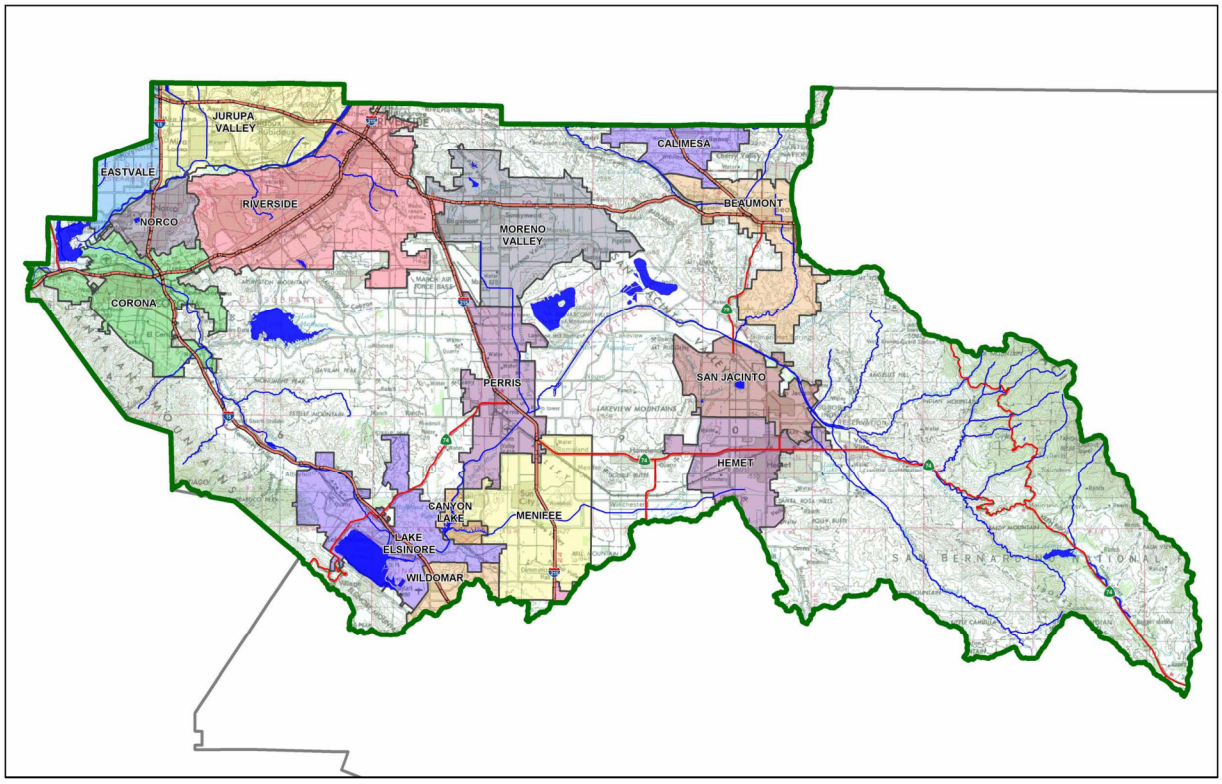
Project Specific Water Quality Management Plan

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

Project Title: NEC Ethanac and Tremble Perris Commercial Development

27278 Ethanac Rd, Perris, CA 92585

Design Review/Case No: P22-05292



☒ **Preliminary**
☐ **Final**

Original Date Prepared: July, 2022

Revision Date(s): February, 2023
August, 2023
November, 2023

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

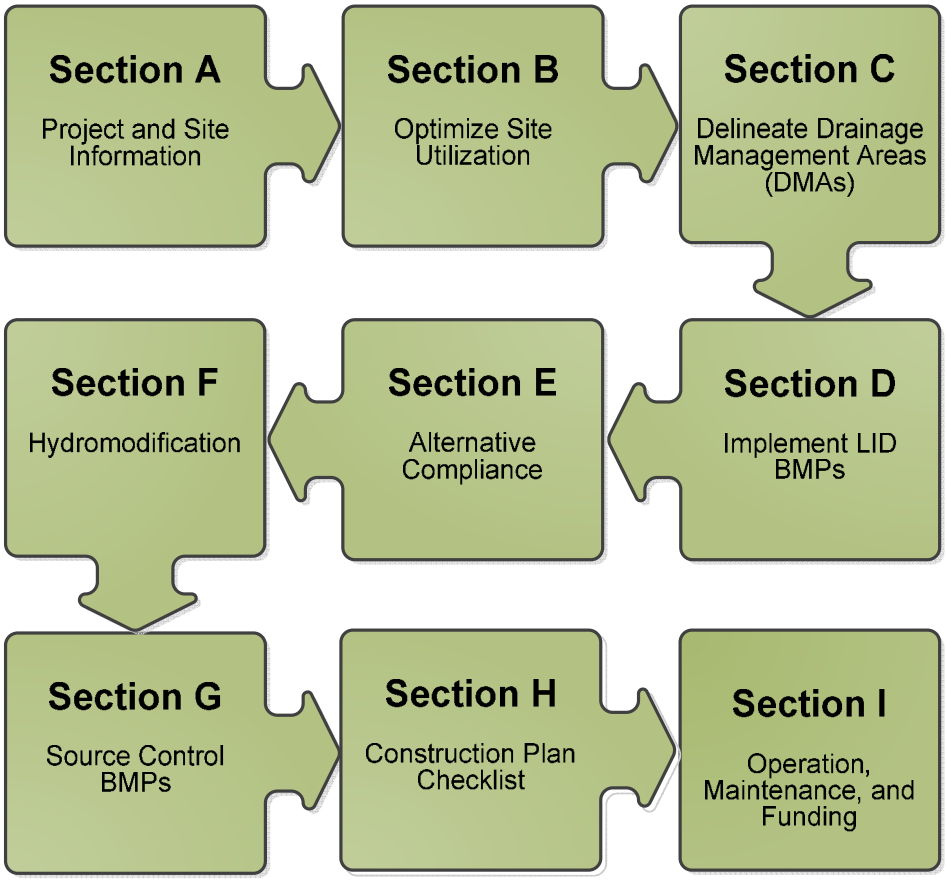
Contact Information:

Prepared for:
Paradise Lake, LLC
4300 Edison Ave Chino, CA 91710
Contact: Michael Ramirez
760-810-8548

Prepared by:
Blue Engineering and Consulting, Inc
9320 Baseline Rd., Ste. D, Rancho Cucamonga, CA 91701

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 Paradise Lake, LLC by Blue Engineering and Consulting, Inc for 27278 Ethanac Rd Beyond Food Mart (P22-05292)

This WQMP is intended to comply with the requirements of the City of Perris, for Ordinance 1194, 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 Perris Water Quality Ordinance (Municipal Code Section 14.12.315).

"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
MARK SATER	
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

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

Preparer's Signature	Date
ANGEL CESAR	PE, QSD
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure: No. 87222

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

NEC Ethanac and Tremble Perris Commercial Development

PROJECT INFORMATION	
Type of Project:	Commercial
Ward Area:	
Community Name:	
Development Name:	NEC Ethanac and Tremble Perris Commercial Development

PROJECT LOCATION
Latitude & Longitude (DMS): 33° 44' 36.4"° N & 117° 11' 4.24"° W
Project Watershed and Sub-Watershed: San Jacinto; Lower San Jacinto River
Total Acres: 1.99
APN(s): 329-240-021 & 329-240-022
Map Book and Page No.: 329-24

PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial
Proposed or Potential SIC Code(s)	5411
Area of Impervious Project Footprint (SF)	65,476
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	65,476
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N

EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	n/a
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	see Geotech Report
What is the Water Quality Design Storm Depth for the project?	0.61 in

Project Description: Project proposes a convenience store and a car wash on a 1.99-acre site. Site will consist of impervious 65,476 sf, and pervious 21,2296 sf. The onsite stormwater will be retained and infiltrated onsite by an underground chamber BMP system sized for 16,454 cu-ft and will have CDS CDS4030-8-C pretreatment BMP before the underground chambers. The project implements measures such as a trench drain, covered trash enclosure, and LID landscaping in its design to conform with LID requirements.

A.1 Maps and Site Plans

Appendix 1 includes a map of the local vicinity and existing site. In addition, WQMP Site Plan, located in Appendix 1, includes 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

A.2 Receiving Waters

In order of upstream to downstream, the receiving waters that the project site is tributary to are as follows. A map of the receiving waters is included in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River Reach 1	None	AGR, GWR, MUN, REC1, REC2, WARM, WILD	N/A
Lake Elsinore	DDT, nutrients, organic enrichment/low dissolved oxygen, PCBs	AGR, REC1, REC2, WARM, WILD	N/A
Canyon Lake	Nutrients	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
San Jacinto Reach 3	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	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)*	☒ Y	☐ N

Section B: Optimize Site Utilization (LID Principles)

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

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

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

Site Optimization

Does the project identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, due to the site's existing topography, runoff currently drains from south to north. The proposed site will be graded such that the runoff generated will continue to drain from south to north.

Does the project identify and protect existing vegetation? If so, how? If not, why?

The existing site is a vacant dirt lot composed of grass and shrubs. The vegetation on building grounds will be removed. The existing vegetation and drainage patterns that will be protected are identified in the WQMP Site Plan.

Does the project identify and preserve natural infiltration capacity? If so, how? If not, why?

Yes, the proposed infiltration chambers are located at P-2, where infiltration is feasible. The test infiltration rate of P-2 is 1.91 in/hr (as shown in Appendix 3).

Does the project identify and minimize impervious area? If so, how? If not, why?

The impervious area has been minimized in relation to the size of the site and the relative density of the development. The site design proposes AC pavement, commercial lots, and landscaped slopes. The proposed roadway widths are designed to meet City of Perris Standards.

Does the project identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

No, runoff is collected through onsite storm drain inlets and conveyed though storm drain to the proposed underground infiltration chambers where water will infiltrate into the ground.

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)	Area (Sq. Ft.)	DMA Type
DMA A-1	Roof	10,135	D
DMA A-2	Concrete/Asphalt	55,341	D
DMA A-3	Ornamental Landscape	21,296	C

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA A-3	21,296		

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 =	Required Retention Depth (inches) [D]
N/A						

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

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

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

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

DMA Name or ID	BMP Name or ID
DMA A-1	Underground Infiltration Chamber
DMA A-2	Underground Infiltration Chamber
DMA A-3	Self-treating

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (ref: Chapter 2.4.4 of the WQMP Guidance Document)? ☐ Y ☒ N

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:		
…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 (verified with the City of Perris).

☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. (Harvest and Use BMPs are still encouraged, but are not required as the Design Capture Volume will be infiltrated or evapotranspired).

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

Harvest and Use BMPs need not be assessed for the site.

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: n/a

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

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

Total Area of Impervious Surfaces: n/a

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

The project EIATIA factor: n/a

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

Minimum required irrigated area: n/a

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

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

Toilet Use Feasibility

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

Projected Number of Daily Toilet Users: n/a

Project Type: n/a

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

Total Area of Impervious Surfaces: n/a

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

The project TUTIA factor: n/a

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

Minimum number of toilet users: n/a

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

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

Other Non-Potable Use Feasibility

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

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

Average Daily Demand: n/a

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

Total Area of Impervious Surfaces: n/a

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

The project factor: n/a

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

Minimum required use: n/a

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

For the project, the following applies:

☐ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4.

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5.

☒ None of the above.

D.4 Feasibility Assessment Summaries

Table D.2 LID Prioritization Summary Matrix

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

Infiltration refers to the proposed underground infiltration chambers.

D.5 LID BMP Sizing

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	*Underground Infiltration BMP*		
	[A]		[B]	[C]	[A] x [C]			
DMA A-1	*10,135*	*Roof*	*1*	*0.89*	*9,040.4*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-2	*55,341*	*Concrete/asphalt*	*1*	*0.89*	*49,364.2*			
DMA A-3	*21,296*	*Ornamental Landscaping*	*0*	*0.04*	*851.8*			
	A_T = 86,772				Σ= [D]=59,256.4	*[E] 0.61*	*[F]=$\frac{[D]X[E]}{12}$= 3012.2*	*16,454*

[B], [C] are obtained from Section 2.3.1 of the WQMP Guidance Document

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

[G] is obtained from LID BMP design procedure sheet, 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 confirmation of LID waiver approval by the Regional Board). For the project, the following applies:

☒ 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 Regional Board 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 alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

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

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

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

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

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

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

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

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

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

[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

The project does create a Hydrologic Condition of Concern, not meeting the criteria for HCOC Exemption as shown below:

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

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

Results included in Table F.1 below and hydrologic analysis included in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration (min)	16.534	8.612	63%
Flow (CFS)	0.066	0.414	145%
Volume (Cubic Feet)	1,490	10,960	152%

[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 (Prado Dam, Santa Ana River) 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

F.2 HCOC Mitigation

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

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

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

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

☐ d. None of the above.

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

	2 year – 24 hour			
	Pre-condition	**Post-Mitigation**	**Post-Mitigation minus Infiltration***	**% Difference**
Flow (CFS)	0.066	0.099	0.000	-100%

*Infiltration rate into ground on bottom of underground chamber = 0.099cfs

See appendix 7 for attachments

Section G: Source Control BMPs

The following table identifies the potential sources of runoff pollutants for this project and specifies how they are addressed through permanent controls and operational BMPs:

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site Storm Drain Inlets	• Mark all inlets with the words "Only Rain-Down the Storm Drain" or similar. Catch Basin Markers shall be per local agency requirements	• Maintain and periodically repaint or replace inlet markings. • Provide Stormwater pollution prevention information to new site owners, lessees, or operators. • See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
Landscape/ Outdoor Pesticide Use	Final landscape plans will accomplish all 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.	• Maintain landscaping using minimum or no pesticides. • See applicable operational BMPs in "What you should know for…..landscape and Gardening" at http://rcflood.org/stormwater/ Provide IPM information to new owners, lessees and operators.

	• To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	

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	Plan Sheet Number(s)	Latitude / Longitude
		Sheet X	

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.

“To be completed at time of Final WQMP”

Section I: Operation, Maintenance and Funding

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

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred.
3. An outline of general maintenance requirements for the Stormwater BMPs 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.
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.

See Appendix 9 for a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on site, and an agreement assigning responsibility for maintenance and providing for inspections and certification.

Maintenance Mechanism: Insert text here.

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

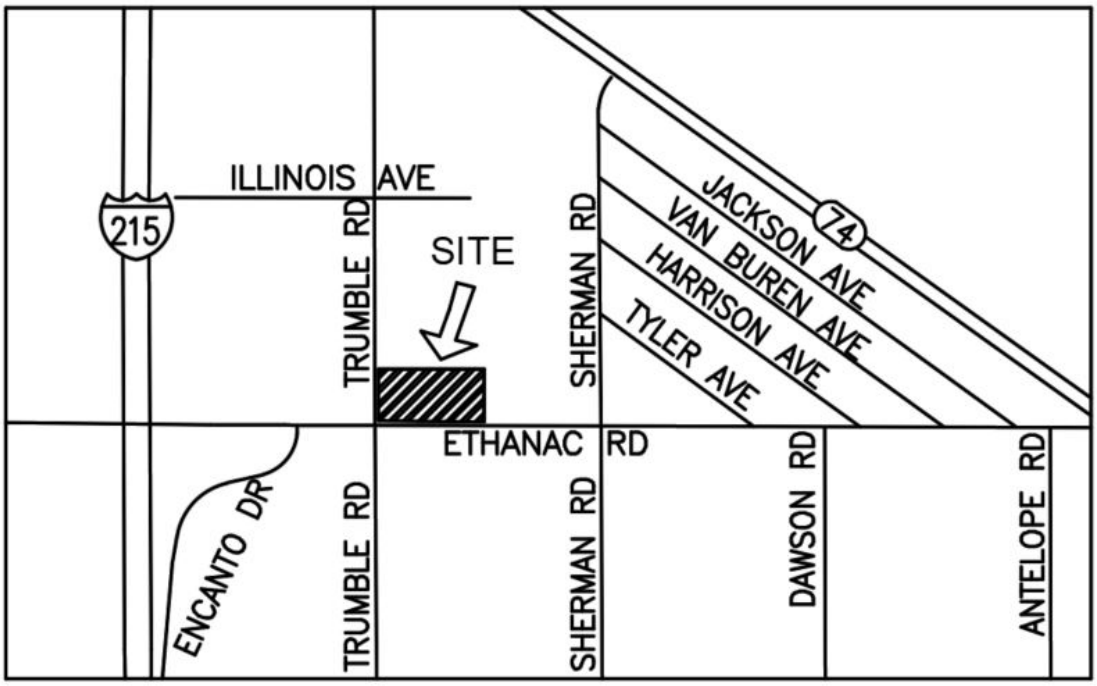
☐ Y ☒ N

Operation and Maintenance Plan and Maintenance Mechanism is included in Appendix 9. Educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP are included in Appendix 10.

"To be completed at time of Final WQMP"

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



VICINITY MAP

N.T.S.

TRUMBLE ROAD

ETHANAC ROAD

BEYOND FOOD MART
(7,250 S.F.)

1427.80 FF
1427.13 PAD

CAR WASH

DA-1
1.99

PR. CURB CUT & INLET
1425.91TC
1425.41FS

1427.77TC
1427.27FS

PR. INLET WITH STENCILING
1427.49TC
1426.99FL/TG

1428.01TC
1427.51FL/HP

PR. TRENCH DRAIN
1428.51TC
1428.01FS

1426.98TC
1426.48FS/HP

1427.25TC
1426.75FS

1426.71TC
1426.21FL

PR. COVERED TRASH ENCLOSURE WITH DRAIN

PR. INLET WITH STENCILING
1427.03TC
1426.53FL/TG

PR. SEWER LATERAL

PR. INLET WITH STENCILING
1427.53TC
1427.03FL/TG

1429.00TC
1428.50FL

1426.95TC
1426.45FL

1427.46TC
1426.96FS

PR. SWALE FOR OFFSITE FLOW

EX. R/W

PR. R/W

PR. V-GUTTER

PR. INLET WITH STENCILING
1426.20 FL

PR. STORM DRAIN

1426.66 FL

PR. UNDERGROUND CHAMBERS
$V_{PROPOSED}$= 16,454 CF
Q_{10}= 0.782 CFS

PR. OVERFLOW

PR. DEAD-END SUMP
NOT CONNECTED TO SYSTEM

PR. INLET WITH STENCILING

1426.03 FL

1426.49 FL

PR. INLET WITH STENCLING

PR. STORM DRAIN

PR. C&G

PR. CDS PRE TREATMENT

PR. INLET WITH STENCILING
1425.98TC
1425.46FL/TC

1426.69TC
1426.19FL/HP

1425.93TC
1425.43FL/TG

PR. FLOW CONTROL MH

PR. BUBBLER OUT

PR. R/W

PR. PARKWAY CULVERT TO DISCHARGE ONSITE RUNOFF

PR. PARKWAY CULVERT TO DISCHARGE OFFSITE RUNOFF

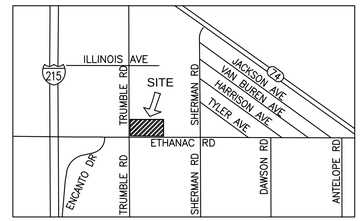
EX. R/W

1.3%
0.4%
0.3%
0.5%
0.5%
0.3%
0.3%

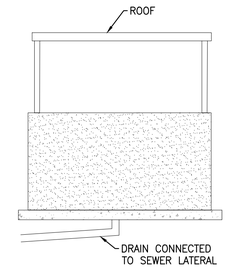
SD
SS
4"SS
8"SS
12"SW
4"FW
2"W
12"RW
EV

LEGEND

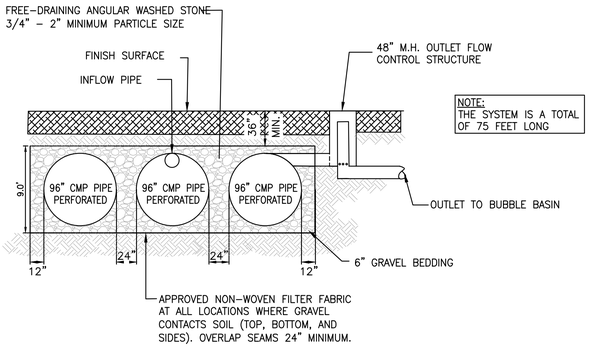
- FLOW LINE
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY
- # / X.XX — DRAINAGE AREA DESIGNATION / DRAINAGE AREA (ACRES)
- PROPOSED LANDSCAPE
- PROPOSED AC PAVEMENT
- PROPOSED CONCRETE



VICINITY MAP
N.T.S.



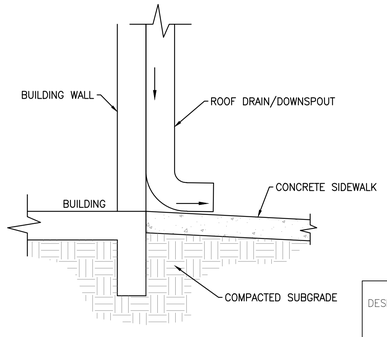
TRASH ENCLOSURE WITH COVER DETAIL
NTS



NOTE:
THE SYSTEM IS A TOTAL OF 75 FEET LONG

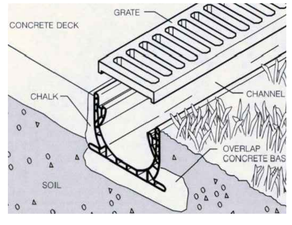
UNDERGROUND CHAMBERS SYSTEM SECTION
NOT TO SCALE

0 20 40 Feet
SCALE 1"= 20'

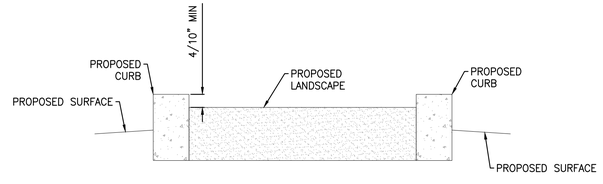


ROOF DRAIN DETAIL
NTS

DRAIN INLET STENCILING DETAIL
NTS



TRENCH DRAIN DETAIL
NTS



LID LANDSCAPE DETAIL
NTS

DESIGNED BY: MG
DRAWN BY: CG
CHECKED BY: AC

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER
ANGEL CESAR
No. 87222
CIVIL
STATE OF CALIFORNIA

BLUE Engineering & Consulting, Inc
9320 BASELINE RD, STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM
WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF:
ANGEL CESAR, P.E. 87222 EXP. 9/30/23 — DATE

REV.	REVISION DESCRIPTION	BY	DATE

CITY OF PERRIS
27278 ETHANAC ROAD, PERRIS, CA 92585

REVIEWED BY: _____ DATE

XXXXXXXXXX
P.E. NO. C-XXXXX
EXP. DATE XX-XX-XXXX

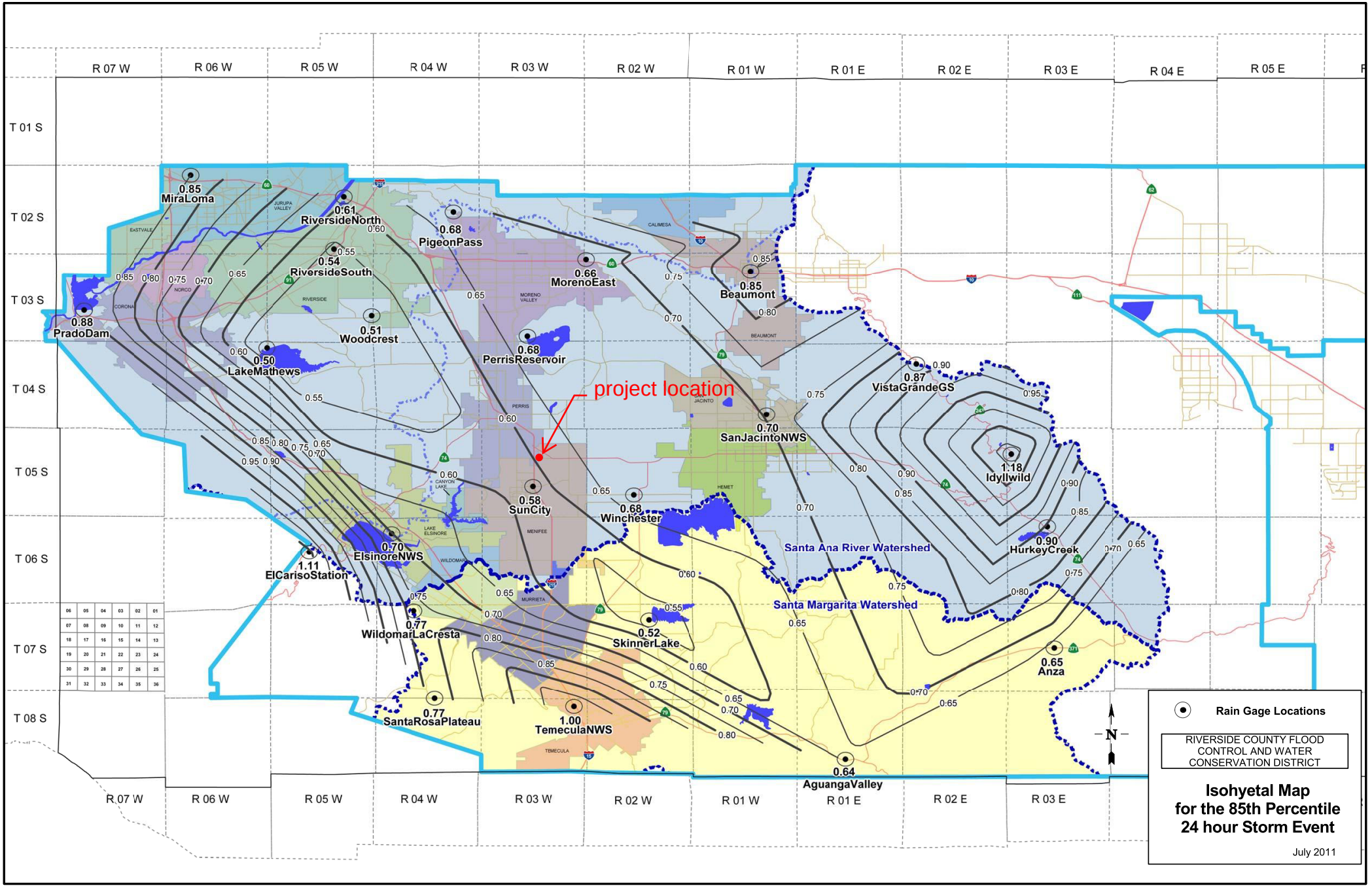
POST-CONSTRUCTION BMP SITE PLAN BEYOND FOOD MART, 27278 ETHANAC ROAD, P22-05292

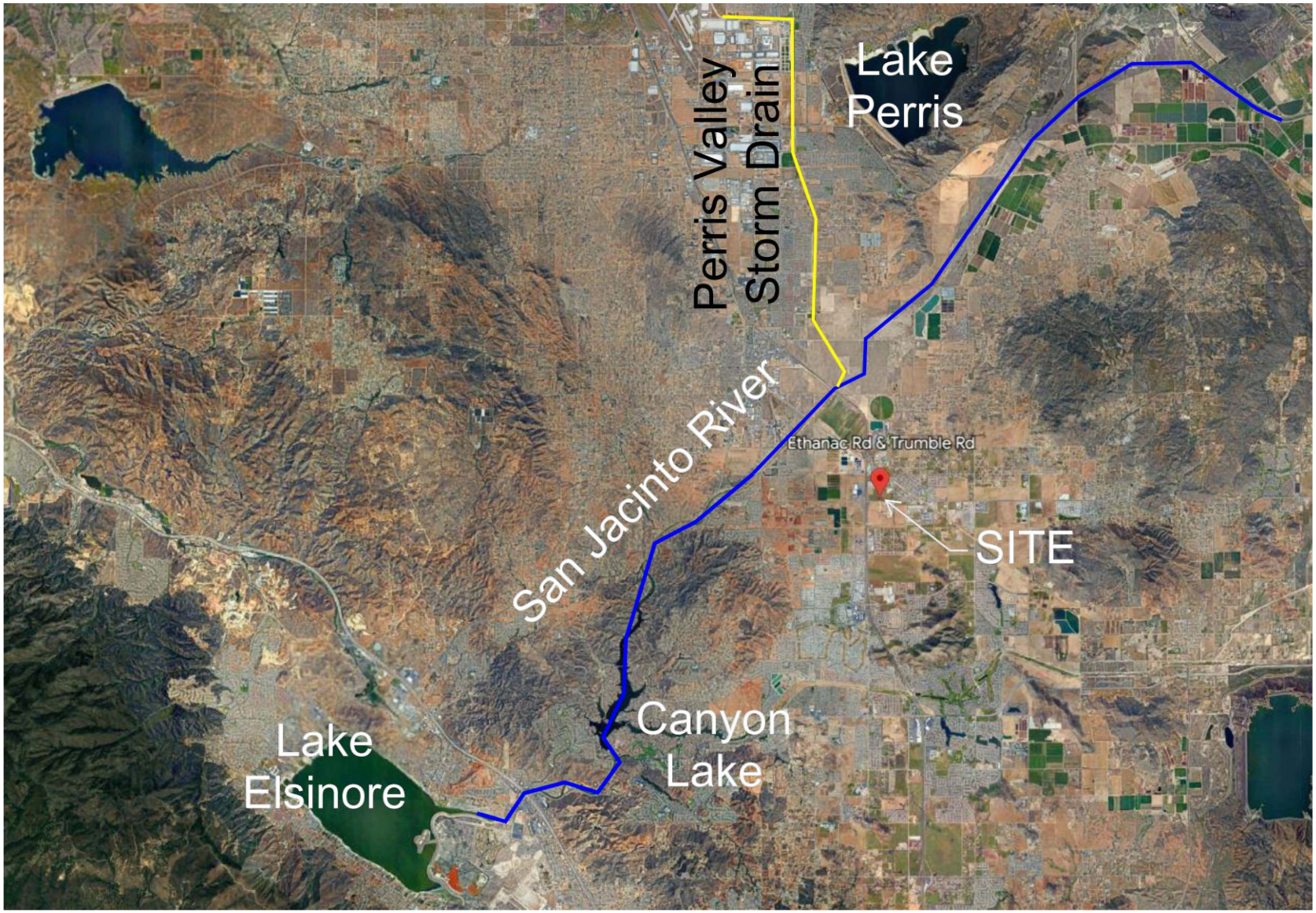
BEYOND FOODS MART
PERRIS SERVICE STATION
CONDITIONAL USE PERMIT

CUP:
LDP:
DATE: February 27, 2024
SHEET 1
OF 1 SHEETS
PROJECT NUMBER:

Plans Prepared On: 2/27/2024

Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Reports\WQMP\Exhibits\2022162 - WQMP EXHIBIT.dwg Feb 27, 2024 - 3:36pm


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
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
project location
0.70 SanJacintoNWS
0.87 VistaGrandeGS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
Santa Ana River Watershed
Santa Margarita Watershed
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011



RECEIVING WATERS MAP

PREPARED BY:

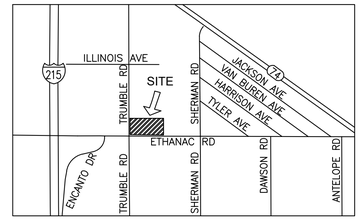
BLUE
ENGINEERING & CONSULTING, INC
FOREVER BLUE N.G.

9320 BASELINE RD., STE. D
RANCHO CUCAMONGA, CA 91701
909-248-6557
INFO@BLUECIVILENG.COM -
WWW.BLUECIVILENG.COM

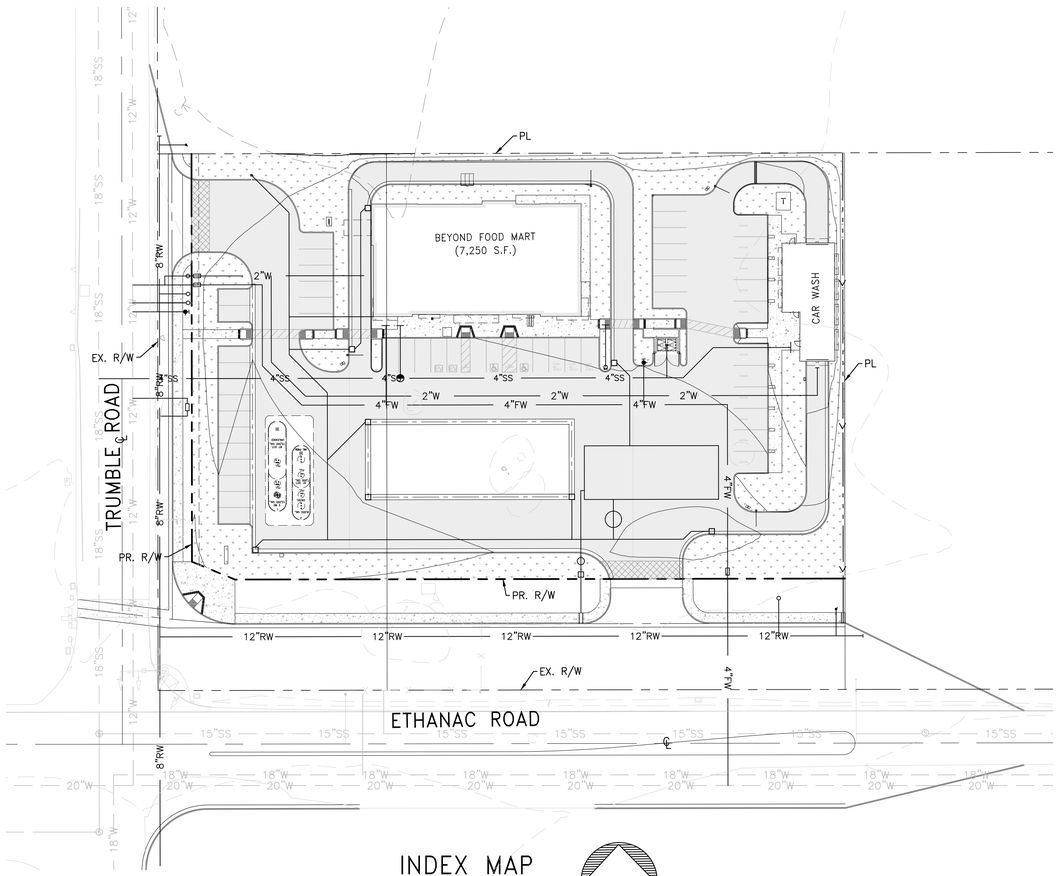
Appendix 2: Construction Plans

Grading and Drainage Plans

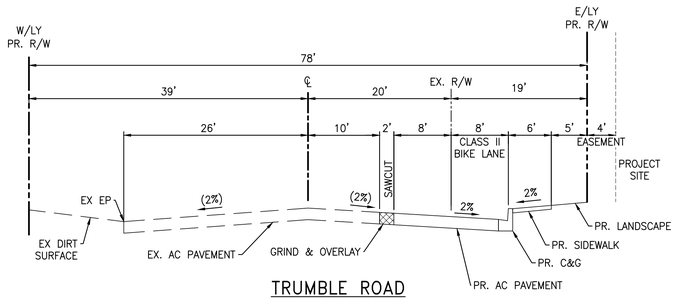
CITY OF PERRIS
BEYOND FOODS MART PERRIS SERVICE STATION
COMMERCIAL DEVELOPMENT
APN: 329-240-021 & 329-240-022



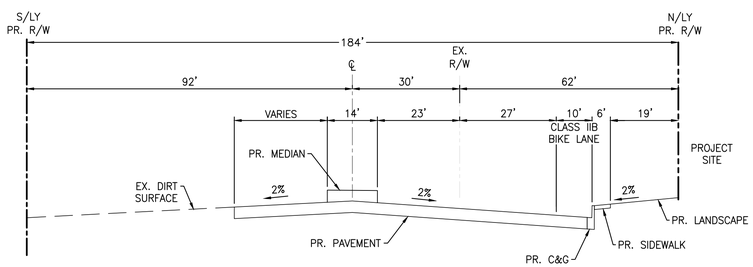
VICINITY MAP
N.T.S.



INDEX MAP
SCALE: 1"= 40'



TRUMBLE ROAD
TYPICAL STREET SECTION
TI=8.0
N.T.S.



ETHANAC ROAD
TYPICAL STREET SECTION
TI=11.0
N.T.S.

PROPERTY OWNER
PARADISE LAKE, LLC
4300 EDISON AVENUE
CHINO, CA 91710
PHONE: (909) 772-5410

CIVIL ENGINEER
BLUE ENGINEERING AND CONSULTING, INC
9320 BASELINE ROAD, SUITE D,
RANCHO CUCAMONGA, CA 91701
CONTACT: ANGEL CESAR, PE
PHONE: (909) 248-6557

LEGAL DESCRIPTION
PARCEL A (APN: 329-240-021)
LOT 21 IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP FILED IN BOOK 329, PAGE 24 OF PARCEL MAPS, IN THE OFFICE THE COUNTY RECORDER OF SAID COUNTY.

PROPERTY SIZE: 0.88 ACRES

PARCEL B (APN: 329-240-022)
LOT 22 IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP FILED IN BOOK 329, PAGE 24 OF PARCEL MAPS, IN THE OFFICE THE COUNTY RECORDER OF SAID COUNTY.

PROPERTY SIZE: 1.67 ACRES

BENCHMARK
ELEVATION: 1421.89

DESCRIPTION: 373 FEET WEST ALONG ETHANAC RD FROM THE INTERSECTION OF ETHANAC RD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC RD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT OF WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT OF WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED H-21-1 RESET 1971 SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND

UTILITIES
EASTERN MUNICIPAL WATER DISTRICT
800-426-3693

SOUTHERN CALIFORNIA EDISON
800-684-8123

THE GAS COMPANY
(800)427-2200

EARTHWORK QUANTITIES

CUT	1.42	CY
FILL	3,287	CY
NET <IMPORT>	3,285	CY

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	CONCEPTUAL GRADING PLAN
3	CONCEPTUAL UTILITY PLAN
4	PRE-HYDROLOGY EXHIBIT
5	POST-HYDROLOGY EXHIBIT

LEGEND
- EXISTING RIGHT OF WAY/ PROPERTY LINE
- PROPOSED RIGHT OF WAY/ PROPERTY LINE
- CENTERLINE
- (101) EXISTING CONTOUR
- 101 PROPOSED CONTOUR
- 4"SS PROPOSED 4" SEWER LATERAL
- 2"W PROPOSED 2" WATER LATERAL
- 4"FW PROPOSED 4" FIRE WATER
- SD PROPOSED STORM DRAIN
- PROPOSED GRADED SWALE

DESIGNED BY: MG
DRAWN BY: CG
CHECKED BY: AC

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER ANGEL CESAR No. 87222 CIVIL STATE OF CALIFORNIA

BLUE Engineering & Consulting, Inc
9320 BASELINE RD. STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM
WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF:
ANGEL CESAR, P.E. 87222 EXP. 9/30/23 DATE

REV.	REVISION DESCRIPTION	BY	DATE

CITY OF PERRIS
27278 ETHANAC ROAD, PERRIS, CA 92585

REVIEWED BY: _____ DATE

XXXXXXXXXX
P.E. NO. C-XXXXX
EXP. DATE XX-XX-XXXX

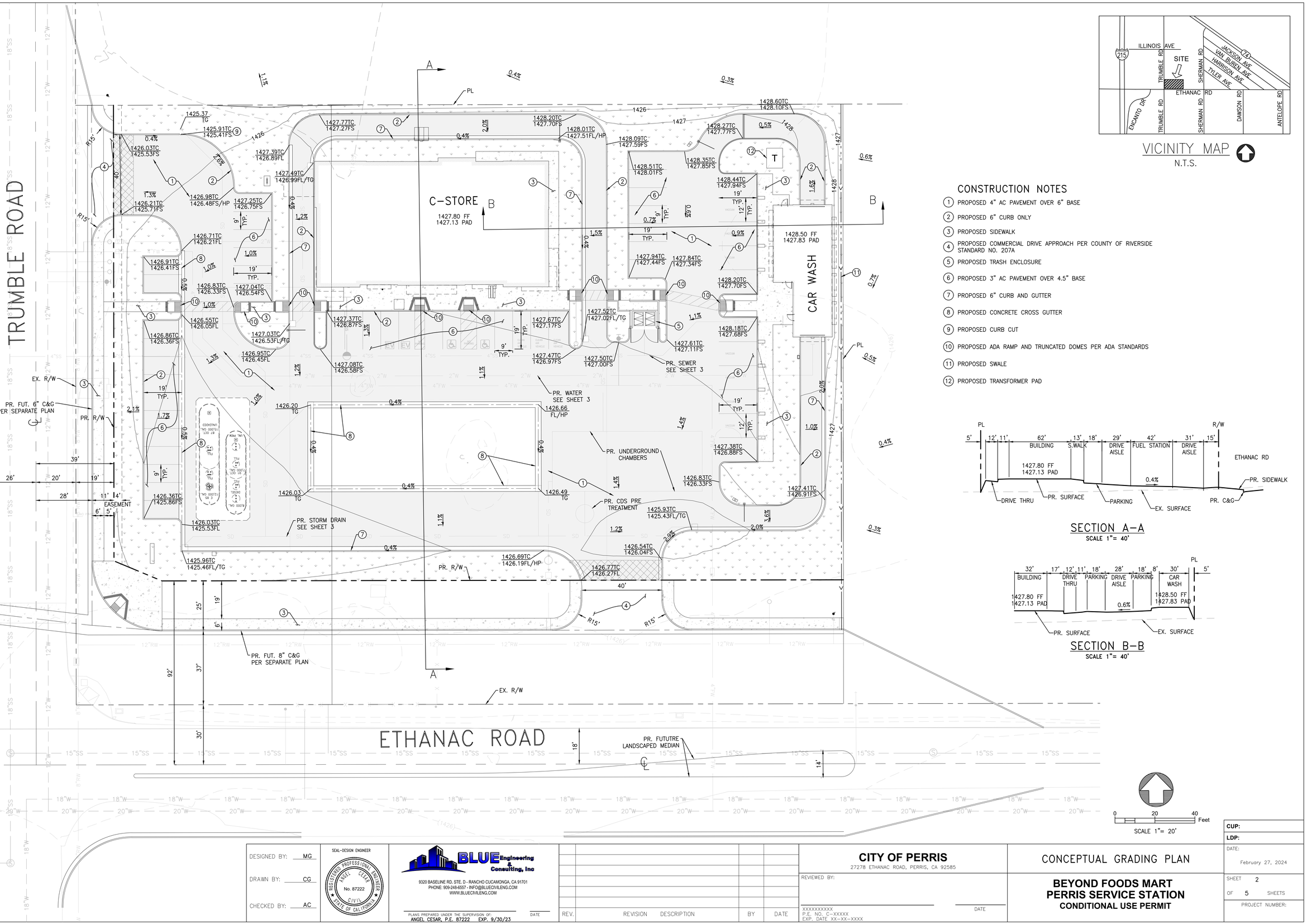
TITLE SHEET

BEYOND FOODS MART
PERRIS SERVICE STATION
CONDITIONAL USE PERMIT

CUP:
LDP:
DATE: February 27, 2024
SHEET 1
OF 5 SHEETS
PROJECT NUMBER:

Plans Prepared On: 2/27/2024

Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Entitlement Package\2022162 - TS.dwg Feb 27, 2024 - 3:57pm



VICINITY MAP
N.T.S.

CONSTRUCTION NOTES

1. PROPOSED 4" AC PAVEMENT OVER 6" BASE
2. PROPOSED 6" CURB ONLY
3. PROPOSED SIDEWALK
4. PROPOSED COMMERCIAL DRIVE APPROACH PER COUNTY OF RIVERSIDE STANDARD NO. 207A
5. PROPOSED TRASH ENCLOSURE
6. PROPOSED 3" AC PAVEMENT OVER 4.5" BASE
7. PROPOSED 6" CURB AND GUTTER
8. PROPOSED CONCRETE CROSS GUTTER
9. PROPOSED CURB CUT
10. PROPOSED ADA RAMP AND TRUNCATED DOMES PER ADA STANDARDS
11. PROPOSED SWALE
12. PROPOSED TRANSFORMER PAD

SECTION A-A
SCALE 1"= 40'

SECTION B-B
SCALE 1"= 40'

0 20 40 Feet
SCALE 1"= 20'

DESIGNED BY:	MG
DRAWN BY:	CG
CHECKED BY:	AC

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER ANGEL CESAR No. 87222 CIVIL STATE OF CALIFORNIA

BLUE Engineering & Consulting, Inc
9320 BASELINE RD, STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM
WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF: ANGEL CESAR, P.E. 87222 EXP. 9/30/23 DATE

REV.	REVISION DESCRIPTION	BY	DATE

CITY OF PERRIS
27278 ETHANAC ROAD, PERRIS, CA 92585

REVIEWED BY: _____ DATE

XXXXXXXXXX
P.E. NO. C-XXXXX
EXP. DATE XX-XX-XXXX

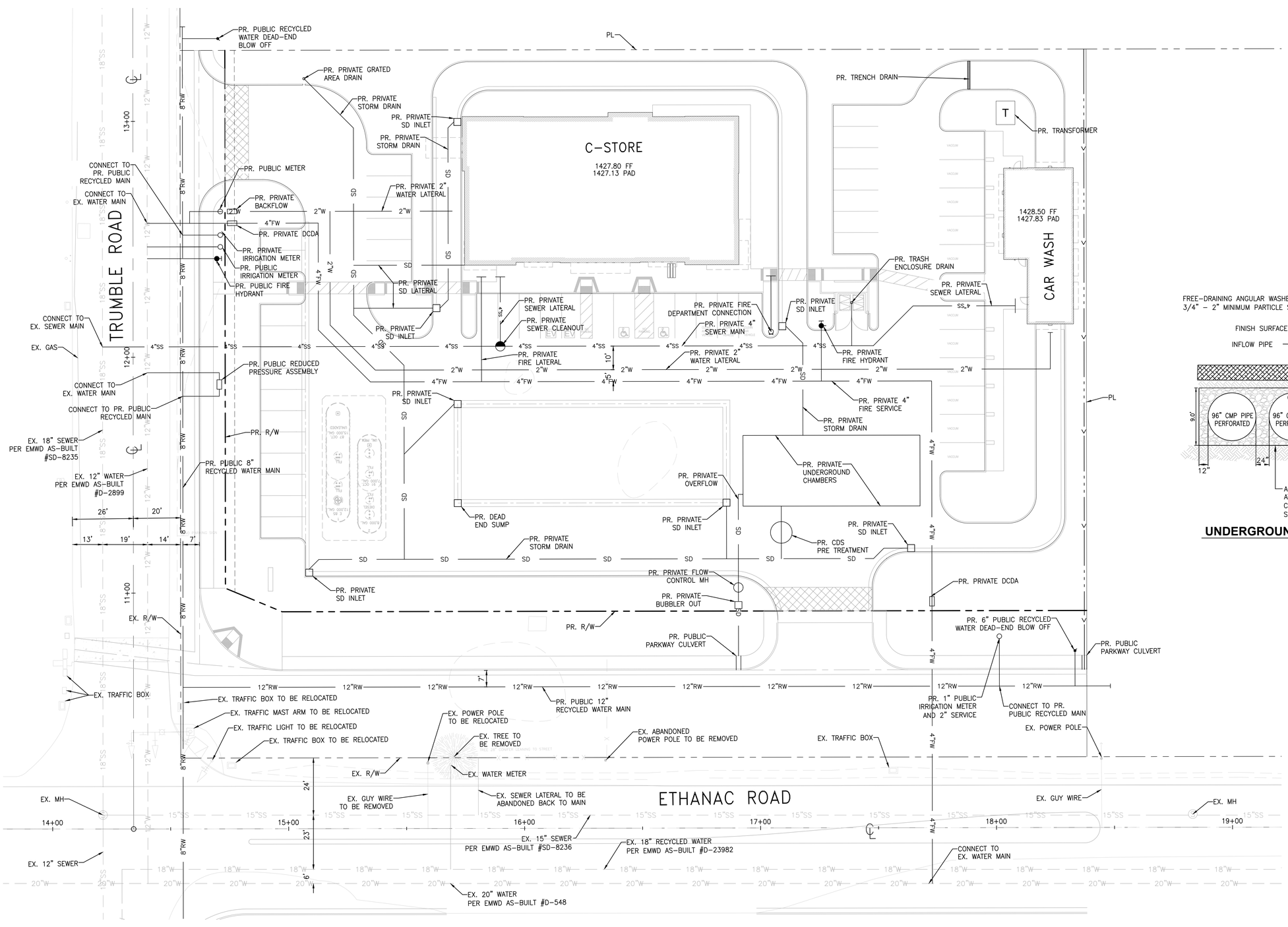
CONCEPTUAL GRADING PLAN

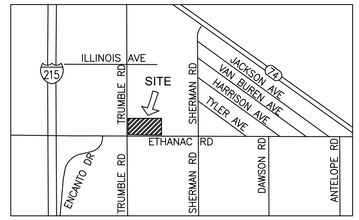
BEYOND FOODS MART
PERRIS SERVICE STATION
CONDITIONAL USE PERMIT

CUP:	
LDP:	
DATE:	February 27, 2024
SHEET	2
OF	5 SHEETS
PROJECT NUMBER:	

Plans Prepared On: 2/27/2024

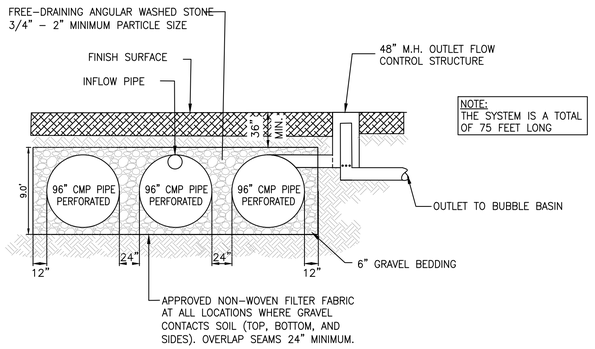
Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Entitlement Package\2022162 - CG.dwg Feb 27, 2024 - 3:57pm





VICINITY MAP

N.T.S.



NOTE: THE SYSTEM IS A TOTAL OF 75 FEET LONG

UNDERGROUND CHAMBERS SYSTEM SECTION

NOT TO SCALE

0 20 40 Feet

SCALE 1"= 20'

DESIGNED BY: MG

DRAWN BY: CG

CHECKED BY: AC

SEAL-DESIGN ENGINEER

REGISTERED PROFESSIONAL ENGINEER ANGEL CESAR No. 87222 CIVIL STATE OF CALIFORNIA

BLUE Engineering & Consulting, Inc

9320 BASELINE RD. STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM
WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF: ANGEL CESAR, P.E. 87222 EXP. 9/30/23 DATE

REV.	REVISION DESCRIPTION	BY	DATE

CITY OF PERRIS
27278 ETHANAC ROAD, PERRIS, CA 92585

REVIEWED BY: DATE

XXXXXXXXXX
P.E. NO. C-XXXXX
EXP. DATE XX-XX-XXXX

CONCEPTUAL UTILITY PLAN

BEYOND FOODS MART
PERRIS SERVICE STATION
CONDITIONAL USE PERMIT

CUP:
LDP:
DATE: February 27, 2024
SHEET 3
OF 5 SHEETS
PROJECT NUMBER:

Plans Prepared On: 2/27/2024

Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Entitlement Package\2022162 - CUP.dwg Feb 27, 2024 - 3:57pm

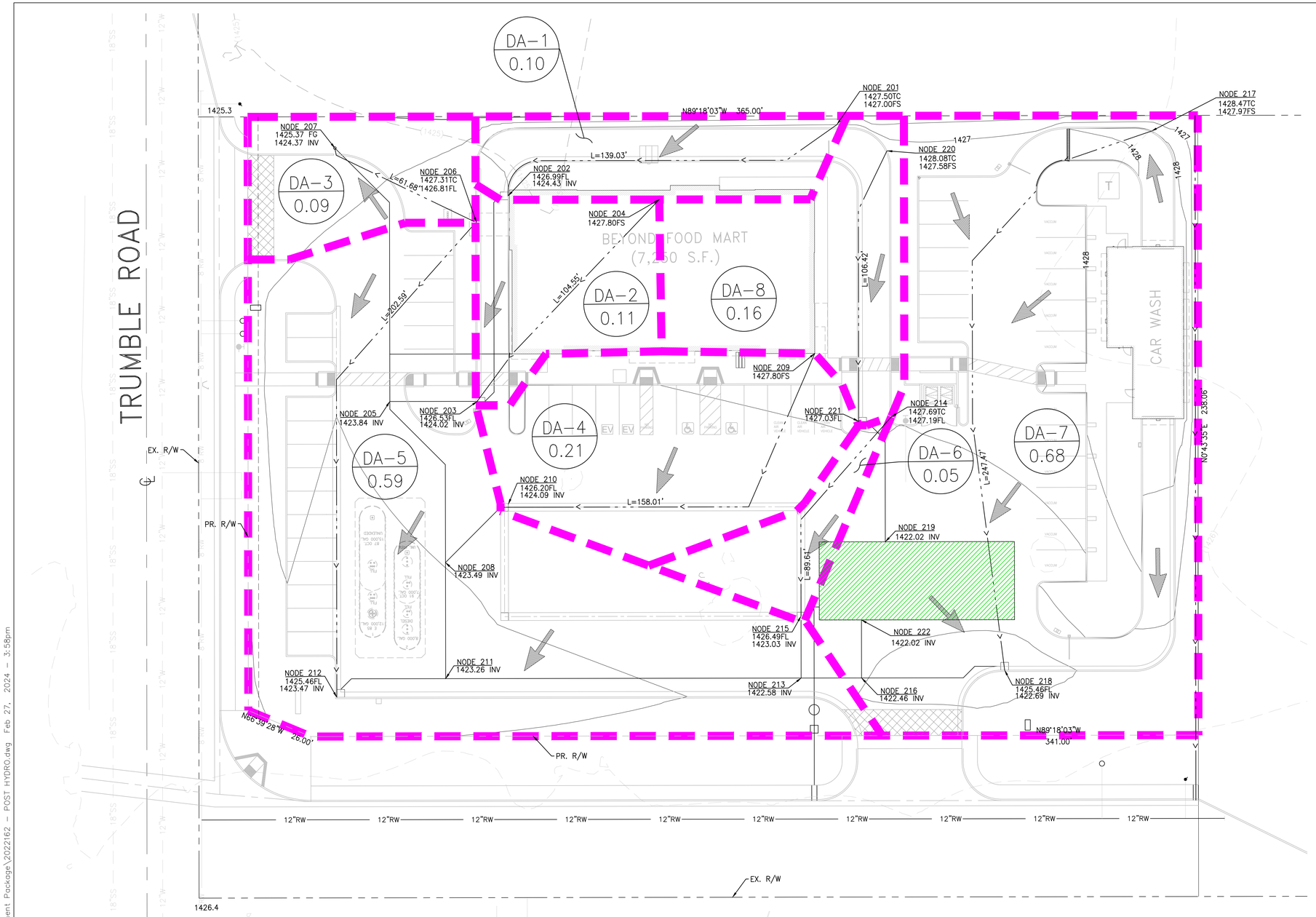
DESIGNED BY: MG DRAWN BY: CG CHECKED BY: AC	SEAL-DESIGN ENGINEER REGISTERED PROFESSIONAL ENGINEER ANGEL CESAR No. 87222 CIVIL STATE OF CALIFORNIA	BLUE Engineering & Consulting, Inc 9320 BASELINE RD. STE. D - RANCHO CUCAMONGA, CA 91701 PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM WWW.BLUECIVILENG.COM PLANS PREPARED UNDER THE SUPERVISION OF: ANGEL CESAR, P.E. 87222 EXP. 9/30/23 DATE	CITY OF PERRIS 27278 ETHANAC ROAD, PERRIS, CA 92585 REVIEWED BY: XXXXXXXXXX P.E. NO. C-XXXXX EXP. DATE XX-XX-XXXX DATE	PRE-HYDROLOGY EXHIBIT **BEYOND FOODS MART PERRIS SERVICE STATION CONDITIONAL USE PERMIT**

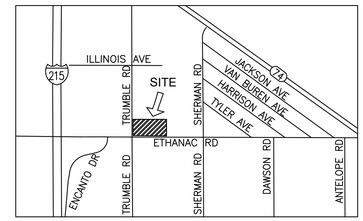
REV.	REVISION DESCRIPTION	BY	DATE

CUP:
LDP:
DATE: February 27, 2024
SHEET 4 OF 5 SHEETS
PROJECT NUMBER:

Plans Prepared On: 2/27/2024

Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Entitlement Package\2022162 - PRE HYDRO.dwg Feb 27, 2024 - 3:58pm





VICINITY MAP
N.T.S.

LEGEND

- FLOW LINE
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY
- # / X.XX — DRAINAGE AREA DESIGNATION / DRAINAGE AREA (ACRES)
- BEST MANAGEMENT PRACTICES (BMP)

0 20 40 Feet

SCALE 1"= 20'

DESIGNED BY: MG
DRAWN BY: CG
CHECKED BY: AC

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER ANGEL CESAR No. 87222 CIVIL STATE OF CALIFORNIA

BLUE Engineering & Consulting, Inc
9320 BASELINE RD, STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - INFO@BLUECIVILENG.COM
WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF:
ANGEL CESAR, P.E. 87222 EXP. 9/30/23 — DATE

REV.	REVISION DESCRIPTION	BY	DATE

CITY OF PERRIS
27278 ETHANAC ROAD, PERRIS, CA 92585

REVIEWED BY: _____ DATE

XXXXXXXXXX
P.E. NO. C-XXXXX
EXP. DATE XX-XX-XXXX

POST-HYDROLOGY EXHIBIT

BEYOND FOODS MART
PERRIS SERVICE STATION
CONDITIONAL USE PERMIT

CUP:
LDP:
DATE: February 27, 2024
SHEET 5
OF 5 SHEETS
PROJECT NUMBER:

Plans Prepared On: 2/27/2024

Z:\Shared\Blue\2022162 - Perris - Ethanac and Trumble_Entitlement Package\2022162 - POST HYDRO.dwg Feb 27, 2024 - 3:58pm

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

NTS GEOTECHNICAL

September 14, 2022

Project No. 22424

Mr. Michael Ramirez
Beyond Food Mart
27278 Ethanac Road
Perris, CA

Subject: Preliminary Geotechnical Engineering Report
Proposed Carwash and Gas Station
27278 Ethanac Road, Perris, California

Dear Mr. Ramirez:

In accordance with your request and authorization, we are presenting the results of our geotechnical investigation for the proposed subject carwash and gas station development project located in the City of Perris, California. The purpose of this investigation has been to evaluate the subsurface conditions at the site and to provide geotechnical engineering recommendations for the proposed construction.

Based on our findings, the proposed project is geotechnically feasible, provided that the recommendations in this report are incorporated into the design and are implemented during construction of the project. This report was prepared in accordance with the requirements of the 2019 California Building Code and the City of Perris requirements.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned at (657) 888-4608 or info@ntsgeo.com.

Respectfully submitted,
NTS GEOTECHNICAL, INC.

Nadim Sunna, M.Sc., Q.S.P, P.E., G.E. 3172
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
NADIM T SUNNA
GE 3172
GEOTECHNICAL
STATE OF CALIFORNIA

Table of Contents

Attachment(s):

Plate 1 – Location Map
Plate 2 – Geotechnical Map

Appendix A – Field Exploration
Appendix B – Geotechnical Laboratory Test Result
Appendix C – Infiltration Test Result

INTRODUCTION

This report presents the results of our geotechnical engineering evaluation performed for the proposed Single Family Residences project located at 27278 Ethanac Road, in the City of Perris, California. See (Plate 1, Location Map). The purpose of this study has been to evaluate the subsurface conditions at the site and to provide geotechnical recommendations related to the design and construction of the proposed improvements.

SITE AND PROJECT DESCRIPTION

The subject site is located on at 27278 Ethanac Road in the City of Perris, California. The relatively flat vacant lot is bound by vacant land on the north and east by Trumble Road on the west, and Ethanac Road on the south.

It is our understanding that the subject project consists of construction of a Beyond Foods Mart service station consists of a 1-story C-store, gas pumps with overhead canopy, and a carwash tunnel. Additionally, site improvements such as new pavement, curbs and gutters, and trash enclosures are planned.

SCOPE OF WORK

As part of the preparation of this report, we have performed the following tasks:

Background Review

We reviewed readily available background data including in-house geologic maps and topographic maps relevant to the subject site in preparation of this report.

Field Exploration

The subsurface conditions were evaluated on August 24, 2022 by advancing four (4) hollow-stem-auger borings at various locations within the subject lot. The borings were advanced to a maximum depth of 30 feet below the existing grade. The approximate locations of the borings are shown on Plate 2, Geotechnical Map. Detailed exploration information of soils borings is presented in Appendix A, Field Exploration.

Geotechnical Laboratory Testing

Laboratory tests were performed on selected samples obtained from the boring in order to aid in the soil classification and to evaluate the engineering properties

of the foundation soils. The following tests were performed in general accordance with ASTM standards:

- In-situ moisture and density;
- No. 200 sieve wash;
- Consolidation;
- Direct shear;
- Sieve analysis; and
- Corrosion.

A summary of the laboratory test results are presented in Appendix B of this report.

SUBSURFACE CONDITIONS

Subsurface Materials

Earth materials encountered during our subsurface investigation consisted of a thin layer of artificial fill overlaying the alluvium to the total depth of the exploration. In general, the fill consists of dark gray, damp, loose, silty sands.

The alluvium consists of orange brown to tan, moist to damp, medium dense to very dense, silty sands and sands.

Groundwater

Groundwater was not observed during our exploration to a maximum depth of 30 feet below the existing grade.

No groundwater data was found during a literature search pertaining to the subject property. There are no known shallow groundwater bearing soil or rock formations beneath the subject property. No evidence of onsite springs was found during the field study. Based on anticipated lot grading and the inferred groundwater depths, groundwater should not be a factor for project design or long-term performance.
Surface water was not observed on the subject site at the time the field study was performed for this report.

Based on results of our subsurface exploration and experience, variations in the continuity and nature of surface and subsurface conditions should be anticipated. Due to uncertainty involved in the nature and depositional characteristics of earth materials at the site, care should be exercised in extrapolating or interpolating subsurface conditions between and beyond the exploratory excavation locations.

Groundwater conditions may vary across the site due to stratigraphic and hydrologic conditions and may change over time as a consequence of seasonal and meteorological fluctuations, or activities by humans at this site and nearby sites. However, based on the above findings, groundwater is unlikely to impact the proposed development.

GEOLOGIC HAZARDS

Faulting and Seismicity

The site is not located within an Alquist-Priolo Earthquake Fault Zone, and no known active faults are shown on the reviewed geologic maps crossing the site, however, the site is located in the seismically active region of Southern California. The nearest known active fault is the Elsinore fault system, which is located approximately 9.6 miles from the site, and capable of generating a maximum earthquake magnitude of 7.3.

Liquefaction and Seismic Settlement

Liquefaction occurs when the pore pressures generated within a soil mass approach the effective overburden pressure. Liquefaction of soils may be caused by cyclic loading such as that imposed by ground shaking during earthquakes. The increase in pore pressure results in a loss of strength, and the soil then can undergo both horizontal and vertical movements, depending on the site conditions. Other phenomena associated with soil liquefaction include sand boils, ground oscillation, and loss of foundation bearing capacity. Liquefaction is generally known to occur in loose, saturated, relatively clean, fine-grained cohesionless soils at depths shallower than approximately 50 feet. Factors to consider in the evaluation of soil liquefaction potential include groundwater conditions, soil type, grain size distribution, relative density, degree of saturation, and both the intensity and duration of ground motion.

Based on our review of the County of Riverside Map My County website, the site is generalized to be within a low liquefaction susceptibility zone. Additionally, based on the lack of shallow groundwater, the dense nature of the subsurface soil, the relatively uniform soil stratum across the site, it is our professional opinion that the liquefaction potential at the site is low.

Landslides

Based on our review of the referenced geologic maps, literature, topographic maps, and our subsurface evaluation, no landslides or related features underlie or are adjacent to the subject site. Due to the relatively level nature of the site and surrounding areas, the potential for landslides at the project site is considered negligible.

Flooding

The Federal Emergency Management Agency (FEMA) has prepared flood insurance rate maps (FIRMs) for use in administering the National Flood Insurance Program. Based on our review of the FEMA flood map, the site is located within an Area of Minimal Flood Hazard (Zone X).

Tsunami and Seiches

Tsunamis are waves generated by massive landslides near or under sea water. The site is not located on any State of California – County of Riverside Tsunami Inundation Map for Emergency Planning. The potential for the site to be adversely impacted by earthquake-induced tsunamis is considered to be negligible because the site is located several miles inland from the Pacific Ocean shore, at an elevation exceeding the maximum height of potential tsunami inundation.

Seiches are standing wave oscillations of an enclosed water body after the original driving force has dissipated. The potential for the site to be adversely impacted by earthquake-induced seiches is considered to be negligible due to the lack of any significant enclosed bodies of water located in the vicinity of the site.

GEOTECHNICAL ENGINEERING FINDINGS

Expansive Soil

Based on our evaluation and experience with similar material types, and laboratory testing, the soils encountered near the ground surface at the site exhibit a very low expansion potential.

Soil Corrosion

The potential for the on-site materials to corrode buried steel and concrete improvements was evaluated. Laboratory testing was performed on representative soil samples to evaluate pH, minimum resistivity, and soluble chloride and sulfate contents. The results of our corrosivity testing is presented within Appendix B of this report. General recommendations to address the corrosion potential of the on-site soils are provided below. Imported fill materials, if used, should be tested to evaluate whether their corrosion potential is more severe than those assumed.

Structural Concrete

Laboratory tests indicate that the potential of sulfate attack on concrete in contact with the on-site soils is “negligible” or “S0” exposure in accordance with ACI 318, Table 19.3.1.1. Therefore, restriction on the type of cement, water to cement ratio, and compressive strength is not required.

Ferrous Metal

The results of the laboratory chemical tests performed on a sample of soil collected within the site indicate that the on-site soils are corrosive to ferrous metals. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. Additional provisions will be required to address high chloride contents of the soil per the 2019 CBC to protect the concrete reinforcement. The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary).

The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview. If detailed testing is required, a corrosion engineer should be consulted to perform the testing and develop appropriate mitigation measures.

Preliminary Infiltration Testing

Two (2) infiltration tests were performed in general conformance with the County of Riverside requirements. The borings were excavated to a depth of 5 and 10 feet below the existing grade using a hollow-stem-auger drill rig. Following the drilling, the borings were set up, presoaked, and testing was performed in general accordance with the County Riverside manual. The result of our infiltration testing is summarized in the table below, which includes a factor of safety of 2. Our infiltration testing calculations are presented in Appendix C of this report.

Preliminary Infiltration Rates Summary

Boring No.	Depth Below Existing Grade (feet)	Factored Infiltration Rate (inches/hour)
P-1	5	0.71
P-2	10	1.91

The infiltration test locations are shown on the attached Plate 2 –Geotechnical Map. Based on our infiltration testing, infiltration within the upper 10 feet of the site soils is deemed feasible from a geotechnical standpoint. Infiltration recommendations are presented in the Conclusion and Recommendations section of this report.

Hydroconsolidation

Based on our laboratory test results and dense nature of the underlying soils, the potential for hydrocollapse settlement to affect the proposed structures should be considered low.

Excavation Characteristics

The majority of the soil materials underlying the site can be excavated with excavators and other conventional grading equipment.

GEOTECHNICAL ENGINEERING CONLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of our field exploration and engineering analyses, it is our opinion that the proposed development is feasible from a geotechnical standpoint, provided that the recommendations in this report are incorporated into the design plans and are implemented during construction.

Based on the geotechnical findings, the following is a summary of our conclusions:

- The proposed structure may be supported on a shallow spread/continuous footing foundation system underlain by engineered fill.
- Groundwater is not anticipated to directly impact the planned precise grading or during the installation of shallow underground utilities.

- The site is not located within a fault zone, however, the site will experience strong ground shaking due to it's proximity to the Elsinore fault.
- Based on the lack of shallow groundwater and relatively dense nature of the subsurface soil, the liquefaction potential is considered low.
- The magnitude of total static settlements beneath the structure is expected to be less than 1.0 inch, with differential settlement on the order of ½ -inch over a span of 30 feet.
- The on-site soils has a negligible sulfate exposure to concrete (i.e., as defined by the CBC) and reinforcement, however is severely corrosive to ferrous metals.

Our geotechnical engineering analyses performed for this report were based on the earth materials encountered during the subsurface exploration for the site. If the design substantially changes, then our geotechnical engineering recommendations would be subject to revision based on our evaluation of the changes. The following sections present our conclusions and recommendations pertaining to the engineering design for this project.

Site Preparation

Site preparation should begin with the removal of utility lines, asphalt, concrete, vegetation, and other deleterious debris from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside edges of the proposed excavation and fill areas. We recommend that unsuitable materials such as organic matter or oversized material be selectively removed and disposed offsite. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed at a legal dump site away from the project area.

Corrective Grading

Due to the dry / loose nature of the near surface soils, we recommend that the upper 3 feet of site soils be removed and recompacted to achieve a uniform blanket of properly moisture conditioned and compacted fill material.

It should be noted that the recommendations provided herein are based on our subsurface exploration and knowledge of the on-site geology. Actual removals may vary in configuration and volume based on observations of geologic materials and conditions encountered during grading. The bottom of all corrective grading removals should be observed by a representative of NTS to verify the suitability of in-place soil prior to performing scarification and recompaction. Corrective grading recommendations are outlined below.

Building Pads

In order to create a firm and stable platform on which to construct the new building pads, we recommend the following:

- The proposed building pads should be excavated to a depth of at least 3 feet from existing grade.
- The excavation should extend laterally a minimum of 3 feet from the edge of the proposed building.
- The bottom of the over excavation should then be scarified to a depth of at least 8 inches, thoroughly flooded to raise the moisture content of the underlying soils to at least 2 percent above optimum moisture content, and should be recompacted using heavy vibratory compaction equipment prior to placement of any fill.
- Following the approval of the over-excavation bottom by a representative of NTS, the onsite material may be used as fill material to achieve the planned pad grade.
- The fill material should then be placed in 6- to- 8-inch-thick lifts, moisture conditioned to near optimum moisture content and compacted to achieve 90 percent relative compaction.

New Streets / Pavements / Hardscape

In order to create a firm and stable platform on which to construct the new vehicular pavement and non-vehicular pavement/hardscape, we recommend the following:

- The proposed pavement should be excavated to the planned subgrade (i.e., bottom of aggregate base for vehicular pavement).
- The bottom of the excavation should then be excavated to a depth of 18 inches below the planned subgrade.
- The bottom of the over excavation should then be scarified to a depth of at least 6 inches, moisture conditioned to 2 percent above optimum moisture content and recompacted to at least 90 percent relative compaction as determined in accordance with ASTM D1557.
- Following the approval of the over-excavation bottom by a representative of NTS, the onsite material may be used as fill material to achieve the planned pad grade.
- The fill material should then be placed in 6- to- 8-inch-thick lifts, moisture conditioned to near optimum moisture content and compacted to achieve 90 percent relative compaction.

If the existing loose fill materials are found to be disturbed to depths greater than the proposed remedial grading, then the depth of over-excavation and re-

compaction should be increased accordingly in local areas as recommended by a representative of NTS.

Materials for Fill

On-site soils with an organic content of less than 3 percent by volume (or 1 percent by weight) are suitable for use as fill. Soil material to be used as fill should not contain contaminated materials, rocks, or lumps over 6 inches in largest dimension, and not more than 40 percent larger than ¾ inch. Utility trench backfill material should not contain rocks or lumps over 3 inches in largest dimension. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or may be disposed offsite.

Any imported fill material should consist of granular soil having a “very low” expansion potential (that is, expansion index of 20 or less). Import material should also have low corrosion potential (that is, chloride content less than 500 parts per million [ppm], soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Materials to be used as fill should be evaluated by a representative of NTS prior to importing or filling.

Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed excavation bottom by NTS. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of at least 8 inches and watered or dried, as needed, to achieve generally consistent moisture contents 2 percent above optimum moisture content. The scarified materials should then be compacted to 90 percent relative compaction in accordance with the latest version of ASTM Test Method D1557.

Compacted fill should be placed in horizontal lifts of approximately 6 to 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve near optimum moisture condition, mixed, and then compacted by mechanical methods, using sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other appropriate compacting rollers, to a relative compaction of 90 percent as evaluated by ASTM D1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved. Within pavement areas, the upper 12 inches of subgrade soil should be compacted to 95 percent relative compaction evaluated by ASTM D1557.

Personnel from NTS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Temporary Excavations

Temporary excavations for the demolishing, earthwork, footing and utility trench are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 4 feet high will generally be stable; however, sloughing of cohesionless sandy materials encountered at the site should be expected.

Where the space is available, temporary, unsurcharged excavation sides over 4 feet in height should be sloped no steeper than an inclination of 1.5H:1V (horizontal:vertical). Where sloped excavations are created, the tops of the slopes should be barricaded so that vehicles and storage loads do not encroach within 10 feet of the top of the excavated slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. NTS should be advised of such heavy vehicle loadings so that specific setback requirements can be established. If the temporary construction slopes are to be maintained during the rainy season, berms are recommended to be graded along the tops of the slopes in order to prevent runoff water from entering the excavation and eroding the slope faces.

Where space for sloped excavations is not available, temporary shoring may be utilized. Recommendations for temporary shoring can be provided as requested. Personnel from NTS should observe the excavation so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Excavations shall not undermine the existing adjacent building / wall footings. Where space for sloped excavations is not available, temporary shoring may be utilized.

Seismic Design

Based on subsurface investigation, the site is designated as Site Class D (“stiff” soil profile). The seismic design parameters based on ASCE 7-16 and 2019 CBC are listed in the following table.

2019 CBC and ASCE 7-16 Seismic Design Parameters

Seismic Item	Design Value	2016 ASCE 7-16 or 2019 CBC Reference
Site Class based on soil profile (ASCE 7-16 Table 20.3-1)	D[a]	ASCE 7-16 Table 20.3-1
Short Period Spectral Acceleration S_s	1.419 [a]	CBC Figures 1613.2.1 (1-8)
1-sec. Period Spectral Acceleration S_1	0.526[a]	CBC Figures 1613.2.1 (1-8)
Site Coefficient F_a (2019 CBC Table 1613.2.3(1))	1.000[a]	CBC Table 1613.2.3 (1)
Site Coefficient F_v (2019 CBC Table 1613.2.3(2))	1.800[b]	CBC Table 1613.2.3 (2)
Short Period MCE* Spectral Acceleration S_{MS} $S_{MS} = F_a S_s$	1.419[a]	CBC Equation 16-36
1-sec. Period MCE Spectral Acceleration S_{M1} $S_{M1} = F_v S_1$	0.947[b]	CBC Equation 16-37
Short Period Design Spectral Acceleration S_{DS} $S_{DS} = 2/3S_{Ms}$	0.946[a]	CBC Equation 16-38
1-sec. Period Design Spectral Acceleration S_{D1} $S_{D1} = 2/3S_{M1}$	0.631[b]	CBC Equation 16-39
Short Period Transition Period T_S (sec) $T_S = S_{D1}/S_{DS}$	0.667[b]	ASCE 7-16 Section 11.4.6
Long Period Transition Period Tl (sec)	8[b]	ASCE 7-16 Figures 22-14 to 22-17
MCE[c] Peak Ground Acceleration (PGA)	0.50[a]	ASCE 7-16 Figures 22-9 to 22-13
Site Coefficient F_{PGA} (ASCE 7-16 Table 11.8-1)	1.100[a]	ASCE 7-16 Table 11.8-1
Modified MCE[c] Peak Ground Acceleration (PGA_M)	0.55[a]	ASCE 7-16 Equation 11.8-1

[a] Design Values Obtained from USGS Earthquake Hazards Program website that are based on the ASCE-7-16 and 2019 CBC and site coordinates of N33.743455º and W117.184533º.
[b] Design Values Determined per ASCE Table 11.4-2 and CBC Equations 16-36 through 16-39.
[c] MCE: Maximum Considered Earthquake.

Since the Site Class is designated as D and the S1 value is greater than or equal to 0.2, the 2019 CBC requires either a site-specific seismic hazard analysis per Section 21.2 of ASCE 7-16 or the application of Exception 2 of Section 11.4.8 of ASCE 7-16. The project structural engineer should apply all requirements of Section 11.4.8 of ASCE 7-16 to determine if increases to the seismic response coefficient (i.e. increases to the loading of the structure) are required.

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2019 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

Foundation Design and Construction

A shallow foundation system may be used for support of the proposed buildings, provided that all the footings are placed on engineered fill prepared as described

in the "**Corrective Grading**" section of this report. Our geotechnical foundation design parameters are presented in the table below:

Foundation Design Parameters

Bearing Material	▪ Engineered Fill
Minimum Footing Size	▪ Width: 12 inches ▪ Depth: 18 inches below the lowest adjacent soil grade
Minimum Footing Reinforcement	▪ Footings reinforcement should consist of at least four No. 4 bars (two on top and two on bottom). ▪ Final reinforcement should be determined by the project structural engineer.
Allowable Bearing Capacity	▪ 2,500 psf for the minimum footing size given above. ▪ The above value may be increased by 1/3 for temporary loads such as wind or earthquake.
Static Settlement	▪ Total static settlement of 1 inch with differential settlement estimated to be approximately ½ inch over a span of 40 feet
Allowable Lateral Passive Resistance	• 300 pcf (equivalent fluid pressure)
Allowable Coefficient of Friction	• 0.35

Slab-On-Grade Design and Construction

The slab-on-grade should be designed and constructed with the minimum recommendations presented below, however, final design of the slab should be determined by the project structural engineer.

Minimum Thickness: The minimum slab thickness should be 5 inches.

Minimum Slab Reinforcement: Minimum slab reinforcement shall not be less than No. 4 bars placed at 18 inches on center. Welded wire mesh is not recommended. Care should be taken to position the reinforcement bars in the center of the slab.

Slab Subgrade:

- The upper 24 inches of the slab subgrade should be moisture conditioned to 2 percent above optimum moisture content and compacted to a minimum relative compaction of compacted to 90 percent relative compaction in accordance with the latest version of ASTM D1557 prior to placement of Moisture Vapor Retarder.

- A moisture vapor retarder should be placed in accordance with the "Moisture Vapor Retarder" section below.

Pole Foundations

It is expected that the canopy structures and light poles will be supported on pole foundations. As a minimum, the pole foundations should be at least 18 inches in diameter and at least 4 feet deep; however, the actual dimensions should be determined by the project structural engineer based on the following design parameters.

Bearing Materials: The pole foundations may bear into competent native soils approved by a representative from NTS.

Bearing Values: End-bearing capacity may be combined to determine the allowable bearing capacities of the pole foundations. An allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for pole foundations at least 18 inches in diameter and embedded a minimum of 4 feet below the lowest adjacent grade.

Lateral Load Design: Lateral loads may be resisted by passive resistance within the adjacent earth materials. For passive resistance, an allowable passive earth pressure of 300 pounds per foot of pile diameter per foot of depth into competent bearing material may be used; however, passive resistance should be disregarded within the upper foot due to possible disturbance during drilling. The passive resistance value may be applied over an area equivalent to two pile diameters.

Moisture Vapor Retarder

A vapor retarder, such as a 15-mil-thick moisture vapor retarder that meets the requirements of ASTM E1745 Class C (Stego Wrap or equivalent) should be placed directly over the prepared soil subgrade to provide protection against vapor transmission through concrete floor slabs thatare anticipated to receive carpet, tile or other moisture sensitive coverings. The use of moisture vapor retarder should be determined by the project architect. At minimum, the vapor retarder should be installed as follows:

- Per the manufacture's specifications as well as with the applicable recognized installation procedures such as ASTM E1643;
- Joints between the sheets and the openings for utility piping should be lapped and taped. If the barrier is not continuously placed across footings/ribs, the barrier should at minimum be lapped into the side of the footing/rib trenches down to the bottom of the trench; and,

- Punctures in the vapor retarder should be repaired prior to concrete placement.

It should be noted that the moisture retarder is intended only to reduce moisture vapor transmissions from the soil beneath the concrete and is consistent with the current standard of the industry in the building construction in Southern California. It is not intended to provide a “waterproof” or “vapor proof” barrier or reduce vapor transmission from sources above the retarder (i.e., concrete). The evaluation of water vapor from any source and its effect on any aspect of the proposed building space above the slab (i.e., floor covering applicability, mold growth, etc.) is beyond our purview and the scope of this report.

Structural Concrete

Based on laboratory test results for the site vicinity, the potential of sulfate attack on concrete in contact with the on-site soils is “negligible” based on ACI 318, Table 19.3.1.1.

The aforementioned recommendations in regards to concrete are made from a soils perspective only. Final concrete mix design is beyond our purview. All applicable codes, ordinances, regulations, and guidelines should be followed in regard to the designing a durable concrete with respect to the potential for sulfate exposure from the on-site soils and/or changes in the environment.

Drainage Control

The control of surface water is essential to the satisfactory performance of the building and site improvements. Surface water should be controlled so that conditions of uniform moisture are maintained beneath the improvements, even during periods of heavy rainfall. The following recommendations are considered minimal:

- Ponding and areas of low flow gradients should be avoided.
- If bare soil within 5 feet of the structure is not avoidable, then a gradient of 5 percent or more should be provided sloping away from the improvement. Corresponding paved surfaces should be provided with a gradient of at least 2 percent.
- The remainder of the unpaved areas should be provided with a drainage gradient of at least 2 percent.
- Positive drainage devices, such as graded swales, paved ditches, and/or catch basins should be employed to accumulate and to convey water to appropriate discharge points.
- Concrete walks and flatwork should not obstruct the free flow of surface water.
- Brick flatwork should be sealed by mortar or be placed over an impermeable membrane.

- Area drains should be recessed below grade to allow free flow of water into the basin.
- Enclosed raised planters should be sealed at the bottom and provided with an ample flow gradient to a drainage device. Recessed planters and landscaped areas should be provided with area inlet and subsurface drain pipes.
- Planters should not be located adjacent to the structures wherever possible. If planters are to be located adjacent to the structures, the planters should be positively sealed, should incorporate a subdrain, and should be provided with free discharge capacity to a drainage device.
- Planting areas at grade should be provided with positive drainage. Wherever possible, the grade of exposed soil areas should be established above adjacent paved grades. Drainage devices and curbing should be provided to prevent runoff from adjacent pavement or walks into planted areas.
- Gutter and downspout systems should be provided to capture discharge from roof areas. The accumulated roof water should be conveyed to off-site disposal areas by a pipe or concrete swale system.
- Landscape watering should be performed judiciously to preclude either soaking or desiccation of soils. The watering should be such that it just sustains plant growth without excessive watering. Sprinkler systems should be checked.

Preliminary Infiltration Design and Construction Recommendations

Infiltration Design

Based on our preliminary infiltration testing and our evaluation, we note that the installation of infiltration system within the subject property is feasible from a geotechnical standpoint provided that the recommendations presented in this section is considered during design and implemented during construction. On this basis we recommend the following:

- We recommend that a design infiltration rate of 0.71 inches and 1.91 inches per hour be used for design of the proposed infiltration system that is located within the upper 5 feet and at a depth of 10 feet of the site soils, respectively.

- The selected infiltration BMP should be designed and constructed in accordance with the minimum requirements presented below, the requirements of the City of Perris.

Minimum Setback Requirements

Any foundation	• A minimum of 10 feet setback or within 1:1 plane drawn up from the bottom of foundation, whichever is greater.
Water wells used for drinking water	• A minimum of 100 feet setback.

The final design and specification should be reviewed by the Geotechnical Engineer of Record prior to construction to verify compliance with the recommendations of this report and/or provide additional recommendations/revisions, if needed.

Utility Trench Backfill Considerations

New utility line pipeline trenches should be backfilled with select bedding materials beneath and around the pipes (pipe zone) and compacted soil above the pipe bedding. Recommendations for the types of the materials to be used and the proper placement of these materials are provided in the following sections.

Pipe Zone (Bedding and Shading)

The pipe bedding and shading materials should extend from at least 6 inches below the pipes to at least 12 inches above the crown of the pipes. Pipe bedding and shading should consist of either clean sand with a sand equivalent (SE) of at least 30, or crushed rock. If crushed rock is used, it should consist of ¾-inch crushed rock that conforms to Table 200-1.2.1 (A) of the 2018 “Greenbook.” Pipe bedding and shading should also meet the minimum requirements of the City of Los Angeles. If the requirements of the City are more stringent, they should take precedence over the geotechnical recommendations. Sufficient laboratory testing should be performed to verify the bedding and shading meets the minimum requirements of the Greenbook and City of Perris grading codes.

Granular pipe bedding and shading material should be properly placed in thicknesses not exceeding 3 feet, and then sufficiently flooded or jetted in place. Crushed rock, if used, should be capped with filter fabric (Mirafi 160N, or equivalent; Mirafi 140N filter fabric is suitable if available) to prevent the migration of fines into the rock.

Trench Backfill

All existing soil material within the limits of the site are considered suitable for use as trench backfill above the pipe bedding and shading zone if care is taken

to remove all significant organic and other decomposable debris, moisture condition the soil materials as necessary, and separate and selectively place and/or stockpile any inert materials larger than 6 inches in maximum diameter.

Imported soils are not anticipated for backfill since the on-site soils are suitable. However, if imported soils are used, the soils should consist of clean, granular materials with physical and chemical characteristics similar to or better than those described herein for on-site soils. Any imported soils to be used as backfill should be evaluated and approved by NTS prior to placement.

Soils to be used as trench backfill should be moistened, dried, or blended as necessary to achieve near optimum moisture content, placed in lifts which, prior to compaction shall not exceed the thickness specified in Section 306-12.3 of the 2018 “Greenbook” for various types of equipment, and mechanically compacted/densified to at least 90 percent relative compaction as determined by ASTM Test Method D 1557. Jetting is not permitted in this trench zone.

No rock or broken concrete greater than 6 inches in maximum diameter should be utilized in the trench backfills.

Asphalt Concrete Pavement Design

In accordance with Chapter 600 of the Caltrans Highway Design Manual, we have performed pavement structural design utilizing assumed traffic indices (TI) of 5.0, 6.0 and 7.0 and assumed R-value of 20. Based on our analysis, we have developed the pavement structural sections presented in the following table. We note that the assumed TI’s should be reviewed by a traffic engineer to confirm their applicability to the project. The assumed R-value should be confirmed by testing at the completion of rough grading.

Asphalt Concrete Pavement Structural Sections

Location	Traffic Index	Asphalt Concrete (in.)	Aggregate Base (in.)*
Driveways	5.0	4.0	5.0
Private Streets	6.0	4.0	9.0
Fire lane	7.0	4.0	12.0

The planned pavement structural sections should consist of the following:

- Aggregate Base materials (AB) consisted of either Crushed Aggregate Base (CAB) or Crushed Miscellaneous Base (CMB).
- Asphalt Concrete (AC) material of a type meeting the minimum City of Menifee standards.
- The subgrade soils should be moisture conditioned to 2 percent above optimum moisture content to a depth of at least 18 inches and compacted to 90 percent relative compaction.
- The AB and AC should be compacted to at least 95 percent relative compaction.

Exterior Flatwork/Hardscape Design Considerations

For exterior flatwork and hardscape planned as part of the proposed development, the following design may be considered by the project civil engineer. These recommendations may be considered as minimal design based on the soils conditions encountered during our investigation. Final design of the proposed flatwork and hardscape area should be provided by the project civil engineer. Based on the conditions encountered, we recommend that the subgrade for the subject concrete flatwork and hardscape be moisture conditioned to near optimum to a depth of 18 inches below finish subgrade elevation and compacted to 90 percent relative compaction. A Type II/V cement may be used from a geotechnical perspective. Our flatwork and hardscape design considerations are presented in the table below.

Concrete Flatwork Table

Description	Subgrade Preparation (1)	Minimum Concrete Thickness	Cut-Off Barrier Or Edge Thickness	Joint Spacing (Maximum)	Concrete(3)
Concrete Sidewalks and Walkways (4)	1) 2 percent above optimum to 18"(1), 2) 2" of sand or well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	4 inches	Not Required	5 feet	Type II/V
Concrete Driveways(4)	1) 2 percent above optimum to 18"(1), 2) 2" of sand or well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	6 inches	Where adjacent to landscape areas – 12" from adjacent finish grade. Min. 8" width	10 feet	Type II/V

(1) The moisture content of the subgrade must be verified by the geotechnical consultant prior to sand/rock placement.
(2) Reinforcement to be placed at or above the mid-point of the slab (i.e., a minimum of 2.0 to 2.5 inches above the prepared subgrade).
(3) The site has negligible levels of sulfates as defined by the CBC. Concrete mix design is outside the geotechnical engineer's purview.
(4) Where flatwork is adjacent a stucco surface, a ¼" to ½" foam separation/expansion joint should be used.
(5) If dowels are placed in cored holes, the core holes shall be placed at alternating in-plane angles (i.e., not cored straight into slab).

Planters and Trees

Where new trees or large shrubs are to be located in close proximity to new concrete flatwork, rigid moisture/root barriers should be placed around the perimeter of the flatwork to at least 12 inches in depth in order to offer protection to the adjacent flatwork against potential root and moisture damage. Existing mature trees near flatwork areas should also incorporate a rigid moisture/root barrier placed at least 2 feet in depth below the top of the flatwork.

Plans and Specifications Review

The recommendations presented in this report are contingent upon review of final plans and specifications for the project by NTS. NTS Geotechnical, Inc. should review and verify in writing the compliance of the final grading plan and the final foundation plans with the recommendations presented in this report.

Construction Observation and Testing

It is recommended that NTS be retained to provide Geotechnical Consulting services during the earthwork operations and foundation installation process. This is to observe compliance with the design concepts, specifications and recommendations and to allow for design changes in the event that subsurface conditions differ from those anticipated during our subsurface investigation.

It is the responsibility of the owner and their representative to bring any deviations or unexpected conditions observed during construction to the attention of NTS Geotechnical, in order for supplemental recommendations can be made with a minimum delay to the project. Construction should be observed and/or testing at the following stages by NTS Geotechnical, Inc.:

- During all phases of precise grading, including over-excavation, temporary excavations, removals, scarification, ground preparation, moisture condition, proof-rolling, and placement and compaction of all fill material.
- All foundation excavation prior to placement of steel
- During backfill of underground utilities
- During placement of pavement structural section, including verifying the subgrade prior to placement of aggregate base, testing of aggregate base, and testing of asphalt concrete pavement.
- When unusual conditions are encountered.

If any of these inspections to verify site geotechnical conditions are not performed by NTS Geotechnical, liability for the safety and stability of the project is limited only to the actual portions of the project that is observed and approved by NTS Geotechnical.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and site construction will be identical to those observed, sampled, and interpreted during our study, or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of

geotechnical conditions and their probable influence on the grading and use of the property.

Our conclusions and recommendations are based on the assumption that our firm will act as the geotechnical engineer of record during construction and grading of the project to observe the actual conditions exposed, to verify our design concepts and the grading contractor's general compliance with the project geotechnical specifications, and to provide our revised conclusions and recommendations should subsurface conditions differ significantly from those used as the basis for our conclusions and recommendations presented in this report. Since our conclusions and recommendations are based on a limited amount of current and previous geotechnical exploration and analysis, all parties should recognize the need for possible revisions to our conclusions and recommendations during grading of the project.

It should be further noted that the recommendations presented herein are intended solely to minimize the effects of post-construction soil movements. Consequently, minor cracking and/or distortion of all on-site improvements should be anticipated.

This report has not been prepared for the use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

REFERENCES

American Concrete Institute, 2014, Building Code Requirements for Structural Concrete (ACI 318-14).

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE 7-16.

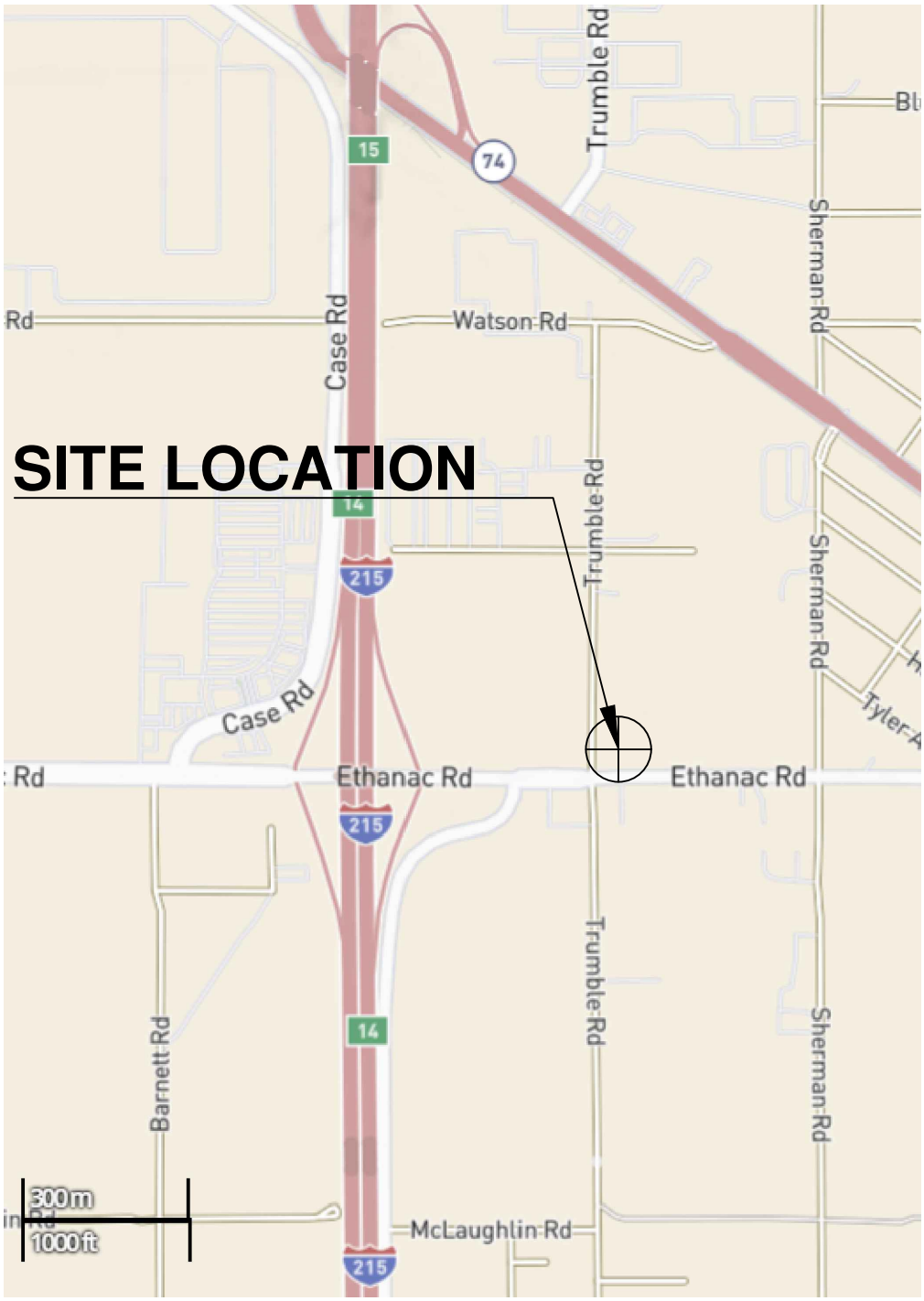
California Building Standards Commission, 2019, California Building Code, California Code of Regulations Title 24, Volume 2, dated July.

Coduto, Donald P., 1994, Foundation Design: Principles and Practices: Prentice-Hall, Inc, Englewood Cliffs, New Jersey.

Morton, D.M., Bovard, K.R., and Morton, Gregory, Geologic Map and Digital Database of the Romoland 7.5' Quadrangle, Riverside County, California, dated 2003.

Naval Facilities Engineering Command, 1986, NAVFAC Design Manual.

United States Geological Survey (USGS), 2008, Unified Hazard Tool, Dynamic: Conterminous U.S. 2014 (update) (v4.2.0), Retrieved May 14, 2020, from: https://earthquake.usgs.gov/hazards/interactive/



N

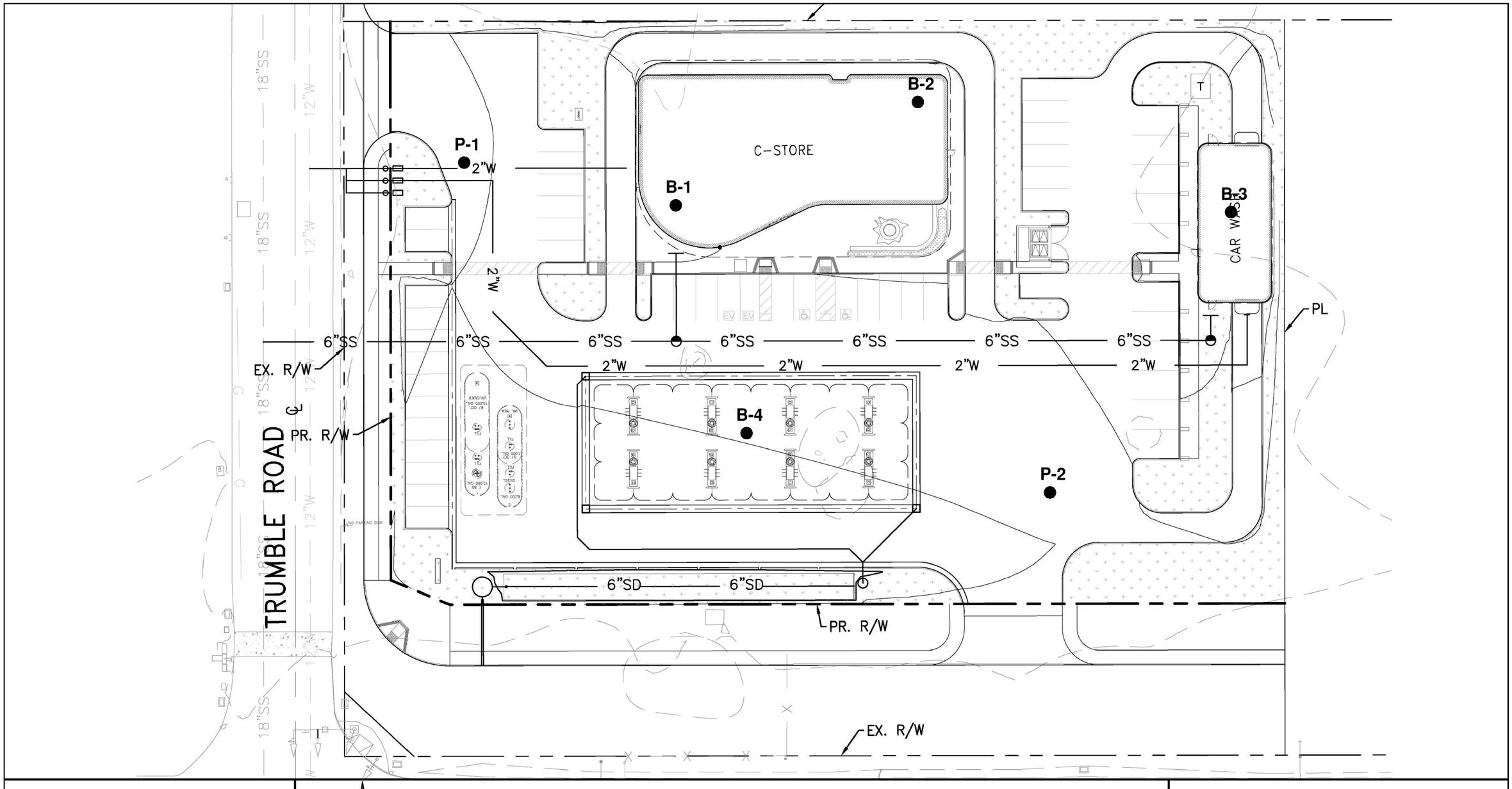
LOCATION MAP

NTS GEOTECHNICAL

Date: September 14, 2022

Project No.: 22424

Plate 1



NTS GEOTECHNICAL

N

0 10'

GEOTECHNICAL LEGEND

B-1 ● APPROXIMATE LOCATION OF BORING

GEOTECHNICAL MAP

Date: 09/14/2022	Project No.: 22424	Plate: 2

NTS GEOTECHNICAL

APPENDIX A

Field Investigation

NTS GEOTECHNICAL

Appendix A
Field Exploration

The subsurface exploration program for the proposed project consisted of advancing six (6) 8-inch-diameter, hollow-stem-auger drill rig. The borings were advanced to depths ranging from 5 to 30 feet below the existing grade.

The Boring Logs are presented as Figures A-2 to A-3. The Boring Logs describe the earth materials encountered, samples obtained, and show the field and laboratory tests performed. The log also shows the boring number, drilling date, and the name of the logger and drilling subcontractor. The borings were logged by an engineer using the Unified Soil Classification System. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual. Drive samples of representative earth materials were obtained from the borings.

Disturbed samples were obtained using a Standard Penetration Sampler (SPT). This sampler consists of a 2-inch O.D., 1.4-inch I.D. split barrel shaft that is advanced into the soil at the bottom of the drilled hole a total of 18 inches. The number of blows required to drive the upper 12 inches of the sampler is presented on the boring logs. Soil samples obtained by the SPT were retained in plastic bags. A California modified sampler was used to obtain drive samples of the soil encountered. This sampler consists of a 3-inch outside diameter (O.D.), 2.4-inch inside diameter (I.D.) split barrel shaft that was driven a total of 18-inches into the soil at the bottom of the boring. The soil was retained in brass rings for laboratory testing. Additional soil from each drive remaining in the cutting shoe was usually discarded after visually classifying the soil. The number of blows required to drive the upper 12 inches of the sampler is presented on the boring logs.

Upon completion of the borings, the boreholes were backfilled with soil from the cuttings.

Project: **27278 Ethanac Rd** Project Location: **27278 Ethanac Rd, Romoland** Project Number: **22424**	NTS GEOTECHNICAL	Key to Log of Boring **Sheet 1 of 1**

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9

COLUMN DESCRIPTIONS

1. Depth (feet): Depth in feet below the ground surface.
2. Sample Type: Type of soil sample collected at the depth interval shown.
3. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
4. Material Type: Type of material encountered.
5. Graphic Log: Graphic depiction of the subsurface material encountered.
6. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
7. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
8. Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
9. REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Silty SAND (SM)

Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
CME Sampler
Pitcher Sample
Bulk Sample
Grab Sample
2-inch-OD unlined split spoon (SPT)
3-inch-OD California w/ brass rings
2.5-inch-OD Modified California w/ brass liners
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting, AW)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

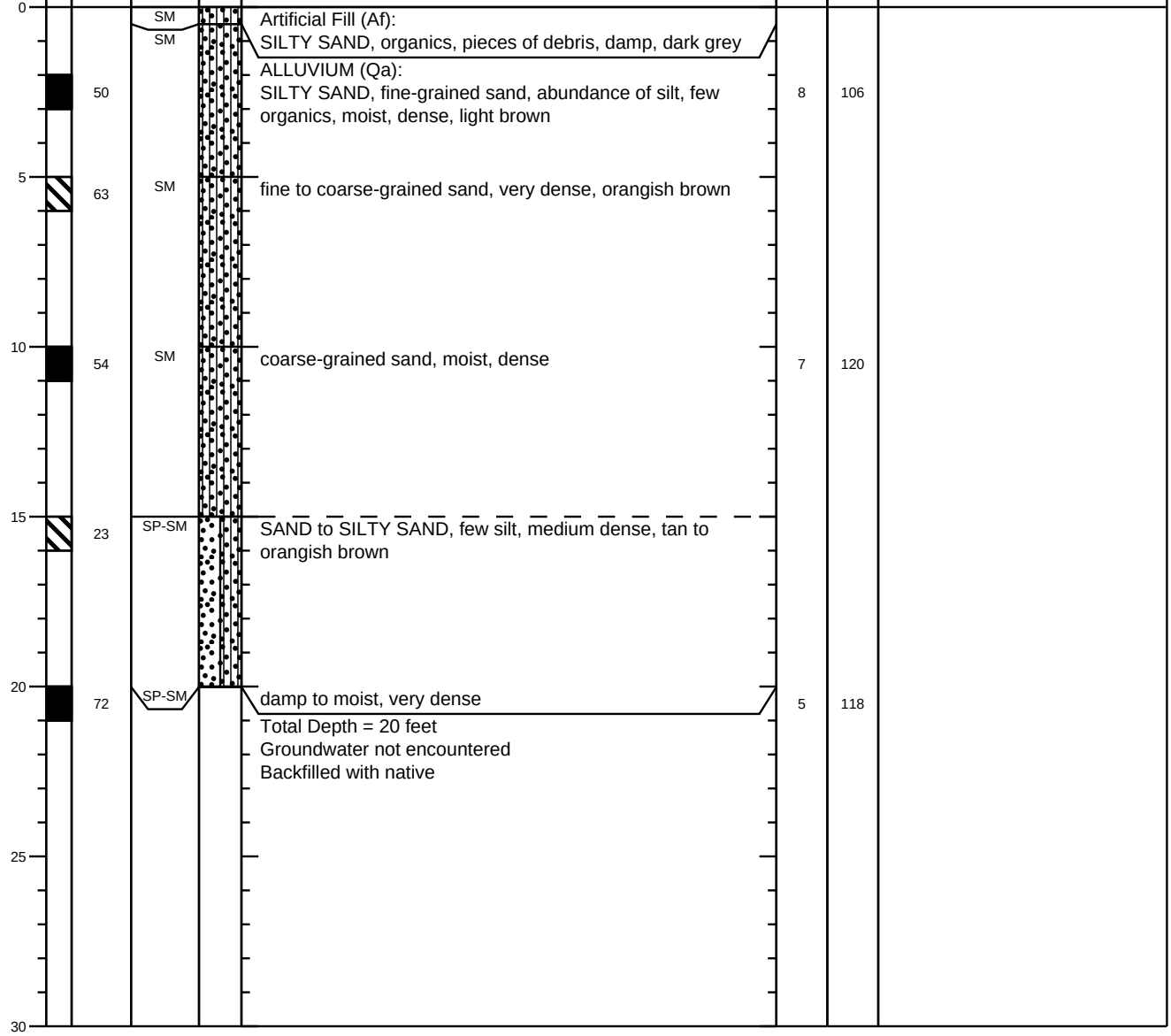
1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-1

Project: **27278 Ethanac Rd** Project Location: **27278 Ethanac Rd, Romoland** Project Number: **22424**	NTS GEOTECHNICAL	Log of Boring B-1 **Sheet 1 of 1**

Date(s) Drilled **8/24/2022**	Logged By **ERL**	Checked By **NS**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8"**	Total Depth of Borehole **20 feet**
Drill Rig Type **CME 75**	Drilling Contractor **OWD**	Approximate Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **140-lb autohammer**
Borehole Backfill **Native**	Location **27278 Ethanac Rd, Romoland**	

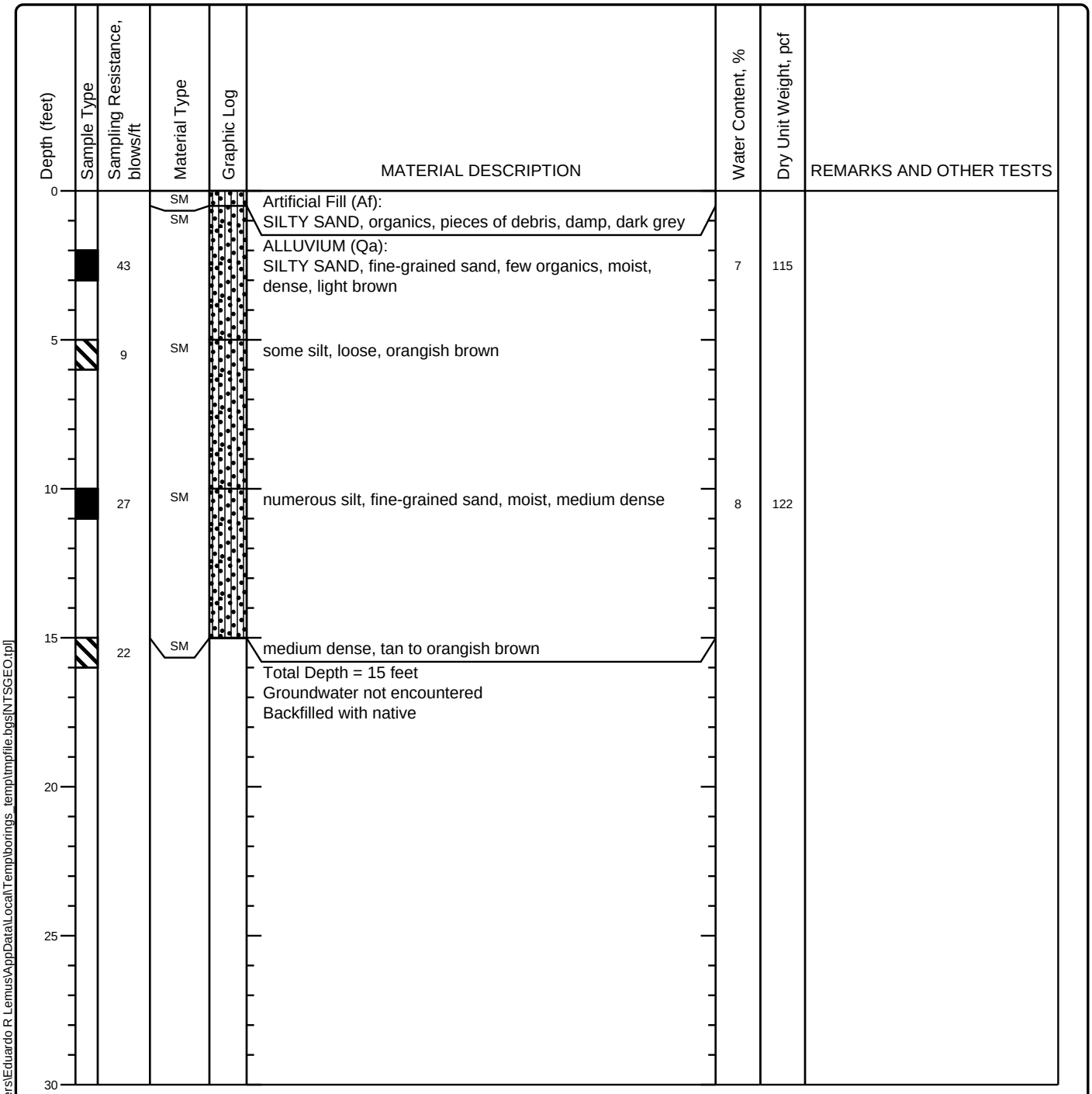


C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-2

Project: **27278 Ethanac Rd** Project Location: **27278 Ethanac Rd, Romoland** Project Number: **22424**	NTS GEOTECHNICAL	Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **8/24/2022**	Logged By **ERL**	Checked By **NS**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8"**	Total Depth of Borehole **15 feet**
Drill Rig Type **CME 75**	Drilling Contractor **OWD**	Approximate Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **140-lb autohammer**
Borehole Backfill **Native**	Location **27278 Ethanac Rd, Romoland**	

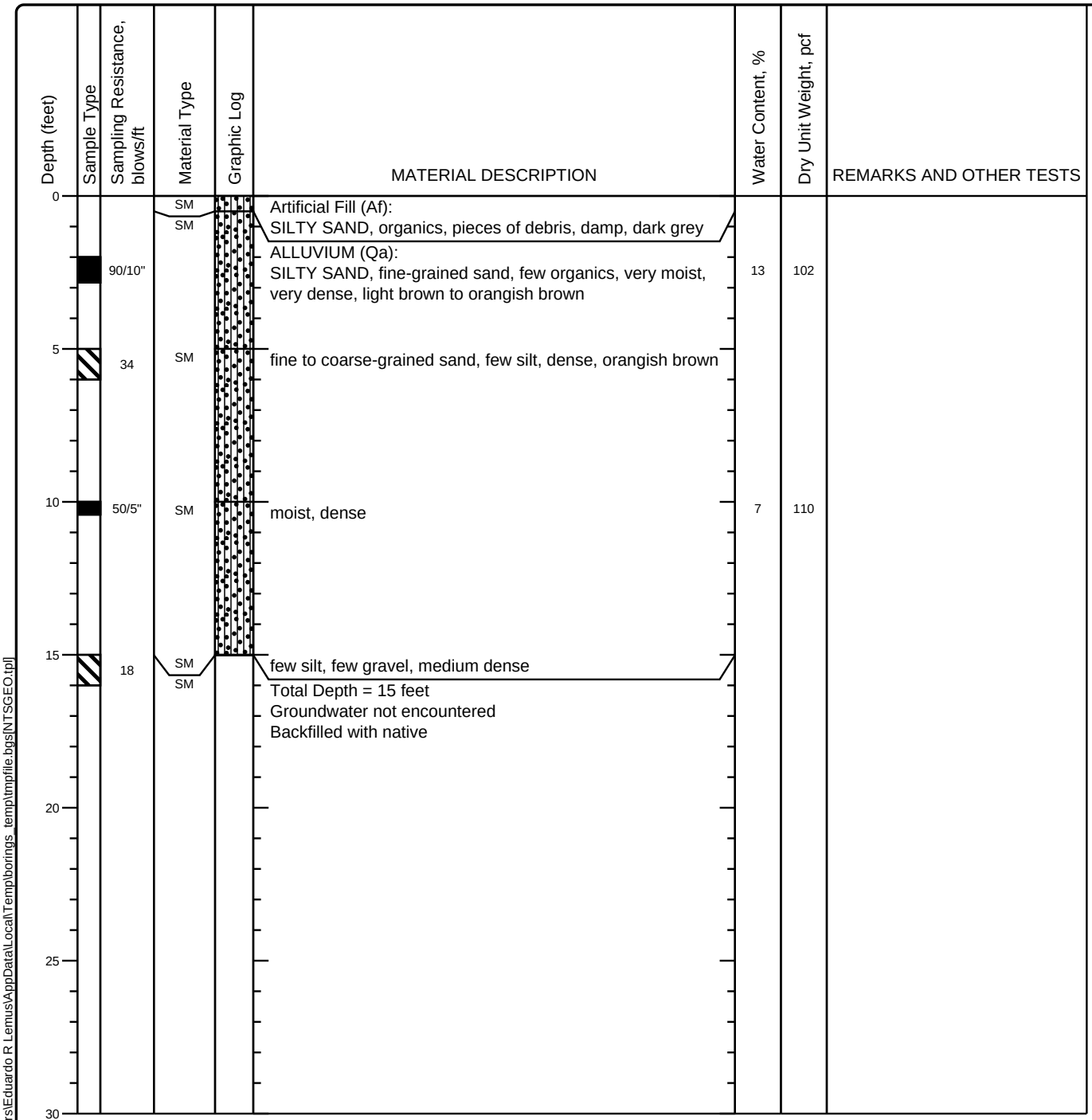


C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-3

Project: **27278 Ethanac Rd** Project Location: **27278 Ethanac Rd, Romoland** Project Number: **22424**	NTS GEOTECHNICAL	Log of Boring B-3 **Sheet 1 of 1**

Date(s) Drilled **8/24/2022**	Logged By **ERL**	Checked By **NS**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8"**	Total Depth of Borehole **15 feet**
Drill Rig Type **CME 75**	Drilling Contractor **OWD**	Approximate Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **140-lb autohammer**
Borehole Backfill **Native**	Location **27278 Ethanac Rd, Romoland**	

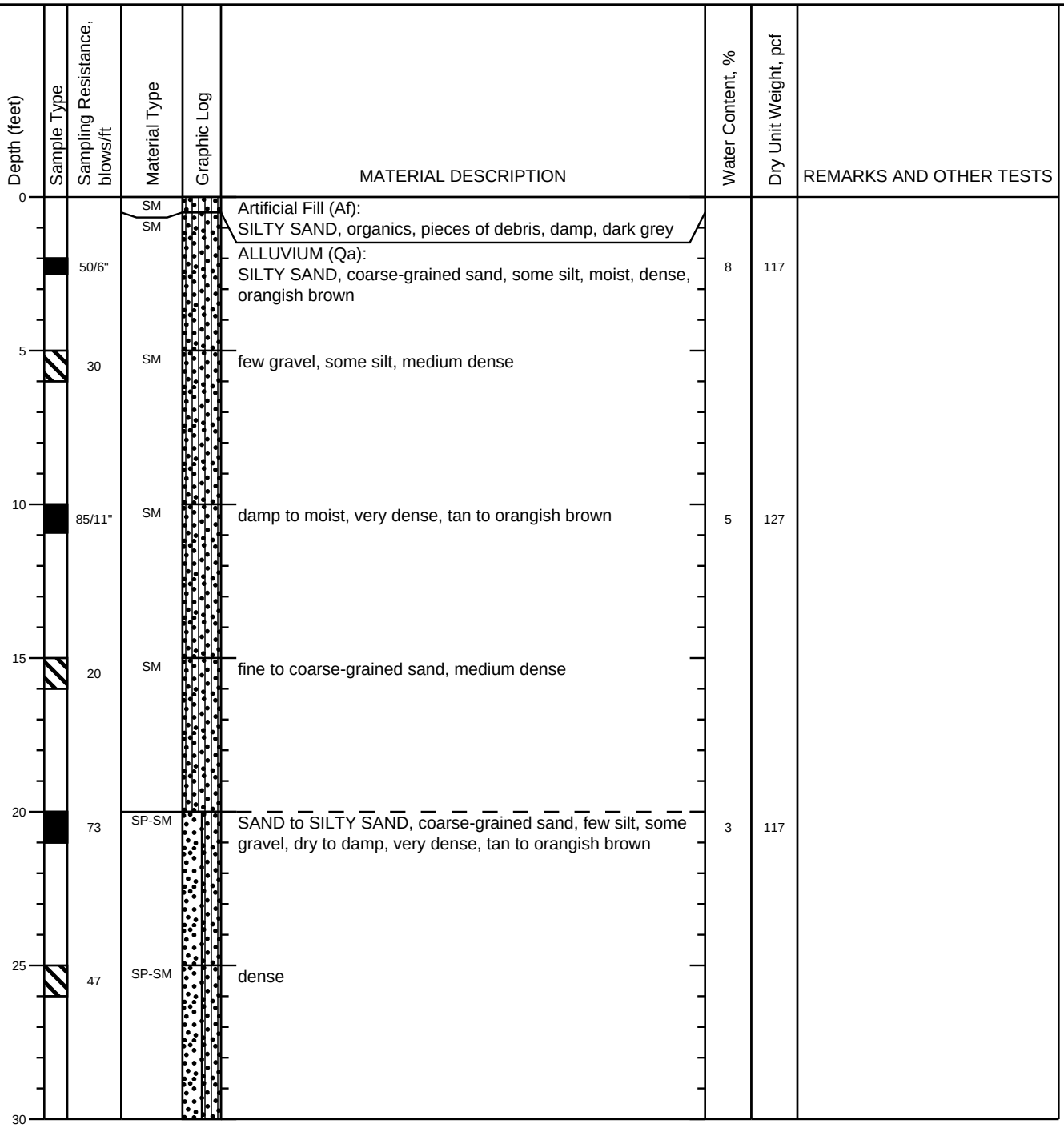


C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-4

Project: **27278 Ethanac Rd** Project Location: **27278 Ethanac Rd, Romoland** Project Number: **22424**	NTS GEOTECHNICAL	Log of Boring B-4 **Sheet 1 of 2**

Date(s) Drilled **8/24/2022**	Logged By **ERL**	Checked By **NS**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8"**	Total Depth of Borehole **30 feet**
Drill Rig Type **CME 75**	Drilling Contractor **OWD**	Approximate Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **140-lb autohammer**
Borehole Backfill **Native**	Location **27278 Ethanac Rd, Romoland**	



C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-5

Project: **27278 Ethanac Rd**
Project Location: **27278 Ethanac Rd, Romoland**
Project Number: **22424**

NTS GEOTECHNICAL

Log of Boring B-4

Sheet 2 of 2

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
30		50/6"	SP-SM		moist, dense	8	109	
					Total Depth = 30 feet			
					Groundwater not encountered			
					Backfilled with native			
35								
40								
45								
50								
55								
60								
65								

C:\Users\Eduardo R Lemus\AppData\Local\Temp\borings_temp\tmpfile.bgs[NTSGEO.tpl]

Figure A-5

NTS GEOTECHNICAL

APPENDIX B

Geotechnical Laboratory Testing

NTS GEOTECHNICAL

Appendix B
Geotechnical Laboratory Testing

Laboratory Moisture Content and Density Tests

The moisture content and dry densities of selected driven samples obtained from the exploratory boring was evaluated in general accordance with the latest version of ASTM D 2937. The test results are presented on the log of the exploratory boring in Appendix A.

Wash Sieve

The number of fines passing the No. 200 sieve was evaluated by the wash sieve. The test procedure was in general accordance with ASTM D 1140. The results are attached to this Appendix B.

Corrosion Suite

The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with ASTM D4327, the minimum resistivity test for potential metal corrosion was performed in general accordance with ASTM G187, and the concentration of soluble chlorides was determined in general accordance with ASTM D4327. The test results are attached to this Appendix B.

Direct Shear Tests

Direct shear tests were performed on selected remolded and relatively undisturbed soil samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of the materials. The samples were inundated during shearing to represent adverse field conditions. Direct shear test results are attached to this Appendix B.

Consolidation Test

Consolidation tests was performed on a selected driven soil sample in general accordance with the latest version of ASTM D2435. The sample was inundated during testing to represent adverse field conditions. The percent consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. Consolidation testing results are attached to this Appendix B.

PROJECT NO.: 22424

PROJECT ADDRESS: 27278 Ethanac Road

LABORATORY RECAPITULATION 1

Explorations	Depth (ft)	Material	Dry Density (p.c.f.)	Moisture Content (%)
B-1	2.0	Qa	106	8
	10.0	Qa	120	7
	20.0	Qa	118	5
B-2	2.0	Qa	115	7
	10.0	Qa	122	8
B-3	2.0	Qa	102	13
	10.0	Qa	110	7
B-4	2.0	Qa	117	8
	10.0	Qa	127	5
	20.0	Qa	117	3
	30.0	Qa	109	8

LABORATORY RECAPITULATION 2

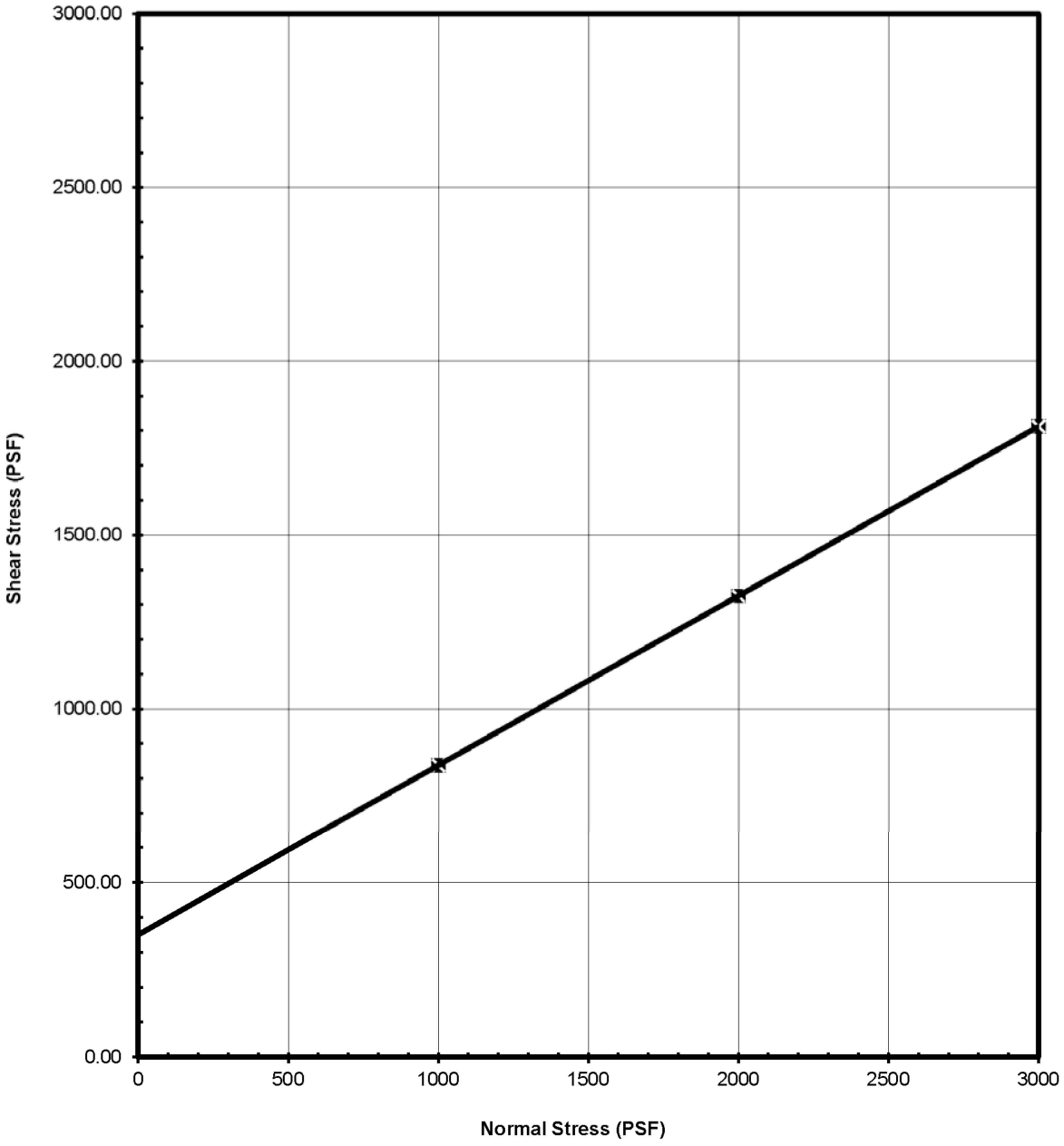
Explorations	Depth (ft)	pH	As-Is Soil Resistivity (ohm-cm)	Minimum Soil Resistivity (ohm-cm)	Chloride (ppm)	Sulfate (ppm)
B-3	5.0	8.22	8,000	2,600	50	60

Direct Shear Test Diagram (D-3080)

PLATE: S-1
P.N. 22424

Sample Description	Sample Identification	Test Type	Sample Test State	Number of Passes
Qa	B-1 @ 2.0'	Ultimate	Saturated	1

Soil Dry Density (PCF)	106	Shear Strength Values:	
Soil Moisture Content (%)	21	Phi (Degrees)	26.0
Soil Saturation (%)	99.4	Cohesion (PSF)	350.3

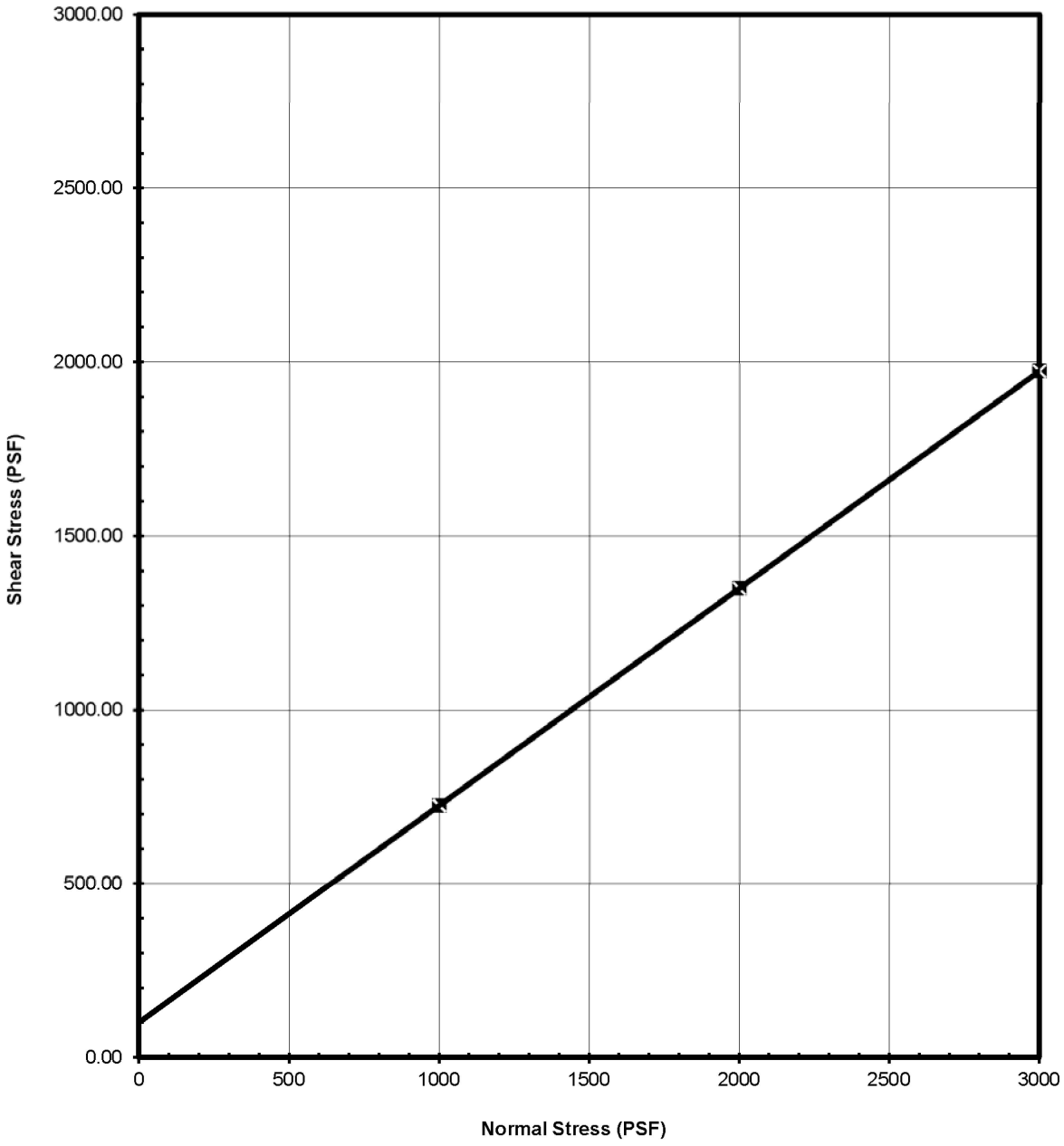


Direct Shear Test Diagram (D-3080)

PLATE: S-2
P.N. 22424

Sample Description	Sample Identification	Test Type	Sample Test State	Number of Passes
Qa	B-4 @ 10.0'	Ultimate	Saturated	1

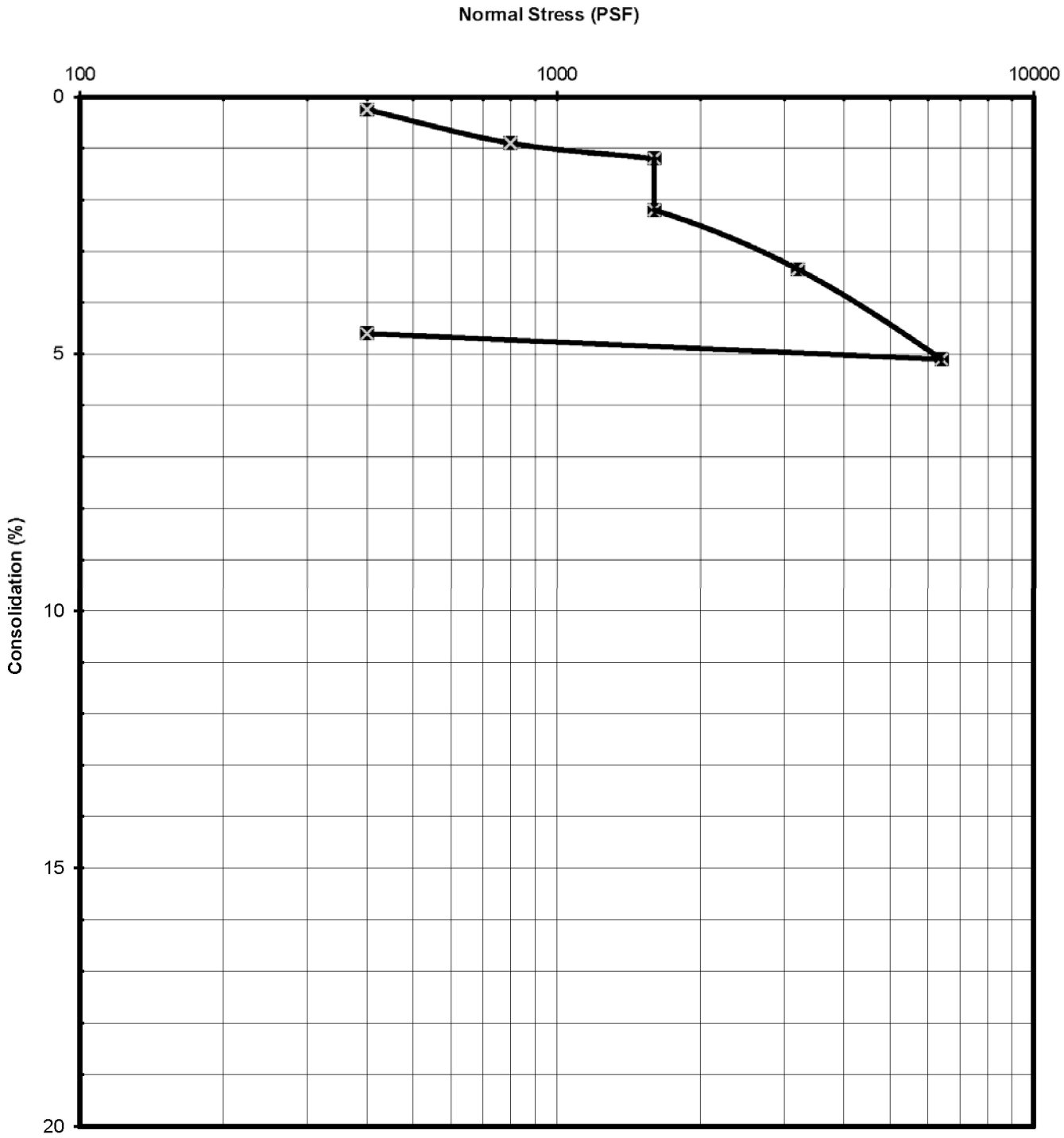
Soil Dry Density (PCF)	127	Shear Strength Values:	
Soil Moisture Content (%)	11.25	Phi (Degrees)	32.0
Soil Saturation (%)	98.7	Cohesion (PSF)	100.0



Consolidation Pressure Curve (D-2435)

Sample Identification	Sample Description
B-1 @ 10.0'	Qa

PLATE: C-1
P.N. 22424

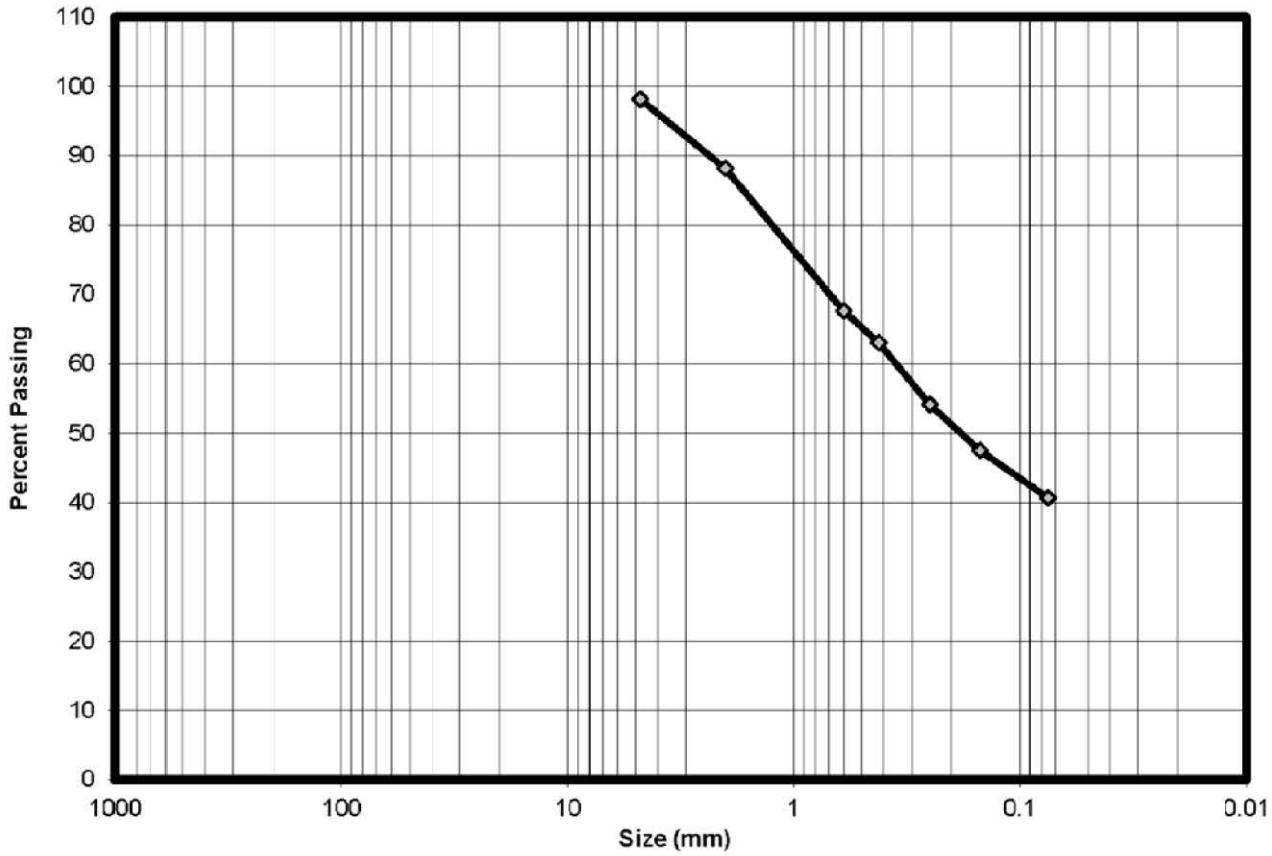


Grain Size Analysis (ASTM D422)

PLATE:	**SV-1**
P.N.	**22424**

Explorations	Sample Depth (ft)	Soil Description	% of Fines (-200)
B-1	5	Qa	49
	15	Qa	11
B-2	15	Qa	16
B-4	25	Qa	12

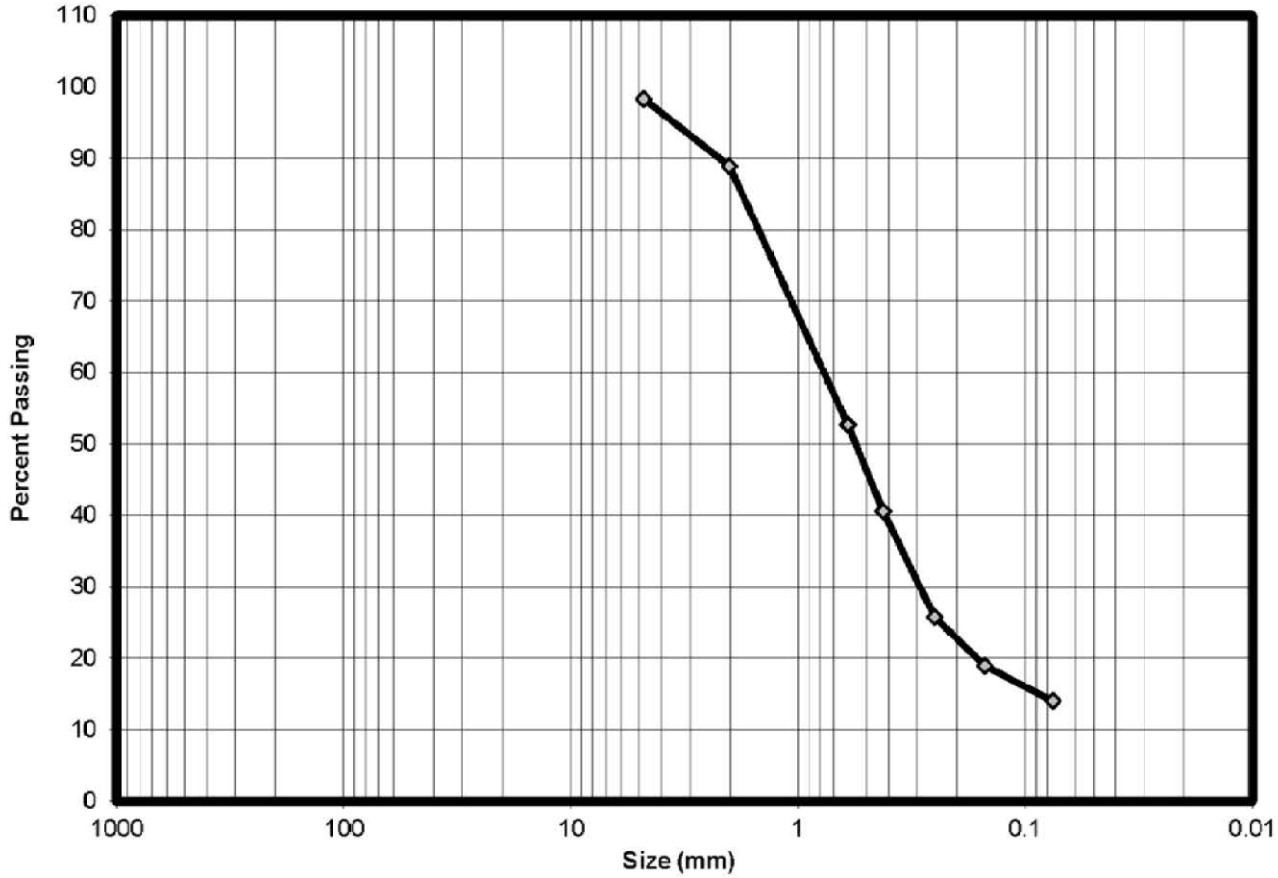
Sieve Size	Percent Passing
No. 4	98.18
No. 10	88.18
No. 30	67.64
No. 40	63.11
No. 60	54.14
No. 100	47.54
No. 200	40.68



Grain Size Analysis (ASTM D422)

Sample Identification	Sample Description	PLATE: G-1 P.N. 22424
P-1 @ 5.0'	Qa	

Sieve Size	Percent Passing
No. 4	98.35
No. 10	88.92
No. 30	52.69
No. 40	40.58
No. 60	25.77
No. 100	18.96
No. 200	14.00



Grain Size Analysis (ASTM D422)

Sample Identification	Sample Description	PLATE: G-1 P.N. 22424
P-2 @ 10.0'	Qa	

NTS GEOTECHNICAL

APPENDIX C

Infiltration Testing Data

NTS GEOTECHNICAL

Falling Head Borehole Infiltration Test

Project Name:	27278 Ethanac Rd, Romoland				**Date:**	8/24/2022	
Project Number:	22424				**Tested By:**	ERL	
Test Hole Number:	P-1				**USCS Soil Classification:**	SM	
Total Depth :	5.00	feet			**Water Temperature:**	N/A	°F
Test Hole Diameter:	8.00	inches	radius=	4	inches		

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolati
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	10:31	11:01	30.0	30.0	4.00	4.48	12.00	6.24	5.76	9.12	2.07
2	11:02	11:32	30.0	60.0	4.38	4.68	7.50	3.84	3.66	5.67	1.91
3	11:33	12:03	30.0	90.0	4.58	4.80	5.04	2.40	2.64	3.72	1.85
4	12:04	12:34	30.0	120.0	4.80	4.93	2.40	0.84	1.56	1.62	1.72
5	12:35	1:05	30.0	150.0	4.00	4.41	12.00	7.08	4.92	9.54	1.71
6	1:06	1:36	30.0	180.0	4.41	4.67	7.08	3.96	3.12	5.52	1.66
7	1:37	2:07	30.0	210.0	4.67	4.84	3.96	1.92	2.04	2.94	1.65
8	2:08	2:38	30.0	240.0	4.84	4.95	1.92	0.60	1.32	1.26	1.62
9	2:39	3:09	30.0	270.0	4.00	4.37	12.00	7.56	4.44	9.78	1.51
10	3:10	3:40	30.0	300.0	4.37	4.63	7.56	4.44	3.12	6.00	1.56
11	3:41	4:11	30.0	330.0	4.63	4.80	4.44	2.40	2.04	3.42	1.51
12	4:12	4:42	30.0	360.0	4.80	4.91	2.40	1.08	1.32	1.74	1.41

SAFETY FACTOR*:	2
UNFACTORED INFILTRATION RATE (IN/HR):	1.41
FACTORED INFILTRATION RATE (IN/HR):	0.71

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	1	0.25
	Depth to groundwater	0.25	2	0.5
	Geotechnical Factor of Safety (SA):			2

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

NTS GEOTECHNICAL

Falling Head Borehole Infiltration Test

Project Name:	27278 Ethanac Rd, Romoland				**Date:**	8/24/2022	
Project Number:	22424				**Tested By:**	ERL	
Test Hole Number:	P-2				**USCS Soil Classification:**	SM	
Total Depth :	10.00	feet			**Water Temperature:**	N/A	°F
Test Hole Diameter:	8.00	inches	radius=	4	inches		

Trial	Start Time	End Time	ΔT	Total Time	Initial Depth of Water	Final Depth of Water	H_0	H_f	ΔH	H_{avg}	Unfactored Percolati
			(min)	*(min)*	*(ft)*	*(ft)*	*(in)*	*(in)*	*(in)*	*(in)*	*(in/hour)*
1	9:24	9:34	10.0	35.0	8.08	8.66	23.04	16.08	6.96	19.56	3.87
2	9:34	9:44	10.0	45.0	8.66	9.07	16.08	11.16	4.92	13.62	3.78
3	9:54	10:04	10.0	55.0	9.07	9.36	11.16	7.68	3.48	9.42	3.66
4	10:04	10:14	10.0	65.0	9.36	9.53	7.68	5.69	1.99	6.68	2.75
5	10:14	10:24	10.0	75.0	9.53	9.66	5.64	4.14	1.50	4.89	2.61
6	10:24	10:34	10.0	85.0	9.66	9.78	4.14	2.64	1.50	3.39	3.34

SAFETY FACTOR*:	1.75
UNFACTORED INFILTRATION RATE (IN/HR):	3.34
FACTORED INFILTRATION RATE (IN/HR):	1.91

Factor Category	Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) = w x v
Suitability Assessment	Soil assessment methods	0.25	3	0.75
	Predominant soil texture	0.25	2	0.5
	Site soil variablity	0.25	1	0.25
	Depth to groundwater	0.25	1	0.25
	Geotechnical Factor of Safety (SA):			1.75

Concern Level	Factor Value (v)
Low	1
Medium	2
High	3

***Factor of safety should not be less than 2. Additional factor of safety in accordance with Table D-7 of the South Orange County Technical Guidance Document should be applied by the project civil engineer.**

Appendix 4: Historical Site Conditions

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

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

TABLE 3-4. LID BMP Applicability

LID BMP Hierarchy	A	B	C	D
	K_{SAT}> 1.6"/hr., and no restrictions on infiltration	Are Harvest and Use BMPs feasible?	0.3"/hr. < K_{SAT} < 1.6"/hr., or unpredictable or unknown	K_{SAT} < 0.3"/hr.
LID Infiltration BMPs*	✓			
Harvest and Use BMPs		✓		✓
LID Bioretention	✓		✓	✓
LID Biotreatment				✓

Notes for Table 3-5:

***See also** Figure 3-6 for guidance in selecting appropriate BMPs*

***Column A:** Selections from this column may be used in locations where the infiltration rate of underlying soils is at least 1.6" per hour and no restrictions on infiltration apply to these locations.*

***Column B:** Harvest and Use BMPs may be used where it can be shown that there is sufficient demand for harvested water and where LID Infiltration BMPs are not feasible.*

***Column C:** Selections in this column may be used in locations where the measured infiltration rate of underlying soils is between 0.3" and 1.6" per hour or where, in accordance with recommendations of a licensed geotechnical engineer, the post-development saturated hydraulic conductivity is uncertain or unknown or cannot be reliably predicted because of soil disturbance or fill, anisotropic soil characteristics, presence of clay lenses, or other factors.*

***Column D:** Selections in this column may be used in locations where the infiltration rate of underlying soils is 0.3" per hour or less. See Chapter 2 for more information.*

** Permeable Pavement, when designed with a maximum of a 2:1 ratio of impervious area to pervious pavement areas, or less, is considered a self-retaining area, and is not considered an LID BMP for the purposes of this table. This table focuses on the 'special case' included in the discussion of 'areas draining to self-retaining areas' above, where a project proponent can choose to design the pervious pavement as a LID BMP in accordance with an approved design, such as the LID BMP Design handbook, and in return drain additional impervious area onto the pervious pavement beyond the 2:1 ratio.*

3.4.2.a. Laying out your LID BMPs

Finding the right location for LID BMPs on your site involves a careful and creative integration of several factors:

- ✓ To make the most efficient use of the site and to maximize aesthetic value, **integrate BMPs with site landscaping**. Many local zoning codes may require landscape setbacks or buffers, or may specify that a minimum portion of the site be landscaped. It may be possible to locate some or all of your site's Stormwater BMPs within this same area, or within utility easements or other non-buildable areas.

- ✓ Bioretention BMPs must be **level or nearly level** all the way around. When configured in a linear fashion (similar to swales) bioretention BMPs may be gently sloped end to end, but opposite sides must be at the same

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name	Blue Engineering	Date	7/19/2023
Designed by	Angel Cesar	Case No	
Company Project Number/Name			

BMP Identification

BMP NAME / ID: Underground Infiltration Chambers

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.61 inches

Drainage Management Area Tabulation

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-1	*10135*	*Roofs*	*1*	*0.89*	*9040.4*			
DMA A-2	*55341*	*Concrete or Asphalt*	*1*	*0.89*	*49364.2*			
DMA A-3	*21296*	*Ornamental Landscaping*	*0*	*0.04*	*851.8*			
	86772	***Total***			**59256.4**	**0.61**	***3012.2***	***3255***

Notes:

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: Blue Engineering — Date: 11/28/2023

Designed by: Angel Cesar — Case No:

Company Project Number/Name:

BMP Identification

BMP NAME / ID: Underground Infiltration Chambers

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = 0.61 in/hr

Drainage Management Area Tabulation

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

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
DMAs	DMA A-1	10135	Roofs	1	0.89	9040.4			
	DMA A-2	55341	Concrete or Asphalt	1	0.892	49364.2			
		65476	Total			58404.6	0.61	0.8	0.8

Notes:

DMA A-3 Ornamental Landscaping is not included because it is self-treating.

PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 229 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 11,511 CF
- BACKFILL STORAGE VOLUME = 4,944 CF
- TOTAL STORAGE PROVIDED = 16,454 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 24"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 12"
- WIDTH AT SIDES = 18"
- BELOW PIPE = 12"

NOTES

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

ASSEMBLY
SCALE: 1" = 10'

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

DATE	REVISION DESCRIPTION	BY

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

CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

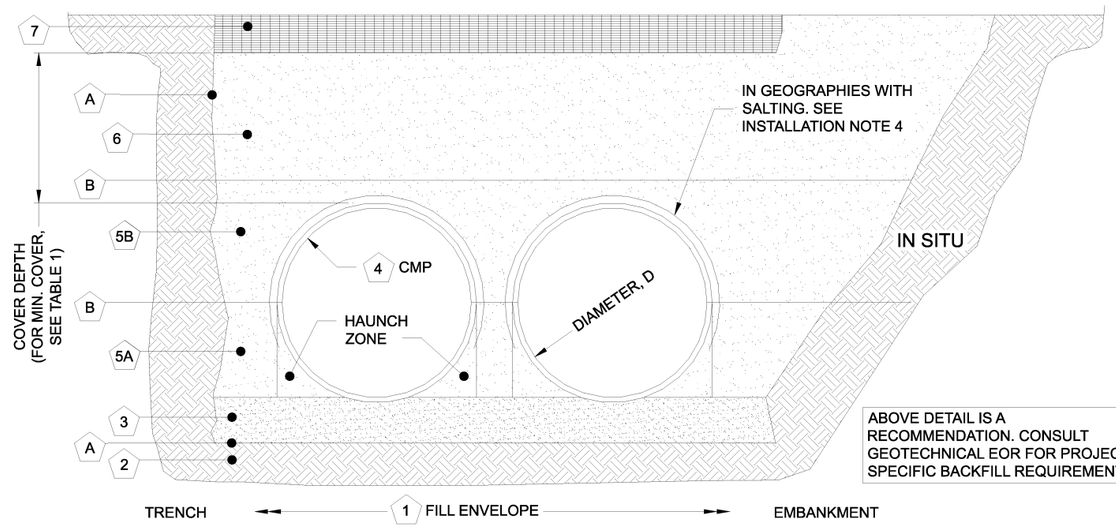
DYO42588 Ethanac rd
Angel Cesar
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
29225	42588	12/14/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

TABLE 1:

DIAMETER, D	MIN. COVER	CORR. PROFILE
6"-10"	12"	1 1/2" x 1/4"
12"-48"	12"	2 2/3" x 1/2"
>48"-96"	12"	3" x 1", 5" x 1"
>96"	D/8	3" x 1", 5" x 1"

- STRUCTURAL BACKFILL MUST EXTEND TO LIMITS OF THE TABLE
- TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT
- ULTRAFLO ALSO AVAILABLE FOR SIZES 18" - 120" WITH 3/4"x 3/4"x 7 1/2" CORRUGATION



MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

ABOVE DETAIL IS A RECOMMENDATION. CONSULT GEOTECHNICAL EOR FOR PROJECT SPECIFIC BACKFILL REQUIREMENTS.

INSTALLATION NOTES

1. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES.
2. OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.
3. BACKFILL USING CONTROLLED LOW-STRENGTH MATERIAL (CLSM, "FLASH FILL" OR "FLOWABLE FILL") MAY BE USED WHEN THE SPACING BETWEEN THE PIPES WILL NOT ALLOW FOR PLACEMENT AND ADEQUATE COMPACTION OF THE BACKFILL. CONTACT CONTECH FOR FURTHER EVALUATION.
4. IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, A GEOMEMBRANE BARRIER IS RECOMMENDED OVER THE UPPER HALF OF THE PIPE. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

TABLE 2: SOLID STANDARD

CMP DETENTION AND CMP DRAINAGE STANDARD BACKFILL SPECIFICATIONS

	MATERIAL LOCATION	MATERIAL SPECIFICATION	DESCRIPTION	
1	FILL ENVELOPE WIDTH	PER ENGINEER OF RECORD	MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE. THE SUGGESTED MINIMUM TRENCH WIDTH, OR EOR RECOMMENDATION: PIPE ≤ 12": D + 16" PIPE > 12": 1.5D + 12"	MINIMUM EMBANKMENT WIDTH (IN FEET) FOR INITIAL FILL ENVELOPE: PIPE < 24": 3.0D PIPE 24" - 144": D + 4'0" PIPE > 144": D + 10'0"
2	FOUNDATION	**AASHTO 26.5.2** OR PER ENGINEER OF RECORD	PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND FOUNDATION BROUGHT BACK TO GRADE WITH A FILL MATERIAL APPROVED BY THE ENGINEER OF RECORD.	
3	BEDDING	**AASHTO M 43: 3, 357, 4, 467, 5, 56, 57** (APPROVED REGIONAL EQUIVALENTS INCLUDE CA-7)	ENGINEER OF RECORD TO DETERMINE IF BEDDING IS REQUIRED. PIPE MAY BE PLACED ON THE TRENCH BOTTOM OF A RELATIVELY LOOSE, NATIVE SUITABLE WELL GRADED GRANULAR MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 2" MIN DEPTH. THE BEDDING MATERIAL MAY BE SUITABLE FOUNDATION SOILS CONFORMING TO AASHTO SOIL CLASSIFICATIONS A1, A2, OR A3 WITH MAXIMUM PARTICLE SIZE OF 3" PER AASHTO 26.3.8.1	
4	CORRUGATED METAL PIPE			
5A	CRITICAL BACKFILL	**AASHTO M 145: A-1, A-2, A-3** *	HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION WITHOUT SOFT SPOTS. BACKFILL SHALL BE PLACED IN 8" +/- LOOSE LIFTS AND COMPACTED TO 90% STANDARD PROCTOR PER AASHTO T 99. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A THREE LIFT (24") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHOULD BE ADVANCED ALONG THE LENGTH OF THE SYSTEM TO AVOID DIFFERENTIAL LOADING. WELL GRADED GRANULAR MATERIAL WHICH MAY CONTAIN SMALL AMOUNTS OF SILT OR CLAY AND MAXIMUM PARTICLE SIZE OF 3" (PER AASHTO 26.3.8.1 AND 12.4-1.3).	
5B	BACKFILL	**AASHTO M 145: A-1, A-2, A-3**		
6	COVER MATERIAL	UP TO MIN. COVER - SEE 5A AND 5B ABOVE ABOVE MIN. COVER - PER ENGINEER OF RECORD	COVER MATERIAL MAY INCLUDE NON-BITUMINOUS, GRANULAR ROAD BASE MATERIAL WITHIN MIN COVER LIMITS	
7	RIGID OR FLEXIBLE PAVEMENT (IF APPLICABLE)	PER ENGINEER OF RECORD	FLEXIBLE PAVEMENT SHOULD NOT BE COUNTED AS PART OF THE FILL HEIGHT OVER THE CMP. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.	
A	OPTIONAL SIDE GEOTEXTILE	NONE	GEOTEXTILE LAYER IS RECOMMENDED ON SIDES OF EXCAVATION TO PREVENT SOIL MIGRATION.	
B	OPTIONAL GEOTEXTILE BETWEEN LAYERS	NONE	IF SOIL TYPES DIFFER AT ANY POINT ABOVE PIPE INVERT, A GEOTEXTILE LAYER IS RECOMMENDED TO BE PLACED BETWEEN THE LAYERS TO PREVENT SOIL MIGRATION.	

NOTES:
- FOR MULTIPLE BARREL INSTALLATIONS, THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE THE PIPE DIAMETER /2 BUT NO LESS THAN 12" FOR DIAMETERS <72". FOR 72" AND LARGER DIAMETERS, THE MINIMUM SPACING IS 36". CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.

* APPROVED REGIONAL EQUIVALENTS FOR SECTION 5A INCLUDE CA-7, MIDOT 2G, 34G, OR 21AA STONE OR GRAVEL; #8; #57; MIDOT 6A, 2G, 3G, 34G.

MANUFACTURER RECOMMENDED BACKFILL

NOT TO SCALE

DATE	REVISION DESCRIPTION	BY

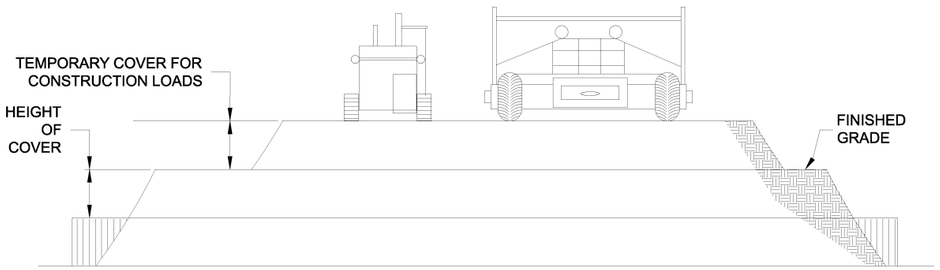
CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO42588 Ethanac rd
Angel Cesar
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
29225	42588	12/14/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

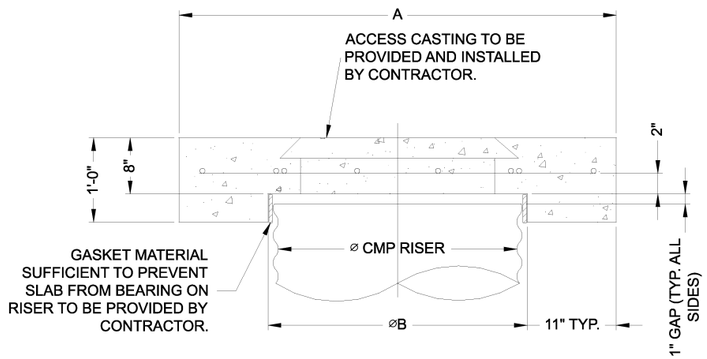
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

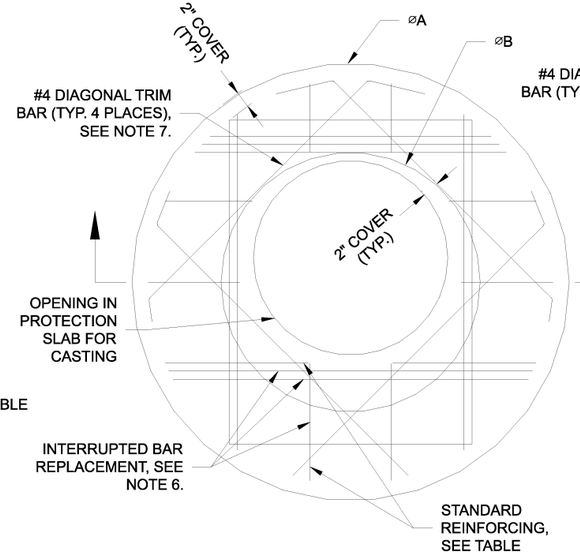
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



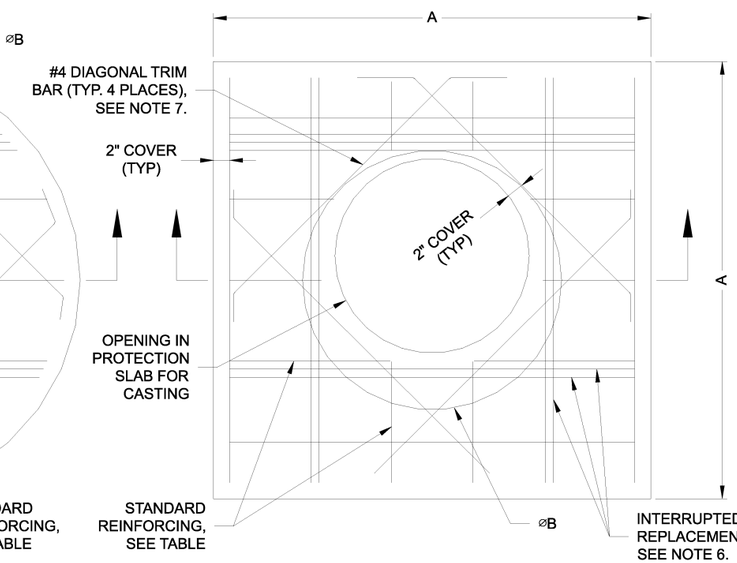
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

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

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO42588 Ethanac rd
Angel Cesar
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
29225	42588	12/14/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

C:\EXPORTS\TEMPLATES\NEWCMP_V8.DWG 10/18/2019 10:02 AM

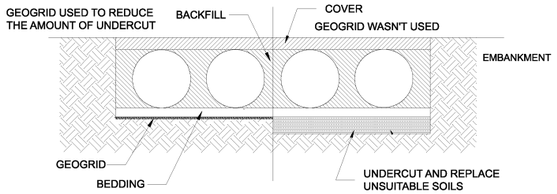
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

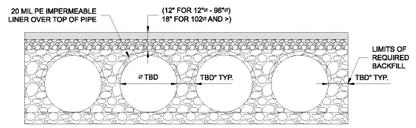


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

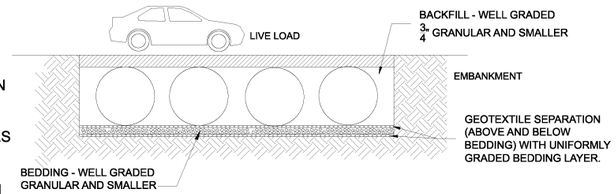
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

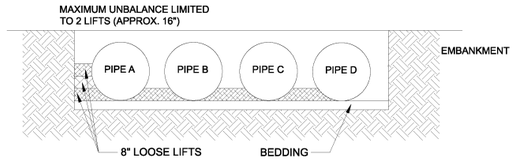
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



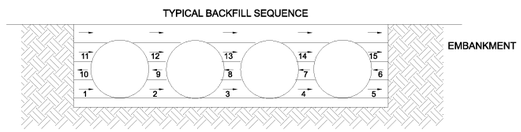
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

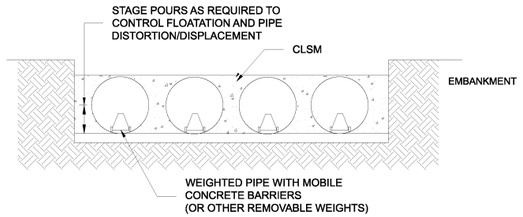


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

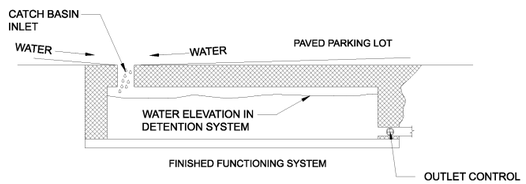


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

DATE	REVISION DESCRIPTION	BY

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

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO42588 Ethanac rd
Angel Cesar
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
29225	42588	12/14/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Hydrodynamic Separation Product Calculator

Ethanac and Tremble

Pre Treatment 1

CDS CDS4030-8-C

Project Information					
Project Name	Ethanac and Tremble			**Option #**	B
Country	UNITED_STATES	**State**	California	**City**	Perris

Contact Information			
First Name	Brandon	**Last Name**	Muse
Company		**Phone #**	909-970-5427
Email	brandon@bluecivileng.com		

Design Criteria					
Site Designation	Pre Treatment 1			**Sizing Method**	Treatment Flow Rate
Screening Required?	Yes	**Treatment Flow Rate**	4.50	**Peak Flow (cfs)**	4.50
Groundwater Depth (ft)	>15	**Pipe Invert Depth (ft)**	5 - 10	**Bedrock Depth (ft)**	>15
Multiple Inlets?	No	**Grate Inlet Required?**	No	**Pipe Size (in)**	12.00
Required Particle Size Distribution?	No	**90° between two inlets?**	N/A		

Treatment Selection				
Treatment Unit	CDS	**System Model**	CDS4030-8-C	
Target Removal	80%	**Particle Size Distribution (PSD)**	WADOE	

Hydrodynamic Separation Product Calculator

Ethanac and Tremble

Pre Treatment 1

CDS CDS4030-8-C

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD								
Rainfall Intensity[1] (in/hr)	% Rainfall Volume[1]	Cumulative Rainfall Volume	Rainfall Volume Treated	Total Flowrate (cfs)	Treated Flowrate (cfs)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
							Removal Efficiency Adjustment[2] =	
							Predicted % Annual Rainfall Treated =	
							Predicted Net Annual Load Removal Efficiency =	
1 -								
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.								

SECTION (_____)
STORM WATER TREATMENT DEVICE

1.0 GENERAL

1.1 This item shall govern the furnishing and installation of the CDS® by Contech Engineered Solutions LLC, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

1.2 The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

1.3 The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

1.4 Related Sections

1.4.1 Section 02240: Dewatering
1.4.2 Section 02260: Excavation Support and Protection
1.4.3 Section 02315: Excavation and Fill
1.4.4 Section 02340: Soil Stabilization

1.5 All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

1.6 The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

1.7 The SWTD manufacturer shall submit to the Engineer of Record a “Manufacturer’s Performance Certification” certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

1.8 No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.0 MATERIALS

2.1 Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

- 2.1.1 Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
- 2.1.2 Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
- 2.1.3 Cement shall be Type III Portland Cement conforming to ASTM C 150;
- 2.1.4 Aggregates shall conform to ASTM C 33;
- 2.1.5 Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
- 2.1.6 Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
- 2.1.7 Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

2.2 Internal Components and appurtenances shall conform to the following:

- 2.2.1 Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;
- 2.2.2 Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
- 2.2.3 Fiberglass components shall conform to applicable sections of ASTM D-4097
- 2.2.4 Access system(s) conform to the following:
- 2.2.5 Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

3.0 PERFORMANCE

3.1 The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load with a particle size distribution having a mean particle size (d_{50}) of 125 microns unless otherwise stated.

3.2 The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this

subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

3.3 The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

3.4 The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

3.5 The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.6 The SWTD shall have completed field tested following TARP Tier II protocol requirements

4.0 EXECUTION

4.1 The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

4.2 The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

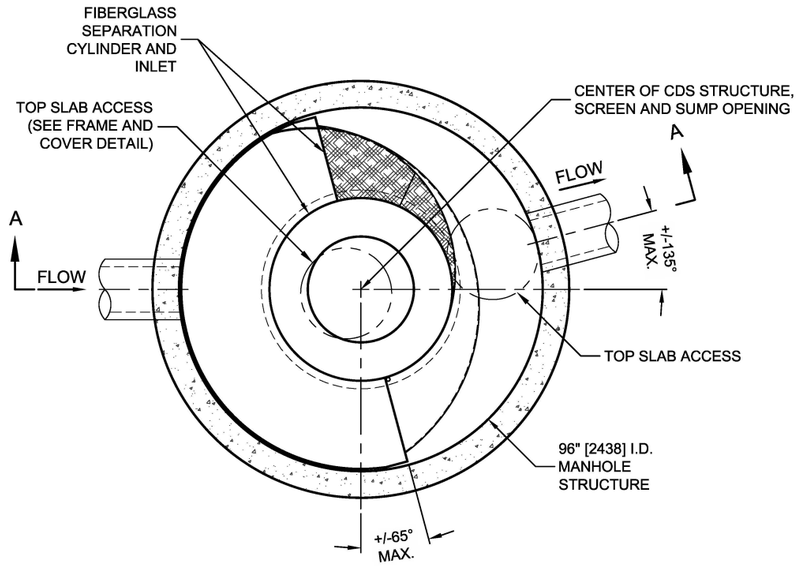
4.3 The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

4.4 The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

TABLE 1
Storm Water Treatment Device
Storage Capacities

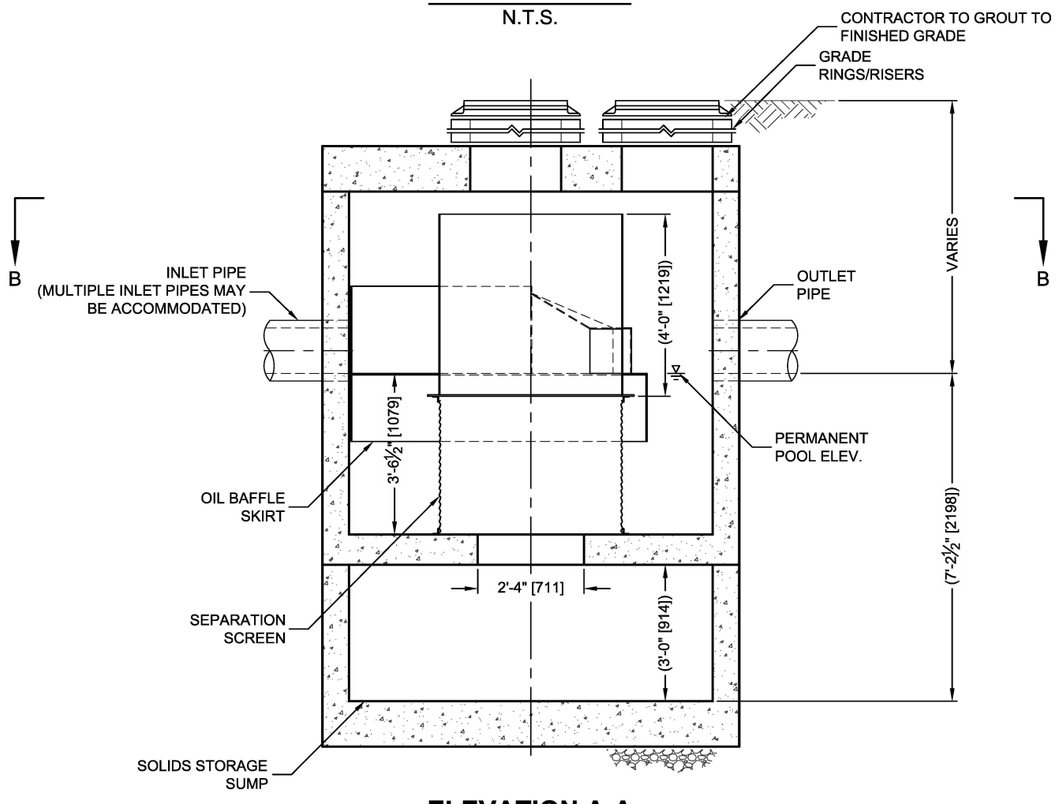
CDS Model	Minimum Sump Storage Capacity $(yd^3)/(m^3)$	Minimum Oil Storage Capacity (gal)/(L)
CDS2015-4	0.9(0.7)	61(232)
CDS2015-5	1.5(1.1)	83(313)
CDS2020-5	1.5(1.1)	99(376)
CDS2025-5	1.5(1.1)	116(439)
CDS3020-6	2.1 (1.6)	184(696)
CDS3025-6	2.1(1.6)	210(795)
CDS3030-6	2.1 (1.6)	236(895)
CDS3035-6	2.1 (1.6)	263(994)
CDS3535-7	2.9(2.2)	377(1426)
CDS4030-8	5.6(4.3)	426(1612)
CDS4040-8	5.6 (4.3)	520(1970)
CDS4045-8	5.6 (4.3)	568(2149)
CDS5640-10	8.7(6.7)	758(2869)
CDS5653-10	8.7(6.7)	965(3652)
CDS5668-10	8.7(6.7)	1172(4435)
CDS5678-10	8.7(6.7)	1309(4956)
CDS7070-DV	3.6(2.8)	914 (3459)
CDS10060-DV	5.0 (3.8)	792 (2997)
CDS10080-DV	5.0 (3.8)	1057 (4000)
CDS100100-DV	5.0 (3.8)	1320 (4996)

END OF SECTION



PLAN VIEW B-B

N.T.S.



ELEVATION A-A

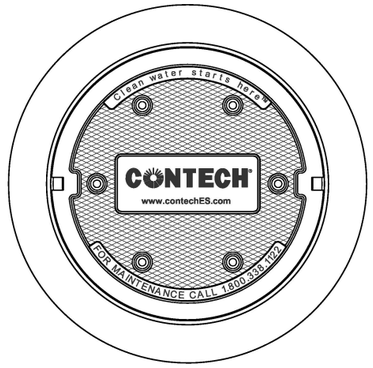
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS4030-8-C DESIGN NOTES

THE STANDARD CDS4030-8-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



FRAME AND COVER

(DIAMETER VARIES)

N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECHENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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

CDS4030-8-C INLINE CDS STANDARD DETAIL

	2 year – 24 hour			
	Pre-condition	**Post-Mitigation**	**Post-Mitigation minus Infiltration***	**% Difference**
Flow (CFS)	0.066	0.099	0.000	-100%

*Infiltration rate into ground on bottom of underground chamber = 0.099cfs

See attachments here after for details.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms
(Will be provided in Final Engineering)

Appendix 10: Educational Materials

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