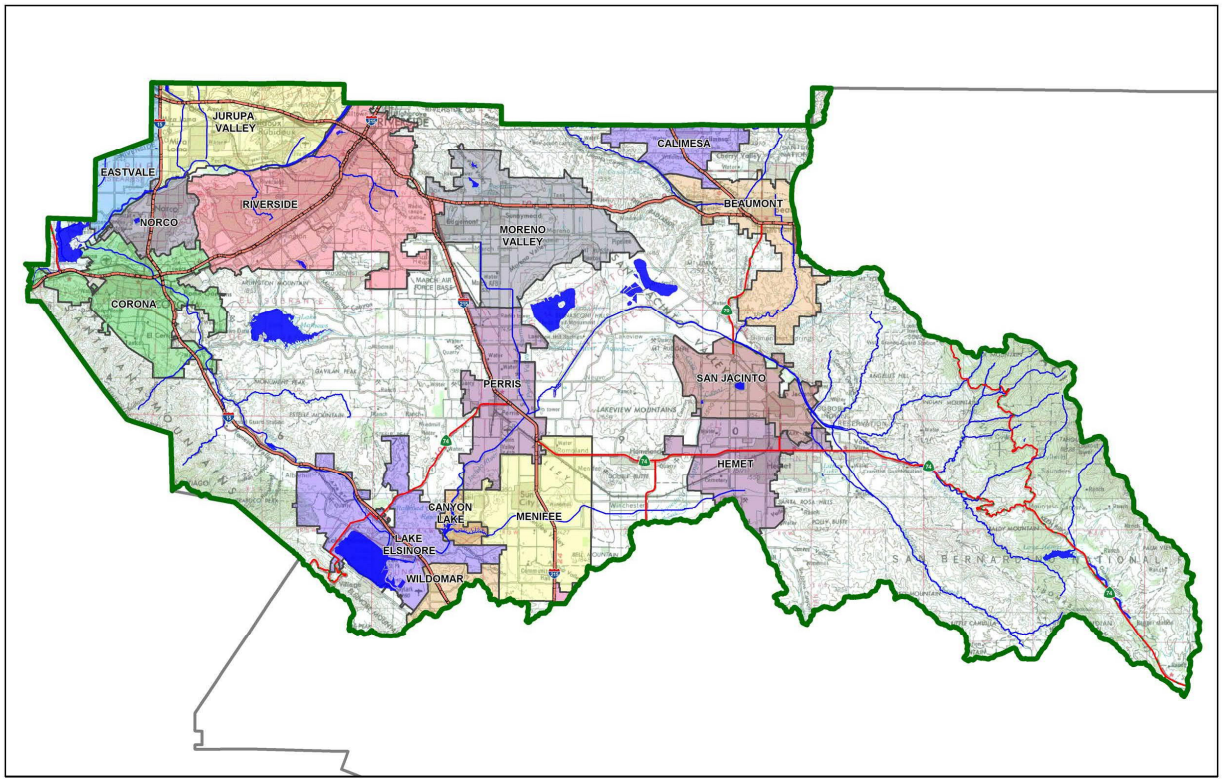
Project Specific Water Quality Management Plan

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

Project Title: Patterson Business Center

Development No: 5030 Patterson Avenue, Perris, CA

Design Review/Case No: DPR 22-00013



☒ Preliminary
☐ Final

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Prepared for Compliance with
Regional Board Order No. R8-2010-0033
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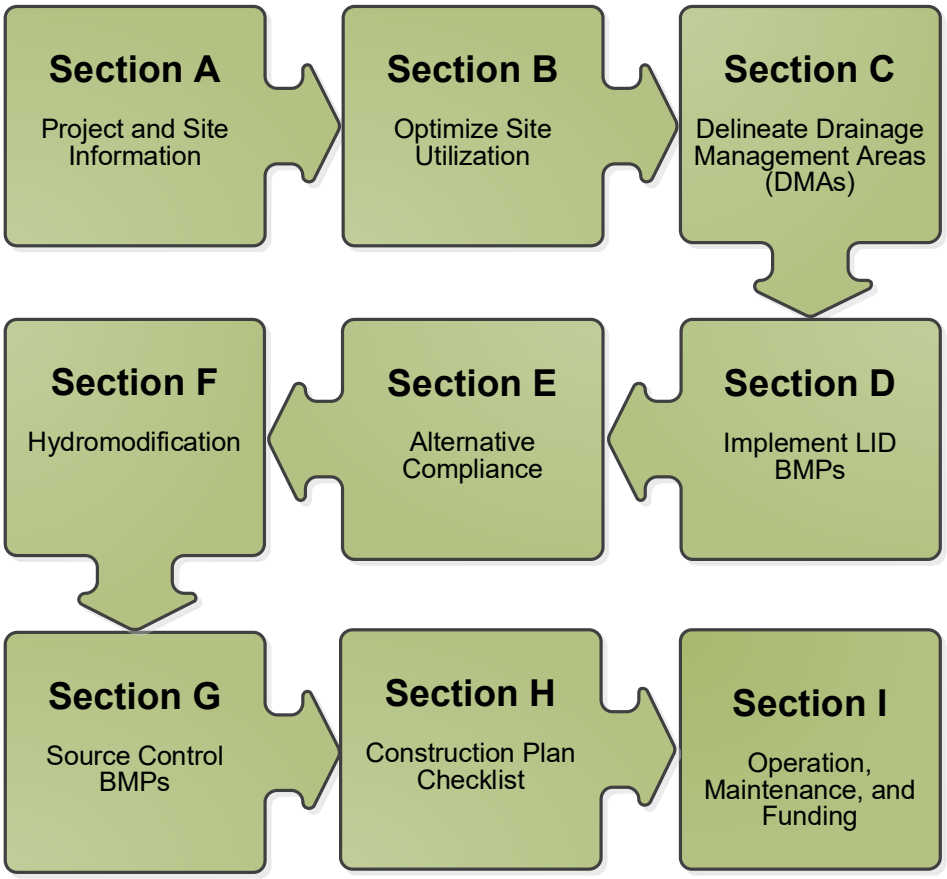
A Brief Introduction

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



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for CGU Capital Management by Valued Engineering, Inc for the Patterson Business Center project (P22-00013).

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

"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: 3/1/23

DALE ULTMAN — Owner's Printed Name

PRESIDENT — 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: 1/16/2023

Mr. Jefferey D. Meiter — Preparer's Printed Name

President — Preparer's Title/Position

Preparer's Licensure:

REGISTERED PROFESSIONAL ENGINEER
JEFFEREY D. MEITER
No. 64696
CIVIL
STATE OF CALIFORNIA

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial
Planning Area:	Perris Planning Area 1
Community Name:	Perris Valley
Development Name:	Planning Area 1
PROJECT LOCATION	
Latitude & Longitude (DMS):	33.86382°, -117.25466°
Project Watershed and Sub-Watershed:	Santa Ana River Watershed & Jacinto Sub-Watersed
Gross Acres:	4.84
APN(s):	294-190-047, 294-190-048
Map Book and Page No.:	Thomas Bros. Map, Page 747
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial Warehouse
Proposed or Potential SIC Code(s)	5051
Area of Impervious Project Footprint (SF)	184,249
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	184,249
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☐ Y ☒ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	C
What is the Water Quality Design Storm Depth for the project?	0.61

Project Description

CGU Capital Management proposes to develop 4.84 acress of existing vacant land in the City of Perris, CA. The developed site will reduce the total acreage from 4.84 acres to 4.821 acres by dedicating 3-feet along the public right-of-way of Patterson Avenue to accommodate public sidewalks and landscaping. This development has 184,249 square-feet of impervious and 26,761 square-feet of pervious throughout the property. The proposed construction includes the 91,953 square-feet of commercial warehouse building along with the parking stalls to accommodate the building size on the property. Additional improvement will also consists of sidewalks, landscape and driveway approaches to access the proposed site. Parkway improvements are proposed for the frontage street of Patterson Avenue. Street improvements will also include constructing curb and gutter to the ultimate street width of 66' per City standards for Patterson Avenue. The existing land use is vacant and barren with minimal vegetative scrub. The existing topography slopes approximately 0.7% in the northwest to southeast direction.

The project is located within the Perris Valley Master Drainage Plan (PVMDP) adopted October 1989. The existing drainage path is characterized by sheet flows that follow the existing topography. The off-site runoff from west of the project location is discharging to the development, therefore the storm drain inlets are proposed on the westerly of the site to capture off-site stormwater run-on to convey through the proposed development and into the Caltrans RCB. All on-site flows generated from the project will be collected by a proposed underground chambers which will capture and store runoff before being treated in a proposed Modular Wetland System for treatment. High level storm events will be diverted into the Perris Valley Storm Drain Channel. However the existing storm drain system Line 'A' is undersized and can not provide the ultimate drainage capacity, therefore the drainage facilities will be proposed with sufficient capacity to safely convey on-site stormwater runoff. The new storm drain system will be constructed parallel to the Line A on Patterson Avenue and connect to the existing storm drain system by Caltrans.

The proposed site will be treated as one drainage area DA 1 and delineated into two subareas, DMA A and DMA B. DMA A will capture the stormwater the southwesterly portion of the development. The DMA A consists of the southern half of the proposed building, enclosed trash enclosure and southwesterly parking area. This DMA will also include the southerly frontage and westerly parking frontage and southern half of the building. DMA B will capture the remaining stormwater from this development. This includes the area from the northern half of the proposed building. This area also includes the drive aisle for the drive approach off of Patterson Avenue and the parking area north of the previously metioned drive approach. DMA delineation can be seen in Appendix 1 of this report.

The runoff from DMA A and DMA B flow to the catch basins which will connect to the underground chambers. For the design rainfall depth, due to low infiltration rates onsite that prevent the use of infiltration BMPs stormwater will be routed through the proposed Modular Wetland System (Biofiltration System). The use of underground detention chambers will capture the design stormwater volume and transport the Vbmp which is 8,408 CF and flows into the MWS treatment system. In scenarios where the storm event exceeds the Vbmp will divert excess flows into the public storm drain. From here, flows continue via City of Perris Storm drain to San Jacinto River and Canyon Lake as they do historically. This treatment method was chosen due to the limited infiltration rate throughout the site. The entire site DA 1 has underground chambers which is sized to the BMP capture volume required. The stormwater will be routed via curb and gutters, gravel swales and curb openings at low points. The overall drainage pattern will mimic the existing condition. General flows will be directed from the westerly ends of the DMA's to the east towards Patterson Avenue. The underground chambers will be located at the low points at the southeasterly end of the DMA's. The emergency outlet to the adjacent public streets along the Patterson Avenue for excess flows and to prevent stormwater from backing up onto the site. The runoff from DA 2, DMA C is pervious 100% pervious landscaping which is 19,668 square-foot. The DA 2 is treated as Self-Treating (Type A). Due to low infiltration rates found on this site on-site infiltration is not a viable treatment for stormwater runoff. The soils investigation was performed by Terracon Consultants, Inc and can be seen in Appendix 3 of this report. This site will incorporate a combination of stormwater treatment from underground chambers and Modular Wetland System (Biofiltration System). Sizing for these treatment methods can be seen in Appendix 6 of this report. The proposed project location is located within an approved HCOC exemption area, see Appendix 7 for HCOC map and exemption location.

A.1 Maps and Site Plans

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

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

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

A.2 Identify Receiving Waters

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

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris Valley Storm Drain	None	None	None
San Jacinto River, Reach 3	None	Agr, GWR, REC1, REC2, Warm, Wild	None
Canyon Lake	Nutrients & Pathogens	Mun, Agr, Gwr, REC1, REC2, Warm, Wild	None
San Jacinto River, Reach 1	None	Agr, GWR, REC1, REC2, Warm, Wild	None
Lake Elsinore	Nutrients, Organic, PCB, Sediment, Unknown Toxicity	REC1, REC2, Warm, Wild	None

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 (Dependent on Tenant)	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other (please list in the space below as required) City of Perris Grading Permit	☒ Y	☐ N
Other (please list in the space below as required) City of Perris Building Permit	☒ Y	☐ N

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

Section B: Optimize Site Utilization (LID Principles)

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

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

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

Site Optimization

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

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

> Yes. Existing stormwater runoff generally flows from west to east at average grades of 1% to 3%. The proposed drainage will hold the general drainage pattern by capturing runoff from the west side of the development to the easterly portion of the property.

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

> No. The existing site consists of undeveloped native earth with poor vegetative cover. The little vegetation present in the existing condition is mainly annual grass/weeds. This vegetation will not be preserved.

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

No. Infiltration is not feasible and will not be utilized to treat stormwater. Natural infiltration capacity is very low which are 0.06 in/hr and 0.07 in/hr.

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

No. The project consists of an industrial warehouse consisting of over 50% of the project site. Additional impervious parking and loading docks are needed for operation of this warehouse. Approximately only 10% of the site will be landscaped.

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

Yes. Roof drain runoff will be dispersed on landscaping and then will drain to landscape areas where grading will direct the stormwater runoff into the proposed underground chambers.

Section C: Delineate Drainage Management Areas (DMAs)

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[12]	Area (Sq. Ft.)	DMA Type
DMA A	Landscape, Roof, PCC/AC pavement	122,122	Underground Detention Chambers with MWS Biofiltration Unit
DMA B	Landscape, Roof, PCC/AC pavement	69,220	

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA C	19,669	Native Low Water Use	Drip Irrigation

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

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

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

DMA Name or ID	BMP Name or ID
DMA A & B	Underground Detention Chambers with MWS Biofiltration Unit - MC3500

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

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

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

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

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

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

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

D.2 Harvest and Use Assessment

Please check what applies:

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

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

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

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

Irrigation Use Feasibility

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: 0.49

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

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: 4.33

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

Enter your EIATIA factor: 0.79

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

Minimum required irrigated area: 3.42

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)
3.42	0.49

Toilet Use Feasibility

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

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

Projected Number of Daily Toilet Users: 100

Project Type: Industrial

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: 4.33

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

Enter your TUTIA factor: 172

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: 745

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)
745	100

Other Non-Potable Use Feasibility

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

N/A

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

Average Daily Demand:

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

Total Area of Impervious Surfaces:

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

Enter the factor from Table 2-4:

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

Minimum required use:

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

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

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

Infiltration is not feasible because infitlration test report for the site determined an infiltration rate is less than 0.07 in/hr, which is less than the minimum 1.6 in/hr required.

Harvest and Use for Irrigation is not feasible per Section D.2 above. Harvest and Use for Toilet Use is not feasible per Section D.0 above. Due to limited factors the proposed underground detention system is being used to treat runoff from the entire site.

Due to these limited factors, the proposed underground detention system and MWS Biofiltration System act as one treatment method and being used to treat runoff from DA 1.

See Section "D.5 LID BMP Sizing" for Vbmp sizing

D.5 LID BMP Sizing

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

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	**DMA Runoff Factor**	DMA Areas x Runoff Factor	DA – 1 (DMA A & B) Underground Detention Chambers & MWS Biofiltration System		
	[A]		[B]	[C]	[A] x [C]			
DA1/1A	91,953	ROOF	1.0	0.892	82,022	*Design Storm Depth (in)*	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA1/2A	92,296	AC/PCC	1.0	0.892	82,328			
DA1/3A	7,093	Landscaping	0.1	0.111	784			
	$A_T = \Sigma[A]$ 191,342				$\Sigma = [D]$ 165,134	[E] 0.611	$[F] = \frac{[D]x[E]}{12}$ 8,408	[G] 9,214

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

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

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

Section E: Alternative Compliance (LID Waiver Program)

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

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

- Or -

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

DA 1 - DMA A and DMA B

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]
MWS Stormwater Biofiltration System MWS-L-4-17-V	Bacterial Indicators, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oil & Grease	Medium

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

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

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

If Yes, HCOC criteria do not apply.

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

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

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

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

Table F.1 Hydrologic Conditions of Concern Summary

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

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

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

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

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

F.2 HCOC Mitigation

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

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

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

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

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

** This site is located within the mapped HCOC exemption area as presented in the Riverside Co. WAP geodatabase approved April 20, 2017.**

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site Storm Drain Inlet	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951-955-1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners, lessees, and operators.
Landscape/Outdoor Pesticide Use	Landscape plans will include; 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 area are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in "What you should know for Landscape and Gardening" http://rcflood.org/stormwater/.com Provide IPM information to new owners, lessees and operators.
Refuse Areas	Trash container storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements from the surrounding area, and screened or walled to prevent off-site transport of trash. Trash dumpsters (containers) shall be leak proof and have attached covers or lids. Trash enclosures shall be roofed and set on a concrete per City standards.	Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "No Hazardous Materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Loading Docks	Loading docks will not be covered and are 4 feet above finished pavement surface. Spill kits are to be kept on-site at all times per SC-11.	Move loaded and unloaded items indoors as soon as possible. See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Roofing, Gutters and Trim	Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.	Clear roof drains and gutters of debris to prevent redirection of flow.

Plazas, Sidewalks and Parking Lots	Documentation of such sweeping shall be kept by the owner in perpetuity. Frequency of sweeping shall be adjusted as needed to maintain a clean site. Spill kits are to be kept on-site all all times per SC-11.	Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Section H: Construction Plan Checklist

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

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
BMP 1	Underground Chambers with MWS Biofiltration System	TBD	TBD

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

This will be completed and addressed at the time of the final WQMP Submittal

Section I: Operation, Maintenance and Funding

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

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

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

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

Maintenance Mechanism: See Appendix 9 for "Operation & Maintenance" of proposed BMPs

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

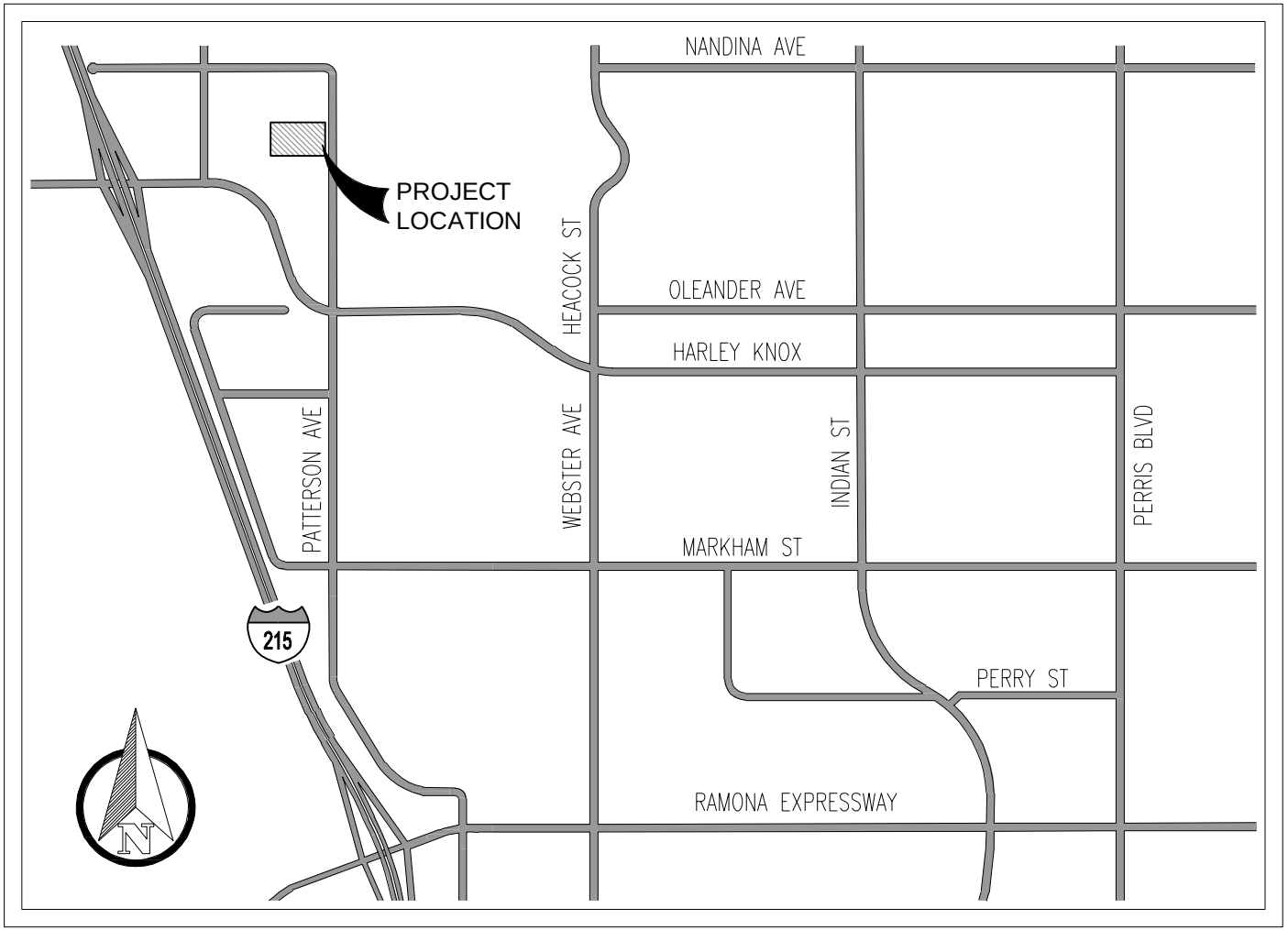
☐ Y ☒ N

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

This will be completed and addressed at the time of the final WQMP Submittal

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



VICINITY MAP

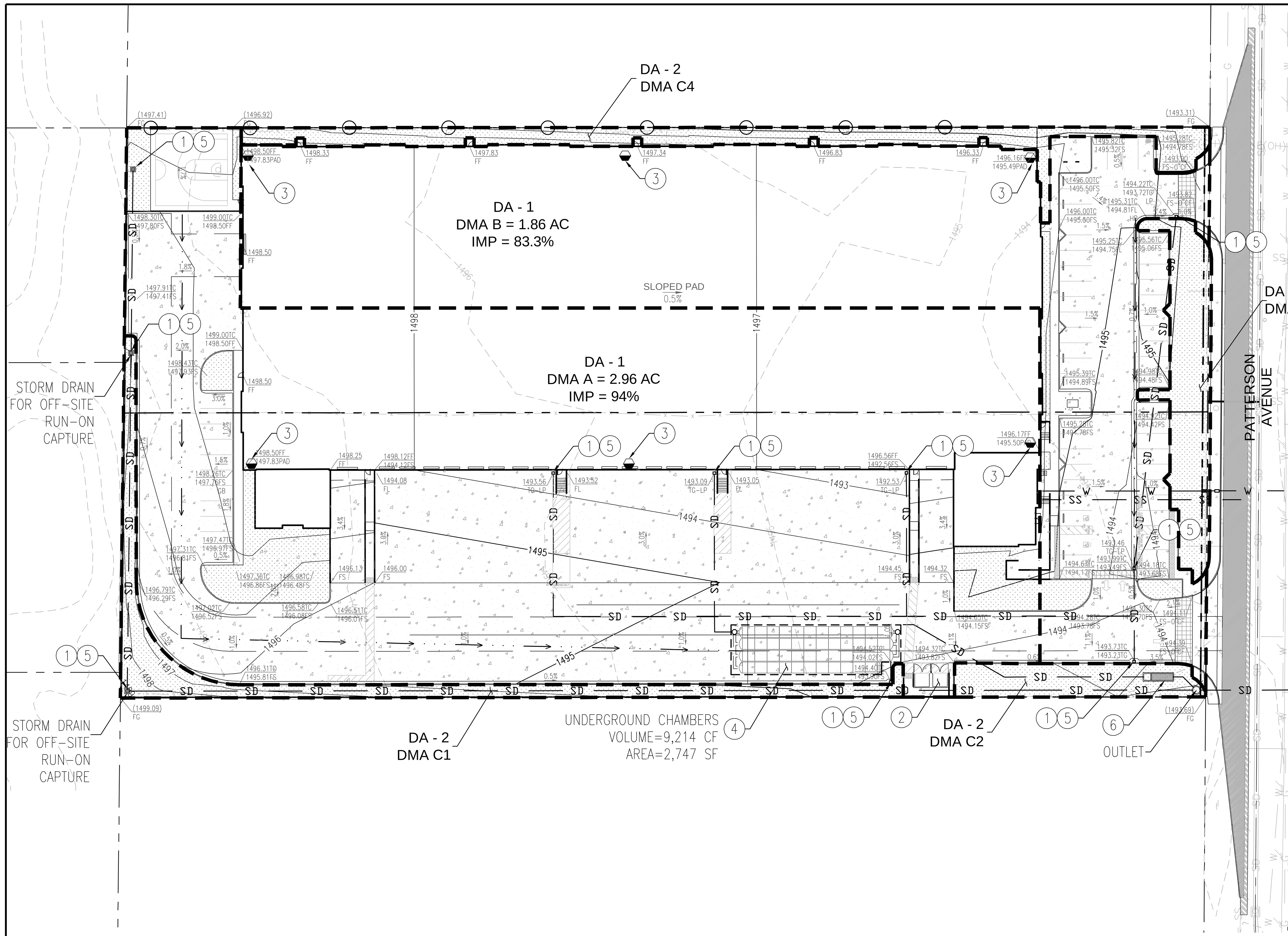
NOT TO SCALE

RECEIVING WATERS MAP

PROJECT SITE

RECEIVING WATER FLOW PATH

VALUED ENGINEERING, INC.	PATTERSON BUSINESS CENTER

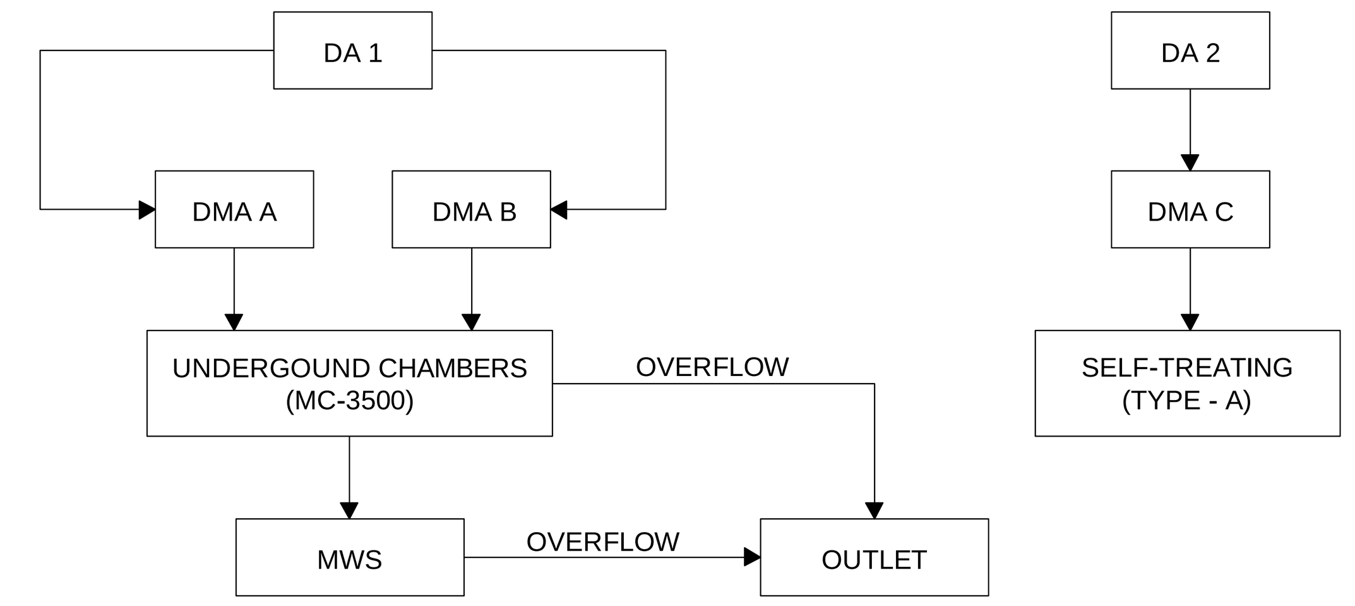


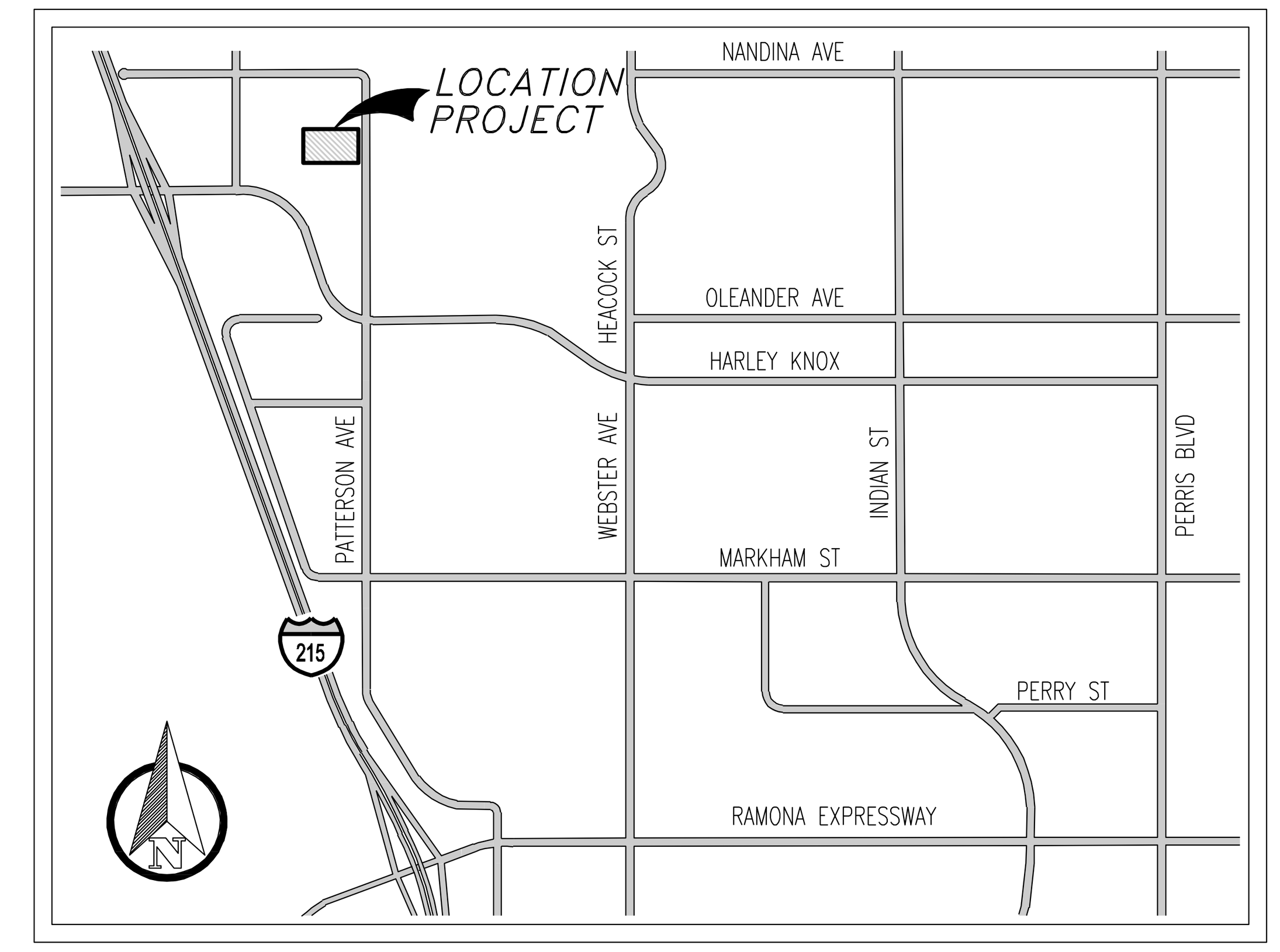
BMP LEGEND

(dashed line)	DRAINAGE AREA BOUNDARY
DMA-X	DRAINAGE MANAGEMENT AREA
	LANDSCAPING
	#57 RIP-RAP
● / ▣	STORM DRAIN INLET
	ROOF DRAINS
	FLOW DIRECTION
	UNDERGROUND CHAMBERS MC-3500

WQMP ITEMS

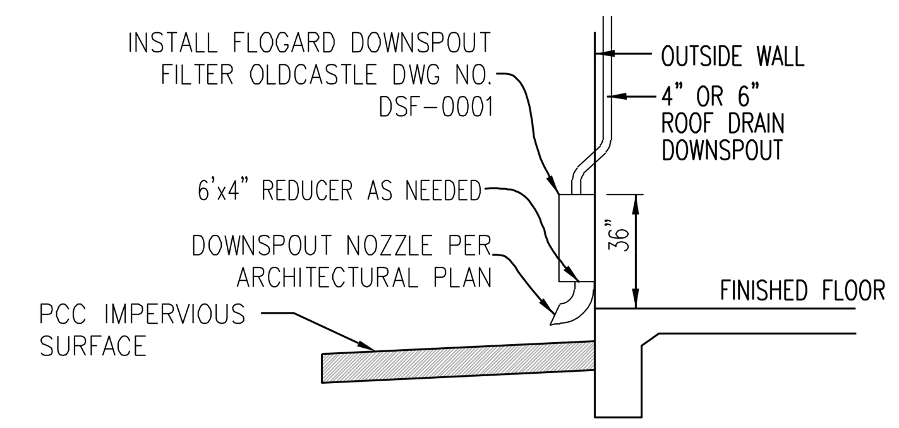
1. STORM DRAIN INLET WITH STENCILING PER DETAIL HEREON
2. TRASH ENCLOSURE WITH ROOF
3. ROOF DRAIN DOWNSPOUT
4. MC3500 UNDERGROUND DETENTION CHAMBERS WITH BIOTREATMENT LAYER PER DETAIL HEREON
5. NO DUMPING, STENCILING AND SIGNAGE
6. MWS STORMWATER BIOFILTRATION SYSTEM MWS-L-4-17-V PER DETAIL HEREON





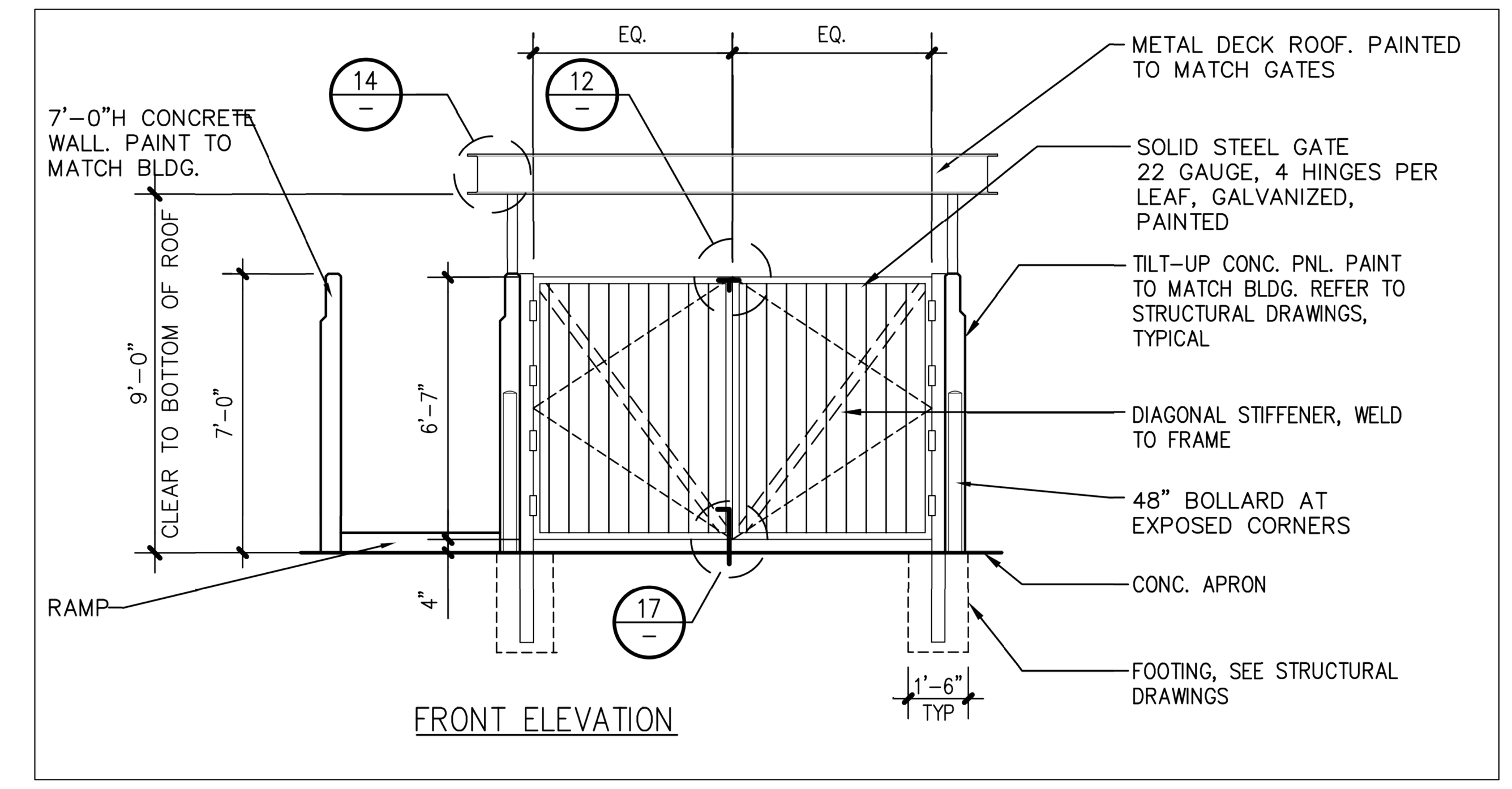
VICINITY MAP

NOT TO SCALE



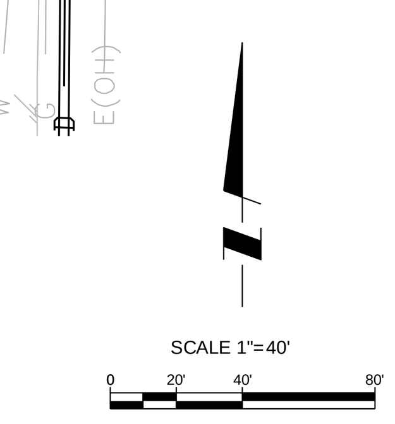
ROOF DRAIN DOWNSPOUT FILTER

NOT TO SCALE



TRASH ENCLOSURE DETAIL

NOT TO SCALE



STENCIL SIGNAGE

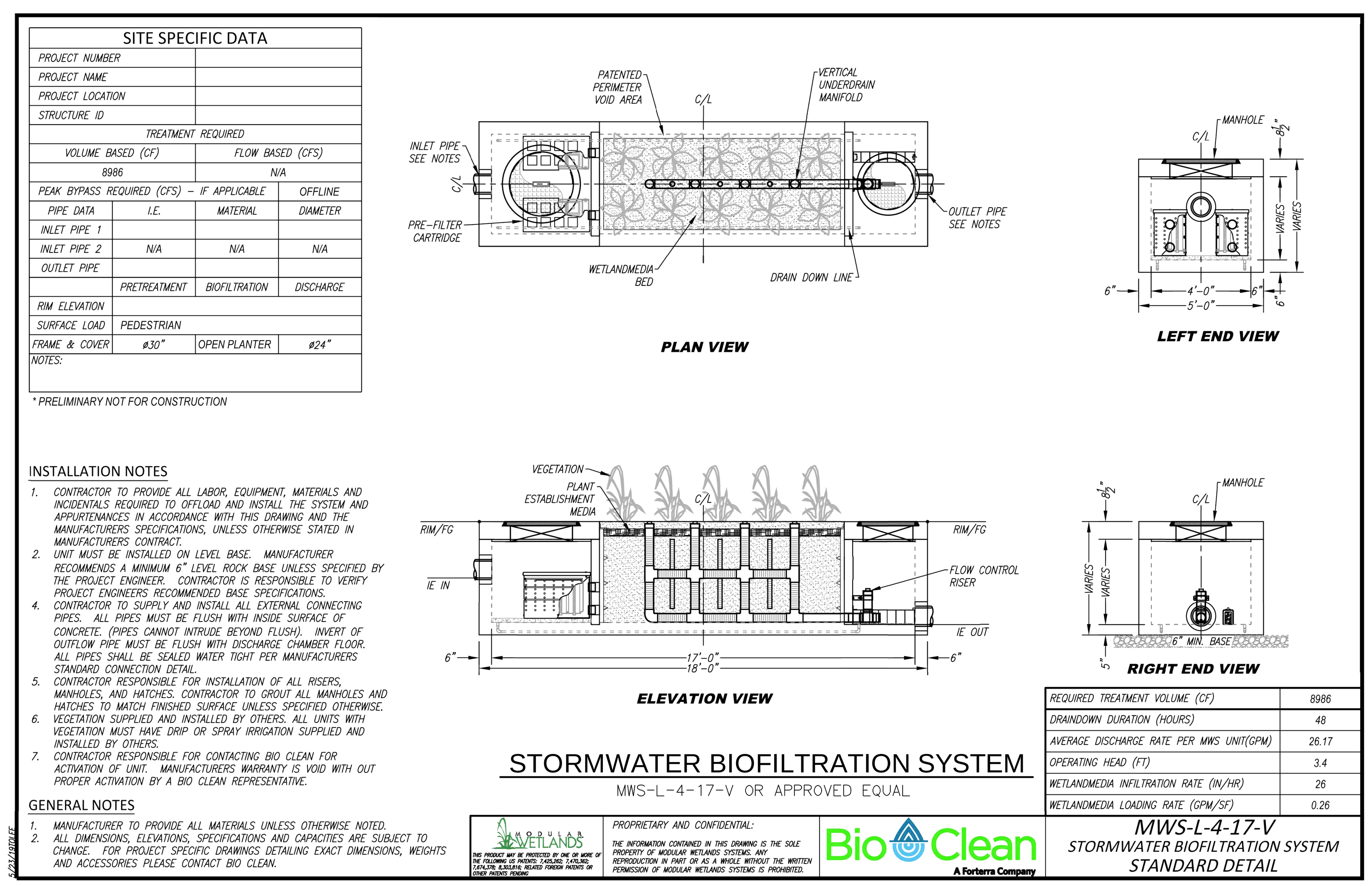
LETTERS 2" HIGH - NTS

POST-DEVELOPED IMPERVIOUS RATIO

DRAINAGE AREA	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	TOTAL (SF)	% IMP
SITE (FULL)	184249	26761	211010	87.32

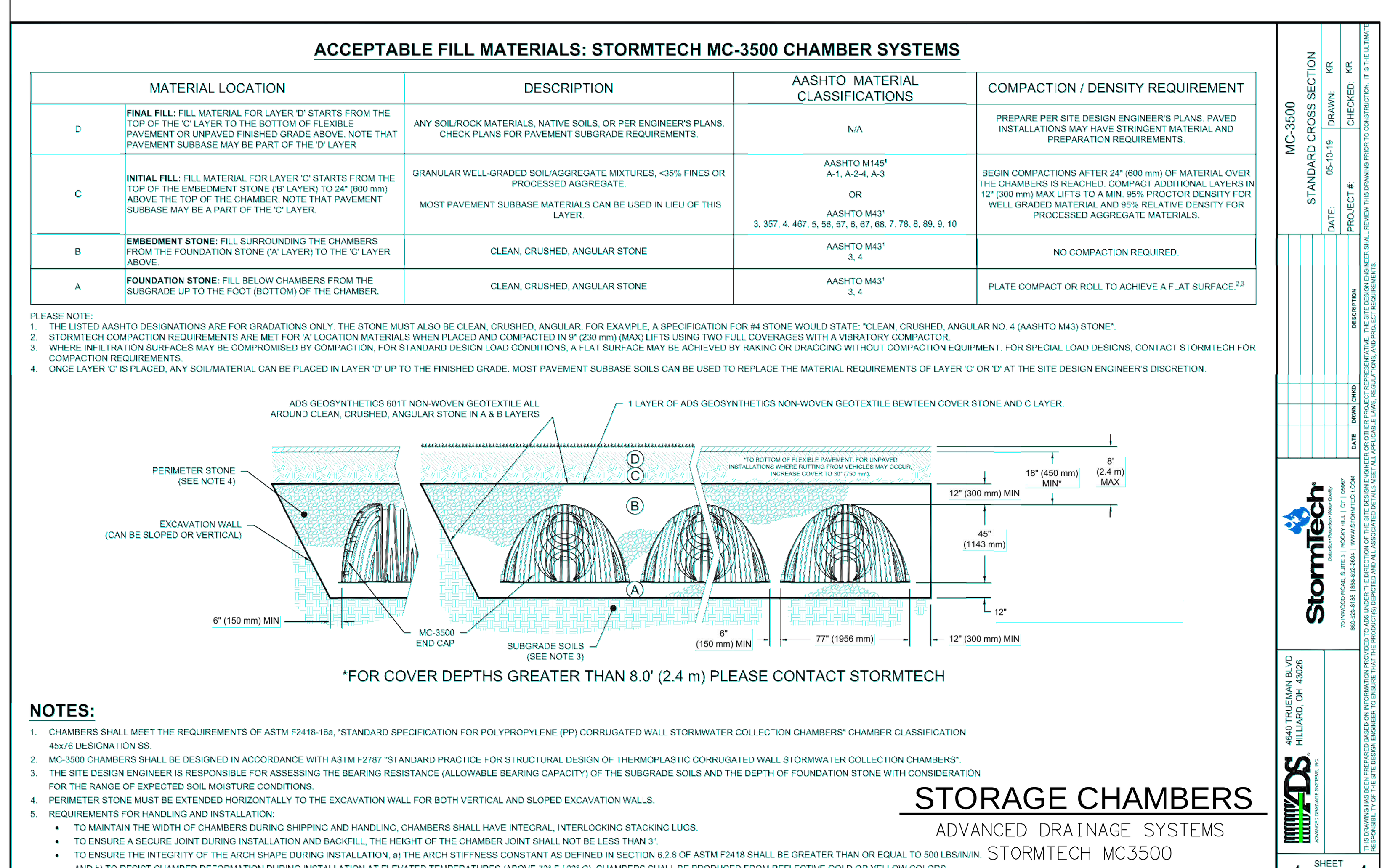
WQMP SUMMARY

DRAINAGE AREA		AREA (FT^2)	SURFACE TYPE	BMP TYPE	REQUIRED DCV (FT^3)	PROPOSED BMP VOLUME (FT^3)	PROPOSED BMP AREA (FT^2)	BMP LOCATION	% OF SITE
DA 1	DMA A1	44425	ROOF	UNDERGROUND CHAMBERS WITH MWS BIOFILTRATION UNIT (TYPE-D)	8690	9226	7286	33° 51' 49.2" N 117° 15' 10.3" W	58%
	DMA A2	71971	CONCRETE & ASPHALT						
	DMA A3	5726	LANDSCAPING						
	DMA B1	47528	ROOF						33%
	DMA B2	20325	CONCRETE & ASPHALT						
	DMA B3	1367	LANDSCAPING						
DA 2	DMA C1-C4	19669	LANDSCAPING	SELF-TREATING (TYPE-A)	112	112	19,669	33° 51' 49.2" N 117° 15' 10.3" W	9%



STORMWATER BIOFILTRATION SYSTEM

MWS-L-4-17-V OR APPROVED EQUAL



STORAGE CHAMBERS

ADVANCED DRAINAGE SYSTEMS
STORMTECH MC3500

VALUED ENGINEERING, INC
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
180 N. BENSON AVE, STE A, UPLAND, CA 91786
PHONE: (909) 982-4601

DATE: OCTOBER 2022 | PREPARED BY: KK | REVIEWED BY: JDM

CITY OF PERRIS
POST CONSTRUCTION BMP SITE PLAN
DPR 22-00013
5030 PATTERSON AVENUE, PERRIS, CA

FOR: CGU CAPITAL MANAGEMENT | W.O. 17-XXXX

SHEET 1 OF 2

DA - 2
DMA C4

DA - 1
DMA B = 1.86 AC
IMP = 83.3%

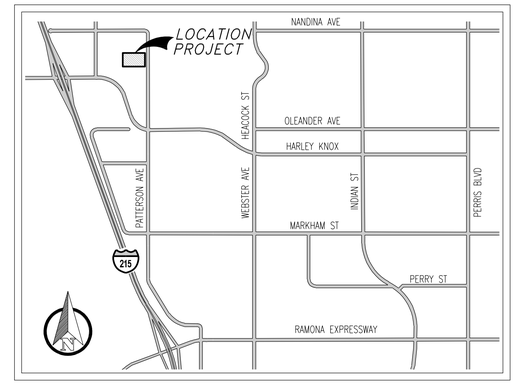
DA - 1
DMA A = 2.96 AC
IMP = 94%

DA - 2
DMA C3

PATTERSON AVENUE

DA - 2
DMA C1

DA - 2
DMA C2



VICINITY MAP
NOT TO SCALE

BMP LEGEND

- DRAINAGE AREA BOUNDARY
- DMA-X — DRAINAGE MANAGEMENT AREA
- LANDSCAPING
- #57 RIP-RAP
- STORM DRAIN INLET
- ROOF DRAINS
- FLOW DIRECTION
- UNDERGROUND CHAMBERS MC-3500

NON-STRUCTURAL SOURCE BMPS

EDUCATION OF PROPERTY OWNERS, TENANTS, AND OCCUPANTS ON STORMWATER BMP'S
ACTIVITY RESTRICTIONS
IRRIGATION SYSTEM AND LANDSCAPE MAINTENANCE
DRAINAGE FACILITY INSPECTION AND MAINTENANCE

STRUCTURAL SOURCE BMPS

BMP SYMBOL	DESCRIPTION
N-1 ON-SITE STORM DRAIN INLET	MARK "ONLY RAIN DOWN THE STORM DRAIN" OR SIMILAR. CATCH BASIN MARKERS MAY BE AVAILABLE FROM THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, CALL 951-955-1200 TO VERIFY.
N-2 LANDSCAPE/OUTDOOR PESTICIDE USE	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.
N-3 LOADING DOCKS	DOCK WILL BE PART OF THE BUILDING AND HAVE A COVER FOR THE ENTIRETY OF THE DOCK LENGTH
N-4 ROOFING GUTTERS AND TRIM	AVOID ROOFING, GUTTERS, AND TRIM MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF.
N-5 PLAZAS, SIDEWALKS AND PARKING LOTS	SWEEP PARKING LOT AND DRIVEWAY ENTRANCE REGULARLY TO REMOVE ACCUMULATED SEDIMENT AND DEBRIS.

TREATMENT CONTROL BMP:

POTENTIAL SOURCE OF RUNOFF POLLUTANTS	STRUCTURAL SOURCE CONTROL BMPs
UNDERGROUND CHAMBERS WITH BIOTREATMENT LAYER	MEASURE THE SEDIMENT BUILDUP AT EACH INSPECTION PORT. A THOROUGH CLEANING OF THE SYSTEM (INLETS, OUTLETS, PORTS, AND INLET BAYS) SHALL BE PERFORMED BY EITHER A VACCUM TRUCK OR BY MANUAL METHODS. INSPECT INLET AND OUTLET LOCATIONS FOR OBSTRUCTIONS.
ROOF DRAIN DOWNSPOUT	INSPECT DOWNSPOUTS AND REMOVE DEBRIS OR ACCUMULATED SEDIMENTS.

WQMP SUMMARY

DRAINAGE AREA		AREA (FT^2)	SURFACE TYPE	BMP TYPE	REQUIRED DCV (FT^3)	PROPOSED BMP VOLUME (FT^3)	PROPOSED BMP AREA (FT^2)	BMP LOCATION	% OF SITE
DA 1	DMA A1	44425	ROOF	UNDERGROUND CHAMBERS WITH MWS BIOFILTRATION UNIT (TYPE-D)	8690	9226	7286	33° 51' 49.2" N 117° 15' 10.3" W	58%
	DMA A2	71971	CONCRETE & ASPHALT						
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	DMA B1	47528	ROOF						33%
	DMA B2	20325	CONCRETE & ASPHALT						
	DMA B3	1367	LANDSCAPING						
DA 2	DMA C1-C4	19669	LANDSCAPING	SELF-TREATING (TYPE-A)	112	112	19,669	33° 51' 49.2" N 117° 15' 10.3" W	9%

SCALE 1"=30'
0 15' 30' 60'
GRAPHIC SCALE

VALUED ENGINEERING, INC
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
180 N. BENSON AVE, STE A, UPLAND, CA 91786
PHONE: (909) 982-4601

DATE: OCTOBER 2022
PREPARED BY: KK
REVIEWED BY: JDM

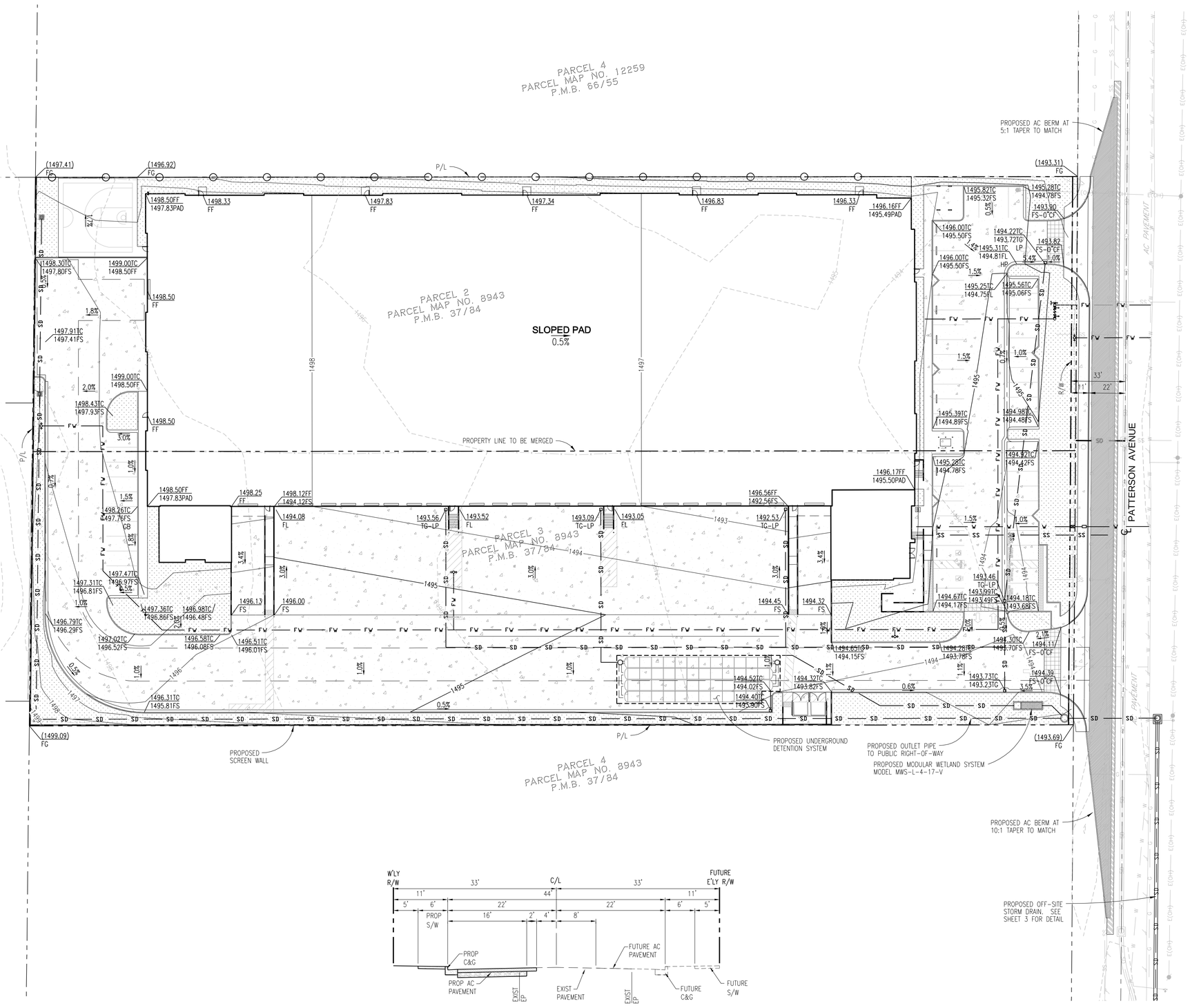
CITY OF PERRIS
POST CONSTRUCTION
BMP SITE PLAN
DPR 22-00013
5030 PATTERSON AVENUE, PERRIS, CA

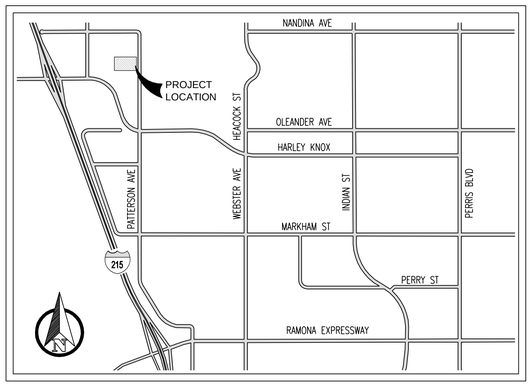
FOR: CGU CAPITAL MANAGEMENT
W.O. 17-XXXX

SHEET 2 OF 2

Appendix 2: Construction Plans

Grading and Drainage Plans





VICINITY MAP

NOT TO SCALE

TYPICAL STREET SECTION

PATTERSON AVENUE
SCALE: 1"=10'

LEGAL DESCRIPTION

PARCELS 2 AND 3 OF PARCEL MAP NO. 8943, AS SHOWN BY MAP ON FILE IN BOOK 37, PAGE 84 OF PARCEL MAPS RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

LAND USE / ZONING

EXISTING LAND USE	VACANT
PROPOSED LAND USE	GI (GENERAL INDUSTRIAL)
EXISTING ZONING	PERRIS VALLEY COMMERCE CENTER
PROPOSED ZONING	PERRIS VALLEY COMMERCE CENTER
EXISTING GENERAL PLAN	PERRIS VALLEY COMMERCE CENTER
PROPOSED GENERAL PLAN	PERRIS VALLEY COMMERCE CENTER
AIRPORT ZONE	B2 (MARCH AIR RESERVE BASE)

NOTES

1. THOMAS BROS. GUIDE, PAGE 747
2. THIS AREA IS NOT SUBJECT TO LIQUEFACTION OR OTHER GEOLOGIC HAZARDS WITHIN A SPECIAL STUDIES ZONE.
3. FEMA COMMUNITY PANEL NO. 060258-0005-D ZONE A (OUTSIDE OF 500 YEAR FLOOD PLAIN, CITY OF PERRIS.
4. CONTOUR INTERVAL, 1 FOOT.
5. THIS AREA IS WITHIN THE NORTH PERRIS SPECIFIC PLAN.
6. THIS PROJECT IS NOT WITHING A COMMUNITY SERVICES DISTRICT.
7. THE PROPERTY IS NOT SUBJECT TO OVERFLOW, INUNDATION, OR FLOOD HAZARD.
8. SUBSURFACE SEPTIC SEWAGE IN NOT INTENDED FOR THIS SITE.
9. ALL GATES ARE AT LEAST 24' WIDE, AUTOMATIC WITH THE KNOX RAPID ENTRY SYSTEM.

TOPOGRAPHY

WILSON ASSOCIATES NORTH DATED AUGUST 24, 2021

PROJECT DATA

SITE AREA	211,004.64 SF (GROSS)	
	210,002.76 SF (NET)	
BUILDING AREA		
WAREHOUSE	74,453 SF	
WAREHOUSE + OFFICE	20,000 SF	
1ST FLOOR OFFICE	3,500 SF	
MEZZ OFFICE	2,500 SF	
TOTAL	94,453 SF	
FLOOR AREA RATIO	15.5%	
LOT COVERAGE	62.4%	
PARKING REQUIREMENTS		
WAREHOUSE+OFFICE 1/1000	20,000 SF	20
WAREHOUSE	74,453 SF	38
TOTAL PARKING REQUIRED		58
PARKING PROVIDED		
AUTO (9'x19' TYPICAL)		46
DEDICATED CLEAN AIR VEHICLES (9'x19' TYPICAL)		2
DEDICATED CAV VAN WIRED (9'x19')		3
DEDICATED CAV CAR ACCESSIBLE WIRED		1
DEDICATED CAV VAN ACCESSIBLE WIRED		1
CAR ACCESSIBLE		3
VAN ACCESSIBLE		2
TOTAL		58
TRUCK DOCK HIGH SPACES		22
LANDSCAPING		
LANDSCAPE PROVIDED	25,424 SF (12.11%)	
HARDSCAPE-SIDEWALK COVERAGE	9,354 SF (4.45%)	
HARDSCAPE-PAVING COVERAGE	83,271 SF (39.65%)	

EARTHWORK

CUT 4611.97 CU. YDS
FILL 4740.09 CU. YDS.
NET 128.12 CU. YDS. (FILL)

ABBREVIATIONS

AC	ASPHALT CONCRETE
ADA	AMERICANS WITH DISABILITIES ACT
CB	CATCH BASIN
C&G	CURB AND GUTTER
C/L	CENTERLINE
DF	DEEPENED FOOTING
EXIST	EXISTING
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FF	FINISH FLOOR
FH	FIRE HYDRANT
FS	FINISH SURFACE
LP	LOW POINT
PB	PULL BOX
PCC	PORTLAND CONCRETE CEMENT
P/L	PROPERTY LINE
R/W	RIGHT OF WAY
ST LT	STREET LIGHT
TC	TOP OF CURB
TYP	TYPICAL

LEGEND

- AC PAVEMENT
- PCC PAVEMENT
- LANDSCAPING
- FIRE LANE RED CURB
- —X— 8' CHAIN LINK FENCE
- T TRANSFORMER
- TRACTOR/TRAILER

NOTE: FIRE ACCESS ROAD WILL ACCOMODATE A FIRE APPARATUS UP TO 68,000 LBS

APPLICANT

CGU CAPITAL MANAGEMENT
ATTN: MR. DALE ULMAN
302 W. 5TH ST, SUITE 103
SAN PEDRO, CA 90731
PHONE: (310) 241-2992

OWNER

CGU CAPITAL MANAGEMENT
ATTN: MR. DALE ULMAN
302 W. 5TH ST, SUITE 103
SAN PEDRO, CA 90731
PHONE: (310) 241-2992

ENGINEER

VALUED ENGINEERING, INC.
ATTN: MR. JEFF MEITER
600 N. MOUNTAIN AVE, SUITE C102
UPLAND, CA 91786
PHONE: (909) 982-4601

UTILITIES

WATER	EASTERN MUNICIPAL WATER DISTRICT
SEWER	EASTERN MUNICIPAL WATER DISTRICT
GAS	SOUTHERN CALIFORNIA GAS COMPANY
ELECTRIC	SOUTHERN CALIFORNIA ELECTRIC
TELEPHONE	VERIZON
SCHOOL DISTRICT	VAL VERDE SCHOOL DISTRICT

SCALE 1"= 30'

0 15' 30' 60' 90'

GRAPHIC SCALE

SCALE:	1" = 30'
DATE:	01/19/2023
DESIGNED:	JA
CHECKED:	JM
PLAN CHECK REF:	
F.B.:	

VALUED ENGINEERING, INC
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
600 N. MOUNTAIN AVE, STE C102, UPLAND, CA 91786
PHONE: (909) 982-4601

JEFFEREY D. MEITER R.C.E. No. 64696

REGISTERED PROFESSIONAL ENGINEER JEFFREY D. MEITER No. 64696 CIVIL STATE OF CALIFORNIA

CITY OF PERRIS
PRELIMINARY GRADING PLAN

GRADING PLAN

W.O.	XXXX-XXXX
SHEET	1
OF	3 SHEET
DWG. NO.	XXXX-XXXX

PARCEL 4
PARCEL MAP NO. 12259
P.M.B. 66/55

PARCEL 2
PARCEL MAP NO. 8943
P.M.B. 37/84

PARCEL 3
PARCEL MAP NO. 8943
P.M.B. 37/84

PARCEL 4
PARCEL MAP NO. 8943
P.M.B. 37/84

P/L

PROPERTY LINE TO BE MERGED

AC PAVEMENT

R/W

33'

11'

22'

SD

℄ PATTERSON AVENUE

ABBREVIATIONS

AC	ASPHALT CONCRETE
ADA	AMERICANS WITH DISABILITIES ACT
CB	CATCH BASIN
C&G	CURB AND GUTTER
C/L	CENTERLINE
DF	DEEPENED FOOTING
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LEGEND

- AC PAVEMENT
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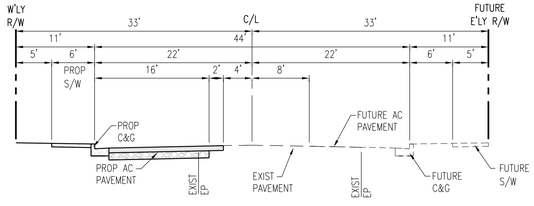
NOTE: FIRE ACCESS ROAD WILL ACCOMODATE A FIRE APPARATUS UP TO 68,000 LBS



TYPICAL STREET SECTION

PATTERSON AVENUE
SCALE: 1"=10'

SCALE 1"= 30'

0 15' 30' 60' 90'

GRAPHIC SCALE

SCALE:	1" = 30'
DATE:	01/19/2023
DESIGNED:	JA
CHECKED:	JM
PLAN CHECK REF:	
F.B.:	

VALUED ENGINEERING, INC
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
600 N. MOUNTAIN AVE., STE C102, UPLAND, CA 91786
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JEFFEREY D. MEITER R.C.E. No. 64696

REGISTERED PROFESSIONAL ENGINEER — JEFFEREY D. MEITER — No. 64696 — CIVIL — STATE OF CALIFORNIA

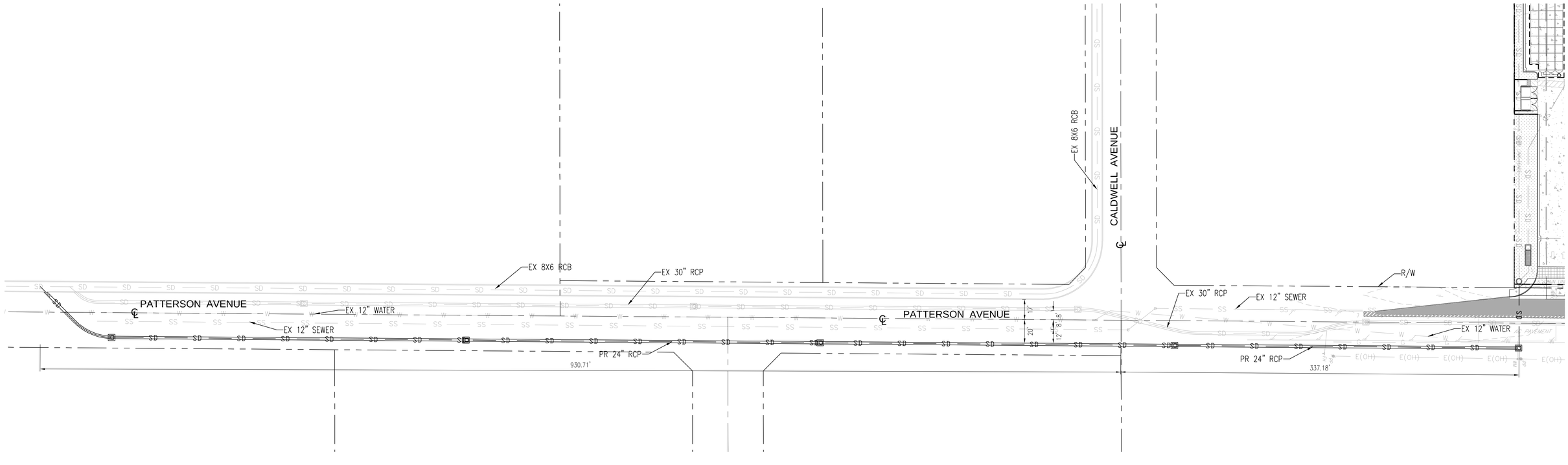
CITY OF PERRIS
PRELIMINARY GRADING PLAN

TRUCK TURNING

W.O. XXXX-XXXX

SHEET 2 OF 3 SHEET

DWG. NO. XXXX-XXXX



SCALE 1"= 40'

0 20' 40' 80' 120'

GRAPHIC SCALE

SCALE:	1" = 30'
DATE:	01/19/2023
DESIGNED:	JA
CHECKED:	JM
PLAN CHECK REF:	
F.B.:	

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JEFFEREY D. MEITER R.C.E. No. 64696

REGISTERED PROFESSIONAL ENGINEER
JEFFEREY D. MEITER
No. 64696
CIVIL
STATE OF CALIFORNIA

CITY OF PERRIS
PRELIMINARY GRADING PLAN

OFF-SITE STORM DRAIN

W.O. XXXX-XXXX

SHEET 3 OF 3 SHEET

DWG. NO. XXXX-XXXX

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

Geotechnical Engineering Report

Patterson Avenue Industrial Center
Perris, Riverside County, California
August 10, 2021
Terracon Project No. CB215068

Prepared for:
CGU Capital Management
San Pedro, California

Prepared by:
Terracon Consultants, Inc.
Colton, California

August 10, 2021

CGU Capital Management
302 W. Fifth Street Suite 103
San Pedro, California 90731

Attn: Mr. Dale Ulman
P: (310) 241-2992
E: dale@linklogistics.com

Re: Geotechnical Engineering Report
Patterson Avenue Industrial Center
Nandina Avenue and Patterson Avenue
Perris, Riverside County, California
Terracon Project No. CB215068

Dear Mr. Ulman:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No.: PCB215068 dated May 7, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Ali Tabatabaei, Ph.D., G.E.
Geotechnical Project Engineer

REGISTERED PROFESSIONAL ENGINEER
SEYEDALI TABATABAEI
No. 3159
GEOTECHNICAL
STATE OF CALIFORNIA

Keith P. Askew, P.E., G.E.
Department Manager

REPORT TOPICS

Note: This report was originally delivered in a web-based format. Orange Bold text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the *GeoReport* logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Patterson Avenue Industrial Center
Nandina Avenue and Patterson Avenue
Perris, Riverside County, California

Terracon Project No. CB215068

August 10, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Patterson Avenue Industrial Center to be located at Nandina Avenue and Patterson Avenue in Perris, Riverside County, California. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions and historic high groundwater
- 2019 California Building Code (CBC) seismic design parameters
- Seismic settlement
- Subgrade preparation/earthwork recommendations
- Foundation design and concrete slabs-on-grade
- Preliminary pavement section design
- On-site infiltration rate

The geotechnical engineering Scope of Services for this project included the advancement of thirteen (13) test borings to depths ranging from approximately 6 ½ to 51½ feet below existing site grades, laboratory testing, and preparation of this report. Our scope also included excavating 2 test pits, approximately 5 feet deep and performing double ring infiltrometer testing.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is approximately 4.84-acre tract of land located at Nandina Avenue and Patterson Avenue in Perris, Riverside County, California. The approximate coordinates of the site are: 33.8639°N/117.2538°W See **Site Location**
Existing Improvements	Based on aerial photos available through Google Earth, the site is a generally vacant tract of land. Old abandoned buildings can be seen at the southwest corner of the property. Containers, old cars, and lumber piles appear stored in the southern portion of the property. The project site is surrounded by the following improvements: East side: Patterson Avenue North side: Vacant tract of land West side: Basic Occupational Training Center South side: Vacant tract of land
Current Ground Cover	The site is covered with soil and patches of weeds.
Existing Topography	The project site is relatively flat.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Proposed Development	Two adjoining warehouses including loading docks and office buildings with a total approximate footprint area of 100,000 square feet (sf) will be constructed at the project site. The industrial development will also include car parking spaces, trailer parking spaces and associated driveways. We have been requested to conduct infiltration testing in the proposed front drive area of the proposed buildings. On-site stormwater infiltration system will have a bottom at approximately 5 feet below proposed grade and the locations were provided by the client.
Proposed Structures	Two warehouse facilities with a total approximate footprint area of 100,000 sf.
Building Construction	We anticipate that the proposed buildings will be supported on conventional strip and spread footings with slab-on-grade floors.
Finished Floor Elevation	Anticipated to be within 5 feet of existing grade.

Item	Description
Structural Loads (assumed)	Structural loads were not provided at the time of this report. We assume that the proposed structures will have the following loads: ■ Columns: 50 to 150 kips ■ Walls: 2 to 4 kips per linear foot (klf) ■ Slabs: 100 to 250 pounds per square foot (psf)
Grading Requirements	Expected to be within 5 feet of existing grades, excluding remedial grading requirements.
Below Grade Structures	None
Infiltration Systems	An on-site stormwater retention/infiltration system is planned and may consist of either a basin or chamber.
Free-Standing Retaining Wall	None
Pavements	Paved driveway and parking will be constructed on site. We assume both rigid (concrete) and flexible (asphalt) pavement sections should be considered. Please confirm this assumption. Anticipated traffic indices (TIs) are as follows for asphalt pavement: ■ Auto Parking Areas: TI=5.0 ■ Drive Lanes TI=5.5 ■ Truck Parking areas: TI=7.0 ■ Truck Delivery Areas: TI=8.0 ■ The pavement design period is 20 years. Anticipated average daily truck traffic (ADTT) is as follows for concrete pavement: ■ Light Duty: ADTT=1 (Category A) ■ Medium Duty: ADTT=25 (Category B) ■ Dumpster Pad: ADTT=700 (Category C)

GEOTECHNICAL CHARACTERIZATION

Site Geology

The site is located in the northern portion of the Perris Block, part of the Peninsular Ranges Geomorphic Province. The northern Perris Block is bounded on the southwest by the Chino-Elsinore fault, on the north by the Cucamonga fault, and on the northeast by the San Jacinto fault. The Perris Block is largely underlain by granitic rocks of the Peninsular Ranges batholith. These rocks consist mostly of varied granitic types such as exist in the Lakeview Mountains, east of the site.

Morton and others (2002, https://ngmdb.usgs.gov/Prodesc/proddesc_46484.htm) mapped the site and vicinity as very old alluvial fan deposits of early Pleistocene age. As part of a relatively stable structural block, these materials have been subjected to a long period of subaerial exposure (at least 25,000 years). The in-situ weathering of the alluvium has resulted in a strong reddish-brown color and elevated clay

content associated with argillic soil horizons.

Subsurface Profile

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options and pavement options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/Relative Density
Stratum I	51 ½	Interbeded layers of sandy lean clay, silty clayey sand, sandy silty clay and silty sand, brown and olive gray	---

Groundwater Conditions

The borings were advanced using continuous flight auger drilling techniques that allow short-term groundwater observations to be made while drilling. Groundwater was observed within borings B-4 and B-5 at 26 and 37 feet bgs at completion of drilling, respectively. Our review of historical information regarding groundwater levels indicates that historical groundwater levels are deeper than 50 feet bgs. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Rising groundwater has been noted around March Air Reserve Base for several years. The cause of this is uncertain and could be related to several factors, including decreased pumping for agricultural uses and increased infiltration of runoff into the subsurface.

Hydroconsolidation

To evaluate the potential deformation that may be caused by the addition of water to subsurface soils, hydroconsolidation testing was performed on a selected, representative relatively undisturbed sample (B-4 at 7.5 feet). The result is shown in Exploration Results section. The test

result indicate collapse potential of 0.6% for the sample tested when saturated under a confining pressure of 2,000 psf.

SEISMIC CONSIDERATIONS

Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our opinion that the Seismic Site Classification is D. The 2019 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16 and 2019 CBC. The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that “In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites.” Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.4.8 applies to the proposed structure. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

Description	Value
Site Classification (CBC) [1]	D [2]
Site Latitude (°N)	33.8639
Site Longitude (°W)	117.2538
S_s Spectral Acceleration for a 0.2-Second Period	1.5
S_1 Spectral Acceleration for a 1-Second Period	0.583
F_a Site Coefficient for a 0.2-Second Period	1.0
F_v Site Coefficient for a 1-Second Period	1.72
Site Modified Peak Ground Acceleration	0.55g
De-aggregated Mean Magnitude [3]	6.99

Description	Value
1. Seismic site classification in general accordance with the *2019 California Building Code*. 2. The 2019 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Our borings were extended to a maximum depth of 51½ feet. This seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration. 3. These values were obtained using on-line Unified Hazard Tool by the USGS (https://earthquake.usgs.gov/hazards/interactive/) for return period of 2% in 50 years accessed	

A site-specific ground motion study may reduce design values and consequently construction costs. We recommend consulting with a structural engineer to evaluate the need for such study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Faulting and Estimated Ground Motions

The site is located in the seismically active southern California area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the San Jacinto (San Jacinto Valley segment) Fault, which is considered to have a significant effect at the site from a design standpoint, has a maximum earthquake magnitude of 8.00 and is located approximately 13.6 kilometers from the site. The San Jacinto Fault forms the northeast boundary of Moreno Valley and the Perris Block. The USGS fault modeling for this area of the Perris Block includes gridded seismic sources with a larger total seismic hazard contribution than the San Jacinto fault.

Based on the USGS Design Maps Summary Report, using the American Society of Civil Engineers (ASCE 7-16) standard, the peak ground acceleration (PGA_M) at the project site is expected to be 0.55 g. Based on the USGS Unified Hazard Tool, the project site has a de-aggregated modal magnitude of 8.1. The site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps. The Perris Block is relatively stable, with a low potential for primary surface fault rupture.

LIQUEFACTION AND SEISMIC SETTLEMENT

Liquefaction Potential

Liquefaction is a mode of ground failure that results from the generation of high pore-water pressures during earthquake ground shaking, causing loss of shear strength, and is typically a hazard where loose sandy soils exist below groundwater. County of Riverside has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of

liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

The subsurface materials generally consist of interbeded layers of sandy lean clay, silty clayey sand, sandy silty clay and silty sand extending to the maximum depth of the borings approximately 51½ feet bgs. Groundwater was observed within borings B-4 and B-5 at 26 and 37 feet bgs at completion of drilling, respectively, and has historically been deeper than 50 feet bgs.

According to the County of Riverside geologic hazard GIS map, the site is located within an area having low liquefaction potential. Based on the County mapping and the age and density of the subsurface soils, it is our opinion that the liquefaction potential is low.

Seismic Settlement

To determine the amount of seismic settlement we utilized the software “LiquefyPro” by CivilTech Software, seismic settlement was estimated using the soil profile from exploratory boring B-4. A Peak Ground Acceleration (PGA) of 0.55g and a de-aggregated mean magnitude (Mw) of 6.99 were utilized as input into the liquefaction analysis program. Settlement analysis used the Ishihara / Yoshimine method and the fines percentage were corrected for liquefaction using the Modify Stark/Olson method. Historical high ground water of 50 feet bgs was used in the analysis.

Based on the calculation results, seismically induced settlement (dry sand settlement) is estimated to be less than 1 inch. The maximum differential seismic settlement could be on the order of half of total seismic settlement over a distance of 40 feet.

GEOTECHNICAL OVERVIEW

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and our current understanding of the proposed project.

The subsurface materials generally consist of interbeded layers of sandy lean clay, silty clayey sand, sandy silty clay and silty sand extending to the maximum depth of the borings approximately 51½ feet bgs.

Based on the conditions encountered, the proposed buildings can be supported on shallow foundations, such as spread footings.

Groundwater was observed within borings B-4 and B-5 at 26 and 37 feet bgs at completion of drilling, respectively. Groundwater is not expected to affect shallow foundation construction on this site.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

The following recommendations include site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations, slabs, and pavements are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Strip and remove existing vegetation, debris, pavements and other deleterious materials from proposed buildings and pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed building structures.

Although no evidence of underground facilities such as septic tanks, cesspools, and basements, was observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills, utilities, or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

We recommend that the proposed building be supported on engineered fill extending to a minimum depth of 2 feet below the bottom of foundations, or 5 feet below existing grades, whichever is greater. Engineered fill placed beneath the entire footprint of the building should extend horizontally a minimum distance of 3 feet beyond the outside edge of perimeter footings.

Subgrade soils beneath exterior slabs and pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. The moisture content and compaction of subgrade soils should be maintained until slab or pavement construction.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned as necessary, and compacted per the compaction requirements in this report. Compacted fill soils should then be placed to the design grades, and the moisture content and compaction of soils should be maintained until slab, pavement, or proposed improvements are constructed.

Based upon the subsurface conditions determined from the geotechnical exploration, the on site soils are anticipated to be relatively workable. However, the workability of the soils may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Material Types

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than three inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

■ general site grading	■ foundation backfill
■ foundation areas	■ pavement areas
■ interior floor slab areas	■ exterior slab areas

If imported soils are used as fill materials to raise grades, these soils should conform to low volume change materials and should conform to the following requirements:

Gradation	**Percent Finer by Weight (ASTM C 136)**

3” 100
No. 4 Sieve ..... 50 - 100
No. 200 Sieve ..... 20 - 50

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum Expansive Index* ..... 20 (max)

*ASTM D 4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Compaction Requirements

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils and/or low volume change imported fill:			
Beneath foundations:	90	0%	+3%
Beneath interior slabs:	90	0%	+3%
Miscellaneous backfill:	90	0%	+3%
Beneath pavements:	95	0%	+3%
Utility Trenches*:	90	0%	+3%
Bottom of excavation receiving fill:	90	0%	+3%
Aggregate base (beneath pavements):	95	0%	+3%

* Upper 12 inches should be compacted to 95% within pavement and structural areas.

Utility Trenches

We anticipate that the on-site soils will provide suitable support for underground utilities and piping that may be installed. Any soft and/or unsuitable material encountered at the bottom of excavations should be removed and be replaced with an adequate bedding material. A non-expansive granular material with a sand equivalent greater than 30 is recommended for bedding and shading of utilities, unless otherwise allowed by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches from one foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Planters and other surface features which could retain water in areas adjacent to the building or pavements should be sealed or eliminated. In areas where sidewalks or paving do not immediately adjoin the structure, we recommend that protective slopes be provided with a minimum grade of approximately 5 percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

We recommend a minimum horizontal setback distance of 10 feet from the perimeter of any building and the high-water elevation of the nearest storm-water retention basin.

Roof drainage should discharge into splash blocks or extensions when the ground surface beneath such features is not protected by exterior slabs or paving. Sprinkler systems and landscaped irrigation should not be installed within 5 feet of foundation walls.

Exterior Slab Design and Construction

Exterior slabs-on-grade, exterior architectural features, and utilities founded on, or in backfill may experience some movement due to the volume change of the backfill. To reduce the potential for damage caused by movement, we recommend:

- minimizing moisture increases in the backfill;
- controlling moisture-density during placement of backfill;
- using designs which allow vertical movement between the exterior features and adjoining structural elements;
- placing effective control joints on relatively close centers.

Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Construction Observation and Testing

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proof-rolling, placement and compaction of controlled compacted fills, backfilling of excavations to the completed subgrade.

The exposed subgrade and each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event that unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Item	Description
Foundation Support	Engineered fill extending 2 feet below the bottom of foundations, or 5 feet below existing grades, whichever is greater.
Net Allowable Bearing pressure [1, 2] **(On-site soils or structural fill)**	2,200 psf
Minimum Foundation Dimensions	Columns: 24 inches Continuous: 18 inches
Minimum Footing Depth	18" below finished grade
Ultimate Passive Resistance [4]	350 pcf
Ultimate Coefficient of Sliding Friction [5]	0.32
Estimated Total Static Settlement from Structural Loads [2]	about 1 inch
Estimated Differential Settlement [2, 6]	About 1/2 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied.
2. Values provided are for maximum loads noted in **Project Description**. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures requires the footing forms be removed and compacted structural fill be placed against the vertical footing face. A factor of safety of 2.0 is recommended.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions. A factor of safety of 1.5 is recommended.
6. Differential settlements are as measured over a span of 40 feet.

FLOOR SLABS

DESCRIPTION	RECOMMENDATION
Interior floor system	Slab-on-grade concrete
Floor slab support	Engineered fill extending 2 feet below the bottom of associated foundations, or 5 feet below existing grades, whichever is greater.
Modulus of subgrade reaction	150 pounds per square inch per inch (psi/in) (The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts). This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas.

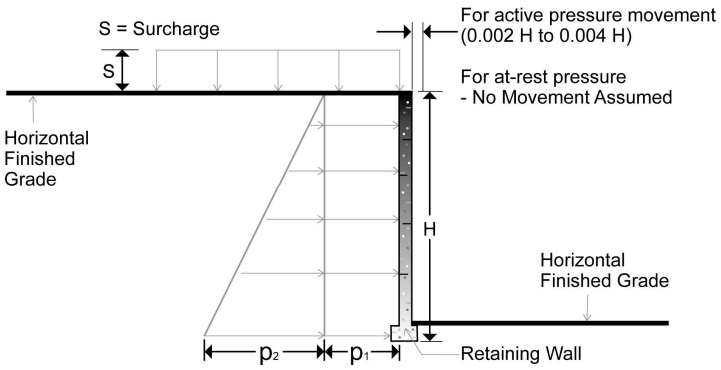
The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

LATERAL EARTH PRESSURES

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The “at-rest” condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated).



For on-site or import materials that are compacted as recommended in this report, we recommend the following preliminary lateral earth pressure parameters

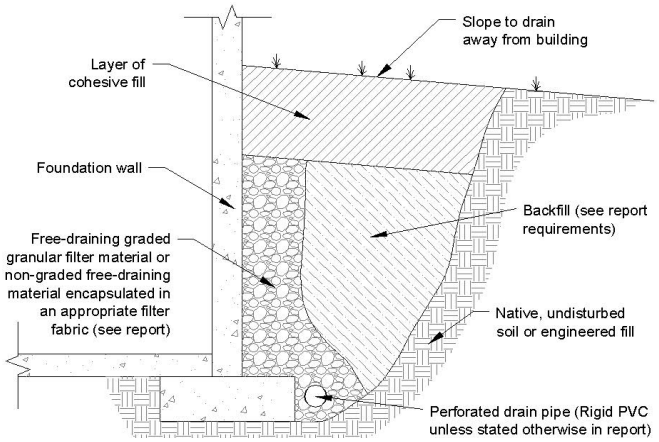
Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Lateral Earth Pressure Coeficients**[2]	**Surcharge Pressure** [3, 4, 5] **p_1 (psf)**	**Effective Fluid Pressures (psf)** [2, 4, 5] **Unsaturated** [6]
Active (Ka)	Granular - 0.33	(0.33)S	(45)psf/ft
At-Rest (Ko)	Granular - 0.5	(0.5)S	(65)psf/ft
Passive (Kp)	Granular - 3	(3)S	(375)psf/ft

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 125 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.
6. To achieve “Unsaturated” conditions, follow guidelines in **Subsurface Drainage for Below-Grade Walls** below.

Backfill placed against structures should consist of granular soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

Subsurface Drainage for Below-Grade Walls

A perforated rigid plastic drain line installed behind the base of walls and extends below adjacent grade is recommended to prevent hydrostatic loading on the walls. The invert of a drain line around a below-grade building area or exterior retaining wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage to daylight or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5% passing the No. 200 sieve. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage structure may be used. A pre-fabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion and is fastened to the wall prior to placing backfill.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Pavement Design Parameters

Design of asphalt concrete (AC) pavements is based on the procedures outlined in the Caltrans "Highway Design Manual for Safety Roadside Rest Areas" (Caltrans, 2016). Design of Portland cement concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330R-08; "Guide for Design and Construction of Concrete Parking Lots."

A correlated design R-value of 15 was used to calculate the AC pavement thickness sections. A modulus of subgrade reaction of 120 pci and a modulus of rupture of 600 psi were used for the PCC pavement designs.

The structural sections are predicated upon proper compaction of the utility trench backfills and the subgrade soils as prescribed by in **Earthwork**, with the upper 12 inches of subgrade soils and all aggregate base material brought to a minimum relative compaction of 95 percent in accordance with ASTM D 1557 prior to paving. The aggregate base should meet Caltrans requirements for Class 2 base.

The pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing (specifically R-value testing) during construction when the actual subgrade soils are exposed. Additionally, the preliminary sections provided are minimums based on procedures previously referenced. The project civil engineer should confirm minimum Traffic Indices and sections required by local agencies or jurisdictions if applicable.

Pavement Section Thicknesses

The following table provides options for AC and PCC Sections:

Asphalt Concrete Design		
Usage	**Assumed Traffic Index**	**Recommended Structural Section**
Auto Parking Areas	5.0	3” HMA[1]/9” Class 2 AB[2]
Drive lanes	5.5	3” HMA[1]/10” Class 2 AB[2]
Truck Parking Areas	7.0	4” HMA[1]/13” Class 2 AB[2]
Truck Delivery Areas	8.0	4.5” HMA[1]/16” Class 2 AB[2]

1. HMA = hot mix asphalt
2. AB = aggregate base

Portland Cement Concrete Design		
Layer	**Thickness (inches)**	
	Medium Duty[1]	**Heavy Duty**[2]
PCC	6.0	7.5
Aggregate Base [3]	--	--

1. Truck Parking Areas, Multiple Units, ADTT = 25 (Category B)
2. In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g., dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles, ADTT = 700 (Category C).
3. Aggregate base is not required. Compacted on-site material is considered competent.

Recommended structural sections were calculated based on assumed TIs and our preliminary sampling and testing.

Terracon does not practice traffic engineering. We recommend that the project civil engineer or traffic engineer verify that the TIs and ADTT traffic indices used are appropriate for this project.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2 percent.
- Subgrade and pavement surfaces should have a minimum 2 percent slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

STORM WATER MANAGEMENT

The soil at the infiltration test locations was classified in the field using a visual/manual procedure. Soil samples from the test locations were returned to our laboratory for testing by sieve analysis. The results of the sieve analyses are attached. The infiltration velocity is presented as the infiltration rate and is summarized in the following table. The infiltration rates provided do not include safety factors.

Test Location	Test Depth (feet)[1]	Soil Type	Infiltration Rate	
			in./hr.	cm./hr.
DR-1	5	SC-SM	0.06	0.16
DR-2	5	SC-SM	0.07	0.18

1. Below existing ground surface

The above infiltration rates determined by the double-ring method are based on field test results utilizing clear water. Infiltration rates can be affected by silt buildup, debris, degree of soil saturation, site variability and other factors. The rate obtained at specific location and depth is representative of the location and depth tested and may not be representative of the entire site.

Due to the significant variation of measured infiltration rates, infiltration rate utilized in the design should be selected carefully and based on the design basin depth. The designer of the basins should also consider other possible site variability in the design. Application of an appropriate safety factor may be prudent to account for subsoil inconsistencies, possible compaction related to site grading, and potential silting of the percolating soils, depending on the application.

CORROSIVITY

The following table lists the laboratory electrical resistivity (standard and as-received), chlorides, soluble sulfates, and pH testing results. These values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Boring	Depth (feet)	Soluble Sulfate (mg/kg)	Soluble Chloride (mg/kg)	Fluoride (mg/kg)	pH	Resistivity (as-received) (Ohm-cm)	Resistivity (saturated) (Ohm-cm)
B-3	0 to 5	64	11	18	7.6	13,200	2,400

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 4.3.1 of the ACI Design Manual. Concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

For protection against corrosion to buried metals, Terracon recommends that an experienced corrosion engineer be retained to design a suitable corrosion protection system for underground metal structures or components.

If corrosion of buried metal is critical, it should be protected using a non-corrosive backfill, wrapping, coating, sacrificial anodes, or a combination of these methods, as designed by a qualified corrosion engineer.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Terracon conducted thirteen (13) soil-testing borings. Our scope also included excavating two (2) test pits, each 5 feet deep, for double ring infiltration testing. These borings and pits were planned at the locations and to depths indicated in the table below.

Boring Nos	Boring Depth (feet) [1]	Location [2]
3 (B-1 to B-3)	21 ½	Warehouse building
2 (B-4 and B-5)	51 ½	Warehouse building
3 (B-6 to B-8)	21 ½	Office buildings and loading docks
4 (B-9 to B-13)	6 ½ and 11 ½	Car/trailer Parking lots
2 (DR-1 and DR-2)	5	Infiltration facility

1. Below ground surface.
2. Boring locatons are based on the similar project site plan. Specfici site plan for this site was not ready at the time of this report.

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from the Google Earth. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advance the borings with a truck-mounted drill rig using hollow-stem augers. Both a standard penetration test (SPT) sampler (2-inch outer diameter and 1-3/8-inch inner diameter) and a modified California ring-lined sampler (3-inch outer diameter and 2-3/8-inch inner diameter) are utilized in our investigation. The penetration resistance is recorded on the boring logs as the number of hammer blows used to advance the sampler in 6-inch increments (or less if noted). The samplers are driven with an automatic hammer that drops a 140-pound weight 30 inches for each blow. After the required seating, samplers are advanced up to 18 inches, providing up to three sets of blowcounts at each sampling interval. The sampling depths, penetration distances, and other sampling information are recorded on the field boring logs. The recorded blows are raw numbers without any corrections for hammer type (automatic vs. manual cathead) or sampler size (ring sampler vs. SPT sampler). Relatively undisturbed and bulk samples of the soils encountered are placed in sealed containers and returned to the laboratory for testing and evaluation.

We observe and record groundwater levels during drilling and sampling. For safety purposes, all borings are backfilled with auger cuttings after their completion.

The test pits for infiltration testing were excavated using a small backhoe. Soil was excavated in a 5-foot by 5-foot square area and to a depth of approximately 5 feet. The excavated material was stockpiled and used to backfill the pit upon completion of testing.

Our exploration team prepares field boring logs as part of the drilling operations. These field logs include visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs are prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Infiltration Testing (Storm Water)

Two double-ring infiltration tests were performed at the proposed basin area (specified by client) within the excavated test pits. The field infiltration test program consists of the following:

Number of Test Borings	Test Pit Depth (feet) [1]	Location
2 (DR 1 and DR 2)	5	See **Exploration Plan**

1. Below ground surface

Utilizing the double-ring infiltrometer method described in ASTM D 3385, testing was performed at the locations indicated on **Exploration Plan**. Based on observations in the excavations utilized for infiltrometer testing, the soil profile within the site generally consists of silty clayey sand.

The double-ring infiltration tests were performed by driving two open aluminum rings into the bottom of excavated test pits, one inside of the other. A tamping rod was used to compact disturbed soils adjacent to the rings. The rings were partially filled with water to equal depths. The water was maintained at a constant level using a float valve and water source for each ring. The volume of water added to the inner and outer rings was recorded at timed intervals. The graduated cylinder corresponding to the inner ring is readable in increments of 25 mL. These data were used to calculate the infiltration rate of the soil. The infiltration test was performed until a relatively steady- state infiltration velocity was reached.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- Water (Moisture) Content of Soil by Mass

- Laboratory Determination of Density (Unit Weight) of Soil Specimens
- Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- Modified Proctor test
- Hydro-consolidation
- Atterberg limits
- Corrosivity suite test

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

SITE LOCATION

Patterson Avenue Industrial Center ■ Perris, Riverside County, California
August 10, 2021 ■ Terracon Project No. CB215068

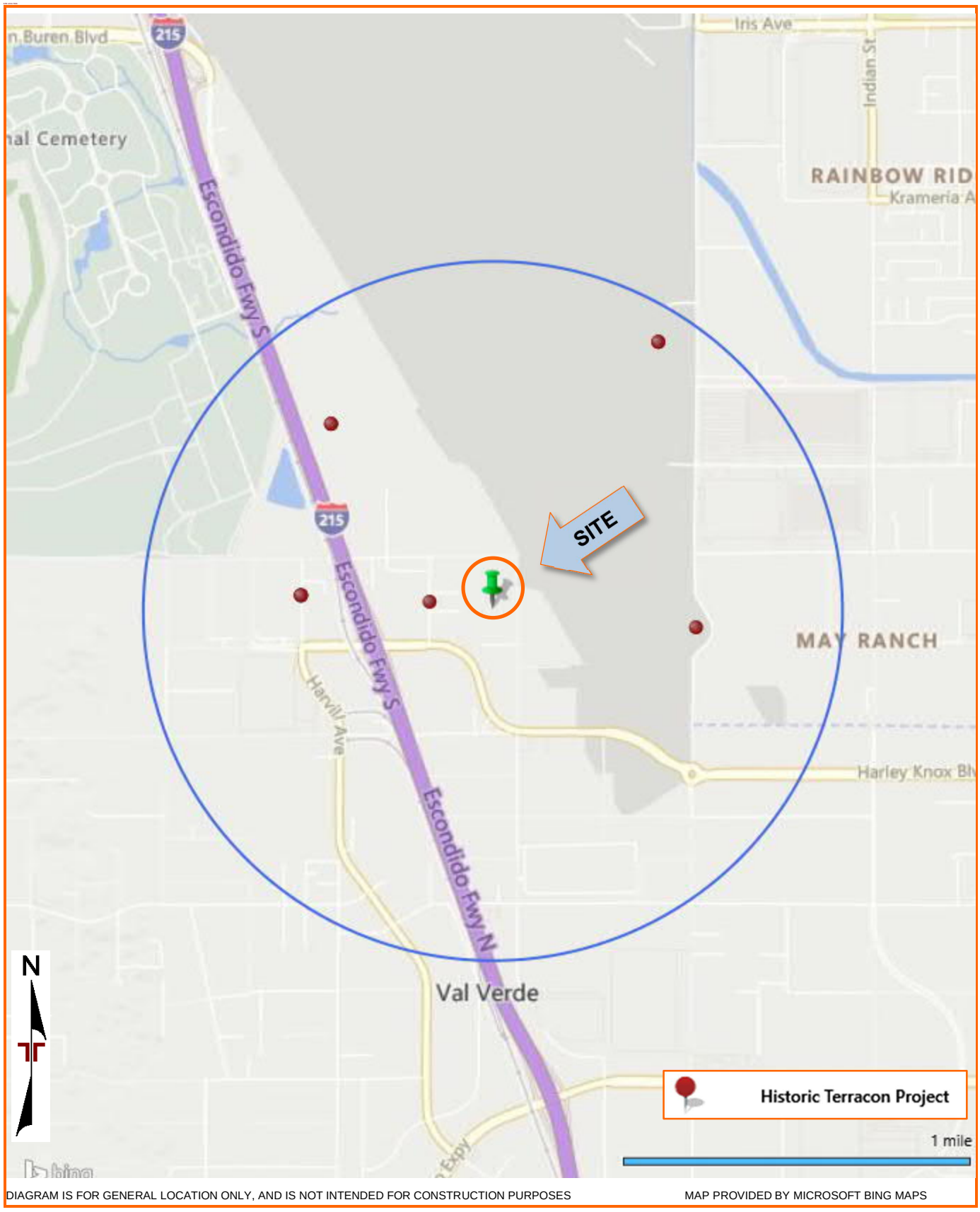


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Patterson Avenue Industrial Center ■ Perris, Riverside County, California
August 10, 2021 ■ Terracon Project No. CB215068

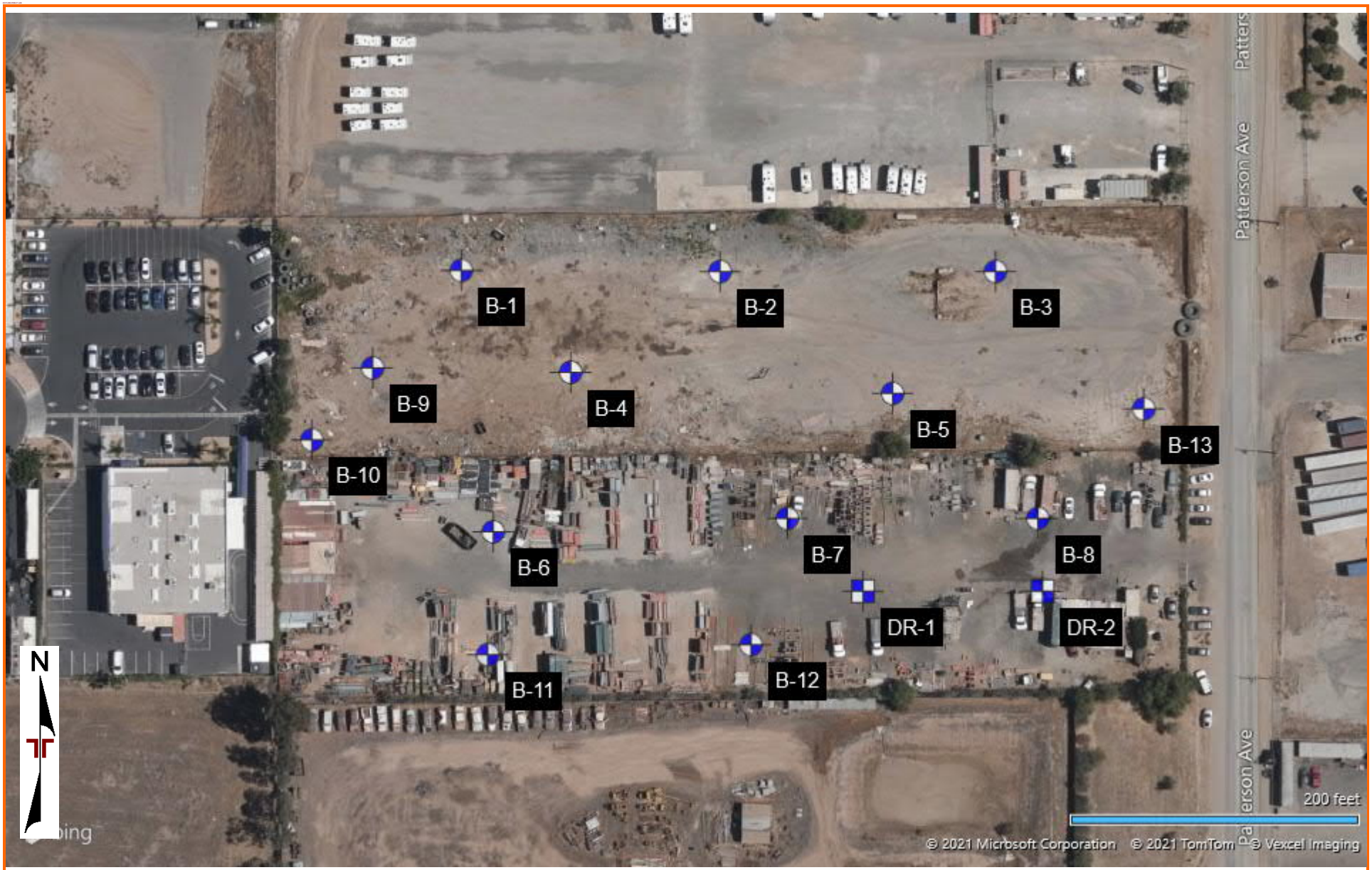


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

BORING LOG NO. B-1

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8644° Longitude: -117.2544°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), dark reddish brown, very stiff				6-9-15				8	126		
4.5		**SILTY CLAYEY SAND (SC-SM)**, fine to coarse grained, orange, very dense	5			25-50/3"				6	116		
		medium dense				8-13-17				6	131		
9.0		**SANDY LEAN CLAY (CL)**, grayish brown, very stiff	10			13-18-20				7	129		
13.0		**LEAN CLAY (CL)**, orange, very stiff	15			6-8-11 N=19							
		2" sandy clay lens at 16.25'											
18.0		**SANDY SILTY CLAY (CL-ML)**, grayish brown, stiff, with mineralization	20			2-6-8 N=14							
21.5		***Boring Terminated at 21.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-2

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8643° Longitude: -117.2538°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), dark reddish brown, very stiff, with mineralization											
						5-10-18				8	127		59
4.5		**SILTY CLAYEY SAND (SC-SM)**, orange, very dense	5			20-50/4"				9	131		42
		medium dense				11-18-21				8	127		41
		dark reddish brown	10			11-25-32				7	131		49
		grayish brown, with mineralization											
		dense, 3" silt lens at 15'	15			14-19-16 N=35							44
18.0		**SILT (ML)**, orange, stiff											
20.8			20			5-7-8 N=15							26
21.5		**SILTY SAND (SM)**, fine to coarse grained, orange, medium dense											
		Boring Terminated at 21.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-3

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8643° Longitude: -117.2531°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), dark reddish brown, stiff											
	4.5				3-5-9				11	125		59
	SANDY SILT (ML), orange, hard	5			23-50/6"				9	123		53
	7.0											
	SILTY CLAYEY SAND (SC-SM), orange, dense				36-41-41				10	121		32
	brown	10			13-23-34				9	128		45
	13.0											
	SANDY LEAN CLAY (CL), brown, very stiff, with mineralization	15			6-13-16 N=29							58
	hard, with 3" silty sand lens at 20'	20			10-17-23 N=40							40
	21.5											
	Boring Terminated at 21.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-4

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8642° Longitude: -117.2541°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY ELASTIC SILT (ML), orange, hard				9-36-50/3"				34	100		56
4.5		**SILTY CLAYEY SAND (SC-SM)**, fine to coarse grained, orange, very dense	5			50/6"				8	105		39
		medium dense				11-13-13				7	116		40
		loose	10			7-8-9				4	114		30
		medium dense	15			6-11-14 N=25							13
16.5		**SANDY SILTY CLAY (CL-ML)**, grayish brown, very stiff	20			3-6-12 N=18							61
23.0		**SILTY SAND (SM)**, fine to coarse grained, grayish brown, medium dense	25	▽		4-5-6 N=11							44

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While sampling*

▽ *At completion of drilling*

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-4

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8642° Longitude: -117.2541°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), fine to coarse grained, grayish brown, medium dense *(continued)*											
	medium to coarse grained, reddish brown, strong cementation	30	▽	X	8-13-16 N=29							19
		35		X	7-11-16 N=27							17
	dense	40		X	11-21-25 N=46							19
		45		X	12-18-25 N=43							19
	very dense	50		X	18-28-34 N=62							26
	51.5											
	Boring Terminated at 51.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While sampling*

▽ *At completion of drilling*

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-5

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8641° Longitude: -117.2534°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), dark reddish brown, very stiff											
						5-13-21				8	129	31-16-15	55
4.0		**SILTY CLAYEY SAND (SC-SM)**, fine to coarse grained, dark reddish brown, very dense, with mineralization	5			15-31-50/4"				22	108		47
		orange				21-36-50/5"				7	131		48
		dense	10			15-26-37				7	129	23-16-7	45
			15			9-15-16 N=31							44
21.5		medium dense	20			9-9-10 N=19							39
		SANDY SILTY CLAY (CL-ML), grayish brown, stiff	25			3-6-8 N=14						27-20-7	59
26.5													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While drilling

At completion of drilling

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-5

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8641° Longitude: -117.2534°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), medium to coarse grained, reddish brown, dense, strong cementation *(continued)*	30			12-17-24 N=41							17
		35			13-20-25 N=45							20
	sandy clay lens at 36.5'		▽									
			▽									
	very dense	40			15-20-35 N=55							17
		45			15-22-32 N=54							19
		50			16-25-31 N=56							18
	51.5											
	Boring Terminated at 51.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-6

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8639° Longitude: -117.2543°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY SILT (ML), orange, hard, with mineralization				16-40-50/2"				5	97		
5.5		**SILTY CLAYEY SAND (SC-SM)**, fine to coarse grained, orange, very dense	5			33-50/2"				6	102		
		medium dense				17-21-23				5	134		
9.5		**SANDY SILT (ML)**, orange, very stiff	10			11-10-10				4	109		
13.0		**SILTY SAND (SM)**, fine to medium grained, brown, medium dense	15			5-11-16 N=27							
		grayish brown	20			4-6-10 N=16							
21.5		***Boring Terminated at 21.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-7

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8639° Longitude: -117.2536°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY SILT (ML), orange, hard, with mineralization											
						14-29-50/3"							55
4.5		**SILTY CLAYEY SAND (SC-SM)**, fine to medium grained, orange, very dense	5			33-50/3"							49
						23-50/5"							40
10.0		**SANDY SILT (ML)**, orange, very stiff	10			16-20-21							56
13.0		**SILTY SAND (SM)**, fine to medium grained, brown, medium dense	15			4-5-7 N=12							17
20.0		**SANDY SILTY CLAY (CL-ML)**, grayish brown, very stiff 3" silty sand lens at 20'	20			6-10-12 N=22							49
21.5		***Boring Terminated at 21.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-8

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8639° Longitude: -117.253°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		SANDY SILT (ML), orange, hard				12-25-23							
4.5		**SILTY CLAYEY SAND (SC-SM)**, fine to medium grained, orange, very dense	5			31-50/3"							
						15-50/6"							
10.0		**SANDY LEAN CLAY (CL)**, brown, very stiff	10			10-10-13							
13.0		**SILTY SAND (SM)**, fine to coarse grained, brown, medium dense	15			6-8-13 N=21							
16.0		**LEAN CLAY (CL)**, brown, very stiff	20			5-9-13 N=22							
21.5		***Boring Terminated at 21.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-9

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8642° Longitude: -117.2546°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), dark reddish brown, medium dense											46
					11-11-14							
		5										
					7-11-12							
	6.5											
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-10

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.864° Longitude: -117.2547°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), dark reddish brown, very stiff				5-7-29							
	4.0											
	SILTY CLAYEY SAND (SC-SM), orange, very dense	5			50/6"							
					13-27-50/6"							
	dense	10			23-26-34							
	11.5											
	Boring Terminated at 11.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-11

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8636° Longitude: -117.2543°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	0											
	SILTY CLAYEY SAND (SC-SM), fine to medium grained, orange, very dense, with mineralization				22-33-50/6"							
		5			50/6"							
	7.0											
	SANDY LEAN CLAY (CL), dark reddish brown, hard				22-37-50/5"							
		10			15-37-42							
	11.5											
	Boring Terminated at 11.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-12

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8636° Longitude: -117.2537°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY CLAYEY SAND (SC-SM), fine to medium grained, reddish brown, very dense, with mineralization				17-31-50/4"							
		5			50/6"							
	9.5 **SANDY SILT (ML)**, reddish brown, very stiff				19-33-44							
		10			7-10-16							
	11.5 ***Boring Terminated at 11.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-29-2021 | Boring Completed: 07-29-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

BORING LOG NO. B-13

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8641° Longitude: -117.2528°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), dark reddish brown, very stiff				8-9-11							
	4.0 **SILTY SAND (SM)**, dark reddish brown, medium dense	5			5-9-10 N=19							
	6.5 ***Boring Terminated at 6.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-30-2021 | Boring Completed: 07-30-2021

Drill Rig: B-61 | Driller: California Pacific Drilling

Project No.: CB215068

TEST PIT LOG NO. DR-1

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.8637° Longitude: -117.2534° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY CLAYEY SAND (SC-SM), orange											27
	5.0	5										
	Test Pit Terminated at 5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Test Pit Started: 07-29-2021
Test Pit Completed: 07-29-2021
Excavator: Backhoe
Operator: California Pacific Drilling
Project No.: CB215068

TEST PIT LOG NO. DR-2

PROJECT: CGU: Patterson Avenue Industrial Center

CLIENT: CGU Capital Management
San Pedro, CA

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

LOCATION See Exploration Plan

Latitude: 33.8637° Longitude: -117.253°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY CLAYEY SAND (SC-SM), orange											47
	5.0	5										
	Test Pit Terminated at 5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

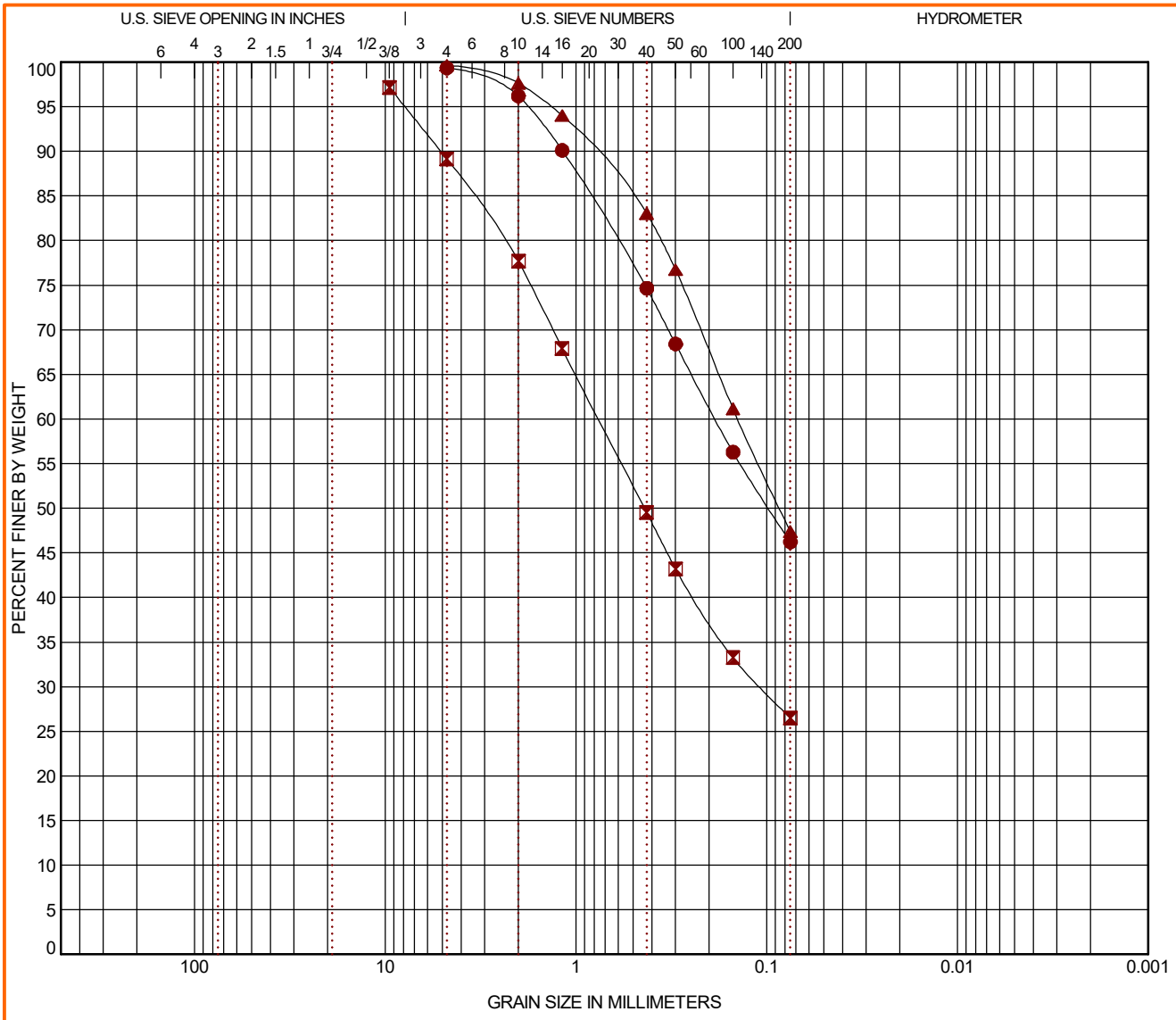
Test Pit Started: 07-29-2021 | Test Pit Completed: 07-29-2021

Excavator: Backhoe | Operator: California Pacific Drilling

Project No.: CB215068

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-9	0 - 5							
⊠	DR-1	0 - 5							
▲	DR-2	0 - 5							

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-9	0 - 5	4.75	0.185					53.1		46.2	
⊠	DR-1	0 - 5	9.5	0.761	0.107			8.0	62.7		26.5	
▲	DR-2	0 - 5	4.75	0.142					52.2		47.4	

PROJECT: CGU: Patterson Avenue Industrial Center

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

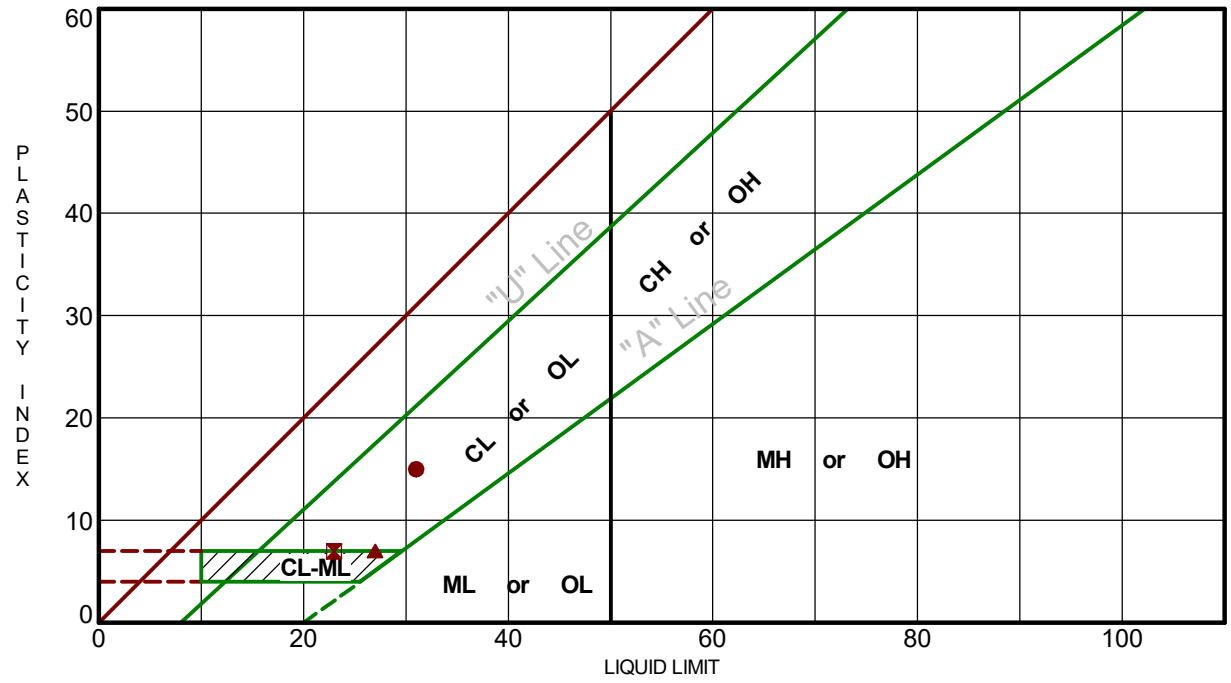
PROJECT NUMBER: CB215068

CLIENT: CGU Capital Management
San Pedro, CA

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 CB215068 CGU PATTERSON A.GPJ TERRACON_DATATEMPLATE.GDT 7/20/21

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth	LL	PL	PI	Fines	USCS	Description
●	B-5	2.5 - 4	31	16	15	54.7	CL	SANDY LEAN CLAY
⊠	B-5	10 - 11.5	23	16	7	45.4	SC-SM	SILTY, CLAYEY SAND
▲	B-5	25 - 26.5	27	20	7	59.1	CL-ML	SANDY SILTY CLAY

PROJECT: CGU: Patterson Avenue Industrial Center

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

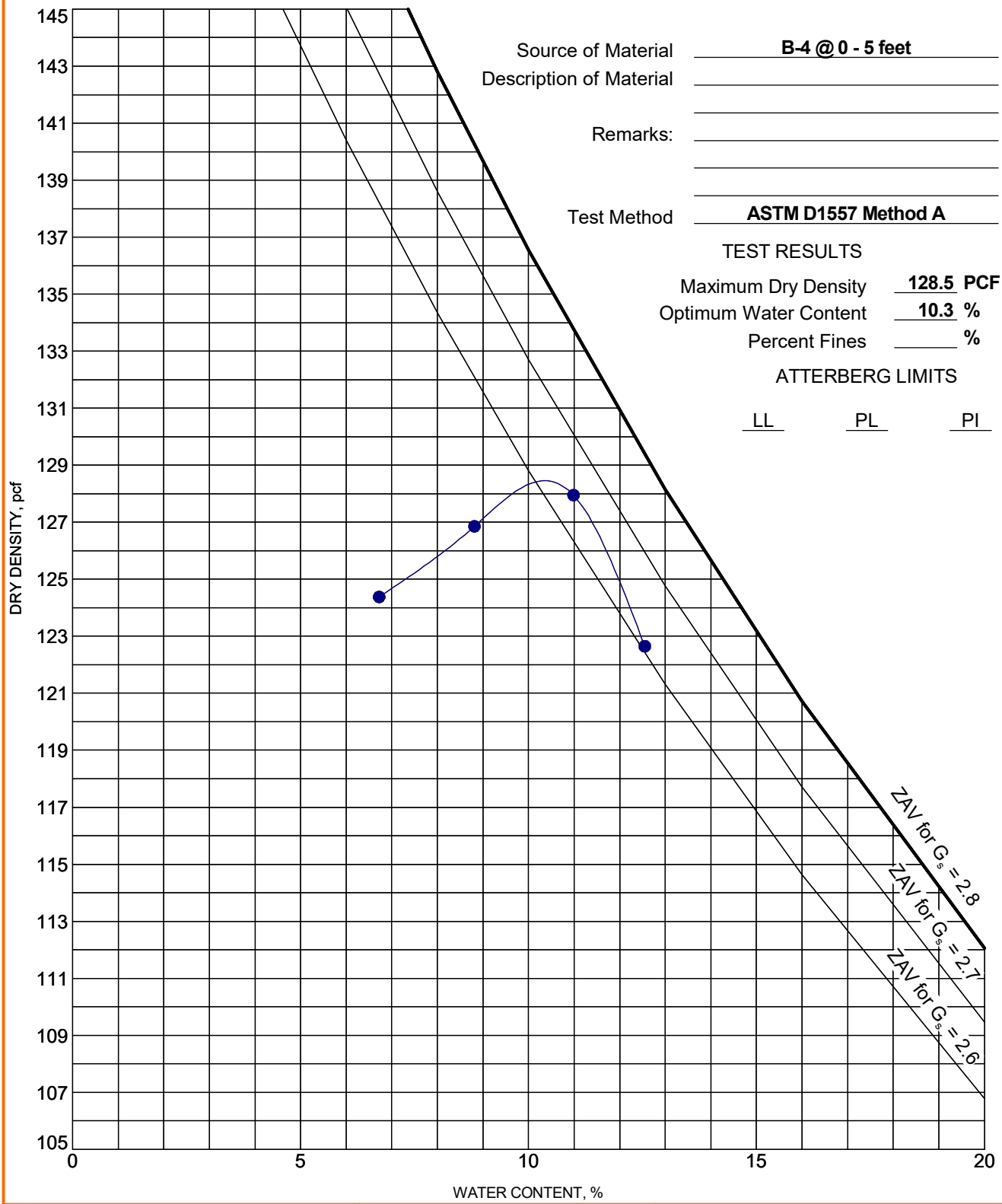
Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215068

CLIENT: CGU Capital Management
San Pedro, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-4 @ 0 - 5 feet**

Description of Material:

Remarks:

Test Method: **ASTM D1557 Method A**

TEST RESULTS

Maximum Dry Density	**128.5**	**PCF**
Optimum Water Content	**10.3**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: CGU: Patterson Avenue Industrial Center

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

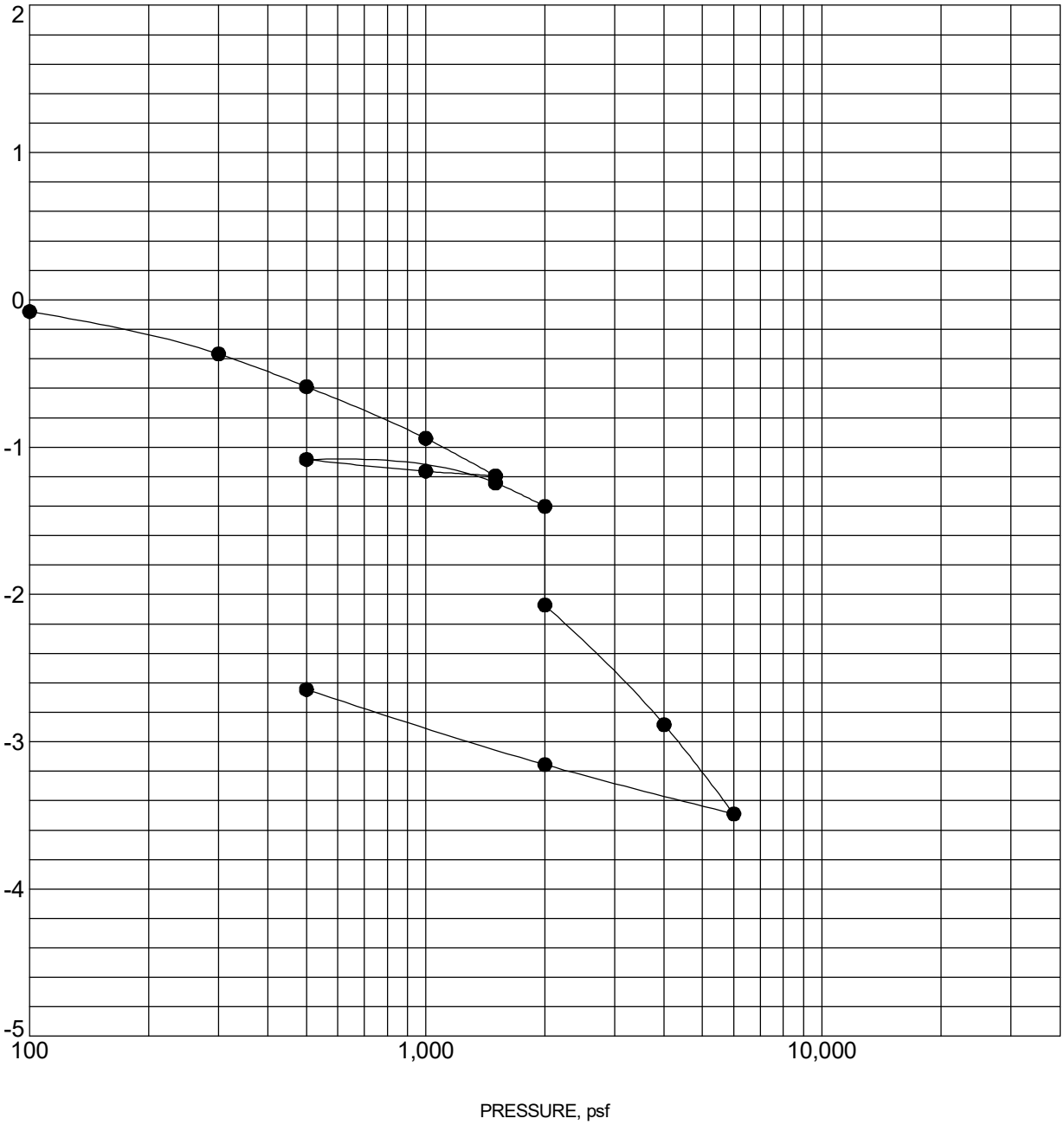
Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215068

CLIENT: CGU Capital Management
San Pedro, CA

SWELL CONSOLIDATION TEST

ASTM D2435



Specimen Identification			Classification	γ_d, pcf	WC, %
●	B-4	7.5 - 9 ft		113	6

NOTES: Saturated at surcharge pressure of 2,000 psf

PROJECT: CGU: Patterson Avenue Industrial Center

SITE: Patterson Ave. & Nandina Ave.
Perris, CA

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215068

CLIENT: CGU Capital Management
San Pedro, CA

TRANSMITTAL LETTER

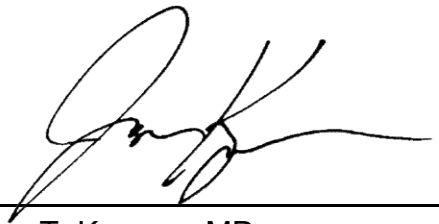
DATE: July 21, 2021

ATTENTION: **Tom Remmel**

TO: Terracon
1355 East Cooley Drive, Suite C
Colton, CA 92324

SUBJECT: Laboratory Test Data
Patterson Ave Ind. Center
Your #CB215068, HDR Lab #21-0631LAB

COMMENTS: Enclosed are the results for the subject project.



James T. Keegan, MD
Corrosion and Lab Services Section Manager

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

Table 1 - Laboratory Tests on Soil Samples

Terracon
Patterson Ave Ind. Center
Your #CB215068, HDR Lab #21-0631LAB
21-Jul-21

Sample ID			B-3 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	13,200
saturated		ohm-cm	2,400
pH			7.6
Electrical Conductivity		mS/cm	0.12
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	46
magnesium	Mg^{2+}	mg/kg	14
sodium	Na^{1+}	mg/kg	93
potassium	K^{1+}	mg/kg	6.5
ammonium	NH_4^{1+}	mg/kg	ND
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	268
fluoride	F^{1-}	mg/kg	18
chloride	Cl^{1-}	mg/kg	11
sulfate	SO_4^{2-}	mg/kg	64
nitrate	NO_3^{1-}	mg/kg	36
phosphate	PO_4^{3-}	mg/kg	ND
Other Tests			
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, pH per ASTM G51, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

CGU Patterson Ave
Double Ring Infiltrometer Test Data Log (DR-1)

Job No.	**CB215068**		Test Location:	DR-1	Date	6/30/2021	Tested by:	GA	Depth:	5'	
Interval No.	Start or End	Time	Elapsed Time (min)	Total Time (min)	Inner Ring Level (cm^3)	Annular Space (cm^3)	Time (hr)	Incremental Infiltration (cm/hr)	Incremental Infiltration (in/hr)	Annular Space Incremental Infiltration (cm/hr)	Annular Space Incremental Infiltration (in/hr)
	Start	8:35 AM			0	0					
1	End	8:50 AM	15	15.0	125	350	0.25	0.69	0.27	0.64	0.25
	Start	8:50 AM			0	0					
2	End	9:05 AM	15	30.0	100	250	0.25	0.55	0.22	0.46	0.18
	Start	9:05 AM			0	0					
3	End	9:20 AM	15	45.0	75	200	0.25	0.41	0.16	0.37	0.14
	Start	9:20 AM			0	0					
4	End	9:35 AM	15	60.0	75	150	0.25	0.41	0.16	0.27	0.11
	Start	9:35 AM			0	0					
5	End	10:05 AM	30	90.0	125	300	0.50	0.34	0.13	0.27	0.11
	Start	10:05 AM			0	0					
6	End	10:35 AM	30	120.0	100	250	0.50	0.27	0.11	0.23	0.09
	Start	10:35 AM			0	0					
7	End	11:05 AM	30	150.0	75	300	0.50	0.21	0.08	0.27	0.11
	Start	11:05 AM			0	0					
8	End	11:35 AM	30	180.0	100	300	0.50	0.27	0.11	0.27	0.11
	Start	11:35 AM			0	0					
9	End	12:05 PM	30	210.0	100	300	0.50	0.27	0.11	0.27	0.11
	Start	12:05 PM			0	0					
10	End	12:35 PM	30	240.0	75	250	0.50	0.21	0.08	0.23	0.09
	Start	12:35 PM			0	0					
11	End	1:05 PM	30	270.0	75	300	0.50	0.21	0.08	0.27	0.11
	Start	1:05 PM			0	0					
12	End	1:35 PM	30	300.0	50	250	0.50	0.14	0.05	0.23	0.09
	Start	1:35 PM			0	0					
13	End	2:05 PM	30	330.0	50	250	0.50	0.14	0.05	0.23	0.09
	Start	2:05 PM			0	0					
14	End	2:35 PM	30	360.0	50	250	0.50	0.14	0.05	0.23	0.09
			Average Rate:	0.06	(Inches/hour)						
			Average Rate:	0.16	(cm/hour)						

CGU Patterson Ave
Double Ring Infiltrometer Test Data Log (DR-2)

Job No.	**CB215068**		Test Location:	DR-2	Date	6/30/2021	Tested by:	GA	Depth:	5'	
Interval No.	Start or End	Time	Elapsed Time (min)	Total Time (min)	Inner Ring Level (cm^3)	Annular Space (cm^3)	Time (hr)	Incremental Infiltration (cm/hr)	Incremental Infiltration (in/hr)	Annular Space Incremental Infiltration (cm/hr)	Annular Space Incremental Infiltration (in/hr)
	Start	8:15 AM			0	0					
1	End	8:30 AM	15	15.0	75	250	0.25	0.41	0.16	0.46	0.18
	Start	8:30 AM			0	0					
2	End	8:45 AM	15	30.0	50	200	0.25	0.27	0.11	0.37	0.14
	Start	8:45 AM			0	0					
3	End	9:00 AM	15	45.0	50	150	0.25	0.27	0.11	0.27	0.11
	Start	9:00 AM			0	0					
4	End	9:15 AM	15	60.0	50	100	0.25	0.27	0.11	0.18	0.07
	Start	9:15 AM			0	0					
5	End	9:45 AM	30	90.0	75	250	0.50	0.21	0.08	0.23	0.09
	Start	9:45 AM			0	0					
6	End	10:15 AM	30	120.0	75	200	0.50	0.21	0.08	0.18	0.07
	Start	10:15 AM			0	0					
7	End	10:45 AM	30	150.0	50	200	0.50	0.14	0.05	0.18	0.07
	Start	10:45 AM			0	0					
8	End	11:15 AM	30	180.0	75	200	0.50	0.21	0.08	0.18	0.07
	Start	11:15 AM			0	0					
9	End	11:45 AM	30	210.0	50	150	0.50	0.14	0.05	0.14	0.05
	Start	11:45 AM			0	0					
10	End	12:15 PM	30	240.0	50	100	0.50	0.14	0.05	0.09	0.04
	Start	12:15 PM			0	0					
11	End	12:45 PM	30	270.0	75	100	0.50	0.21	0.08	0.09	0.04
	Start	12:45 PM			0	0					
12	End	1:15 PM	30	300.0	75	100	0.50	0.21	0.08	0.09	0.04
	Start	1:15 PM			0	0					
13	End	1:45 PM	30	330.0	50	50	0.50	0.14	0.05	0.05	0.02
	Start	1:45 PM			0	0					
14	End	2:15 PM	30	360.0	75	100	0.50	0.21	0.08	0.09	0.04
			Average Rate:	0.07	(Inches/hour)						
			Average Rate:	0.18	(cm/hour)						

SUPPORTING INFORMATION

Contents:

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

CGU: Patterson Avenue Industrial Center ■ Perris, CA

Terracon Project No. CB215068

Terracon GeoReport

SAMPLING

- Auger Cuttings
- Modified California Ring Sampler
- Standard Penetration Test

WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**
- **Cave In Encountered**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

N	**Standard Penetration Test Resistance (Blows/Ft.)**
(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
UC	**Unconfined Compressive Strength**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	> 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay [K, L, M, N] / Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay [K, L, M, P] / Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

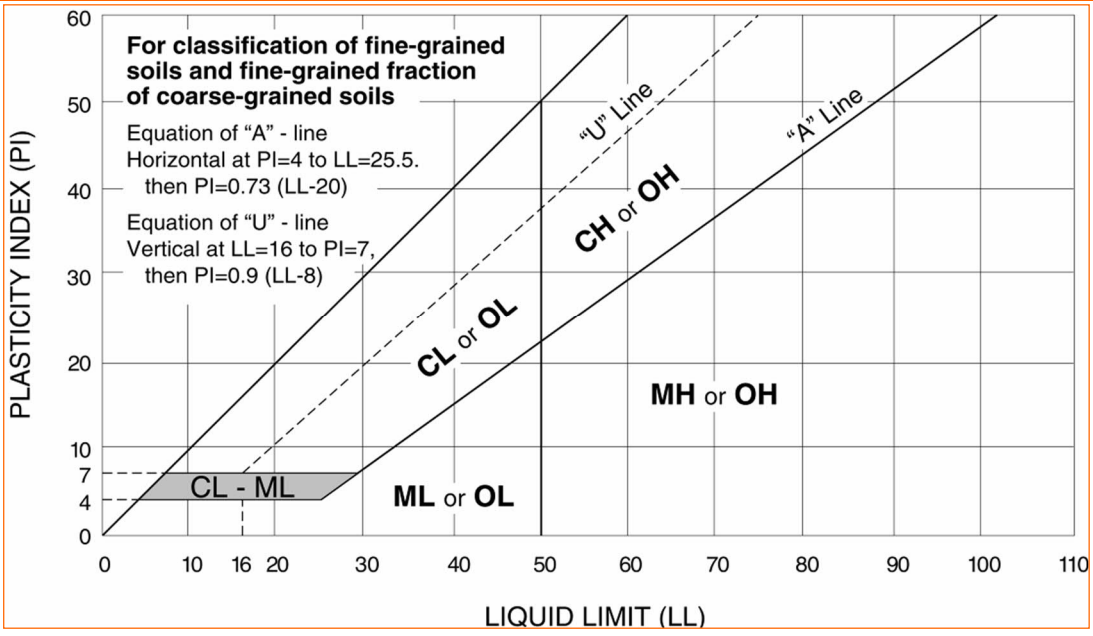
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Appendix 4: Historical Site Conditions

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

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

1412101 WQMP - PATTERSON BUSINESS CENTER					
		FT^2	AC	%	DESCRIPTION
EXISTING CONDITION	A_T=	210002.8	4.82	---	VACANT LAND - UNDEVELOPED
	A_{PERV}=	210002.8	4.82	100.00%	
	A_{IMP}=	0	0.000	0.00%	
PROPOSED CONDITION	A_T=	211010	4.84	---	BUILDING, NATIVE EARTH, LANDSCAPING, PCC - DEVELOPED
	A_{LS}=	26761.16	0.61	12.68%	
	A_{IMP}=	184248.9	4.23	87.32%	
DMA A	A_T=	122122	2.80	---	TYPE D
	A_{LS}=	5726	0.13	4.69%	
	A_{IMP}=	116396	2.67	95.31%	
DMA B	A_T=	69219.8	1.59	---	TYPE D
	A_{LS}=	1366.86	0.03	1.97%	
	A_{IMP}=	67852.94	1.56	98.03%	
DMA C	A_T=	19668.55	0.45	---	TYPE A
	A_{LS}=	19668.55	0.45	100.00%	
	A_{IMP}=	0	0.00	0.00%	

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 Riverside North
0.54 Riverside South
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
SITE LOCATION (0.6)
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

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

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

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: VALUED ENGINEERING, INC — Date: 1/12/2023

Designed by: VEI — Case No:

Company Project Number/Name: 1412101 PATTERSON BUSINESS CENTER

BMP Identification

BMP NAME / ID: UNDERGROUND CHAMBERS (DMA A & B)

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)
DA1/A1	44425	Roofs	1	0.89	39627.1			
DA1/A2	71971	Concrete or Asphalt	1	0.89	64198.1			
DA1/A3	5726	Ornamental Landscaping	0.1	0.11	632.5			
DA1/B1	47528	Roofs	1	0.89	42395			
DA1/B2	20325	Concrete or Asphalt	1	0.89	18129.9			
DA1/B3	1367	Ornamental Landscaping	0.1	0.11	151			
	191342	Total			165133.6	0.61	8408.1	9226

Notes:

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: VALUED ENGINEERING, INC — Date: 1/12/2023

Designed by: VEI — Case No:

Company Project Number/Name: 1412101 PATTERSON BUSINESS CENTER

BMP Identification

BMP NAME / ID: DA 2, DMA C - SELF TREATING (TYPE A)

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)
DA2/C1	5955	Ornamental Landscaping	0.1	0.11	657.8			
DA2/C2	2780	Ornamental Landscaping	0.1	0.11	307.1			
DA2/C3	4871	Ornamental Landscaping	0.1	0.11	538			
DA2/C4	6317	Ornamental Landscaping	0.1	0.11	697.8			
	19923	Total			2200.7	0.61	112.1	112.1

Notes:

User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	Yes
Project Name:	1412101 Patterson
Engineer:	David Hwan
Project Location:	California
Measurement Type:	Imperial
Required Storage Volume:	8920 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Average Cover Over Chambers:	18 in.
Design Constraint Dimensions:	(40 ft. x 100 ft.)

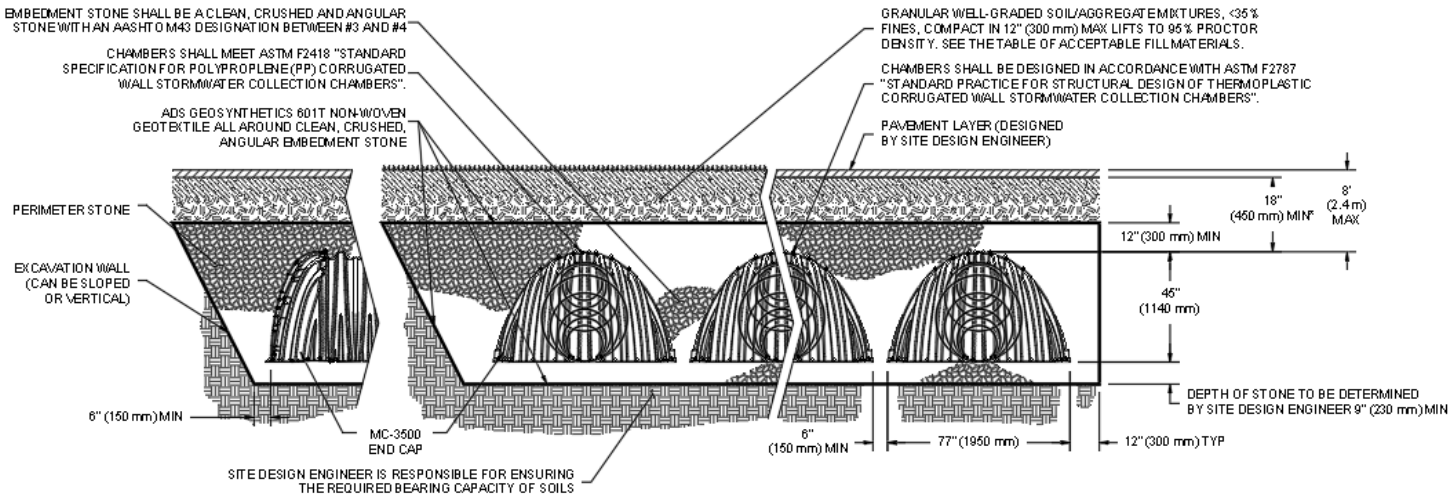
Results

System Volume and Bed Size

Installed Storage Volume:	9214.11 cubic ft.
Storage Volume Per Chamber:	109.90 cubic ft.
Number Of Chambers Required:	47
Number Of End Caps Required:	8
Chamber Rows:	4
Maximum Length:	95.88 ft.
Maximum Width:	29.17 ft.
Approx. Bed Size Required:	2747.00 square ft.

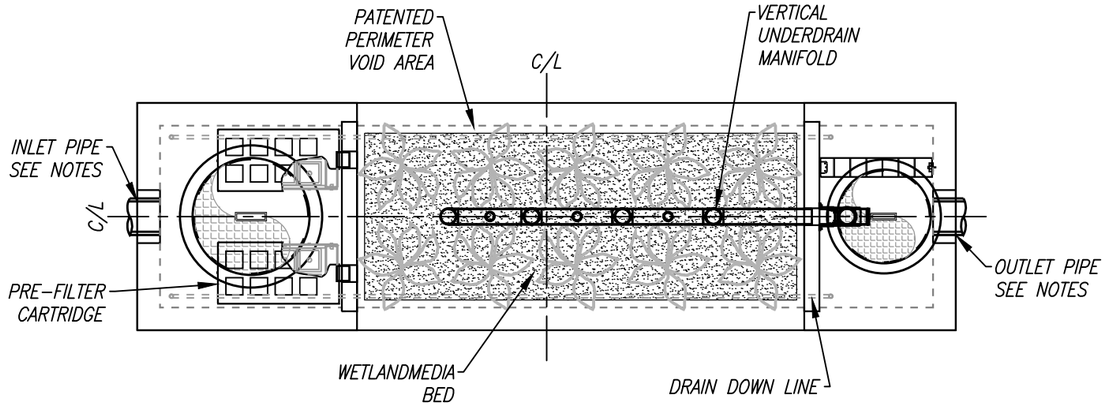
System Components

Amount Of Stone Required:	364 cubic yards
Volume Of Excavation (Not Including Fill):	560 cubic yards
Total Non-woven Geotextile Required:	916 square yards
Woven Geotextile Required (excluding Isolator Row):	51 square yards
Woven Geotextile Required (Isolator Row):	105 square yards
Total Woven Geotextile Required:	155 square yards
Impervious Liner Required:	0 square yards

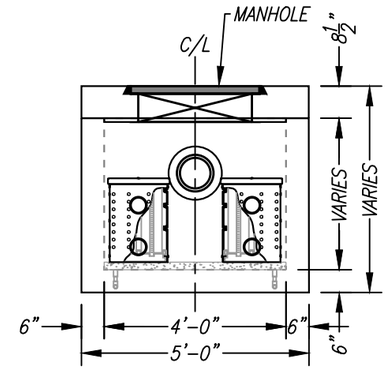


SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
8986		N/A	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



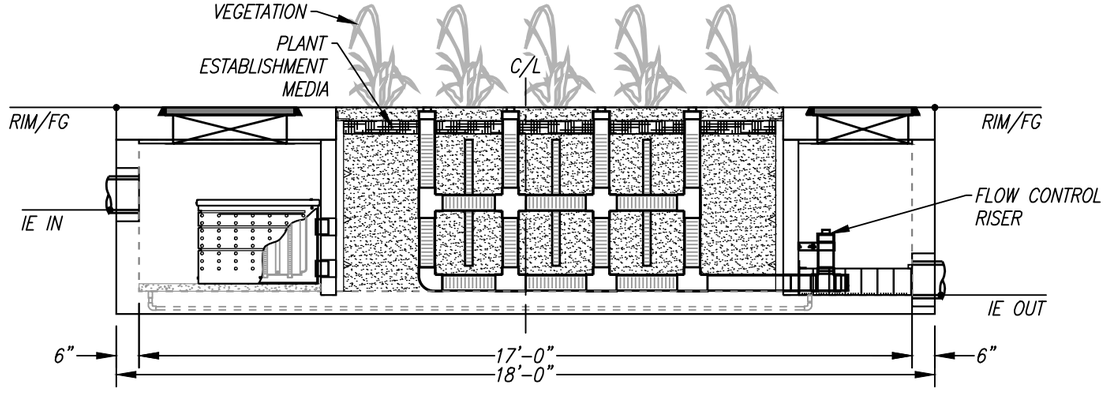
LEFT END VIEW

INSTALLATION NOTES

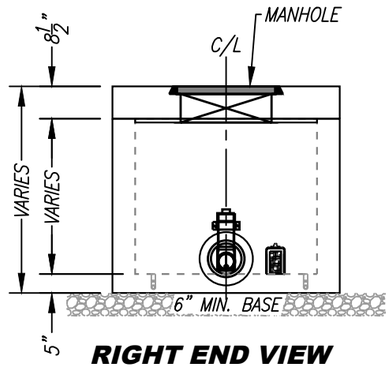
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	8986
DRAINDOWN DURATION (HOURS)	48
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	26.17
OPERATING HEAD (FT)	3.4
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

MWS-L-4-17-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

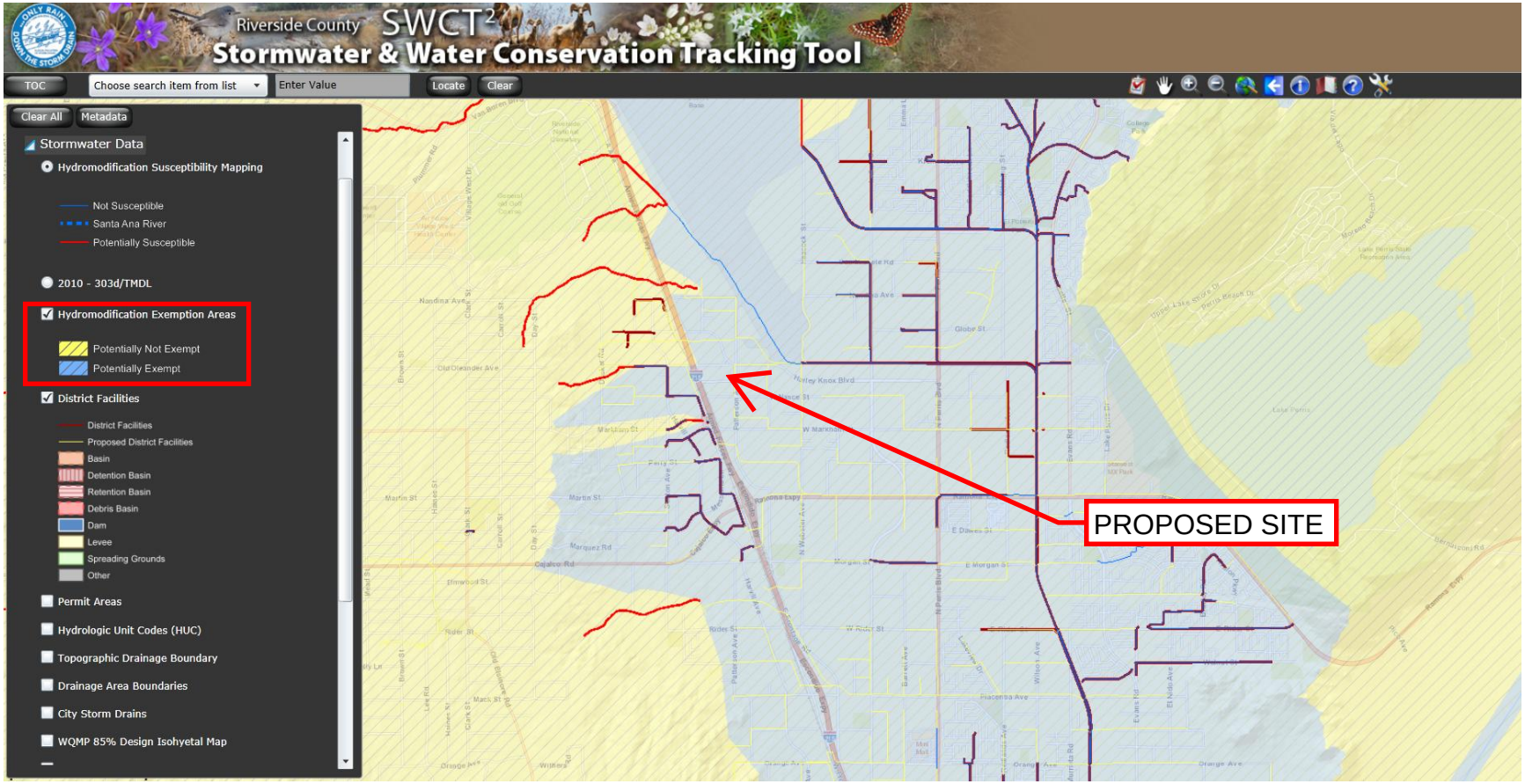
5/23/19TOLEE

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Approved HCOC Map

(http://rcstormwatertool.org/)



Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

Appendix 9: O&M

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

Appendix 10: Educational Materials

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