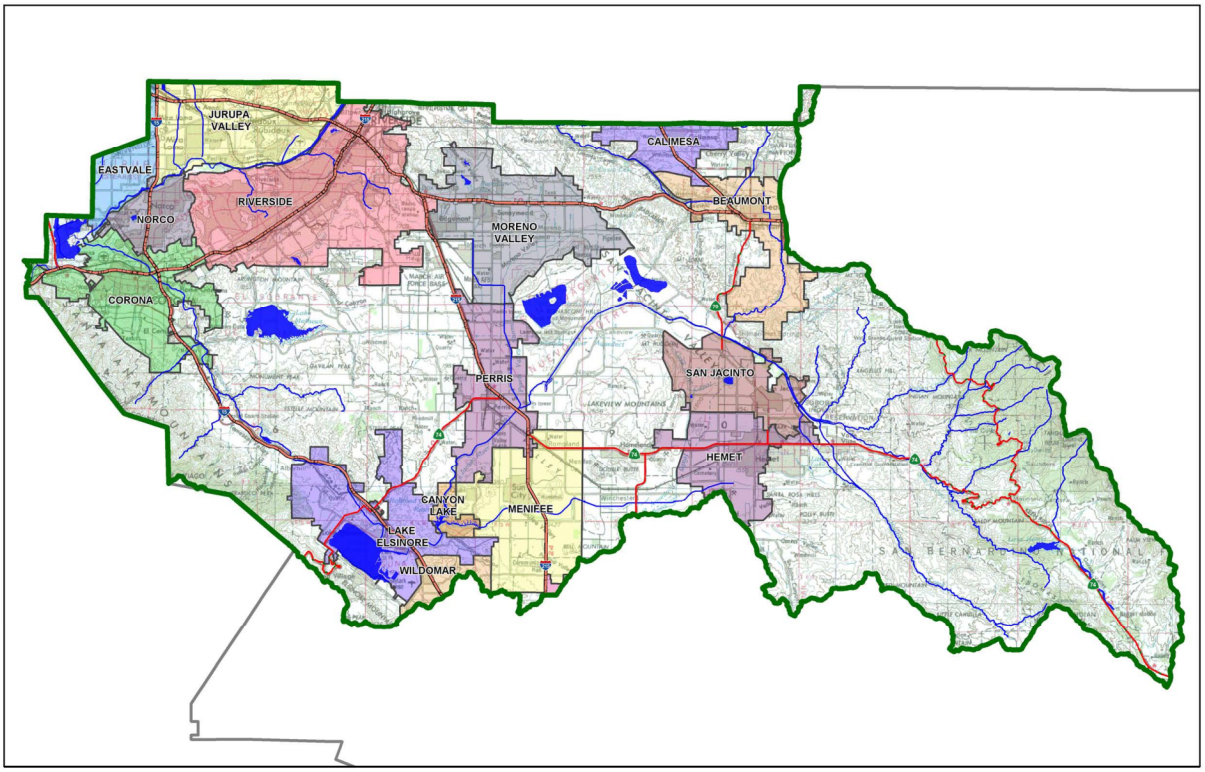
Project Specific Water Quality Management Plan

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

Project Title: Duke Ramona & Webster

Development No: Ramona Expressway & Webster Ave.

Design Review/Case No: P22-00035



Prepared for: PROLOGIS Ahead of what's next

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☒ **Preliminary**
☐ **Final**

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Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

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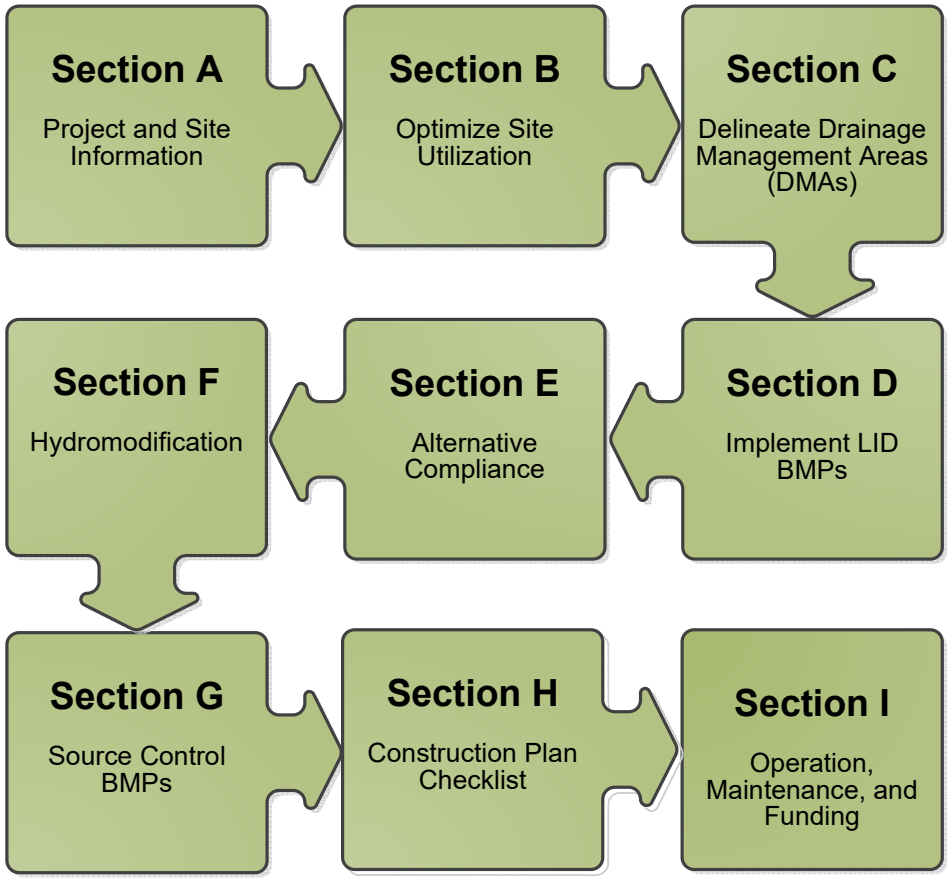
A Brief Introduction

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 Prologis by Adkan Engineers for the Ramona & Webster project. (P22-00035)

This WQMP is intended to comply with the requirements of City of Perris for Water Quality Ordinance No. 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 Section1194).

"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: 3/2/2023
Owner's Printed Name: Christian Cochrun	Owner's Title/Position: V.P. DEVELOPMENT

Notary Certificate attached/affixed pursuant
☒ CA Civil Code § 1189
☐ CA Government Code § 8202

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
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Orange)

On 3/2/2023 before me, Kristian A Anderson | Notary Public
(insert name and title of the officer)

personally appeared Christian Cochrun,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

KRISTIAN A. ANDERSON
Notary Public - California
Orange County
Commission # 2363323
My Comm. Expires Jun 29, 2025

Signature _____ **(Seal)**

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Section A: Project and Site Information

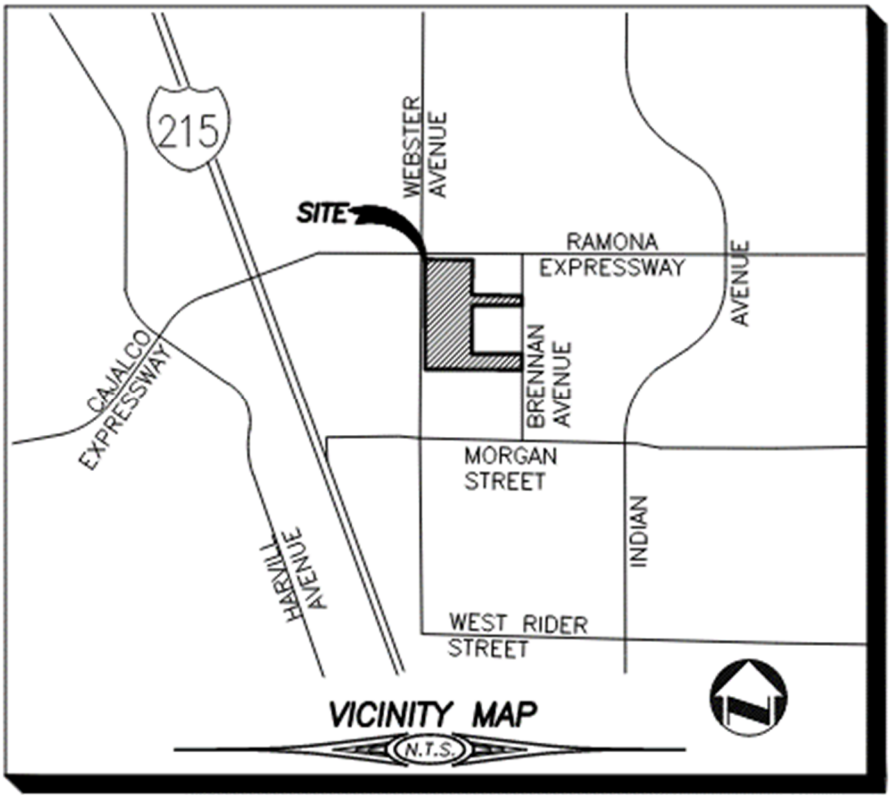
PROJECT INFORMATION	
Type of Project:	Commerial/Industrial
Planning Area:	Mead Valley Area Plan
Community Name:	Perris Valley Commerce Center (PVCC) Specific Plan
Development Name:	Duke Ramona & Webster
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°84'21.98", -117°24'16.41"	
Project Watershed and Sub-Watershed: Santa Ana, San Jacinto Valley	
Gross Acres: 29.45 AC APN(s): 303-020-055, 303-020-056, & 303-030-57	
Map Book and Page No.: Thomas Bros. Map: Page 777, Grid E2 & F2 (2009)	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial/Industrial
Proposed or Potential SIC Code(s)	1541 & 4225
Area of Impervious Project Footprint (SF)	1,115,667 SF
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	1,115,667 SF
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	N/A
What is the Water Quality Design Storm Depth for the project?	0.62

The Ramona & Webster Project is located at the southeast corner of Ramona Expressway and Webster Avenue. The portions of the project site connect to Brennan Avenue to the east. There are two commercial properties to the south and east. The existing land use is currently vacant and undeveloped with the exception for the southeast portion of the site that is occupied as an unpaved storage yard for the existing warehouse building. The storage yard will be cleared prior to grading. The existing topography slopes approximately 0.9% in a southwest to north east direction. Existing elevations range from approximately 1486 in the southwest corner to 1471 in the northeast corner (NAVD88). The existing drainage path is characterized by sheet flows that follow the existing topography. The planned site condition will propose a commercial/industrial warehouse (approximately 551,700 square-feet) on roughly 29.45 acres. The project proposes an impervious area of 1,103,768 sq. ft., which includes the roof and parking lot. The parking lot, drive aisle, and walkways are estimated to be 557,020 sq. feet. The pervious area is approximately 115,075 sq. ft. for the landscaping.

All on-site flows that will not be self-treated will be captured and treated before continuing to public facilities. The site proposes, 2 locations for underground chambers, 2 pumps, 2 filtera bioscapes, and 2 bioretention basin. The bioretention basin was designed per the County of Riverside BMP Design

Handbook. There are two bioretention basins (C & D) for the site, each with an overflow drainage structure. Bioretention basin D will be near the southwest corner of the proposed warehouse to treat the landscape area in that region. The northwest area of the project will be self-treating. The remaining bioretention basin C will be treating the northern entrance of Brennan Avenue. The initial bioretention basin location was at the north landscape area, however, there is an existing easement that was not indicated on the title report. Therefore, the bioretention basin had to be relocated. A reinforced concrete box (RCB) will replace the existing trapezoidal channel and match existing inverts along Ramona Expressway. The central area flows will be directed to catch basins with DrainPac filters that empty into proposed Contech CMP 96" non-perforated underground chambers that provides a storage volume of 36,292 cf. The drop inlet DrainPac is designed for drop inlet type storm drains. They are installed in a self-supported configuration on the lip of the catch basin underneath the traffic grate. Once the chambers begin to fill, a proposed Jensen 348-S Series lift station will simultaneously force runoff into a Contech bioscape filterra system for treatment before being released into the public system. Similar underground chambers with a storage volume of 14,112 cf. and bioscape filterrra system will be applied to the southern part of the project except for a smaller lift station, Jensen 248-S Series.

The project will not be impacted by offsite flows. There will be drought tolerant landscape area at all self-treating locations and the trash enclosures which will be covered. The proposed project is within a HCOC exemption area. Proposed land use flowrates will not be required to match existing land use flowrates.



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 Channel	None	None	Not a water body classified as RARE
San Jacinto River (Reach 3) (HU# 802.11)	None	Intermittent: MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
San Jacinto River (Reach 2) (HU# 802.11)	None	Intermittent: MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
Canyon Lake (HU# 802.11, 802.12)	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
San Jacinto River (Reach 1) (HU# 802.31, 802.32)	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a water body classified as RARE
Lake Elsinore (HU# 802.31)	PCBs, (Organic Compound), Nutrients, Organic Enrichment (Low DO), Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	Not a water body classified as RARE

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 and Encroachment Permits.	☒ 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 basin 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?

The existing drainage patterns have generally been preserved. The proposed site conveys flow to the east and north to the proposed underground chambers and bioretention basin, respectively. The bioretention basin to the north will continue to existing RCFC – Line E and the underground chambers to the east will connect to the existing RCFC – Line E-6.

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

The existing project site is mostly vacant with low lying vegetation. Dense vegetative areas with established trees are not present.

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

Per the attached infiltration and geotechnical reports, the infiltration rates range from 0.1 to 1.2 inches/hour. This is below the recommended 1.6 in/hr for infiltration BMPs. Therefore, infiltration is not feasible for the site.

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

Impervious areas were minimized given the proposed site usage and required parameters.

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

Runoff will be directed towards the proposed underground chambers and bioretention basin areas. Self-retaining areas will hold a portion of water quality runoff.

Section C: Delineate Drainage Management Areas (DMAs)

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

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
D-1.1	Roof	498,445	D
D-1.2	Roof	48,303	D
D-2.1	Asphalt/Concrete	284,656	D
D-2.2	Asphalt/Concrete	251,810	D
D-2.3	Asphalt/Concrete	20,554	D
D-3.1	Landscaping	30,819	D
D-3.2	Landscaping	31,434	D
D-3.3	Landscaping	32,602	D
D-3.4	Landscaping	20,220	D
Self-Treating	Landscaping	84,304	A

[KLL1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

[2]*If multi-surface provide back-up*

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
Self-Treating	84,304	Landscape	Drip

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

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
D-3.1	Landscaping	30,819	0.62	-	-	0.62
D-3.2	Landscaping	31,434	0.62	-	-	0.62

D-3.3	Landscaping	31,602	0.62	-	-	0.62
D-3.4	Landscaping	20,220	0.62	-	-	0.62

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

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

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

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

DMA Name or ID	BMP Name or ID
D-1.1	Contech CMP/Filterra B
D-1.2	Contech CMP/Filterra A
D-2.1	Contech CMP/Filterra B
D-2.2	Contech CMP/Filterra A
D-2.3	Bioretention Basin C
D-3.1	Bioretention Basin D
D-3.2	Contech CMP/Filterra B
D-3.3	Contech CMP/Filterra A
D-3.4	Bioretention Basin C

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

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

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

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

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…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: DMA 1 (1.2in/hr) & DMA 4 (0.4in/hr)		
…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: **4.48 ac**

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

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

Total Area of Impervious Surfaces: **25.64 ac**

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

Enter your EIATIA factor: **1.05 ac**

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: **26.92 ac**

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

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
26.92 ac	**4.48 ac**

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: ***300-400***

Project Type: ***Warehousing***

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: ***25.64 ac***

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

Enter your TUTIA factor: ***185***

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: ***5,900***

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)
5,900	**400**

Other Non-Potable Use Feasibility

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

N/A

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

Average Daily Demand: ***N/A***

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

Total Area of Impervious Surfaces: ***N/A***

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

Enter the factor from Table 2-4: ***N/A***

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

Minimum required use: ***N/A***

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

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

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

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
D-1.1	☐	☐	☐	☐	☒
D-1.2	☐	☐	☐	☐	☒
D-2.1	☐	☐	☐	☐	☒
D-2.2	☐	☐	☐	☐	☒
D-2.3	☐	☐	☒	☐	☐
D-3.1	☐	☐	☒	☐	☐
D-3.2	☐	☐	☐	☐	☒
D-3.3	☐	☐	☐	☐	☒
D-3.4	☐	☐	☒	☐	☐

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

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.3A DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* The galvanized CMP underground detention chambers A		
	[A]		[B]	[C]	[A] x [C]			
D-1.2	*48,303*	*Roof*	*1*	*0.89*	*42,990*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-2.2	*251,810*	*Concrete /Asphalt*	*1*	*0.89*	*224,111*			
D-3.3	*32,602*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,586*			
	332,715				270,687	0.62	13503	14112

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

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

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

Table D.4B DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* Bioscape Filterra A		
	[A]		[B]	[C]	[A] x [C]			
D-1.3	*48,303*	*Roof*	*1*	*0.89*	*42,990*	*Design Storm Intensity (in)*	*Pump Flow Rate,* Q_{BMP} *(cfs)*	*Proposed Treatment Flow Rate (cfs)*
D-2.3	*251,810*	*Concrete /Asphalt*	*1*	*0.89*	*224,111*			
D-3.3	*32,602*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,586*			
	332,715				270,687	-	0.18	0.2

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

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

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

Table D.5C DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* The galvanized CMP underground detention chambers B		
	[A]		[B]	[C]	[A] x [C]			
D-1.2	*498,445*	*Roof*	*1*	*0.89*	*443,616*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-2.2	*284,656*	*Concrete /Asphalt*	*1*	*0.89*	*253,344*			
D-3.2	*31,434*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,458*			
	814,535				700,418	0.62	36,270	36,292

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

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

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

Table D.6D DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* Bioscape Filterra B		
	[A]		[B]	[C]	[A] x [C]			
D-1.2	*498,445*	*Roof*	*1*	*0.89*	*443,616*	*Design Storm Intensity (in)*	*Pump Flow Rate, Q_{BMP} (cfs)*	*Proposed Treatment Flow Rate (cfs)*
D-2.2	*284,656*	*Concrete /Asphalt*	*1*	*0.89*	*253,344*			
D-3.2	*31,434*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,458*			
	814,535				700,418	-	0.39	0.40

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

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

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

Table D.7E DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* Bioretention Basin C		
	[A]		[B]	[C]	[A] x [C]			
D-2.4	*20,554*	*Concrete /Asphalt*	*1*	*0.89*	*18,334*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-3.4	*6,519*	*Ornamental Landscaping*	*0.1*	*0.11*	*720*			
	27,073				19,054	0.62	985	1047

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

Table D.8F DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* Bioretention Basin D		
	[A]		[B]	[C]	[A] x [C]			
D-3.1	*30,819*	*Ornamental Landscaping*	*0.1*	*0.11*	*3,390*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	30,819				3,390	0.62	176	652

[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

The proposed Contech underground chambers A & B will hold the design capture volume then the pumps will slowly discharge all the water in the chambers. The pumps are designed to empty the underground chambers in 24hours. The bioscape filterra will treat the slow flow from the pump then divert the water offsite to public water facilities. See Appendix 6 for bioscape filterra sizing calculations and underground chamber sizing calculations.

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

E.1 Identify Pollutants of Concern

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

Table E.1 Potential Pollutants by Land Use Type

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

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

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]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = 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]
Contech Filterra Bioscape (BMP-A)	TSS/TOC 66%-85%	66%-85%
	Nutrients	73%

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

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

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

If Yes, HCOC criteria do not apply.

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

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

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

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

Table F.1 Hydrologic Conditions of Concern Summary

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

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

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

The project is located within the Riverside County WAP geodatabase mapping tool as approved April 20, 2017. See Appendix 7 for the map indicating that the site is within the hydromodification exemption area.

Section G: Source Control BMPs

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

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

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

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets.	Mark all inlets with the works "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. On-site drainage structures,	Maintain and periodically repaint or replace inlet markings as needed; at least every 5 years. Inspect annually every summer. Provide stormwater pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-44, "Drainage

	including all storm drain clean outs, area drains, inlets, catch basins, inlet & outlet structures, lift stations, forebays, & water treatment control basins shall be inspected and maintained on a regular basis to ensure their operational adequacy. Inspect and maintain before each rainy season and after the first heavy rain.	System Maintenance," in Appendix 10 (CASQA Stormwater Quality Handbook at www.cabmphandbooks.com Include the following in lease agreements: "Tenants 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" Maintenance should include removal of trash, debris, & sediment and the repair of any deficiencies or damage that may impact water quality. Maintain at least once in September prior to the rainy season and after each storm as needed.
Interior floor drains and elevator shaft sump	The interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer	Inspect and maintain drains at least once annually to prevent blockages and overflow.
Landscape/Outdoor Pesticide Use	The final landscape shall be designed to accomplish all of the following: Preserve existing native trees, shrubs and ground cover to the maximum extent possible. Design landscape 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.	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 and Appendix 10. Provide IPM information to new owners, lessees and operators. Landscape maintenance should include mowing, weeding, trimming, removal of trash & debris, repair of erosion, re-vegetation, and removal

	Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To ensure successful establishments, select plants appropriate to site, soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. Pesticide usage should be at a necessary minimum and be consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation. Pesticides should be used at an absolute minimum or not at all in the retention/infiltration basin. If used, it should not be applied in close proximity to the rainy season	of cut & dead vegetation. It should be completed before rainy season and as needed. Irrigation maintenance should include the repair of leaky or broken sprinkler heads, the maintaining of timing apparatus accuracy, and the maintaining of shut off valves in good working order.
Refuse Trash Storage 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.	Adequate number of receptacles shall be provided. Inspect receptacles monthly; repair or replace leaky receptacles as needed. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, in

	Trash enclosures shall be roofed per City standards and the details on the FWQMP Exhibit in Appendix 1. Trash compactors shall be roofed and set on a concrete pad per City standards. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line. Connection of trash area drains to the MS4 is prohibited. See CASQA SD-32 BMP Fact Sheets in Appendix 10 for additional info. Signs shall be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	Appendix 10, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook 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. Inspect for accumulated trash and debris. Implement good housekeeping procedures on a regular basis. Sweep areas clean instead of using wash water. Loading docks will be kept in a clean and orderly condition, through a regular program of sweeping and litter control, and immediate cleanup of any spills or broken containers. Property owner will ensure thatloading docks will be swept as needed. Cleanup procedures will not include the use of wash-down water. Property owner will

		be responsible for implementation of loading dock housekeeping procedures. See the Fact Sheet SC-30, in Appendix 10, "Outdoor Loading and Unloading" in the CASQA Stormwater Quality Handbooks a www.cabmphandbooks.com
Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in the Fact Sheet SC-41, in Appendix 10, "Building and Grounds Maintenance", in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
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 of other unprotected metals that may leach into runoff. Include controls for other sources as specified by local reviewer	
Plazas, sidewalks, and parking lots	Spill kits are to be kept on-site at all times per SC-11	Sweep plazas, sidewalks, and parking lots weekly and before the rainy season 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)

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

To be completed during FWQMP

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:

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.

			Maintenance Responsibility				Funding Mechanism for Maintenance			Maintenance Costs	
BMP	Used	Not Used	Owner **	City	County	Flood District	Owner	Developer	Public *	1-year ($)	2-year ($)
Hydro seeding & Mulching	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Landscape Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Landscape Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Lawns	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Impervious permanent cover (concrete /asphalt) Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Impervious permanent cover (concrete /asphalt) Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Pervious permanent cover (gravel)	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Down Drains	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Ribbon Gutter Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Ribbon Gutter Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Curb & gutter Public	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Curb & gutter Private	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Storm Drain	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Underground Chambers	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Bioscape Filterra	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Education Materials	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Vehicle Wash Area	☐	☐	☐	☐	☐	☐	☐	☐	☐		

* Provide annual costs (1-year and 2-year) for all publicly maintained BMP's. Specifically include the costs for all public landscaping and treatment control that are responsibility of the City or the Landscape Maintenance District.

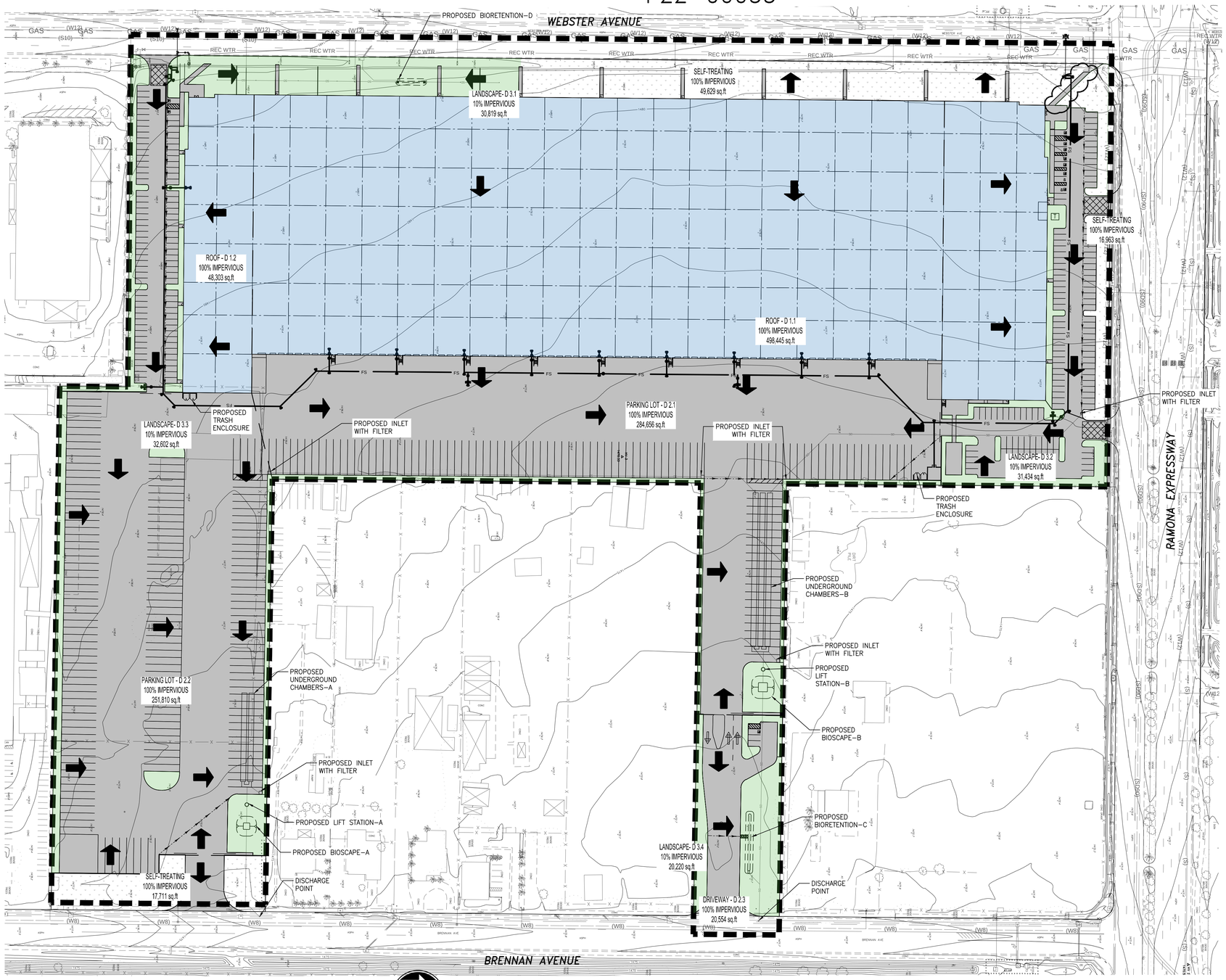
** Maintenance funding contact information for each privately maintained (by owner, POA or HOA) BMP must be included.

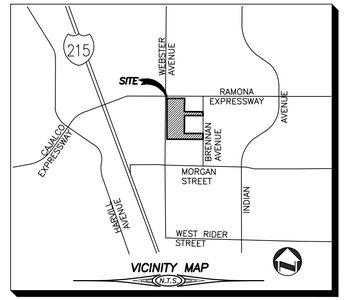
<u>To be completed during FWQMP</u>

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

DMA SITE PLAN
RAMONA EXPRESSWAY AND WEBSTER AVENUE
P22-00035





DMA 1				
DMA	DMA CLASSIFICATION	NAME	SURFACE TYPE	AREA (SF)
1.2	D	ROOF	ROOF	48,303
2.2	D	STREETS	ASPHALT/CONCRETE	249,090
3.3	D	LANDSCAPING	ORNAMENTAL LANDSCAPING	32,602
SELF-TREATING	A	SELF-TREATING	ORNAMENTAL LANDSCAPING	17,711
TOTAL				347,706

DMA 2				
DMA	DMA CLASSIFICATION	NAME	SURFACE TYPE	AREA (SF)
3.1	D	LANDSCAPING	ORNAMENTAL LANDSCAPING	48,303
SELF-TREATING	A	SELF-TREATING	ORNAMENTAL LANDSCAPING	49,628
TOTAL				97,931

DMA 3				
DMA	DMA CLASSIFICATION	NAME	SURFACE TYPE	AREA (SF)
2.3	D	STREETS	ASPHALT/CONCRETE	20,554
3.4	D	LANDSCAPING	ORNAMENTAL LANDSCAPING	20,220
TOTAL				40,774

DMA 4				
DMA	DMA CLASSIFICATION	NAME	SURFACE TYPE	AREA (SF)
1.1	D	ROOF	ROOF	498,445
2.1	D	STREETS	ASPHALT/CONCRETE	35,566
3.2	D	LANDSCAPING	ORNAMENTAL LANDSCAPING	30,819
SELF-TREATING	A	SELF-TREATING	ORNAMENTAL LANDSCAPING	16,962
TOTAL				549,792

BMP SIZING	
BMP	STORAGE (CU.FT.)
UNDERGROUND CHAMBERS A	14,112
UNDERGROUND CHAMBERS B	36,292
TOTAL	50,404

0 80 240
40 160 320
SCALE: 1" = 80'

LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- FLOW ARROW
- ROOF AREA
- IMPERVIOUS AREA
- PERVIOUS AREA
- PROPOSED STORM DRAIN
- SELF TREATING AREA

DMA SITE PLAN –PROLOGIS
RAMONA & WEBSTER
INDUSTRIAL FACILITY–
SHEET 1
P22–00035
PREPARATION DATE: FEBRUARY 2023
JOB NUMBER: 10331
PLANS PREPARED BY:

adkan ENGINEERS
Civil Engineering • Surveying • Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 • Fax:(951) 688-0599

PLOT DATE: 3/1/2023 2:15 PM

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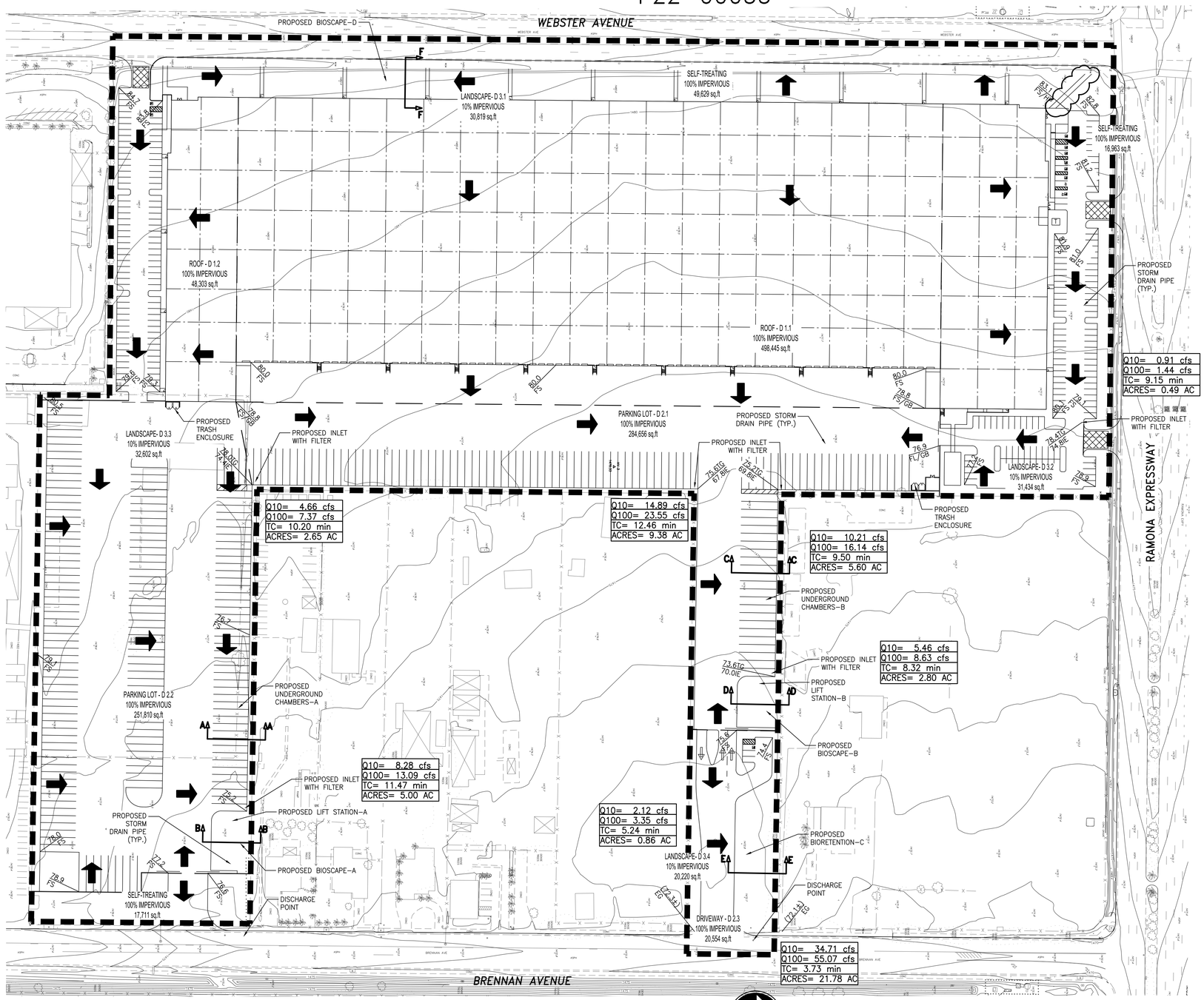
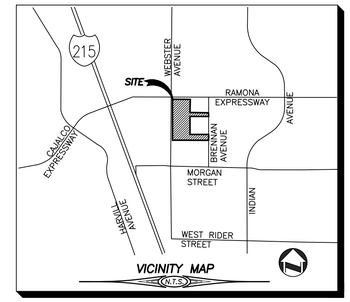
DMA SITE PLAN
RAMONA EXPRESSWAY AND WEBSTER AVENUE
P22-00035

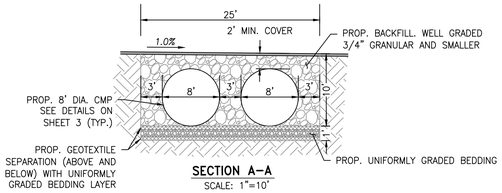


0 80 240
40 160 320
SCALE: 1" = 80'

LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- FLOW ARROW
- ROOF AREA
- IMPERVIOUS AREA
- PERVIOUS AREA
- PROPOSED STORM DRAIN
- SELF TREATING AREA





SECTION A-A
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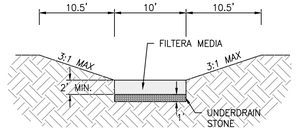

SECTION B-B
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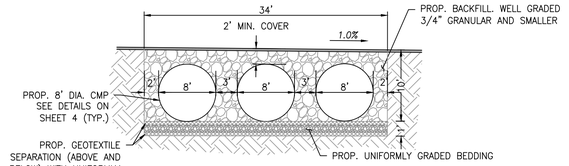

SECTION C-C
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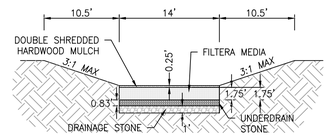

SECTION D-D
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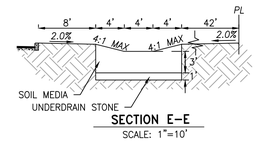

SECTION E-E
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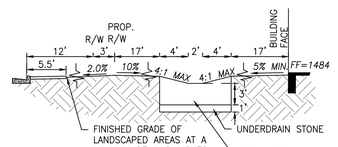

SECTION F-F
SCALE: 1"=10'

POST-CONSTRUCTION
BMP SITE PLAN -
PROLOGIS RAMONA &
WEBSTER INDUSTRIAL
FACILITY- SHEET 1
P22-00035

PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

adkan ENGINEERS
Civil Engineering • Surveying • Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 • Fax:(951) 688-0599

PLOT DATE: 3/1/2023 4:30 PM

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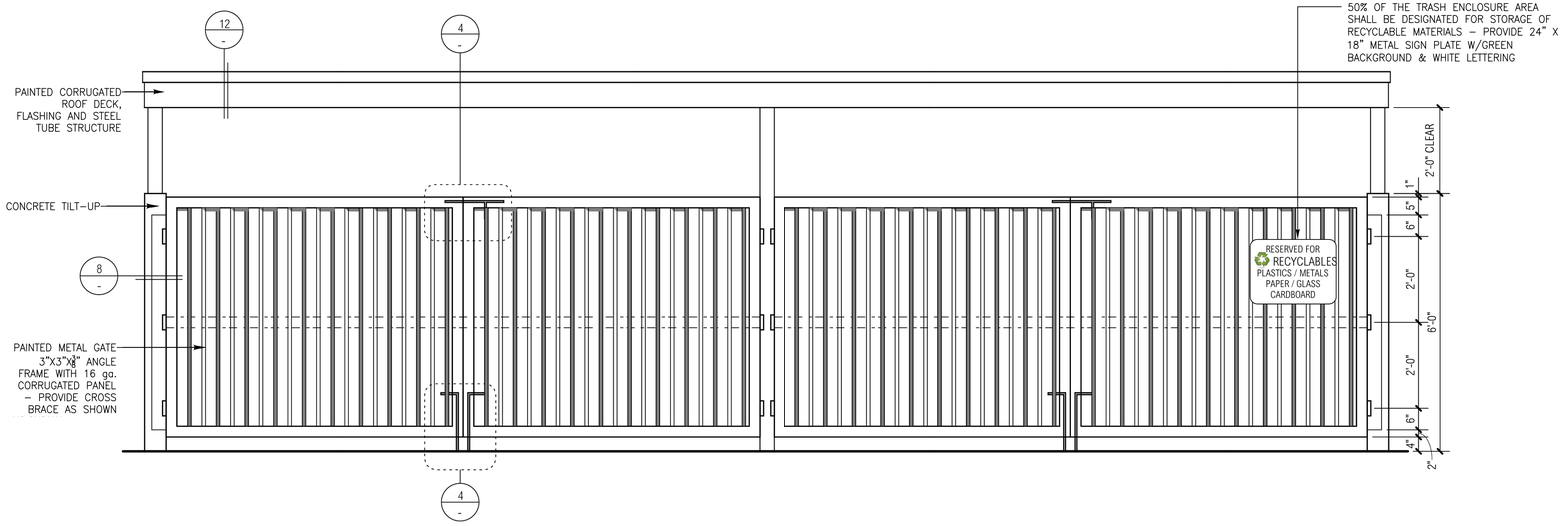
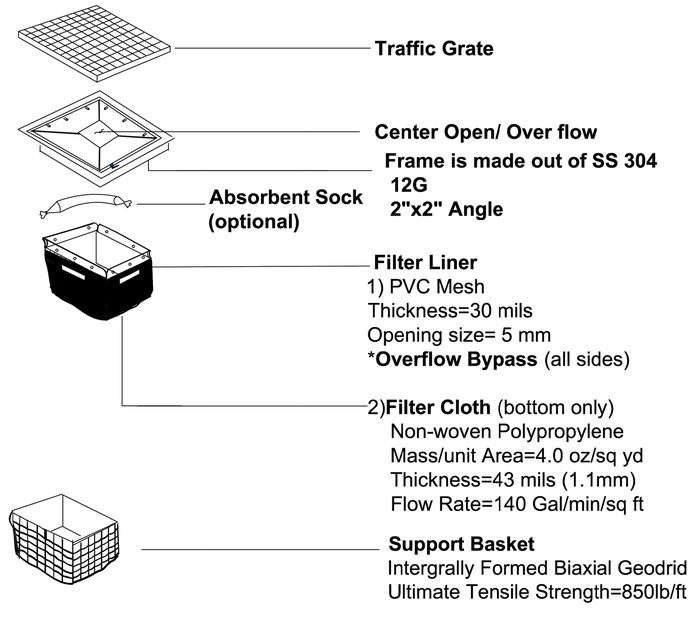
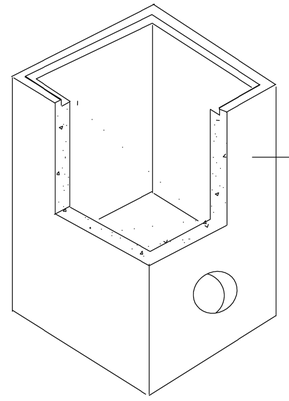


TRASH ENCLOSURE GATE ELEVATION

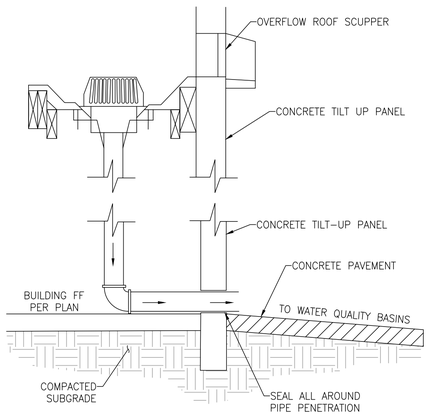
NTS





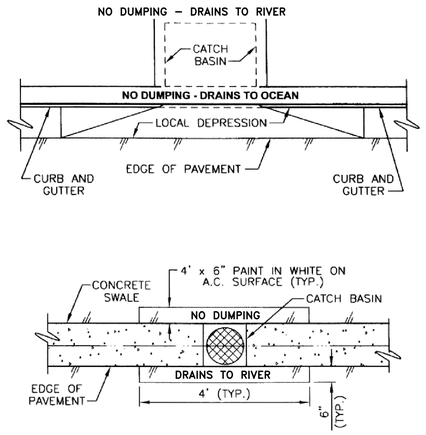
DRAINPAC DETAIL

NTS



ROOF DRAIN DETAIL

NTS



CATCH BASIN STENCILING DETAIL

NTS

POST-CONSTRUCTION BMP SITE PLAN – PROLOGIS RAMONA & WEBSTER INDUSTRIAL FACILITY– SHEET 2
P22-00035
PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

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PLOT DATE: 3/1/2023 4:30 PM

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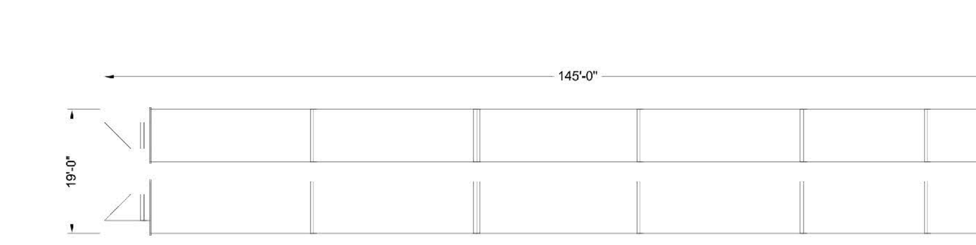
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 295 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 14,018 CF
- PIPE STORAGE VOLUME = 14,112 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 14,112 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = GALV
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



ASSEMBLY
SCALE: 1" = 20'

NOTES

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

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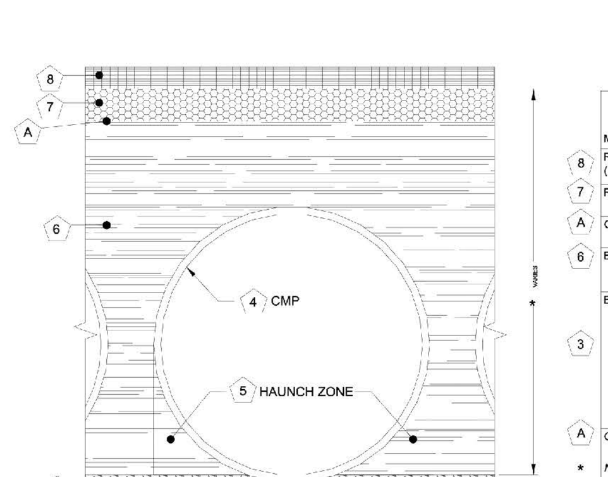
CONTECH CMP DETENTION SYSTEMS | CONTECH DYODS DRAWING

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

PROJECT No.: 15987 | SEQ. No.: 24214 | DATE: 2/8/2023 | DESIGNED: DYO | DRAWN: DYO | CHECKED: DYO | APPROVED: DYO | SHEET NO.: 1



DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE				
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types

* Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.

1. MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

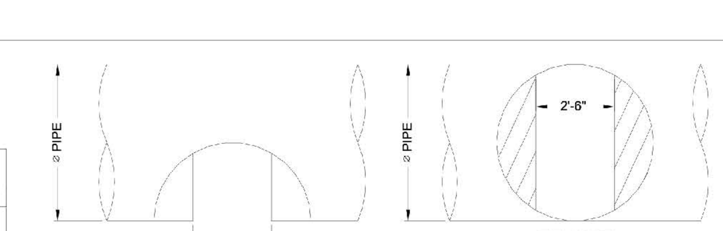
2. PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5. HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

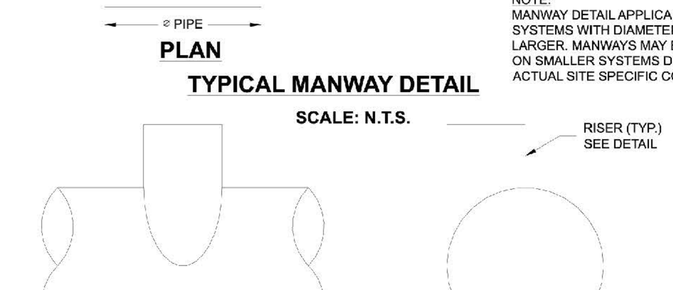
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN | FRONT

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

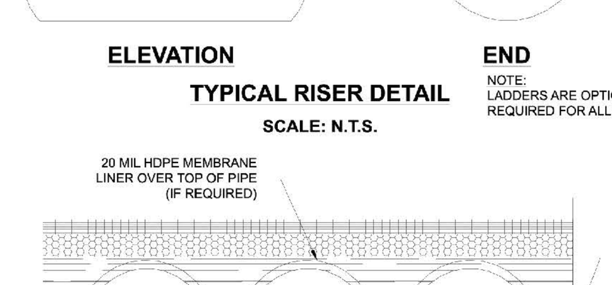
TYPICAL MANWAY DETAIL
SCALE: N.T.S.



ELEVATION | END

TYPICAL RISER DETAIL
SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW
LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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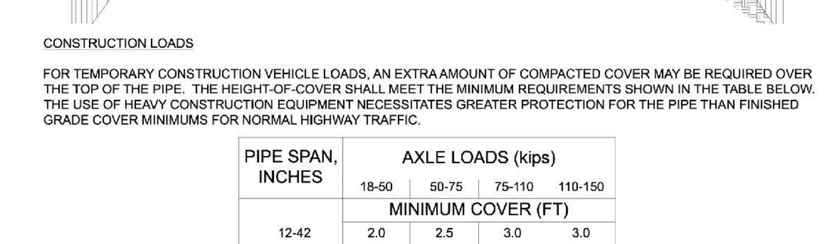
DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM



CONSTRUCTION LOADS

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

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

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

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

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

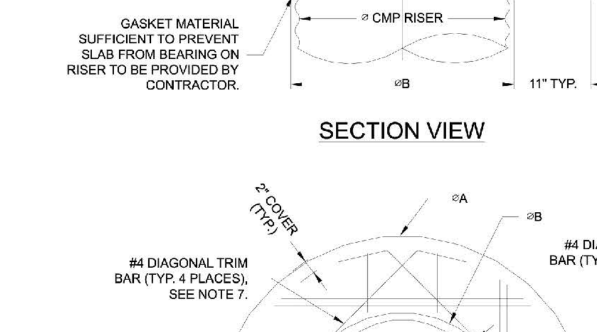
ALUMINUM: AASHTO M-196 OR ASTM B-745 APPLICABLE

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE. APPLICABLE REQUIREMENTS

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

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

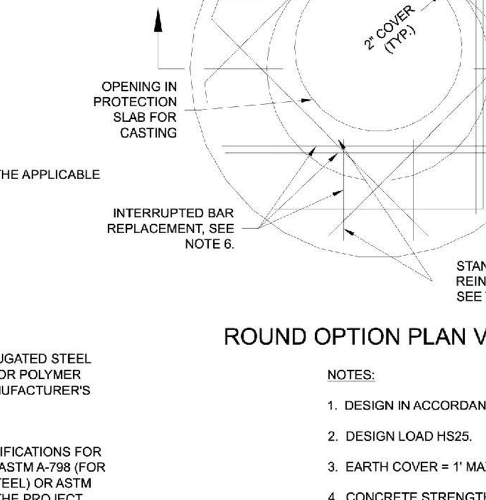
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



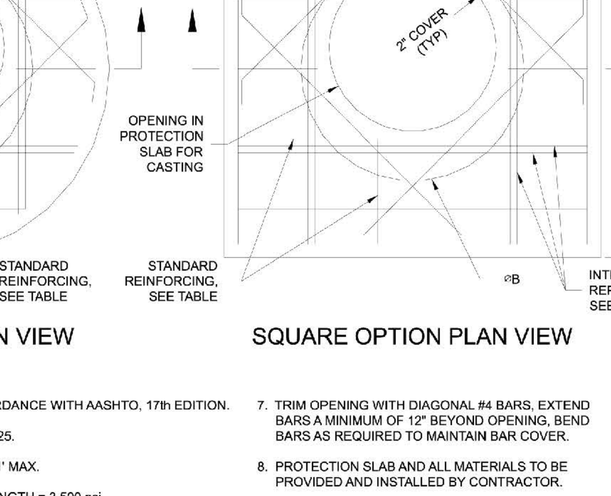
SECTION VIEW

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

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

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

MANHOLE CAP DETAIL
SCALE: N.T.S.

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

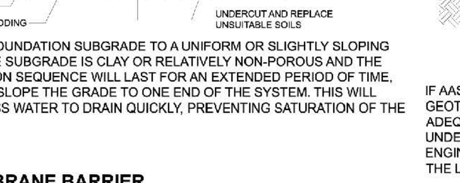
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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



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

GEOMEMBRANE BARRIER

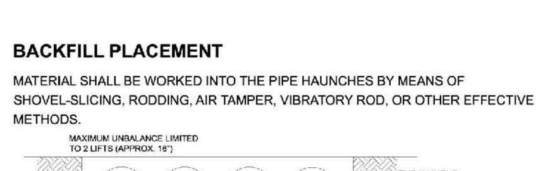
A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM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

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

IN-SITU TRENCH WALL

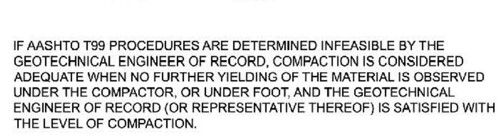
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



BACKFILL PLACEMENT

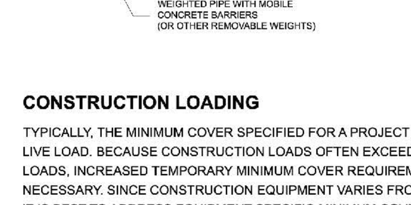
MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.



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

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

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

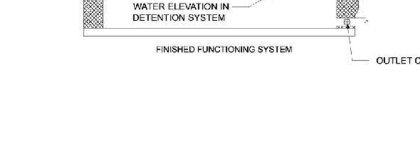


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

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

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

MAINTENANCE

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

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

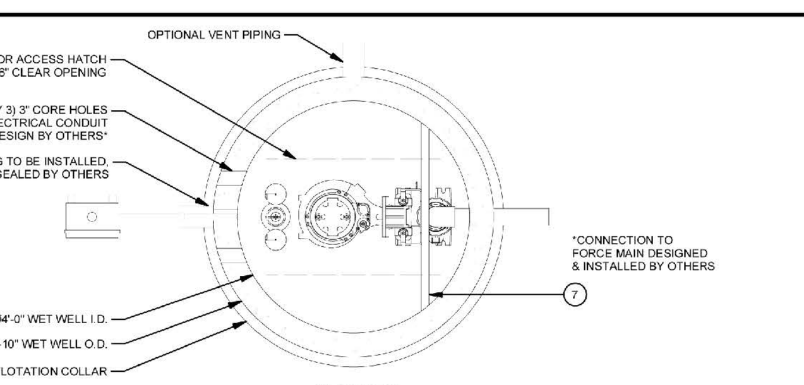
ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM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

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

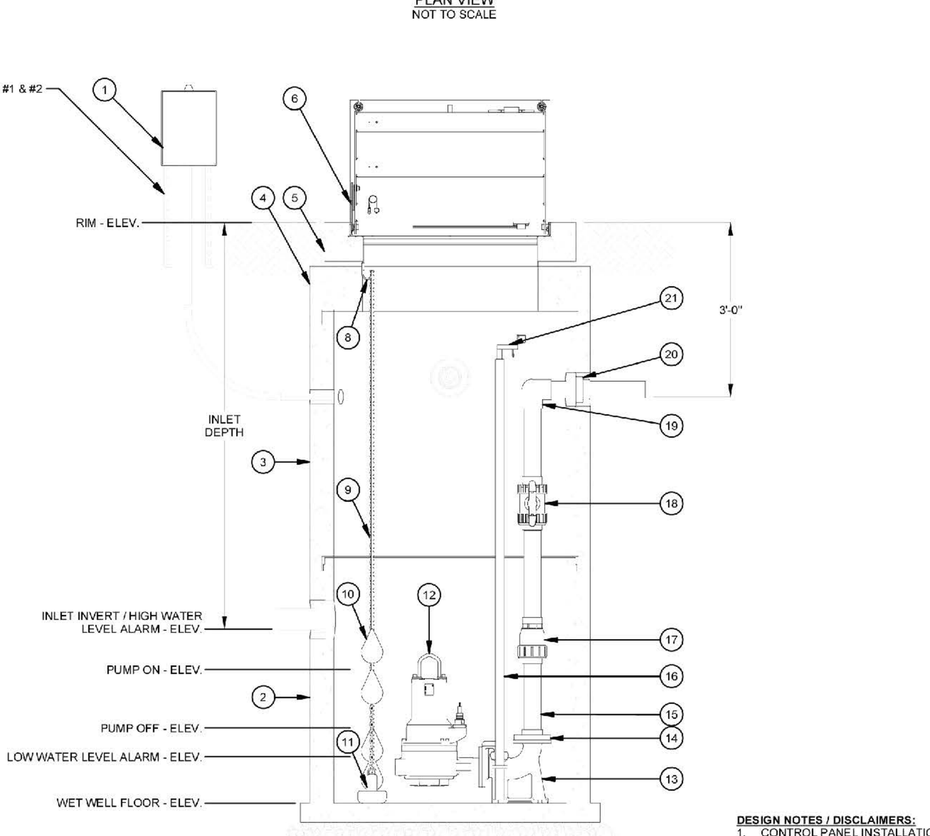
THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE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

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

N.T.S. — CONTECH DETENTION DESIGN DETAILS — A1



PLAN VIEW
NOT TO SCALE



PROFILE VIEW
NOT TO SCALE

BILL OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	1	SIMPLEX CONTROL PANEL
2	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BASE *HEIGHT VARIES*
3	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BARREL *HEIGHT VARIES *
4	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE FLAT TOP
5	1	JENSEN PRECAST CONCRETE HATCH RISER
6	1	SINGLE DOOR HATCH WITH A CLEAR OPENING OF 24IN X 36IN
7	5 LF	LF STRUT C-CHANNEL 1-5/8 X 1-5/8 12GA SLOTTED 316SS
8	1	FLOAT BRACKET 3 HOOK TYPE 316SS
9	10 LF	LF CHAIN 1/4IN 316SS
10	4	FLOAT SWITCH w/ 100' CABLE
11	1	ANCHOR 15LB PVC COATED
12	1	3IN SUBMERSIBLE PUMP
13	1	AUTOCOUPLING ASSY 3IN FLG STD
14	1	ADAPTER 3IN FLG X SLIP SCH 80 PVC
15	20 LF	LF PIPE PVC SCH 80 3IN DIA
16	20 LF	LF PIPE 1-1/2IN SCH40 GUIDE RAIL 304SS
17	1	BALL CHECK VALVE 3IN SCH 80 PVC SLIP
18	1	BALL VALVE 3IN SCH 80 PVC SLIP
19	1	90 DEG ELBOW 3IN SCH 80 PVC SLIP
20	1	FLEXIBLE PIPE CONNECTOR
21	1	UPPER GUIDE RAIL BRACKET 3IN

348-S Series Standard.idw

PROJECT SPECIFIC INFORMATION	
FINISHED GRADE (Ft.)	
RIM ELEV. (Ft.)	
INLET ELEV. (Ft.)	
FORCE MAIN DISCHARGE ELEV. (Ft.)	
AVAILABLE POWER SUPPLY	120V [ ] 240V [ ] 480V [ ]
AVAILABLE POWER PHASE	Single [ ] Three [ ]

SYSTEM CHARACTERISTICS	
APPLICATION	SEWAGE [ ] STORM WATER [ ]
DESIGN FLOW (gpm)	
TOTAL DYNAMIC HEAD (Ft.)	
STATIC HEAD (Ft.)	
PUMP MOTOR (Std / XP)	Standard [ ] XP/FM [ ]
PUMP TYPE	Non-Clog [ ] Grinder [ ] Chopper [ ] Vortex [ ]
PUMP RATED HP & CURRENT	
ACCESS HATCH LOAD LEVEL	Pedestrian [ ] Incidental H-20 [ ] Parking Lot H-20 [ ] Full Traffic H-20 [ ]

ADDITIONAL OPTIONS		
OPTION	YES	NO
CONTROL PANEL SS ENCLOSURE	[ ]	[ ]
CONTROL PANEL AC UNIT	[ ]	[ ]
CONTROL PANEL REMOTE ALARM MONITORING	[ ]	[ ]
AIR RELEASE/VACUUM VALVE	[ ]	[ ]
INTERIOR LINER	[ ]	[ ]
CONCRETE WATERPROOFING	[ ]	[ ]
VENT PIPE	[ ]	[ ]
ODOR CONTROL VALVE	[ ]	[ ]
LIFTING CRANE	[ ]	[ ]
GENERATOR RECEPTACLE	[ ]	[ ]

DESIGN NOTES / DISCLAIMERS:
1. CONTROL PANEL INSTALLATION, MOUNTING DESIGN & HARDWARE BY OTHERS.
2. FINAL CONTROL PANEL LOCATION TO BE DETERMINED ACCORDING TO PROJECT REQUIREMENTS. CONSULT ALL SUBMITTED PUMP AND LEVEL CONTROL CABLE LENGTHS WHEN DETERMINING THE CONTROL PANEL LOCATION.
3. ALL FOUNDATION, SUBGRADE, AND BACKFILL DESIGNED BY OTHERS.

DISCLAIMERS, INCLUDING BUT NOT LIMITED TO:
1.) All elevations have been provided by others, and have not been verified by Jensen Precast. Contractor to verify all dimensions and elevations in field prior to installation.
2.) These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint orientations may vary across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
3.) System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
4.) Foundation, subgrade, and backfill to be designed by others.

JENSEN PUMP STATIONS | 521 DUNN CIRCLE, SPARKS, NV 89431 | www.jensenwaterresources.com | (855) 468-5600

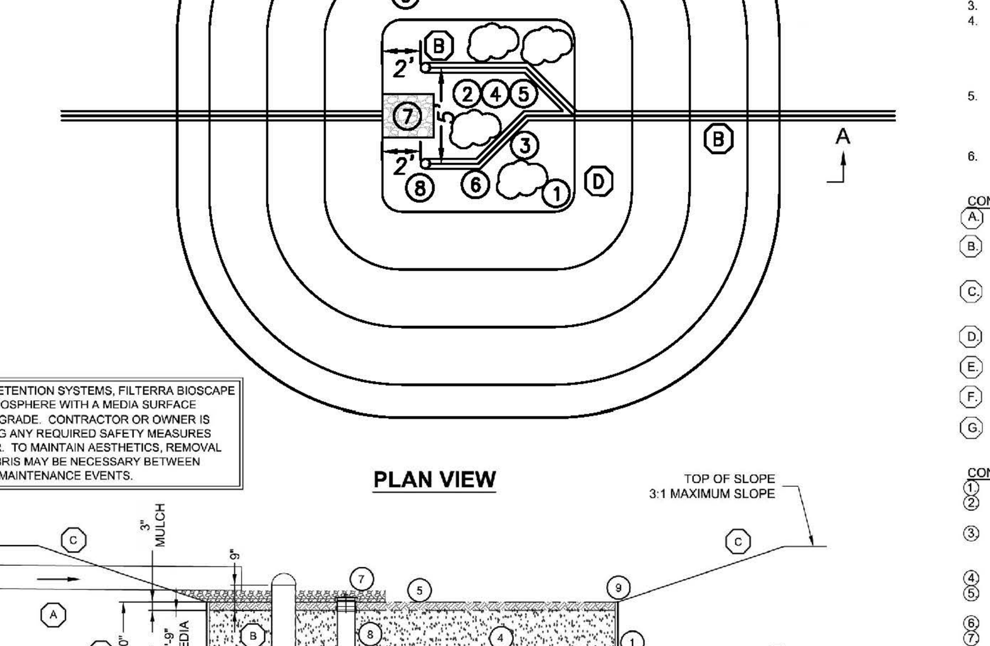
DESCRIPTION: 348-S SERIES STANDARD | MECHANICAL DETAIL | PART NUMBER: 348-S Series Standard | DRAWN BY: T. Handke | MODIFIED: 4/29/2020 | SHEET: 2 OF 2

N.T.S. — JENSEN 672-S SERIES SIMPLEX PUMP STATION DETAIL — A2

THIS IS A SCHEMATIC LAYOUT ONLY. ACTUAL CONFIGURATION WILL VARY BASED ON THE SITE SPECIFIC CONSIDERATIONS. REFER TO FLOWKIT DRAWINGS FOR ADDITIONAL DETAILS.

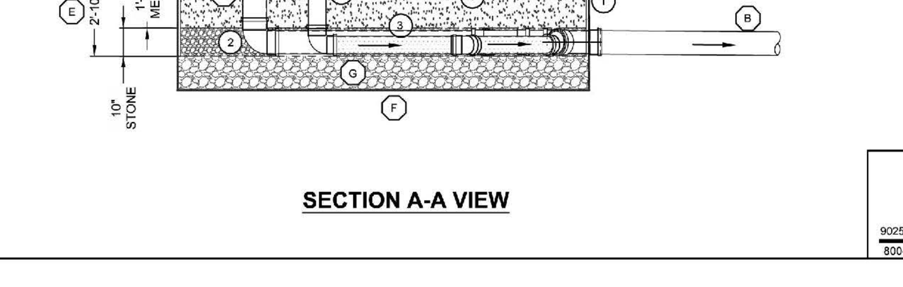
BILL OF MATERIALS		
COUNT	DESCRIPTION	INSTALLED BY
X	FILTERRA SURFACE AREA (SF)	CONTRACTOR
X	MULCH VOLUME (CY)	CONTRACTOR
XX	FILTERRA MEDIA VOLUME (CY)	CONTRACTOR
X	1/2" #4 ROUND AGGREGATE UNDERDRAIN STONE (CY)	CONTRACTOR
X	ENERGY DISSIPATION ROCK (CY)	CONTRACTOR
X	EROSION CONTROL (LF)	CONTRACTOR
X	FILTERRA FLOWKIT	CONTRACTOR

PLANTING SCHEDULE *NOTE: PLANTS PROVIDED BY OTHERS	
QUANTITY	FILTERRA BIOSCAPE SYSTEM PLANT PALETTE



AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE SYSTEM IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.

PLAN VIEW



SECTION A-A VIEW

GENERAL NOTES
1. CONTRACTOR SHALL CONTACT CONTECH TO COORDINATE DELIVERY AND SUPERVISION OF PLACEMENT OF FILTERRA BIOSCAPE SYSTEM COMPONENTS (ACTIVATION). CONTRACTOR SHALL COMPLETE ITEMS IN THE LIST OF CONTRACTOR INSTALLATION RESPONSIBILITIES LISTED ON THIS DETAIL BEFORE CONTECH'S REPRESENTATIVE ATTENDS AND SUPERVISES THE ACTIVATION OF THE BIOSCAPE SYSTEM.
2. PERFORM FILTERRA BIOSCAPE SYSTEM EXCAVATION ONLY AFTER ALL THE CONTRIBUTING DRAINAGE AREAS ARE PERMANENTLY STABILIZED. DO NOT CONSTRUCT FILTERRA BIOSCAPE SYSTEM IN AN AREA USED AS EROSION AND SEDIMENT CONTROL FACILITIES. DO NOT STOCKPILE MATERIALS NOR STORE EQUIPMENT IN THIS AREA.
3. USE METHODS OF EXCAVATION THAT MINIMIZE COMPACTION OF THE UNDERLYING SOIL UNLESS THE SYSTEM IS TO BE LINED.
4. CONTRACTOR SHALL COORDINATE WITH CONTECH BEFORE THE FILTERRA BIOSCAPE SYSTEM AREA IS EXCAVATED TO MINIMIZE TIME BETWEEN EXCAVATION AND DELIVERY AND ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY STANDING WATER THAT ACCUMULATES IN THE EXCAVATED AREA MUST BE REMOVED BY THE CONTRACTOR BEFORE CONTECH CAN PROVIDE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY ADDITIONAL EXCAVATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. EXCAVATION DIMENSIONS SHOULD BE PROVIDED TO CONTECH IN THE ACTIVATION REQUEST CHECKLIST.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE EXCAVATED AREA(S) FOR USE DURING THE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM(S). ACCESS SHALL NOT PROHIBIT LIGHT DUTY EQUIPMENT THAT MAY BE USED TO INSTALL THE COMPONENTS (STONE, MEDIA, ETC). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RE-STABILIZATION THAT MAY BE REQUIRED AFTER THE FILTERRA BIOSCAPE SYSTEM ACTIVATION.
6. CONTECH AND/OR ITS REPRESENTATIVES MUST BE SCHEDULED TO BE ON SITE FOR THE LIST ENTITLED CONTRACTOR ACTIVATION RESPONSIBILITIES.

CONTRACTOR SITE PREPARATION RESPONSIBILITIES AS DENOTED BY (X) ON THIS DETAIL:
(A) CONTRACTOR SHALL INSTALL PIPE OR SWALE THAT CONVEYS INFLUENT FLOWS AS WELL AS ANY REQUIRED INLET AND OUTLET STRUCTURES.
(B) CONTRACTOR SHALL PROVIDE BYPASS PIPE AND RISER OR OTHER STRUCTURE AS SHOWN ON PLANS. THE BYPASS PIPE SHALL BE INSTALLED WITH WYE(S), OR OTHER PIPE FITTINGS, AND WITH REDUCER COUPLING(S) FOR CONNECTION OF UNDERDRAIN PIPE, PER PLANS. PIPES SHALL BE INSTALLED TO PROMOTE POSITIVE FLOW FROM THE FILTERRA BIOSCAPE SYSTEM.
(C) IF REQUIRED, CONTRACTOR TO PROVIDE SHOULDER ACCORDING TO DIMENSION AND SLOPE SHOWN ON PLANS OR AS DESIGNED BY ENGINEER OF RECORD. SLOPE FROM SHOULDER TO FILTERRA BIOSCAPE SYSTEM SURFACE AREA SHALL NOT EXCEED 3:1. SOD IS REQUIRED TO STABILIZE SIDE SLOPES OR ADJACENT GRADE.
(D) CONTRACTOR TO EXCAVATE MEDIA AREA CORRESPONDING TO THE SIZE OF THE FILTERRA BIOSCAPE SYSTEM SURFACE AREA AS SHOWN ON DETAIL AND ON PLAN SHEETS.
(E) CONTRACTOR SHALL EXCAVATE VERTICALLY FROM BOTTOM OF UNDERDRAIN STONE, OR DRAINAGE STONE, IF REQUIRED, TO ELEVATION OF MULCH AS SHOWN ON THIS DETAIL.
(F) CONTRACTOR TO PROVIDE AND INSTALL ANY GEOTEXTILE OR IMPERMEABLE LINER FOR BOTTOM OF THE FILTERRA BIOSCAPE SYSTEM IF REQUIRED PER THE PLANS.
(G) CONTRACTOR TO PROVIDE AND INSTALL ANY ADDITIONAL DRAINAGE STONE BELOW THE FILTERRA BIOSCAPE SYSTEM AS CALLED OUT ON THE PLANS.

CONTRACTOR ACTIVATION RESPONSIBILITIES AS DENOTED BY (#) ON THIS DETAIL:
1. PLACE GEOTEXTILE FABRIC ALONG THE PERIMETER OF THE FILTERRA BIOSCAPE SYSTEM EXCAVATION.
2. PLACE 10" OF UNDERDRAIN STONE - 2" UNDER THE PIPING, 6" AROUND THE PIPING AND 2" ABOVE THE PIPING USING LIGHT DUTY EQUIPMENT ONLY.
3. PLACE 6" UNDERDRAIN PIPING UNLESS OTHERWISE APPROVED BY CONTECH, ASSOCIATED PIPING AND FITTINGS/ELBOWS TO CONNECT TO THE PIPING/FITTING(S) THAT IS PROVIDED BY CONTRACTOR (SEE CONTRACTOR INSTALLATION RESPONSIBILITIES THIS DETAIL).
4. PLACE 21" FILTERRA MEDIA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MEDIA.
5. PLACE 3" DOUBLE SHREDDED HARDWOOD MULCH OVER ENTIRE FILTERRA BIOSCAPE SYSTEM SURFACE AREA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MULCH.
6. PROVIDE AND PLANT VEGETATION AS INDICATED IN TABLE ON THIS DETAIL OR ON SITE PLANS.
7. PLACE ENERGY DISSIPATION ROCK APRON AS DESIGNED AND INDICATED ON THIS DETAIL OR PER ENGINEER OF RECORD PLANS.
8. PLACE CLEANOUT ADAPTER, PLUG AND PIPING.
9. PLACE ADDITIONAL EROSION CONTROL AROUND FILTERRA BIOSCAPE SYSTEM (IF REQUIRED).

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FILTERRA BIOSCAPE™ SYSTEM
STANDARD DETAIL

N.T.S. — CONTECH FILTERRA BIOSCAPE SYSTEM DETAIL — A3

POST-CONSTRUCTION BMP SITE PLAN - PROLOGIS RAMONA & WEBSTER INDUSTRIAL FACILITY- SHEET 3
P22-00035
PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

adkan ENGINEERS
Civil Engineering · Surveying · Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 · Fax:(951) 688-0599

PLOT DATE: 3/1/2023 4:31 PM

U:\PROJECTS\PROLOGIS\10331 - RAMONA & WEBSTER\ENGINEERING\WQMP\10331_BMP SITE PLAN.DWG

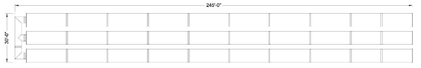
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = H20/SH20
- APPROX. LINEAR FOOTAGE = 746 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 36,270 CF
- PIPE STORAGE VOLUME = 36,292 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 36,292 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



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

"The design and information shown on this drawing is provided only for the use by persons or companies to whom it is addressed and may not be used for any purpose other than stated without the written consent of CONTECH. Any use or reliance by any unauthorized party is at such party's sole risk and without liability to CONTECH. Unauthorized use of this drawing may result in civil and criminal sanctions."

"If discrepancies between the supplied information and specific site conditions or design requirements are encountered, it is the responsibility of the user to inform CONTECH before proceeding with fabrication. Failure to do so will void CONTECH's responsibility for the design."

DATE	REVISION DESCRIPTION	BY

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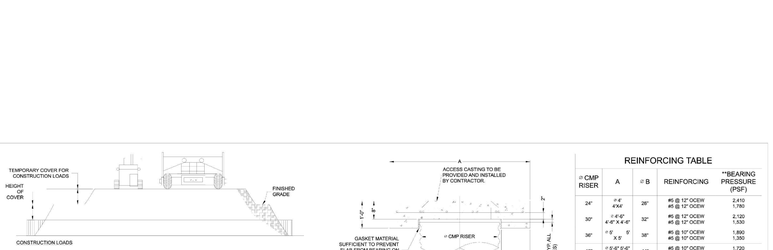
CONTECH CMP DETENTION SYSTEMS
CONTROL DYODS DRAWING

ASSEMBLY
SCALE: 1" = 30'

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.	REQ. No.	DATE
NAME	24217	2/8/2023
DESIGNED	DRAWN	
DYO	DYO	
CHECKED	APPROVED	
DYO	DYO	
SHEET NO.		1



REINFORCING TABLE

CMP RISER	A	B	REINFORCING	**BEARING PRESSURE (PSF)
24"	0'-8" 4'x4'	26°	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	0'-8" 4'-6" X 4'-6"	32°	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	0'-8" X 5' 5'	38°	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	0'-8" 5'-0" X 5'-6"	44°	#5 @ 10" OCEW #5 @ 8" OCEW	1,720 1,210
48"	0'-8" X 6'	50°	#5 @ 8" OCEW #5 @ 8" OCEW	1,600 1,100

NOTES:
1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, BUT NOT LESS THAN 2 SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

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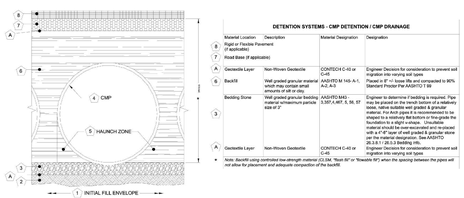
CONTECH CMP DETENTION SYSTEMS
CONTROL DYODS DRAWING

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.	REQ. No.	DATE
NAME	24217	2/8/2023
DESIGNED	DRAWN	
DYO	DYO	
CHECKED	APPROVED	
DYO	DYO	
SHEET NO.		1

N.T.S.

CONTECH DETENTION DESIGN DETAILS | B1



DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE

	Material Location	Description	Material Designation	Designation
7	Rigid or Flexible Pavement (if applicable)			
6	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decisions for consideration to prevent soil migration into varying soil types
5	Backfill	Well graded granular material with a maximum particle size of 2"	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
4	Bedding Stone	Well graded granular Bedding material w/maximum particle size of 2"	AASHTO M43: 3,357,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. Pipe may be placed on a minimum 4" thick shaped to a relatively flat bottom or fine grade the foundation to a slight v-shape. Unsuitable foundation soils may be stabilized with crushed stone with a 4" layer of well graded & granular stone per the material designation. See AASHTO M 43 for Size Designations
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decisions for consideration to prevent soil migration into varying soil types

* Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "Flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

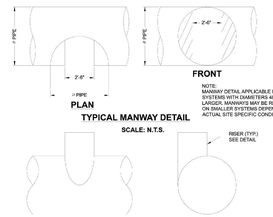
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

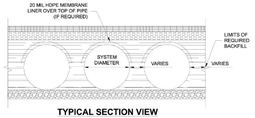
5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE HAUNCHES OF THE PIPE. THERE SHALL BE NO MORE THAN THREE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE LIFTS AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.





NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE MEMBRANE LINER WILL PROTECT THE SYSTEM FROM THE CORROSIVE EFFECTS FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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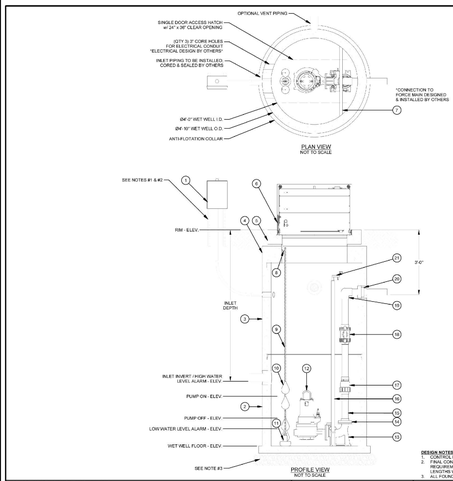
CONTECH CMP DETENTION SYSTEMS
CONTROL DYODS DRAWING

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.	REQ. No.	DATE
NAME	24217	2/8/2023
DESIGNED	DRAWN	
DYO	DYO	
CHECKED	APPROVED	
DYO	DYO	
SHEET NO.		1

N.T.S.

JENSEN 672-S SERIES SIMPLEX PUMP STATION DETAIL | B2



ITEM	QTY	DESCRIPTION
1	1	SIMPLEX CONTROL PANEL
2	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BASE *HEIGHT VARIES*
3	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BARREL *HEIGHT VARIES *
4	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE FLAT TOP
5	1	JENSEN PRECAST CONCRETE HATCH INSERT
6	1	SINGLE DOOR HATCH (W/(1) 4-CLEAR OPENING) OF 24IN X 36IN
7	5 LF	LF STRUT C-CHANNEL 1-5/8 X 1-5/8 12GA SLOTTED 316SS
8	1	FLOAT BRACKET 2-HOOK TYPE 316SS
9	10 LF	LF CHAIN 1/4IN 316SS
10	4	FLOAT SWITCH w/ 10ft CABLE
11	1	ANCHOR 15LB POC COATED
12	1	3IN SUBMERSIBLE PUMP
13	1	AUTOCOUPLING ASSY 3IN FLG STD
14	1	ADAPTER 3IN FLG X 3LIP SCH 80 PVC
15	20 LF	LF PIPE PVC SCH 80 3IN DIA
16	20 LF	LF PIPE 1 1/2IN SCH40 GUIDE RAIL 304SS
17	1	BALL CHECK VALVE 3IN SCH 80 PVC SLIP
18	1	BALL VALVE 3IN SCH 80 PVC SLIP
19	1	90 ELL 45 ELBOW 3IN SCH 80 PVC SLIP
20	1	FLEXIBLE PIPE CONNECTOR
21	1	UPPER GUIDE RAIL BRACKET 3IN

PROJECT SPECIFIC INFORMATION

FINISHED GRADE (R.)	
RIM ELEV. (R.)	
INLET ELEV. (R.)	
FORCE MAIN DISCHARGE ELEV. (R.)	
AVAILABLE POWER SUPPLY	120V [ ] 240V [ ] 480V [ ]
AVAILABLE POWER PHASE	Single [ ] Three [ ]

SYSTEM CHARACTERISTICS

APPLICATION	SEWAGE [ ] STORM WATER [ ]
DESIGN FLOW (gpm)	
TOTAL DYNAMIC HEAD (Ft.)	
STATIC HEAD (Ft.)	
PUMP MOTOR (Size / RP)	Standard [ ] RPPM [ ]
PUMP TYPE	Non-Clog [ ] Grinder [ ] Chopper [ ] Vortex [ ]
PUMP RATED HP & CURRENT	
ACCESS HATCH (QAD LEVEL)	Pedestrian [ ] Incidental H-20 [ ] Parking Lot H-20 [ ] Full Traffic H-20 [ ]

ADDITIONAL OPTIONS

OPTION	YES	NO
CONTROL PANEL / ENCLOSURE	[ ]	[ ]
CONTROL PANEL W/ UNIT	[ ]	[ ]
CONTROL PANEL WITH ALARM MONITORING	[ ]	[ ]
AIR RELEASE/VACUUM VALVE	[ ]	[ ]
INTERCOUPLER	[ ]	[ ]
CONCRETE WATERPROOFING	[ ]	[ ]
VENT PIPE	[ ]	[ ]
ODOR CONTROL VALVE	[ ]	[ ]
LIFTING CRANE	[ ]	[ ]
GENERATOR RECEPTACLE	[ ]	[ ]

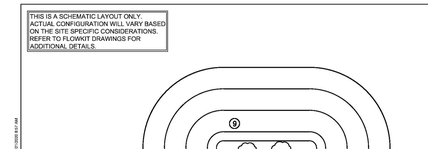
DESIGN NOTES / DISCLAIMERS:
1. CONTROL PANEL INSTALLATION, MOUNTING DESIGN & HARDWARE BY OTHERS.
2. FINAL CONTROL PANEL LOCATION TO BE DETERMINED ACCORDING TO PROJECT SPECIFIC CONDITIONS. REFER TO CONTROL PANEL LOCATION DRAWING FOR MORE INFORMATION.
3. ALL FOUNDATION, SUBGRADE, AND BACKFILL DESIGNED BY OTHERS.

DISCLAIMERS, INCLUDING BUT NOT LIMITED TO:
1.) All elevations have been provided by others, and have not been verified by Jensen Precast. Contractor to verify all dimensions and elevations in field prior to installation.
2.) These layout drawings are intended to show overall system design only. All concrete component thicknesses, dimensions, and joint configurations are subject to accuracy across Jensen Precast's manufacturing facilities. Contractor to confirm all thicknesses, dimensions, and joint orientations prior to installation.
3.) System design criteria has been provided to Jensen Precast. Others are responsible for verification that system meets intended application.
4.) Foundation, subgrade, and backfill to be designed by others.

JENSEN PRECAST PUMP STATIONS
521 DUNN CIRCLE, SPARKS, NV 89431
www.jensenwaterstormsources.com
(855) 465-5600

DESCRIPTION:	348-S SERIES STANDARD	REV.
MECHANICAL DETAIL		SHEET
PART NUMBER: 348-S Series Standard	DRAWN BY: T. Hardke	2 OF 2
CREATED	MODIFIED 4/29/2020	

THIS IS A SCHEMATIC LAYOUT ONLY. ACTUAL CONFIGURATION WILL VARY BASED ON THE SITE SPECIFIC CONSIDERATIONS. REFER TO FLOWKIT DRAWINGS FOR ADDITIONAL DETAILS.



BILL OF MATERIALS

COUNT	DESCRIPTION	INSTALLED BY
X	FILTERRA BIOSCAPE AREA (SF)	CONTRACTOR
X	MULCH VOLUME (CY)	CONTRACTOR
XX	FILTERRA MEDIA VOLUME (CY)	CONTRACTOR
X	12" W ROUND AGGREGATE UNDERDRAIN STONE (CY)	CONTRACTOR
X	ENERGY DISSIPATION ROCK (CY*)	CONTRACTOR
X	EROSION CONTROL (LF)	CONTRACTOR
X	FILTERRA PLANKIT	CONTRACTOR

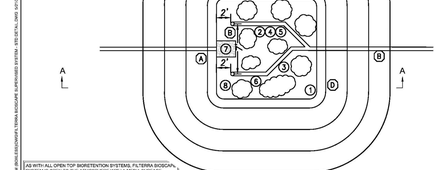
PLANTING SCHEDULE
*NOTE: PLANTS PROVIDED BY OTHERS

QUANTITY	FILTERRA BIOSCAPE SYSTEM PLANT PALETTE

GENERAL NOTES
1. CONTRACTOR SHALL CONTACT CONTECH TO COORDINATE DELIVERY AND SUPERVISION OF PLACEMENT OF FILTERRA BIOSCAPE SYSTEM COMPONENTS (ACTIVATION). CONTRACTOR SHALL COMPLETE ITEMS IN THE LIST OF CONTRACTOR INSTALLATION RESPONSIBILITIES LISTED ON THIS DETAIL BEFORE CONTECH REPRESENTATIVE ATTENDS AND SUPERVISES THE ACTIVATION OF THE BIOSCAPE SYSTEM.
2. PERFORM FILTERRA BIOSCAPE SYSTEM EXCAVATION ONLY AFTER ALL THE CONTRIBUTING DRAINAGE AREAS ARE PERMANENTLY STABILIZED. DO NOT CONSTRUCT FILTERRA BIOSCAPE SYSTEM IN AN AREA USED AS EROSION AND SEDIMENT CONTROL FACILITY DURING THE CONSTRUCTION PHASE UNLESS APPROVED BY CONTECH.
3. USE METHODS OF EXCAVATION THAT MINIMIZE COMPACTION OF THE UNDERLYING SOIL UNLESS THE SYSTEM IS TO BE LINED.
4. CONTRACTOR SHALL COORDINATE WITH CONTECH BEFORE THE FILTERRA BIOSCAPE SYSTEM AREA IS EXCAVATED TO MINIMIZE TIME BETWEEN EXCAVATION AND DELIVERY AND ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY STANDING WATER THAT ACCUMULATES IN THE EXCAVATED AREA MUST BE REMOVED BY THE CONTRACTOR BEFORE CONTECH CAN PROVIDE ACTIVATION. ANY SEDIMENT ACCUMULATION IN THE EXCAVATED AREA MUST BE REMOVED BY AND AT THE EXPENSE OF THE CONTRACTOR. EXCAVATION DIMENSIONS SHOULD BE PROVIDED TO CONTECH IN THE ACTIVATION REQUEST CHECKLIST.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE EXCAVATED AREA(S) FOR USE DURING THE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM(S). ACCESS SHALL NOT PROHIBIT LIGHT DUTY EQUIPMENT THAT MAY BE USED TO INSTALL THE COMPONENTS (STONE, MEDIA, ETC.). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RE-STABILIZATION THAT MAY BE REQUIRED AFTER THE CONTECH REP HAS LEFT THE SITE.
6. CONTECH AND/OR ITS REPRESENTATIVES MUST BE SCHEDULED TO BE ON SITE FOR THE LIST ENTITLED CONTRACTOR ACTIVATION RESPONSIBILITIES.

CONTRACTOR SITE PREPARATION RESPONSIBILITIES AS DENOTED BY (A) ON THIS DETAIL
(A) CONTRACTOR SHALL INSTALL TYPE OR SHALE THAT CONVEYS INFLUENT FLOWS AS WELL AS ANY REQUIRED INLET AND OUTLET STRUCTURES.
(B) CONTRACTOR SHALL PROVIDE BYPASS PIPE AND RISER OR OTHER STRUCTURE AS SHOWN ON PLANS. THE BYPASS PIPE SHALL BE INSTALLED WITH WYE(S), OR OTHER PIPE FITTINGS, AND WITH REDUCER COUPLING(S) FOR CONNECTION OF UNDERDRAIN PIPE(S) PER PLANS. PIPES SHALL BE INSTALLED TO PROMOTE POSITIVE FLOW FROM THE FILTERRA BIOSCAPE SYSTEM.
(C) CONTRACTOR SHALL PROVIDE AND INSTALL ANY ADDITIONAL DRAINAGE STONE BELOW THE FILTERRA BIOSCAPE SYSTEM OR AS DESIGNED BY ENGINEER OF RECORD. SLOPE FROM SHOULDER TO FILTERRA BIOSCAPE SYSTEM SURFACE AREA SHALL NOT EXCEED 5:1 SOD IS REQUIRED TO STABILIZE SIDE SLOPES OR ADJACENT GRADE.
(D) CONTRACTOR TO EXCAVATE MEDIA AREA CORresponding TO THE SIZE OF THE FILTERRA BIOSCAPE SYSTEM SURFACE AREA AS SHOWN ON DETAIL AND ON PLAN SHEETS.
(E) CONTRACTOR TO PROVIDE AND INSTALL ANY STONE FROM BOTTOM OF UNDERDRAIN STONE, OR DRAINAGE STONE, IF REQUIRED, TO ELEVATION OF MULCH AS SHOWN ON THIS DETAIL.
(F) CONTRACTOR TO PROVIDE AND INSTALL ANY GEOTEXTILE OR IMPERMEABLE LINER FOR BOTTOM OF THE FILTERRA BIOSCAPE SYSTEM IF REQUIRED PER THE PLANS.
(G) CONTRACTOR TO PROVIDE AND INSTALL ANY ADDITIONAL DRAINAGE STONE BELOW THE FILTERRA BIOSCAPE SYSTEM AS CALLED OUT ON THE PLANS.

CONTRACTOR ACTIVATION RESPONSIBILITIES AS DENOTED BY (A) ON THIS DETAIL
(1) PLACE GEOTEXTILE FABRIC ALONG THE PERIMETER OF THE FILTERRA BIOSCAPE SYSTEM EXCAVATION.
(2) PLACE 12" OF UNDERDRAIN STONE - 2" UNDER THE PIPING, 6" AROUND THE PIPING AND 2" ABOVE THE PIPING USING LIGHT DUTY EQUIPMENT ONLY.
(3) PLACE 6" UNDERDRAIN PIPING UNLESS OTHERWISE APPROVED BY CONTECH. ASSOCIATED PIPING AND FITTINGS BLOWS TO CONNECT TO THE PIPING/FITTING(S) THAT IS PROVIDED BY CONTRACTOR (SEE CONTRACTOR INSTALLATION RESPONSIBILITIES THIS DETAIL).
(4) PLACE 2'-0" FILTERRA MEDIA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MEDIA.
(5) PLACE 3" OF MULCH USING LIGHT DUTY EQUIPMENT ONLY OVER ENTIRE FILTERRA BIOSCAPE SYSTEM SURFACE AREA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MULCH.
(6) PROVIDE AND PLANT VEGETATION AS INDICATED IN TABLE ON THIS DETAIL OR ON SITE PLANS.
(7) PLACE ENERGY DISSIPATION ROCK APRON AS DESIGNED AND INDICATED ON THIS DETAIL OR PER ENGINEER OF RECORD PLANS.
(8) PLACE CLEANOUT ADAPTER, PLUG AND PIPING.
(9) PLACE ADDITIONAL EROSION CONTROL AROUND FILTERRA BIOSCAPE SYSTEM (IF REQUIRED).



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FILTERRA BIOSCAPE™ SYSTEM
STANDARD DETAIL

N.T.S.

CONTECH FILTERRA BIOSCAPE SYSTEM DETAIL | B3

POST-CONSTRUCTION BMP SITE PLAN – PROLOGIS RAMONA & WEBSTER INDUSTRIAL FACILITY– SHEET 4
P22-00035
PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

adkan ENGINEERS
Civil Engineering·Surveying·Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241·Fax:(951) 688-0599

PLOT DATE: 3/1/2023 4:31 PM

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POST-CONSTRUCTION
BMP SITE PLAN –
PROLOGIS RAMONA &
WEBSTER INDUSTRIAL
FACILITY– SHEET 5
P22-00035

PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

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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
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T 03 S
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T 06 S
T 07 S
T 08 S

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

0.85 MiraLoma
0.61 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
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

PROJECT SITE

Santa Ana River Watershed
Santa Margarita Watershed

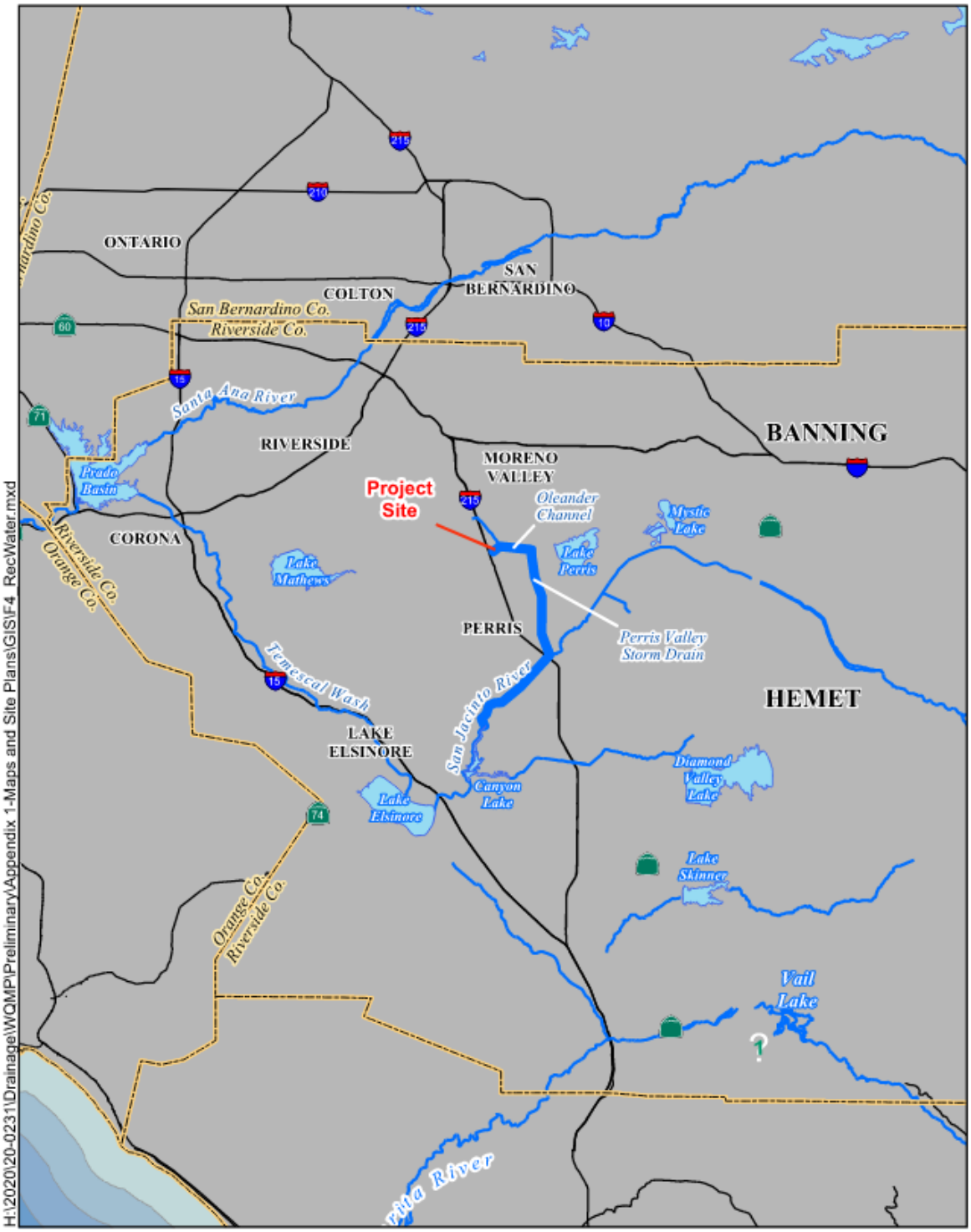
JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | HEMET | MURRIETA | TEMECULA

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011



Sources: USGS 30 Meter DEM;
USGS Digital Line Graph

Figure 4. Receiving Waterbodies

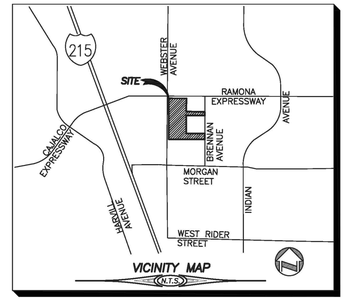
0 2 4 6
Miles

Flowpath

Appendix 2: Construction Plans

Grading and Drainage Plans

DEVELOPMENT PLAN REVIEW NO. XX-XXXXX
PROLOGIS - RAMONA EXPRESSWAY & WEBSTER AVENUE
CONCEPTUAL GRADING & DRAINAGE PLAN



LEGAL DESCRIPTION

PARCELS 1 THROUGH 9, INCLUSIVE OF PARCEL MAP 19113, IN THE CITY OF PERRIS, AS PER MAP RECORDED IN BOOK 121, PAGES 9 TO 11, INCLUSIVE OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA.

LOTS 9 AND 10 OF GOLDEN VALLEY FARMS TRACT NO. 3, IN THE CITY OF PERRIS, AS SHOWN BY MAP RECORDED IN BOOK 17, PAGE 22 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA.

LOTS 21, 22 AND 23 OF GOLDEN VALLEY FARMS NO. 3, IN THE CITY OF PERRIS, AS PER MAP RECORDED IN BOOK 17, PAGE 22, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA. EXCEPT THE EAST 9.00 FEET AS CONDEMNED IN FAVOR OF THE CITY OF PERRIS BY FINAL ORDER OF CONDEMNATION RECORDED JUNE 25, 1991 AS INSTRUMENT NO. 213486, OFFICIAL RECORDS.

PARCEL 1 OF CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 29, 1986 AS INSTRUMENT NO. 331493 OF OFFICIAL RECORDS, BEING LOTS 24 AND 25 OF GOLDEN VALLEY FARMS NO. 3, IN THE CITY OF PERRIS, AS PER MAP RECORDED IN BOOK 17, PAGE 22, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA TOGETHER WITH THAT PORTION OF PARCEL 10 OF PARCEL MAP 19113, AS PER MAP RECORDED IN BOOK 121, PAGES 9 TO 11, INCLUSIVE, OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST NORTHEASTERLY CORNER OF SAID PARCEL 10;
THENCE SOUTH 00° 01' 15A WEST ALONG THE MOST EASTERLY PROPERTY LINE OF SAID PARCEL 10, 106.13 FEET TO THE NORTHERLY LINE OF PARCEL 14 OF SAID PARCEL MAP 19113; THENCE NORTH 84° 34' 02A WEST ALONG THE NORTHERLY LINE OF SAID PARCEL 14, 140.23 FEET TO THE NORTHWEST CORNER OF SAID PARCEL 4;
THENCE NORTH 00° 03' 10A EAST 105.99 FEET TO THE NORTHERLY LINE OF SAID PARCEL 10;
THENCE NORTH 84° 54' 02A WEST ALONG THE NORTHERLY LINE, 140.11 FEET TO THE POINT OF BEGINNING.EXCEPT THE EAST 9.00 FEET OF LOTS 24 AND 25 AS CONDEMNED IN FAVOR OF THE CITY OF PERRIS BY FINAL ORDER OF CONDEMNATION RECORDED JUNE 25, 1991 AS INSTRUMENT NO. 213486, OFFICIAL RECORDS

NOTES

1. THIS PROJECT IS WITHIN THE PERRIS VALLEY COMMERCE CENTER SPECIFIC PLAN (PVC SP).
2. THIS PROJECT IS WITHIN THE UNHATCHED AREA OF ZONE X PER FLOOD INSURANCE RATE MAP NUMBER 06065C1430H, DATED AUGUST 18, 2014.
3. THIS PROJECT IS NOT WITHIN A COMMUNITY SERVICES DISTRICT.
4. ALL PARCELS WITHIN PROJECT BOUNDARY TO BE COMBINED VIA PARCEL MAP.

EASEMENT NOTES

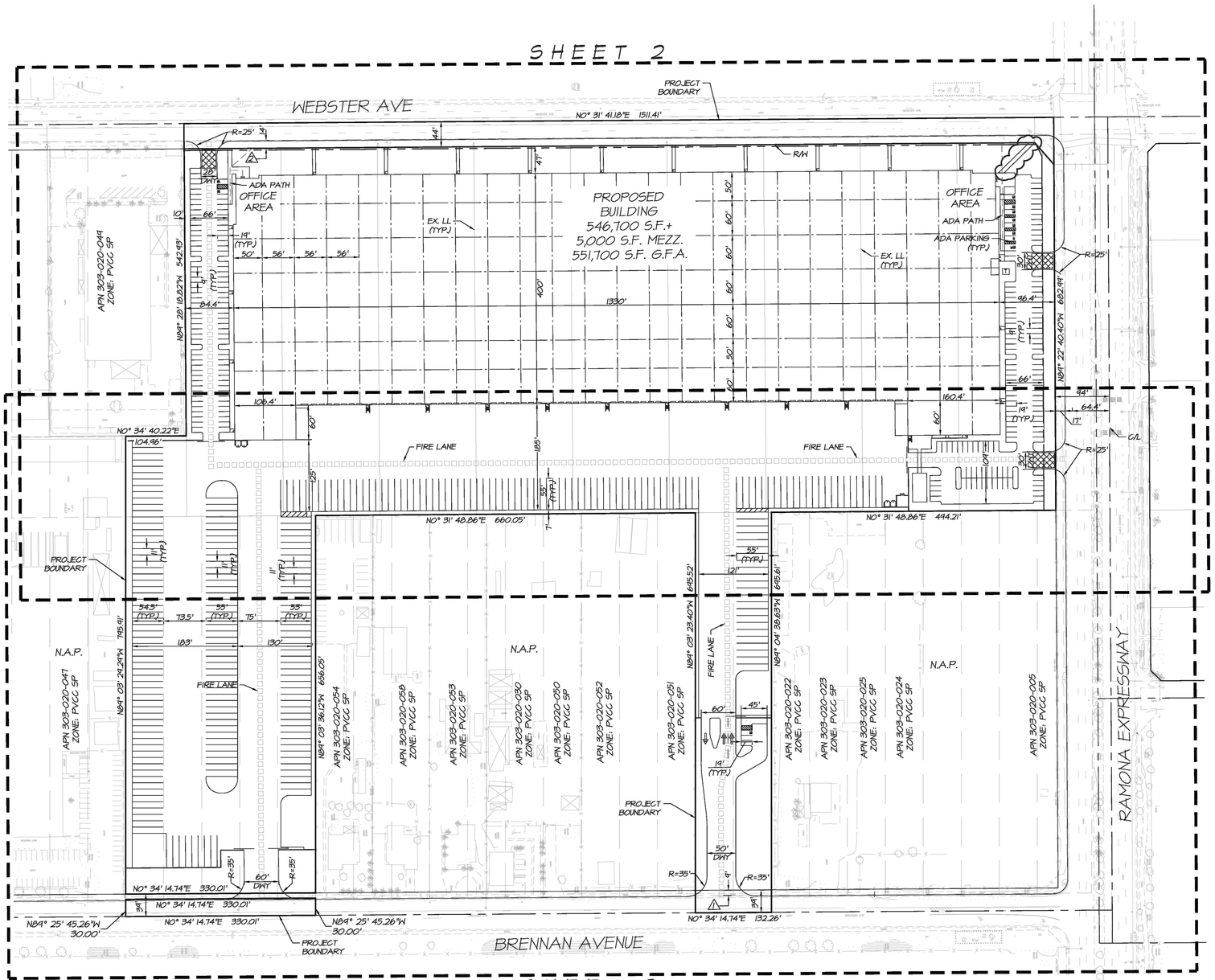
⚠1 AN IRREVOCABLE OFFER TO DEDICATE AN EASEMENT OVER A PORTION OF SAID LAND FOR PUBLIC STREET AND HIGHWAY PURPOSES AND MAINTAIN UTILITIES, SEWERS AND DRAINS, RECORDED AUGUST 12, 1985 AS INSTRUMENT NO. 85-178364, OFFICIAL RECORDS.

⚠2 ROAD EASEMENT PER PARCEL MAP 19113, PMB 121/9-11

PROJECT DATA:

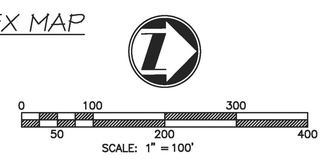
GROSS SITE AREA:	29.45 A.C.
NET SITE AREA:	26.68 A.C.
BUILDING AREA:	
FOOTPRINT	546,700 S.F.
MEZZANINE	5,000 S.F.
TOTAL	551,700 S.F.
COVERAGE:	42.62%
F.A.R.:	0.430
PARKING REQUIRED:	
20,000 S.F. OFFICE (LESS THAN 10%)	00 STALLS
0-20,000 S.F. W.H.S.E. @1/1000 S.F.	20 STALLS
20K-40K S.F. W.H.S.E. @1/2000 S.F.	10 STALLS
40K AND ABV (1/5000 S.F.)	102 STALLS
TOTAL REQUIRED:	132 STALLS
PARKING PROVIDED:	
STANDARD STALLS	213 STALLS
ACCESSIBLE STALLS	8 STALLS
TOTAL PROVIDED:	221 STALLS
DOCK POSITIONS PROVIDED:	64 DOCK POSITIONS
TRAILER POSITIONS PROVIDED:	285 TRAILER POSITIONS

SHEET 2



SHEET 3

INDEX MAP



ENGINEER

adkan ENGINEERS
6879 AIRPORT DRIVE
RIVERSIDE, CA 92504
TEL: (951) 688-0241
FAX: (951) 688-0549

OWNER/APPLICANT

PROLOGIS
3546 CONCOURS ST.
ONTARIO, CA 91764
(909) 673-8700

PROJECT DESCRIPTION

DEVELOPMENT PLAN REVIEW FOR A DISTRIBUTION WAREHOUSE FACILITY CONSISTING OF 1 BUILDING TOTALING 546,700 SQUARE FEET ON 26.68± NET ACRES

UTILITY COMPANIES

WATER:	EASTERN MUNICIPAL WATER DISTRICT PHONE: (800) 426-3693
SEWER:	EASTERN MUNICIPAL WATER DISTRICT PHONE: (800) 426-3693
ELECTRIC:	SOUTHERN CALIFORNIA EDISON COMPANY PHONE: (800) 684-8123
TELEPHONE:	CHARTER COMMUNICATIONS PHONE: (833) 644-4254
GAS:	SOUTHERN CALIFORNIA GAS COMPANY PHONE: (800) 427-2200
SCHOOL:	VAL VERDE UNIFIED SCHOOL DISTRICT PHONE: (951) 940-6100

A.P.N.

303-020-019 &303-020-034 THROUGH 303-020-042
&303-020-055 THROUGH 303-020-057

ZONING

PVCC SP (PERRIS VALLEY COMMERCE CENTER SPECIFIC PLAN)

EARTHWORK QUANTITIES

CUT:	32,400 CY
FILL:	115,600 CY
SHRINKAGE:	(13,240) CY
NET:	86,440 CY (IMPORT)

LEGEND

C&G	CURB AND GUTTER
CONC.	CONCRETE
DWY	DRIVEWAY
FF	FINISHED FLOOR
FG	FINISHED GROUND
EG	EXISTING GROUND
TG	TOP OF GRATE
FL	FLOW LINE
GB	GRADE BREAK
IE	INVERT ELEVATION
EX.	EXISTING
HP	HIGH POINT
TG	TOP OF GRATE
N.A.P.	NOT APART
PROP.	PROPOSED
TYP.	TYPICAL
BW	BACK OF WALKWAY
R/W	RIGHT OF WAY
PCC	PORTLAND CONCRETE CEMENT
PP	POWER POLE
LL	LOT LINE
SD	STORM DRAIN
EP	EDGE OF PAVEMENT
	PROPOSED FLOW LINE
	ADA PATH OF TRAVEL
1400	EXISTING CONTOUR
1400	PROPOSED CONTOUR
SD	PROPOSED STORM DRAIN
GB	GRADE BREAK LINE
RL	RIDGE LINE
	5" PCC PAVEMENT
	7" PCC PAVEMENT
	LANDSCAPE
	RIP-RAP
	FIRE ACCESS LANE

SCALE: AS NOTED	
DATE: 3/8/2023	
DESIGNED: RI	
CHECKED: RR	
PLN CK REF.:	
F.B.	

PLANS PREPARED BY:
adkan ENGINEERS
Civil Engineering · Surveying · Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688 0241 Fax:(951) 688 0599

CITY OF PERRIS
DEVELOPMENT PLAN REVIEW NO. _____

PROLOGIS

JN 10331
SHEET 1 OF 3 SHEETS
DWG. NO.

PLOT DATE: 3/8/2023

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WEBSTER AVE

PROJECT BOUNDARY

N0° 31' 41.18"E 1511.41'

BIORETENTION BASIN

PROP. STORM DRAIN

OVERFLOW INLET

PROP. UNDER DRAIN

PROP. STORM DRAIN

R/W

OFFICE AREA

PROPOSED BUILDING
546,700 S.F.+
5,000 S.F. MEZZ.
551,700 S.F. G.F.A.

FF=1484.0

OFFICE AREA

ADA PATH

ADA PARKING (TYP.)

EX. 12" WATERLINE EASEMENT

EX. CONC. TRAPEZOIDAL CHANNEL TO BE REMOVED & REPLACED W/ RCB SD

VARIES DEDICATION

RAMONA EXPRESSWAY

LL (TYP.)

ADA PATH

PROP. 8' HIGH FENCE ALONG P.L.

N34° 28' 18.82"W 542.83'

N34° 22' 40.40"W 662.94'

N0° 34' 40.22"E 104.95'

PROP. GATE

PROP. 12' HIGH SCREENWALL

EX. FENCE TO BE REMOVED

EX. SHIPPING CONTAINERS TO BE REMOVED

PROP. DROP INLET WITH FILTER

89 TRAILER STALLS

N0° 31' 48.86"E 660.05'

N0° 31' 48.86"E 444.21'

PROP. WATER QUALITY UNDERGROUND CHAMBERS

PROJECT BOUNDARY

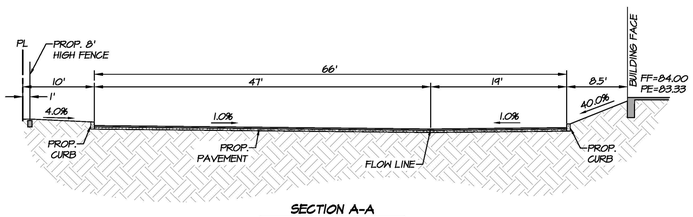
155 TRAILER STALLS

PROP. 8' HIGH FENCE ALONG P.L.

SEE SHEET 3

LEGEND

C&G	CURB AND GUTTER
CONC.	CONCRETE
DWY	DRIVEWAY
FF	FINISHED FLOOR
FG	FINISHED GROUND
EG	EXISTING GROUND
TG	TOP OF GRATE
FL	FLOW LINE
GB	GRADE BREAK
IE	INVERT ELEVATION
EX.	EXISTING
HP	HIGH POINT
TG	TOP OF GRATE
N.A.P.	NOT APART
PROP.	PROPOSED
TYP.	TYPICAL
BW	BACK OF WALKWAY
R/W	RIGHT OF WAY
P.C.C.	
PP	POWER POLE
LL	LOT LINE
SD	STORM DRAIN
EP	EDGE OF PAVEMENT
	PROPOSED FLOW LINE
	ADA PATH OF TRAVEL
—1400—	EXISTING CONTOUR
—1400—	PROPOSED CONTOUR
GB	GRADE BREAK LINE
RL	RIDGE LINE
	5" PCC PAVEMENT
	7" PCC PAVEMENT
	LANDSCAPE
	RIP-RAP
	FIRE ACCESS LANE



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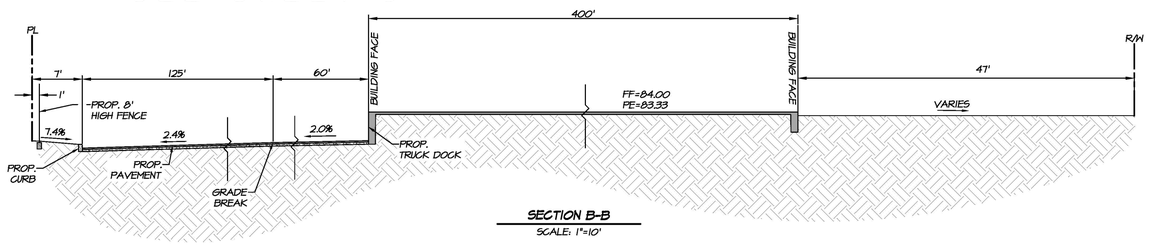
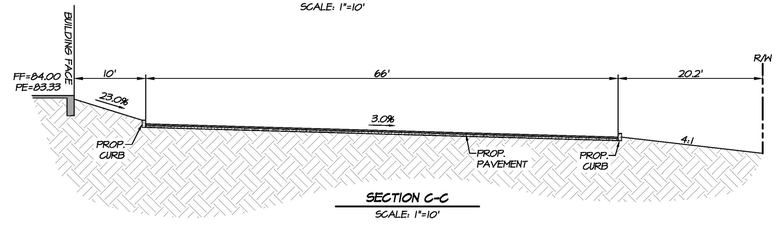


SECTION B-B
SCALE: 1"=10'



SECTION C-C
SCALE: 1"=10'

0 60 180
30 120 240
SCALE: 1" = 60'

NOTE: ADD 1400' TO ALL PROPOSED ELEVATIONS FOR ACTUAL ELEVATION

SCALE: AS NOTED	
DATE: 3/8/2023	
DESIGNED: RI	
CHECKED: RR	
PLN CK REF:	
F.B.	

PLANS PREPARED BY:
adkan ENGINEERS
Civil Engineering · Surveying · Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688 0241 Fax:(951) 688 0599

CITY OF PERRIS
DEVELOPMENT PLAN REVIEW NO. _____

PROLOGIS

JN 10331
SHEET 2 OF 3 SHEETS
DWG. NO.

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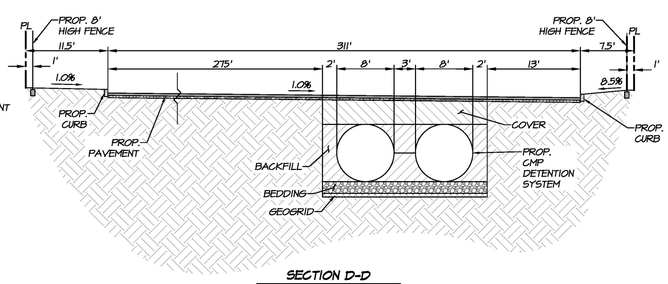
PLOT DATE: 3/8/2023

SEE SHEET 2

PROP. 8' HIGH FENCE ALONG PL
PROP. GATE
PROP. 12' HIGH SCREENWALL
EX. FENCE TO BE REMOVED
EX. SHIPPING CONTAINERS TO BE REMOVED
PROP. DROP INLET WITH FILTER
84 TRAILER STALLS
PROJECT BOUNDARY
158 TRAILER STALLS
PROP. WATER QUALITY UNDERGROUND CHAMBERS
23 TRAILER STALLS
PROP. 5D PUMP STATION
PROP. WATER QUALITY BASIN
PROP. STORM DRAIN
EX. BOLLARDS TO BE REMOVED
PROP. UNDER DRAIN
CURB OPENING
BIORETENTION BASIN
NO° 34' 40.22"E 104.95'
NO° 31' 48.86"E 660.05'
NO° 31' 48.86"E 444.21'
N84° 03' 24.24"W 745.41'
N84° 03' 36.12"W 656.05'
N84° 03' 23.40"W 645.52'
N84° 04' 36.65"W 645.61'
NO° 34' 14.74"E 330.01'
S0° 34' 14.74"W 330.01'
N89° 25' 45.26"W 30.000'
NO° 34' 14.74"E 132.26'
BRENNAN AVENUE
RAMONA EXPRESSWAY

LEGEND

C&G	CURB AND GUTTER
CONC.	CONCRETE
DWY.	DRIVEWAY
FF	FINISHED FLOOR
FG	FINISHED GROUND
EG	EXISTING GROUND
TG	TOP OF GRATE
FL	FLOW LINE
GB	GRADE BREAK
IE	INVERT ELEVATION
EX.	EXISTING
HP	HIGH POINT
TG	TOP OF GRATE
N.A.P.	NOT A PART
PROP.	PROPOSED
TYP.	TYPICAL
BW	BACK OF WALKWAY
R/W	RIGHT OF WAY
PCC	PORTLAND CONCRETE CEMENT
PP	POWER POLE
LL	LOT LINE
SD	STORM DRAIN
EP	EDGE OF PAVEMENT
	PROPOSED FLOW LINE
	ADA PATH OF TRAVEL
—1400—	EXISTING CONTOUR
—1400—	PROPOSED CONTOUR
SD	PROPOSED STORM DRAIN
GB	GRADE BREAK LINE
RL	RIDGE LINE
	5" PCC PAVEMENT
	7" PCC PAVEMENT
	LANDSCAPE
	RIP-RAP
	FIRE ACCESS LANE



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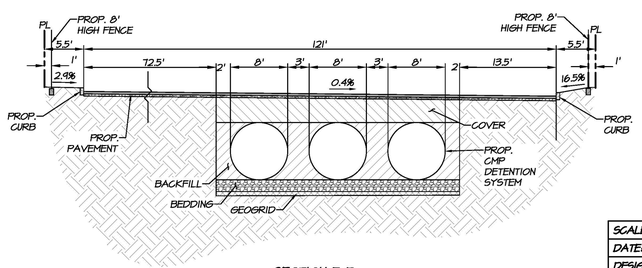

SECTION E-E
SCALE: 1"=10'

NOTE: ADD 1400' TO ALL PROPOSED ELEVATIONS FOR ACTUAL ELEVATION

0 60 180
30 120 240
SCALE: 1" = 60'

SCALE: AS NOTED	
DATE: 3/8/2023	
DESIGNED: RI	
CHECKED: RR	
PLN CK REF:	
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PLANS PREPARED BY:
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CITY OF PERRIS
DEVELOPMENT PLAN REVIEW NO. _____

PROLOGIS

JN 10331
SHEET 3 OF 3 SHEETS
DWG. NO.

PLOT DATE: 3/8/2023

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Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEOTECHNICAL INVESTIGATION
PROPOSED PERRIS VALLEY COMMERCE CENTER

SEC Webster Avenue and Ramona Expressway
Perris, California
for
Duke Realty

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

July 21, 2022

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Duke Realty
200 Spectrum Center Drive, Suite 1600
Irvine, California 92618

Attention: Mr. D.J. Arellano
Vice President, Development Services

Project No.: **22G195-1**

Subject: **Geotechnical Investigation**
Proposed Perris Valley Commerce Center
SEC Webster Avenue and Ramona Expressway
Perris, California

Dear Mr. Arellano:

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

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Robert G. Trazo, GE 2655
Principal Engineer

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

Gregory K. Mitchell, GE 2364
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
GREGORY K. MITCHELL
No. 2364
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

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A Plate 1: Site Location Map
Plate 2: Boring Location Plan
B Boring Logs
C Laboratory Test Results
D Grading Guide Specifications
E Seismic Design Parameters

1.0 EXECUTIVE SUMMARY

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

Geotechnical Design Considerations

- Artificial fill soils were encountered at all of the boring locations, extending to depths of 3 to 8± feet. The existing fill soils are considered to represent undocumented fill.
- Native alluvial soils were encountered at each boring, extending to at least the maximum explored depth of 25± feet.
- The near-surface native alluvial soils within the upper 7± feet generally consist of silty sands, sandy silts and sandy clays which possess variable strengths and unfavorable consolidation/collapse characteristics. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structure. The alluvium present at depths greater than 7± feet generally possesses higher strengths and densities and more favorable consolidation/collapse characteristics.
- Remedial grading will be necessary within the proposed building pad to remove the undocumented fill soils in their entirety and the upper portion of the near-surface native alluvial soils and replace these materials as compacted structural fill soils.

Site Preparation

- Initial site preparation should include removal of all vegetation, including tree root masses (as necessary) and any organic topsoil.
- Remedial grading is recommended within the proposed building pad area to remove the undocumented fill soils, which extend to depths of 3 to 8± feet at the boring locations, in their entirety. At a minimum, the building pad area should also be overexcavated to a depth of at least 6 feet below existing grade and to a depth of at least 5 feet below proposed pad grade, whichever is greater. Overexcavation within the foundation areas is recommended to extend to a depth of at least 3 feet below proposed foundation bearing grade.
- After overexcavation has been completed, the subgrade soils should be evaluated by the geotechnical engineer to identify additional soils that may need to be overexcavated. The resulting subgrade should then be scarified to a depth of 12 inches, moisture conditioned or air dried to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.
- The new parking area subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings.

Building Floor Slab

- Conventional Slab-on-Grade: minimum 6 inches thick.
- Modulus of Subgrade Reaction: k = 120 psi/in.
- Slabs should be reinforced with rebar. The actual floor slab reinforcement should be designed and provided by the structural engineer, based on the anticipated slab loading, geotechnical conditions and intended use.

Pavement Design

ASPHALT PAVEMENTS (R = 30)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	6	8	10	11	13
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 30)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 22P233, dated May 11, 2022. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The site is located at the southeast corner of Webster Avenue and Ramona Expressway in Perris, California. The site is bounded to the north by Ramona Expressway, to the west by Webster Avenue, to the south by two existing commercial/industrial buildings, and to the east by Brennan Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site consists of several parcels, which total 19.64± acres in size. The site is currently vacant and undeveloped, except for the southeast portion of the site which is currently used as am unpaved storage yard for an existing warehouse building. The ground surface cover appears to consist of exposed soil with sparse to moderate native grass and weed growth.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography is generally flat.

3.2 Proposed Development

Based on a site plan prepared by RGA, the site will be developed with one (1) industrial building, 542,760± ft² in size, located in the western area of the site. Dock-high doors will be constructed along a portion of the east building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

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

No significant amounts of below-grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 5 to 6± feet are expected to be necessary to achieve the proposed site grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of nine (9) borings identified as Boring Nos. B-9 through B-17, advanced to depths of 5 to 25± feet below the existing site grades. All of the borings were logged during drilling by a member of our staff.

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

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

4.2 Geotechnical Conditions

Artificial Fill

Artificial fill soils were encountered at the ground surface at all of the boring locations. The fill soils extend to depths of 3 to 8± feet below the existing site grades. The fill soils generally consist of medium dense to very dense sandy silts and silty sands with occasional stiff to hard silty clays. The fill soils possess a disturbed appearance and mottled appearance resulting in their classification as artificial fill.

Alluvium

Native alluvium was encountered below the fill soils at all of the boring locations, extending to at least the maximum depth explored of 25± feet below existing site grades. The alluvium generally consists of medium dense to very dense sandy silts, silty sands and silts and medium dense sands and occasional clay content. Several alluvial strata were observed to be moderately cementer. Boring No. B-12 encountered a stiff to hard clayey silt layer from 8½ to 12± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a depth greater than the maximum explored depth of 25± feet below existing site grades for this project.

Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located approximately 1 mile northeast from the site. Water level readings within this monitoring well indicates a groundwater level of 44± feet below the ground surface in March 2022.

5.0 LABORATORY TESTING

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

Classification

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

Density and Moisture Content

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

Consolidation

Selected soil samples have been tested to evaluate their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to evaluate their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-3 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample has been tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-4 in Appendix C of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Expansion Index

The expansion potential of the on-site soils was evaluated in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge

equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-9 @ 0 to 5 feet	24	Low
B-11 @ 0 to 5 feet	21	Low

Soluble Sulfates

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

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-9 @ 0 to 5 feet	0.018	Negligible (S0)
B-11 @ 0 to 5 feet	0.040	Negligible (S0)

Corrosivity Testing

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

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-9 @ 0 to 5 feet	3,618	8.0	52.9	11.0
B-11 @ 0 to 5 feet	2,345	7.6	154.4	44.0

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

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

6.1 Seismic Design Considerations

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

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

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

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

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

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

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.568
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.984
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.656

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

Liquefaction

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

The Riverside County GIS website indicates that the subject site is located within a zone of low liquefaction susceptibility. In addition, the subsurface conditions encountered at the boring locations are not considered to be conducive to liquefaction. These conditions consist of moderate to high strength older native alluvial soils and no evidence of a long-term groundwater table within the depths explored by the borings. Based on these considerations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

All of the borings encountered artificial fill materials, extending to depths of 3 to 8± feet. Based on their strength characteristics and a lack of documentation regarding the placement and compaction of the existing fill materials, these soils are considered to consist of undocumented fill. Native alluvium was encountered beneath the existing undocumented fill soils, extending to at least the maximum depth explored of 25± feet below existing site grades. The near-surface native alluvium possesses unfavorable consolidation/collapse characteristics to a depth of 7± feet below the existing site grades. Based on these conditions, remedial grading is considered warranted within the proposed building area in order to remove the existing upper portion of the near-surface native alluvial soils, and replace these materials as compacted structural fill soils.

Settlement

The recommended remedial grading will remove all of the undocumented fill soils and a portion of the near-surface native alluvial soils and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation possess

generally favorable consolidation/collapse characteristics and will not be subject to significant stress increases from the foundations of the new structure. Therefore, following completion of the recommended grading, post-construction settlements are expected to be within tolerable limits.

Expansion

The near surface soils at this site generally consist of silty sands and clayey sands with occasional sandy clay layers. Laboratory testing performed on a representative sample of these materials indicate that they possess a low expansion potential (EI = 21 to 24). Based on the low expansive classification, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing indicated that the select samples of the near-surface soils possesses a sulfate concentration of approximately 0.040 percent or less. This concentration is considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possess a saturated minimum resistivity of 2,345 to 3,618 ohm-cm, and a pH value of 7.6 to 8.0. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. Based on these factors, and utilizing the DIPRA procedure, the on-site soils are considered to be mildly corrosive to ductile iron pipe. Therefore, polyethylene encasement or some other appropriate method of protection may be required for iron pipes.

Relatively low concentrations (up to 154.4 mg/kg) of chlorides were detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of significant chlorides in the tested samples, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested samples possess nitrate concentrations of up to 44.0 mg/kg. Based on the test results, the on-site soils are not considered to be corrosive to copper pipe.

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

Shrinkage/Subsidence

Removal and recompaction of the artificial fill and near-surface native soils is estimated to result in an average shrinkage of 5 to 15 percent. Shrinkage estimates for the individual samples ranged between from 2 to 19 percent shrinkage based on the results of density testing and the assumption that the on-site soils will be compacted to about 92 percent of the ASTM D-1557 maximum dry density. It should be noted that the shrinkage estimate is based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test pits where in-place densities are evaluated using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1 feet.

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

Grading and Foundation Plan Review

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

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations and our understanding of the proposed development. We recommend that grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping

Initial site stripping should include removal of surficial vegetation. This should include weeds, grasses, trees and shrubs. The actual extent of site stripping should be evaluated in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area to remove all of the existing undocumented fill soils and a portion of the near-surface alluvium in order reduce the potential for hydroconsolidation settlement. The proposed building area is recommended to be overexcavated to a depth of at least 6 feet below existing grade and to a depth of at least 5 feet below proposed building pad subgrade elevation, whichever is greater.

Where not encompassed within the general building pad overexcavation, additional overexcavation should be performed within the influence zones of the new foundations, to provide for a new layer of compacted structural fill extending to a depth of at least 3 feet below proposed bearing grades.

The overexcavation areas should extend at least 5 feet beyond the building perimeter and foundations, and to an extent equal to the depth of fill below the new foundations. If the proposed structure incorporates exterior columns (such as for a canopy or overhang) the overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the building area should be evaluated by the geotechnical engineer to confirm their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This evaluation should include proofrolling and probing to identify soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if fill materials are encountered, or loose, porous, or low density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches, moisture treated to 2 to 4 percent above the optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of proposed retaining and non-retaining site walls should be overexcavated to a depth of at least 3 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pad. The overexcavation areas should extend at least 3 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Please note that erection pads are considered to be part of the foundation system. These overexcavation recommendations apply to erection pads also. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior

to scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils, as discussed for the building areas. The previously excavated soils may then be replaced as compacted structural fill.

Please note that if the lateral and/or vertical extents of overexcavation are not achievable for the project retaining walls or site walls, then additional recommendations including, but not limited to, reduced design bearing pressures may be required. Additionally, specialized grading techniques such as slot cutting or shoring may be required in order to facilitate construction.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing soils in the new flatwork, parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading.

Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of soils disturbed during stripping operations. The geotechnical engineer should then evaluate the subgrade to identify areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of undocumented fill soils and compressible/collapsible alluvial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed flatwork, parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork, parking and drive areas. The grading recommendations presented above do not completely mitigate the extent of loose or collapsible alluvium in the flatwork, parking and drive areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the flatwork, parking and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of debris to the satisfaction of the geotechnical engineer.
- Grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the City of Perris.
- Fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not

be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

Imported structural fill should consist of very low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, utility trench backfill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). It is recommended that materials in excess of 3 inches in size not be used for utility trench backfill. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the City of Perris. Utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

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

6.4 Construction Considerations

Excavation Considerations

The near surface soils generally consist of silty sands and sandy silts. These materials will likely be subject to caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. Excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

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

Groundwater

The static groundwater table is considered to exist at a depth greater than 25± feet below existing grade. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace near-surface alluvial soils. These new structural fill soils are expected to extend to depths of at least 3 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, the proposed structure may be supported on shallow foundations.

Foundation Design Parameters

New continuous and rectangular footings may be designed as follows:

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

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on standard geotechnical practice. Additional rigidity may be necessary for structural considerations. The actual design of the foundations should be provided by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Unsuitable materials should be

removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 2 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

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

Lateral Load Resistance

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

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill. The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slab should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the new structure may be constructed as a conventional slabs-on-grade supported on newly placed structural fill, extending to a depth of at least 5 feet below proposed finished pad grade. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 6 inches.

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

- Minimum slab reinforcement: Slabs should be reinforced with rebar. The actual floor slab reinforcement should be designed and provided by the structural engineer, based on the anticipated slab loading, geotechnical conditions and intended use.

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

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

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

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement. Additional rigidity may be necessary for structural considerations.

6.7 Exterior Flatwork Design and Construction

Subgrades which will support new exterior slabs-on-grade for sidewalks, patios, and other concrete flatwork, should be prepared in accordance with the recommendations contained in the ***Grading Recommendations*** section of this report. Based on geotechnical considerations, exterior slabs on grade may be designed as follows:

- Minimum slab thickness: 4½ inches.

- Minimum slab reinforcement: No. 4 bars at 18 inches on center, in both directions.

- The flatwork at building entry areas should be structurally connected to the perimeter foundation that is recommended to span across the door opening. This recommendation is designed to reduce the potential for differential movement at this joint.

- Moisture condition the slab subgrade soils to at least 2 to 4 percent of optimum moisture content, to a depth of at least 12 inches. Adequate moisture conditioning should be verified by the geotechnical engineer 24 hours prior to concrete placement.

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

- Control joints should be provided at a maximum spacing of 8 feet on center in two directions for slabs and at 6 feet on center for sidewalks. Control joints are intended to direct cracking. Minor cracking of exterior concrete slabs on grade should be expected.

Expansion or felt joints should be used at the interface of exterior slabs on grade and any fixed structures to permit relative movement.

6.8 Retaining Wall Design and Construction

Although not indicated on the site plan, the proposed development may require some small retaining walls (less than 5± feet in height) to facilitate the new site grades and in the dock-high areas of the buildings.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The near surface soils generally consist of silty sands and sandy silts. Based on their classifications, these materials are expected to possess a friction angle of at least 29 degrees when compacted to at least 90 percent of the ASTM-1557 maximum dry density.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-Site Silty Sands and Sandy Silts
Internal Friction Angle (ϕ)		29°
Unit Weight		135 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	47 lbs/ft^3
	Active Condition (2h:1v backfill)	78 lbs/ft^3
	At-Rest Condition (level backfill)	70 lbs/ft^3

Regardless of the backfill type, the walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

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

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

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 3 feet below the proposed bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls be used. If the drainage composite material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The drainage composite should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

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

Subsurface Drainage

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

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

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

6.9 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these

designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of silty sands and clayey sands. These soils are considered to possess fair pavement support characteristics with estimated R-values of 30 to 40. The subsequent pavement design is based upon an R-value of 30. Fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering observed conditions. It is recommended that R-value testing be performed after completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

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

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

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

ASPHALT PAVEMENTS (R = 30)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	6	8	10	11	13
Compacted Subgrade	12	12	12	12	12

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

Portland Cement Concrete

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

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 30)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

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

7.0 GENERAL COMMENTS

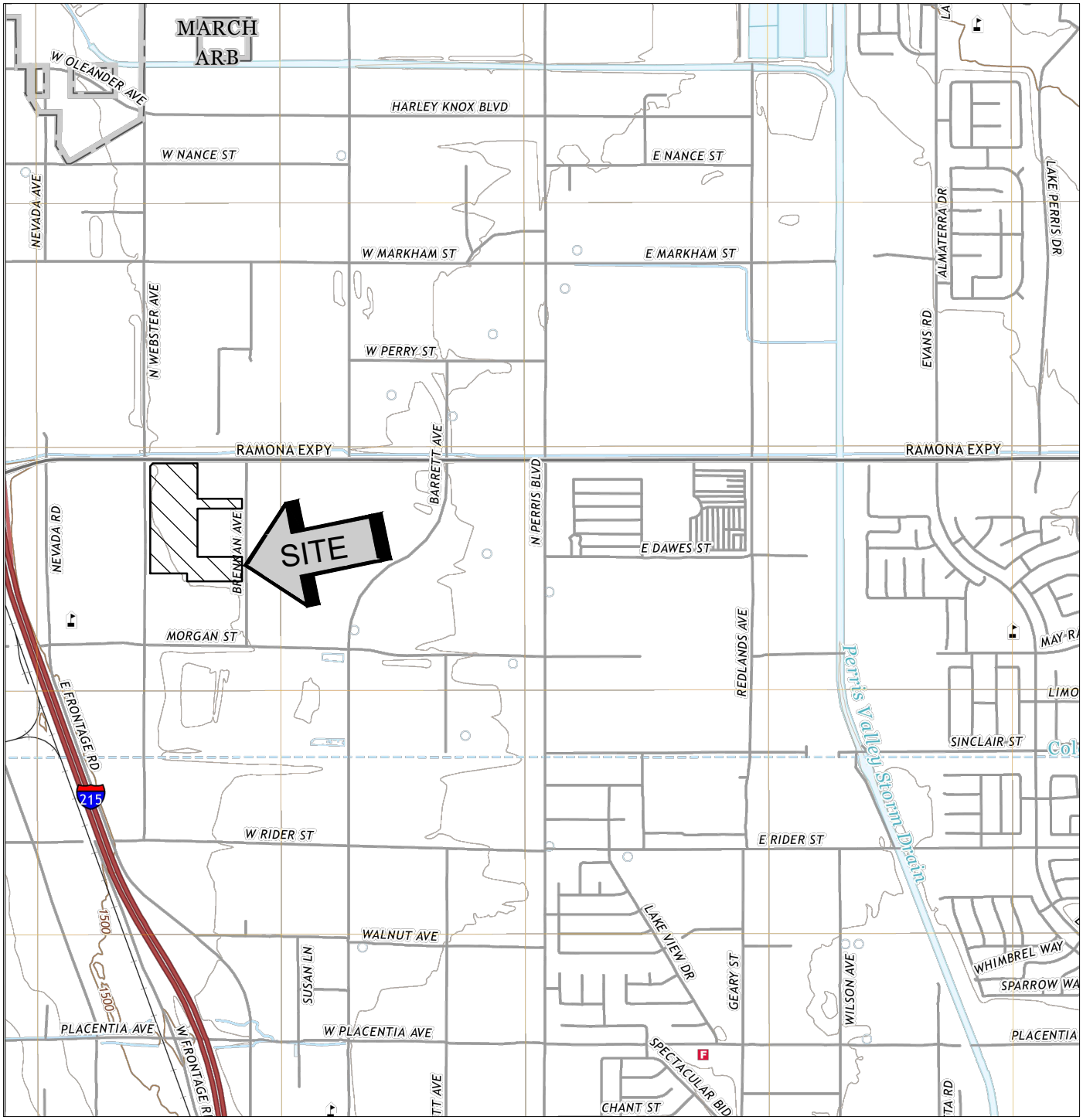
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

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

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

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

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

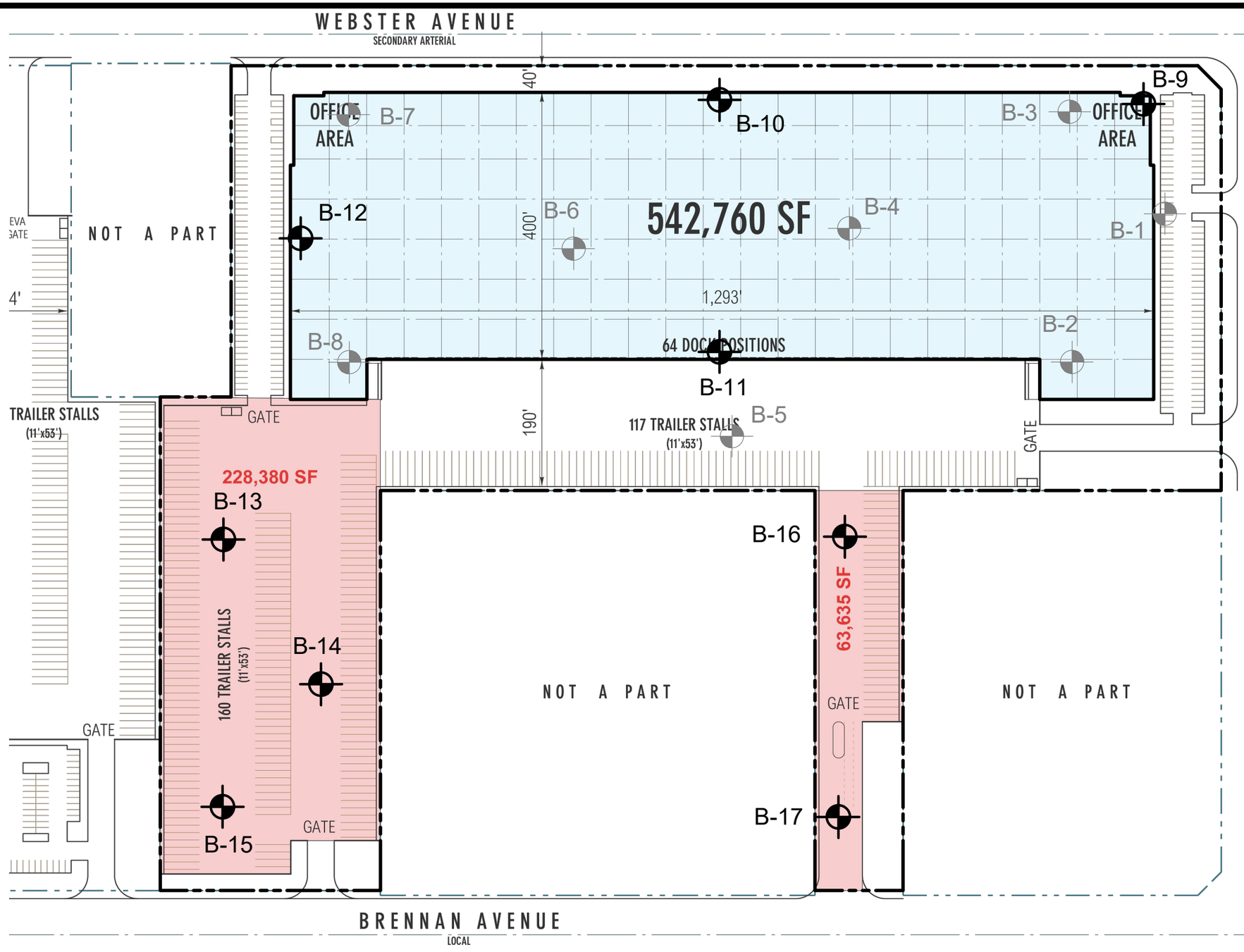
PERRIS VALLEY COMMERCE CENTER

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JJH CHKD: DN	
SCG PROJECT 22G195-1	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 08G186-1)

NOTE: SITE PLAN PROVIDED BY THE CLIENT.

BORING LOCATION PLAN

PERRIS VALLEY COMMERCE CENTER

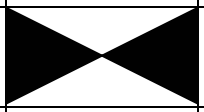
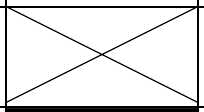
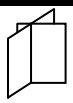
PERRIS, CALIFORNIA

SCALE: 1" = 160'	
DRAWN: OS CHKD: RGT	
SCG PROJECT 22G195-1	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

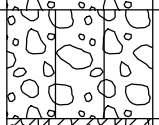
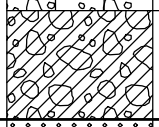
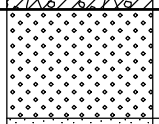
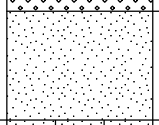
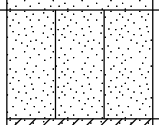
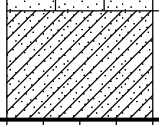
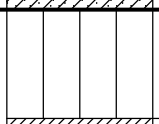
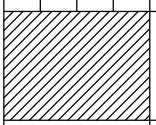
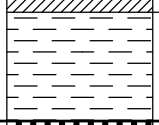
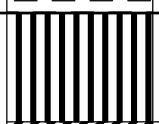
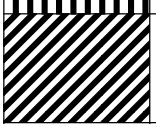
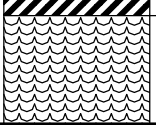
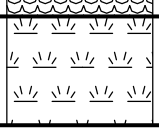
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

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

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		32			FILL: Gray Brown fine to medium Sandy Silt, trace to little Clay, trace coarse Sand, little fine root fibers, porous, slightly mottled, weakly cemented, medium dense to dense-damp	108	3					EI = 24 @ 0 to 5 feet
		64			@ 3 feet, little Calcareous veining, dense	116	5					
5		68			ALLUVIUM: Brown fine Sandy Silt, trace Clay, trace medium Sand, trace Calcareous veining, moderately cemented, dense to very dense-damp	116	6					
		75				120	6					
		72/11"			Brown Silt to fine Sandy Silt, trace medium Sand, moderately cemented, dense to very dense-moist	119	12					
10												
					Brown fine Sandy Silt, trace Clay, medium dense-moist							
		26					10					
15												
					Gray Brown Silty fine to medium Sand, trace to little coarse Sand, medium dense-damp							
		16					5					
20												
					Gray Brown fine to coarse Sand, trace Silt, trace fine Gravel, medium dense-damp							
		24					3					
25												
					Boring Terminated at 25'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG **PLATE B-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

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

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		63	2.5		FILL: Brown fine Sandy Clay, some Silt, trace medium to coarse Sand, trace fine root fibers, moderately cemented, hard-damp		4					
		61	3.5				6					
5		69/10"			ALLUVIUM: Brown fine Sandy Silt, little Clay, trace medium Sand, trace Calcareous nodules, moderately cemented, very dense-damp to moist		9					
		79			Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, medium dense to very dense-damp to moist		10					
10												
		27					8					
15												
		31					10					
20					Boring Terminated at 20'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG **PLATE B-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

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

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		71			FILL: Brown Silty fine Sand to fine Sandy Silt, trace Clay, trace medium Sand, trace fine root fibers, porous, moderately cemented, dense to very dense-damp	113	5					EI = 21 @ 0 to 5 feet
		76/11"				118	5					
5		74/11"				116	6					
		66			ALLUVIUM: Brown fine Sandy Silt, little Clay, trace medium Sand, little Calcareous nodules, strongly cemented, dense to very dense-damp	116	7					
		73/11"				111	8					
10												
		71					8					
15					Boring Terminated at 15'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG **PLATE B-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-12

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

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

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		42			FILL: Brown fine Sandy Silt, little Clay, trace medium Sand, trace fine root fibers, porous, moderately cemented, medium dense-damp	109	3					
		35			FILL: Dark Gray Brown Silty fine Sand, trace Clay, trace medium to coarse Sand, medium dense-damp		4					@ 3 feet, Disturbed Sample
5		45			ALLUVIUM: Gray fine Sandy Silt, little medium to coarse Sand, weakly cemented, dense to very dense-damp	120	5					
		50/5"				108	6					
		80/9"	2.0		Brown Clayey Silt, little fine Sand, trace Calcareous nodules, moderately cemented, hard-moist	111	14					
10					Gray Brown fine to medium Sand, trace Clay, trace to little Silt, medium dense-damp							
		23					3					
15												
		28					5					
20												
		54			Brown Silty fine Sand to fine Sandy Silt, little medium Sand, trace coarse Sand, trace Clay, trace Calcareous nodules, very dense-damp		8					
25					Boring Terminated at 25'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-13

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		17			FILL: Dark Brown fine Sandy Silt, some Clay, trace medium Sand, weakly cemented, medium dense-damp		7					
		25					7					
5		25			ALLUVIUM: Gray Brown to Brown fine Sandy Silt, trace medium Sand, medium dense-damp to moist		10					
		25					9					
10					Boring Terminated at 10'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG **PLATE B-5**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-14

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

WATER DEPTH: Dry
CAVE DEPTH: 2 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		14	2.5		FILL: Dark Brown fine Sandy Clay, some Silt, trace medium Sand, stiff-damp		6					
		48			ALLUVIUM: Brown fine Sandy Silt, little Clay, trace medium Sand, dense-damp		5					
5					Boring Terminated at 5'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-15

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		34			FILL: Brown fine Sandy Silt, trace Clay, trace medium Sand, dense-damp		4					
		46			ALLUVIUM: Brown fine Sandy Silt, trace Clay, trace medium to coarse Sand, trace Calcareous veining, dense-damp		7					
5		30					4					
		24			Brown fine to medium Sand, trace to little Silt, trace coarse Sand, medium dense-damp		3					
10					Boring Terminated at 10'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG

PLATE B-7

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-16

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

WATER DEPTH: Dry
CAVE DEPTH: 3 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		34	4.5		FILL: Brown fine Sandy Clay, little to some Silt, trace medium to coarse Sand, trace fine root fibers, hard-damp		6					
		29			ALLUVIUM: Brown fine Sandy Silt, trace Clay, trace medium to coarse Sand, medium dense-damp		6					
5					Boring Terminated at 5'							

TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-17

JOB NO.: 22G195-1
PROJECT: Perris Valley Commerce Center
LOCATION: Perris, California

DRILLING DATE: 6/7/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joey Hernandez

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		24			FILL: Brown fine Sandy Silt, trace to little Clay, little medium Sand, moderately cemented, porous, medium dense-damp to moist		5					
		29					8					
5		29					11					
		26			ALLUVIUM: Brown fine Sandy Silt, trace Clay, little medium Sand, strongly cemented, medium dense-moist		10					
10					Boring Terminated at 10'							

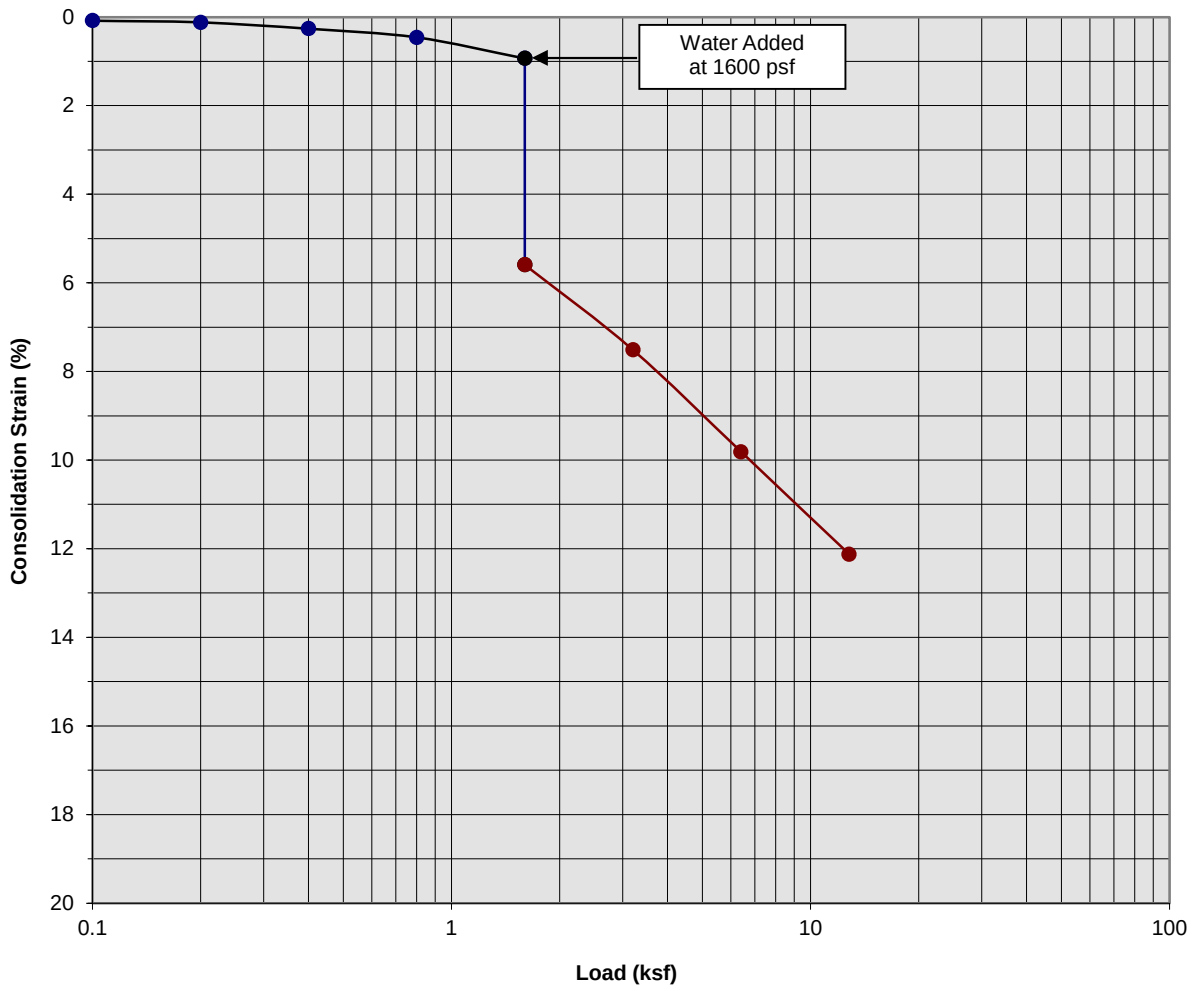
TBL 22G195-1.GPJ SOCALGEO.GDT 7/21/22

TEST BORING LOG

PLATE B-9

APPENDIX C

Consolidation/Collapse Test Results



Classification: Gray fine Sandy Silt, little medium to coarse Sand

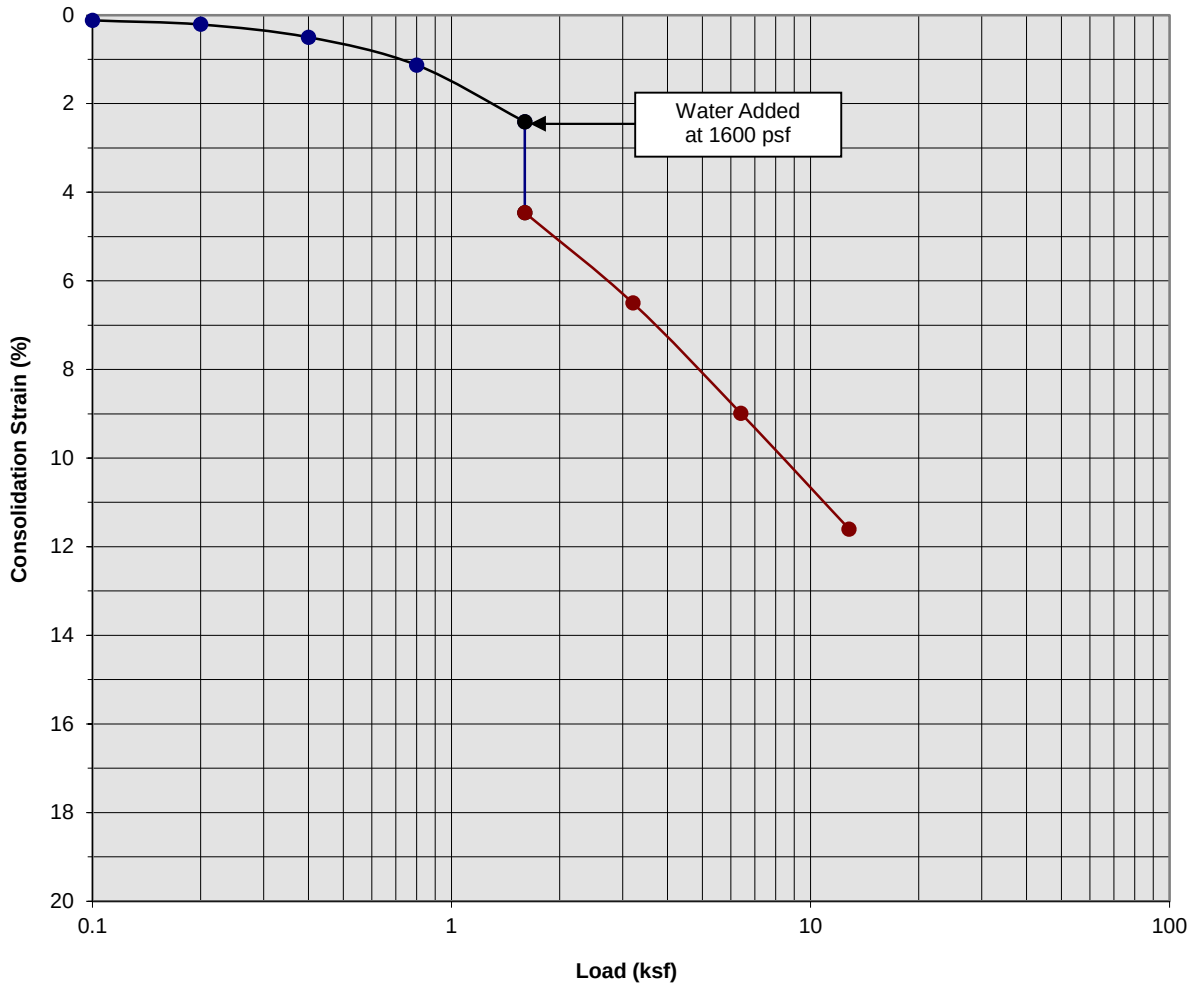
Boring Number:	B-12	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	5 to 6	Initial Dry Density (pcf)	120.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	136.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.66

Perris Valley Commerce Center
Perris, CA
Project No. 22G195-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Gray fine Sandy Silt, little medium to coarse Sand

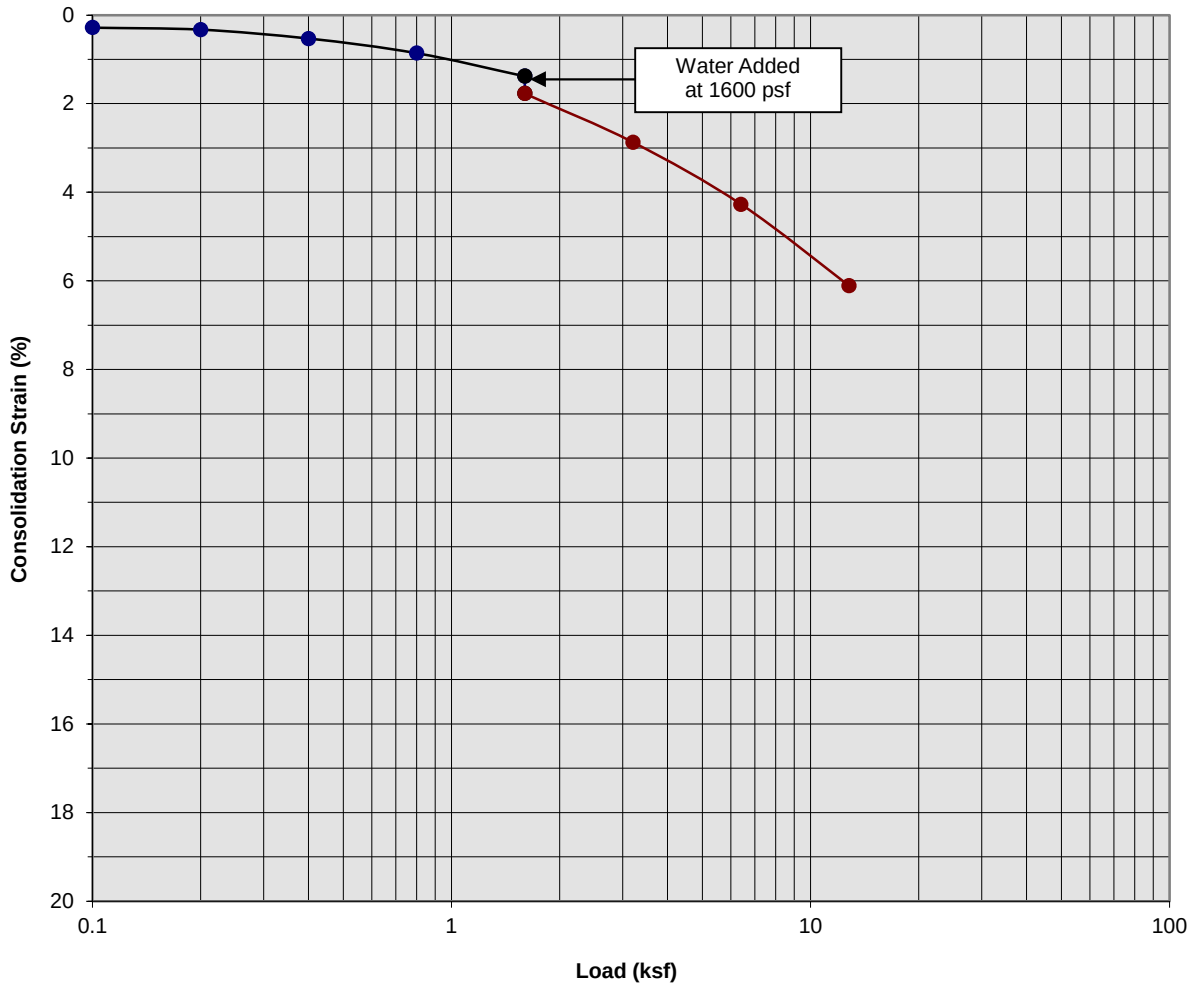
Boring Number:	B-12	Initial Moisture Content (%)	6
Sample Number:	---	Final Moisture Content (%)	22
Depth (ft)	7 to 8	Initial Dry Density (pcf)	107.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.05

Perris Valley Commerce Center
Perris, CA
Project No. 22G195-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Brown Clayey Silt, little fine Sand

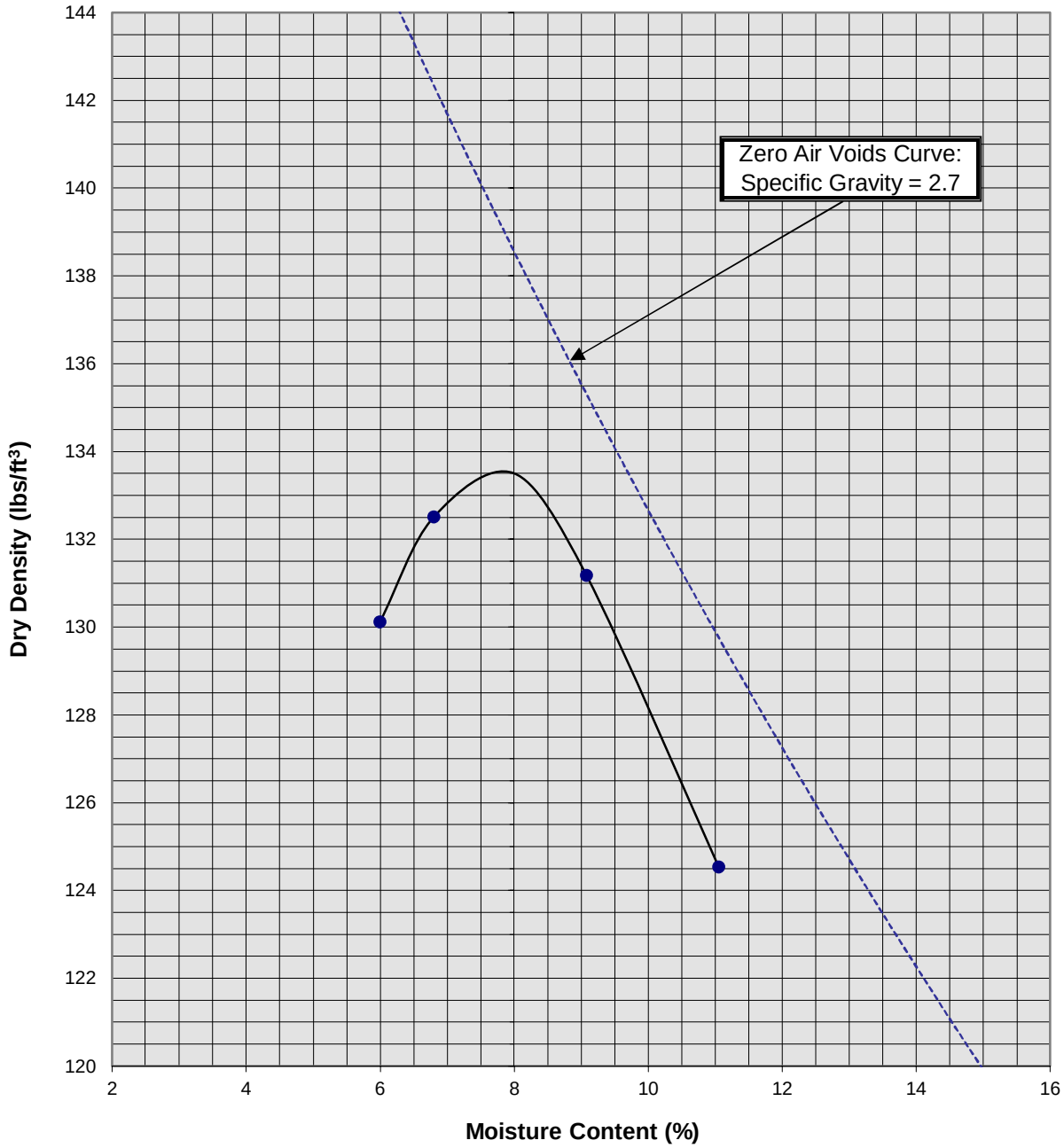
Boring Number:	B-12	Initial Moisture Content (%)	14
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	9 to 10	Initial Dry Density (pcf)	111.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.39

Perris Valley Commerce Center
Perris, CA
Project No. 22G195-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-11 @0-5'
Optimum Moisture (%)	8
Maximum Dry Density (pcf)	133.5
Soil Classification	Brown Silty fine Sand to fine Sandy Silt, trace Clay

Perris Valley Commerce Center
Perris, CA
Project No. 22G195-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

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

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

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

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

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

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

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

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

Compacted Fills

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

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

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

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

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

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

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

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

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

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

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

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

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

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

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

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

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

Foundations

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

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

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

Fill Slopes

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

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

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

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

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

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

Cut Slopes

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

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

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

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

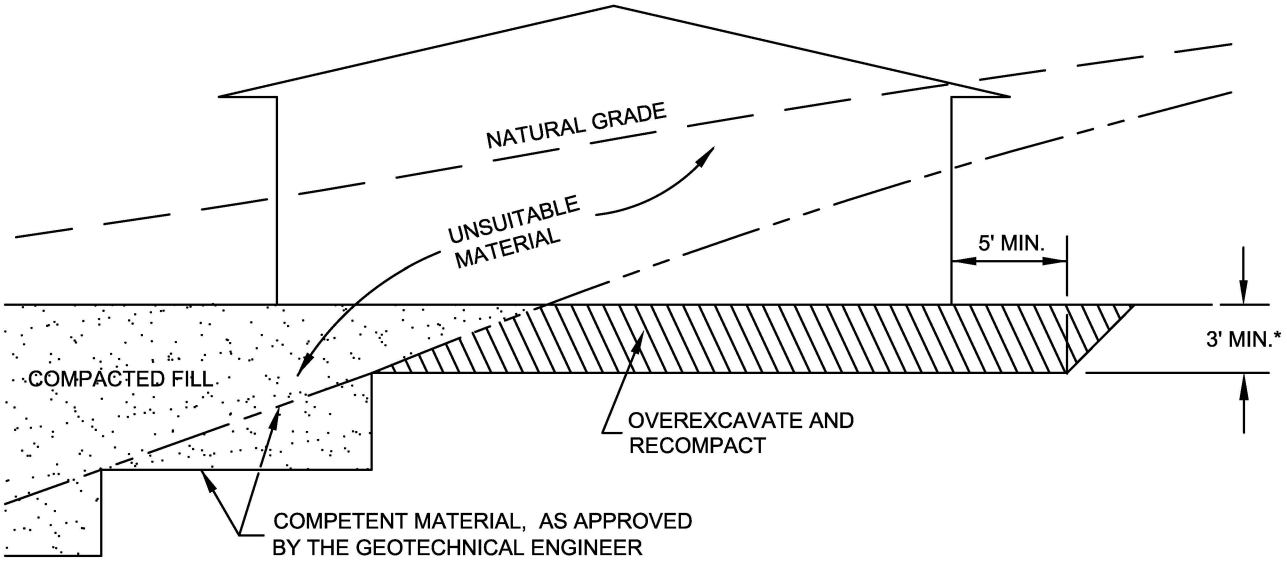
Subdrains

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

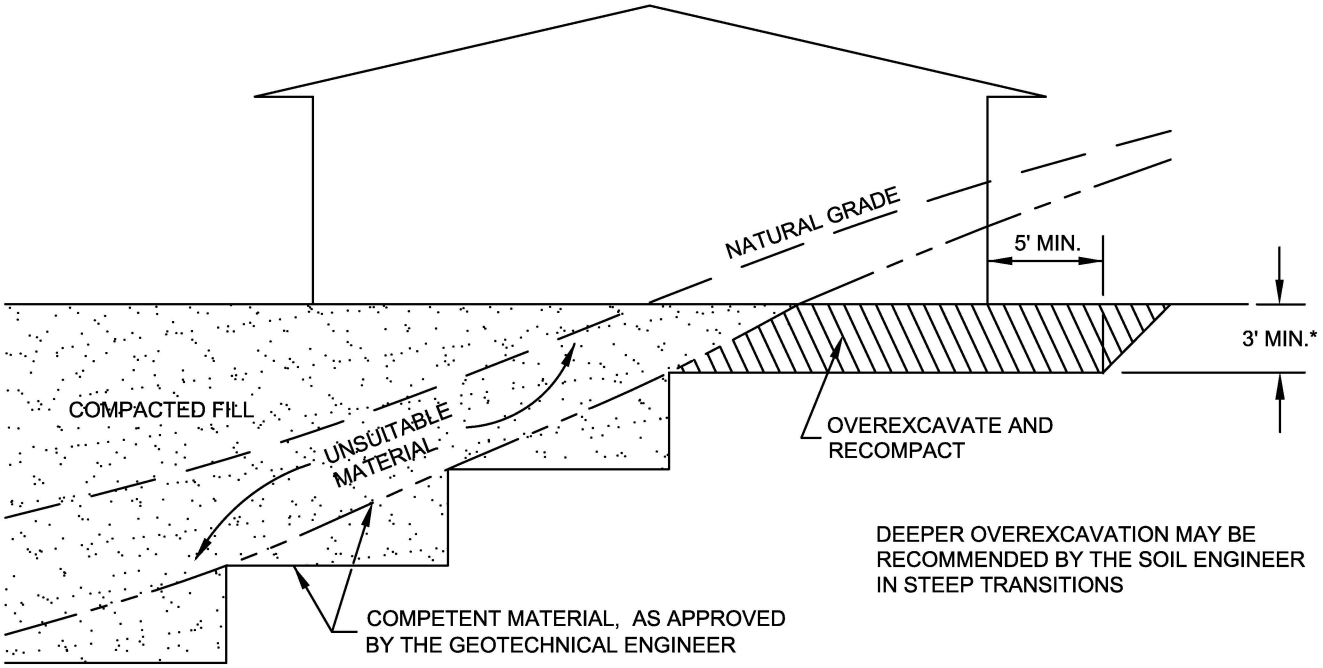
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

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

CUT LOT



CUT/FILL LOT (TRANSITION)



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

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

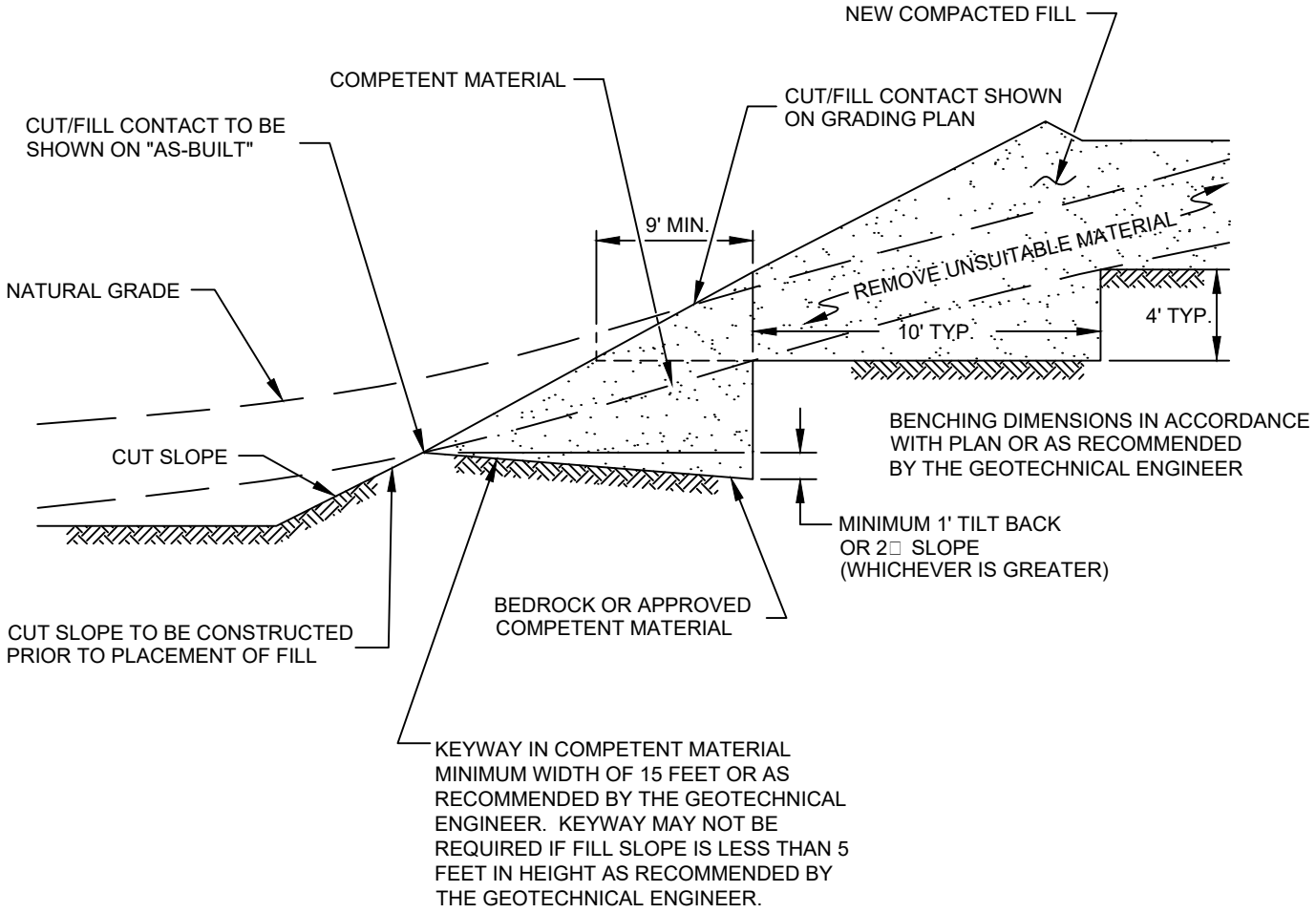
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

GRADING GUIDE SPECIFICATIONS

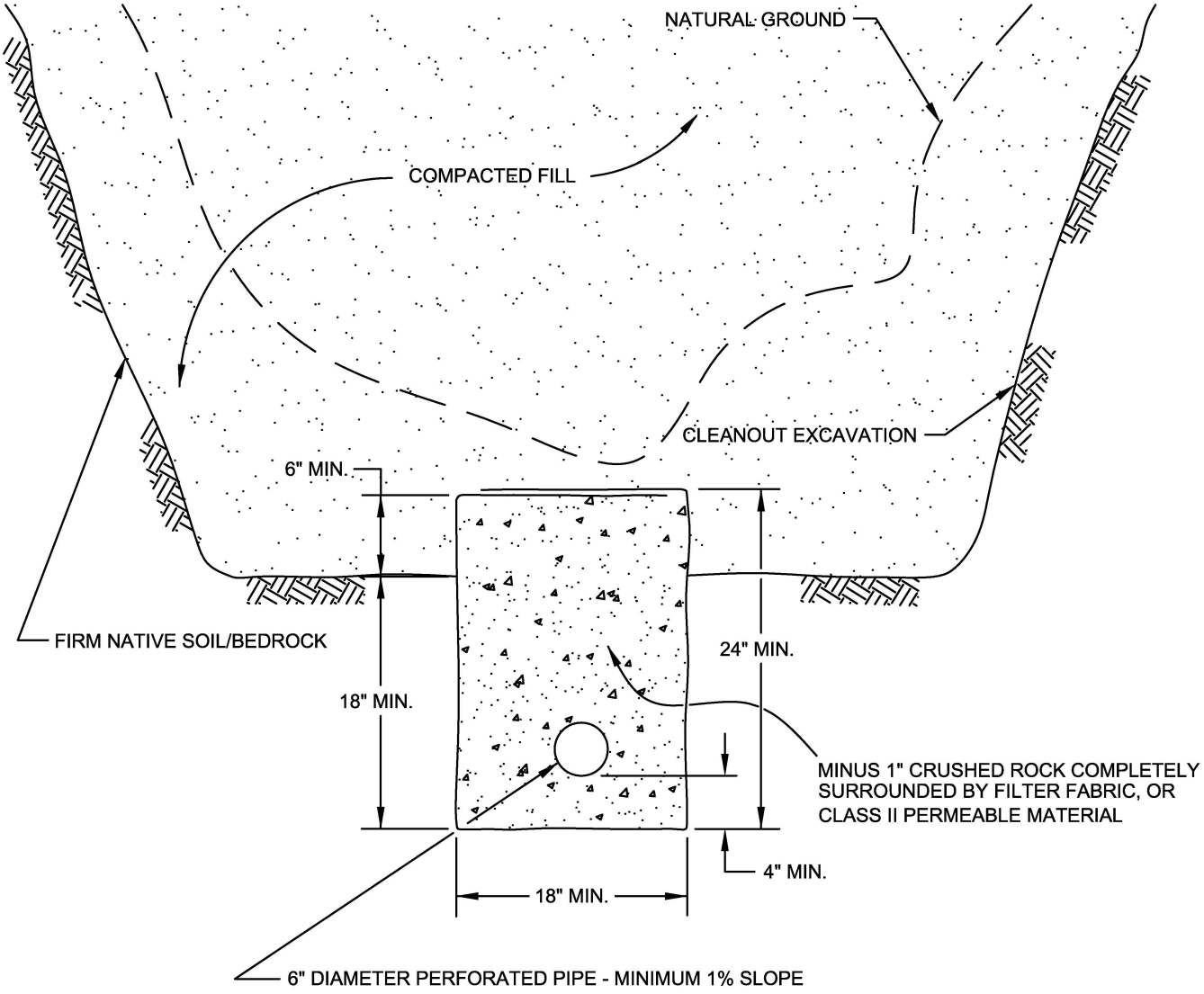
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



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

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

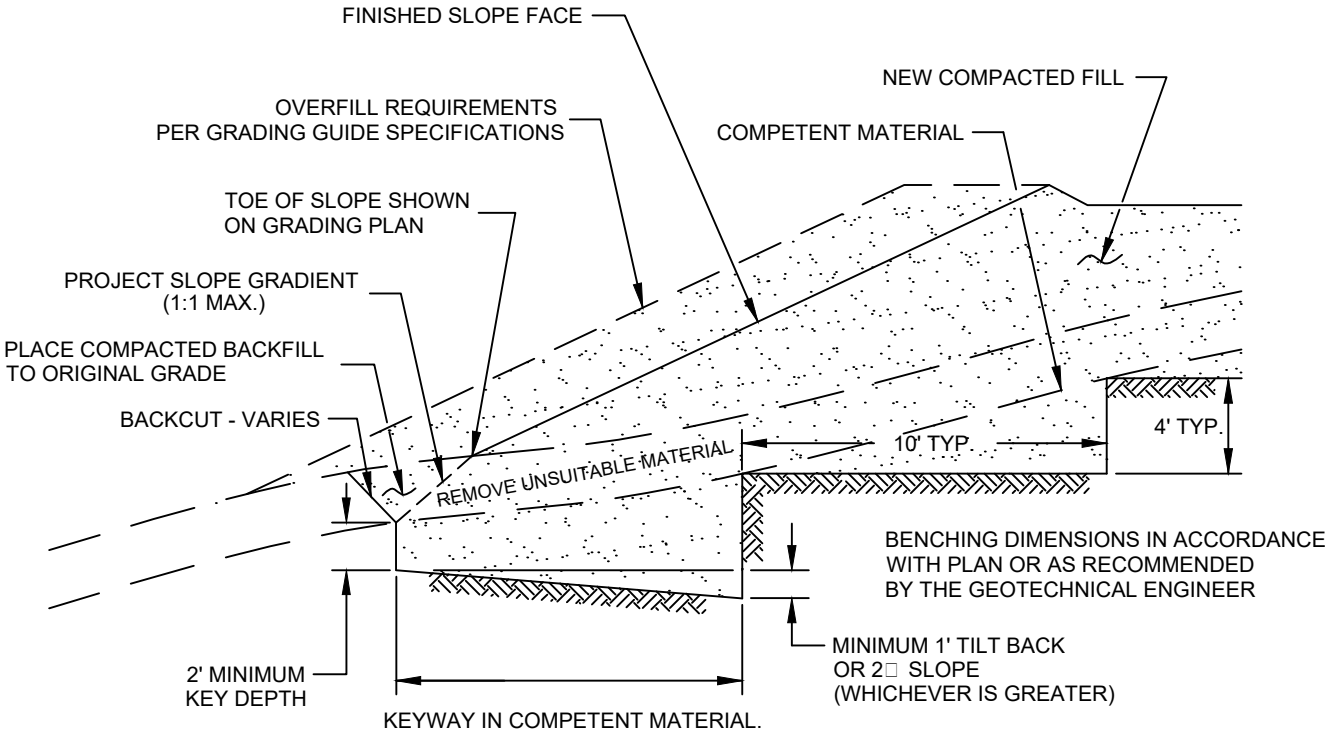
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

GRADING GUIDE SPECIFICATIONS

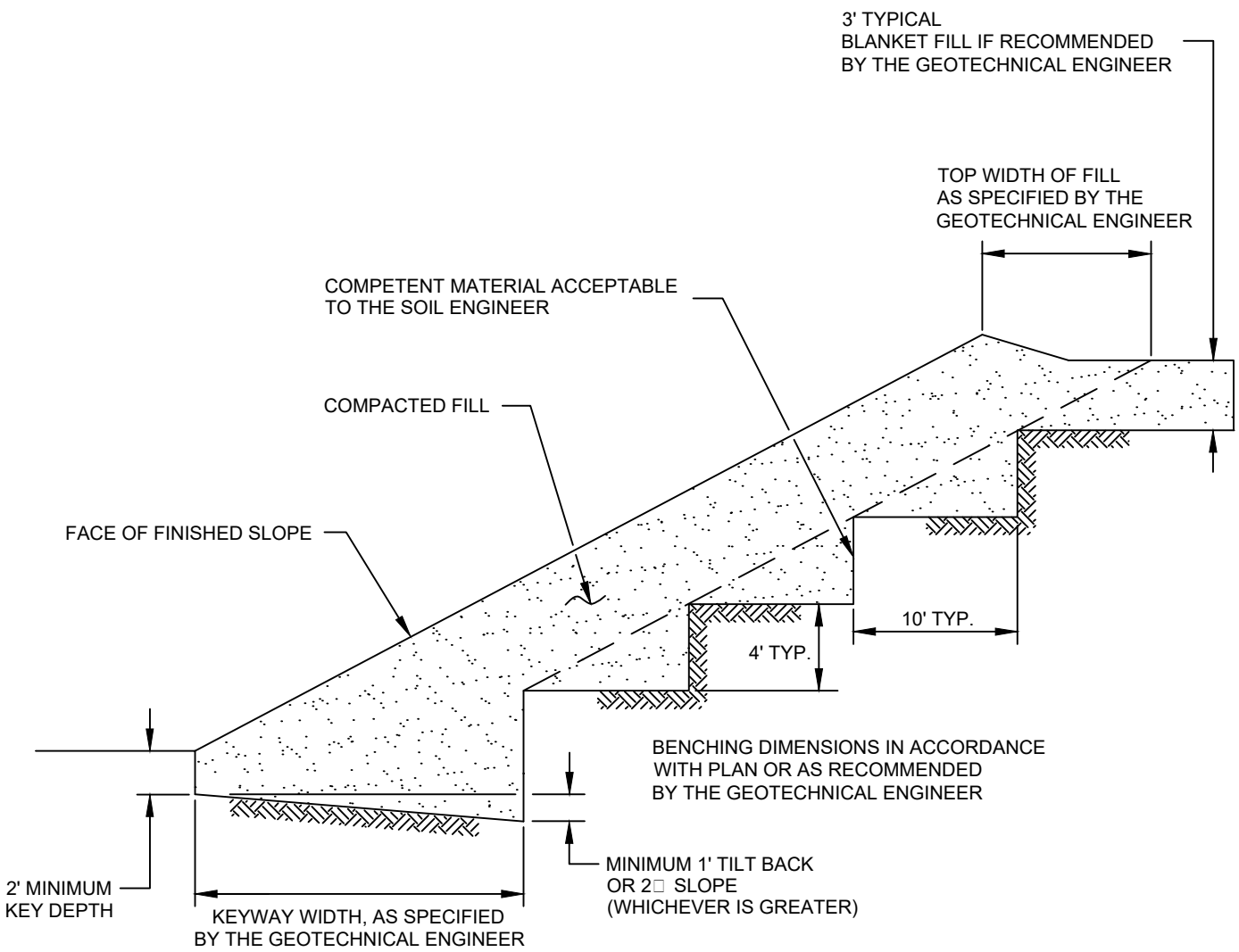
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

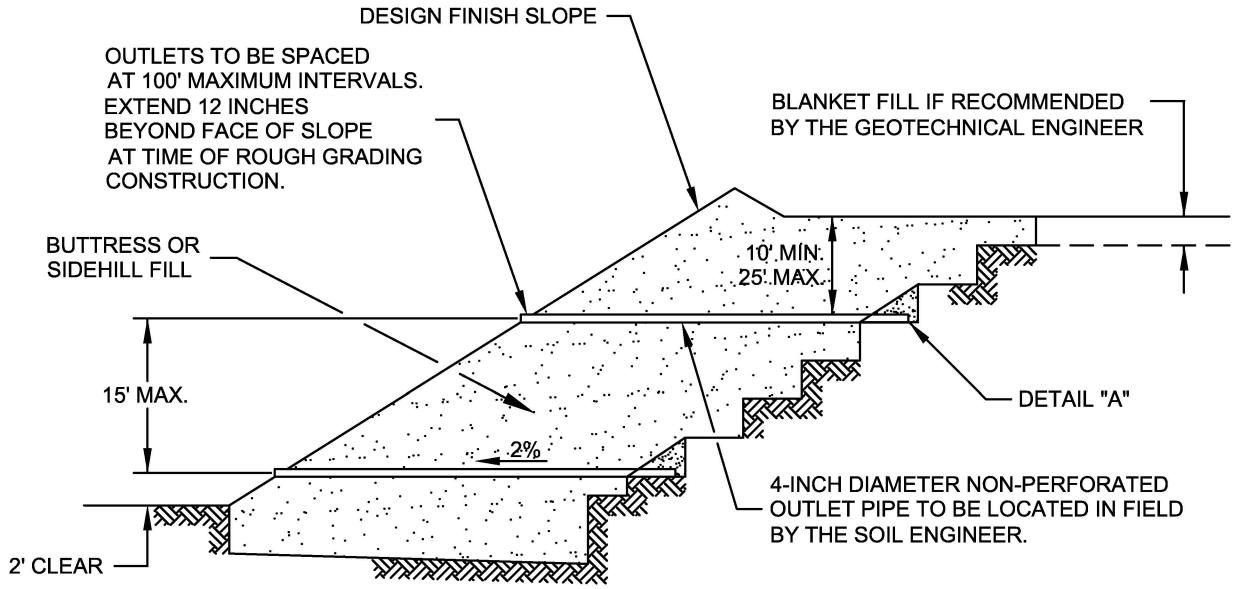
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



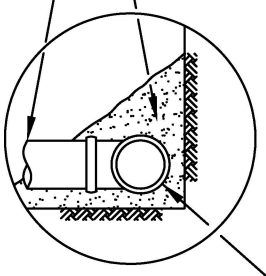
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

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

SLOPE FILL SUBDRAINS

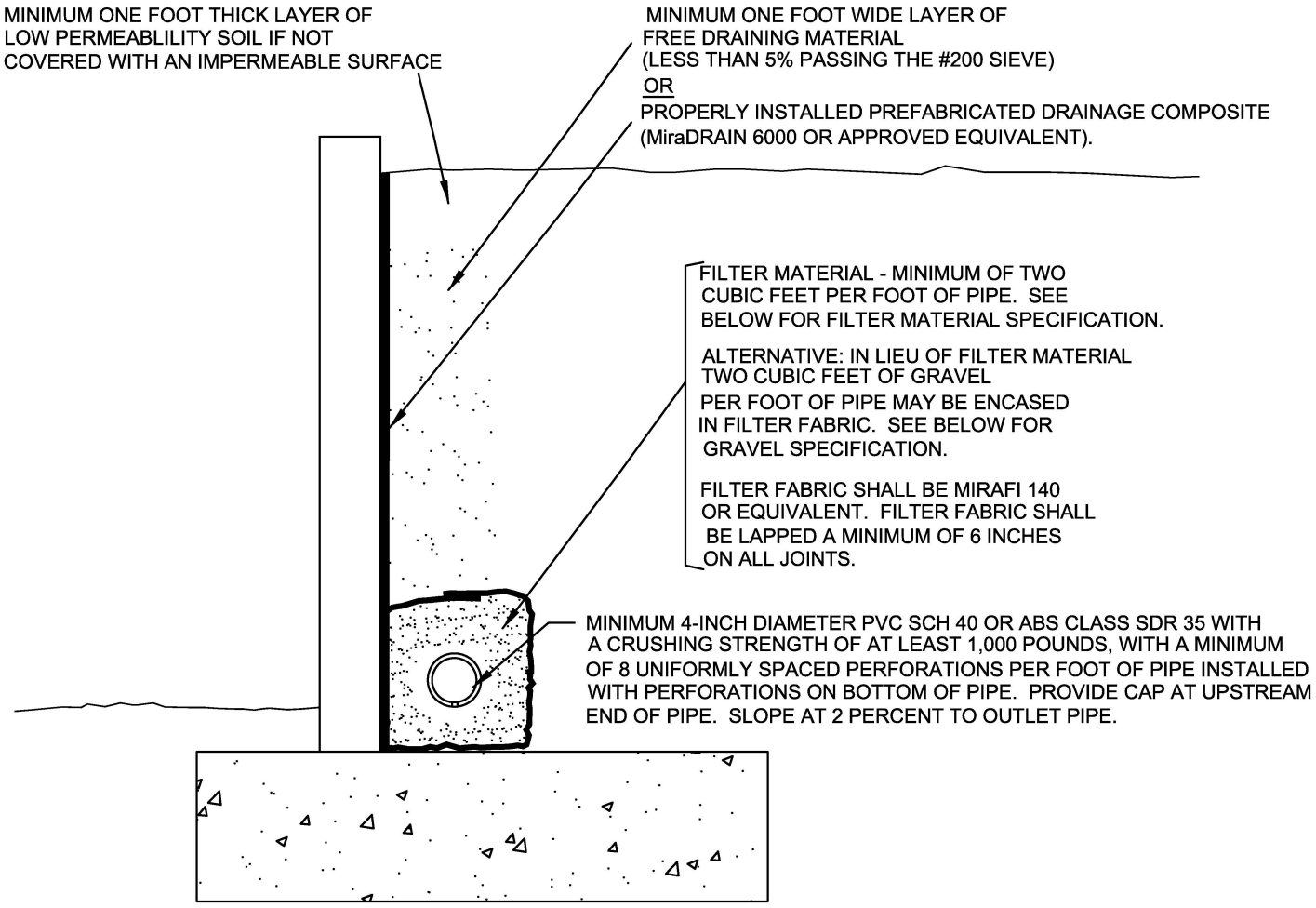
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



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

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

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

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

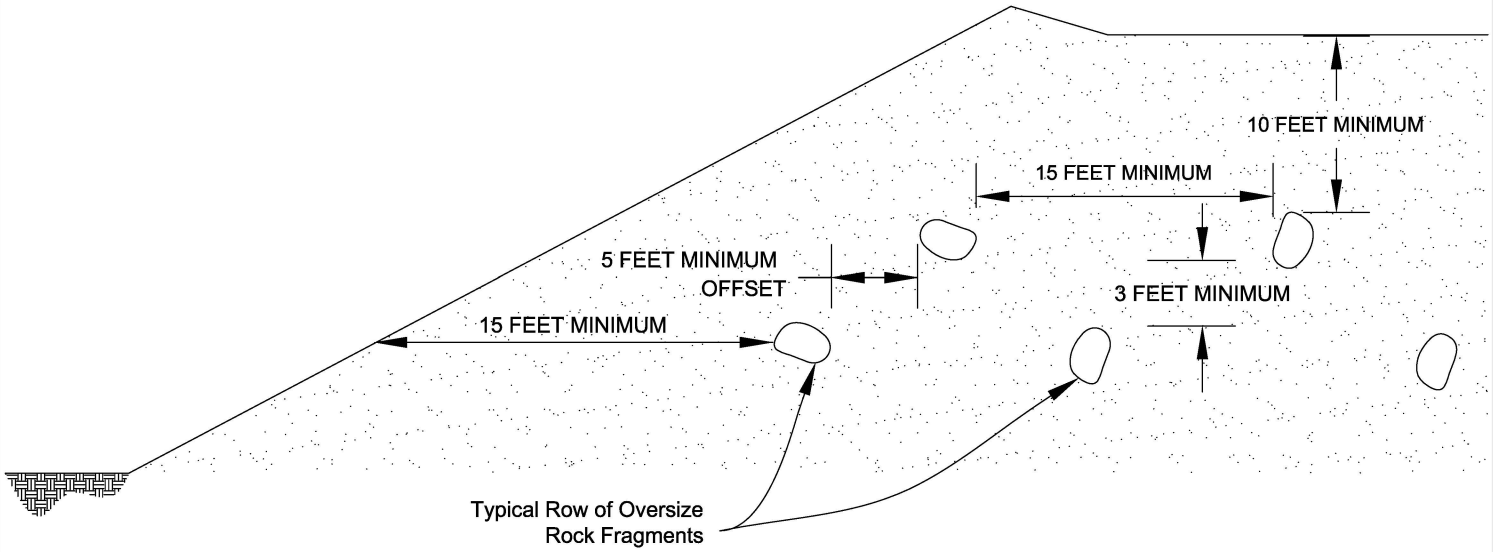
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

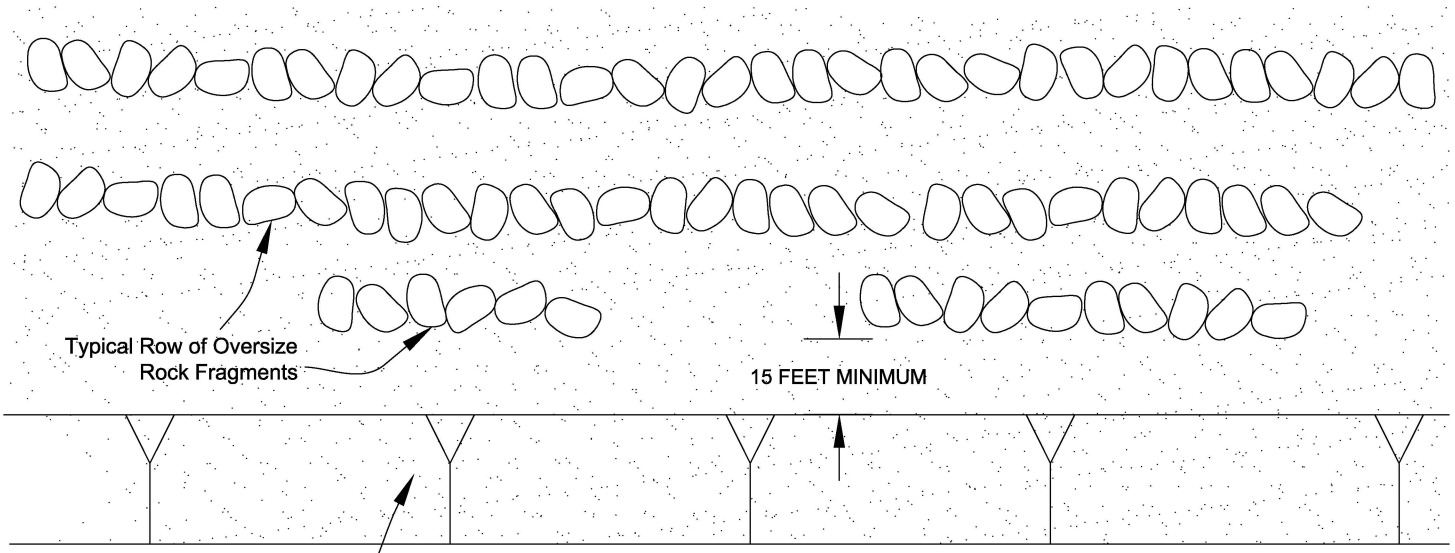
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

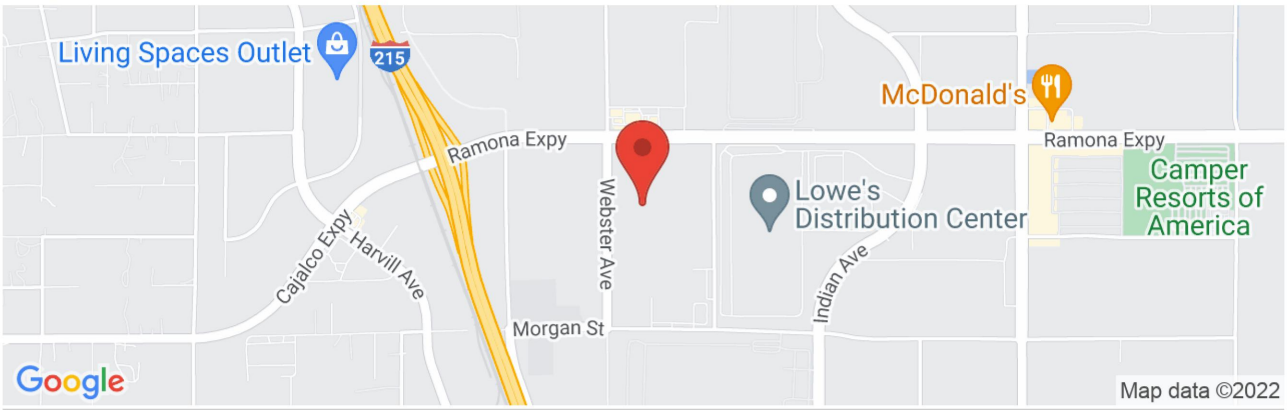
PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

Latitude, Longitude: 33.84209761, -117.24234332



Date	6/17/2022, 2:20:51 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.568	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.55	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.525	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.631	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.568	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.622	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.935	Mapped value of the risk coefficient at short periods
C_{R1}	0.913	Mapped value of the risk coefficient at a period of 1 s

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

SEISMIC DESIGN PARAMETERS - 2019 CBC

PERRIS VALLEY COMMERCE CENTER

PERRIS, CALIFORNIA

DRAWN: JJH
CHKD: DN

SCG PROJECT
22G195-1

PLATE E-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

July 26, 2022

Duke Realty
200 Spectrum Center Drive, Suite 1600
Irvine, California 92618

Attention: Mr. D.J. Arellano
Vice President, Development Services

Project No.: **22G195-2**

Subject: **Results of Infiltration Testing**
Proposed Perris Valley Commerce Center
SEC Webster Avenue and Ramona Expressway
Perris, California

Reference: Geotechnical Investigation, Perris Valley Commerce Center, SEC Webster Avenue and Ramona Expressway, Perris, California, prepared for Duke Realty, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G195-2.

Mr. Arellano:

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

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 22P233, dated May 11, 2022. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located at the southeast corner of Webster Avenue and Ramona Expressway in Perris, California. The site is bounded to the north by Ramona Expressway, to the west by Webster Avenue, to the south by two existing commercial/industrial buildings, and to the east by Brennan Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 of this report.

The subject site consists of several parcels, which total 19.64± acres in size. The site is currently vacant and undeveloped, except for the southeast portion of the site which is currently used as a storage yard for an existing warehouse building. The ground surface cover consists of exposed soil with sparse to moderate native grass and weed growth.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography is generally flat.

Proposed Development

Based on a site plan prepared by RGA, the site will be developed with one (1) industrial building, 542,760± ft² in size, located in the northern area of the site. Dock-high doors will be constructed along a portion of the east building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

The site will utilize on-site stormwater disposal. Based on conversations with the project civil engineer, the infiltration systems will consist of the following:

Infiltration System	Infiltration System Location	Bottom of Infiltration System (feet)
"A"	Central	8 to 10
"B"	Northeast	8 to 10
"C"	Southeast	8 to 10

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, nine (9) borings were advanced to depths of 5 to 25± feet below existing site grades. Artificial fill soils were encountered at the ground surface at all of the boring locations. The fill soils extend to depths of 3 to 8± feet below the existing site grades. The fill soils generally consist of medium dense to very dense sandy silts and silty sands with occasional stiff to hard silty clays. Native alluvium was encountered below the fill soils at all of the boring locations, extending to at least the maximum depth explored of 25± feet below existing site grades. The alluvium generally consists of medium dense to very dense sandy silts, silty sands and silts and occasional clay content.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a depth greater than the maximum explored depth of 25± feet below existing site grades for this project.

Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located approximately 1 mile northeast from the site. Water level readings within this monitoring well indicates a groundwater level of 44± feet below the ground surface in March 2022.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe-excavated trenches, extending to depths of 8 to 9± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 through I-4) are indicated on the Infiltration Test Location Plans, enclosed as Plate 2 of this report.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface of Infiltration Trench Nos. I-1, I-2 and I-3, extending 1 to 1½± feet below existing site grades. The artificial fill soils consist of loose fine sandy silts with trace amounts of medium sand and clay. These materials possess a disturbed appearance, resulting in their classification as artificial fill. Native alluvium was encountered and the ground surface of Infiltration Trench No. I-4 and beneath the artificial fill of the remaining infiltration trench locations, extending to at least the maximum explored depth of 9± feet below existing site grades. The alluvium generally consists of medium dense to very dense silty fine to medium sands and fine to medium sandy silts. The alluvial soils generally possess trace to little clay, trace to little coarse sand and occasional porosity and cementation. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at both of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 15-minute increments. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	8	Silty fine to medium Sand, trace to little Clay, trace coarse Sand	0.1
I-2	8	Silty fine to medium Sand, trace Clay, trace coarse Sand	1.2
I-3	8	Fine to medium Sandy Silt, trace Clay, trace coarse Sand	0.4
I-4	9	Silty fine to medium Sand, little to some Clay, trace coarse Sand	1.2

Design Recommendations

Four (4) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 0.1 to 1.2 inches per hour. The major factors affecting the lack of infiltration at these locations are the varying relative densities and silt/clay content. **Based on the results of the infiltration testing, we recommend the following infiltration rates for the proposed infiltration systems:**

Infiltration System	Infiltration Rate (Inches per Hour)
A	0.6*
B	0.4
C	1.2

*Note: This rate is an average of Infiltration Test Nos. I-1 and I-2.

The design of the storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. It is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rates recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rates are based on infiltration testing at four (4) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Infiltration Rate Considerations

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

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

Construction Considerations

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

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. The infiltration rate of the system will likely vary significantly if the composition of the soil located beneath the system is not consistent with the tested soils.

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

Chamber Maintenance

The proposed project may include below-grade infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the basin subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

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

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

General Comments

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

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

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

Closure

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

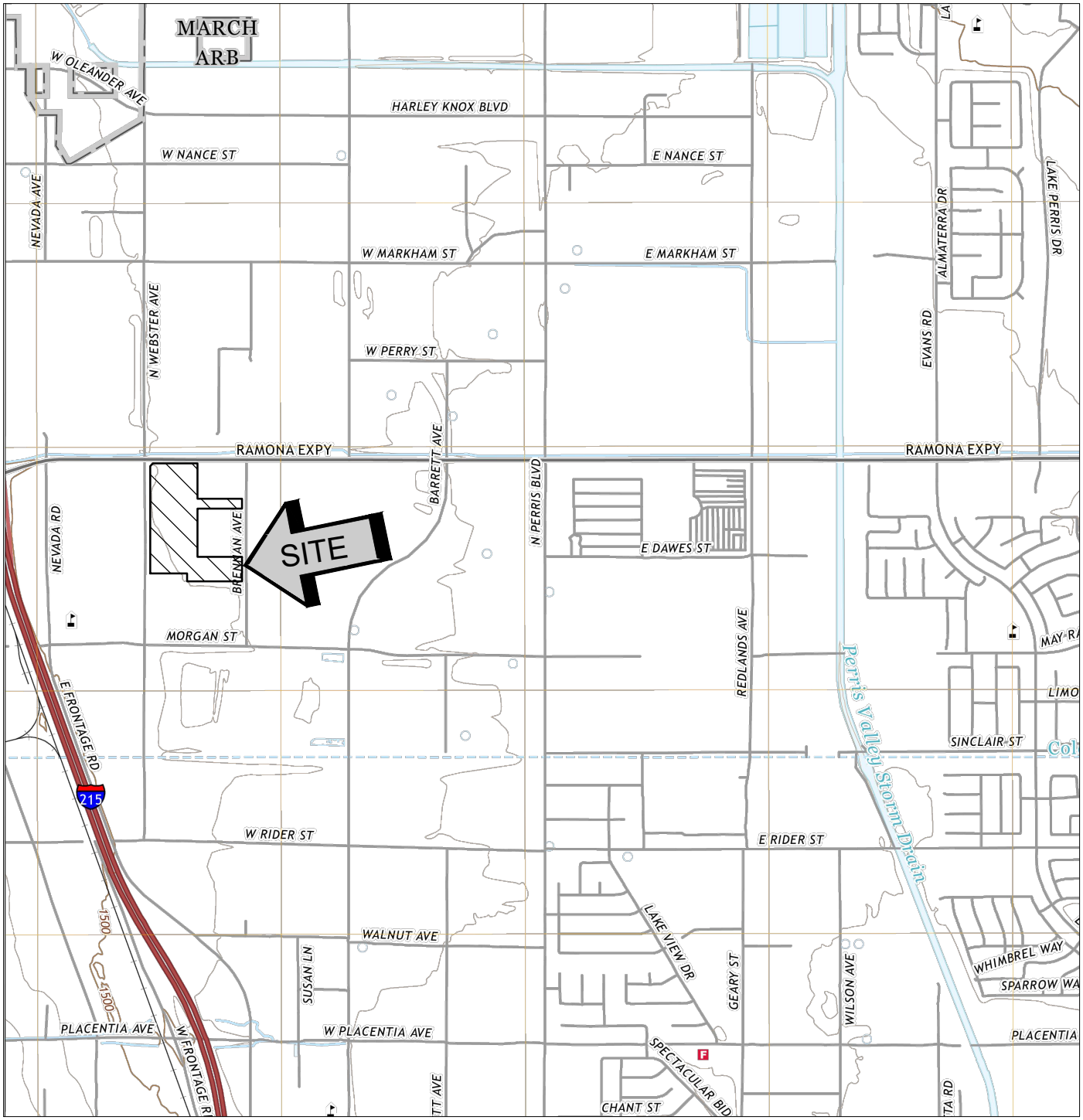
Respectfully Submitted,
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Jamie Hayward
Staff Geologist

Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

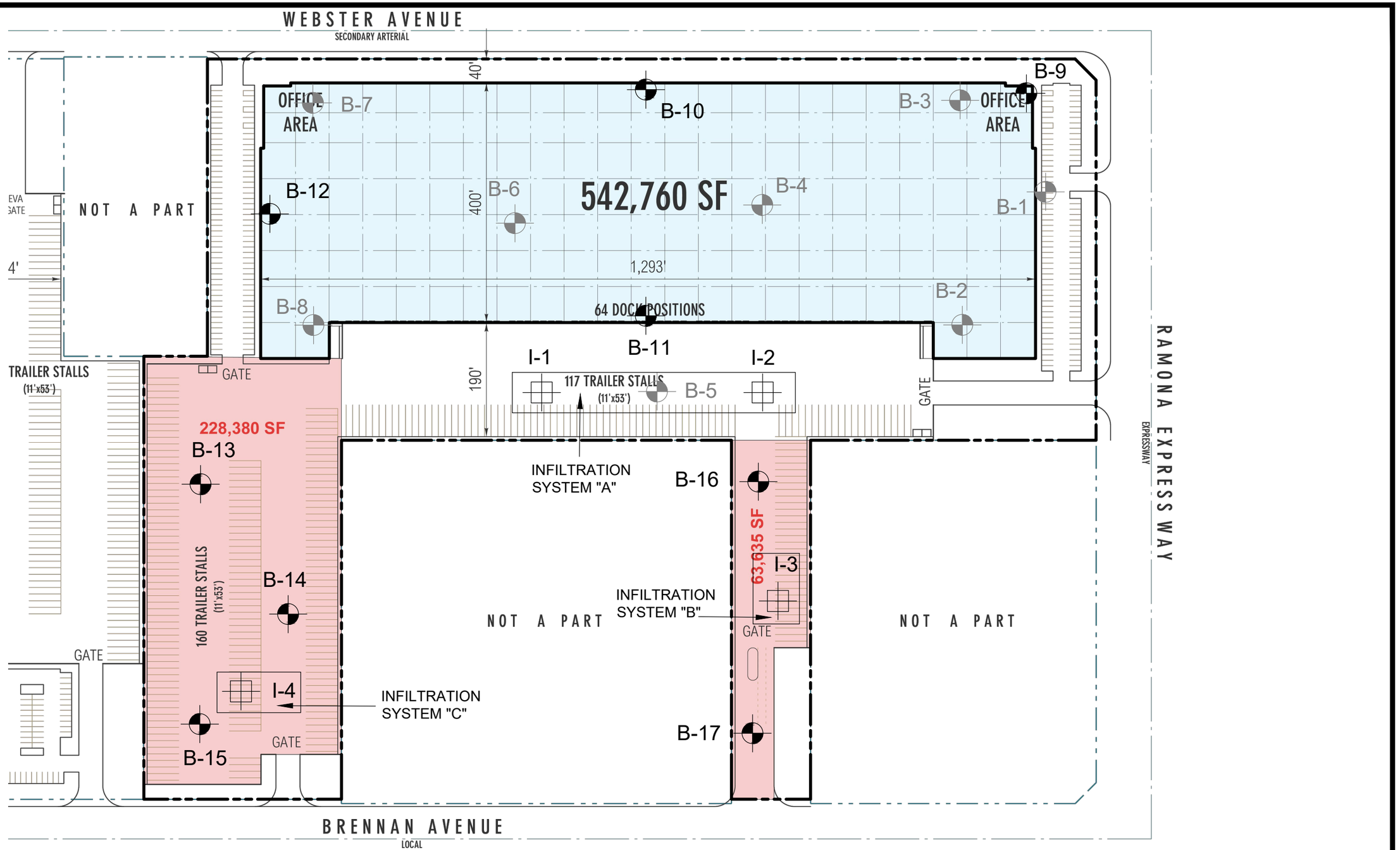
PERRIS VALLEY COMMERCE CENTER

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JJH CHKD: DN	
SCG PROJECT 22G195-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION (SCG PROJECT NO. 22G195-1)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 08G186-1)

NORTH

NOTE: SITE PLAN PROVIDED BY THE CLIENT.

INFILTRATION TEST LOCATION PLAN

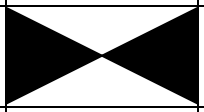
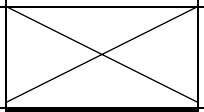
PERRIS VALLEY COMMERCE CENTER

PERRIS, CALIFORNIA

SCALE: 1" = 160'	
DRAWN: OS CHKD: RGT	
SCG PROJECT 22G195-2	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

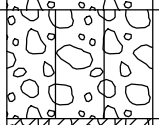
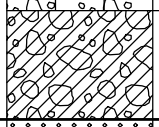
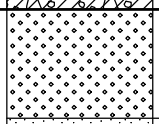
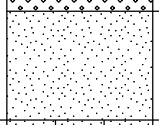
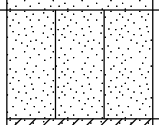
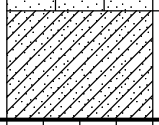
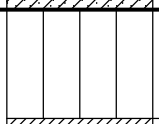
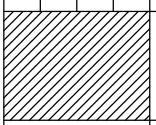
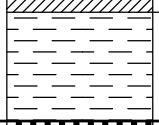
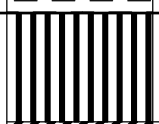
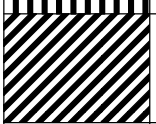
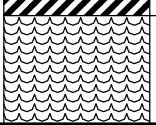
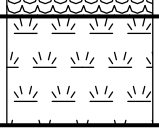
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 22G195-2
PROJECT: Perris Valley Commerce
LOCATION: Perris, California

EXCAVATION DATE: 6/10/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Light Brown fine Sandy Silt, trace medium Sand, trace fine root fibers, loose-dry							
					ALLUVIUM: Brown Silty fine to medium Sand, trace to little Clay, trace coarse Sand, porous, strongly cemented, very dense-damp							
5							4			40		
					Trench Terminated at 8'							

TBL 22G195-2 (TRENCHES).GPJ SOCALGEO.GDT 7/6/22

TEST TRENCH LOG

PLATE I-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-2

JOB NO.: 22G195-2
PROJECT: Perris Valley Commerce
LOCATION: Perris, California

EXCAVATION DATE: 6/10/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Light Brown fine Sandy Silt, trace medium Sand, trace fine root fibers, loose-dry							
					ALLUVIUM: Brown Silty fine to medium Sand, trace Clay, little coarse Sand, porous, moderately cemented, very dense-damp							
5							5			35		
					Trench Terminated at 8'							

TBL 22G195-2 (TRENCHES).GPJ SOCALGEO.GDT 7/6/22

TEST TRENCH LOG **PLATE I-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-3

JOB NO.: 22G195-2
PROJECT: Perris Valley Commerce
LOCATION: Perris, California

EXCAVATION DATE: 6/13/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Light Brown fine Sandy Silt, trace Clay, trace fine root fibers, loose-dry							
					ALLUVIUM: Brown fine to medium Sandy Silt, trace Clay, trace coarse Sand, medium dense-damp							
5							7			53		
					Trench Terminated at 8'							

TBL 22G195-2 (TRENCHES).GPJ SOCALGEO.GDT 7/6/22

TEST TRENCH LOG **PLATE I-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-4

JOB NO.: 22G195-2
PROJECT: Perris Valley Commerce
LOCATION: Perris, California

EXCAVATION DATE: 6/13/22
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					ALLUVIUM: Brown Silty fine to medium Sand, little to some Clay, medium dense-damp		9			38		
					Trench Terminated at 9'							

TBL 22G195-2 (TRENCHES).GPJ SOCALGEO.GDT 7/6/22

TEST TRENCH LOG

PLATE I-4

INFILTRATION CALCULATIONS

Project Name	Perris Valley Commerce Center
Project Location	Perris, California
Project Number	22G195-2
Engineer	OS

Infiltration Test No: I-1

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	11:15 AM	15	0	350	0	2500	1.92	4.57	0.76	1.80
	Final	11:30 AM	**15**	350		2500					
2	Initial	11:30 AM	15	0	50	0	1000	0.27	1.83	0.11	0.72
	Final	11:45 AM	**30**	50		1000					
3	Initial	11:45 AM	15	0	50	0	1000	0.27	1.83	0.11	0.72
	Final	12:00 PM	**45**	50		1000					
4	Initial	12:00 PM	15	0	50	0	1000	0.27	1.83	0.11	0.72
	Final	12:15 PM	**60**	50		1000					
5	Initial	12:15 PM	15	0	50	0	1000	0.27	1.83	0.11	0.72
	Final	12:30 PM	**75**	50		1000					
6	Initial	12:30 PM	15	0	50	0	1000	0.27	1.83	0.11	0.72
	Final	12:45 PM	**90**	50		1000					

INFILTRATION CALCULATIONS

Project Name	Perris Valley Commerce Center
Project Location	Perris, California
Project Number	22G195-2
Engineer	OS

Infiltration Test No: I-2

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:35 AM	15	0	1100	0	7000	6.03	12.79	2.37	5.04
	Final	9:50 AM	**15**	1100		7000					
2	Initial	9:50 AM	15	0	1000	0	4000	5.48	7.31	2.16	2.88
	Final	10:05 AM	**30**	1000		4000					
3	Initial	10:05 AM	15	0	750	0	4000	4.11	7.31	1.62	2.88
	Final	10:20 AM	**45**	750		4000					
4	Initial	10:20 AM	15	0	600	0	3500	3.29	6.40	1.30	2.52
	Final	10:35 AM	**60**	600		3500					
5	Initial	10:35 AM	15	0	600	0	3500	3.29	6.40	1.30	2.52
	Final	10:50 AM	**75**	600		3500					
6	Initial	10:50 AM	15	0	550	0	3400	3.02	6.21	1.19	2.45
	Final	11:05 AM	**90**	550		3400					

INFILTRATION CALCULATIONS

Project Name	Perris Valley Commerce Center
Project Location	Perris, California
Project Number	22G195-2
Engineer	OS

Infiltration Test No: I-3

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	7:00 AM	15	0	200	0	9000	1.10	16.45	0.43	6.48
	Final	7:15 AM	**15**	200		9000					
2	Initial	7:15 AM	15	0	300	0	8000	1.64	14.62	0.65	5.76
	Final	7:30 AM	**30**	300		8000					
3	Initial	7:30 AM	15	0	300	0	8000	1.64	14.62	0.65	5.76
	Final	7:45 AM	**45**	300		8000					
4	Initial	7:45 AM	15	0	200	0	8000	1.10	14.62	0.43	5.76
	Final	8:00 AM	**60**	200		8000					
5	Initial	8:00 AM	15	0	200	0	7000	1.10	12.79	0.43	5.04
	Final	8:15 AM	**75**	200		7000					
6	Initial	8:15 AM	15	0	200	0	7000	1.10	12.79	0.43	5.04
	Final	8:30 AM	**90**	200		7000					

INFILTRATION CALCULATIONS

Project Name	Perris Valley Commerce Center
Project Location	Perris, California
Project Number	22G195-2
Engineer	OS

Infiltration Test No: I-4

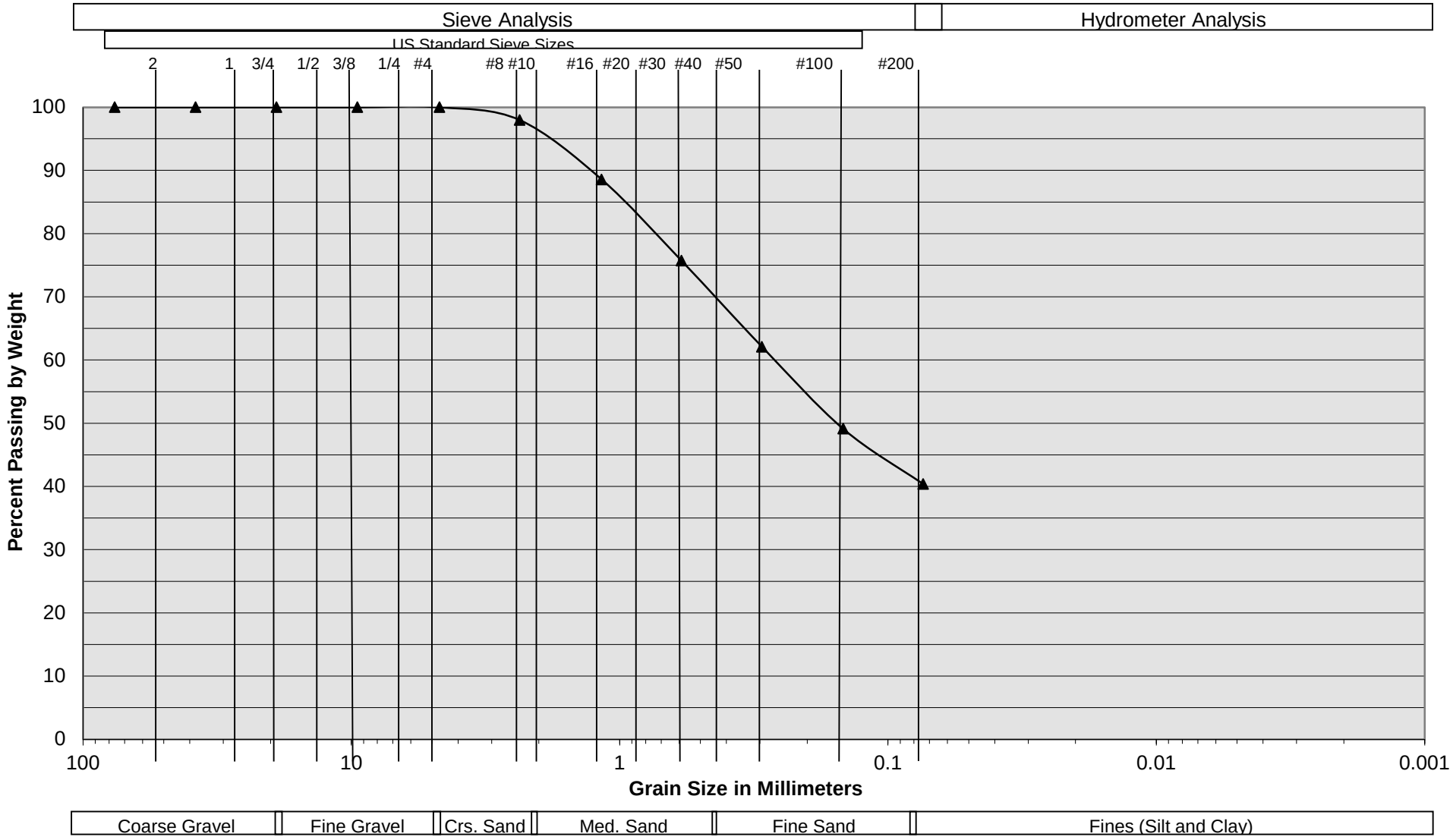
Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	10:00 AM	15	0	700	0	3000	3.84	5.48	1.51	2.16
	Final	10:15 AM	**15**	700		3000					
2	Initial	10:15 AM	15	0	650	0	3000	3.56	5.48	1.40	2.16
	Final	10:30 AM	**30**	650		3000					
3	Initial	10:30 AM	15	0	600	0	3100	3.29	5.66	1.30	2.23
	Final	10:45 AM	**45**	600		3100					
4	Initial	10:45 AM	15	0	600	0	2800	3.29	5.12	1.30	2.01
	Final	11:00 AM	**60**	600		2800					
5	Initial	11:00 AM	15	0	550	0	2700	3.02	4.93	1.19	1.94
	Final	11:15 AM	**75**	550		2700					
6	Initial	11:15 AM	15	0	550	0	2600	3.02	4.75	1.19	1.87
	Final	11:30 AM	**90**	550		2600					

Grain Size Distribution

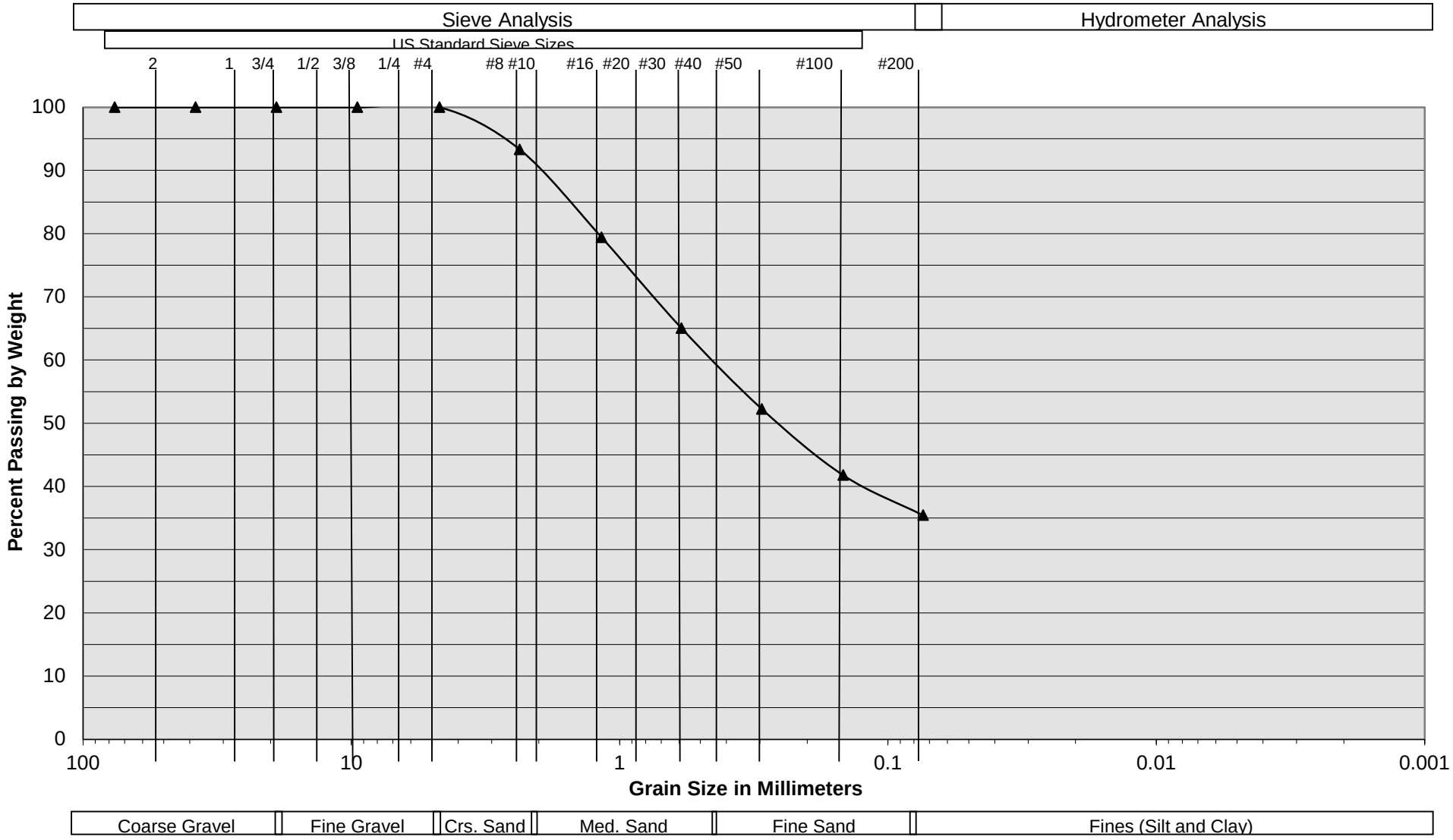


Sample Description	I-1 @ 8'
Soil Classification	Silty fine to medium Sand, trace to little Clay, trace coarse Sand

Perris Valley Commerce Center
Perris, California
Project No. 22G195-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

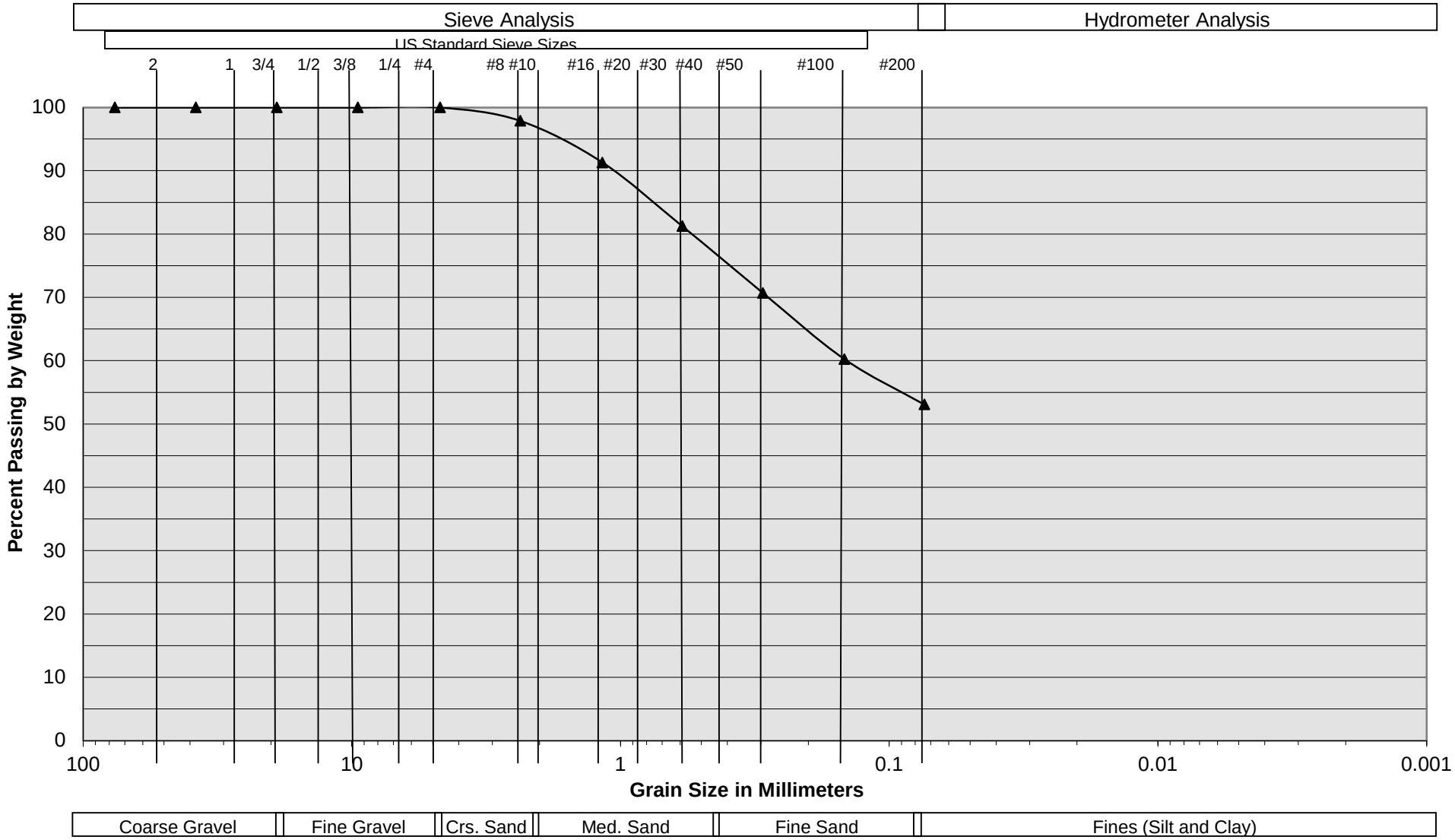


Sample Description	I-2 @ 8'
Soil Classification	Silty fine to medium Sand, trace Clay, trace coarse Sand

Perris Valley Commerce Center
Perris, California
Project No. 22G195-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

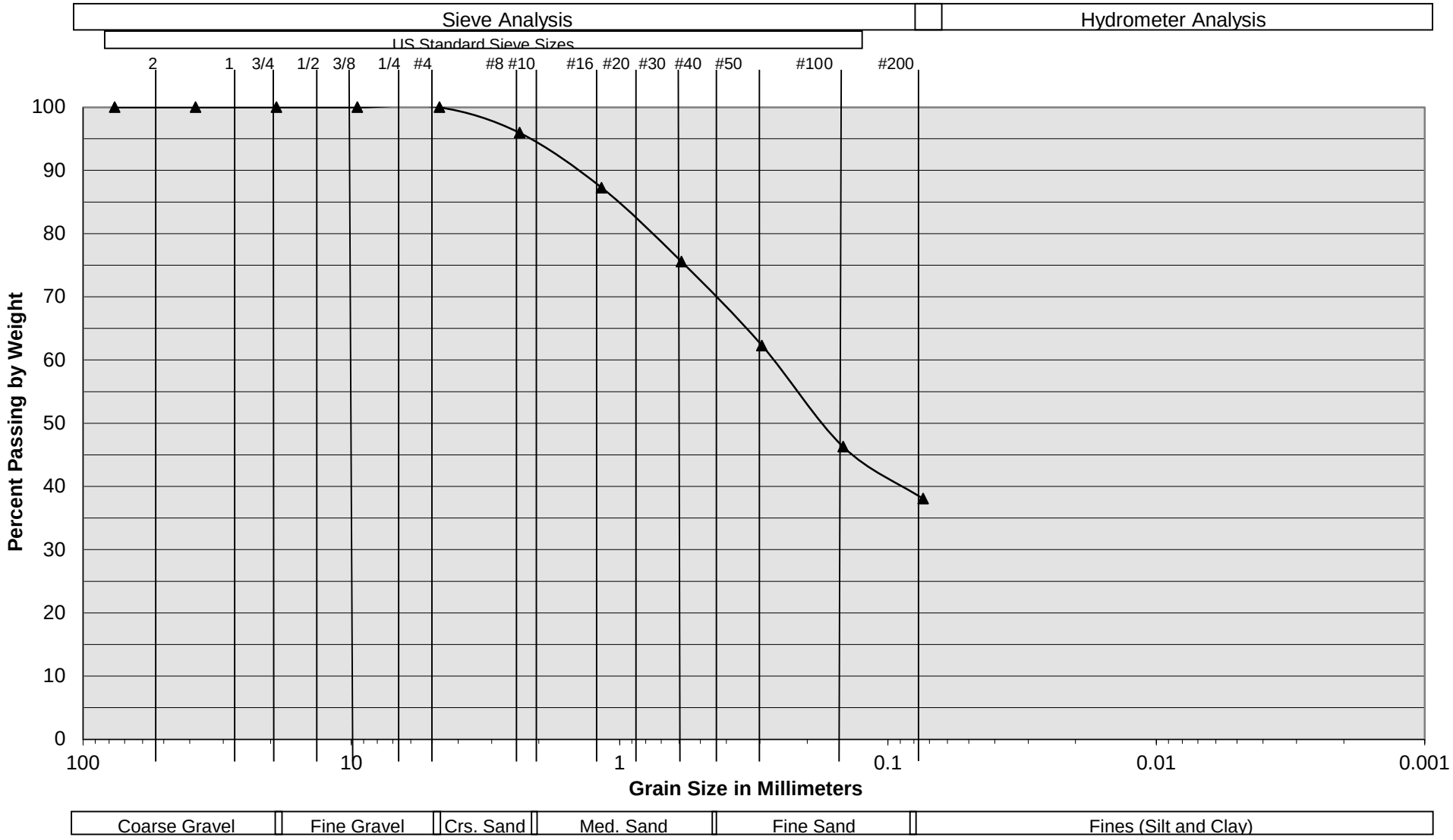


Sample Description	I-3 @ 8'
Soil Classification	Fine to medium Sandy Silt, trace Clay, trace coarse Sand

Perris Valley Commerce Center
Perris, California
Project No. 22G195-2
PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 9'
Soil Classification	Silty fine to medium Sand, little to some Clay, trace coarse Sand

Perris Valley Commerce Center
Perris, California
Project No. 22G195-2
PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix 4: Historical Site Conditions

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

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

“Not Applicable”

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

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	ADKAN ENGINEERS	Date	11/28/2022
Designed by	J. SWORD	Case No	
Company Project Number/Name	10331 - RAMONA AND WEBSTER		

BMP Identification

BMP NAME / ID: CHAMBERS-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}= 0.62 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)*
D-1.2	*48303*	*Roofs*	*1*	*0.89*	*43086.3*			
D-2.2	*251810*	*Concrete or Asphalt*	*1*	*0.89*	*224614.5*			
D-3.3	*32602*	*Ornamental Landscaping*	*0.1*	*0.11*	*3601.2*			
	332715	**Total**			**271302**	**0.62**	**14017.3**	**14112**

Notes:

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

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

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

Company Name: ADKAN ENGINEERS — Date: 11/29/2022

Designed by: J. SWORD — Case No:

Company Project Number/Name: 10331 - RAMONA AND WEBSTER

BMP Identification

BMP NAME / ID: BIOFILTERRA-A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity — I = in/hr

Drainage Management Area Tabulation

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

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*D-1.2*	*48303*	*Roofs*	*1*	*0.89*	*43086.3*			
	D-2.2	*251810*	*Concrete or Asphalt*	*1*	*0.892*	*224614.5*			
	D-3.3	*32602*	*Ornamental Landscaping*	*0.1*	*0.11046*	*3601.2*			
		332715	***Total***			**271302**		***0.18 (PUMP)***	***0.2***

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	ADKAN ENGINEERS	Date	11/28/2022
Designed by	J. SWORD	Case No	
Company Project Number/Name	10331 - RAMONA AND WEBSTER		

BMP Identification

BMP NAME / ID: CHAMBERS-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} = 0.62 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)*
D-1.1	*498445*	*Roofs*	*1*	*0.89*	*444612.9*			
D-2.1	*284656*	*Concrete or Asphalt*	*1*	*0.89*	*253913.2*			
D-3.2	*31434*	*Ornamental Landscaping*	*0.1*	*0.11*	*3472.1*			
	814535	***Total***			**701998.2**	**0.62**	***36269.9***	***36292***

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	ADKAN ENGINEERS	Date	11/28/2022
Designed by	J. SWORD	Case No	
Company Project Number/Name			

BMP Identification

BMP NAME / ID: BIORETENTION - D

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}= 0.62 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)*
D-3.1	*30,819*	*Ornamental Landscaping*	*0.1*	*0.11*	*3404.2*			
	30819	***Total***			**3404.2**	**0.62**	***175.9***	***652.08***

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries	
	BIORET. -C		Calculated Cells	

Company Name:	ADKAN ENGINEERS	Date:	11.29.2022
Designed by:	J.SWORD	County/City Case No.:	RIVERSIDE

Design Volume

Enter the area tributary to this feature	A_T=	0.94	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,063	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.44	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	738	ft^2
Proposed Surface Area	A=	J	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Natural Grasses	

Notes: L=96 ft., W=12ft., D=0.5ft.

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	ADKAN ENGINEERS	Date	11/28/2022
Designed by	J. SWORD	Case No	
Company Project Number/Name	10331 - RAMONA AND WEBSTER		

BMP Identification

BMP NAME / ID BIORETENTION -C

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}= 0.62 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)*
D-2.3	*20554*	*Concrete or Asphalt*	*1*	*0.89*	*18334.2*			
D-3.4	*20220*	*Ornamental Landscaping*	*0.1*	*0.11*	*2233.5*			
	40774	***Total***			**20567.7**	**0.62**	***1062.7***	***1671.39***

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries	
	BIORET. -D		Calculated Cells	

Company Name:	ADKAN ENGINEERS	Date:	11.29.2022
Designed by:	J.SWORD	County/City Case No.:	RIVERSIDE

Design Volume

Enter the area tributary to this feature	A_T=	5.06	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	176	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	10.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.43	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	124	ft^2
Proposed Surface Area	A=	456	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		2	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Natural Grasses	

Notes: L=48 ft., W=10ft., D=0.5ft.

BIOSCAPE-B SIZING CALCULATION			COMMENTS
LENGTH(L) =	14.0	FT	
WIDTH (W) =	14.0	FT	
AREA (A) = L x W=	196.0	SF	
INFILTRATION RATE (I) =	140.0	IN/HR	Provided by Contech Bioscape specficiations
TREATEMENT FLOW RATE= Qt = (A*(I/12))/(60*60)=	0.6	CFS	
FACTOR OF SAFETY (FS) =	1.5		
DESIGN TREATMENT = Qt/FS	0.4	CFS	
DESIGN TREATMENT (CFS TO GPM CONVERSION)	190.1	GPM	
PUMP: MAX OUTPUT	175.0	GPM	Provided by Jensen 348-S specficiations

PUMP TO EMPTY CHAMBERS-B WITHIN 48 HOURS			
CHAMBERS VOLUME	36270.0	CF	
PUMP: MAX OUTPUT = Qp	175.0	GPM	Provided by Jensen 348-S specficiations
PUMP: MAX OUTPUT (GPM TO CFS CONVERSION)= Qp	0.4	CFS	
DESIGN TIME= (V/Qp)	93000.0	S	
DESIGN TIME (SECONDS TO HOURS CONVERSION)	25.8	HRS	

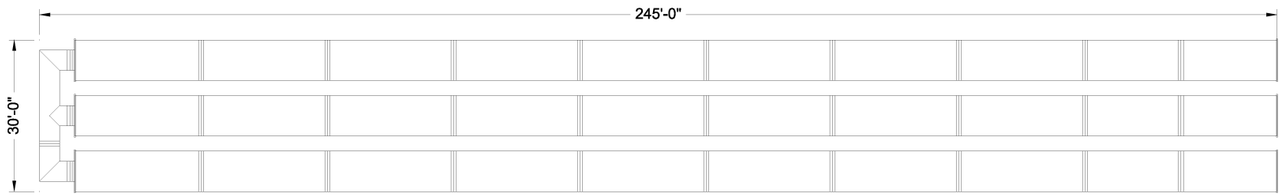
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 746 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 36,270 CF
- PIPE STORAGE VOLUME = 36,292 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 36,292 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTES

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

ASSEMBLY
SCALE: 1" = 30'

DATE	REVISION DESCRIPTION	BY

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CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24217	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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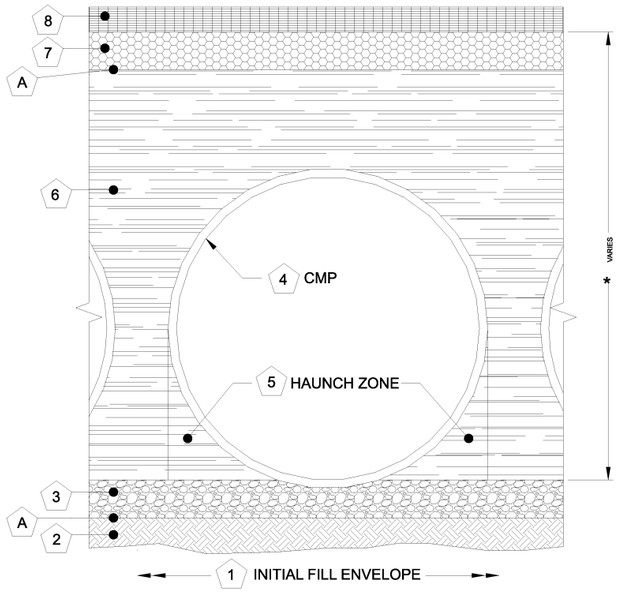


DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable)			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6 Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
* *Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

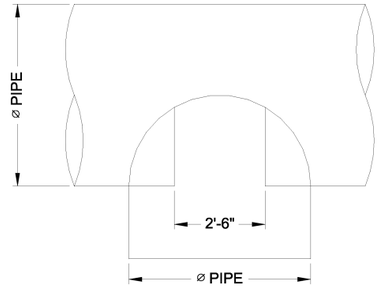
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

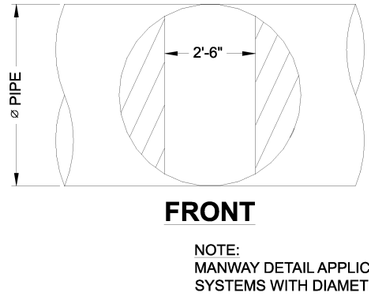
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

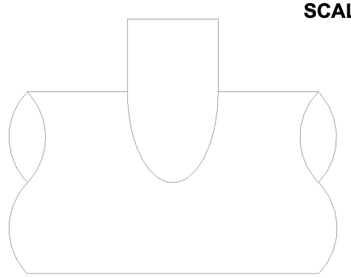


FRONT

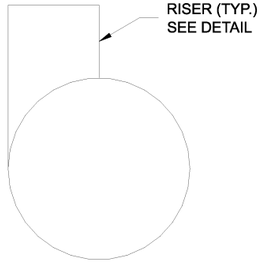
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

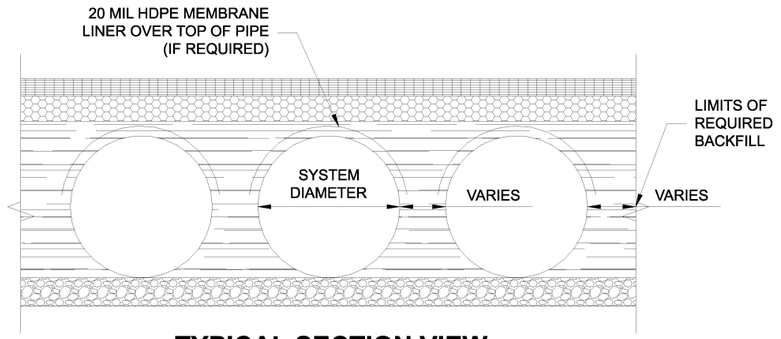


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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CONTECH **DYODS** DRAWING

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24217	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
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SHEET NO.: 1		

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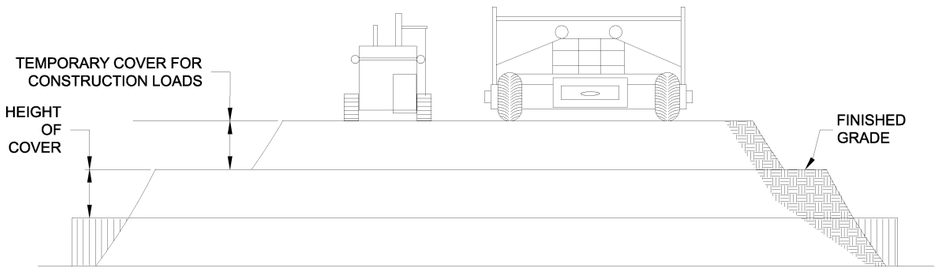


CONSTRUCTION LOADS

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

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

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

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

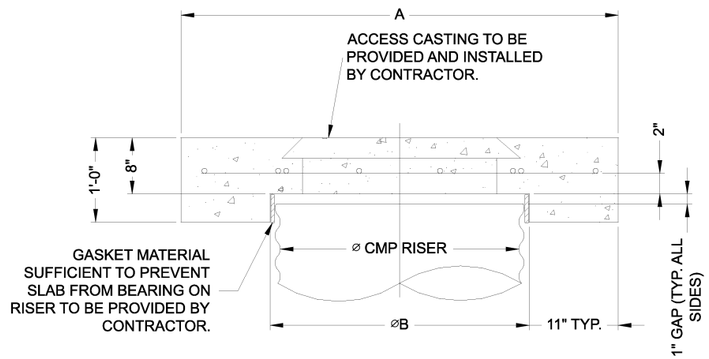
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

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

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

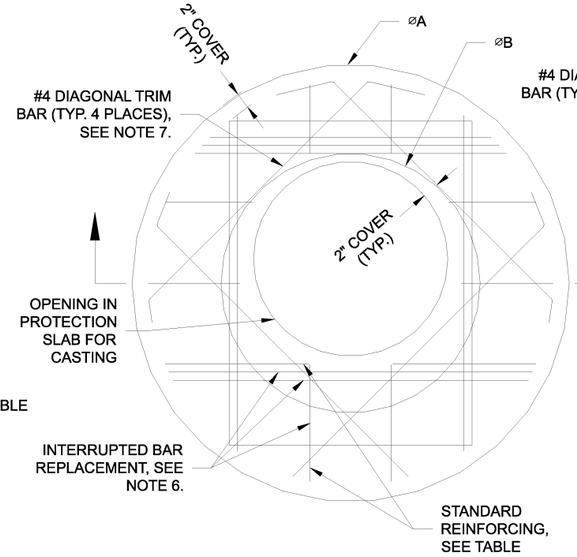
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



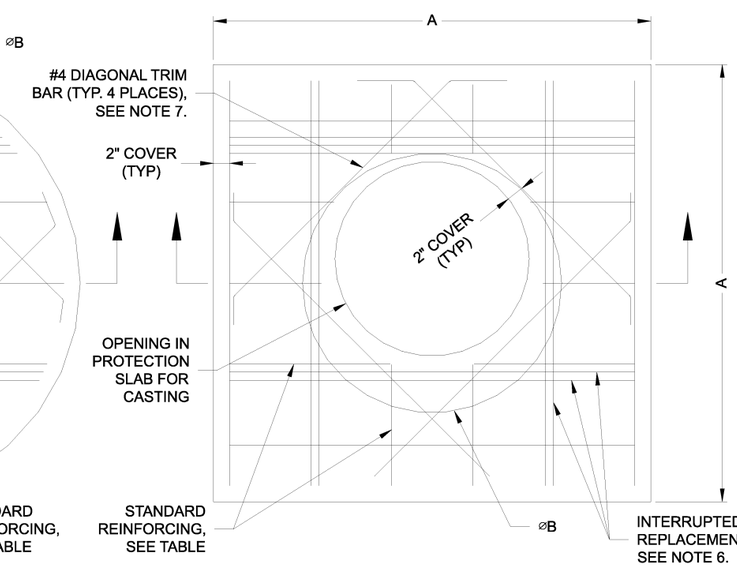
SECTION VIEW

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

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

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

MANHOLE CAP DETAIL

SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

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DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24217	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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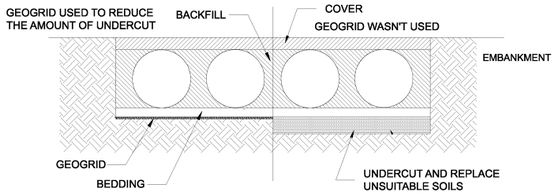
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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

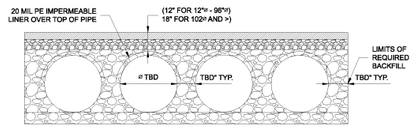


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

GEOMEMBRANE BARRIER

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

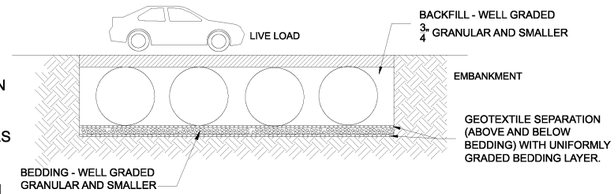
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

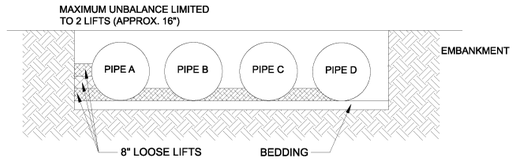
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



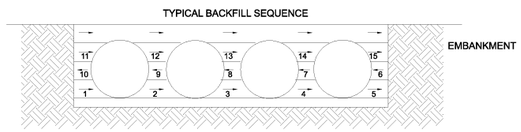
BACKFILL PLACEMENT

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

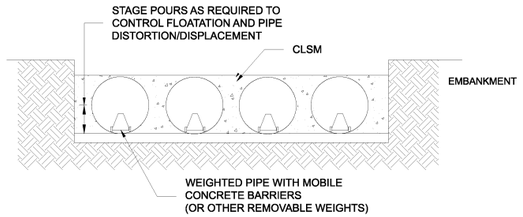


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

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



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

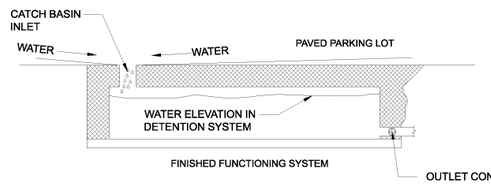


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

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

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

MAINTENANCE

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

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

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

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

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

DATE	REVISION DESCRIPTION	BY

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800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO24217 10331 - Ramona & Webster Warehouse
CMP Detention Design B
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24217	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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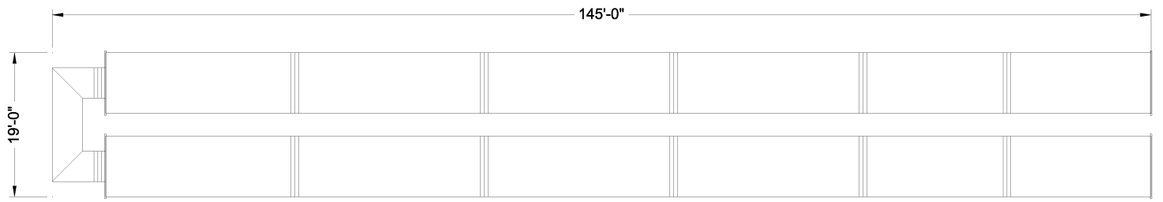
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 295 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 14,018 CF
- PIPE STORAGE VOLUME = 14,112 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 14,112 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = GALV
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTES

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

ASSEMBLY
SCALE: 1" = 20'

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

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24214	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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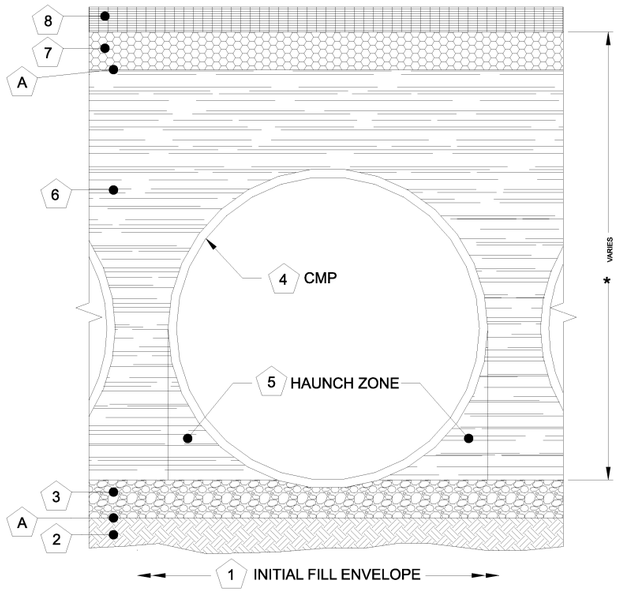


	DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

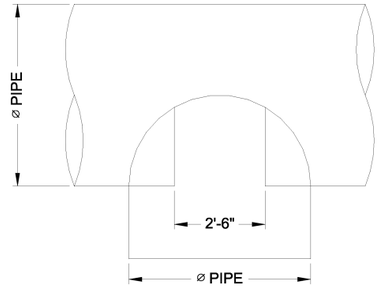
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

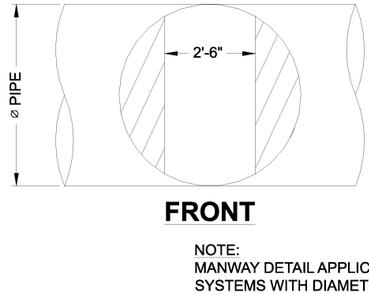
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

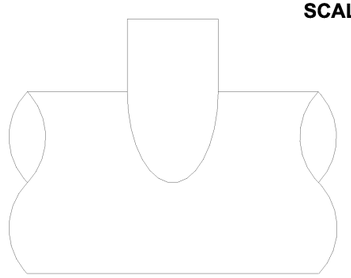


FRONT

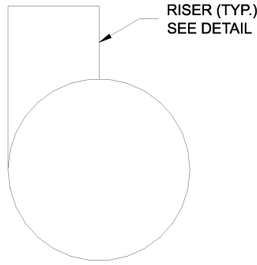
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

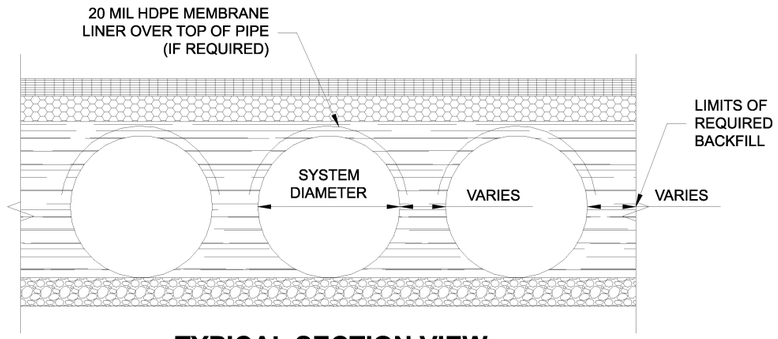


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24214	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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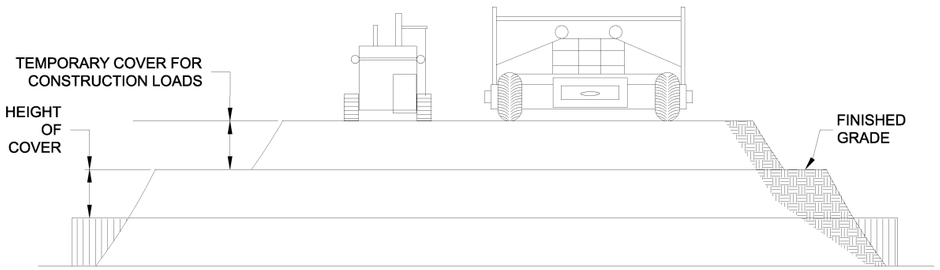


CONSTRUCTION LOADS

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

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

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

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

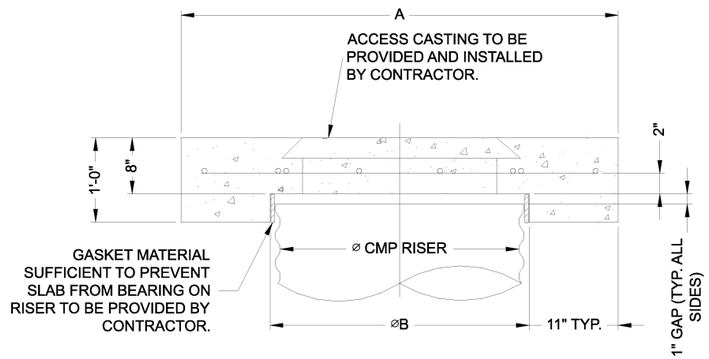
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

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

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

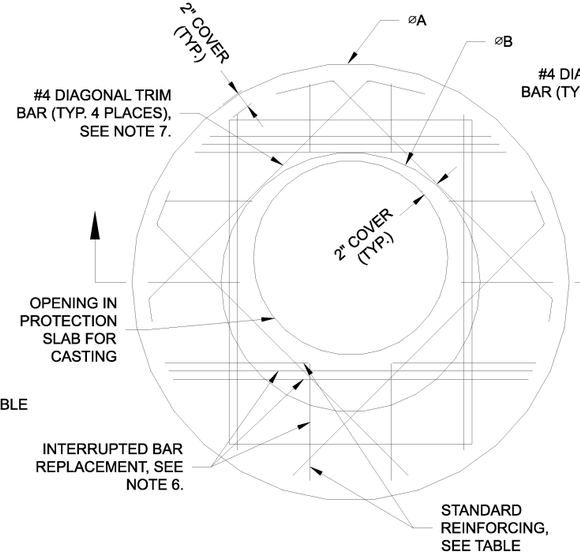
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



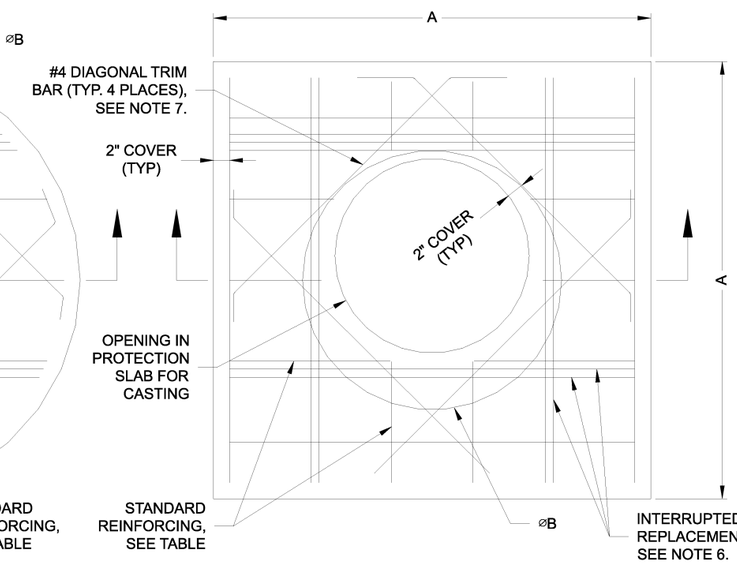
SECTION VIEW

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

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

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

MANHOLE CAP DETAIL

SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24214	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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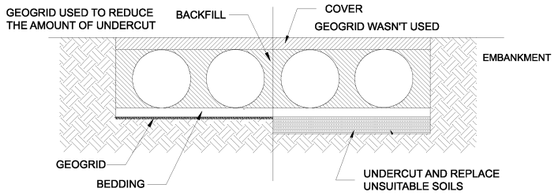
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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

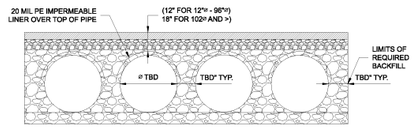


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

GEOMEMBRANE BARRIER

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

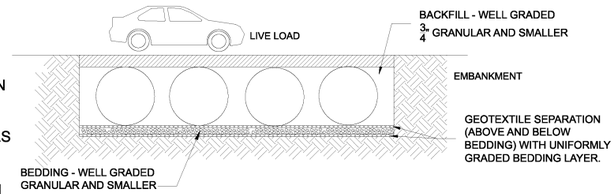
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

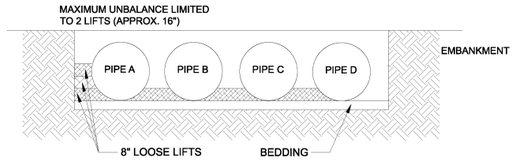
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



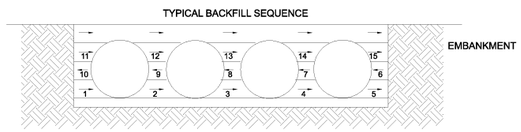
BACKFILL PLACEMENT

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

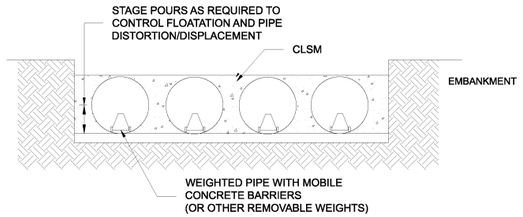


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

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



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

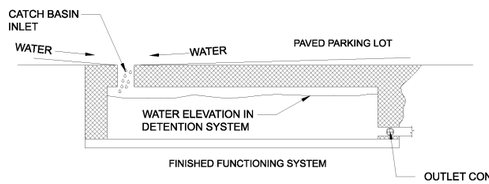


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

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

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

MAINTENANCE

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

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

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

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

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

DATE	REVISION DESCRIPTION	BY

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

DYO24214 10331 - Ramona & Webster Warehouse
CMP Detention Design A
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15987	24214	2/8/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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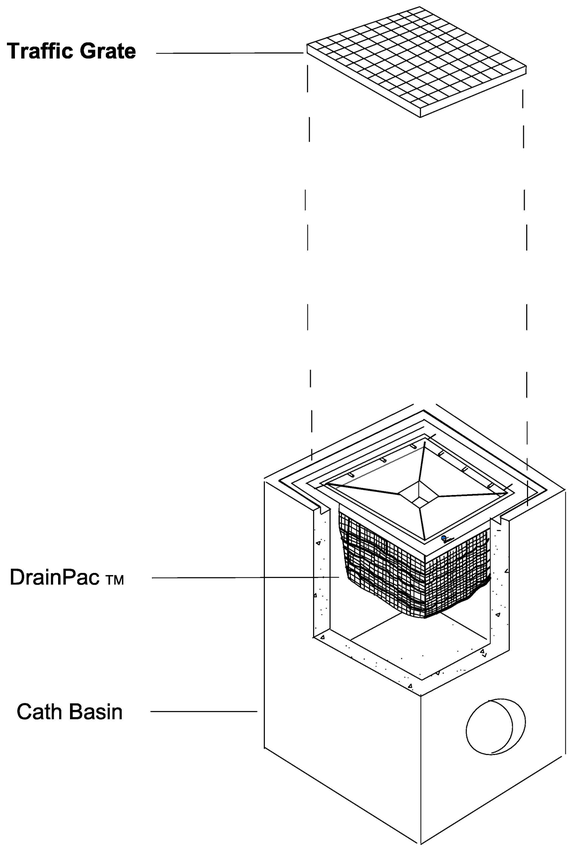
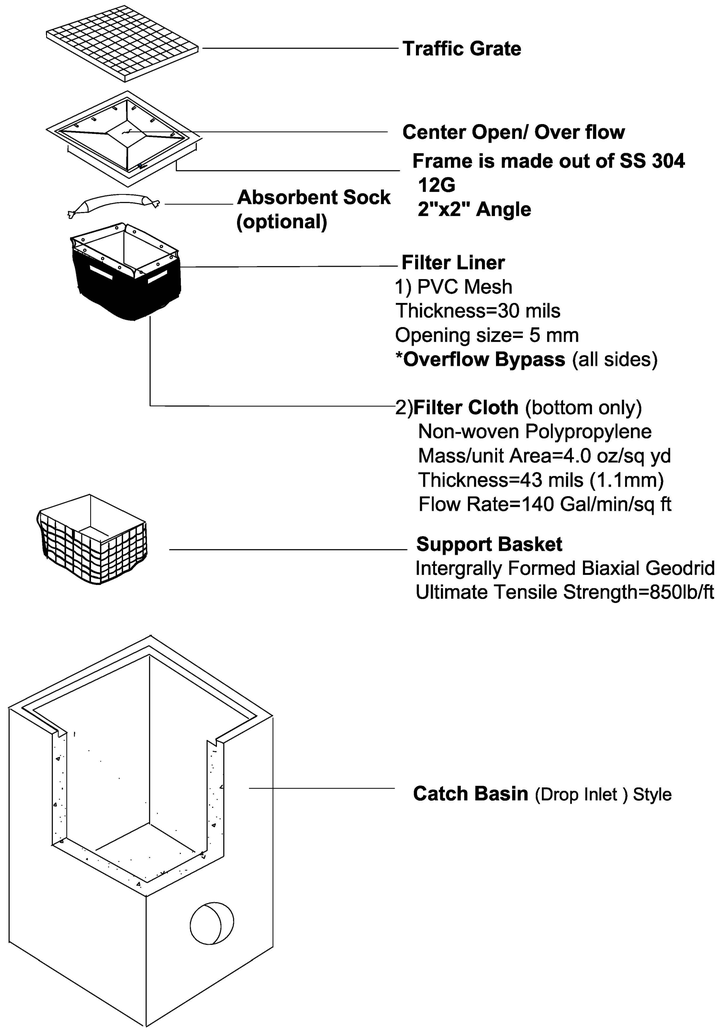


INSTALLATION VIEW

Drawing Notes :

1) DrainPac TM ,
2) DrainPac TM install in drop inlet type basins are self supported filter inserts that will rest (gravity held) on the existing catch basin grate frame
3) This product will aid in filtering constituents such as heavy metals,petroleum hydrocarbons,sediments,trash and debris



EXPLODED VIEW

DrainPac TM Installation Drawing: Drop Inlet

UNITED STORM WATER, Inc.
Protecting Our Water Resources

14000 E.Valley Blvd
City of Industry,CA 91746
Los Angeles:(877)717-8676
San Diego:(866)440-2790
www.unitedstormwater.com

General Notes

No.	Revision/Issue	Date
1		7/15/10

Firm Name and Address

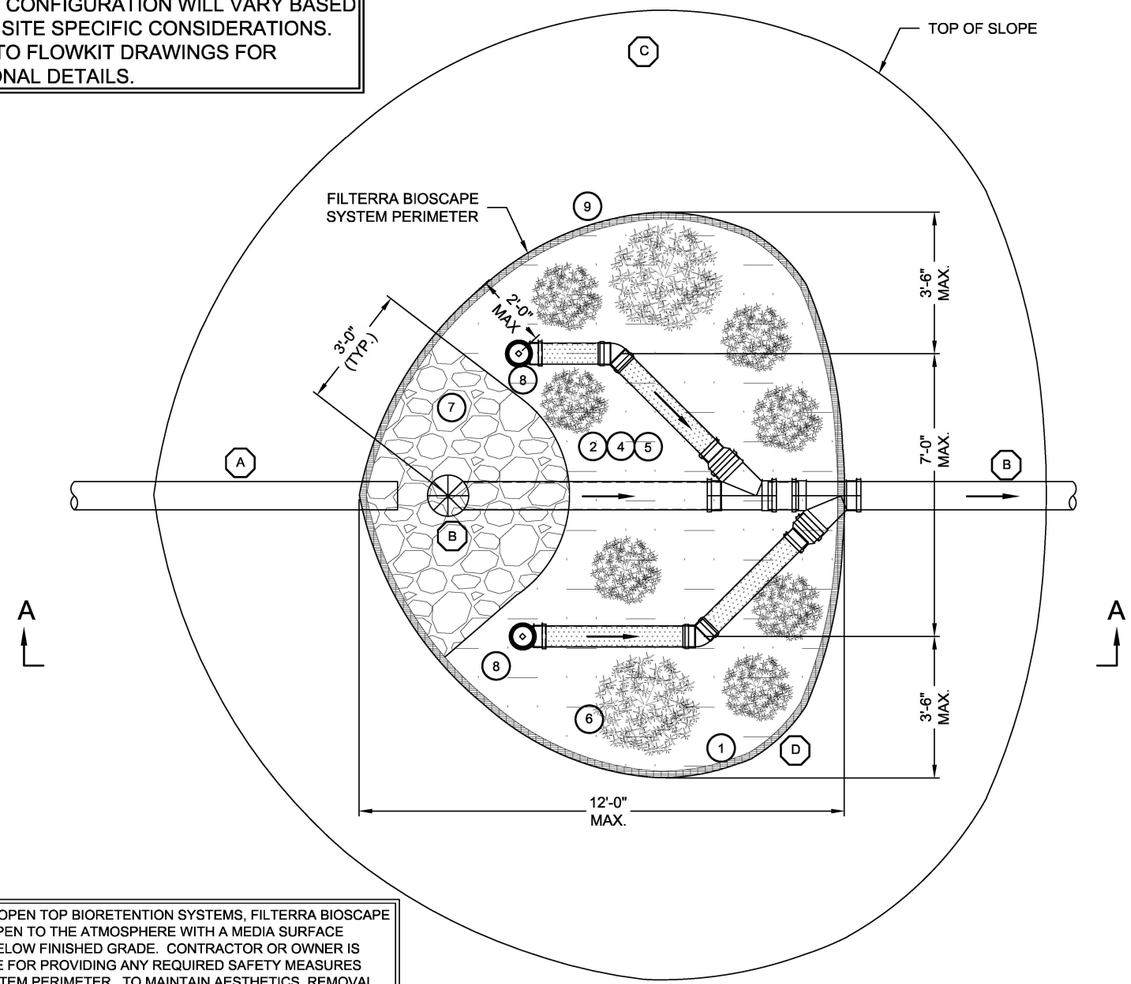
UNITED STORM WATER, Inc.
Protecting Our Water Resources
14000 E. Valley Blvd
City of Industry, CA 91746

Project Name and Address

DrainPac
Model: Drop Inlet

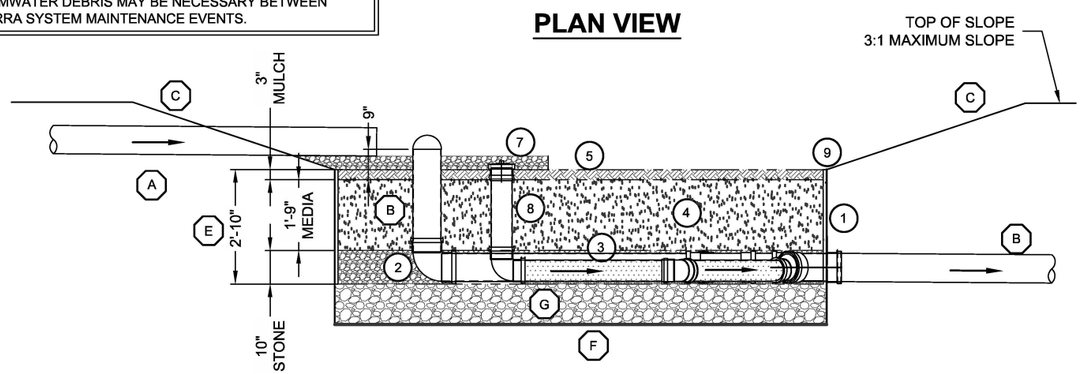
Project	Sheet
DrainPac	1 of 1
Date	
Scale: Not to Scale	

THIS IS A SCHEMATIC LAYOUT ONLY. ACTUAL CONFIGURATION WILL VARY BASED ON THE SITE SPECIFIC CONSIDERATIONS. REFER TO FLOWKIT DRAWINGS FOR ADDITIONAL DETAILS.



AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE SYSTEM IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.

PLAN VIEW



SECTION A-A VIEW

BILL OF MATERIALS

COUNT	DESCRIPTION	INSTALLED BY
X	FILTERRA SURFACE AREA (SF)	CONTRACTOR
X	MULCH VOLUME (CY)	CONTRACTOR
XX	FILTERRA MEDIA VOLUME (CY)	CONTRACTOR
X	1/2" #4 ROUND AGGREGATE UNDERDRAIN STONE (CY)	CONTRACTOR
X	ENERGY DISSIPATION ROCK (CY)	CONTRACTOR
X	EROSION CONTROL (LF)	CONTRACTOR
X	FILTERRA FLOWKIT	CONTRACTOR

PLANTING SCHEDULE

*NOTE: PLANTS PROVIDED BY OTHERS

QUANTITY	FILTERRA BIOSCAPE SYSTEM PLANT PALETTE

GENERAL NOTES

1. CONTRACTOR SHALL CONTACT CONTECH TO COORDINATE DELIVERY AND SUPERVISION OF PLACEMENT OF FILTERRA BIOSCAPE SYSTEM COMPONENTS (ACTIVATION). CONTRACTOR SHALL COMPLETE ITEMS IN THE LIST OF CONTRACTOR INSTALLATION RESPONSIBILITIES LISTED ON THIS DETAIL BEFORE CONTECH'S REPRESENTATIVE ATTENDS AND SUPERVISES THE ACTIVATION OF THE BIOSCAPE SYSTEM.
2. PERFORM FILTERRA BIOSCAPE SYSTEM EXCAVATION ONLY AFTER ALL THE CONTRIBUTING DRAINAGE AREAS ARE PERMANENTLY STABILIZED. DO NOT CONSTRUCT FILTERRA BIOSCAPE SYSTEM IN AN AREA USED AS EROSION AND SEDIMENT CONTROL FACILITIES. DO NOT STOCKPILE MATERIALS NOR STORE EQUIPMENT IN THIS AREA.
3. USE METHODS OF EXCAVATION THAT MINIMIZE COMPACTION OF THE UNDERLYING SOIL UNLESS THE SYSTEM IS TO BE LINED.
4. CONTRACTOR SHALL COORDINATE WITH CONTECH BEFORE THE FILTERRA BIOSCAPE SYSTEM AREA IS EXCAVATED TO MINIMIZE TIME BETWEEN EXCAVATION AND DELIVERY AND ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY STANDING WATER THAT ACCUMULATES IN THE EXCAVATED AREA MUST BE REMOVED BY THE CONTRACTOR BEFORE CONTECH CAN PROVIDE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM. ANY ADDITIONAL EXCAVATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. EXCAVATION DIMENSIONS SHOULD BE PROVIDED TO CONTECH IN THE ACTIVATION REQUEST CHECKLIST.
5. CONTRACTOR SHALL PROVIDE ACCESS TO THE EXCAVATED AREA(S) FOR USE DURING THE ACTIVATION OF THE FILTERRA BIOSCAPE SYSTEM(S). ACCESS SHALL NOT PROHIBIT LIGHT DUTY EQUIPMENT THAT MAY BE USED TO INSTALL THE COMPONENTS (STONE, MEDIA, ETC). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RE-STABILIZATION THAT MAY BE REQUIRED AFTER THE FILTERRA BIOSCAPE SYSTEM ACTIVATION.
6. CONTECH AND/OR ITS REPRESENTATIVES MUST BE SCHEDULED TO BE ON SITE FOR THE LIST ENTITLED CONTRACTOR ACTIVATION RESPONSIBILITIES.

CONTRACTOR SITE PREPARATION RESPONSIBILITIES AS DENOTED BY (X) ON THIS DETAIL:

- (A) CONTRACTOR SHALL INSTALL PIPE OR SWALE THAT CONVEYS INFLUENT FLOWS AS WELL AS ANY REQUIRED INLET AND OUTLET STRUCTURES.
- (B) CONTRACTOR SHALL PROVIDE BYPASS PIPE AND RISER OR OTHER STRUCTURE AS SHOWN ON PLANS. THE BYPASS PIPE SHALL BE INSTALLED WITH WYE(S), OR OTHER PIPE FITTINGS, AND WITH REDUCER COUPLING(S) FOR CONNECTION OF UNDERDRAIN PIPE, PER PLANS. PIPES SHALL BE INSTALLED TO PROMOTE POSITIVE FLOW FROM THE FILTERRA BIOSCAPE SYSTEM.
- (C) IF REQUIRED, CONTRACTOR TO PROVIDE SHOULDER ACCORDING TO DIMENSION AND SLOPE SHOWN ON PLANS OR AS DESIGNED BY ENGINEER OF RECORD. SLOPE FROM SHOULDER TO FILTERRA BIOSCAPE SYSTEM SURFACE AREA SHALL NOT EXCEED 3:1. SOD IS REQUIRED TO STABILIZE SIDE SLOPES OR ADJACENT GRADE.
- (D) CONTRACTOR TO EXCAVATE MEDIA AREA CORRESPONDING TO THE SIZE OF THE FILTERRA BIOSCAPE SYSTEM SURFACE AREA AS SHOWN ON DETAIL AND ON PLAN SHEETS.
- (E) CONTRACTOR SHALL EXCAVATE VERTICALLY FROM BOTTOM OF UNDERDRAIN STONE, OR DRAINAGE STONE, IF REQUIRED, TO ELEVATION OF MULCH AS SHOWN ON THIS DETAIL .
- (F) CONTRACTOR TO PROVIDE AND INSTALL ANY GEOTEXTILE OR IMPERMEABLE LINER FOR BOTTOM OF THE FILTERRA BIOSCAPE SYSTEM IF REQUIRED PER THE PLANS.
- (G) CONTRACTOR TO PROVIDE AND INSTALL ANY ADDITIONAL DRAINAGE STONE BELOW THE FILTERRA BIOSCAPE SYSTEM AS CALLED OUT ON THE PLANS.

CONTRACTOR ACTIVATION RESPONSIBILITIES AS DENOTED BY (#) ON THIS DETAIL:

- (1) PLACE GEOTEXTILE FABRIC ALONG THE PERIMETER OF THE FILTERRA BIOSCAPE SYSTEM EXCAVATION.
- (2) PLACE 10" OF UNDERDRAIN STONE - 2" UNDER THE PIPING, 6" AROUND THE PIPING AND 2" ABOVE THE PIPING USING LIGHT DUTY EQUIPMENT ONLY.
- (3) PLACE 6" UNDERDRAIN PIPING UNLESS OTHERWISE APPROVED BY CONTECH, ASSOCIATED PIPING AND FITTINGS/ELBOWS TO CONNECT TO THE PIPING/FITTING(S) THAT IS PROVIDED BY CONTRACTOR (SEE CONTRACTOR INSTALLATION RESPONSIBILITIES THIS DETAIL).
- (4) PLACE 21" FILTERRA MEDIA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MEDIA.
- (5) PLACE 3" DOUBLE SHREDDED HARDWOOD MULCH OVER ENTIRE FILTERRA BIOSCAPE SYSTEM SURFACE AREA USING LIGHT DUTY EQUIPMENT ONLY. DO NOT COMPACT MULCH.
- (6) PROVIDE AND PLANT VEGETATION AS INDICATED IN TABLE ON THIS DETAIL OR ON SITE PLANS.
- (7) PLACE ENERGY DISSIPATION ROCK APRON AS DESIGNED AND INDICATED ON THIS DETAIL OR PER ENGINEER OF RECORD PLANS.
- (8) PLACE CLEANOUT ADAPTER, PLUG AND PIPING.
- (9) PLACE ADDITIONAL EROSION CONTROL AROUND FILTERRA BIOSCAPE SYSTEM (IF REQUIRED).

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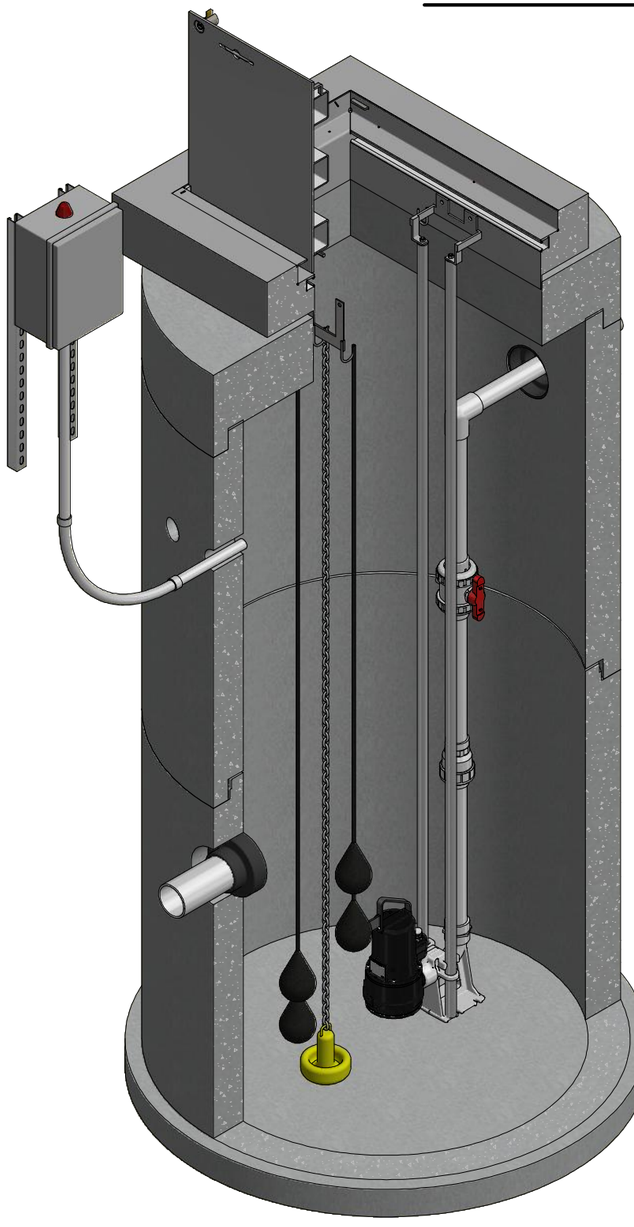
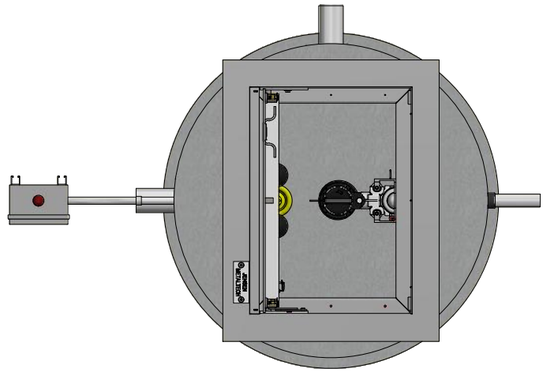
FILTERRA BIOSCAPE™ SYSTEM STANDARD DETAIL

248-S SERIES STANDARD
SIMPLEX PUMP STATION



TOP LEFT ISOMETRIC VIEW w/ SECTION
NOT TO SCALE



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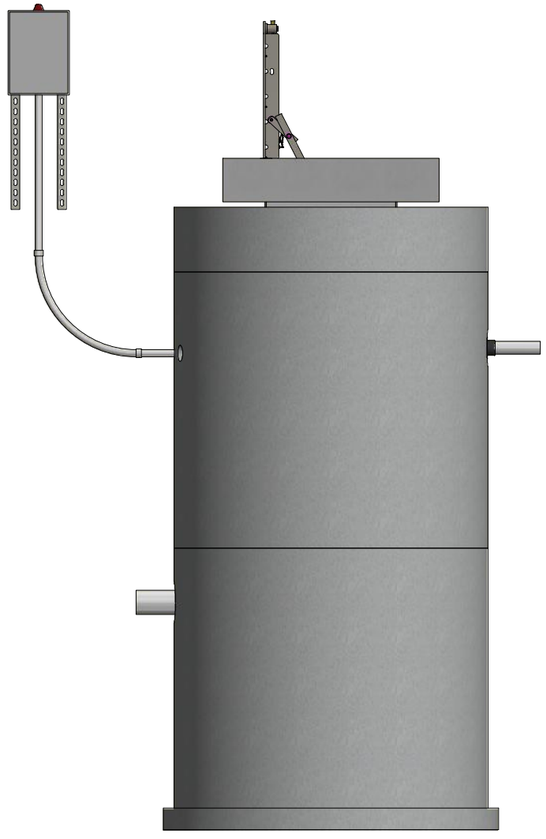
NOT TO SCALE



PROFILE VIEW
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JENSEN PRECAST PUMP STATIONS
521 DUNN CIRCLE, SPARKS, NV 89431
www.jensenwaterresources.com
(855) 468-5600

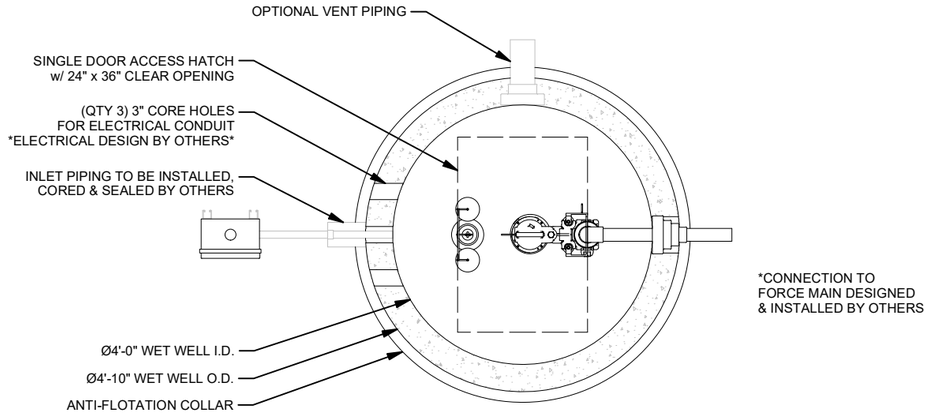
DESCRIPTION: 248-S SERIES STANDARD
TITLE SHEET

REV:

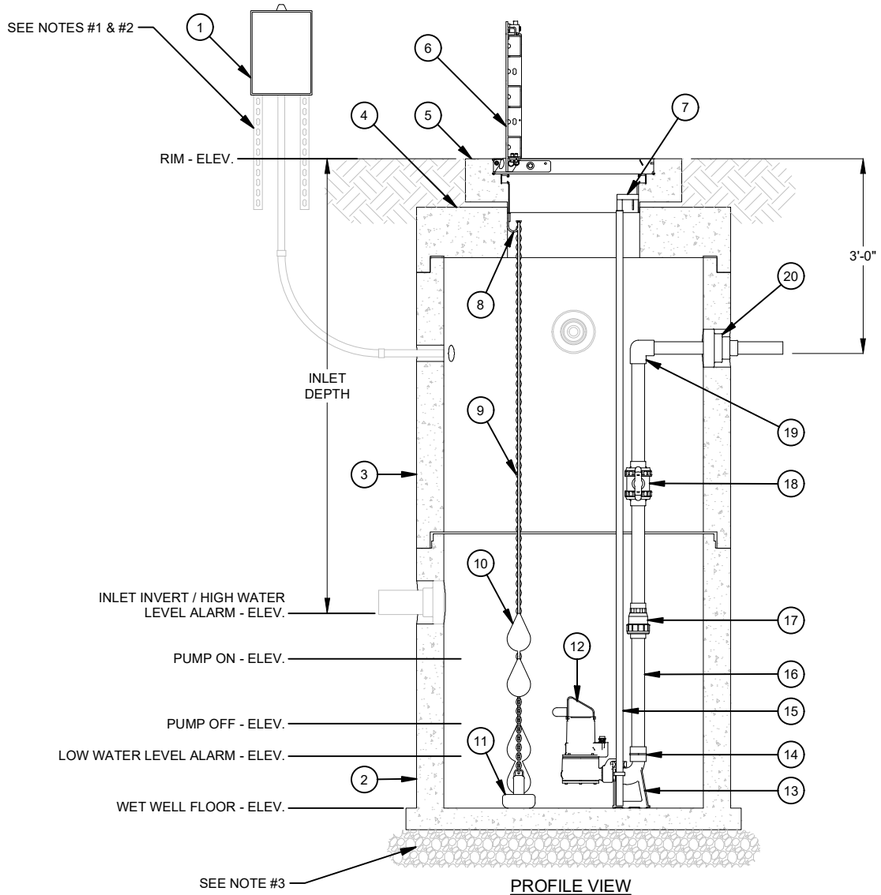
PART NUMBER: 248-S Series Standard
DRAWN BY: T. Handke
CREATED:
MODIFIED: 4/29/2020

SHEET: 1 OF 2

248-S Series Standard.idw



PLAN VIEW
NOT TO SCALE



PROFILE VIEW
NOT TO SCALE

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
1	1	SIMPLEX CONTROL PANEL
2	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BASE *HEIGHT VARIES*
3	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE BARREL *HEIGHT VARIES *
4	1	48IN DIA JENSEN PRECAST CONCRETE MANHOLE FLAT TOP
5	1	JENSEN PRECAST CONCRETE HATCH RISER
6	1	SINGLE DOOR HATCH WITH A CLEAR OPENING OF 24IN X 36IN
7	1	UPPER GUIDE RAIL BRACKET 2IN
8	1	FLOAT BRACKET 3 HOOK TYPE 316SS
9	10 LF	LF CHAIN 1/4IN 316SS
10	4	FLOAT SWITCH w/ 100' CABLE
11	1	ANCHOR 15LB PVC COATED
12	1	2IN SUBMERSIBLE PUMP
13	1	AUTOCOUPLING ASSY 2IN STD
14	1	ADAPTER 2IN FML THRD X SLIP SCH 80 PVC
15	20 LF	LF PIPE 1IN SCH40 GUIDE RAIL 304SS
16	20 LF	LF PIPE PVC SCH 80 2IN DIA
17	1	BALL CHECK VALVE 2IN SCH 80 PVC SLIP
18	1	BALL VALVE 2IN SCH 80 PVC SLIP
19	1	90 DEG ELBOW 2IN SCH 80 PVC SLIP
20	1	FLEXIBLE PIPE CONNECTOR

PROJECT SPECIFIC INFORMATION

FINISHED GRADE (Ft.)	
RIM ELEV. (Ft.)	
INLET ELEV. (Ft.)	
FORCE MAIN DISCHARGE ELEV. (Ft.)	
AVAILABLE POWER SUPPLY	120V [ ] 240V [ ] 480V [ ]
AVAILABLE POWER PHASE	Single [ ] Three [ ]

SYSTEM CHARACTERISTICS

APPLICATION	SEWAGE [ ] STORM WATER [ ]
DESIGN FLOW (gpm)	
TOTAL DYNAMIC HEAD (Ft.)	
STATIC HEAD (Ft.)	
PUMP MOTOR (Std / XP)	Standard [ ] XP/FM [ ]
PUMP TYPE	Non-Clog [ ] Grinder [ ] Chopper [ ] Vortex [ ]
PUMP RATED HP & CURRENT	
ACCESS HATCH LOAD LEVEL	Pedestrian [ ] Incidental H-20 [ ] Parking Lot H-20 [ ] Full Traffic H-20 [ ]

ADDITIONAL OPTIONS

OPTION	YES	NO
CONTROL PANEL SS ENCLOSURE	[ ]	[ ]
CONTROL PANEL AC UNIT	[ ]	[ ]
CONTROL PANEL REMOTE ALARM MONITORING	[ ]	[ ]
AIR RELEASE/VACUUM VALVE	[ ]	[ ]
INTERIOR LINER	[ ]	[ ]
CONCRETE WATERPROOFING	[ ]	[ ]
VENT PIPE	[ ]	[ ]
ODOR CONTROL VALVE	[ ]	[ ]
LIFTING CRANE	[ ]	[ ]
GENERATOR RECEPTACLE	[ ]	[ ]

DESIGN NOTES / DISCLAIMERS:

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(855) 468-5600

DESCRIPTION:

248-S SERIES STANDARD

MECHANICAL DETAIL

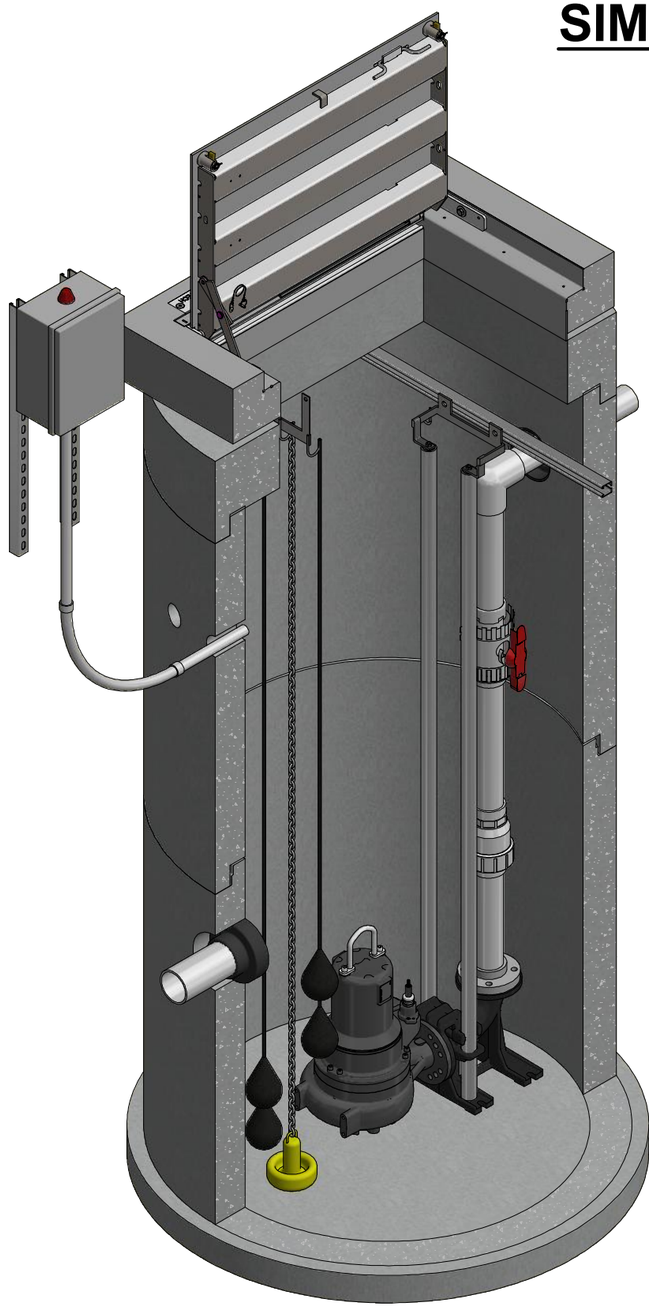
PART NUMBER:	248-S Series Standard	DRAWN BY:	T. Handke
CREATED:		MODIFIED:	4/29/2020

REV:

SHEET: 2 OF 2

248-S Series Standard.idw

348-S SERIES STANDARD
SIMPLEX PUMP STATION



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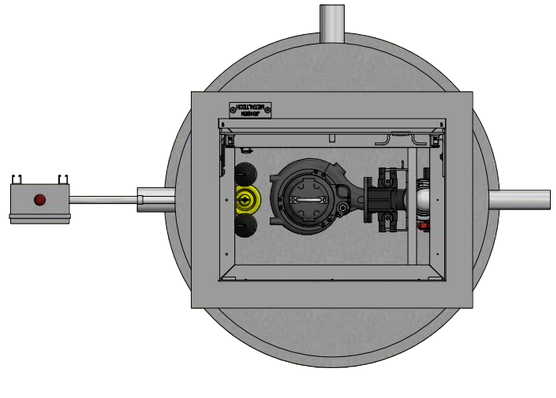
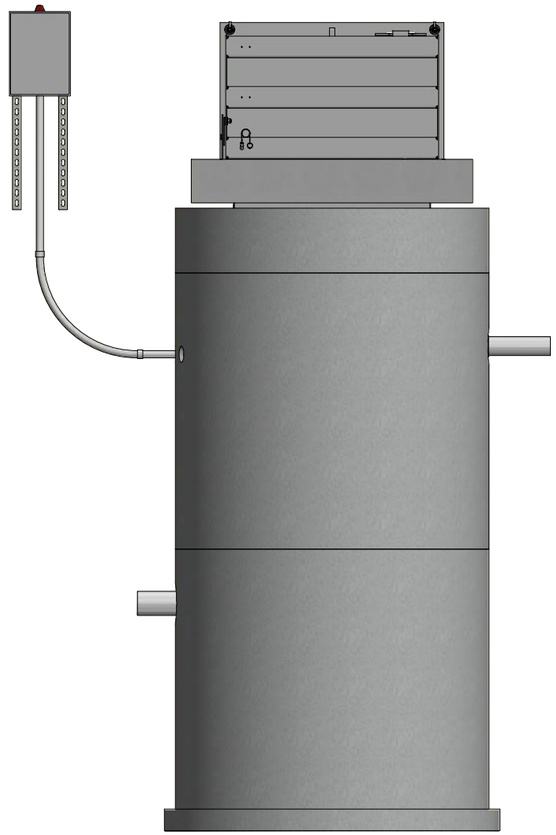
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



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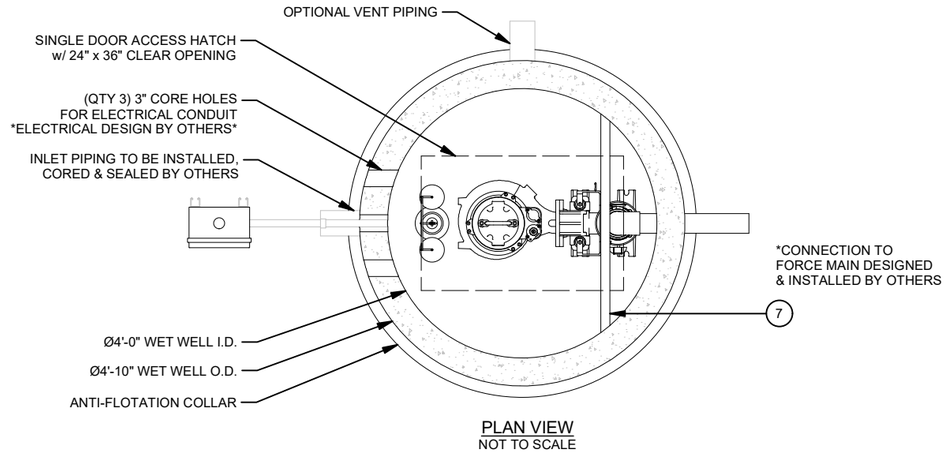
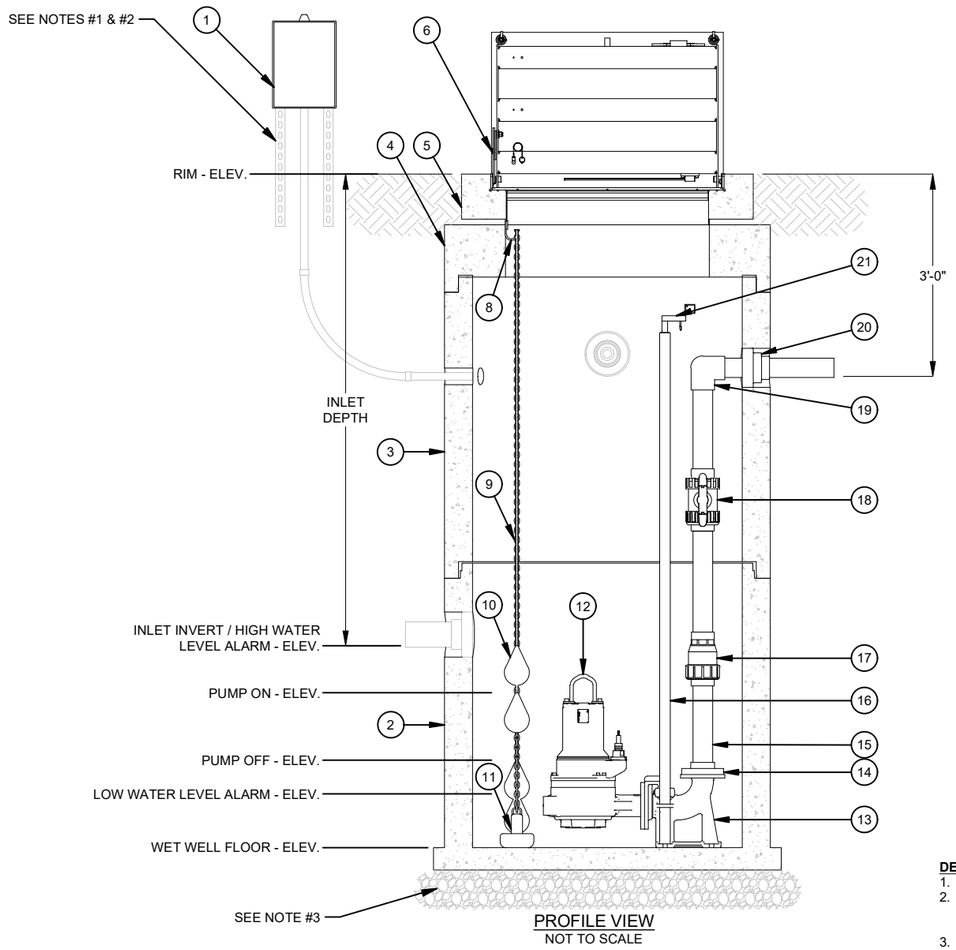
DESCRIPTION: 348-S SERIES STANDARD TITLE SHEET			REV:
PART NUMBER:	348-S Series Standard	DRAWN BY: T. Handke	SHEET: 1 OF 2
CREATED:		MODIFIED: 4/29/2020	

348-S Series Standard.idw



PLAN VIEW
NOT TO SCALE



PROFILE VIEW
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5	1	JENSEN PRECAST CONCRETE HATCH RISER
6	1	SINGLE DOOR HATCH WITH A CLEAR OPENING OF 24IN X 36IN
7	5 LF	LF STRUT C-CHANNEL 1-5/8 X 1-5/8 12GA SLOTTED 316SS
8	1	FLOAT BRACKET 3 HOOK TYPE 316SS
9	10 LF	LF CHAIN 1/4IN 316SS
10	4	FLOAT SWITCH w/ 100' CABLE
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12	1	3IN SUBMERSIBLE PUMP
13	1	AUTOCOUPLING ASSY 3IN FLG STD
14	1	ADAPTER 3IN FLG X SLIP SCH 80 PVC
15	20 LF	LF PIPE PVC SCH 80 3IN DIA
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18	1	BALL VALVE 3IN SCH 80 PVC SLIP
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20	1	FLEXIBLE PIPE CONNECTOR
21	1	UPPER GUIDE RAIL BRACKET 3IN

PROJECT SPECIFIC INFORMATION

FINISHED GRADE (Ft.)	
RIM ELEV. (Ft.)	
INLET ELEV. (Ft.)	
FORCE MAIN DISCHARGE ELEV. (Ft.)	
AVAILABLE POWER SUPPLY	120V [ ] 240V [ ] 480V [ ]
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SYSTEM CHARACTERISTICS

APPLICATION	SEWAGE [ ] STORM WATER [ ]
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TOTAL DYNAMIC HEAD (Ft.)	
STATIC HEAD (Ft.)	
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PUMP TYPE	Non-Clog [ ] Grinder [ ] Chopper [ ] Vortex [ ]
PUMP RATED HP & CURRENT	
ACCESS HATCH LOAD LEVEL	Pedestrian [ ] Incidental H-20 [ ] Parking Lot H-20 [ ] Full Traffic H-20 [ ]

ADDITIONAL OPTIONS

OPTION	YES	NO
CONTROL PANEL SS ENCLOSURE	[ ]	[ ]
CONTROL PANEL AC UNIT	[ ]	[ ]
CONTROL PANEL REMOTE ALARM MONITORING	[ ]	[ ]
AIR RELEASE/VACUUM VALVE	[ ]	[ ]
INTERIOR LINER	[ ]	[ ]
CONCRETE WATERPROOFING	[ ]	[ ]
VENT PIPE	[ ]	[ ]
ODOR CONTROL VALVE	[ ]	[ ]
LIFTING CRANE	[ ]	[ ]
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DESCRIPTION: 348-S SERIES STANDARD
MECHANICAL DETAIL

REV:

PART NUMBER: 348-S Series Standard
DRAWN BY: T. Handke
CREATED:
MODIFIED: 4/29/2020

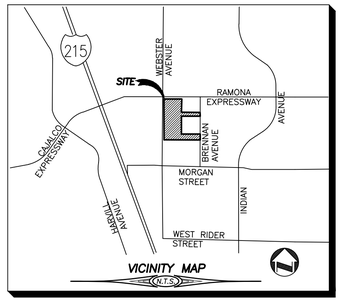
SHEET: 2 OF 2

348-S Series Standard.idw

Appendix 7: Hydromodification

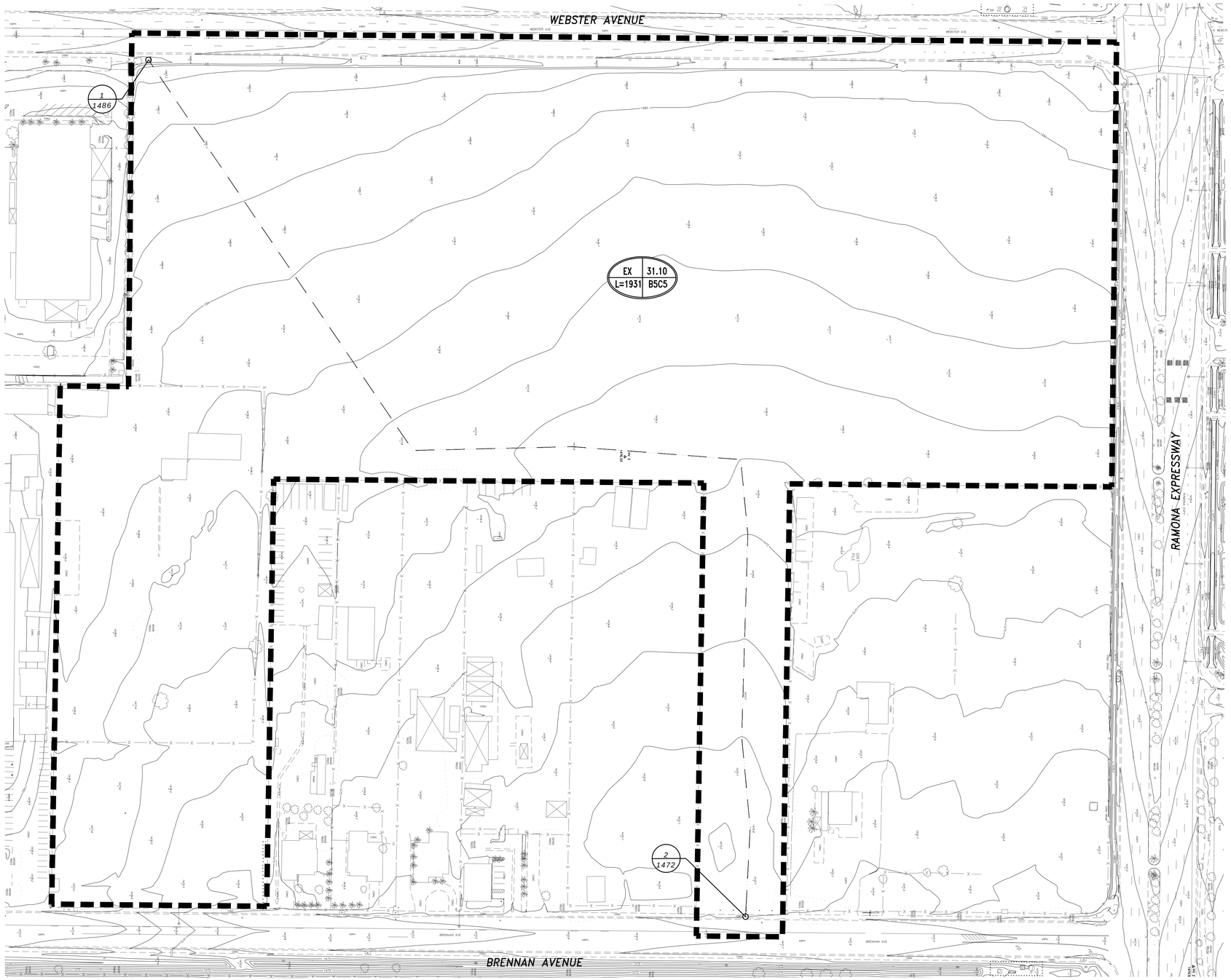
Supporting Detail Relating to Hydrologic Conditions of Concern

PRE-DEVELOPMENT UNIT HYDROGRAPH MAP
PATTERSON AVENUE AND NANCE STREET



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- FLOW ARROW



0 80 240
40 160 320
SCALE: 1" = 80'

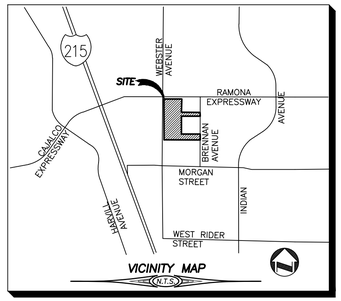
PRE DEVELOPMENT
UNIT HYDROGRAPH MAP
PREPARATION DATE: NOVEMBER 2022
JOB NUMBER: 10331
PLANS PREPARED BY:

adkan ENGINEERS
Civil Engineering • Surveying • Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 • Fax:(951) 688-0599

PLOT DATE: 11/30/2022 8:47 AM

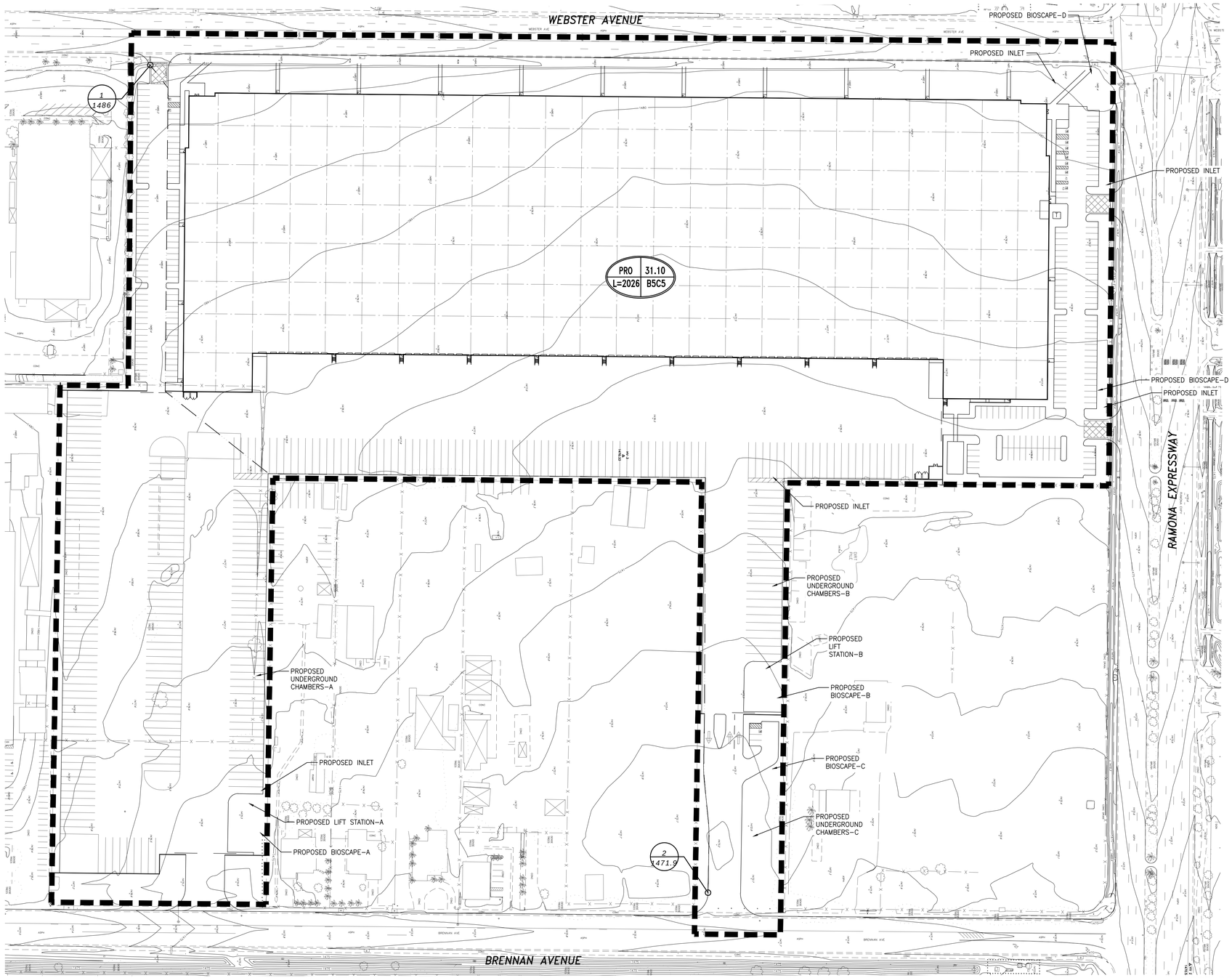
\\ADK-FS01\ADKANDATA\PROJECTS\DUKE\10331 - RAMONA & WEBSTER\ENGINEERING\HYDROLOGY\10331_EXISTING UNIT HYDROGRAPH MAP.DWG

POST-DEVELOPMENT UNIT HYDROGRAPH MAP
PATTERSON AVENUE AND NANCE STREET



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- FLOW ARROW



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40 160 320
SCALE: 1" = 80'

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PREPARATION DATE: NOVEMBER 2022
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6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 • Fax:(951) 688-0599

PLOT DATE: 11/30/2022 8:49 AM

\\ADK-FS01\ADKANDATA\PROJECTS\DUKE\10331 - RAMONA & WEBSTER\ENGINEERING\HYDROLOGY\10331_PROPOSED UNIT HYDROGRAPH MAP.DWG

U n i t H y d r o g r a p h A n a l y s i s

Study date 11/29/22 File: ex2242.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 5006

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 31.10(Ac.) = 0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.10(Ac.) = 0.049 Sq. Mi.
Length along longest watercourse = 1931.00(Ft.)
Length along longest watercourse measured to centroid = 965.50(Ft.)
Length along longest watercourse = 0.366 Mi.
Length along longest watercourse measured to centroid = 0.183 Mi.
Difference in elevation = 14.00(Ft.)
Slope along watercourse = 38.2807 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.129 Hr.
Lag time = 7.73 Min.
25% of lag time = 1.93 Min.
40% of lag time = 3.09 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
31.10	2.00	62.20

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
31.10	5.00	155.50

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
31.100	74.00	0.000

Total Area Entered = 31.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
74.0	55.8	0.513	0.000	0.513	1.000	0.513
					Sum (F) =	0.513

Area averaged mean soil loss (F) (In/Hr) = 0.513
Minimum soil loss rate ((In/Hr)) = 0.256
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)

1	0.083	64.662	9.304	2.916
2	0.167	129.325	37.065	11.617
3	0.250	193.987	24.988	7.832
4	0.333	258.649	9.612	3.013
5	0.417	323.311	5.799	1.818
6	0.500	387.974	3.893	1.220
7	0.583	452.636	2.676	0.839
8	0.667	517.298	1.994	0.625
9	0.750	581.961	1.530	0.479
10	0.833	646.623	1.130	0.354
11	0.917	711.285	0.799	0.250
12	1.000	775.947	0.647	0.203
13	1.083	840.610	0.564	0.177
			Sum = 100.000 Sum=	31.343

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.909)	0.014	0.002
2	0.17	0.07	0.016	(0.906)	0.014	0.002
3	0.25	0.07	0.016	(0.902)	0.014	0.002
4	0.33	0.10	0.024	(0.899)	0.022	0.002
5	0.42	0.10	0.024	(0.895)	0.022	0.002
6	0.50	0.10	0.024	(0.892)	0.022	0.002
7	0.58	0.10	0.024	(0.888)	0.022	0.002
8	0.67	0.10	0.024	(0.885)	0.022	0.002
9	0.75	0.10	0.024	(0.881)	0.022	0.002
10	0.83	0.13	0.032	(0.878)	0.029	0.003
11	0.92	0.13	0.032	(0.874)	0.029	0.003
12	1.00	0.13	0.032	(0.871)	0.029	0.003
13	1.08	0.10	0.024	(0.867)	0.022	0.002
14	1.17	0.10	0.024	(0.864)	0.022	0.002
15	1.25	0.10	0.024	(0.861)	0.022	0.002
16	1.33	0.10	0.024	(0.857)	0.022	0.002
17	1.42	0.10	0.024	(0.854)	0.022	0.002
18	1.50	0.10	0.024	(0.850)	0.022	0.002
19	1.58	0.10	0.024	(0.847)	0.022	0.002
20	1.67	0.10	0.024	(0.843)	0.022	0.002
21	1.75	0.10	0.024	(0.840)	0.022	0.002
22	1.83	0.13	0.032	(0.837)	0.029	0.003
23	1.92	0.13	0.032	(0.833)	0.029	0.003
24	2.00	0.13	0.032	(0.830)	0.029	0.003
25	2.08	0.13	0.032	(0.827)	0.029	0.003
26	2.17	0.13	0.032	(0.823)	0.029	0.003
27	2.25	0.13	0.032	(0.820)	0.029	0.003
28	2.33	0.13	0.032	(0.817)	0.029	0.003
29	2.42	0.13	0.032	(0.813)	0.029	0.003
30	2.50	0.13	0.032	(0.810)	0.029	0.003
31	2.58	0.17	0.040	(0.807)	0.036	0.004
32	2.67	0.17	0.040	(0.803)	0.036	0.004
33	2.75	0.17	0.040	(0.800)	0.036	0.004
34	2.83	0.17	0.040	(0.797)	0.036	0.004
35	2.92	0.17	0.040	(0.793)	0.036	0.004
36	3.00	0.17	0.040	(0.790)	0.036	0.004
37	3.08	0.17	0.040	(0.787)	0.036	0.004
38	3.17	0.17	0.040	(0.784)	0.036	0.004
39	3.25	0.17	0.040	(0.780)	0.036	0.004
40	3.33	0.17	0.040	(0.777)	0.036	0.004
41	3.42	0.17	0.040	(0.774)	0.036	0.004
42	3.50	0.17	0.040	(0.771)	0.036	0.004
43	3.58	0.17	0.040	(0.767)	0.036	0.004
44	3.67	0.17	0.040	(0.764)	0.036	0.004
45	3.75	0.17	0.040	(0.761)	0.036	0.004
46	3.83	0.20	0.048	(0.758)	0.043	0.005
47	3.92	0.20	0.048	(0.755)	0.043	0.005
48	4.00	0.20	0.048	(0.751)	0.043	0.005
49	4.08	0.20	0.048	(0.748)	0.043	0.005
50	4.17	0.20	0.048	(0.745)	0.043	0.005
51	4.25	0.20	0.048	(0.742)	0.043	0.005
52	4.33	0.23	0.056	(0.739)	0.050	0.006
53	4.42	0.23	0.056	(0.736)	0.050	0.006
54	4.50	0.23	0.056	(0.732)	0.050	0.006
55	4.58	0.23	0.056	(0.729)	0.050	0.006
56	4.67	0.23	0.056	(0.726)	0.050	0.006
57	4.75	0.23	0.056	(0.723)	0.050	0.006
58	4.83	0.27	0.064	(0.720)	0.058	0.006
59	4.92	0.27	0.064	(0.717)	0.058	0.006
60	5.00	0.27	0.064	(0.714)	0.058	0.006
61	5.08	0.20	0.048	(0.711)	0.043	0.005
62	5.17	0.20	0.048	(0.707)	0.043	0.005
63	5.25	0.20	0.048	(0.704)	0.043	0.005

64	5.33	0.23	0.056	(0.701)	0.050	0.006
65	5.42	0.23	0.056	(0.698)	0.050	0.006
66	5.50	0.23	0.056	(0.695)	0.050	0.006
67	5.58	0.27	0.064	(0.692)	0.058	0.006
68	5.67	0.27	0.064	(0.689)	0.058	0.006
69	5.75	0.27	0.064	(0.686)	0.058	0.006
70	5.83	0.27	0.064	(0.683)	0.058	0.006
71	5.92	0.27	0.064	(0.680)	0.058	0.006
72	6.00	0.27	0.064	(0.677)	0.058	0.006
73	6.08	0.30	0.072	(0.674)	0.065	0.007
74	6.17	0.30	0.072	(0.671)	0.065	0.007
75	6.25	0.30	0.072	(0.668)	0.065	0.007
76	6.33	0.30	0.072	(0.665)	0.065	0.007
77	6.42	0.30	0.072	(0.662)	0.065	0.007
78	6.50	0.30	0.072	(0.659)	0.065	0.007
79	6.58	0.33	0.080	(0.656)	0.072	0.008
80	6.67	0.33	0.080	(0.653)	0.072	0.008
81	6.75	0.33	0.080	(0.650)	0.072	0.008
82	6.83	0.33	0.080	(0.647)	0.072	0.008
83	6.92	0.33	0.080	(0.644)	0.072	0.008
84	7.00	0.33	0.080	(0.641)	0.072	0.008
85	7.08	0.33	0.080	(0.638)	0.072	0.008
86	7.17	0.33	0.080	(0.636)	0.072	0.008
87	7.25	0.33	0.080	(0.633)	0.072	0.008
88	7.33	0.37	0.088	(0.630)	0.079	0.009
89	7.42	0.37	0.088	(0.627)	0.079	0.009
90	7.50	0.37	0.088	(0.624)	0.079	0.009
91	7.58	0.40	0.096	(0.621)	0.086	0.010
92	7.67	0.40	0.096	(0.618)	0.086	0.010
93	7.75	0.40	0.096	(0.615)	0.086	0.010
94	7.83	0.43	0.104	(0.613)	0.094	0.010
95	7.92	0.43	0.104	(0.610)	0.094	0.010
96	8.00	0.43	0.104	(0.607)	0.094	0.010
97	8.08	0.50	0.120	(0.604)	0.108	0.012
98	8.17	0.50	0.120	(0.601)	0.108	0.012
99	8.25	0.50	0.120	(0.598)	0.108	0.012
100	8.33	0.50	0.120	(0.596)	0.108	0.012
101	8.42	0.50	0.120	(0.593)	0.108	0.012
102	8.50	0.50	0.120	(0.590)	0.108	0.012
103	8.58	0.53	0.128	(0.587)	0.115	0.013
104	8.67	0.53	0.128	(0.585)	0.115	0.013
105	8.75	0.53	0.128	(0.582)	0.115	0.013
106	8.83	0.57	0.136	(0.579)	0.122	0.014
107	8.92	0.57	0.136	(0.576)	0.122	0.014
108	9.00	0.57	0.136	(0.574)	0.122	0.014
109	9.08	0.63	0.152	(0.571)	0.137	0.015
110	9.17	0.63	0.152	(0.568)	0.137	0.015
111	9.25	0.63	0.152	(0.566)	0.137	0.015
112	9.33	0.67	0.160	(0.563)	0.144	0.016
113	9.42	0.67	0.160	(0.560)	0.144	0.016
114	9.50	0.67	0.160	(0.557)	0.144	0.016
115	9.58	0.70	0.168	(0.555)	0.151	0.017
116	9.67	0.70	0.168	(0.552)	0.151	0.017
117	9.75	0.70	0.168	(0.549)	0.151	0.017
118	9.83	0.73	0.176	(0.547)	0.158	0.018
119	9.92	0.73	0.176	(0.544)	0.158	0.018
120	10.00	0.73	0.176	(0.542)	0.158	0.018
121	10.08	0.50	0.120	(0.539)	0.108	0.012
122	10.17	0.50	0.120	(0.536)	0.108	0.012
123	10.25	0.50	0.120	(0.534)	0.108	0.012
124	10.33	0.50	0.120	(0.531)	0.108	0.012
125	10.42	0.50	0.120	(0.529)	0.108	0.012
126	10.50	0.50	0.120	(0.526)	0.108	0.012
127	10.58	0.67	0.160	(0.523)	0.144	0.016
128	10.67	0.67	0.160	(0.521)	0.144	0.016
129	10.75	0.67	0.160	(0.518)	0.144	0.016
130	10.83	0.67	0.160	(0.516)	0.144	0.016
131	10.92	0.67	0.160	(0.513)	0.144	0.016
132	11.00	0.67	0.160	(0.511)	0.144	0.016
133	11.08	0.63	0.152	(0.508)	0.137	0.015
134	11.17	0.63	0.152	(0.506)	0.137	0.015
135	11.25	0.63	0.152	(0.503)	0.137	0.015
136	11.33	0.63	0.152	(0.501)	0.137	0.015
137	11.42	0.63	0.152	(0.498)	0.137	0.015
138	11.50	0.63	0.152	(0.496)	0.137	0.015
139	11.58	0.57	0.136	(0.493)	0.122	0.014
140	11.67	0.57	0.136	(0.491)	0.122	0.014
141	11.75	0.57	0.136	(0.488)	0.122	0.014
142	11.83	0.60	0.144	(0.486)	0.130	0.014
143	11.92	0.60	0.144	(0.484)	0.130	0.014
144	12.00	0.60	0.144	(0.481)	0.130	0.014
145	12.08	0.83	0.200	(0.479)	0.180	0.020
146	12.17	0.83	0.200	(0.476)	0.180	0.020
147	12.25	0.83	0.200	(0.474)	0.180	0.020
148	12.33	0.87	0.208	(0.472)	0.187	0.021
149	12.42	0.87	0.208	(0.469)	0.187	0.021

150	12.50	0.87	0.208	(0.467)	0.187	0.021
151	12.58	0.93	0.224	(0.464)	0.202	0.022
152	12.67	0.93	0.224	(0.462)	0.202	0.022
153	12.75	0.93	0.224	(0.460)	0.202	0.022
154	12.83	0.97	0.232	(0.457)	0.209	0.023
155	12.92	0.97	0.232	(0.455)	0.209	0.023
156	13.00	0.97	0.232	(0.453)	0.209	0.023
157	13.08	1.13	0.272	(0.451)	0.245	0.027
158	13.17	1.13	0.272	(0.448)	0.245	0.027
159	13.25	1.13	0.272	(0.446)	0.245	0.027
160	13.33	1.13	0.272	(0.444)	0.245	0.027
161	13.42	1.13	0.272	(0.442)	0.245	0.027
162	13.50	1.13	0.272	(0.439)	0.245	0.027
163	13.58	0.77	0.184	(0.437)	0.166	0.018
164	13.67	0.77	0.184	(0.435)	0.166	0.018
165	13.75	0.77	0.184	(0.433)	0.166	0.018
166	13.83	0.77	0.184	(0.430)	0.166	0.018
167	13.92	0.77	0.184	(0.428)	0.166	0.018
168	14.00	0.77	0.184	(0.426)	0.166	0.018
169	14.08	0.90	0.216	(0.424)	0.194	0.022
170	14.17	0.90	0.216	(0.422)	0.194	0.022
171	14.25	0.90	0.216	(0.419)	0.194	0.022
172	14.33	0.87	0.208	(0.417)	0.187	0.021
173	14.42	0.87	0.208	(0.415)	0.187	0.021
174	14.50	0.87	0.208	(0.413)	0.187	0.021
175	14.58	0.87	0.208	(0.411)	0.187	0.021
176	14.67	0.87	0.208	(0.409)	0.187	0.021
177	14.75	0.87	0.208	(0.407)	0.187	0.021
178	14.83	0.83	0.200	(0.405)	0.180	0.020
179	14.92	0.83	0.200	(0.403)	0.180	0.020
180	15.00	0.83	0.200	(0.401)	0.180	0.020
181	15.08	0.80	0.192	(0.398)	0.173	0.019
182	15.17	0.80	0.192	(0.396)	0.173	0.019
183	15.25	0.80	0.192	(0.394)	0.173	0.019
184	15.33	0.77	0.184	(0.392)	0.166	0.018
185	15.42	0.77	0.184	(0.390)	0.166	0.018
186	15.50	0.77	0.184	(0.388)	0.166	0.018
187	15.58	0.63	0.152	(0.386)	0.137	0.015
188	15.67	0.63	0.152	(0.384)	0.137	0.015
189	15.75	0.63	0.152	(0.382)	0.137	0.015
190	15.83	0.63	0.152	(0.380)	0.137	0.015
191	15.92	0.63	0.152	(0.379)	0.137	0.015
192	16.00	0.63	0.152	(0.377)	0.137	0.015
193	16.08	0.13	0.032	(0.375)	0.029	0.003
194	16.17	0.13	0.032	(0.373)	0.029	0.003
195	16.25	0.13	0.032	(0.371)	0.029	0.003
196	16.33	0.13	0.032	(0.369)	0.029	0.003
197	16.42	0.13	0.032	(0.367)	0.029	0.003
198	16.50	0.13	0.032	(0.365)	0.029	0.003
199	16.58	0.10	0.024	(0.363)	0.022	0.002
200	16.67	0.10	0.024	(0.362)	0.022	0.002
201	16.75	0.10	0.024	(0.360)	0.022	0.002
202	16.83	0.10	0.024	(0.358)	0.022	0.002
203	16.92	0.10	0.024	(0.356)	0.022	0.002
204	17.00	0.10	0.024	(0.354)	0.022	0.002
205	17.08	0.17	0.040	(0.352)	0.036	0.004
206	17.17	0.17	0.040	(0.351)	0.036	0.004
207	17.25	0.17	0.040	(0.349)	0.036	0.004
208	17.33	0.17	0.040	(0.347)	0.036	0.004
209	17.42	0.17	0.040	(0.345)	0.036	0.004
210	17.50	0.17	0.040	(0.344)	0.036	0.004
211	17.58	0.17	0.040	(0.342)	0.036	0.004
212	17.67	0.17	0.040	(0.340)	0.036	0.004
213	17.75	0.17	0.040	(0.339)	0.036	0.004
214	17.83	0.13	0.032	(0.337)	0.029	0.003
215	17.92	0.13	0.032	(0.335)	0.029	0.003
216	18.00	0.13	0.032	(0.334)	0.029	0.003
217	18.08	0.13	0.032	(0.332)	0.029	0.003
218	18.17	0.13	0.032	(0.330)	0.029	0.003
219	18.25	0.13	0.032	(0.329)	0.029	0.003
220	18.33	0.13	0.032	(0.327)	0.029	0.003
221	18.42	0.13	0.032	(0.325)	0.029	0.003
222	18.50	0.13	0.032	(0.324)	0.029	0.003
223	18.58	0.10	0.024	(0.322)	0.022	0.002
224	18.67	0.10	0.024	(0.321)	0.022	0.002
225	18.75	0.10	0.024	(0.319)	0.022	0.002
226	18.83	0.07	0.016	(0.318)	0.014	0.002
227	18.92	0.07	0.016	(0.316)	0.014	0.002
228	19.00	0.07	0.016	(0.315)	0.014	0.002
229	19.08	0.10	0.024	(0.313)	0.022	0.002
230	19.17	0.10	0.024	(0.312)	0.022	0.002
231	19.25	0.10	0.024	(0.310)	0.022	0.002
232	19.33	0.13	0.032	(0.309)	0.029	0.003
233	19.42	0.13	0.032	(0.307)	0.029	0.003
234	19.50	0.13	0.032	(0.306)	0.029	0.003
235	19.58	0.10	0.024	(0.305)	0.022	0.002

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236  19.67     0.10      0.024       (  0.303)       0.022        0.002
237  19.75     0.10      0.024       (  0.302)       0.022        0.002
238  19.83     0.07      0.016       (  0.300)       0.014        0.002
239  19.92     0.07      0.016       (  0.299)       0.014        0.002
240  20.00     0.07      0.016       (  0.298)       0.014        0.002
241  20.08     0.10      0.024       (  0.296)       0.022        0.002
242  20.17     0.10      0.024       (  0.295)       0.022        0.002
243  20.25     0.10      0.024       (  0.294)       0.022        0.002
244  20.33     0.10      0.024       (  0.293)       0.022        0.002
245  20.42     0.10      0.024       (  0.291)       0.022        0.002
246  20.50     0.10      0.024       (  0.290)       0.022        0.002
247  20.58     0.10      0.024       (  0.289)       0.022        0.002
248  20.67     0.10      0.024       (  0.288)       0.022        0.002
249  20.75     0.10      0.024       (  0.287)       0.022        0.002
250  20.83     0.07      0.016       (  0.285)       0.014        0.002
251  20.92     0.07      0.016       (  0.284)       0.014        0.002
252  21.00     0.07      0.016       (  0.283)       0.014        0.002
253  21.08     0.10      0.024       (  0.282)       0.022        0.002
254  21.17     0.10      0.024       (  0.281)       0.022        0.002
255  21.25     0.10      0.024       (  0.280)       0.022        0.002
256  21.33     0.07      0.016       (  0.279)       0.014        0.002
257  21.42     0.07      0.016       (  0.278)       0.014        0.002
258  21.50     0.07      0.016       (  0.277)       0.014        0.002
259  21.58     0.10      0.024       (  0.276)       0.022        0.002
260  21.67     0.10      0.024       (  0.275)       0.022        0.002
261  21.75     0.10      0.024       (  0.274)       0.022        0.002
262  21.83     0.07      0.016       (  0.273)       0.014        0.002
263  21.92     0.07      0.016       (  0.272)       0.014        0.002
264  22.00     0.07      0.016       (  0.271)       0.014        0.002
265  22.08     0.10      0.024       (  0.270)       0.022        0.002
266  22.17     0.10      0.024       (  0.269)       0.022        0.002
267  22.25     0.10      0.024       (  0.268)       0.022        0.002
268  22.33     0.07      0.016       (  0.267)       0.014        0.002
269  22.42     0.07      0.016       (  0.266)       0.014        0.002
270  22.50     0.07      0.016       (  0.266)       0.014        0.002
271  22.58     0.07      0.016       (  0.265)       0.014        0.002
272  22.67     0.07      0.016       (  0.264)       0.014        0.002
273  22.75     0.07      0.016       (  0.263)       0.014        0.002
274  22.83     0.07      0.016       (  0.263)       0.014        0.002
275  22.92     0.07      0.016       (  0.262)       0.014        0.002
276  23.00     0.07      0.016       (  0.261)       0.014        0.002
277  23.08     0.07      0.016       (  0.261)       0.014        0.002
278  23.17     0.07      0.016       (  0.260)       0.014        0.002
279  23.25     0.07      0.016       (  0.260)       0.014        0.002
280  23.33     0.07      0.016       (  0.259)       0.014        0.002
281  23.42     0.07      0.016       (  0.259)       0.014        0.002
282  23.50     0.07      0.016       (  0.258)       0.014        0.002
283  23.58     0.07      0.016       (  0.258)       0.014        0.002
284  23.67     0.07      0.016       (  0.257)       0.014        0.002
285  23.75     0.07      0.016       (  0.257)       0.014        0.002
286  23.83     0.07      0.016       (  0.257)       0.014        0.002
287  23.92     0.07      0.016       (  0.257)       0.014        0.002
288  24.00     0.07      0.016       (  0.256)       0.014        0.002
                (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.4
      Flood volume = Effective rainfall      0.20(In)
       times area      31.1(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      1.80(In)
      Total soil loss =     4.665(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       22577.2 Cubic Feet
      Total soil loss =      203195.1 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.840(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0004      0.04  Q         |         |         |         |
   0+20       0.0007      0.04  Q         |         |         |         |
   0+25       0.0011      0.06  Q         |         |         |         |
   0+30       0.0016      0.06  Q         |         |         |         |
   0+35       0.0020      0.07  Q         |         |         |         |
   0+40       0.0025      0.07  Q         |         |         |         |
   0+45       0.0030      0.07  Q         |         |         |         |
   0+50       0.0035      0.07  Q         |         |         |         |
   0+55       0.0041      0.09  Q         |         |         |         |
   1+ 0       0.0047      0.09  Q         |         |         |         |
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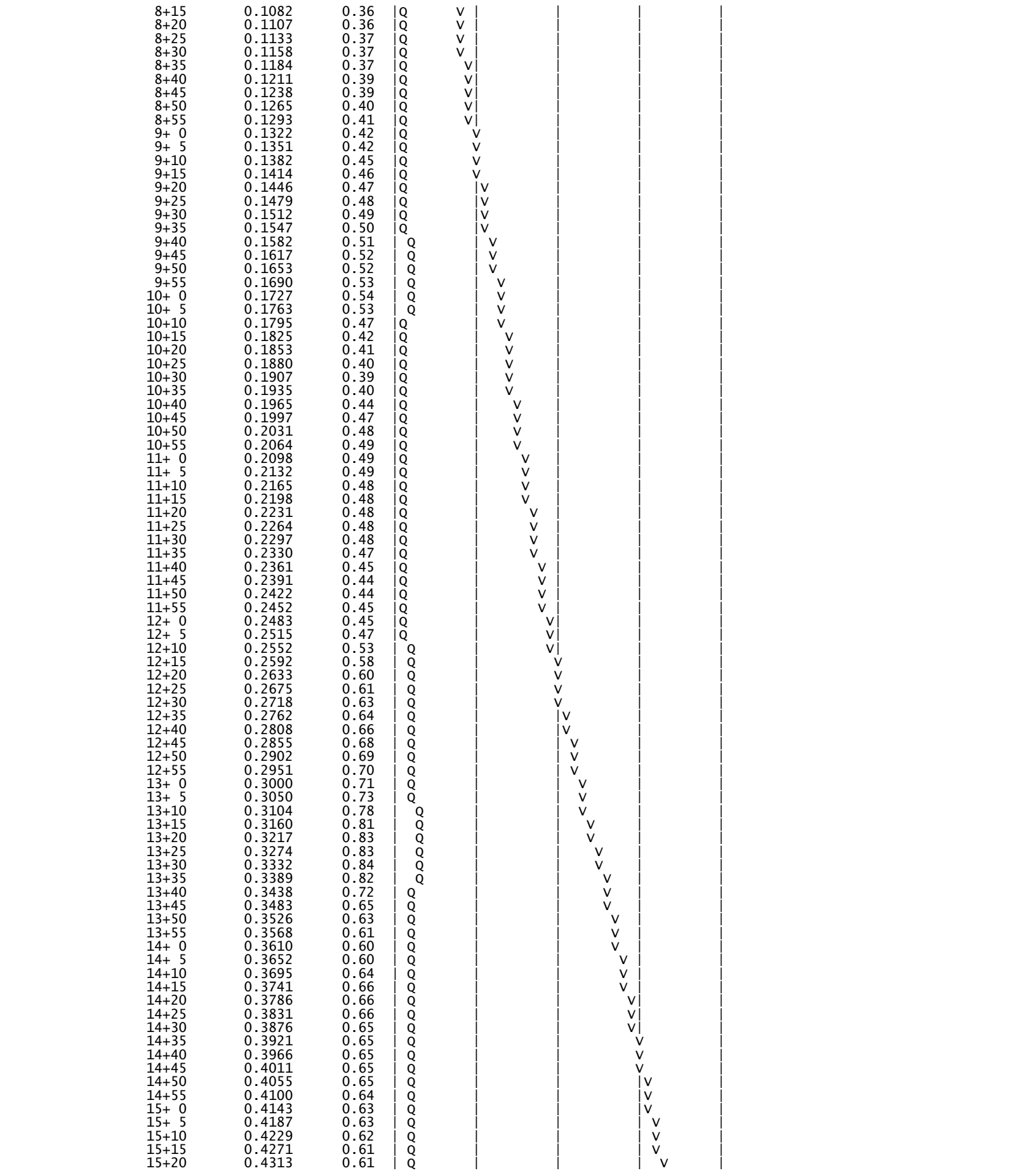
1+ 5	0.0054	0.09	Q	|	|	|	|
1+10	0.0059	0.09	Q	|	|	|	|
1+15	0.0065	0.08	Q	|	|	|	|
1+20	0.0070	0.08	Q	|	|	|	|
1+25	0.0076	0.08	Q	|	|	|	|
1+30	0.0081	0.08	Q	|	|	|	|
1+35	0.0086	0.08	Q	|	|	|	|
1+40	0.0091	0.08	Q	|	|	|	|
1+45	0.0097	0.08	Q	|	|	|	|
1+50	0.0102	0.08	Q	|	|	|	|
1+55	0.0108	0.09	Q	|	|	|	|
2+ 0	0.0115	0.09	Q	|	|	|	|
2+ 5	0.0121	0.10	Q	|	|	|	|
2+10	0.0128	0.10	Q	|	|	|	|
2+15	0.0135	0.10	QV	|	|	|	|
2+20	0.0141	0.10	QV	|	|	|	|
2+25	0.0148	0.10	QV	|	|	|	|
2+30	0.0155	0.10	QV	|	|	|	|
2+35	0.0162	0.10	QV	|	|	|	|
2+40	0.0170	0.11	QV	|	|	|	|
2+45	0.0178	0.12	QV	|	|	|	|
2+50	0.0186	0.12	QV	|	|	|	|
2+55	0.0195	0.12	QV	|	|	|	|
3+ 0	0.0203	0.12	QV	|	|	|	|
3+ 5	0.0212	0.12	QV	|	|	|	|
3+10	0.0220	0.12	QV	|	|	|	|
3+15	0.0229	0.12	QV	|	|	|	|
3+20	0.0237	0.12	QV	|	|	|	|
3+25	0.0246	0.13	QV	|	|	|	|
3+30	0.0255	0.13	QV	|	|	|	|
3+35	0.0263	0.13	Q V	|	|	|	|
3+40	0.0272	0.13	Q V	|	|	|	|
3+45	0.0281	0.13	Q V	|	|	|	|
3+50	0.0289	0.13	Q V	|	|	|	|
3+55	0.0299	0.14	Q V	|	|	|	|
4+ 0	0.0309	0.14	Q V	|	|	|	|
4+ 5	0.0319	0.15	Q V	|	|	|	|
4+10	0.0329	0.15	Q V	|	|	|	|
4+15	0.0339	0.15	Q V	|	|	|	|
4+20	0.0349	0.15	Q V	|	|	|	|
4+25	0.0360	0.16	Q V	|	|	|	|
4+30	0.0372	0.17	Q V	|	|	|	|
4+35	0.0384	0.17	Q V	|	|	|	|
4+40	0.0396	0.17	Q V	|	|	|	|
4+45	0.0408	0.17	Q V	|	|	|	|
4+50	0.0420	0.18	Q V	|	|	|	|
4+55	0.0432	0.19	Q V	|	|	|	|
5+ 0	0.0446	0.19	Q V	|	|	|	|
5+ 5	0.0459	0.19	Q V	|	|	|	|
5+10	0.0471	0.17	Q V	|	|	|	|
5+15	0.0482	0.16	Q V	|	|	|	|
5+20	0.0493	0.16	Q V	|	|	|	|
5+25	0.0505	0.17	Q V	|	|	|	|
5+30	0.0517	0.17	Q V	|	|	|	|
5+35	0.0529	0.18	Q V	|	|	|	|
5+40	0.0541	0.19	Q V	|	|	|	|
5+45	0.0555	0.19	Q V	|	|	|	|
5+50	0.0568	0.20	Q V	|	|	|	|
5+55	0.0582	0.20	Q V	|	|	|	|
6+ 0	0.0595	0.20	Q V	|	|	|	|
6+ 5	0.0609	0.20	Q V	|	|	|	|
6+10	0.0624	0.21	Q V	|	|	|	|
6+15	0.0639	0.22	Q V	|	|	|	|
6+20	0.0654	0.22	Q V	|	|	|	|
6+25	0.0669	0.22	Q V	|	|	|	|
6+30	0.0685	0.22	Q V	|	|	|	|
6+35	0.0700	0.23	Q V	|	|	|	|
6+40	0.0716	0.24	Q V	|	|	|	|
6+45	0.0733	0.24	Q V	|	|	|	|
6+50	0.0750	0.25	Q V	|	|	|	|
6+55	0.0767	0.25	Q V	|	|	|	|
7+ 0	0.0784	0.25	Q V	|	|	|	|
7+ 5	0.0801	0.25	Q V	|	|	|	|
7+10	0.0819	0.25	Q V	|	|	|	|
7+15	0.0836	0.25	|Q V	|	|	|	|
7+20	0.0853	0.25	|Q V	|	|	|	|
7+25	0.0871	0.26	|Q V	|	|	|	|
7+30	0.0890	0.27	|Q V	|	|	|	|
7+35	0.0909	0.27	|Q V	|	|	|	|
7+40	0.0928	0.28	|Q V	|	|	|	|
7+45	0.0948	0.29	|Q V	|	|	|	|
7+50	0.0969	0.30	|Q V	|	|	|	|
7+55	0.0990	0.31	|Q V	|	|	|	|
8+ 0	0.1012	0.32	|Q V	|	|	|	|
8+ 5	0.1034	0.32	|Q V	|	|	|	|
8+10	0.1058	0.34	|Q V	|	|	|	|



8+15	0.1082	0.36	
8+20	0.1107	0.36	
8+25	0.1133	0.37	
8+30	0.1158	0.37	
8+35	0.1184	0.37	
8+40	0.1211	0.39	
8+45	0.1238	0.39	
8+50	0.1265	0.40	
8+55	0.1293	0.41	
9+ 0	0.1322	0.42	
9+ 5	0.1351	0.42	
9+10	0.1382	0.45	
9+15	0.1414	0.46	
9+20	0.1446	0.47	
9+25	0.1479	0.48	
9+30	0.1512	0.49	
9+35	0.1547	0.50	
9+40	0.1582	0.51	
9+45	0.1617	0.52	
9+50	0.1653	0.52	
9+55	0.1690	0.53	
10+ 0	0.1727	0.54	
10+ 5	0.1763	0.53	
10+10	0.1795	0.47	
10+15	0.1825	0.42	
10+20	0.1853	0.41	
10+25	0.1880	0.40	
10+30	0.1907	0.39	
10+35	0.1935	0.40	
10+40	0.1965	0.44	
10+45	0.1997	0.47	
10+50	0.2031	0.48	
10+55	0.2064	0.49	
11+ 0	0.2098	0.49	
11+ 5	0.2132	0.49	
11+10	0.2165	0.48	
11+15	0.2198	0.48	
11+20	0.2231	0.48	
11+25	0.2264	0.48	
11+30	0.2297	0.48	
11+35	0.2330	0.47	
11+40	0.2361	0.45	
11+45	0.2391	0.44	
11+50	0.2422	0.44	
11+55	0.2452	0.45	
12+ 0	0.2483	0.45	
12+ 5	0.2515	0.47	
12+10	0.2552	0.53	
12+15	0.2592	0.58	
12+20	0.2633	0.60	
12+25	0.2675	0.61	
12+30	0.2718	0.63	
12+35	0.2762	0.64	
12+40	0.2808	0.66	
12+45	0.2855	0.68	
12+50	0.2902	0.69	
12+55	0.2951	0.70	
13+ 0	0.3000	0.71	
13+ 5	0.3050	0.73	
13+10	0.3104	0.78	
13+15	0.3160	0.81	
13+20	0.3217	0.83	
13+25	0.3274	0.83	
13+30	0.3332	0.84	
13+35	0.3389	0.82	
13+40	0.3438	0.72	
13+45	0.3483	0.65	
13+50	0.3526	0.63	
13+55	0.3568	0.61	
14+ 0	0.3610	0.60	
14+ 5	0.3652	0.60	
14+10	0.3695	0.64	
14+15	0.3741	0.66	
14+20	0.3786	0.66	
14+25	0.3831	0.66	
14+30	0.3876	0.65	
14+35	0.3921	0.65	
14+40	0.3966	0.65	
14+45	0.4011	0.65	
14+50	0.4055	0.65	
14+55	0.4100	0.64	
15+ 0	0.4143	0.63	
15+ 5	0.4187	0.63	
15+10	0.4229	0.62	
15+15	0.4271	0.61	
15+20	0.4313	0.61	

15+25	0.4354	0.59	| Q	|	|	| V	|
15+30	0.4395	0.59	| Q	|	|	| V	|
15+35	0.4434	0.57	| Q	|	|	| V	|
15+40	0.4471	0.54	| Q	|	|	| V	|
15+45	0.4506	0.51	| Q	|	|	| V	|
15+50	0.4540	0.50	|Q	|	|	| V	|
15+55	0.4574	0.49	|Q	|	|	| V	|
16+ 0	0.4608	0.49	|Q	|	|	| V	|
16+ 5	0.4639	0.45	|Q	|	|	| V	|
16+10	0.4660	0.31	|Q	|	|	| V	|
16+15	0.4674	0.21	Q	|	|	| V	|
16+20	0.4686	0.17	Q	|	|	| V	|
16+25	0.4697	0.15	Q	|	|	| V	|
16+30	0.4706	0.14	Q	|	|	| V	|
16+35	0.4715	0.12	Q	|	|	| V	|
16+40	0.4722	0.11	Q	|	|	| V	|
16+45	0.4728	0.09	Q	|	|	| V	|
16+50	0.4734	0.09	Q	|	|	| V	|
16+55	0.4740	0.08	Q	|	|	| V	|
17+ 0	0.4746	0.08	Q	|	|	| V	|
17+ 5	0.4751	0.08	Q	|	|	| V	|
17+10	0.4758	0.10	Q	|	|	| V	|
17+15	0.4766	0.11	Q	|	|	| V	|
17+20	0.4774	0.12	Q	|	|	| V	|
17+25	0.4782	0.12	Q	|	|	| V	|
17+30	0.4790	0.12	Q	|	|	| V	|
17+35	0.4799	0.12	Q	|	|	| V	|
17+40	0.4807	0.12	Q	|	|	| V	|
17+45	0.4816	0.12	Q	|	|	| V	|
17+50	0.4824	0.12	Q	|	|	| V	|
17+55	0.4832	0.11	Q	|	|	| V	|
18+ 0	0.4839	0.11	Q	|	|	| V	|
18+ 5	0.4847	0.11	Q	|	|	| V	|
18+10	0.4854	0.10	Q	|	|	| V	|
18+15	0.4861	0.10	Q	|	|	| V	|
18+20	0.4868	0.10	Q	|	|	| V	|
18+25	0.4875	0.10	Q	|	|	| V	|
18+30	0.4882	0.10	Q	|	|	| V	|
18+35	0.4889	0.10	Q	|	|	| V	|
18+40	0.4895	0.09	Q	|	|	| V	|
18+45	0.4900	0.08	Q	|	|	| V	|
18+50	0.4906	0.08	Q	|	|	| V	|
18+55	0.4910	0.07	Q	|	|	| V	|
19+ 0	0.4914	0.06	Q	|	|	| V	|
19+ 5	0.4919	0.06	Q	|	|	| V	|
19+10	0.4923	0.07	Q	|	|	| V	|
19+15	0.4928	0.07	Q	|	|	| V	|
19+20	0.4933	0.07	Q	|	|	| V	|
19+25	0.4939	0.09	Q	|	|	| V	|
19+30	0.4945	0.09	Q	|	|	| V	|
19+35	0.4952	0.09	Q	|	|	| V	|
19+40	0.4958	0.08	Q	|	|	| V	|
19+45	0.4963	0.08	Q	|	|	| V	|
19+50	0.4968	0.08	Q	|	|	| V	|
19+55	0.4973	0.07	Q	|	|	| V	|
20+ 0	0.4977	0.06	Q	|	|	| V	|
20+ 5	0.4981	0.06	Q	|	|	| V	|
20+10	0.4985	0.07	Q	|	|	| V	|
20+15	0.4990	0.07	Q	|	|	| V	|
20+20	0.4995	0.07	Q	|	|	| V	|
20+25	0.5000	0.07	Q	|	|	| V	|
20+30	0.5005	0.07	Q	|	|	| V	|
20+35	0.5010	0.07	Q	|	|	| V	|
20+40	0.5016	0.07	Q	|	|	| V	|
20+45	0.5021	0.07	Q	|	|	| V	|
20+50	0.5026	0.07	Q	|	|	| V	|
20+55	0.5030	0.06	Q	|	|	| V	|
21+ 0	0.5034	0.06	Q	|	|	| V	|
21+ 5	0.5038	0.06	Q	|	|	| V	|
21+10	0.5042	0.07	Q	|	|	| V	|
21+15	0.5047	0.07	Q	|	|	| V	|
21+20	0.5052	0.07	Q	|	|	| V	|
21+25	0.5056	0.06	Q	|	|	| V	|
21+30	0.5060	0.06	Q	|	|	| V	|
21+35	0.5064	0.06	Q	|	|	| V	|
21+40	0.5068	0.06	Q	|	|	| V	|
21+45	0.5073	0.07	Q	|	|	| V	|
21+50	0.5078	0.07	Q	|	|	| V	|
21+55	0.5082	0.06	Q	|	|	| V	|
22+ 0	0.5086	0.06	Q	|	|	| V	|
22+ 5	0.5090	0.06	Q	|	|	| V	|
22+10	0.5094	0.06	Q	|	|	| V	|
22+15	0.5099	0.07	Q	|	|	| V	|
22+20	0.5104	0.07	Q	|	|	| V	|
22+25	0.5108	0.06	Q	|	|	| V	|
22+30	0.5112	0.06	Q	|	|	| V	|

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   22+35       0.5116      0.05  Q          |          |          |          V|
   22+40       0.5119      0.05  Q          |          |          |          V|
   22+45       0.5123      0.05  Q          |          |          |          V|
   22+50       0.5126      0.05  Q          |          |          |          V|
   22+55       0.5130      0.05  Q          |          |          |          V|
   23+ 0       0.5133      0.05  Q          |          |          |          V|
   23+ 5       0.5137      0.05  Q          |          |          |          V|
   23+10       0.5140      0.05  Q          |          |          |          V|
   23+15       0.5144      0.05  Q          |          |          |          V|
   23+20       0.5147      0.05  Q          |          |          |          V|
   23+25       0.5151      0.05  Q          |          |          |          V|
   23+30       0.5154      0.05  Q          |          |          |          V|
   23+35       0.5158      0.05  Q          |          |          |          V|
   23+40       0.5161      0.05  Q          |          |          |          V|
   23+45       0.5165      0.05  Q          |          |          |          V|
   23+50       0.5168      0.05  Q          |          |          |          V|
   23+55       0.5172      0.05  Q          |          |          |          V|
   24+ 0       0.5175      0.05  Q          |          |          |          V|
   24+ 5       0.5178      0.05  Q          |          |          |          V|
   24+10       0.5180      0.03  Q          |          |          |          V|
   24+15       0.5181      0.01  Q          |          |          |          V|
   24+20       0.5182      0.01  Q          |          |          |          V|
   24+25       0.5182      0.01  Q          |          |          |          V|
   24+30       0.5182      0.00  Q          |          |          |          V|
   24+35       0.5183      0.00  Q          |          |          |          V|
   24+40       0.5183      0.00  Q          |          |          |          V|
   24+45       0.5183      0.00  Q          |          |          |          V|
   24+50       0.5183      0.00  Q          |          |          |          V|
   24+55       0.5183      0.00  Q          |          |          |          V|
   25+ 0       0.5183      0.00  Q          |          |          |           V
-------------------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
              Study date  11/29/22 File: pro2242.out

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------------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 5006

------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



------------------------------------------------------------------------
------------------------------------------------------------------------
Drainage Area =      31.10(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      31.10(Ac.)  =      0.049 Sq. Mi.
Length along longest watercourse =    2026.00(Ft.)
Length along longest watercourse measured to centroid =    1013.00(Ft.)
Length along longest watercourse =      0.384 Mi.
Length along longest watercourse measured to centroid =      0.192 Mi.
Difference in elevation =      14.10(Ft.)
Slope along watercourse =     36.7463 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.067 Hr.
Lag time =     4.04 Min.
25% of lag time =     1.01 Min.
40% of lag time =     1.62 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.10            2.00                 62.20

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.10            5.00                155.50

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    31.100           62.50         0.900
 Total Area Entered =     31.10(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
62.5  42.5      0.645     0.900        0.123       1.000      0.123
                                                 Sum (F) =    0.123
Area averaged mean soil loss (F) (In/Hr) =  0.123
Minimum soil loss rate ((In/Hr)) =  0.061
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.180
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                      VALLEY S-Curve
------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
```

1	0.083	123.724	26.268	8.233
2	0.167	247.448	48.586	15.228
3	0.250	371.172	12.992	4.072
4	0.333	494.896	5.854	1.835
5	0.417	618.620	3.266	1.024
6	0.500	742.344	1.823	0.571
7	0.583	866.068	1.211	0.380
			Sum = 100.000	Sum= 31.343

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.217)	0.003	0.013
2	0.17	0.07	0.016	(0.217)	0.003	0.013
3	0.25	0.07	0.016	(0.216)	0.003	0.013
4	0.33	0.10	0.024	(0.215)	0.004	0.020
5	0.42	0.10	0.024	(0.214)	0.004	0.020
6	0.50	0.10	0.024	(0.213)	0.004	0.020
7	0.58	0.10	0.024	(0.212)	0.004	0.020
8	0.67	0.10	0.024	(0.212)	0.004	0.020
9	0.75	0.10	0.024	(0.211)	0.004	0.020
10	0.83	0.13	0.032	(0.210)	0.006	0.026
11	0.92	0.13	0.032	(0.209)	0.006	0.026
12	1.00	0.13	0.032	(0.208)	0.006	0.026
13	1.08	0.10	0.024	(0.207)	0.004	0.020
14	1.17	0.10	0.024	(0.207)	0.004	0.020
15	1.25	0.10	0.024	(0.206)	0.004	0.020
16	1.33	0.10	0.024	(0.205)	0.004	0.020
17	1.42	0.10	0.024	(0.204)	0.004	0.020
18	1.50	0.10	0.024	(0.203)	0.004	0.020
19	1.58	0.10	0.024	(0.203)	0.004	0.020
20	1.67	0.10	0.024	(0.202)	0.004	0.020
21	1.75	0.10	0.024	(0.201)	0.004	0.020
22	1.83	0.13	0.032	(0.200)	0.006	0.026
23	1.92	0.13	0.032	(0.199)	0.006	0.026
24	2.00	0.13	0.032	(0.198)	0.006	0.026
25	2.08	0.13	0.032	(0.198)	0.006	0.026
26	2.17	0.13	0.032	(0.197)	0.006	0.026
27	2.25	0.13	0.032	(0.196)	0.006	0.026
28	2.33	0.13	0.032	(0.195)	0.006	0.026
29	2.42	0.13	0.032	(0.194)	0.006	0.026
30	2.50	0.13	0.032	(0.194)	0.006	0.026
31	2.58	0.17	0.040	(0.193)	0.007	0.033
32	2.67	0.17	0.040	(0.192)	0.007	0.033
33	2.75	0.17	0.040	(0.191)	0.007	0.033
34	2.83	0.17	0.040	(0.191)	0.007	0.033
35	2.92	0.17	0.040	(0.190)	0.007	0.033
36	3.00	0.17	0.040	(0.189)	0.007	0.033
37	3.08	0.17	0.040	(0.188)	0.007	0.033
38	3.17	0.17	0.040	(0.187)	0.007	0.033
39	3.25	0.17	0.040	(0.187)	0.007	0.033
40	3.33	0.17	0.040	(0.186)	0.007	0.033
41	3.42	0.17	0.040	(0.185)	0.007	0.033
42	3.50	0.17	0.040	(0.184)	0.007	0.033
43	3.58	0.17	0.040	(0.184)	0.007	0.033
44	3.67	0.17	0.040	(0.183)	0.007	0.033
45	3.75	0.17	0.040	(0.182)	0.007	0.033
46	3.83	0.20	0.048	(0.181)	0.009	0.039
47	3.92	0.20	0.048	(0.180)	0.009	0.039
48	4.00	0.20	0.048	(0.180)	0.009	0.039
49	4.08	0.20	0.048	(0.179)	0.009	0.039
50	4.17	0.20	0.048	(0.178)	0.009	0.039
51	4.25	0.20	0.048	(0.177)	0.009	0.039
52	4.33	0.23	0.056	(0.177)	0.010	0.046
53	4.42	0.23	0.056	(0.176)	0.010	0.046
54	4.50	0.23	0.056	(0.175)	0.010	0.046
55	4.58	0.23	0.056	(0.174)	0.010	0.046
56	4.67	0.23	0.056	(0.174)	0.010	0.046
57	4.75	0.23	0.056	(0.173)	0.010	0.046
58	4.83	0.27	0.064	(0.172)	0.012	0.052
59	4.92	0.27	0.064	(0.171)	0.012	0.052
60	5.00	0.27	0.064	(0.171)	0.012	0.052
61	5.08	0.20	0.048	(0.170)	0.009	0.039
62	5.17	0.20	0.048	(0.169)	0.009	0.039
63	5.25	0.20	0.048	(0.168)	0.009	0.039
64	5.33	0.23	0.056	(0.168)	0.010	0.046
65	5.42	0.23	0.056	(0.167)	0.010	0.046
66	5.50	0.23	0.056	(0.166)	0.010	0.046
67	5.58	0.27	0.064	(0.166)	0.012	0.052
68	5.67	0.27	0.064	(0.165)	0.012	0.052
69	5.75	0.27	0.064	(0.164)	0.012	0.052

70	5.83	0.27	0.064	(0.163)	0.012	0.052
71	5.92	0.27	0.064	(0.163)	0.012	0.052
72	6.00	0.27	0.064	(0.162)	0.012	0.052
73	6.08	0.30	0.072	(0.161)	0.013	0.059
74	6.17	0.30	0.072	(0.160)	0.013	0.059
75	6.25	0.30	0.072	(0.160)	0.013	0.059
76	6.33	0.30	0.072	(0.159)	0.013	0.059
77	6.42	0.30	0.072	(0.158)	0.013	0.059
78	6.50	0.30	0.072	(0.158)	0.013	0.059
79	6.58	0.33	0.080	(0.157)	0.014	0.066
80	6.67	0.33	0.080	(0.156)	0.014	0.066
81	6.75	0.33	0.080	(0.155)	0.014	0.066
82	6.83	0.33	0.080	(0.155)	0.014	0.066
83	6.92	0.33	0.080	(0.154)	0.014	0.066
84	7.00	0.33	0.080	(0.153)	0.014	0.066
85	7.08	0.33	0.080	(0.153)	0.014	0.066
86	7.17	0.33	0.080	(0.152)	0.014	0.066
87	7.25	0.33	0.080	(0.151)	0.014	0.066
88	7.33	0.37	0.088	(0.151)	0.016	0.072
89	7.42	0.37	0.088	(0.150)	0.016	0.072
90	7.50	0.37	0.088	(0.149)	0.016	0.072
91	7.58	0.40	0.096	(0.149)	0.017	0.079
92	7.67	0.40	0.096	(0.148)	0.017	0.079
93	7.75	0.40	0.096	(0.147)	0.017	0.079
94	7.83	0.43	0.104	(0.146)	0.019	0.085
95	7.92	0.43	0.104	(0.146)	0.019	0.085
96	8.00	0.43	0.104	(0.145)	0.019	0.085
97	8.08	0.50	0.120	(0.144)	0.022	0.098
98	8.17	0.50	0.120	(0.144)	0.022	0.098
99	8.25	0.50	0.120	(0.143)	0.022	0.098
100	8.33	0.50	0.120	(0.142)	0.022	0.098
101	8.42	0.50	0.120	(0.142)	0.022	0.098
102	8.50	0.50	0.120	(0.141)	0.022	0.098
103	8.58	0.53	0.128	(0.140)	0.023	0.105
104	8.67	0.53	0.128	(0.140)	0.023	0.105
105	8.75	0.53	0.128	(0.139)	0.023	0.105
106	8.83	0.57	0.136	(0.138)	0.024	0.112
107	8.92	0.57	0.136	(0.138)	0.024	0.112
108	9.00	0.57	0.136	(0.137)	0.024	0.112
109	9.08	0.63	0.152	(0.137)	0.027	0.125
110	9.17	0.63	0.152	(0.136)	0.027	0.125
111	9.25	0.63	0.152	(0.135)	0.027	0.125
112	9.33	0.67	0.160	(0.135)	0.029	0.131
113	9.42	0.67	0.160	(0.134)	0.029	0.131
114	9.50	0.67	0.160	(0.133)	0.029	0.131
115	9.58	0.70	0.168	(0.133)	0.030	0.138
116	9.67	0.70	0.168	(0.132)	0.030	0.138
117	9.75	0.70	0.168	(0.131)	0.030	0.138
118	9.83	0.73	0.176	(0.131)	0.032	0.144
119	9.92	0.73	0.176	(0.130)	0.032	0.144
120	10.00	0.73	0.176	(0.130)	0.032	0.144
121	10.08	0.50	0.120	(0.129)	0.022	0.098
122	10.17	0.50	0.120	(0.128)	0.022	0.098
123	10.25	0.50	0.120	(0.128)	0.022	0.098
124	10.33	0.50	0.120	(0.127)	0.022	0.098
125	10.42	0.50	0.120	(0.126)	0.022	0.098
126	10.50	0.50	0.120	(0.126)	0.022	0.098
127	10.58	0.67	0.160	(0.125)	0.029	0.131
128	10.67	0.67	0.160	(0.125)	0.029	0.131
129	10.75	0.67	0.160	(0.124)	0.029	0.131
130	10.83	0.67	0.160	(0.123)	0.029	0.131
131	10.92	0.67	0.160	(0.123)	0.029	0.131
132	11.00	0.67	0.160	(0.122)	0.029	0.131
133	11.08	0.63	0.152	(0.122)	0.027	0.125
134	11.17	0.63	0.152	(0.121)	0.027	0.125
135	11.25	0.63	0.152	(0.120)	0.027	0.125
136	11.33	0.63	0.152	(0.120)	0.027	0.125
137	11.42	0.63	0.152	(0.119)	0.027	0.125
138	11.50	0.63	0.152	(0.119)	0.027	0.125
139	11.58	0.57	0.136	(0.118)	0.024	0.112
140	11.67	0.57	0.136	(0.117)	0.024	0.112
141	11.75	0.57	0.136	(0.117)	0.024	0.112
142	11.83	0.60	0.144	(0.116)	0.026	0.118
143	11.92	0.60	0.144	(0.116)	0.026	0.118
144	12.00	0.60	0.144	(0.115)	0.026	0.118
145	12.08	0.83	0.200	(0.114)	0.036	0.164
146	12.17	0.83	0.200	(0.114)	0.036	0.164
147	12.25	0.83	0.200	(0.113)	0.036	0.164
148	12.33	0.87	0.208	(0.113)	0.037	0.171
149	12.42	0.87	0.208	(0.112)	0.037	0.171
150	12.50	0.87	0.208	(0.112)	0.037	0.171
151	12.58	0.93	0.224	(0.111)	0.040	0.184
152	12.67	0.93	0.224	(0.111)	0.040	0.184
153	12.75	0.93	0.224	(0.110)	0.040	0.184
154	12.83	0.97	0.232	(0.109)	0.042	0.190
155	12.92	0.97	0.232	(0.109)	0.042	0.190

156	13.00	0.97	0.232	(0.108)	0.042	0.190
157	13.08	1.13	0.272	(0.108)	0.049	0.223
158	13.17	1.13	0.272	(0.107)	0.049	0.223
159	13.25	1.13	0.272	(0.107)	0.049	0.223
160	13.33	1.13	0.272	(0.106)	0.049	0.223
161	13.42	1.13	0.272	(0.106)	0.049	0.223
162	13.50	1.13	0.272	(0.105)	0.049	0.223
163	13.58	0.77	0.184	(0.105)	0.033	0.151
164	13.67	0.77	0.184	(0.104)	0.033	0.151
165	13.75	0.77	0.184	(0.103)	0.033	0.151
166	13.83	0.77	0.184	(0.103)	0.033	0.151
167	13.92	0.77	0.184	(0.102)	0.033	0.151
168	14.00	0.77	0.184	(0.102)	0.033	0.151
169	14.08	0.90	0.216	(0.101)	0.039	0.177
170	14.17	0.90	0.216	(0.101)	0.039	0.177
171	14.25	0.90	0.216	(0.100)	0.039	0.177
172	14.33	0.87	0.208	(0.100)	0.037	0.171
173	14.42	0.87	0.208	(0.099)	0.037	0.171
174	14.50	0.87	0.208	(0.099)	0.037	0.171
175	14.58	0.87	0.208	(0.098)	0.037	0.171
176	14.67	0.87	0.208	(0.098)	0.037	0.171
177	14.75	0.87	0.208	(0.097)	0.037	0.171
178	14.83	0.83	0.200	(0.097)	0.036	0.164
179	14.92	0.83	0.200	(0.096)	0.036	0.164
180	15.00	0.83	0.200	(0.096)	0.036	0.164
181	15.08	0.80	0.192	(0.095)	0.035	0.157
182	15.17	0.80	0.192	(0.095)	0.035	0.157
183	15.25	0.80	0.192	(0.094)	0.035	0.157
184	15.33	0.77	0.184	(0.094)	0.033	0.151
185	15.42	0.77	0.184	(0.093)	0.033	0.151
186	15.50	0.77	0.184	(0.093)	0.033	0.151
187	15.58	0.63	0.152	(0.092)	0.027	0.125
188	15.67	0.63	0.152	(0.092)	0.027	0.125
189	15.75	0.63	0.152	(0.091)	0.027	0.125
190	15.83	0.63	0.152	(0.091)	0.027	0.125
191	15.92	0.63	0.152	(0.091)	0.027	0.125
192	16.00	0.63	0.152	(0.090)	0.027	0.125
193	16.08	0.13	0.032	(0.090)	0.006	0.026
194	16.17	0.13	0.032	(0.089)	0.006	0.026
195	16.25	0.13	0.032	(0.089)	0.006	0.026
196	16.33	0.13	0.032	(0.088)	0.006	0.026
197	16.42	0.13	0.032	(0.088)	0.006	0.026
198	16.50	0.13	0.032	(0.087)	0.006	0.026
199	16.58	0.10	0.024	(0.087)	0.004	0.020
200	16.67	0.10	0.024	(0.086)	0.004	0.020
201	16.75	0.10	0.024	(0.086)	0.004	0.020
202	16.83	0.10	0.024	(0.086)	0.004	0.020
203	16.92	0.10	0.024	(0.085)	0.004	0.020
204	17.00	0.10	0.024	(0.085)	0.004	0.020
205	17.08	0.17	0.040	(0.084)	0.007	0.033
206	17.17	0.17	0.040	(0.084)	0.007	0.033
207	17.25	0.17	0.040	(0.083)	0.007	0.033
208	17.33	0.17	0.040	(0.083)	0.007	0.033
209	17.42	0.17	0.040	(0.083)	0.007	0.033
210	17.50	0.17	0.040	(0.082)	0.007	0.033
211	17.58	0.17	0.040	(0.082)	0.007	0.033
212	17.67	0.17	0.040	(0.081)	0.007	0.033
213	17.75	0.17	0.040	(0.081)	0.007	0.033
214	17.83	0.13	0.032	(0.081)	0.006	0.026
215	17.92	0.13	0.032	(0.080)	0.006	0.026
216	18.00	0.13	0.032	(0.080)	0.006	0.026
217	18.08	0.13	0.032	(0.079)	0.006	0.026
218	18.17	0.13	0.032	(0.079)	0.006	0.026
219	18.25	0.13	0.032	(0.079)	0.006	0.026
220	18.33	0.13	0.032	(0.078)	0.006	0.026
221	18.42	0.13	0.032	(0.078)	0.006	0.026
222	18.50	0.13	0.032	(0.077)	0.006	0.026
223	18.58	0.10	0.024	(0.077)	0.004	0.020
224	18.67	0.10	0.024	(0.077)	0.004	0.020
225	18.75	0.10	0.024	(0.076)	0.004	0.020
226	18.83	0.07	0.016	(0.076)	0.003	0.013
227	18.92	0.07	0.016	(0.076)	0.003	0.013
228	19.00	0.07	0.016	(0.075)	0.003	0.013
229	19.08	0.10	0.024	(0.075)	0.004	0.020
230	19.17	0.10	0.024	(0.075)	0.004	0.020
231	19.25	0.10	0.024	(0.074)	0.004	0.020
232	19.33	0.13	0.032	(0.074)	0.006	0.026
233	19.42	0.13	0.032	(0.074)	0.006	0.026
234	19.50	0.13	0.032	(0.073)	0.006	0.026
235	19.58	0.10	0.024	(0.073)	0.004	0.020
236	19.67	0.10	0.024	(0.073)	0.004	0.020
237	19.75	0.10	0.024	(0.072)	0.004	0.020
238	19.83	0.07	0.016	(0.072)	0.003	0.013
239	19.92	0.07	0.016	(0.072)	0.003	0.013
240	20.00	0.07	0.016	(0.071)	0.003	0.013
241	20.08	0.10	0.024	(0.071)	0.004	0.020

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242  20.17     0.10      0.024       (  0.071)       0.004        0.020
243  20.25     0.10      0.024       (  0.070)       0.004        0.020
244  20.33     0.10      0.024       (  0.070)       0.004        0.020
245  20.42     0.10      0.024       (  0.070)       0.004        0.020
246  20.50     0.10      0.024       (  0.069)       0.004        0.020
247  20.58     0.10      0.024       (  0.069)       0.004        0.020
248  20.67     0.10      0.024       (  0.069)       0.004        0.020
249  20.75     0.10      0.024       (  0.069)       0.004        0.020
250  20.83     0.07      0.016       (  0.068)       0.003        0.013
251  20.92     0.07      0.016       (  0.068)       0.003        0.013
252  21.00     0.07      0.016       (  0.068)       0.003        0.013
253  21.08     0.10      0.024       (  0.067)       0.004        0.020
254  21.17     0.10      0.024       (  0.067)       0.004        0.020
255  21.25     0.10      0.024       (  0.067)       0.004        0.020
256  21.33     0.07      0.016       (  0.067)       0.003        0.013
257  21.42     0.07      0.016       (  0.066)       0.003        0.013
258  21.50     0.07      0.016       (  0.066)       0.003        0.013
259  21.58     0.10      0.024       (  0.066)       0.004        0.020
260  21.67     0.10      0.024       (  0.066)       0.004        0.020
261  21.75     0.10      0.024       (  0.065)       0.004        0.020
262  21.83     0.07      0.016       (  0.065)       0.003        0.013
263  21.92     0.07      0.016       (  0.065)       0.003        0.013
264  22.00     0.07      0.016       (  0.065)       0.003        0.013
265  22.08     0.10      0.024       (  0.065)       0.004        0.020
266  22.17     0.10      0.024       (  0.064)       0.004        0.020
267  22.25     0.10      0.024       (  0.064)       0.004        0.020
268  22.33     0.07      0.016       (  0.064)       0.003        0.013
269  22.42     0.07      0.016       (  0.064)       0.003        0.013
270  22.50     0.07      0.016       (  0.064)       0.003        0.013
271  22.58     0.07      0.016       (  0.063)       0.003        0.013
272  22.67     0.07      0.016       (  0.063)       0.003        0.013
273  22.75     0.07      0.016       (  0.063)       0.003        0.013
274  22.83     0.07      0.016       (  0.063)       0.003        0.013
275  22.92     0.07      0.016       (  0.063)       0.003        0.013
276  23.00     0.07      0.016       (  0.063)       0.003        0.013
277  23.08     0.07      0.016       (  0.062)       0.003        0.013
278  23.17     0.07      0.016       (  0.062)       0.003        0.013
279  23.25     0.07      0.016       (  0.062)       0.003        0.013
280  23.33     0.07      0.016       (  0.062)       0.003        0.013
281  23.42     0.07      0.016       (  0.062)       0.003        0.013
282  23.50     0.07      0.016       (  0.062)       0.003        0.013
283  23.58     0.07      0.016       (  0.062)       0.003        0.013
284  23.67     0.07      0.016       (  0.062)       0.003        0.013
285  23.75     0.07      0.016       (  0.061)       0.003        0.013
286  23.83     0.07      0.016       (  0.061)       0.003        0.013
287  23.92     0.07      0.016       (  0.061)       0.003        0.013
288  24.00     0.07      0.016       (  0.061)       0.003        0.013
              (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    19.7
      Flood volume = Effective rainfall      1.64(In)
       times area      31.1(Ac.)/[(In)/(Ft.)] =       4.3(Ac.Ft)
      Total soil loss =      0.36(In)
      Total soil loss =     0.933(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =      185133.3 Cubic Feet
      Total soil loss =       40639.0 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      6.981(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                    R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
---------------------------------------------------------------------------
  0+ 5       0.0007      0.11  Q         |         |         |         |
  0+10       0.0029      0.31  VQ        |         |         |         |
  0+15       0.0054      0.36  VQ        |         |         |         |
  0+20       0.0084      0.44  VQ        |         |         |         |
  0+25       0.0122      0.55  V Q       |         |         |         |
  0+30       0.0162      0.59  V Q       |         |         |         |
  0+35       0.0204      0.60  V Q       |         |         |         |
  0+40       0.0246      0.61  V Q       |         |         |         |
  0+45       0.0288      0.61  V Q       |         |         |         |
  0+50       0.0335      0.67  V Q       |         |         |         |
  0+55       0.0388      0.77  V  Q      |         |         |         |
  1+ 0       0.0443      0.80  V  Q      |         |         |         |
  1+ 5       0.0495      0.76  V  Q      |         |         |         |
  1+10       0.0540      0.66  V Q       |         |         |         |
  1+15       0.0584      0.64  V Q       |         |         |         |
  1+20       0.0628      0.63  V Q       |         |         |         |
  1+25       0.0671      0.62  V Q       |         |         |         |
  1+30       0.0713      0.62  V Q       |         |         |         |
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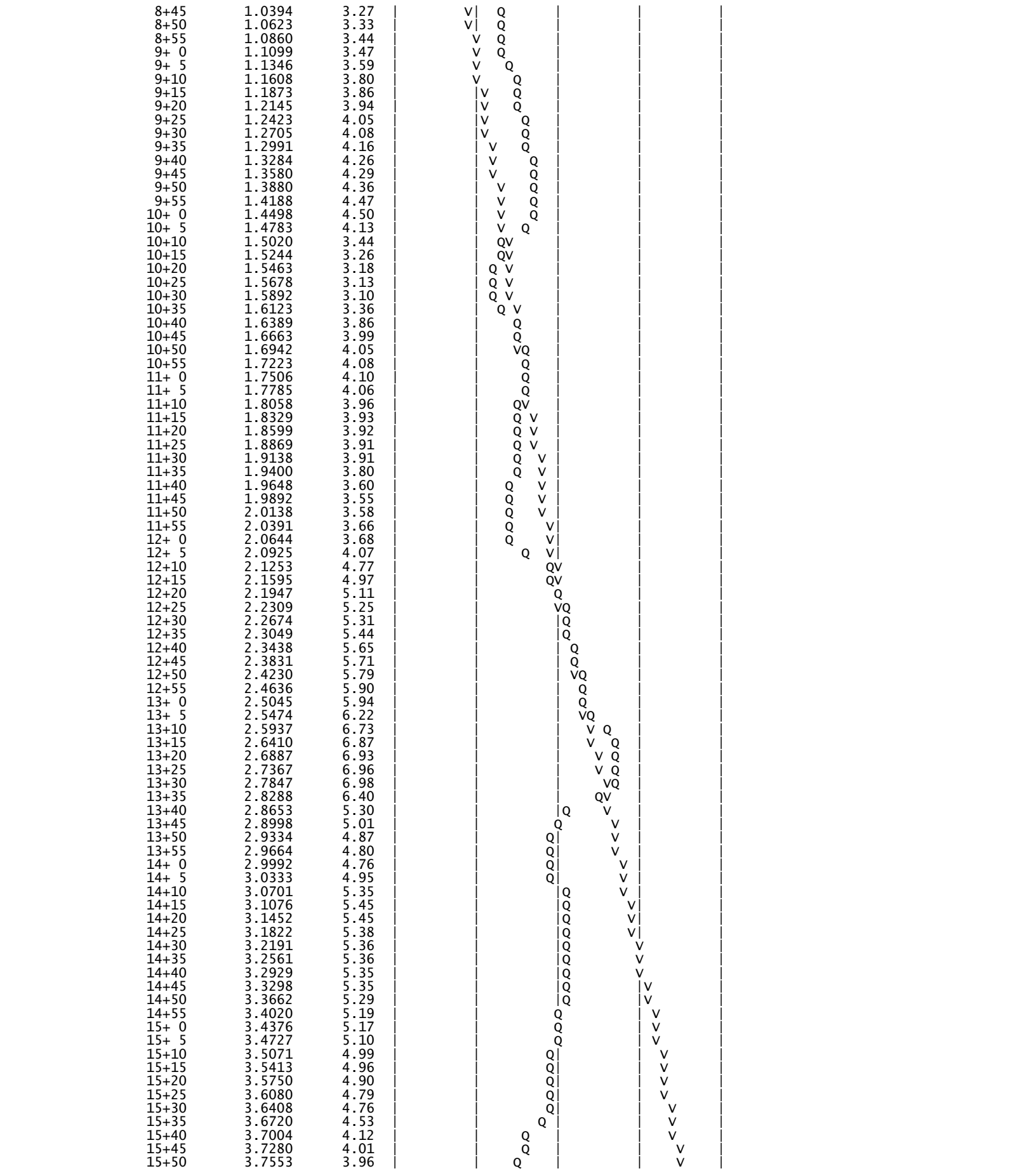
1+35	0.0756	0.62	V Q	|	|	|	|
1+40	0.0798	0.62	V Q	|	|	|	|
1+45	0.0841	0.62	V Q	|	|	|	|
1+50	0.0887	0.67	V Q	|	|	|	|
1+55	0.0940	0.77	V Q	|	|	|	|
2+ 0	0.0995	0.80	V Q	|	|	|	|
2+ 5	0.1051	0.81	V Q	|	|	|	|
2+10	0.1107	0.82	|V Q	|	|	|	|
2+15	0.1164	0.82	|V Q	|	|	|	|
2+20	0.1220	0.82	|V Q	|	|	|	|
2+25	0.1277	0.82	|V Q	|	|	|	|
2+30	0.1334	0.82	|V Q	|	|	|	|
2+35	0.1394	0.88	|V Q	|	|	|	|
2+40	0.1461	0.98	|V Q	|	|	|	|
2+45	0.1530	1.00	|V Q	|	|	|	|
2+50	0.1600	1.02	|V Q	|	|	|	|
2+55	0.1671	1.02	|V Q	|	|	|	|
3+ 0	0.1741	1.03	|V Q	|	|	|	|
3+ 5	0.1812	1.03	|V Q	|	|	|	|
3+10	0.1883	1.03	|V Q	|	|	|	|
3+15	0.1954	1.03	|V Q	|	|	|	|
3+20	0.2025	1.03	|V Q	|	|	|	|
3+25	0.2096	1.03	|V Q	|	|	|	|
3+30	0.2166	1.03	| V Q	|	|	|	|
3+35	0.2237	1.03	| V Q	|	|	|	|
3+40	0.2308	1.03	| V Q	|	|	|	|
3+45	0.2379	1.03	| V Q	|	|	|	|
3+50	0.2453	1.08	| V Q	|	|	|	|
3+55	0.2535	1.18	| V Q	|	|	|	|
4+ 0	0.2618	1.21	| V Q	|	|	|	|
4+ 5	0.2702	1.22	| V Q	|	|	|	|
4+10	0.2787	1.23	| V Q	|	|	|	|
4+15	0.2872	1.23	| V Q	|	|	|	|
4+20	0.2960	1.29	| V Q	|	|	|	|
4+25	0.3056	1.39	| V Q	|	|	|	|
4+30	0.3153	1.41	| V Q	|	|	|	|
4+35	0.3252	1.43	| V Q	|	|	|	|
4+40	0.3351	1.43	| V Q	|	|	|	|
4+45	0.3449	1.44	| V Q	|	|	|	|
4+50	0.3552	1.49	| V Q	|	|	|	|
4+55	0.3662	1.59	| V Q	|	|	|	|
5+ 0	0.3774	1.62	| V Q	|	|	|	|
5+ 5	0.3879	1.52	| V Q	|	|	|	|
5+10	0.3970	1.33	| V Q	|	|	|	|
5+15	0.4059	1.28	| V Q	|	|	|	|
5+20	0.4149	1.31	| V Q	|	|	|	|
5+25	0.4246	1.40	| V Q	|	|	|	|
5+30	0.4344	1.42	| VQ	|	|	|	|
5+35	0.4446	1.48	| VQ	|	|	|	|
5+40	0.4555	1.59	| V Q	|	|	|	|
5+45	0.4666	1.62	| V Q	|	|	|	|
5+50	0.4779	1.63	| V Q	|	|	|	|
5+55	0.4892	1.64	| V Q	|	|	|	|
6+ 0	0.5005	1.64	| V Q	|	|	|	|
6+ 5	0.5122	1.70	| V Q	|	|	|	|
6+10	0.5246	1.80	| V Q	|	|	|	|
6+15	0.5372	1.83	| V Q	|	|	|	|
6+20	0.5498	1.84	| V Q	|	|	|	|
6+25	0.5625	1.85	| V Q	|	|	|	|
6+30	0.5753	1.85	| V Q	|	|	|	|
6+35	0.5884	1.91	| V Q	|	|	|	|
6+40	0.6022	2.01	| V Q	|	|	|	|
6+45	0.6162	2.03	| V Q	|	|	|	|
6+50	0.6303	2.04	| V Q	|	|	|	|
6+55	0.6444	2.05	| V Q	|	|	|	|
7+ 0	0.6585	2.05	| V Q	|	|	|	|
7+ 5	0.6727	2.06	| V Q	|	|	|	|
7+10	0.6869	2.06	| V Q	|	|	|	|
7+15	0.7010	2.06	| V Q	|	|	|	|
7+20	0.7156	2.11	| V Q	|	|	|	|
7+25	0.7308	2.21	| V Q	|	|	|	|
7+30	0.7462	2.24	| VQ	|	|	|	|
7+35	0.7621	2.30	| V Q	|	|	|	|
7+40	0.7787	2.41	| V Q	|	|	|	|
7+45	0.7955	2.44	| V Q	|	|	|	|
7+50	0.8128	2.51	| V Q	|	|	|	|
7+55	0.8308	2.62	| V Q	|	|	|	|
8+ 0	0.8490	2.65	| V Q	|	|	|	|
8+ 5	0.8681	2.77	| V |Q	|	|	|	|
8+10	0.8886	2.98	| V |Q	|	|	|	|
8+15	0.9095	3.03	| V | Q	|	|	|	|
8+20	0.9306	3.06	| V | Q	|	|	|	|
8+25	0.9517	3.07	| V | Q	|	|	|	|
8+30	0.9729	3.08	| V| Q	|	|	|	|
8+35	0.9946	3.14	| V| Q	|	|	|	|
8+40	1.0169	3.24	| V| Q	|	|	|	|



8+45	1.0394	3.27	
8+50	1.0623	3.33	
8+55	1.0860	3.44	
9+ 0	1.1099	3.47	
9+ 5	1.1346	3.59	
9+10	1.1608	3.80	
9+15	1.1873	3.86	
9+20	1.2145	3.94	
9+25	1.2423	4.05	
9+30	1.2705	4.08	
9+35	1.2991	4.16	
9+40	1.3284	4.26	
9+45	1.3580	4.29	
9+50	1.3880	4.36	
9+55	1.4188	4.47	
10+ 0	1.4498	4.50	
10+ 5	1.4783	4.13	
10+10	1.5020	3.44	
10+15	1.5244	3.26	
10+20	1.5463	3.18	
10+25	1.5678	3.13	
10+30	1.5892	3.10	
10+35	1.6123	3.36	
10+40	1.6389	3.86	
10+45	1.6663	3.99	
10+50	1.6942	4.05	
10+55	1.7223	4.08	
11+ 0	1.7506	4.10	
11+ 5	1.7785	4.06	
11+10	1.8058	3.96	
11+15	1.8329	3.93	
11+20	1.8599	3.92	
11+25	1.8869	3.91	
11+30	1.9138	3.91	
11+35	1.9400	3.80	
11+40	1.9648	3.60	
11+45	1.9892	3.55	
11+50	2.0138	3.58	
11+55	2.0391	3.66	
12+ 0	2.0644	3.68	
12+ 5	2.0925	4.07	
12+10	2.1253	4.77	
12+15	2.1595	4.97	
12+20	2.1947	5.11	
12+25	2.2309	5.25	
12+30	2.2674	5.31	
12+35	2.3049	5.44	
12+40	2.3438	5.65	
12+45	2.3831	5.71	
12+50	2.4230	5.79	
12+55	2.4636	5.90	
13+ 0	2.5045	5.94	
13+ 5	2.5474	6.22	
13+10	2.5937	6.73	
13+15	2.6410	6.87	
13+20	2.6887	6.93	
13+25	2.7367	6.96	
13+30	2.7847	6.98	
13+35	2.8288	6.40	
13+40	2.8653	5.30	
13+45	2.8998	5.01	
13+50	2.9334	4.87	
13+55	2.9664	4.80	
14+ 0	2.9992	4.76	
14+ 5	3.0333	4.95	
14+10	3.0701	5.35	
14+15	3.1076	5.45	
14+20	3.1452	5.45	
14+25	3.1822	5.38	
14+30	3.2191	5.36	
14+35	3.2561	5.36	
14+40	3.2929	5.35	
14+45	3.3298	5.35	
14+50	3.3662	5.29	
14+55	3.4020	5.19	
15+ 0	3.4376	5.17	
15+ 5	3.4727	5.10	
15+10	3.5071	4.99	
15+15	3.5413	4.96	
15+20	3.5750	4.90	
15+25	3.6080	4.79	
15+30	3.6408	4.76	
15+35	3.6720	4.53	
15+40	3.7004	4.12	
15+45	3.7280	4.01	
15+50	3.7553	3.96	

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15+55      3.7824      3.93  |          |     Q    |          |     V    |
16+ 0      3.8093      3.92  |          |     Q    |          |     V    |
16+ 5      3.8307      3.10  |          | Q        |          |      V   |
16+10      3.8417      1.60  |        Q |          |          |      V   |
16+15      3.8499      1.20  |    Q     |          |          |      V   |
16+20      3.8569      1.02  |    Q     |          |          |      V   |
16+25      3.8633      0.92  |   Q      |          |          |      V   |
16+30      3.8692      0.86  |   Q      |          |          |      V   |
16+35      3.8745      0.77  |   Q      |          |          |      V   |
16+40      3.8791      0.67  | Q        |          |          |      V   |
16+45      3.8835      0.64  | Q        |          |          |      V   |
16+50      3.8878      0.63  | Q        |          |          |      V   |
16+55      3.8921      0.62  | Q        |          |          |      V   |
17+ 0      3.8964      0.62  | Q        |          |          |      V   |
17+ 5      3.9014      0.73  | Q        |          |          |      V   |
17+10      3.9078      0.93  |   Q      |          |          |      V   |
17+15      3.9145      0.98  |   Q      |          |          |      V   |
17+20      3.9214      1.00  |    Q     |          |          |      V   |
17+25      3.9284      1.02  |    Q     |          |          |      V   |
17+30      3.9355      1.02  |    Q     |          |          |       V  |
17+35      3.9425      1.03  |    Q     |          |          |       V  |
17+40      3.9496      1.03  |    Q     |          |          |       V  |
17+45      3.9567      1.03  |    Q     |          |          |       V  |
17+50      3.9634      0.97  |   Q      |          |          |       V  |
17+55      3.9694      0.87  |   Q      |          |          |       V  |
18+ 0      3.9753      0.85  |   Q      |          |          |       V  |
18+ 5      3.9810      0.84  |   Q      |          |          |       V  |
18+10      3.9867      0.83  |   Q      |          |          |       V  |
18+15      3.9924      0.83  |   Q      |          |          |       V  |
18+20      3.9981      0.82  |   Q      |          |          |       V  |
18+25      4.0038      0.82  |   Q      |          |          |       V  |
18+30      4.0094      0.82  |   Q      |          |          |       V  |
18+35      4.0147      0.77  |   Q      |          |          |       V  |
18+40      4.0193      0.67  | Q        |          |          |       V  |
18+45      4.0238      0.64  | Q        |          |          |       V  |
18+50      4.0277      0.58  | Q        |          |          |       V  |
18+55      4.0310      0.47  |Q         |          |          |       V  |
19+ 0      4.0340      0.44  |Q         |          |          |       V  |
19+ 5      4.0373      0.48  |Q         |          |          |       V  |
19+10      4.0412      0.57  | Q        |          |          |        V |
19+15      4.0453      0.59  | Q        |          |          |        V |
19+20      4.0498      0.66  | Q        |          |          |        V |
19+25      4.0551      0.76  |   Q      |          |          |        V |
19+30      4.0606      0.80  |   Q      |          |          |        V |
19+35      4.0658      0.76  |   Q      |          |          |        V |
19+40      4.0704      0.66  | Q        |          |          |        V |
19+45      4.0748      0.64  | Q        |          |          |        V |
19+50      4.0787      0.58  | Q        |          |          |        V |
19+55      4.0820      0.47  |Q         |          |          |        V |
20+ 0      4.0850      0.44  |Q         |          |          |        V |
20+ 5      4.0883      0.48  |Q         |          |          |        V |
20+10      4.0922      0.57  | Q        |          |          |        V |
20+15      4.0963      0.59  | Q        |          |          |        V |
20+20      4.1005      0.60  | Q        |          |          |        V |
20+25      4.1047      0.61  | Q        |          |          |        V |
20+30      4.1089      0.61  | Q        |          |          |        V |
20+35      4.1132      0.62  | Q        |          |          |        V |
20+40      4.1174      0.62  | Q        |          |          |        V |
20+45      4.1217      0.62  | Q        |          |          |        V |
20+50      4.1255      0.56  | Q        |          |          |        V |
20+55      4.1287      0.46  |Q         |          |          |        V |
21+ 0      4.1317      0.44  |Q         |          |          |        V |
21+ 5      4.1350      0.48  |Q         |          |          |        V |
21+10      4.1390      0.57  | Q        |          |          |        V |
21+15      4.1431      0.59  | Q        |          |          |        V |
21+20      4.1468      0.55  | Q        |          |          |         V|
21+25      4.1500      0.46  |Q         |          |          |         V|
21+30      4.1530      0.43  |Q         |          |          |         V|
21+35      4.1563      0.48  |Q         |          |          |         V|
21+40      4.1602      0.57  | Q        |          |          |         V|
21+45      4.1643      0.59  | Q        |          |          |         V|
21+50      4.1681      0.55  | Q        |          |          |         V|
21+55      4.1712      0.46  |Q         |          |          |         V|
22+ 0      4.1742      0.43  |Q         |          |          |         V|
22+ 5      4.1775      0.48  |Q         |          |          |         V|
22+10      4.1815      0.57  | Q        |          |          |         V|
22+15      4.1856      0.59  | Q        |          |          |         V|
22+20      4.1893      0.55  | Q        |          |          |         V|
22+25      4.1925      0.46  |Q         |          |          |         V|
22+30      4.1955      0.43  |Q         |          |          |         V|
22+35      4.1984      0.42  |Q         |          |          |         V|
22+40      4.2013      0.42  |Q         |          |          |         V|
22+45      4.2041      0.41  |Q         |          |          |         V|
22+50      4.2070      0.41  |Q         |          |          |         V|
22+55      4.2098      0.41  |Q         |          |          |         V|
23+ 0      4.2126      0.41  |Q         |          |          |         V|
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   23+ 5       4.2155      0.41  |Q        |         |         |        V|
   23+10       4.2183      0.41  |Q        |         |         |        V|
   23+15       4.2211      0.41  |Q        |         |         |        V|
   23+20       4.2240      0.41  |Q        |         |         |        V|
   23+25       4.2268      0.41  |Q        |         |         |        V|
   23+30       4.2296      0.41  |Q        |         |         |        V|
   23+35       4.2325      0.41  |Q        |         |         |        V|
   23+40       4.2353      0.41  |Q        |         |         |        V|
   23+45       4.2381      0.41  |Q        |         |         |        V|
   23+50       4.2410      0.41  |Q        |         |         |        V|
   23+55       4.2438      0.41  |Q        |         |         |        V|
   24+ 0       4.2466      0.41  |Q        |         |         |        V|
   24+ 5       4.2487      0.30  |Q        |         |         |        V|
   24+10       4.2494      0.10  Q         |         |         |        V|
   24+15       4.2498      0.05  Q         |         |         |        V|
   24+20       4.2500      0.03  Q         |         |         |        V|
   24+25       4.2500      0.01  Q         |         |         |        V|
   24+30       4.2501      0.00  Q         |         |         |         V
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Riverside County SWCT²

Stormwater & Water Conservation Tracking Tool

Choose search item from list | Enter Value | Locate | Clear Results

33.8435,-117.2526 Zoom: 15

WQMP report is only available at zoom level 16 or greater.

Toggle Legend | Clear Layers | Metadata | Map Tutorial

- **Base Data**
- **Stormwater Data**
  - Hydromodification Susceptibility Mapping
  - 2010 - 303d/TMDL
  - Hydromodification Exemption Areas
    - Potentially Not Exempt
    - Potentially Exempt
  - District Facilities
  - Permit Areas
  - Hydrologic Unit Codes(HUC)
  - Topographic Drainage Boundary
  - Drainage Area Boundaries
  - City Storm Drains
  - WQMP 85% Design Isohyetal Map
  - CRP (Control Release Point)
  - FEMA Floodplain
  - Flood Plain - Other Special Studies
  - As-Built Plans
- **Groundwater Data**
- **Critical Coarse Sediment Yield Areas**
- **U.S. Fish and Wildlife Critical Habitat**
- **WRMSHCP Potential Survey Areas**
- **SKRHCP**
- **CVMSHCP Survey Data and Conservation Areas**

PROJECT SITE

300 m
1000 ft

Topo

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/

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❑ 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**

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❑ 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.**

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❑ 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/

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❑ 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.**

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❑ 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**

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☐ 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

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☒ 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