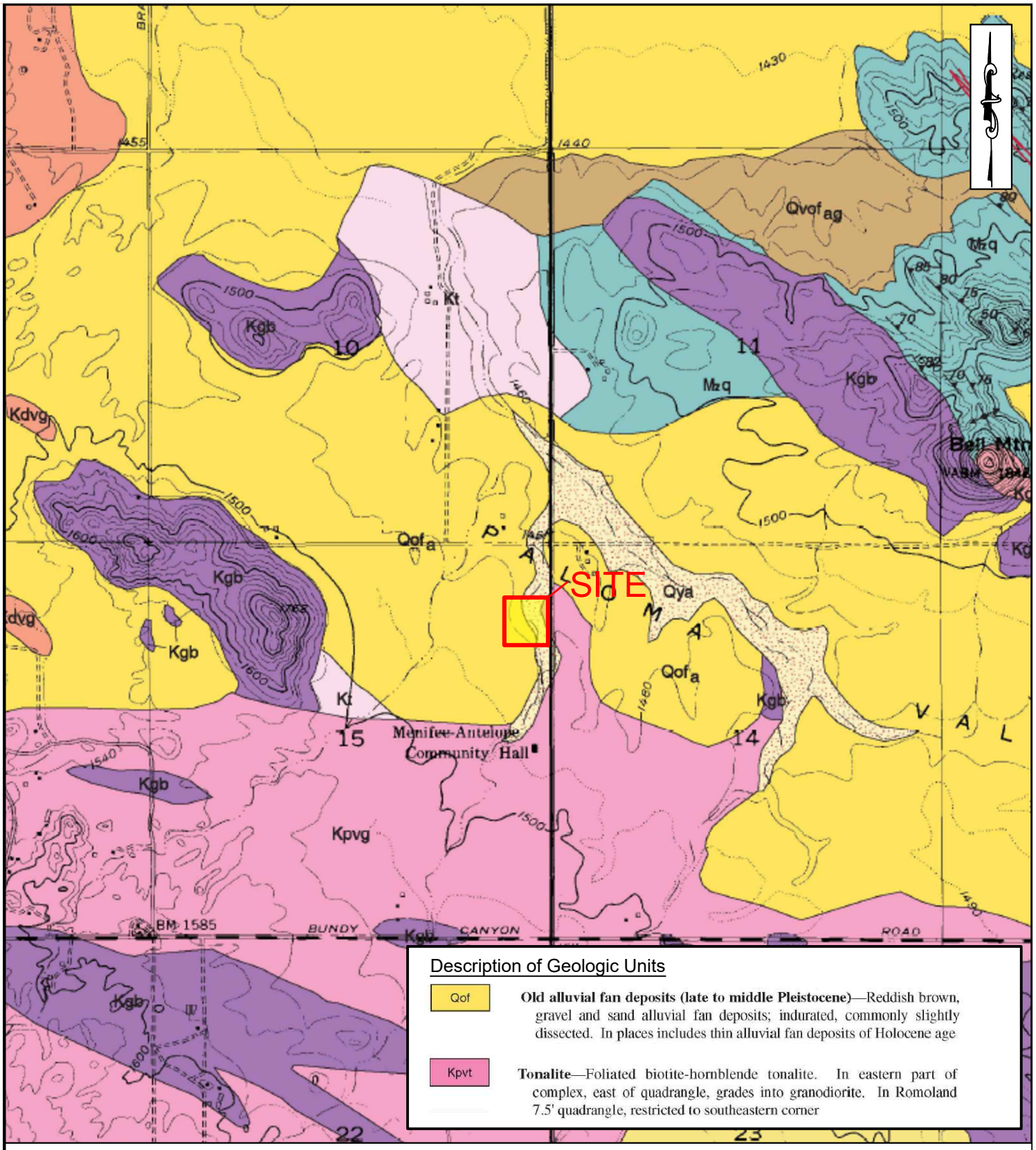
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SCALE: 1"=50'

BORING LOCATION MAP

PROJECT NO.: 13906.1
ENCLOSURE: A-2
DATE: April 2023
SCALE: 1" ≈ 125'

PROJECT: Proposed Fitwell Campus
CLIENT: N.T. Thomas Construction, Inc.

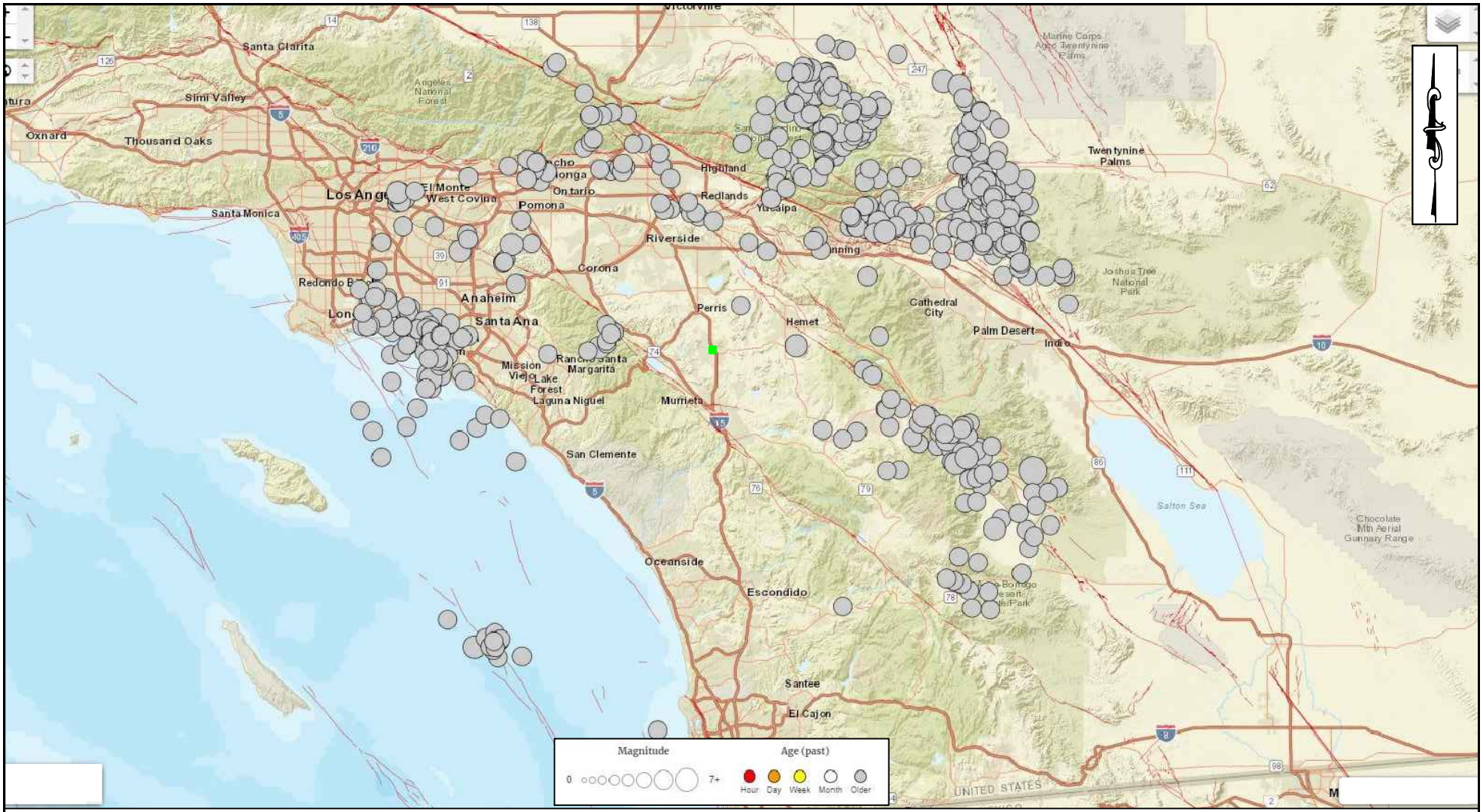
LOR GEOTECHNICAL GROUP, INC.



REGIONAL GEOLOGIC MAP

(Morton, 2003)

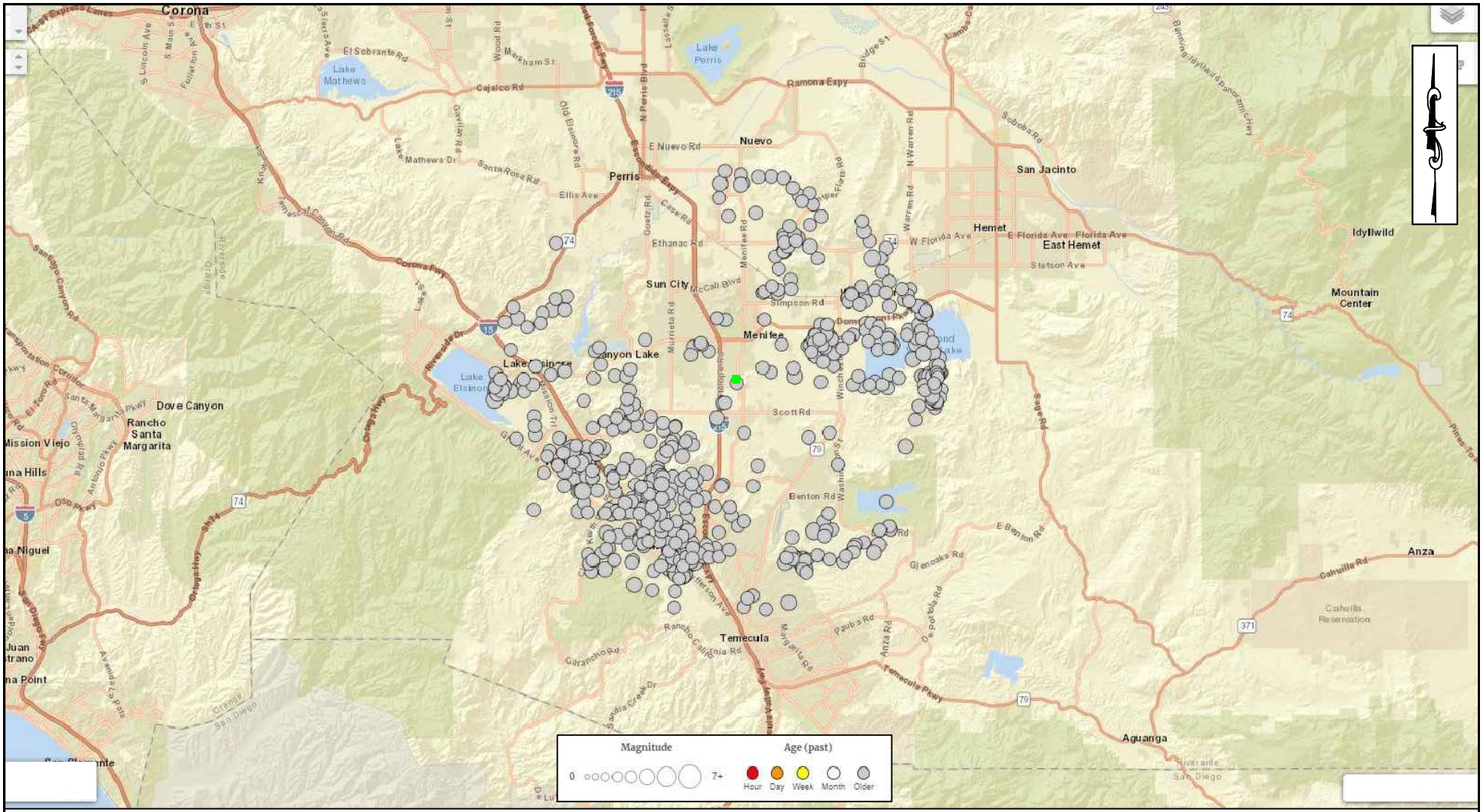
PROJECT:	Proposed Fitwell Campus	**PROJECT NO.:**	13906.1
CLIENT:	N.T. Thomas Construction, Inc.	**ENCLOSURE:**	A-3
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	April 2023
		SCALE:	1" ≈ 2,000'



U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 527 epicenters of instrument-recorded events from 01/01/32 to present (03/29/23) of local magnitude 4+ within a radius of ~62 miles (100 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 100km Radius

PROJECT:	Proposed Fitwell Campus	**PROJECT NO.:**	13906.1
CLIENT:	N.T. Thomas Construction, Inc.	**ENCLOSURE:**	A-4
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	April 2023
		SCALE:	1" ≈ 40km



U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 623 epicenters of instrument-recorded events from 01/01/78 to present (03/29/23) of local magnitude 2+ within a radius of ~9.2 miles (15 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 10km Radius

PROJECT: Proposed Fitwell Campus	**PROJECT NO.:** 13906.1
CLIENT: N.T. Thomas Construction, Inc.	**ENCLOSURE:** A-5
LOR GEOTECHNICAL GROUP, INC.	**DATE:** April 2023
	SCALE: 1" ≈ 10km

APPENDIX B

Field Investigation Program and Boring Logs

APPENDIX B
FIELD INVESTIGATION

Subsurface Exploration

Our subsurface exploration of the site consisted of drilling 12 exploratory borings to depths of approximately 6.5 and 26.5 feet below the existing ground surface using a Mobile B-61 drill rig on March 7, 2023. The approximate locations of the borings are shown on Enclosure A-2 within Appendix A.

The drilling exploration was conducted using a Mobile B-61 drill rig equipped with 8-inch diameter hollow stem augers. The soils were continuously logged by a geologist from this firm who inspected the site, created detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.25 inch outside diameter or a Standard Penetration Sampler (SPT) from the ground surface to the total depth explored. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures (N60) which are included in the boring logs, Enclosures B-1 through B-12.

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

All samples obtained were taken to our geotechnical laboratory for storage and testing. Detailed logs of the borings are presented on the enclosed Boring Logs, Enclosures B-1 through B-12. A Boring Log Legend is presented on Enclosure B-i. A Soil Classification Chart is presented as Enclosure B-ii.

CONSISTENCY OF SOIL

SANDS

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

COHESIVE SOILS

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

SAMPLE KEY

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

TYPES OF LABORATORY TESTS

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

BORING LOG LEGEND

PROJECT:	Proposed Fitwell Health Campus, Menifee, California	**PROJECT NO.:**	13906.1
CLIENT:	N.T. Thomas Construction, Inc.	**ENCLOSURE:**	B-i
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	April 2023

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	
12"	3"	3/4"	No . 4	No. 10	No. 40	200	

(U.S. STANDARD SIEVE SIZE)

SOIL CLASSIFICATION CHART

PROJECT:	Proposed Fitwell Health Campus, Menifee, California	**PROJECT NO.:**	13906.1
CLIENT:	N.T. Thomas Construction, Inc.	**ENCLOSURE:**	B-ii
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	April 2023

LOG OF BORING B-1

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0		10						SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 15% coarse grained sand, 30% medium grained sand, 30% fine grained sand, and 20% silty fines, brown, moist, loose to medium dense.
	6		10.1		110.7				
5	14		4.3		110.4				@ 6 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, upper 1± moderately weathered and decomposed; gradually becomes harder with increase in depth.
	43 for 6"		4.3		112.6				
10	113 for 10"		3.5						Below 12', slower drilling; hard.
15	109 for 10"		4.1						Below 15±', becomes more grayish-brown.
20	73 for 6"		4.6						END OF BORING @ 20.5' No fill No groundwater Bedrock @ 6'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,473'
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-1

LOG OF BORING B-2

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	51		10.4		119.4			SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 10% fine gravel, 15% coarse grained sand, 25% medium grained sand, 30% fine grained sand, and 20% silty fines, dark brown, moist, medium dense.
									@ 3 feet, large rock encountered; boring repositioned.
5	56		4.9		105.7				@ 6 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, hard at this location, surface of bedrock appears to be buried, fresh, angular, and hard material; refusal with two attempts to advance boring.

END OF BORING @ 6.5' (due to refusal)

No fill
No groundwater
Bedrock @ 6'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,470'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-2

LOG OF BORING B-3

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	60		6.3		132.8			SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 15% coarse grained sand, 25% medium grained sand, 30% fine grained sand, and 25% silty fines, brown, damp, loose to medium dense.
									@ 2.5 feet, GRANITIC BEDROCK: fine to coarse grained, grayish-brown, damp, weathered in upper 6-12"; gradually becomes fresher with increase in depth.
5	63 for 11"		4.8		119.4				
10	111		4.0						@ 10 feet, relatively fresh bedrock.
15	106 for 11"		4.6						@ 15 feet, unweathered, fresh bedrock; micaceous.
									END OF BORING @ 15.92'
									No fill No groundwater Bedrock @ 2.5'

TEST DATA

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1	
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,469'	
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023	
		EQUIPMENT:	Mobile B-61	
		HOLE DIA.: 8"	**ENCLOSURE:**	B-3

LOG OF BORING B-4

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0								SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel, 10% coarse grained sand, 30% medium grained sand, 35% fine grained sand, and 20% silty fines, brown, moist, loose.
		9, 10						SC	@ 1 foot, CLAYEY SAND, trace fine gravel, approximately 10% coarse grained sand, 20% medium grained sand, 30% fine grained sand, and 40% clayey fines, yellowish-brown, moist, medium dense.
	25		11.4		115.8				
									@ 4± feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown and grayish-brown, moist, weathered with minor secondary clay in upper 2±'; becomes fresher with increase in depth.
5	40 for 6"		8.7		107.7				
10	95		5.6						@ 10 feet, no secondary clay; mostly grayish-brown granite.
									END OF BORING @ 11' No fill No groundwater Bedrock @ 4±'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,471'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-4

LOG OF BORING B-5

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0								SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel, 15% coarse grained sand, 30% medium grained sand, 35% fine grained sand, and 15% silty fines, brown, moist, loose.
	40 for 4"		3.0		99.2				@ 1± foot, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, excavated as fine to coarse grained SILTY SAND.
5	89		4.2						@ 5 feet, less weathered.
10	107 for 11"		3.9						@ 10 feet, micaceous.
									END OF BORING @ 10.92'
									No fill
									No groundwater
									Bedrock @ 1±'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,476'
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-5

LOG OF BORING B-6

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
									TEST DATA
0	50		7.1		130.2			SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel, 10% coarse grained sand, 30% medium grained sand, 35% fine grained sand, and 20% silty fines, brown, moist, loose.
									@ 1.5± feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, highly weathered in upper 2±', includes minor secondary clay, locally fractured and varying in color to grayish-brown.
5	43		7.5		105.8				@ 5 feet, fractured and weathered bedrock produces gravelly cuttings with sand and clay.
10	69		6.0						@ 10 feet, finer grained; still weathered and contains some minor secondary clay (fault gouge).
15	38		25.9						@ 15 feet, clay lining fractures apparent; lighter in color - gouge.
20	109		6.8						@ 20 feet, out of fault gouge and into fine to coarse grained granitic bedrock.
									END OF BORING @ 21.5'
									No fill No groundwater Bedrock @ 1.5±'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,474'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-6

LOG OF BORING B-7

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0								SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel, 10% coarse grained sand, 25% medium grained sand, 35% fine grained sand, and 25% silty fines, brown, moist, loose.
	20		9.3		120.4				@ 2± feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, highly weathered and moderately decomposed in upper 2±'.
5	60 for 11"		7.2		124.2				
10	116 for 10"		3.3						END OF BORING @ 10.83' No fill No groundwater Bedrock @ 2±'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,477'
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-7

LOG OF BORING B-8

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0								SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel, 10% coarse grained sand, 20% medium grained sand, 30% fine grained sand, and 35% silty fines.
	14	1, 3, 4, 7, 8, 9, 10	13.6		114.0			CL	@ 1 foot, LEAN CLAY with SAND, approximately 5% medium grained sand, 25% fine grained sand, and 70% clayey fines, dark brown, moist, soft to stiff.
5	23		12.4		120.5				@ 5 feet, slight decrease in clay content.
	18		14.5		114.6			ML	@ 7± feet, SANDY SILT, approximately 5% medium grained sand, 40% fine grained sand, and 55% silty and clayey fines, brown, moist, very stiff.
10	16	2	13.1		115.8				@ 10 feet, slight increase in sand content.
	19		12.1		119.4			SM	@ 11.5± feet, SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 50% fine grained sand, and 30% silty fines, brown, moist, medium dense.
15	11		24.2		102.1	▽		SC	@ 15± feet, CLAYEY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 45% fine grained sand, and 30% clayey fines, brown, wet, loose to medium dense; groundwater.
								SM	@ 19 feet, SILTY SAND, approximately 5% coarse grained sand, 25% medium grained sand, 40% fine grained sand, and 30% silty fines, brown, wet, medium dense.
20	29		21.8		106.0				
									@ 23 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, wet, moderately weathered and slightly decomposed, hard.
25	51 for 5"		16.0		114.0				END OF BORING @ 25.42'
									No fill Groundwater @ 15±' Bedrock @ 23'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,472'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-8

LOG OF BORING B-9

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
									TEST DATA
0								SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 15% fine gravel and coarse grained sand, 20% medium grained sand, 30% fine grained sand, and 35% silty fines, brown, moist, loose to medium dense.
	9		15.6		114.9			CL	@ 2 feet, SANDY LEAN CLAY, approximately 5% coarse grained sand, 20% medium grained sand, 20% fine grained sand, and 55% clayey and silty fines, dark brown, moist, stiff.
								SM	@ 4 feet, SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 35% fine grained sand, and 40% silty fines, brown, moist, medium dense to dense.
5	28		5.0		126.1				
10	18		4.1		105.4				@ 10 feet, coarser grained sand; less silt.
						▽			@ 14 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, moist to wet, hard; groundwater.
15	79		7.0		134.4				
									END OF BORING @ 16.5'
									No fill Groundwater @ 14' Bedrock @ 14'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,471'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-9

LOG OF BORING B-10

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0	16	3, 7, 9, 10	10.3		125.5			SM ML SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 10% coarse grained sand, 25% medium grained sand, 30% fine grained sand, and 30% silty fines, dark brown, moist, medium dense. @ 1 foot, grades to SANDY SILT/SILTY SAND, trace fine gravel, approximately 5% coarse grained sand, 10% medium grained sand, 35% fine grained sand, and 50% silty fines.
5	14		7.1		118.9			CL	@ 4.5 feet, SANDY LEAN CLAY, approximately 5% medium grained sand, 25% fine grained sand, and 70% clayey and silty fines, dark brown, moist, soft to stiff.
10	13	2	14.5		113.3			ML	@ 8.5± feet, SANDY SILT, approximately 5% medium grained sand, 35% fine grained sand, and 60% silty fines, brown, moist, soft to stiff.
15	9		22.7		104.2	▽		SM	@ 13± feet, SILTY SAND, approximately 5% coarse grained sand, 20% medium grained sand, 45% fine grained sand, and 30% silty fines, brown, very moist, loose to medium dense. @ 16.5 feet, groundwater.
20	29		15.8		109.7				@ 20 feet, coarser grained sand and less silt.
25	51 for 5"		12.9		124.2				@ 22 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, wet, slightly to moderately weathered and decomposed, hard.
									END OF BORING @ 25.42' No fill Groundwater @ 16.5' Bedrock @ 22'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,473'
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-10

LOG OF BORING B-11

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0	7		12.0		111.4			SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 15% fine gravel and coarse grained sand, 20% medium grained sand, 35% fine grained sand, and 30% silty fines, dark brown, moist.
5	9	2	7.7		105.8			ML	@ 4.5± feet, SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 25% fine grained sand, and 55% silty fines, brown, moist, soft to stiff.
10	16		6.4		125.5				
15	80 for 11"		3.5		122.3				@ 12.5 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown, damp, slightly weathered and slightly decomposed, hard.
									END OF BORING @ 15.92'
									No fill No groundwater Bedrock @ 12.5'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,475'
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	March 7, 2023
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-11

LOG OF BORING B-12

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
	TEST DATA								
0	10		6.8		114.0			SM	@ 0 feet, OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 10% coarse grained sand, 25% medium grained sand, 30% fine grained sand, and 30% silty fines, brown, moist, loose to medium dense.
5	31		4.9		115.8				
								ML	@ 8± feet, SANDY SILT, approximately 5% coarse grained sand, 15% medium grained sand, 20% fine grained sand, and 60% silty fines, brown, moist, soft to stiff.
10	15		9.4		114.0				
								SC	@ 14 feet, CLAYEY SAND, approximately 10% medium grained sand, 60% fine grained sand, and 30% clayey and silty fines, brown, moist, medium dense.
15	18		12.9		120.5				
						▽			@ 19 feet, groundwater.
20	25		21.9						@ 20 feet, GRANITIC BEDROCK: fine to coarse grained, yellowish-brown to grayish-brown, moist, highly weathered in upper 1-2' with abundant secondary clay from decomposition.
25	124		10.1						END OF BORING @ 26.5'
									No fill Groundwater @ 19' Bedrock @ 20'

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**ELEVATION:**	1,472'
		DATE DRILLED:	March 7, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-12

APPENDIX C

Borehole Percolation Testing Program and Infiltration Rate Test Results

APPENDIX C
BOREHOLE PERCOLATION TESTING PROGRAM AND INFILTRATION RATE TEST RESULTS

Two borehole percolation tests were conducted in general accordance with the Shallow Percolation Test procedure as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The general locations of our tests are illustrated on Enclosure A-2 and were conducted at the requested locations and depth. Subsequent to drilling, a 3-inch diameter, perforated PVC pipe wrapped in filter fabric was placed within each test hole and 3/4-inch gravel was placed between the outside of the pipe and the hole wall. Test holes were pre-soaked the same day as drilling. Testing took place the next day, March 8, 2023, within 26 hours but not before 15 hours, of the pre-soak. The holes were filled using water from a 200 gallon water tank. Test periods consisted of allowing the water to drop in approximately 30-minute intervals. After each reading, the hole was refilled. Testing was terminated after a total of 12 readings were recorded. The percolation test data was converted to an infiltration rate using the Porchet Method as outlined by the Technical Guidance Document (CDM Smith, 2013).

Infiltration test results are summarized in the following table:

Test No.	Depth* (ft)	Infiltration Rate** (in/hr)
P-1	3.5	0.03
P-2	3.3	0.03

* depth measured below existing ground surface
** Porchet Method determined clear water rate

The results of this testing are presented as Enclosures C-1 and C-2.

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project:	APN 360-350-014	Test Date:	March 9, 2023
Project No.:	13906.1	Test Hole No.:	P-1
Soil Classificaiton:	(SM) Silty sand	Effective Hole Dia.*:	4.8 in.
Depth of Test Hole:	3.5 ft.	Date Excavated:	March 8, 2023
Tested By:	A.L.		

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	INITIAL HOLE DEPTH	FINAL HOLE DEPTH	CHANGE IN WATER LEVEL	AVERAGE WETTED DEPTH	PERCOLATION RATE
			min	hr.	hr.	in.	in.	in.	in.	in.	in.	(min/in)
1	9:13 AM	9:38 AM	25	0.42	0.42	17.25	17.75	42.00	42.00	0.50	24.50	50.0
2	9:38 AM	10:03 AM	25	0.42	0.83	17.75	18.50	42.00	42.00	0.75	23.88	33.3
3	10:03 AM	10:35 AM	32	0.53	1.37	18.50	19.00	42.00	42.00	0.50	23.25	64.0
4	10:35 AM	11:07 AM	32	0.53	1.90	19.00	19.50	42.00	42.00	0.50	22.75	64.0
5	11:07 AM	11:39 AM	32	0.53	2.43	19.50	19.75	42.00	42.00	0.25	22.38	128.0
6	11:39 AM	12:11 PM	32	0.53	2.97	19.75	20.25	42.00	42.00	0.50	22.00	64.0
7	12:11 PM	12:43 PM	32	0.53	3.50	20.25	20.75	42.00	42.00	0.50	21.50	64.0
8	12:43 PM	1:15 PM	32	0.53	4.03	20.75	21.00	42.00	42.00	0.25	21.13	128.0
9	1:15 PM	1:47 PM	32	0.53	4.57	21.00	21.25	42.00	42.00	0.25	20.88	128.0
10	1:47 PM	2:19 PM	32	0.53	5.10	21.25	21.75	42.00	42.00	0.50	20.50	64.0
11	2:19 PM	2:51 PM	32	0.53	5.63	21.75	22.25	42.00	42.00	0.50	20.00	64.0
12	2:51 PM	3:23 PM	32	0.53	6.17	22.25	22.50	42.00	42.00	0.25	19.63	128.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_O	19.75	
H_f	19.50	
ΔH	0.25	
H_{avg}	19.63	
I_t	**0.03**	in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project:	APN 360-350-014	Test Date:	March 9, 2023
Project No.:	13906.1	Test Hole No.:	P-2
Soil Classificaiton:	(SM) Silty sand	Effective Hole Dia.*:	4.8 in.
Depth of Test Hole:	3.3 ft.	Date Excavated:	March 8, 2023
Tested By:	A.L.		

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	INITIAL HOLE DEPTH	FINAL HOLE DEPTH	CHANGE IN WATER LEVEL	AVERAGE WETTED DEPTH	PERCOLATION RATE
			min	hr.	hr.	in.	in.	in.	in.	in.	in.	(min/in)
1	9:15 AM	9:40 AM	25	0.42	0.42	16.00	16.25	40.00	40.00	0.25	23.88	100.0
2	9:40 AM	10:05 AM	25	0.42	0.83	16.00	16.50	40.00	40.00	0.50	23.75	50.0
3	10:05 AM	10:37 AM	32	0.53	1.37	16.50	17.00	40.00	40.00	0.50	23.25	64.0
4	10:37 AM	11:09 AM	32	0.53	1.90	17.00	17.50	40.00	40.00	0.50	22.75	64.0
5	11:09 AM	11:41 AM	32	0.53	2.43	17.50	18.00	40.00	40.00	0.50	22.25	64.0
6	11:41 AM	12:13 PM	32	0.53	2.97	18.00	18.25	40.00	40.00	0.25	21.88	128.0
7	12:13 PM	12:45 PM	32	0.53	3.50	18.25	18.75	40.00	40.00	0.50	21.50	64.0
8	12:45 PM	1:17 PM	32	0.53	4.03	18.75	19.25	40.00	40.00	0.50	21.00	64.0
9	1:17 PM	1:49 PM	32	0.53	4.57	19.25	19.50	40.00	40.00	0.25	20.63	128.0
10	1:49 PM	2:21 PM	32	0.53	5.10	19.50	19.75	40.00	40.00	0.25	20.38	128.0
11	2:21 PM	2:53 PM	32	0.53	5.63	19.75	20.25	40.00	40.00	0.50	20.00	64.0
12	2:53 PM	3:25 PM	32	0.53	6.17	20.25	20.50	40.00	40.00	0.25	19.63	128.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_O	19.75	
H_f	19.50	
ΔH	0.25	
H_{avg}	19.63	
I_t	**0.03**	in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

APPENDIX D

Laboratory Testing Program and Test Results

APPENDIX D
LABORATORY TESTING

General

Selected soil samples obtained from the borings were tested in our geotechnical laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, Atterberg limits, consolidation, and corrosion. Descriptions of the laboratory tests are presented in the following paragraphs:

Moisture Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, in accordance with ASTM D 2921 and ASTM D 2216, respectively, and the results are shown on the boring logs, Enclosures B-1 through B-12 for convenient correlation with the soil profile.

Laboratory Compaction

A selected soil sample was tested in the laboratory to determine compaction characteristics using the ASTM D 1557 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Maximum Dry Density (pcf)**	**Optimum Moisture Content (percent)**
B-8	1-4	(CL) Sandy Clay	122.5	12.0
B-10	1-4	(SM) Silty Sand	128.5	11.0

Direct Shear Test

Shear tests are performed in general accordance with ASTM D 3080 with a direct shear machine at a constant rate-of-strain (0.04 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in remolded condition (90 percent relative compaction per ASTM D 1557) and soaked, to represent the worse case conditions expected in the field.

The results of the shear test on a selected soil sample is presented in the following table:

DIRECT SHEAR TEST				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Apparent Cohesion (psf)**	**Angle of Internal Friction (degrees)**
B-8	1-4	(CL) Sandy Clay	380	25
B-10	1-4	(SM) Silty Sand	750	25

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the grain size distribution analyses are presented graphically on Enclosure D-1.

Sand Equivalent

The sand equivalent of selected soils were evaluated using the California Sand Equivalent Test Method, Caltrans Number 217. The results of the sand equivalent tests are presented with the grain size distribution analyses on Enclosure D-1.

R-Value Test

Based on the indicator testing above, a soil sample was selected and tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the R-value test is presented on Enclosure D-1.

Consolidation Test

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

Samples are tested at field and greater-than field moisture contents. The results are shown on Enclosures D-2 through D-4.

Expansion Index Test

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

EXPANSION INDEX TEST				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Expansion Index (EI)**	**Expansion Potential**
B-8	1-4	(CL) Sandy Clay	43	Low

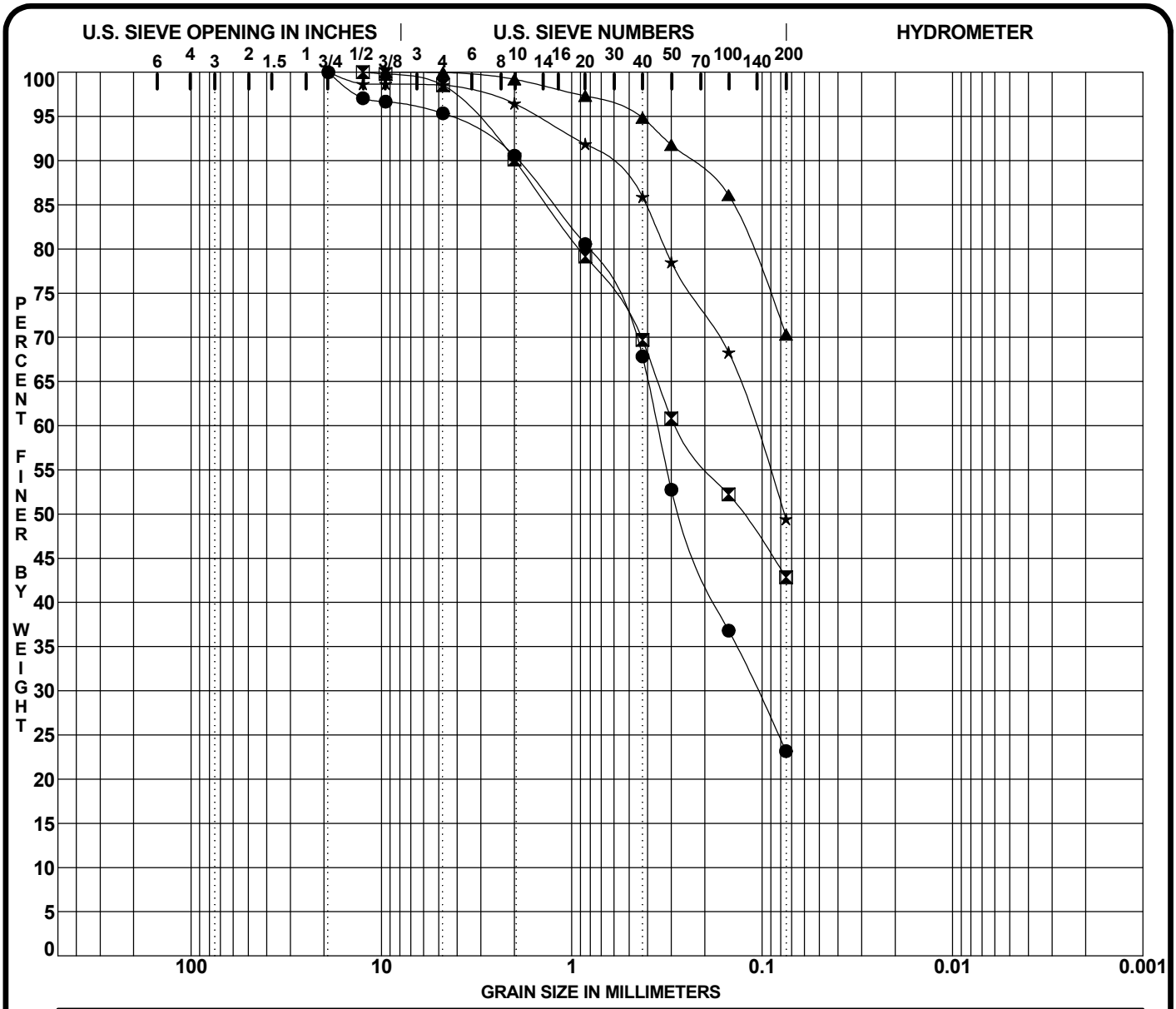
Expansion Index:	0-20	21-50	51-90	91-130
	Very low	Low	Medium	High

Atterberg Limits

A selected sample of the on-site fine grained, low expansion potential soils were tested for their Atterberg limits in accordance with ASTM D 4318. The results of these tests are presented on Enclosure D-5.

Corrosion

Corrosion testing was conducted by our subconsultant, Project X Corrosion Engineering. Test results are enclosed.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Soil Classification	SE	RV	PL	PI	Cc	Cu
●	B-01	@ 0-3'	(SM) Silty Sand	--	--				
⊠	B-04	@ 1-4'	(SC) Clayey Sand	11	--				
▲	B-08	@ 1-4'	(CL) Lean Clay with Sand	5	15	18	10		
★	B-10	@ 1-4'	(ML/SM) Sandy Silt/Silty Sand	10	--				

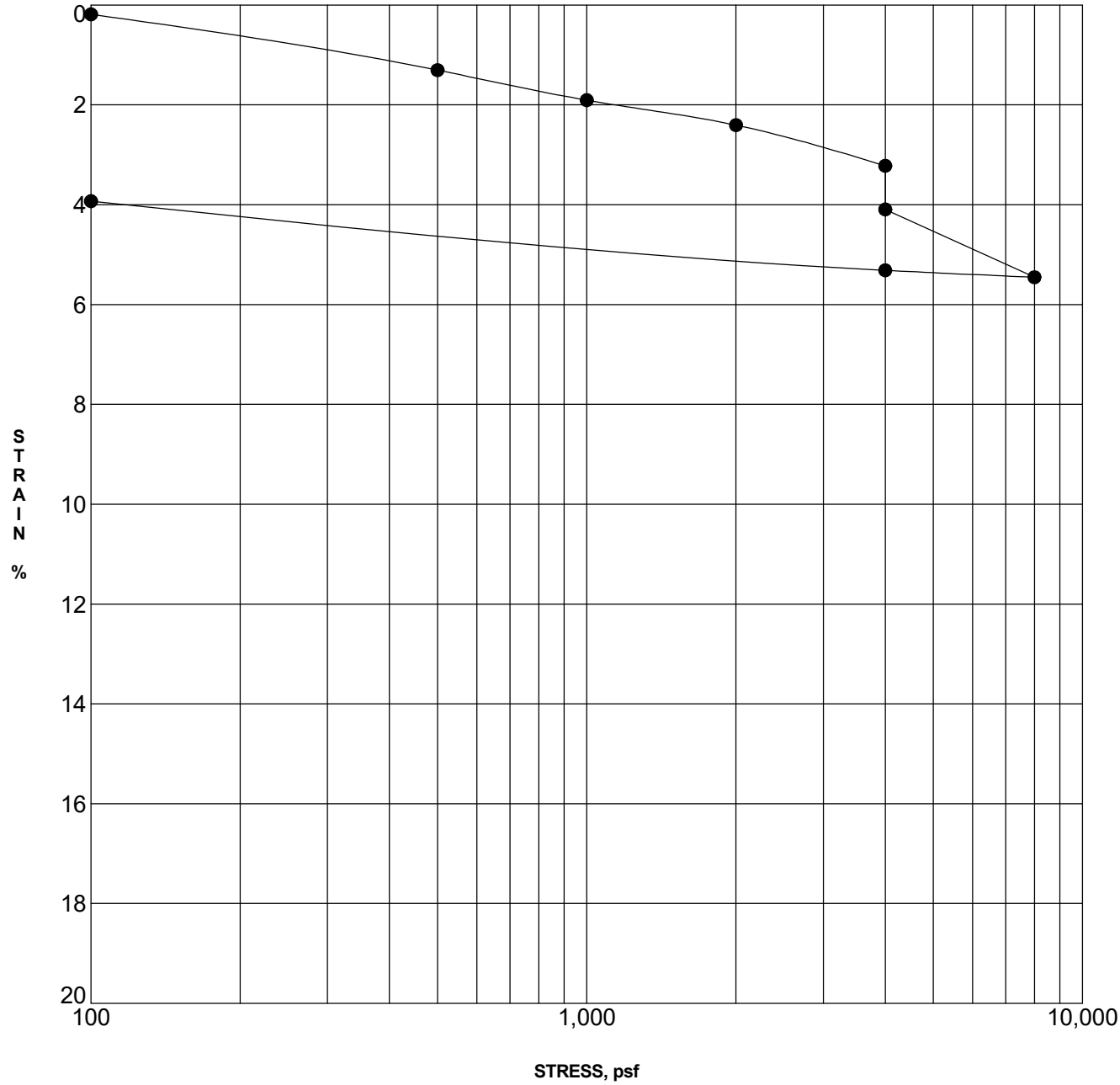
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-01	@ 0-3'	19.00	0.35	0.106		4.7	72.2	23.2	
⊠	B-04	@ 1-4'	12.50	0.28			1.5	55.7	42.9	
▲	B-08	@ 1-4'	9.50				0.0	29.7	70.3	
★	B-10	@ 1-4'	19.00	0.11			1.4	49.1	49.4	

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**DATE:**	March 2023

GRADATION CURVES

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: D-1



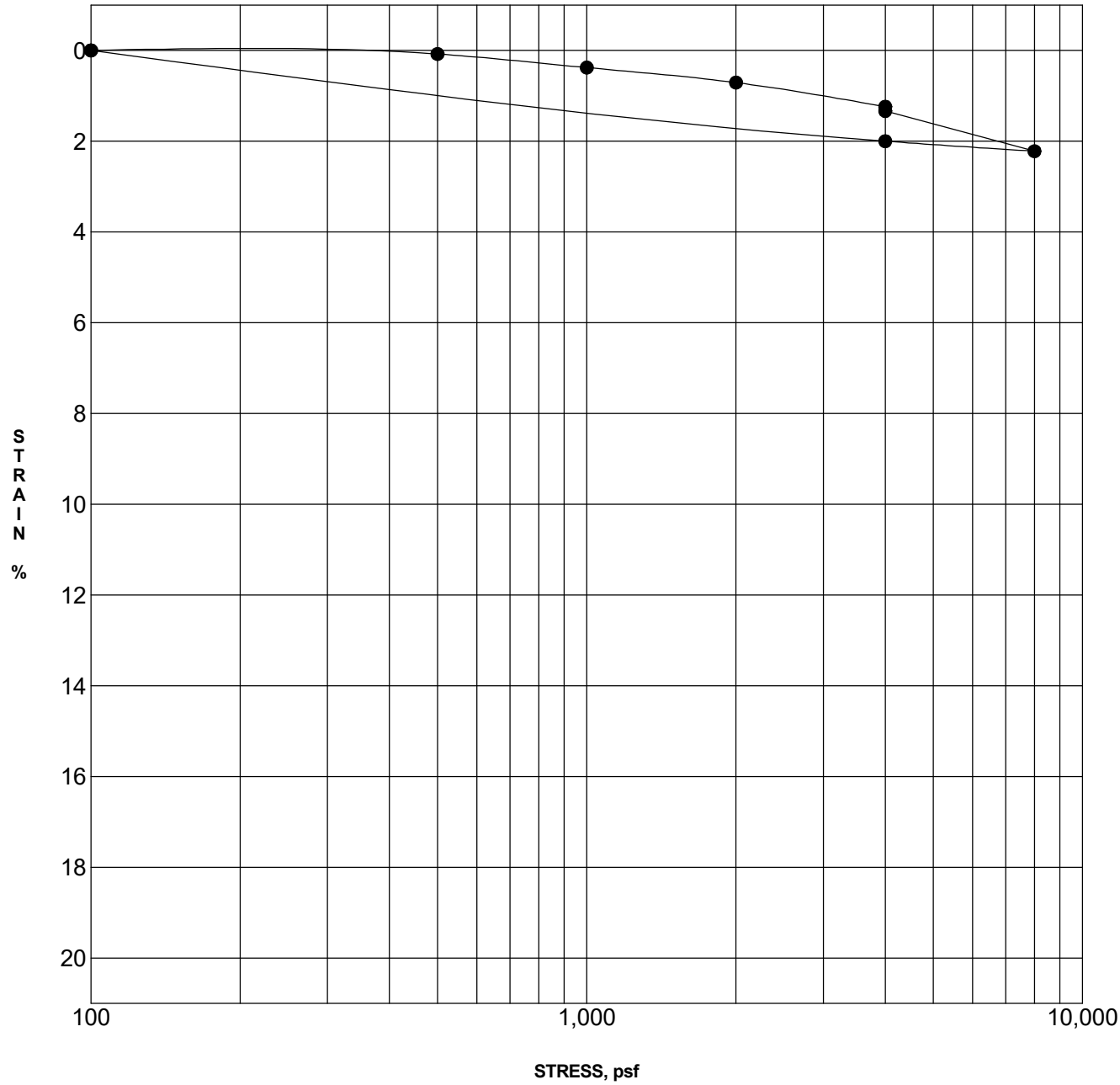
Specimen Identification		Classification	DD	MC%
● B-08 @ 10'		*(ML) Sandy Silt*	113	13

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**DATE:**	March 2023

CONSOLIDATION TEST

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: D-2



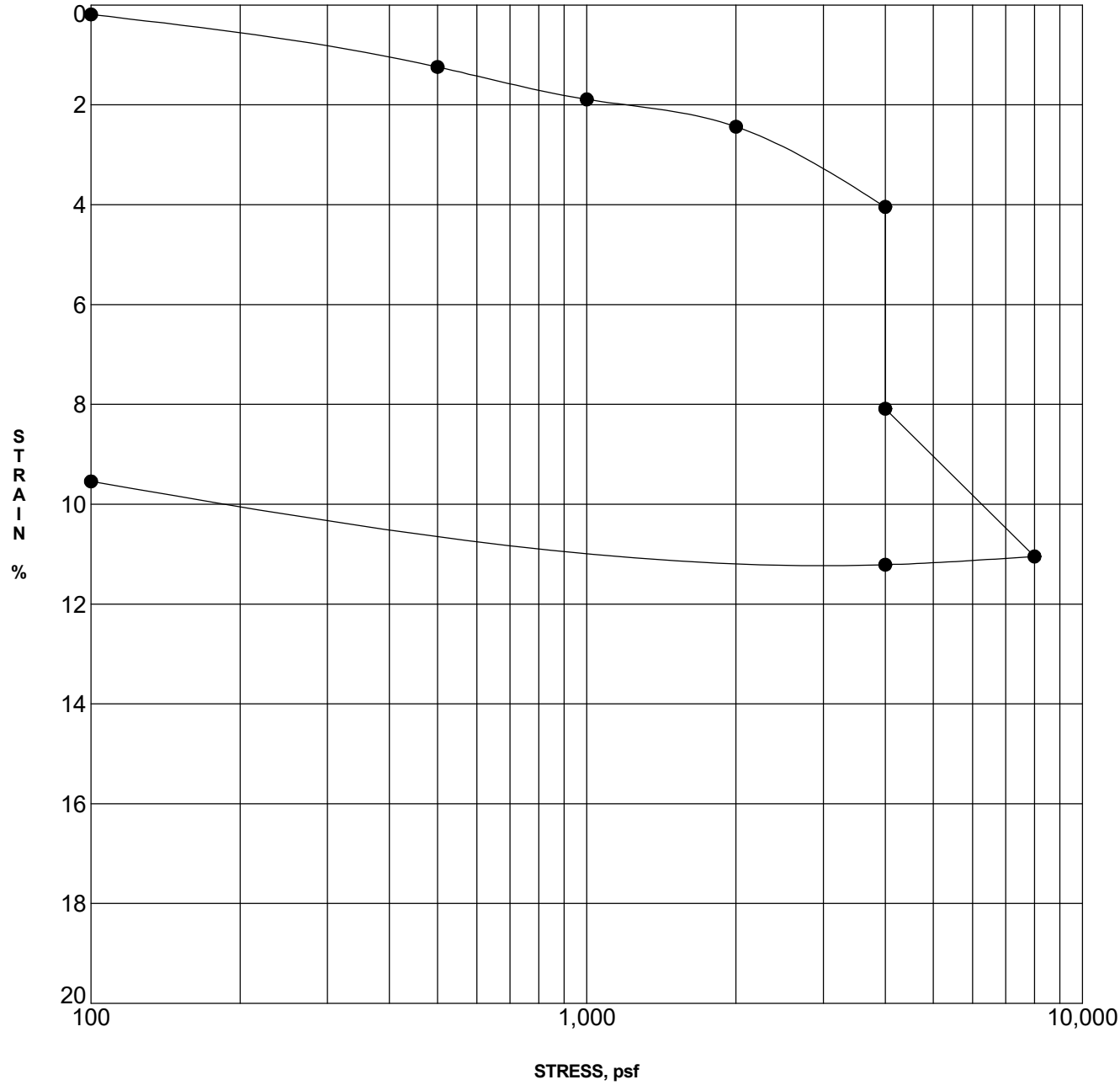
Specimen Identification		Classification	DD	MC%
● B-10 @ 10'		*(ML) Sandy Silt*	113	15

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**DATE:**	March 2023

CONSOLIDATION TEST

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: D-3



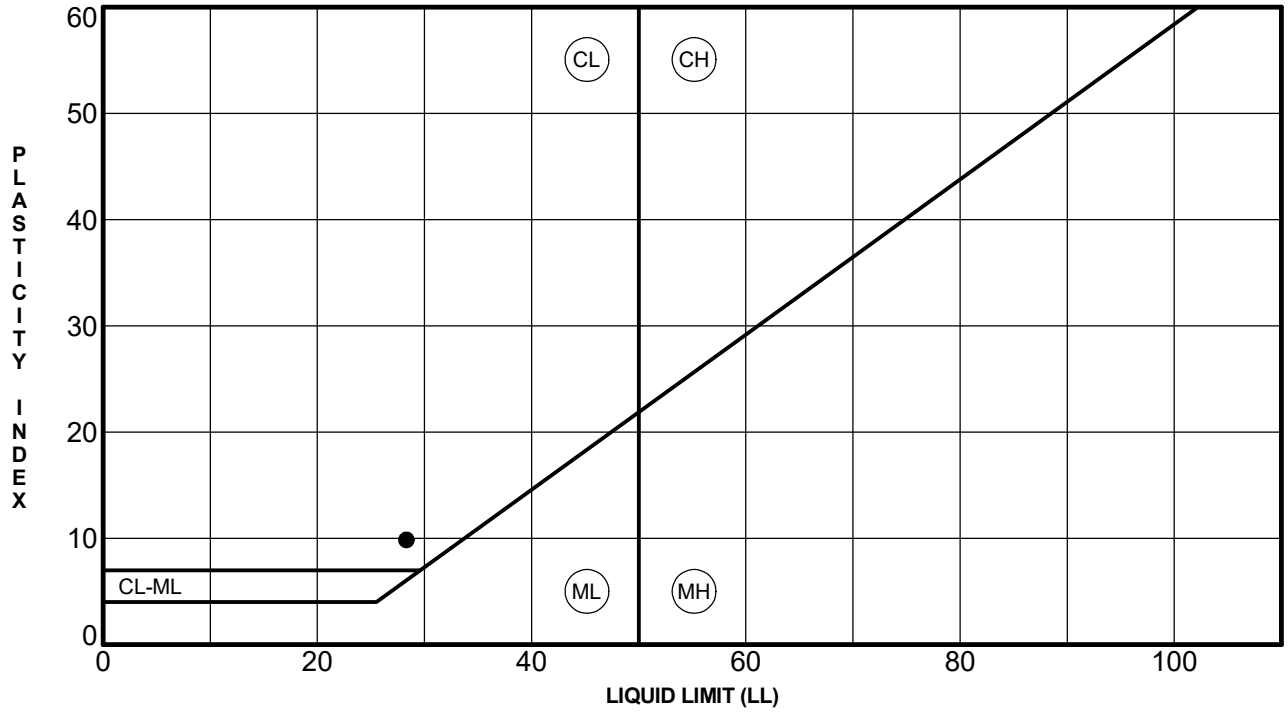
Specimen Identification		Classification	DD	MC%
● B-11 @ 5'		*(ML) Sandy Silt*	101	8

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**DATE:**	March 2023

CONSOLIDATION TEST

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: D-4



Specimen Identification		LL	PL	PI	Fines	Classification
● B-08	@ 1-4'	28	18	10	70.3	(CL) Lean Clay with Sand

PROJECT:	Proposed Fitwell Health Campus	**PROJECT NO.:**	13906.1
CLIENT:	NT Thomas Construction, Inc.	**DATE:**	March 2023

ATTERBERG LIMITS RESULTS

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: D-5

Results Only Soil Testing for N. T. Thomas Construction, Inc.

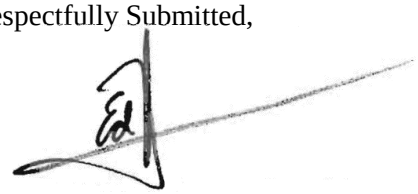
March 13, 2023

Prepared for:

Robb Markoff
LOR Geotechnical
6121 Quail Valley Ct
Riverside, CA
rmarkoff@lorgeo.com

Project X Job#: S230310A
Client Job or PO#: 13906.1

Respectfully Submitted,





Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

Soil Analysis Lab Results

Client: LOR Geotechnical
Job Name: N. T. Thomas Construction, Inc.
Client Job Number: 13906.1
Project X Job Number: S230310A
March 13, 2023

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^{--}	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
BB-4, B-3 (SC) Clayey Sand	1-4	30.9	0.0031	30.6	0.0031	17,420	5,896	8.1	142	4.8	22.8	14.1	0.0	38.5	5.0	41.0	119.1	2.0	63.8
BB-7, B-10 (CL) Sandy Clay	5-8	70.2	0.0070	123.6	0.0124	5,829	1,072	8.0	119	0.1	89.7	11.1	0.0	138.0	4.0	40.4	110.0	4.4	1.7

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

Project X Corrosion Engineering

Corrosion Control - Soil, Water, and Metallurgy Lab

Lab Request Sheet Chain of Custody

Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com

Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

Project X Job Number: S230310A LOR 139061 N.T. THOMAS 2FULL

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Company Name:	LOR Geotechnical Group, Inc.	**Contact Name:**	ROBB MARKOFF
Phone No:	951-653-1760		
Mailing Address:	6121 Quail Valley Court	**Contact Email:**	RMARKOFF@LORGEO.COM
Accounting Contact:	John Leuer	**Invoice Email:**	ATARDIE " "
Client Project No:	139061	**Project Name:**	N.T. THOMAS CONST., INC.
P.O. #:	--		

Turn Around Time: 3-5 Day Standard ✓ | 3 Day Guarantee 50% mark-up | 24 Hr RUSH 100% mark-up

Results By: ☐ Phone ☐ Fax ☐ Email

Date & Received by :

Special Instructions:

ANALYSIS REQUESTED (Please circle)

| Default Method | Caltrans CTM643 | Caltrans CTM643 | Caltrans CTM417 | Caltrans CTM422 | | |

Appendix 4: Historical Site Conditions

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

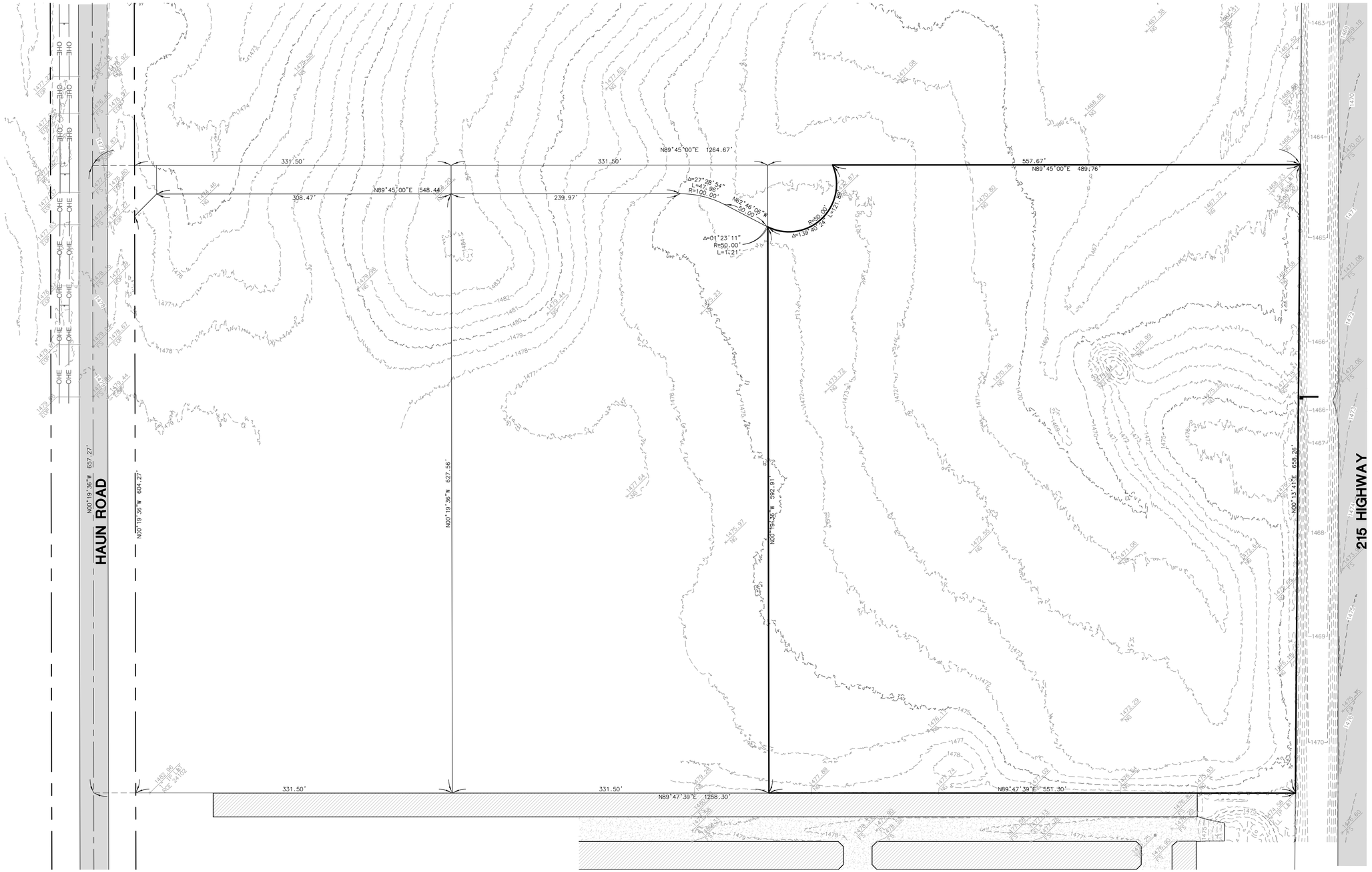
BASIS OF BEARINGS:

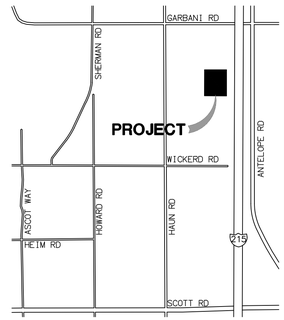
CENTERLINE OF HAUN ROAD N00°19'36"W PER PARCEL MAP NO. 18039 RECORDED IN THE COUNTY OF RIVERSIDE, BOOK 83 PAGES 75 AND 76.

BENCHMARK:

DESCRIBED BY RIVERSIDE COUNTY CALIFORNIA 1968
7.5 MI N FROM MURRIETA. 0.2 MILES SOUTH ON WASHINGTON AVE. FROM THE POST OFFICE IN MURRIETA, 2.4 MILES EAST ON LOS ALAMOS RD., 4.8 MILES NORTH ON HWY. 395, 0.1 MILE WEST ON SCOTT RD., 78 FT. SOUTH-EAST OF POWER POLE 312098-S, 60 FT. SOUTH OF SCOTT RD., 4 FT. NORTH-WEST OF THE NORTH-EAST CORNER OF A PUMP HOUSE, 2 FT. WEST OF A MARKER POST. SET A BRASS DISK IN THE TOP OF A CONCRETE POST.

ELEV: 1520.00'





VICINITY MAP
NTS

LEGEND:

- EX PALM TREE
- EX TREE
- EX SEWER MANHOLE
- EX STREETLIGHT
- EX FIRE HYDRANT
- EX UTILITY BOX
- EX STORM DRAIN MANHOLE
- EX CATCH BASIN
- EX POWER POLE
- EX TRAFFIC LIGHT
- EX UNDERGROUND UTILITY VAULT
- EX IRRIGATION METER
- EX ELECTRICAL METER
- EX WATER VALVE COVER
- EX WATER METER
- EX MANHOLE
- EX STREET SIGN
- EX BOLLARD
- EX FREEWAY SIGN
- EX TRANSFORMER
- EX FIRE WATER STRUCTURE
- EX GAS STRUCTURE
- EX GAS VALVE
- EX PROPERTY BOUNDARY
- EX STREET CENTERLINE
- EX RIGHT-OF-WAY
- EX PROPERTY LINE
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- SS — EX SEWER LINE
- DW — EX DOMESTIC WATER LINE
- FW — EX FIRE WATER LINE
- RW — EX RECYCLED WATER LINE
- SD — EX STORM DRAIN LINE
- OHE — EX OVERHEAD ELECTRIC
- UE — EX UNDERGROUND ELECTRIC
- EX GAS LINE
- EX IRON FENCE
- EX CHAIN LINK FENCE
- EX WOOD FENCE
- EX BLOCK WALL
- EX PLANTER WALL
- EX RETAINING WALL
- EX CURB AND GUTTER
- EX SLOPE
- EX CONCRETE
- EX STRUCTURE FOOTPRINT
- EX ASPHALT
- EX POOL
- EX TENNIS COURT
- EX STRIPING

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

50 25 0 50 100 150
SCALE: 1"=50'

SCALE 1"=50'

ADVANCED CIVIL GROUP

ADVANCED CIVIL GROUP INC.
30251 GOLDEN LANTERN,
SUITE E, PMB 251
LAGUNA NIGUEL, CA 92677
(866) 338-5778 PHONE
WWW.ADVANCEDCIVILGROUP.COM

SEAL—ENGINEER

REGISTERED PROFESSIONAL ENGINEER
R. STEVEN AUSTIN
No. 68795
CIVIL
STATE OF CALIFORNIA

TOPOGRAPHIC SURVEY
360-350-014
MENIFEE, CA

DRAWN BY:	JRW
DESIGNED BY:	JRW
CHECKED BY:	RSA
APPROVED BY:	RSA
DATE:	2/28/2023
REVISIONS:	
PROJECT NUMBER:	1010602

SHEET NO.
C-1
1 OF 2

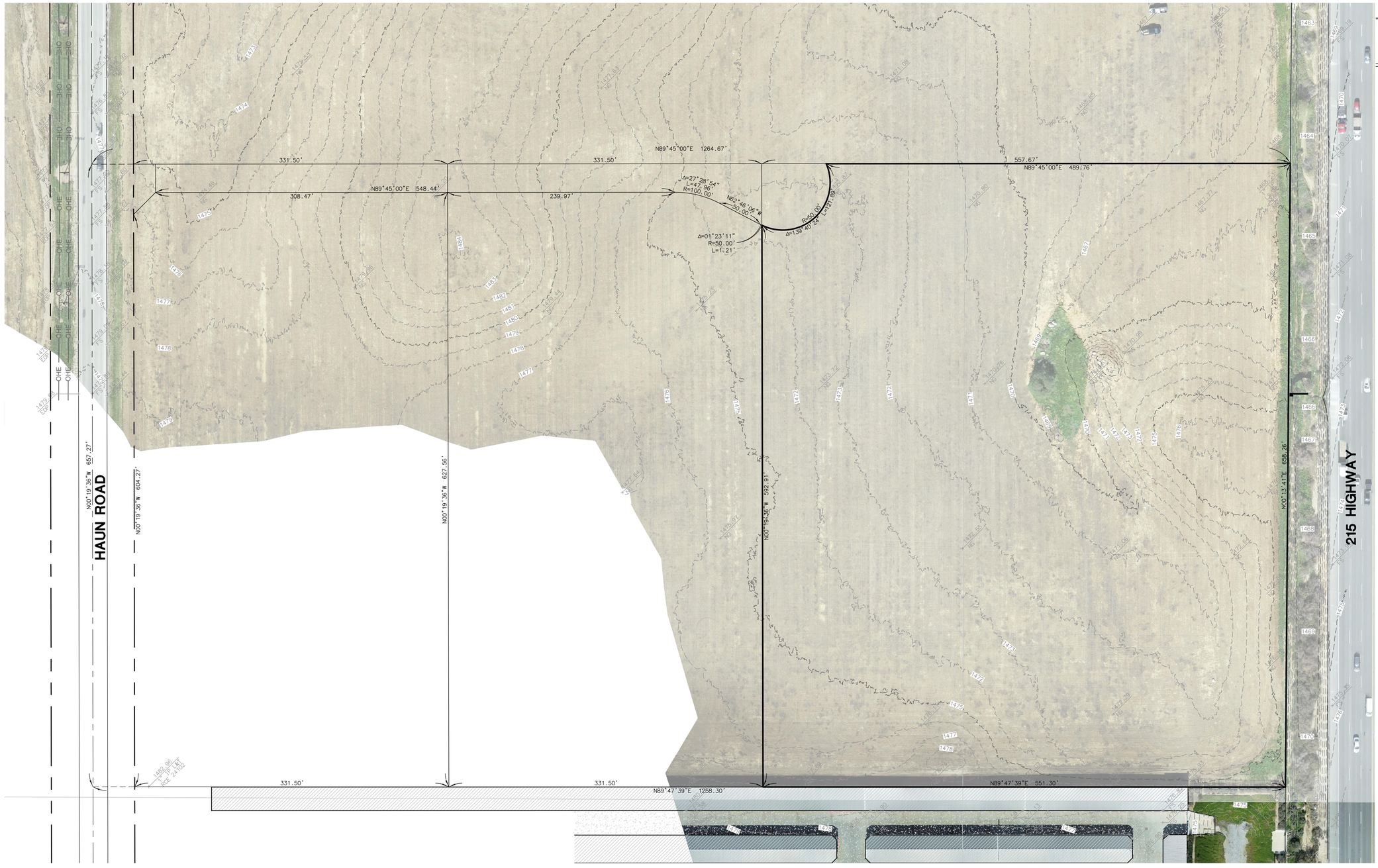
BASIS OF BEARINGS:

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ELEV: 1520.00'





VICINITY MAP
NTS

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- EX TREE
- EX SEWER MANHOLE
- EX STREETLIGHT
- EX FIRE HYDRANT
- EX UTILITY BOX
- EX STORM DRAIN MANHOLE
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- EX IRON FENCE
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- EX CURB AND GUTTER
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- EX ASPHALT
- EX POOL
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- EX STRIPING

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BAR IS ONE INCH ON ORIGINAL DRAWING

IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

50 25 0 50 100 150
SCALE: 1"=50'

SCALE 1"=50'

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REGISTERED PROFESSIONAL ENGINEER
R. STEVEN AUSTIN
No. 68795
CIVIL
STATE OF CALIFORNIA

ORTHO PHOTO W/ BOUNDARY

360-350-014

MENIFEE, CA

DRAWN BY: JRW
DESIGNED BY: JRW
CHECKED BY: RSA
APPROVED BY: RSA
DATE: 2/28/2023
REVISIONS:

PROJECT NUMBER: 1010602

SHEET NO.
C-2
2 OF 2

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

TOTAL AREA	**360,423**

IMPERVIOUS AREAS	
BUILDING IMPERVIOUS AREA	64,097
BUILDING FUTURE IMPERVIOUS AREA	8,308
ASPHALT IMPERVIOUS AREA	177,289
CONCRETE IMPERVIOUS AREA	32,115
TOTAL IMPERVIOUS	**281,809**

PERVIOUS AREAS	
PLANTER ISLANDS	17,310
PERIMETER PLANTERS	61,304
TOTAL PERVIOUS	**78,614**

Vbmp CALCULATION

LID BMP SIZING	AREA	TYPE	EFF IMP	DMA RUNOFF FACTOR	DMA AREA RUNOFF X FACTOR	
D-1	72,405	ROOF	1	0.89	64,440.45	72,405
D-2	32,115	CONCRETE	1	0.89	28,582.35	32,115
D-3	177,289	ASPHALT	1	0.89	157,787.21	177,289
D-4	78,614	LANDSCAPE	0.1	0.11	8,647.54	7,861
	360,423				259,458	289,670

C	0.80	

Vbmp - CALCULATION		
D85	0.58	IN
C	0.60	
Vu	0.35	
Vbmp	**10,516**	**CF**

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

Company Name:	Advanced Civil Group	Date:	06.09.2025
Designed by:	R. Steven Austin, PE	County/City Case No.:	FITWELL

Design Volume

Enter the area tributary to this feature	A_T =	8.27	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	10,516	ft^3

Type of Bioretention Facility Design

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

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

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	60.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.34	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	7,858	ft^2
Proposed Surface Area	A=	8,917	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		3	%
6" Check Dam Spacing		10	feet

Describe Vegetation: Natural Grasses

Notes:

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

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

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

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

PROJECT SITE

Santa Ana River Watershed

Santa Margarita Watershed

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

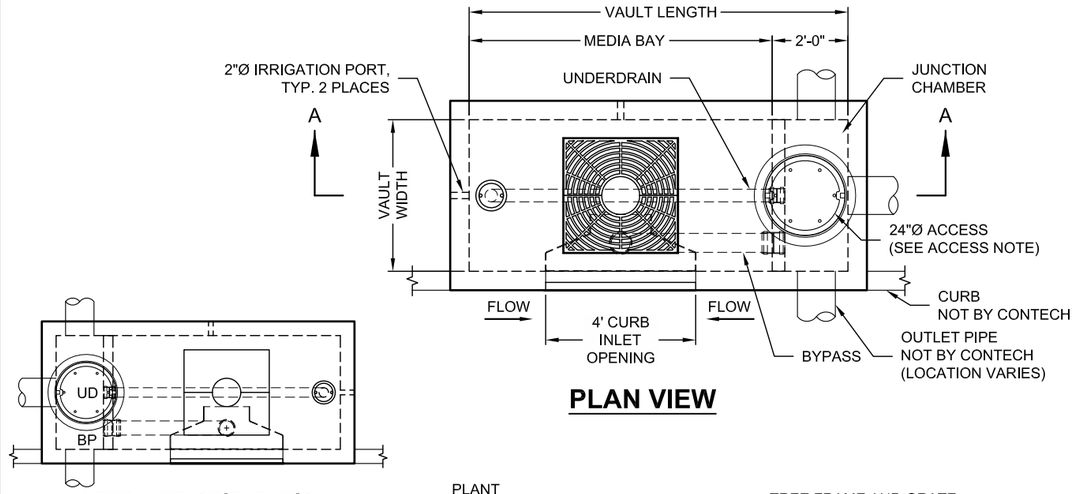
N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

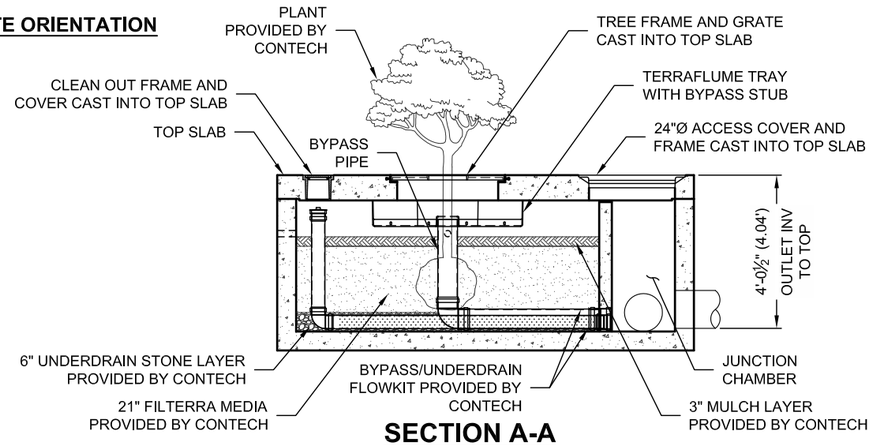
Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011



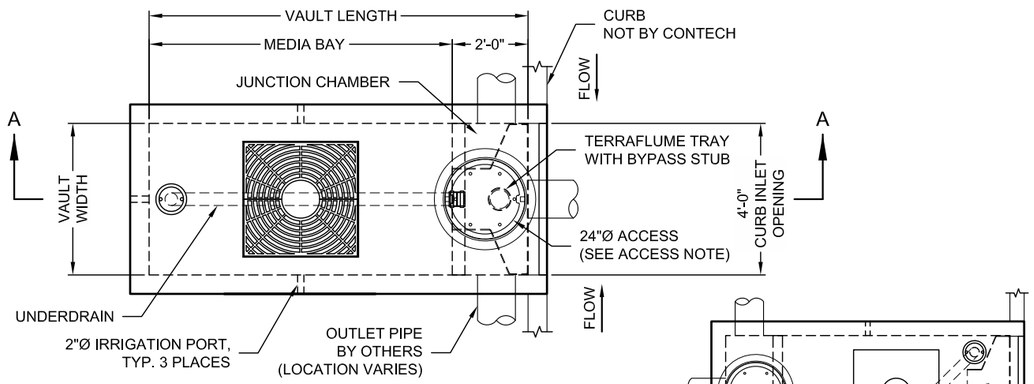
PLAN VIEW

ALTERNATE ORIENTATION

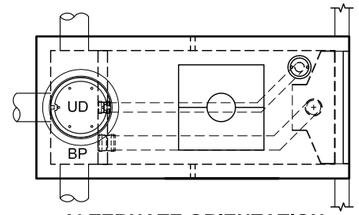


SECTION A-A

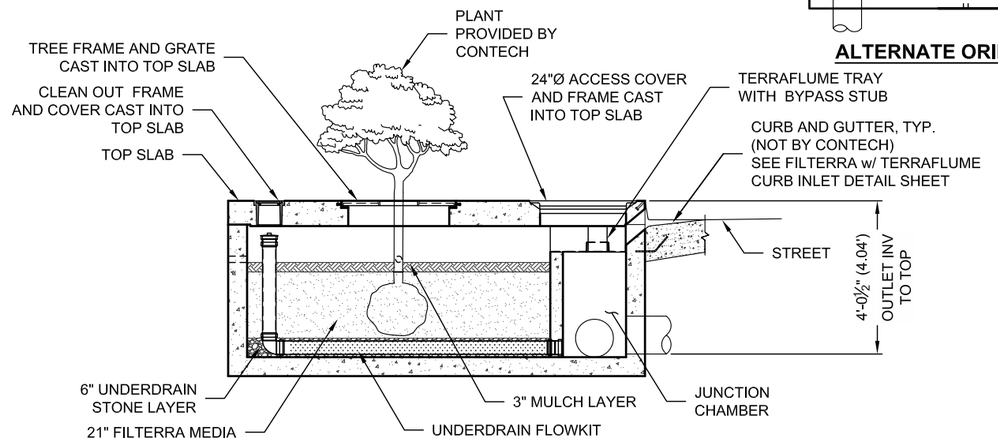
ACCESS NOTE:
JUNCTION CHAMBER TOP SLAB ACCESS WILL BE 12"Ø FOR FTIBC0404-CSS AND FTIBC0404-CLS DUE TO STRUCTURAL CONSIDERATIONS



PLAN VIEW



ALTERNATE ORIENTATION



SECTION A-A

FTIBC-C LONG SIDE CURB INLET

DESIGNATION (LONG SIDE)	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	MAX. BYPASS PIPE DIA	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBC0404LS-C	N/A CA	4 x 4	6 x 4	6" SDR 35	1.42	4" SDR 35	(1) 3' x 3'
FTIBC04504-C	CA ONLY	4.5 x 4	6.5 x 4	8"SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC058045-C	MID-ATL ONLY	5.83 x 4.5	7.83 x 4.5	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0604-C	N/A MID-ATL	6 x 4	8 x 4	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0606LS-C	ALL	6 x 6	8 x 6	10" SDR 35	2.37	4" SDR 35	(1) 3' x 3'
FTIBC0806-C	ALL	8 x 6	10 x 6	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBC1006-C	ALL	10 x 6	12 x 6	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC1107-C	ALL	11 x 7	13 x 7	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC1208-C*	CALL CONTECH	12 x 8	14 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(2) 4' x 4'
FTIBC1408-C*	CALL CONTECH	14 x 8	16 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(2) 4' x 4'
FTIBC1608-C*	CALL CONTECH	16 x 8	18 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(2) 4' x 4'
FTIBC1808-C*	CALL CONTECH	18 x 8	20 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(3) 4' x 4'
FTIBC2008-C*	CALL CONTECH	20 x 8	22 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(3) 4' x 4'
FTIBC2208-C*	CALL CONTECH	22 x 8	24 x 8	(2) 10" SDR 35	4.74	6" SDR 35	(3) 4' x 4'

N/A = NOT AVAILABLE
*REQUIRES (2) TERRAFLUMES

FTIBC-C SHORT SIDE CURB INLET

DESIGNATION (SHORT SIDE)	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (W x L)	MAX. BYPASS PIPE DIA	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBC0404SS-C	N/A CA	4 x 4	4 x 6	6" SDR 35	1.42	4" SDR 35	(1) 3' x 3'
FTIBC04045-C	CA ONLY	4 x 4.5	4 x 6.5	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0406-C	N/A MID-ATL	4 x 6	4 x 8	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC045058-C	MID-ATL	4.5 x 5.83	4.5 x 7.83	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0606SS-C	ALL	6 x 6	6 x 8	10" SDR 35	2.37	4" SDR 35	(1) 3' x 3'
FTIBC0608-C	ALL	6 x 8	6 x 10	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBC0610-C	ALL	6 x 10	6 x 12	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC0711-C	ALL	7 x 11	7 x 13	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC0812-C*	CALL CONTECH	8 x 12	8 x 14	(2) 10" SDR 35	4.74	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE
*REQUIRES (2) TERRAFLUMES

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

filterra®
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,277,274; 6,569,321; 7,625,485; 7,425,261; 7,833,412; RELATED FOREIGN PATENTS.

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FILTERRA INTERNAL BYPASS CURB WITH CHAMBER (FTIBC-C) CONFIGURATION DETAIL

I:\COMMON\CAD\TREATMENT\54 FILTERRA\40 STANDARD DRAWINGS\FTIBC-C - INTERNAL BYPASS CURB INLET - CHAMBER\LAYOUT DETAILS\DWG\FTIBC-C FILTERRA INTERNAL BYPASS CURB INLET AND CHAMBER CONFIG DETAILS.DWG 11/8/2017 8:42 AM

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ **A. On-site storm drain inlets**	☑ **Locations of inlets.**	☑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☑ **Maintain and periodically repaint or replace inlet markings.** ☐ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☐ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☐ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
☐ **B. Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ **C. Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ D1. Need for future indoor & structural pest control		☑ Note building design features that discourage entry of pests.	☑ Provide Integrated Pest Management information to owners, lessees, and operators.
☑ D2. Landscape/ Outdoor Pesticide Use	☐ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☐ Show self-retaining landscape areas, if any. ☐ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ☐ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☐ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☐ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☑ Maintain landscaping using minimum or no pesticides. ☐ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☐ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ **E. Pools, spas, ponds, decorative fountains, and other water features.**	❑ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	❑ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
❑ **F. Food service**	❑ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ❑ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	❑ **Describe the location and features of the designated cleaning area.** ❑ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	❑ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
❑ **G. Refuse areas**	❑ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ❑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ❑ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	❑ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ❑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	❑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑ **Car dealerships and similar may rinse cars with water only.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. Fuel Dispensing Areas	❑ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. Loading Docks	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

Appendix 9: O&M

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

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.



Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Appendix 10: Educational Materials

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

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

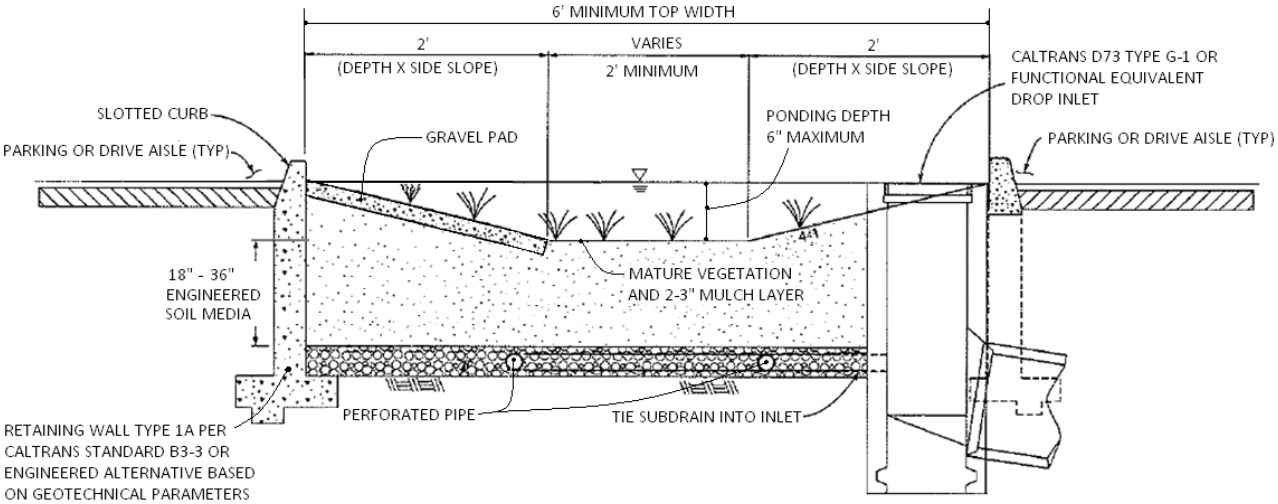
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/



Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

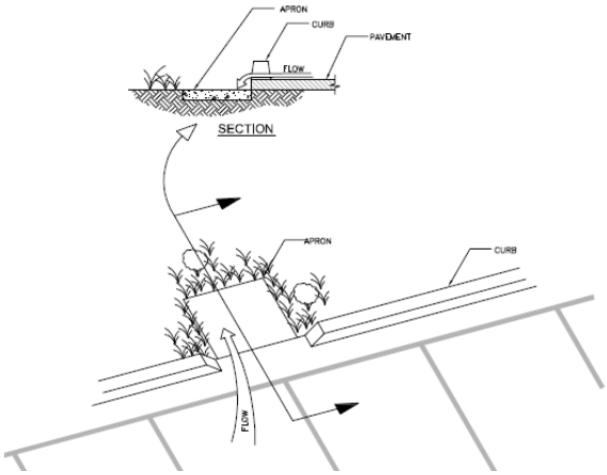


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

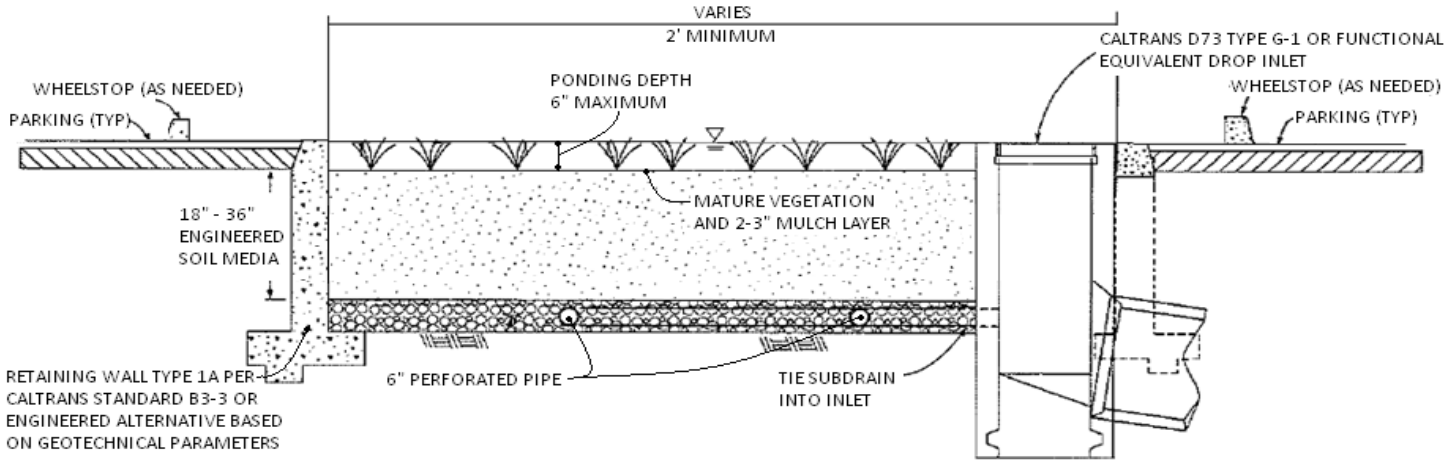
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.



Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.



Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

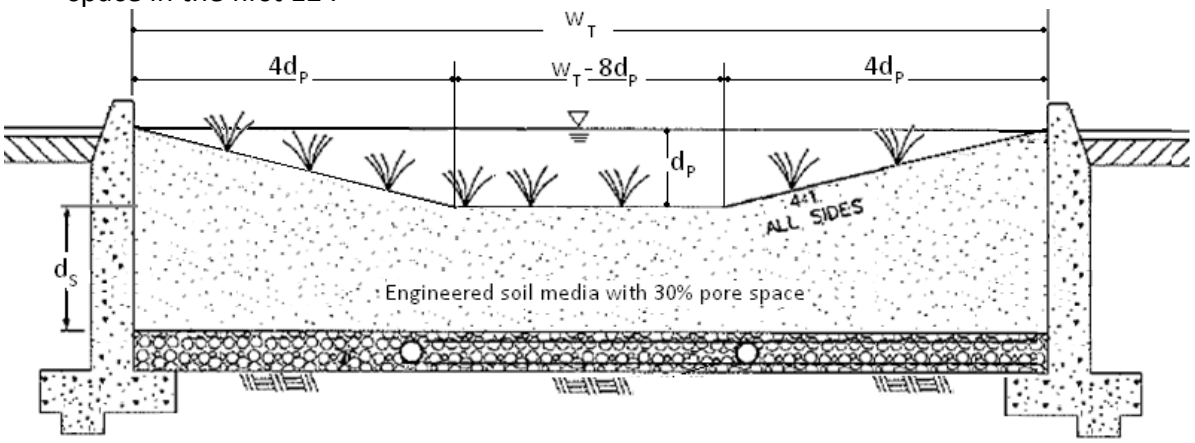
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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