County of San Diego
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ARCO VALLEY CENTER
PDS2015-STP-15-012, PDS2015-AMC-15-006

SWC Valley Center Road and Cole Grade Road
Valley Center, California 92082

ASSESSOR'S PARCEL NUMBER(S):
180-260-31

ENGINEER OF WORK:

_____

David Caron, RCE #70066

PREPARED FOR:

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14109 Calle De Vista
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(760) 484-3286

PDP SWQMP PREPARED BY:

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(760) 908-8745

DATE OF SWQMP:
6-25-18
Revised 10-25-18,
Revised 3-12-19,
Revised 1-20-21
Revised 2-8-21

PLANS PREPARED BY:
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SWQMP APPROVED BY:

APPROVAL DATE:


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Table of Contents

Attachments

Attachment 1: Backup for PDP Pollutant Control BMPs
- Attachment 1a: Storm Water Pollutant Control Worksheet Calculations
- Attachment 1b: DMA Exhibit
- Attachment 1c: Individual Structural BMP DMA Mapbook

Attachment 2: Backup for PDP Hydromodification Control Measures
- Attachment 2a: Flow Control Facility Design
- Attachment 2b: Hydromodification Management Exhibit
- Attachment 2c: Management of Critical Coarse Sediment Yield Areas
- Attachment 2d: Geomorphic Assessment of Receiving Channels (optional)
- Attachment 2e: Vector Control Plan (if applicable)

Attachment 3: Structural BMP Maintenance Plan
- Attachment 3a: Structural BMP Maintenance Thresholds and Actions
- Attachment 3b: Draft Maintenance Agreements / Notifications(when applicable)

Attachment 4: County of San Diego PDP Structural BMP Verification for DPW Permitted Land Development Projects

Attachment 5: Copy of Plan Sheets Showing Permanent Storm Water BMPs

Attachment 6: Copy of Project's Drainage Report

Attachment 7: Copy of Project's Geotechnical and Groundwater Investigation Report

Acronyms

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
BMP DM	Best Management Practice Design Manual
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group

MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDCI	Private Development Construction Inspection Section
PDP	Priority Development Project
PDS	Planning and Development Services
PE	Professional Engineer
RPO	Resource Protection Ordinance
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan
WMAA	Watershed Management Area Analysis
WPO	Watershed Protection Ordinance
WQIP	Water Quality Improvement Plan

PDP SWQMP Preparer's Certification Page

Project Name: ARCO VALLEY CENTER
Permit Application Number: PDS2015-STP-15-012, PDS2015-AMC-15-006

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

I have read and understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by County staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature, PE Number & Expiration Date

David Caron
Print Name

Civil Landworks Corp.
Company

2-8-2021
Date

Engineer's Seal:

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Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	6-25-18	Initial Submittal
2	10-25-18	Second submittal
3	3-12-19	Third
4	2-8-21	Final

Final Design

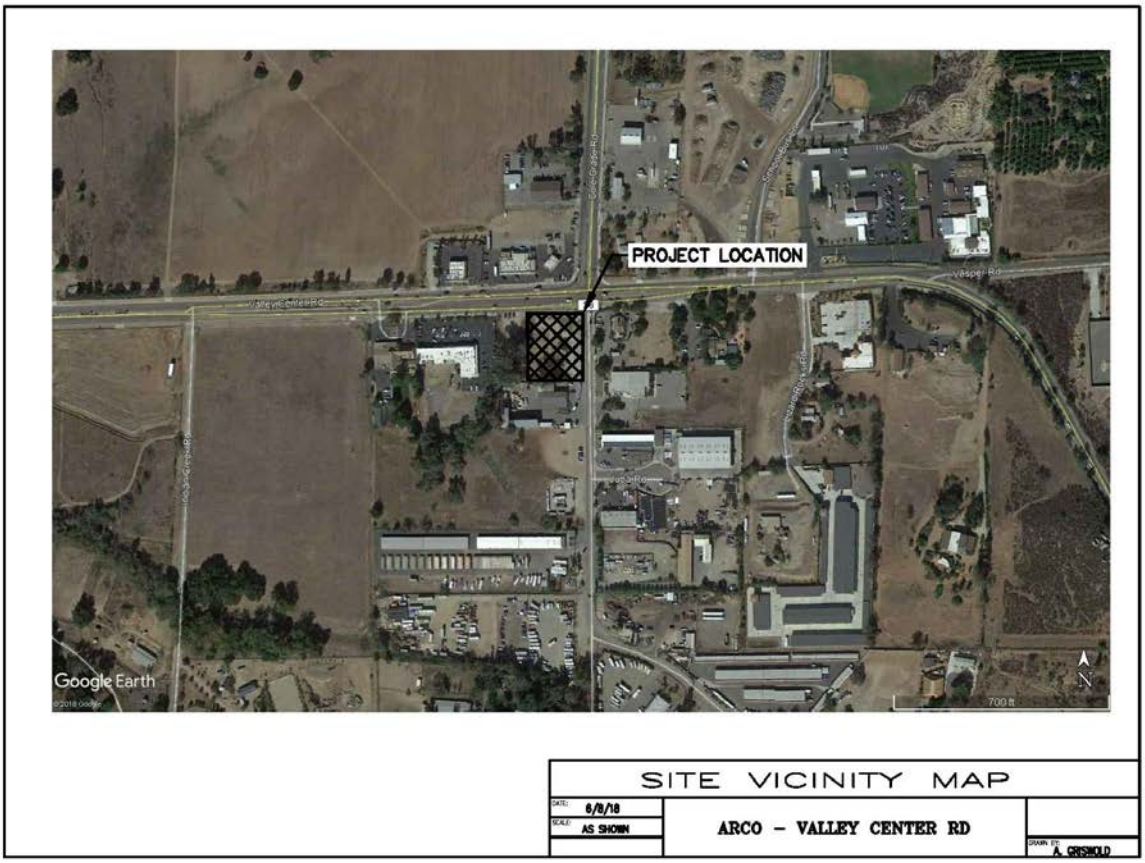
Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Plan Changes

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Project Vicinity Map

Project Name: ARCO VALLEY CENTER
Record ID: PDS2014-IC-14-083, PDS2015-STP-15-012



Step 1: Project type determination (Standard or Priority Development Project)

Is the project part of another Priority Development Project (PDP)? (☐ Yes ☒ No If so, a PDP SWQMP is required. Go to Step 2.			
The project is (select one): ☐ New Development ☒ Redevelopment[1]			
The total proposed newly created or replaced impervious area is: 24,376 ft^2			
The total existing (pre-project) impervious area is: 5,399 ft^2			
The total area disturbed by the project is: 37,020 ft^2			
If the total area disturbed by the project is 1 acre (43,560 sq. ft.) or more OR the project is part of a larger common plan of development disturbing 1 acre or more, a Waste Discharger Identification (WDID) number must be obtained from the State Water Resources Control Board. WDID: N/A			
Is the project in any of the following categories, (a) through (f)?[2]			
Yes ☒	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces [3](collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ☒	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

1 Redevelopment is defined as: The creation and/or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include routine maintenance activities, such as trenching and resurfacing associated with utility work; pavement grinding; resurfacing existing roadways; new sidewalks construction; pedestrian ramps; or bike lanes on existing roads; and routine replacement of damaged pavement, such as pothole repair.

2 Applicants should note that any development project that will create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) is considered a new development.

3 For solar energy farm projects, the area of the solar panels does not count toward the total impervious area of the site.

Project type determination (continued)

Yes ☐	No ☒	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☒	No ☐	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☐	No ☒	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See BMP Design Manual Section 1.4.2 for additional guidance.*

Does the project meet the definition of one or more of the Priority Development Project categories (a) through (f) listed above?

☐ No – the project is not a Priority Development Project (Standard Project).

☒ Yes – the project is a Priority Development Project (PDP).

Further guidance may be found in Chapter 1 and Table 1-2 of the BMP Design Manual.

The following is for **redevelopment PDPs only**:

The area of existing (pre-project) impervious area at the project site is:	5,399	ft^2 (A)
The total proposed newly created or replaced impervious area is	24,376	ft^2 (B)
Percent impervious surface created or replaced (B/A)*100:	451	%

The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – **only newly created or replaced impervious areas are considered a PDP and subject to stormwater requirements**

OR

☒ greater than fifty percent (50%) – **the entire project site is considered a PDP and subject to stormwater requirements**

Step 1.1: Storm Water Quality Management Plan requirements

Step	Answer	Progression
Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, complete Step 1 Project Type Determination Checklist on Pages 1 and 2, and see PDP exemption information below. For further guidance, see Section 1.4 of the BMP Design Manual *in its entirety*.	☐ Standard Project	Standard Project requirements apply, including Standard Project SWQMP. **Complete Standard Project SWQMP.**
	☒ PDP	Standard and PDP requirements apply, including PDP SWQMP. **Complete PDP SWQMP.**
	☐ PDP with ACP	If participating in offsite alternative compliance, **complete Step 6.3 and an ACP SWQMP.**
	☐ PDP Exemption	**Go to Step 1.2 below.**

Step 1.2: Exemption to PDP definitions

Is the project exempt from PDP definitions based on either of the following:	If so:
☐ Projects that are only new or retrofit paved sidewalks, bicycle lanes, or trails that meet the following criteria: (i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR (ii) Designed and constructed to be hydraulically disconnected from paved streets or roads [i.e., runoff from the new improvement does not drain directly onto paved streets or roads]; OR (iii) Designed and constructed with permeable pavements or surfaces in accordance with County of San Diego Guidance on Green Infrastructure;	Standard Project requirements apply, AND any additional requirements specific to the type of project. County concurrence with the exemption is required. *Provide discussion and list any additional requirements below in this form.* **Complete Standard Project SWQMP**
☐ Projects that are only retrofitting or redeveloping existing paved alleys, streets or roads that are designed and constructed in accordance with the County of San Diego Guidance on Green Infrastructure.	**Complete Green Streets PDP Exempt SWQMP.**
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:	

Step 2: Construction Storm Water BMP Checklist

Minimum Required Standard Construction Storm Water BMPs		
If you answer "Yes" to any of the questions below, your project is subject to Table 1 on the following page (Minimum Required Standard Construction Stormwater BMPs). As noted in Table 1, please select at least the minimum number of required BMPs, or as many as are feasible for your project. If no BMP is selected, an explanation must be given in the box provided. The following questions are intended to aid in determining construction BMP requirements for your project. **Note: All selected BMPs below must be included on the BMP plan incorporated into the construction plan sets.**		
1. Will there be soil disturbing activities that will result in exposed soil areas? (This includes minor grading and trenching.) **Reference Table 1 Items A, B, D, and E** Note: Soil disturbances NOT considered significant include, but are not limited to, change in use, mechanical/electrical/plumbing activities, signs, temporary trailers, interior remodeling, and minor tenant improvement.	☒Yes	☐No
2. Will there be asphalt paving, including patching? **Reference Table 1 Items D and F**	☒Yes	☐No
3. Will there be slurries from mortar mixing, coring, or concrete saw cutting? **Reference Table 1 Items D and F**	☒Yes	☐No
4. Will there be solid wastes from concrete demolition and removal, wall construction, or form work? **Reference Table 1 Items D and F**	☒Yes	☐No
5. Will there be stockpiling (soil, compost, asphalt, concrete, solid waste) for over 24 hours? **Reference Table 1 Items D and F**	☒Yes	☐No
6. Will there be dewatering operations? **Reference Table 1 Items C and D**	☐Yes	☒No
7. Will there be temporary on-site storage of construction materials, including mortar mix, raw landscaping and soil stabilization materials, treated lumber, rebar, and plated metal fencing materials? **Reference Table 1 Items E and F**	☒Yes	☐No
8. Will trash or solid waste product be generated from this project? **Reference Table 1 Item F**	☒Yes	☐No
9. Will construction equipment be stored on site (e.g.: fuels, oils, trucks, etc.?) **Reference Table 1 Item F**	☒Yes	☐No
10. Will Portable Sanitary Services ("Porta-potty") be used on the site? **Reference Table 1 Item F**	☒Yes	☐No

Table 1. Construction Storm Water BMP Checklist

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook[4] Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
A. Select Erosion Control Method for Disturbed Slopes (choose at least one for the appropriate season)			
Vegetation Stabilization Planting[5] (Summer)	SS-2, SS-4	☒	
Hydraulic Stabilization Hydroseeding[2] (Summer)	SS-4	☐	
Bonded Fiber Matrix or Stabilized Fiber Matrix[6] (Winter)	SS-3	☐	
Physical Stabilization Erosion Control Blanket[3] (Winter)	SS-7	☐	
B. Select erosion control method for disturbed flat areas (slope < 5%) (choose at least one)			
County Standard Lot Perimeter Protection Detail	PDS 659[7], SC-2	☒	
Will use erosion control measures from Item A on flat areas also	SS-3, 4, 7	☐	
County Standard Desilting Basin (must treat all site runoff)	PDS 660[8], SC-2	☐	
Mulch, straw, wood chips, soil application	SS-6, SS-8	☐	

4 State of California Department of Transportation (Caltrans). 2003. Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual. March. Available online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm.

5 If Vegetation Stabilization (Planting or Hydroseeding) is proposed for erosion control it may be installed between May 1st and August 15th. Slope irrigation is in place and needs to be operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. The owner must implement a contingency physical BMP by August 15th if vegetation establishment does not occur by that date. If landscaping is proposed, erosion control measures must also be used while landscaping is being established. Established vegetation must have a subsurface mat of intertwined mature roots with a uniform vegetative coverage of 70 percent of the natural vegetative coverage or more on all disturbed areas.

6 All slopes over three feet must have established vegetative cover prior to final permit approval.

7 County of San Diego, Planning & Development Services. 2012. Standard Lot Perimeter Protection Design System. Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds659.pdf.

8 County of San Diego, Planning & Development Services. 2012. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds660.pdf.

Table 1. Construction Storm Water BMP Checklist (continued)

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
C. If runoff or dewatering operation is concentrated, velocity must be controlled using an energy dissipater			
Energy Dissipater Outlet Protection[9]	SS-10	☐	All storm water sheet flow into biofiltration basin on site. Storm water discharges to an existing culvert.
D. Select sediment control method for all disturbed areas (choose at least one)			
Silt Fence	SC-1	☒	
Fiber Rolls (Straw Wattles)	SC-5	☐	
Gravel & Sand Bags	SC-6 & 8	☒	
Dewatering Filtration	NS-2	☐	
Storm Drain Inlet Protection	SC-10	☒	
Engineered Desilting Basin (sized for 10-year flow)	SC-2	☐	
E. Select method for preventing offsite tracking of sediment (choose at least one)			
Stabilized Construction Entrance	TC-1	☒	
Construction Road Stabilization	TC-2	☐	
Entrance/Exit Tire Wash	TC-3	☐	
Entrance/Exit Inspection & Cleaning Facility	TC-1	☐	
Street Sweeping and Vacuuming	SC-7	☒	
F. Select the general site management BMPs			
F.1 Materials Management			
Material Delivery & Storage	WM-1	☒	
Spill Prevention and Control	WM-4	☒	
F.2 Waste Management[10]			
Waste Management Concrete Waste Management	WM-8	☒	
Solid Waste Management	WM-5	☒	
Sanitary Waste Management	WM-9	☒	
Hazardous Waste Management	WM-6	☒	

Note: The Construction General Permit (Order No. 2009-0009-DWQ) also requires all projects not subject to the BMP Design Manual to comply with runoff reduction requirements through the implementation of post-construction BMPs as described in Section XIII of the order.

[9] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater is also acceptable for velocity reduction.

[10] Not all projects will have every waste identified. The applicant is responsible for identifying wastes that will be onsite and applying the appropriate BMP. For example, if concrete will be used, BMP WM-8 must be selected.

Step 3: County of San Diego PDP SWQMP Site Information Checklist

Step 3.1: Description of Existing Site Condition

Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	San Luis Rey Hydrologic Unit, Lower San Luis Hydrologic Area, Rincon, HSA (903.16)

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Demolition completed without new construction
- ☐ Agricultural or other non-impervious use
- ☒ Vacant, undeveloped/natural

Description / Additional Information:
The existing project site is undeveloped but contains fruit stands

Existing Land Cover Includes (select all that apply and provide each area on site):

- ☐ Vegetative Cover _____ Acres (_____ Square Feet)
- ☒ Non-Vegetated Pervious Areas 0.726 Acres (31,621 Square Feet)
- ☒ Impervious Areas 0.124 Acres (5,399 Square Feet)

Description / Additional Information:
The site is undeveloped with the exception of fruit stands

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☒ NRCS Type C
- ☐ NRCS Type D

Approximate Depth to Groundwater (GW) (or N/A if no infiltration is used):

- ☐ GW Depth < 5 feet
- ☐ 5 feet < GW Depth < 10 feet
- ☒ 10 feet < GW Depth < 20 feet
- ☐ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☒ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☐ None
- ☐ Other

Description / Additional Information:
There is an existing drainage channel located to the west of the site

Step 3.2: Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

(1) Whether existing drainage conveyance is natural or urban;
(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
(3) Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:
The site drains southwesterly toward the southwest corner of the site. There is an existing drainage channel located to the west. The storm drain system under Valley Center Road discharges into this drainage channel and flows southwesterly.
The site is considered a re-development project as previous buildings have been demolished.

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:
The proposed project will construct a gas station and convenience store

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):
Proposed impervious features of the project includes gas station canopy, convenience store, sidewalks, driveways, trash enclosure, and parking

List/describe proposed pervious features of the project (e.g., landscape areas):
Proposed pervious features of the project includes landscape areas and a biofiltration basin.

Does the project include grading and changes to site topography?
☒Yes
☐No

Description / Additional Information:
The site will be raised 1-4' and there will be a proposed wall along the western portion of the site

Insert acreage or square feet for the different land cover types in the table below:

Change in Land Cover Type Summary			
Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	0 ft^2	5,591 ft^2	%
Pervious (non-vegetated)	31,621 ft^2	0 ft^2	%
Impervious	5,399 ft^2	24,376 ft^2	451%

Step 3.4: Description of Proposed Site Drainage Patterns

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒Yes

☐No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:

The existing site drains southwesterly toward an existing drainage channel. The proposed project will direct flow into a bioretention basin located at the northeastern portion of the site. The runoff will then discharge into the same existing drainage channel as the existing condition.

Step 3.5: Potential Pollutant Source Areas

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply). Select "Other" if the project is a phased development and provide a description:

- ☒ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☐ Need for future indoor & structural pest control
- ☒ Landscape/Outdoor Pesticide Use
- ☐ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☒ Refuse areas
- ☐ Industrial processes
- ☐ Outdoor storage of equipment or materials
- ☐ Vehicle and Equipment Cleaning
- ☐ Vehicle/Equipment Repair and Maintenance
- ☒ Fuel Dispensing Areas
- ☐ Loading Docks
- ☒ Fire Sprinkler Test Water
- ☐ Miscellaneous Drain or Wash Water
- ☒ Plazas, sidewalks, and parking lots
- ☐ Other (provide description)

Description / Additional Information:

Step 3.6: Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):
The site discharges southwesterly into an existing drainage channel

List any 303(d) impaired water bodies[11] within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
San Luis Rey River	*Chloride and Total Dissolved Solids*	*Bacteria*
j		

Identification of Project Site Pollutants*

*Identification of project site pollutants below is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs. Note the project must also participate in an alternative compliance program (unless prior lawful approval to meet earlier PDP requirements is demonstrated).

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☒	☐	☐
Nutrients	☒	☐	☐
Heavy Metals	☐	☒	☐
Organic Compounds	☐	☒	☐
Trash & Debris	☐	☒	☐
Oxygen Demanding Substances	☐	☒	☒
Oil & Grease	☐	☒	☐
Bacteria & Viruses	☒	☐	☐
Pesticides	☒	☐	☐

[11] The current list of Section 303(d) impaired water bodies can be found at http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

Step 3.7: Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

☒Yes, hydromodification management requirements for flow control and preservation of critical coarse sediment yield areas are applicable.

☐No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA[12] for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Hydromodificaiton flow control has been achieved by a biofiltration basin and tree wells. The site will implement the biofiltration basins (POC-1) and the public ROW will utilize the tree wells (POC-2 and POC-3).

Tree wells have been sized per the County of San Diego SSD-BMP Worksheet (V1.0). A total of 5 tree wells are proposed. They are sized to satisfy both water quality requirements and hydromodification requirements. Therefore, a DCV multiplier was used to produce the necessary RRV.

[12] The Watershed Management Area Analysis (WMAA) is an optional element for inclusion in the Water Quality Improvement Plans (WQIPs) described in the 2013 MS4 Permit [Provision B.3.b.(4)]. It is available online at the Project Clean Water website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=248

Step 3.7.1: Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Projects must satisfy critical coarse sediment yield area (CCSYA) requirements by characterizing the project as one of the scenario-types presented below and satisfying associated criteria. Projects must appropriately satisfy all requirements for identification, avoidance, and bypass, OR may alternatively elect to demonstrate no net impact.

☐ **Scenario 1**: Project is subject to and in compliance with RPO requirements *(without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3) that result in impacts to more than 15% of the project-scale CCSYAs)*.

- ☐ Identify: Project has identified both onsite and upstream CCSYAs as areas that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☐ Avoid: Project has avoided onsite CCSYAs per existing RPO steep slope encroachment criteria. AND,
- ☐ Bypass: Project has demonstrated that both onsite and upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 1 criteria above and must alternatively demonstrate no net impact to the receiving water.

☒ **Scenario 2**: Project is entirely exempt/not subject to RPO requirements without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3).

- ☒ Identify: Project has identified upstream CCSYAs that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☒ Avoid: Project is not required to avoid onsite CCSYAs as none were identified in the previous step. AND,
- ☒ Bypass: Project has demonstrated that upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 2 criteria above and must alternatively demonstrate no net impact to the receiving water. *(Skip to next row).*

☐ **Scenario 3**: Project utilizes exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3) and impacts more than 15% of the project-scale CCSYAs.

- ☐ No Net Impact: Project is not eligible for traditional methods of identification, avoidance, and bypass. Project must demonstrate no net impact to the receiving water.

Critical Coarse Sediment Yield Areas Continued
Demonstrate No Net Impact
If the project elects to satisfy CCSYA criteria through demonstration of no net impact to the receiving water. Applicants must identify the methods utilized from the list below and provide supporting documentation in Attachment 2c of the SWQMP. Check all that are applicable. ☒ N/A, the project appropriately identifies, avoids, and bypasses CCSYAs. ☐ Project has performed additional analysis to demonstrate that impacts to CCSYAs satisfy the no net impact standard of Ep/Sp≤1.1. ☐ Project has provided alternate mapping of CCSYAs. ☐ Project has implemented additional onsite hydromodification flow control measures. ☐ Project has implemented an offsite stream rehabilitation project to offset impacts. ☐ Project has implemented other applicant-proposed mitigation measures.

Step 3.7.2: Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.
Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 *If a geomorphic assessment has been performed, provide title, date, and preparer:* *Discussion / Additional Information: (optional)*

Step 3.8: Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

A portion of the site will be sloped northeasterly to an area that will be used as biofiltration basin. The roof of the fueling canopy will be collected in roof drains and be directed into the biofiltration basin.

Tree wells have been provided, per Green Street Design Standards, for the newly created impervious area as a part of the improvements.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Step 4: Source Control BMP Checklist

Source Control BMPs			
All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the County BMP Design Manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following: • "Yes" means the project will implement the source control BMP as described in Chapter 4.2 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification must be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.3 not implemented: No outdoor materials storage area proposed on project.			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.4 not implemented: No materials stored in outdoor work areas proposed on project.			

Source Control Requirement	Applied?		
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.5 not implemented:			
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below):			
☒ A. On-site storm drain inlets	☒Yes	☐No	☐N/A
☐ B. Interior floor drains and elevator shaft sump pumps	☐Yes	☐No	☒N/A
☐ C. Interior parking garages	☐Yes	☐No	☒N/A
☐ D. Need for future indoor & structural pest control	☐Yes	☐No	☒N/A
☒ E. Landscape/outdoor pesticide use	☒Yes	☐No	☐N/A
☐ F. Pools, spas, ponds, fountains, and other water features	☐Yes	☐No	☒N/A
☐ G. Food service	☐Yes	☐No	☒N/A
☒ H. Refuse areas	☒Yes	☐No	☐N/A
☐ I. Industrial processes	☐Yes	☐No	☒N/A
☐ J. Outdoor storage of equipment or materials	☐Yes	☐No	☒N/A
☐ K. Vehicle and equipment cleaning	☐Yes	☐No	☒N/A
☐ L. Vehicle/equipment repair and maintenance	☐Yes	☐No	☒N/A
☒ M. Fuel dispensing areas	☒Yes	☐No	☐N/A
☐ N. Loading docks	☐Yes	☐No	☒N/A
☒ O. Fire sprinkler test water	☒Yes	☐No	☐N/A
☐ P. Miscellaneous drain or wash water	☐Yes	☐No	☒N/A
☒ Q. Plazas, sidewalks, and parking lots	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			

Note: Show all source control measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 5: Site Design BMP Checklist

Site Design BMPs
All development projects must implement site design BMPs SD-A through SD-H where applicable and feasible. See Chapter 4.3 and Appendix E of the County BMP Design Manual for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following: • "Yes" means the project will implement the site design BMP as described in Chapter 4.3 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification must be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☐Yes	☒No	☐N/A
Discussion / justification if 4.3.1 not implemented: The project changes the drainage pattern of the site			
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☐Yes	☐No	☒N/A
Discussion / justification if 4.3.2 not implemented: No scarcely any vegetation exist onsite.			
4.3.3 Minimize Impervious Area	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.3 not implemented: Proposed development will minimize impervious area to the maximum extent practical.			
4.3.4 Minimize Soil Compaction	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.4 not implemented: Soil compaction will be minimized in landscape area.			
4.3.5 Impervious Area Dispersion	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.5 not implemented: Impervious areas will be graded to flow into landscape areas prior to discharging to biofiltration areas to the maximum extent possible.			

Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.6 not implemented: All portion of the site storm water will be collected in the biofiltration basins. All other portions will be directed into landscape.			
4.3.7 Landscaping with Native or Drought Tolerant Species	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.7 not implemented: Landscape area will use native or drought tolerant vegetation.			
4.3.8 Harvesting and Using Precipitation	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.8 not implemented: Rain barrels are proposed with the project. There will be 3 rain barrels located along the south section of the convenient store			

Note: Show all site design measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 6: PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the County at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the County must confirm the maintenance (see Section 7 of the BMP Design Manual).

Use this section to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (Step 6.2) for each structural BMP within the project (copy the BMP summary information sheet [Step 6.2] as many times as needed to provide summary information for each individual structural BMP).

Step 6.1: Description of structural BMP strategy

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.

Harvest and use BMPs were considered, however, per worksheet B.3-1, harvest and use BMPs is considered to be infeasible. Refer to worksheet in Attachment 1 for additional information.

Hydromodificaiton flow control has been achieved by a biofiltration basin and tree wells. The site will implement the biofiltration basins (POC-1) and the public ROW will utilize the tree wells (POC-2 and POC-3). POC 4 will be self mitigated and will drain into a curb underdrain downstream of the tree wells to POC 2.

Tree wells have been sized per the County of San Diego SSD-BMP Worksheet (V1.0). A total of 5 tree wells are proposed. They are sized to satisfy both water quality requirements and hydromodification requirements. Therefore, a DCV multiplier was used to produce the necessary RRV. Green streets methodology is used and the newly created impervious area in the right of way is being treated with the proposed tree wells.

(Continue on following page as necessary.)

Description of structural BMP strategy continued
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

(Continued from previous page)

The following are factors when considering retention or infiltration. According to the USGS web survey, the proposed development sits on soil describe as Type "C" which has slow to very slow infiltration rates when thoroughly wet. Per infiltration report by Southern California Geotechnical, dated December 23, 2014, the site being underlain at shallow depth by plutonic bedrock that is not conducive to infiltration. Report indicates that further infiltrated storm water could exacerbate expansive soil effects and damage underground utilities.

See Hydrology Report for information on drainage areas and flow rates.

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)
Structural BMP ID No. IMP-1,
Construction Plan Sheet No. 1
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☒ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☒ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	David Caron,Civil Landworks Corp.
Who will be the final owner of this BMP?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)

What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	Category 1
Discussion (as needed): The biofiltration basin is sized to treat the 85th first flush, and storm drains will provide the volume required for hydromodification. *(Continue on subsequent pages as necessary)*	

Step 6.3: Offsite Alternative Compliance Participation Form

PDP INFORMATION	
Record ID:	N/A
Assessor's Parcel Number(s) [APN(s)]	
What are your PDP Pollutant Control Debits? *See Attachment 1 of the PDP SWQMP	
What are your PDP HMP Debits? (if applicable) *See Attachment 2 of the PDP SWQMP	
ACP Information	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
Project Owner/Address	
What are your ACP Pollutant Control Credits? *See Attachment 1 of the ACP SWQMP	
What are your ACP HMP Debits? (if applicable) *See Attachment 2 of the ACP SWQMP	
Is your ACP in the same watershed as your PDP? ☐ Yes ☐ No	Will your ACP project be completed prior to the completion of the PDP? ☐ Yes ☐ No
Does your ACP account for all Deficits generated by the PDP? ☐ Yes ☐ No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.	What is the difference between your PDP debits and ACP Credits? *(ACP Credits -Total PDP Debits = Total Earned Credits)

Attachment 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.3-1 (Required) -Worksheet B.1-1 (Required) -Worksheet B.4-1 (if applicable) -Worksheet B.4-2 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☒ Included
Attachment 1b	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☒ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1c	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☒ Included
Attachment 1d	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5”x11” paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☒ Included

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

☐ Underlying hydrologic soil group
☐ Approximate depth to groundwater
☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☐ Critical coarse sediment yield areas to be protected
☐ Existing topography and impervious areas
☐ Existing and proposed site drainage network and connections to drainage offsite
☐ Proposed demolition
☐ Proposed grading
☐ Proposed impervious features
☐ Proposed design features and surface treatments used to minimize imperviousness
☐ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☐ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
☐ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)

Attachment 1a

Storm Water Pollutant Control Worksheet Calculations

Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	IMP-1										unitless
	2	85th Percentile 24-hr Storm Depth	0.76										inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	24,376										sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	4,131										sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	Yes	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E	3										#
	21	Average Rain Barrel Size	75										gal
Initial Runoff Factor Calculation	22	Total Tributary Area	28,507	0	0	0	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	1,444	0	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	1,444	0	0	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	30	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	22,235	0	0	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	30	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	1,414	0	0	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	IMP-1	-	-	-	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.76	-	-	-	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	C										unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted										unitless
	5	Nature of Restriction	Other		Other	Other							unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No		No	No							yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes		Yes	Yes							yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000		0.000	0.000							in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	-	-	-	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	-	-	-	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.01	-	-	-	-	-	-	-	-	-	ratio
	13	Required Retention Volume	14	-	-	-	-	-	-	-	-	-	cubic-feet

No Warning Messages

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	1	Drainage Basin ID or Name	IMP-1	-	-	-	-	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	-	-	-	-	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	1,414	-	-	-	-	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated										unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined										unitless
	6	Does BMP Have an Underdrain?	Underdrain										unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard										unitless
	8	Provided Surface Area	2,000										sq-ft
	9	Provided Surface Ponding Depth	6										inches
	10	Provided Soil Media Thickness	18										inches
	11	Provided Gravel Thickness (Total Thickness)	14.5										inches
	12	Underdrain Offset	3										inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	1.00										inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	120	0	0	0	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	373	0	0	0	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	1,041	0	0	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0449	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	5.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	14.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	6	0	0	0	0	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	15	0	0	0	0	0	0	0	0	0	hours
	40	Total Depth Biofiltered	20.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	1,561	0	0	0	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	1,561	0	0	0	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	781	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	781	0	0	0	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	-	-	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

No Warning Messages

SSD-BMP Automated Worksheet I-1: Step 1. Calculation of Design Capture Volume (V1.0)													
Category	**#**	**Description**	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	**Units**
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-2	DMA-3									unitless
	2	85th Percentile 24-hr Storm Depth	0.76	0.76									inches
	3	Is Hydromodification Control Applicable?	Yes	Yes									yes/no
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	6,009	573									sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	987	626									sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
SSD-BMPs Proposed	11	Does Tributary Incorporate Dispersion and/or Rain Barrels?	No	No									yes/no
	12	Does Tributary Incorporate Tree Wells?	Yes	Yes									yes/no
Dispersion Area & Rain Barrel Inputs (Optional)	13	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	14	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	15	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	17	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	18	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	19	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	6,996	1,199	0	0	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.81	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.81	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	359	42	0	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustment & Rain Barrel Adjustment	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area for DCV Reduction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.81	0.55	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	359	42	0	0	0	0	0	0	0	0	cubic-feet
	33	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	34	Final Adjusted Runoff Factor	0.81	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Final Effective Tributary Area	5,667	659	0	0	0	0	0	0	0	0	sq-ft
	36	Initial Design Capture Volume Retained by Dispersion Area and Rain Barrel(s)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	37	Remaining Design Capture Volume Tributary to Tree Well(s)	359	42	0	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

SSD-BMP Automated Worksheet I-2: Step 2. Dispersion Area Validation (V1.0)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Dispersion Area Inputs	1	Drainage Basin ID or Name	-	-	-	-	-	-	-	-	-	-	unitless
	2	Final Design Capture Volume (DCV)	-	-	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	-	-	-	-	-	-	-	-	-	-	yes/no
	4	Total Impervious Area Dispersed to Pervious Surface	-	-	-	-	-	-	-	-	-	-	sq-ft
	5	Total Engineered Pervious Surface and/or Natural Soil Dispersion Area (Does Not Include Semi-Pervious Surfaces Serving as Dispersion Area)	-	-	-	-	-	-	-	-	-	-	sq-ft
	6	Ratio of Dispersed Impervious Area to Total Engineered Pervious Surface and/or Natural Soil Dispersion Area	-	-	-	-	-	-	-	-	-	-	unitless
	7	Dispersion Area Length (Length of Sheet Flow Across Dispersion Area)											feet
	8	Dispersion Area Slope											%
	9	Thickness of Amended Soil											inches
	10	How is Flow Dispersed Across Width of Dispersion Area (definitions below*)?											unitless
Results	11	Is DCV Requirement Fully Satisfied by Dispersion Area?	-	-	-	-	-	-	-	-	-	-	yes/no
	12	Is Hydromodification Control Requirement Satisfied by Dispersion Area?	-	-	-	-	-	-	-	-	-	-	yes/no
	13	Are Dispersion Area Length, Slope, and Thickness of Amended Soil (when applicable) Adequate?	-	-	-	-	-	-	-	-	-	-	yes/no

No Warning Messages

Notes:

***How is Flow Dispersed Across Width of Pervious Dispersion Area?**

Sheet Flow:	Flow arrives as sheet flow across the width of the adjacent impervious area
Spreader(s):	Flow is discharged from flow spreader(s) across the width of the pervious area
Roof Drains:	Discharge from roof drains distributed across the width of the pervious area
Curb Cuts:	Discharge from curb cuts distributed across the width of the pervious area
Other:	Other (Describe in PDP SWQMP)

SSD-BMP Automated Worksheet I-3: Step 3. Tree Well Sizing (V1.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
Standard Tree Well Inputs	1	Drainage Basin ID or Name	DMA-2	DMA-3	-	-	-	-	-	-	-	-	unitless
	2	Design Capture Volume Tributary to BMP	359	42	-	-	-	-	-	-	-	-	cubic-feet
	3	Is Hydromodification Control Applicable?	Yes	Yes	-	-	-	-	-	-	-	-	yes/no
	4	Predominant NRCS Soil Type Within Tree Well(s) Location	C	C									unitless
	5	Select a Tree Species for the Tree Well(s) Consistent with SD-A Tree Palette Table Note: Numbers shown in list are Tree Species Mature Canopy Diameters	25' - Other	20' - Other									unitless
	6	Tree Well(s) Soil Depth (Installation Depth) Must be 30, 36, 42, or 48 Inches; Select from Standard Depths**	42	48									inches
	7	Number of Identical* Tree Wells Proposed for this DMA	4	1									trees
	8	Proposed Width of Tree Well(s) Soil Installation for One (1) Tree	8.5	9.0									feet
	9	Proposed Length of Tree Well(s) Soil Installation for One (1) Tree	34.0	18.8									feet
Tree Data	10	Botanical Name of Tree Species	Provide in PDP SWQMP	Provide in PDP SWQMP	-	-	-	-	-	-	-	-	unitless
	11	Tree Species Mature Height per SD-A	Provide in PDP SWQMP	Provide in PDP SWQMP	-	-	-	-	-	-	-	-	feet
	12	Tree Species Mature Canopy Diameter per SD-A	25	20	-	-	-	-	-	-	-	-	feet
	13	Minimum Soil Volume Required In Tree Well (2 Cubic Feet Per Square Foot of Mature Tree Canopy Projection Area)	982	628	-	-	-	-	-	-	-	-	cubic-feet
	14	Credit Volume Per Tree	290	180	-	-	-	-	-	-	-	-	cubic-feet
Tree Well Sizing Calculations	15	DCV Multiplier To Meet Flow Control Requirements	3.17	3.50	-	-	-	-	-	-	-	-	unitless
	16	Required Retention Volume (RRV) To Meet Flow Control Requirements	1138	147	-	-	-	-	-	-	-	-	cubic-feet
	17	Number of Trees Required	4	1	-	-	-	-	-	-	-	-	trees
	18	Total Area of Tree Well Soil Required for Each Tree	280	157	-	-	-	-	-	-	-	-	sq-ft
	19	Approximate Required Width of Tree Well Soil Area for Each Tree	17	13	-	-	-	-	-	-	-	-	feet
	20	Approximate Required Length of Tree Well Soil Area for Each Tree	17	13	-	-	-	-	-	-	-	-	feet
	21	Number of Trees Proposed for this DMA	4	1	-	-	-	-	-	-	-	-	trees
	22	Total Area of Tree Well Soil Proposed for Each Tree	289	169	-	-	-	-	-	-	-	-	sq-ft
	23	Minimum Spacing Between Multiple Trees To Meet Soil Area Requirements (when applicable)***	34.0	n/a	-	-	-	-	-	-	-	-	feet
Results	24	Are Tree Well Soil Installation Requirements Met?	Yes	Yes	-	-	-	-	-	-	-	-	yes/no
	25	Is Remaining DCV Requirement Fully Satisfied by Tree Well(s)?	Yes	Yes	-	-	-	-	-	-	-	-	yes/no
	26	Is Hydromodification Control Requirement Satisfied by Tree Well(s)?	Yes	Yes	-	-	-	-	-	-	-	-	yes/no

Attention!

-[Line 12] Applicant to provide supporting documentation for tree species in PDP SWQMP.

Notes:

*If using more than one mature canopy diameter within the same DMA, only the smallest mature canopy diameter should be entered. Alternatively, if more than one mature canopy diameter is proposed and/or the dimensions of multiple tree well installations will vary, separate DMAs may be delineated.

**If the actual proposed installation depth is not available in the table of standard depths, select the next lower depth.

***Tree Canopy or Agency Requirements May Also Influence the Minimum Spacing of Trees.

Attachment 1b

Form I-8, Categorization of Infiltration Feasibility Condition

May 30, 2017

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Rafat Mikhail
c/o Barghausen Consulting Engineers, Inc.
3883 Ruffin Road, Suite B
San Diego, California 92123

Attention: Mr. Allen Sipe, AIA
Senior Project Architect

Project No.: **14G209-3**

Subject: **Proposed Stormwater Infiltration System**
Proposed Arco AM/PM
SWC Valley Center Road at Cole Grade Road
Valley Center (San Diego County), California

Reference: Geotechnical Investigation, Proposed Arco AM/PM, SWC Valley Center Road at Cole Grade Road, Valley Center (San Diego County), California, prepared by Southern California Geotechnical, Inc. (SCG) for Rafat Mikhail, SCG Project No. 14G209-1, dated December 23, 2014.

Gentlemen:

In accordance with your request, we are providing this letter to document design considerations related to a proposed stormwater infiltration system at the subject site. SCG previously conducted a geotechnical investigation for the subject site, the results of which are presented in the above referenced report. Based on data presented in that previous report, it is our opinion that the subject site is not a good candidate for stormwater infiltration due to the following conditions:

- Groundwater was encountered within the borings drilled for the previous geotechnical investigation at depths of 10 to 14± feet below existing site grades. In addition, groundwater data maintained by the State of California on the Geotracker website indicates that groundwater levels within nearby monitoring wells range from 2 to 11 feet below the ground surface. It is generally recommended that infiltration systems maintain a separation of at least 10 feet from the bottom of the infiltration system and the highest historic groundwater level. This condition could not be achieved at the subject site.
- The subject site is a commercial gas station. The use of a stormwater infiltration system would increase the potential for petroleum hydrocarbons to penetrate the ground surface and contaminate the underlying groundwater.
- SCG recommends that stormwater infiltration systems be placed at least 25 feet away from any permanent structures such as buildings or retaining walls. Based on the existing site geometry, which includes three new structures and several retaining walls, this spacing would not be feasible.

In summary, based on geotechnical considerations, the subject site is not considered to be a viable candidate for the use of on-site stormwater infiltration.

We sincerely appreciate the opportunity to be of continued service on this project. If there are any questions concerning this matter, please contact our office at your convenience.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Gregory K. Mitchell, GE 2364
Principal Engineer

Distribution: (1) Addressee

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

Avocet Environmental, Inc., 2013, Interim remedial action report, Monte Vista Forest Fire Station, 2249 Jamacha Road, El Cajon, California (SAM Case No. H05241-002), Project No. 1338.005, dated August 26.

Birkeland, P.W., 1999, Soils and geomorphology, third edition, Oxford University Press.

California Regional Water Quality Control Board - San Diego Region, 1994, Water Quality Control Plan for the San Diego Basin (9), dated September 8 (amended May 17, 2016).

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State of California Department of Water Resources, 1967, Ground water occurrence and quality, San Diego Region, Bulletin 106-2, Vol. II, Plate 8A, dated June.

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Twidale, C.R., and Vidal Romaní, J.R., 2005, Landforms and geology of granite terrains, A.A. Balkema Publishers Leiden, the Netherlands.

United States Department of Agriculture - Natural Resources Conservation Service, 2016, Web soil survey, https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, last modified August 10.

United States Geological Survey, 1967, El Cajon quadrangle, San Diego County, California, 7.5 minute series, 1:24,000 scale, photorevised 1975.

APPENDIX B

COUNTY OF SAN DIEGO WORKSHEET C.4-1

Worksheet 0-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition			Worksheet C.4-1
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	**Yes**	**No**
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: Site specific infiltration testing was not performed and is not considered feasible due to the presence of shallow groundwater (approximately 6 to 8 feet below existing site grades) and the high clay content of the on-site soils. However, should infiltration testing be performed, it is expected that the infiltration rate would be significantly less than 0.5 inches per hour based on our previous experience. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: As discussed above, no significant infiltration is considered feasible at this site. Based on the relatively level existing site topography, the existing site conditions, and the proposed site condictions, the geotechnical hazards mentioned above are also not considered to be applicable. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Unknown. Our evaluation did not include any environmental aspects of the site. Our investigation was strictly for geotechnical purposes. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: Unknown. Our evaluation did not include a site specific hydrology or geohydrology evaluation. However, since infiltration is not considered to be feasible at this site, the infiltration rate is will not be greater than 0.5 inches per hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		No

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

Due to the shallow groundwater (approximately 6 to 8 feet below the existing site grades) and the significant clay content of the subsurface soils, the infiltration rate will be insignificant and should not considered to have an appreciable rate or volume.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

As discussed above, no significant infiltration is considered feasible at this site. Based on the relatively flat topography, and considering the proposed development, the geotechnical hazards mentioned above are also not considered to be applicable.

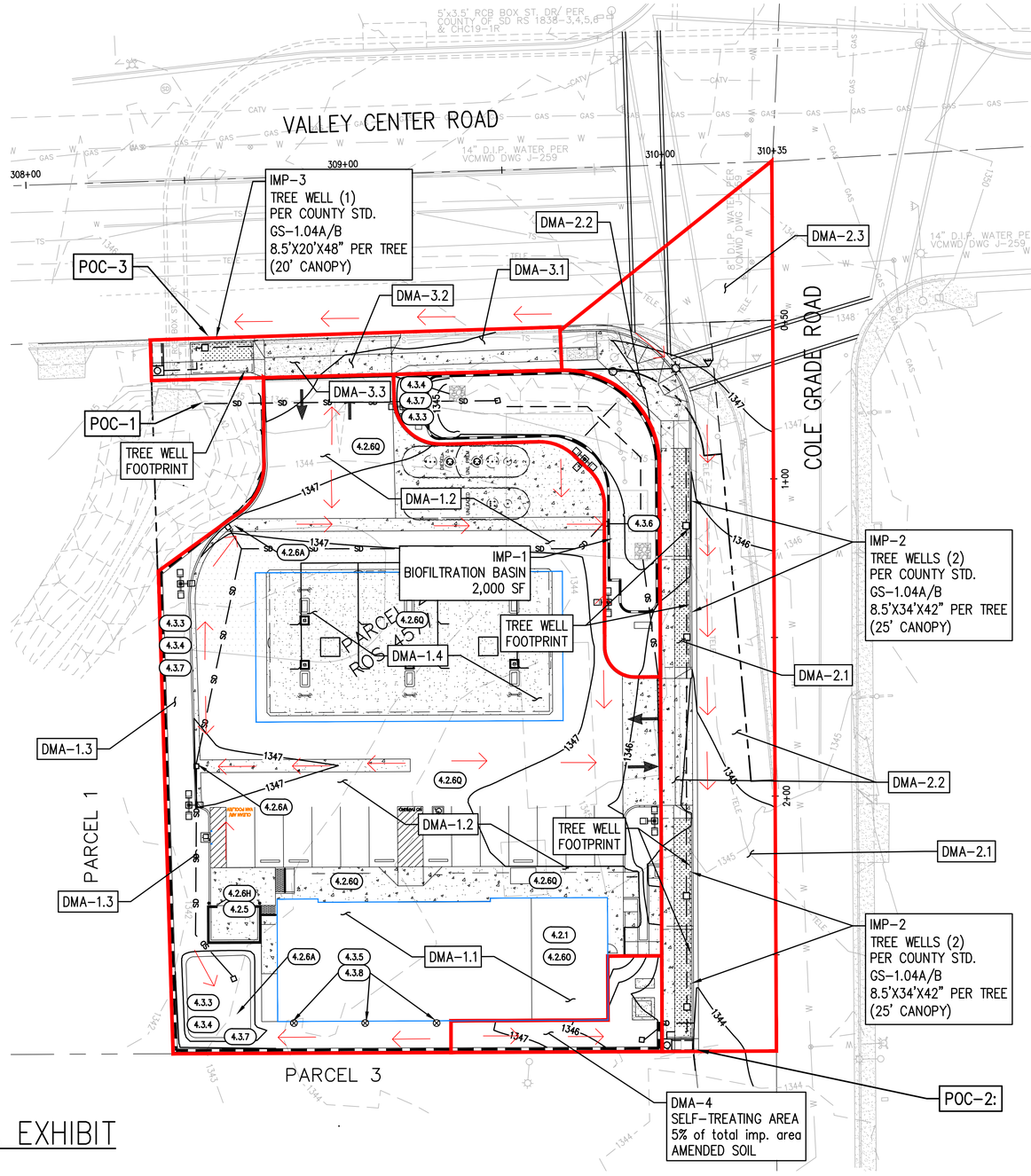
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Unknown. Our evaluation did not include any environmental aspects of the site. Our investigation was for geotechnical purposes only. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Unknown. Our investigation did not include a hydrologic study or geohydrologic study. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**		No

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

Attachment 1c

DMA Exhibit



DMA EXHIBIT

LEGEND

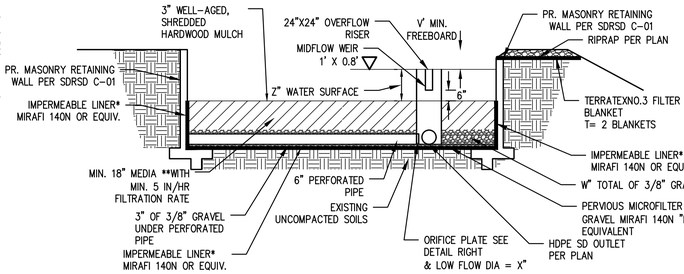
ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	
PCC HARDSCAPE	
RAIN BARRELS	⊗

SOURCE CONTROL BMPS

- (4.2.1) PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- (4.2.2) STORM DRAIN STENCILING OR SIGNAGE
- (4.2.5) PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON RUNOFF, AND WIND DISPERSAL
- (4.2.6A) ONSITE STORM DRAIN INLETS
- (4.2.6H) REFUSE AREAS
- (4.2.6O) FIRE SPRINKLER TEST WATER
- (4.2.6Q) PLAZAS, SIDEWALKS, AND PARKING LOTS

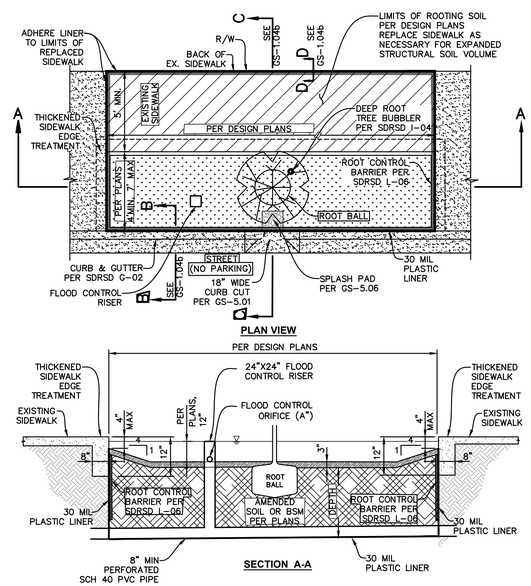
SITE DESIGN BMP

- (4.3.3) MINIMIZE IMPERVIOUS AREA
- (4.3.4) MINIMIZE SOIL COMPACTION
- (4.3.5) IMPERVIOUS AREA DISPERSION
- (4.3.6) RUNOFF COLLECTION
- (4.3.7) LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES
- (4.3.8) RAIN BARRELS



*IMPERMEABLE LINER TO BE PLACED ALONG THE SIDES OF THE BIOFILTRATION BASIN
**ENGINEERED SOIL LAYER SHALL BE MINIMUM 18' DEEP THE MIX SHALL CONTAIN 70-80% SAND, 15-20% SILT, AND 5-10% CLAY. ENGINEERED MIX TO BE APPROVED BY COUNTY PRIOR TO PLACEMENT. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

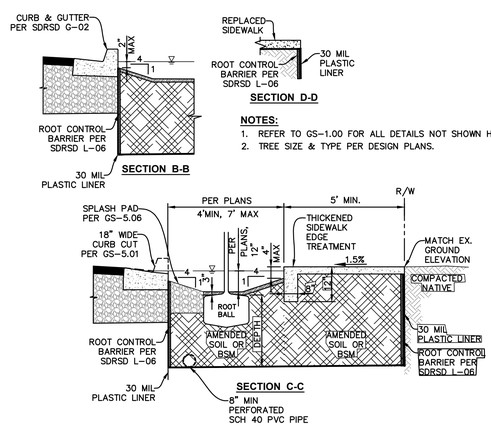
WALLED BIOFILTRATION BASIN
NTS



NOTES:
1. REFER TO GS-1.00 FOR ALL DETAILS NOT SHOWN HERE.
2. TREE SIZE & TYPE PER DESIGN PLANS.

(MODIFIED) TREE WELL WITH OPEN SPACE
NTS

GS-1.04a



NOTES:
1. REFER TO GS-1.00 FOR ALL DETAILS NOT SHOWN HERE.
2. TREE SIZE & TYPE PER DESIGN PLANS.

(MODIFIED) TREE WELL WITH OPEN SPACE
NTS

GS-1.04b

DMA-4, SELF MITIGATION NOTES

- VEGETATION IN THE NATURAL OR LANDSCAPED AREA IS NATIVE AND/OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERANT SPECIES THAT DO NOT REQUIRE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.
- SOILS ARE UNDISTURBED NATIVE TOPSOIL, OR DISTURBED SOILS THAT HAVE BEEN AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE TOPSOIL.
- THE INCIDENTAL IMPERVIOUS AREAS ARE LESS THAN 5 PERCENT OF THE SELF-MITIGATING AREA.
- IMPERVIOUS AREA WITHIN THE SELF-MITIGATED AREA SHOULD NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPERVIOUS AREAS UNLESS IT IS A STORM WATER CONVEYANCE SYSTEM (SUCH AS A BROW DITCH).
- THE SELF-MITIGATING AREA IS HYDRAULICALLY SEPARATE FROM DMAS THAT CONTAIN PERMANENT STORM WATER POLLUTANT CONTROL BMPS.

NOTE

1. GROUNDWATER DEPTH RANGING BETWEEN 25 TO 35 FEET PER ENVIRONMENTAL STUDY BY AVOCET ENVIRONMENTAL, INC.
2. CRITICAL COARSE SEDIMENT YIELD AREAS NOT LOCATED ON SITE.

BMP TABLE

ID#	TYPE	AREA(SF)	FREE BOARD "V" (FT)	STORAGE LAYER "W" (IN)	ORIFICE SIZE "X" (IN)	RISER HEIGHT "Z" (FT)	MID WEIR DIM.
IMP-1	BIOFILTRATION (BF-1)	2,000	0.25	14.5	0.97	1.5	1'X0.8'

TREE WELL TABLE

ID#	CANOPY / NUMBER	AREA(SF)	DEPTH (IN)	TYPE	UNDERDRAIN (IN)	HYDRO ORIFICE "A" (IN)
IMP-2	25' CANOPY - 4 TREES	289	42	3	8	2.5
IMP-3	20' CANOPY - 1 TREE	169	48	3	8	(4) 4.5

NOTE: VALUES LISTED ABOVE ARE FOR EACH INDIVIDUAL TREE

DMA ID 1	Type	Total Area SF	Total Area Acres
DMA-1.1	Roof	3,959	0.091
DMA-1.2	Pavement	15,868	0.364
DMA-1.3	Landscape (Soil C)	4,131	0.095
DMA-1.4	Canopy area	4,549	0.104
TOTAL		28,507	0.654
Drains to BMP IMP-1 (2000 SF)			

DMA ID 2	Type	Total Area SF	Total Area Acres
DMA-2.1	Landscape (Soil C)	987	0.023
DMA-2.2	Sidewalk and AC	6,009	0.138
DMA-2.3	Ex. Impervious (Untreated - Green Streets)	3,532	0.081
TOTAL		10,529	0.242
Drains to BMP IMP-2			

DMA ID 3	Type	Total Area SF	Total Area Acres
DMA-3.1	Landscape (Soil C)	626	0.014
DMA-3.2	Sidewalk	573	0.013
DMA-3.3	Ex. Impervious (Untreated - Green Streets)	503	0.012
TOTAL		1,703	0.039
Drains to BMP IMP-3			

DMA ID 4	Type	Total Area SF	Total Area Acres
DMA-4	Landscape (Soil C)	1,007	0.023
TOTAL		1,007	0.023
Drains to BMP IMP-3			

20 0 20 40
GRAPHIC SCALE
SCALE: 1"= 20'

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

DMA EXHIBIT

SHEET 1 OF 1

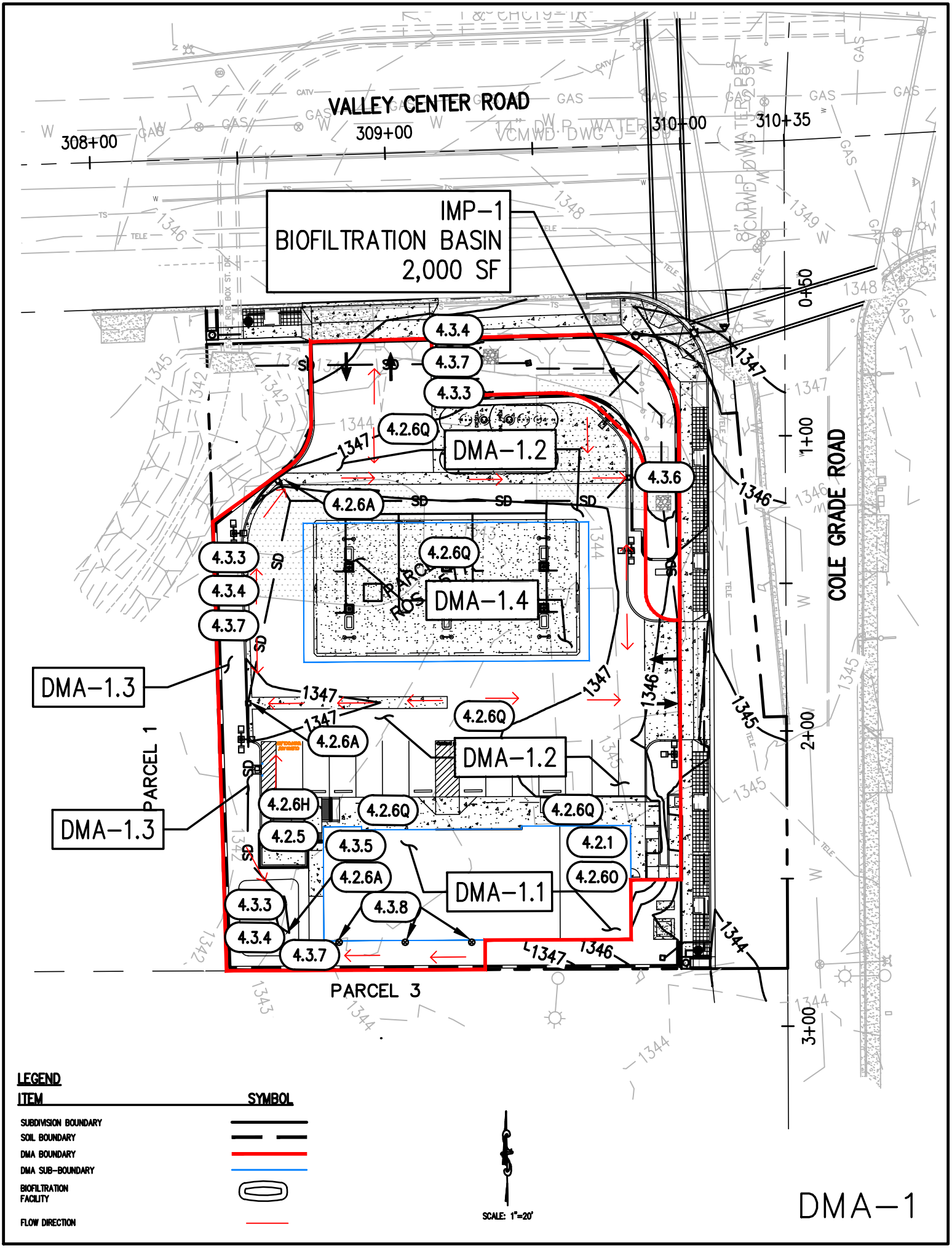
ARCO STATION
VALLEY CENTER ROAD, VALLEY CENTER, CALIFORNIA

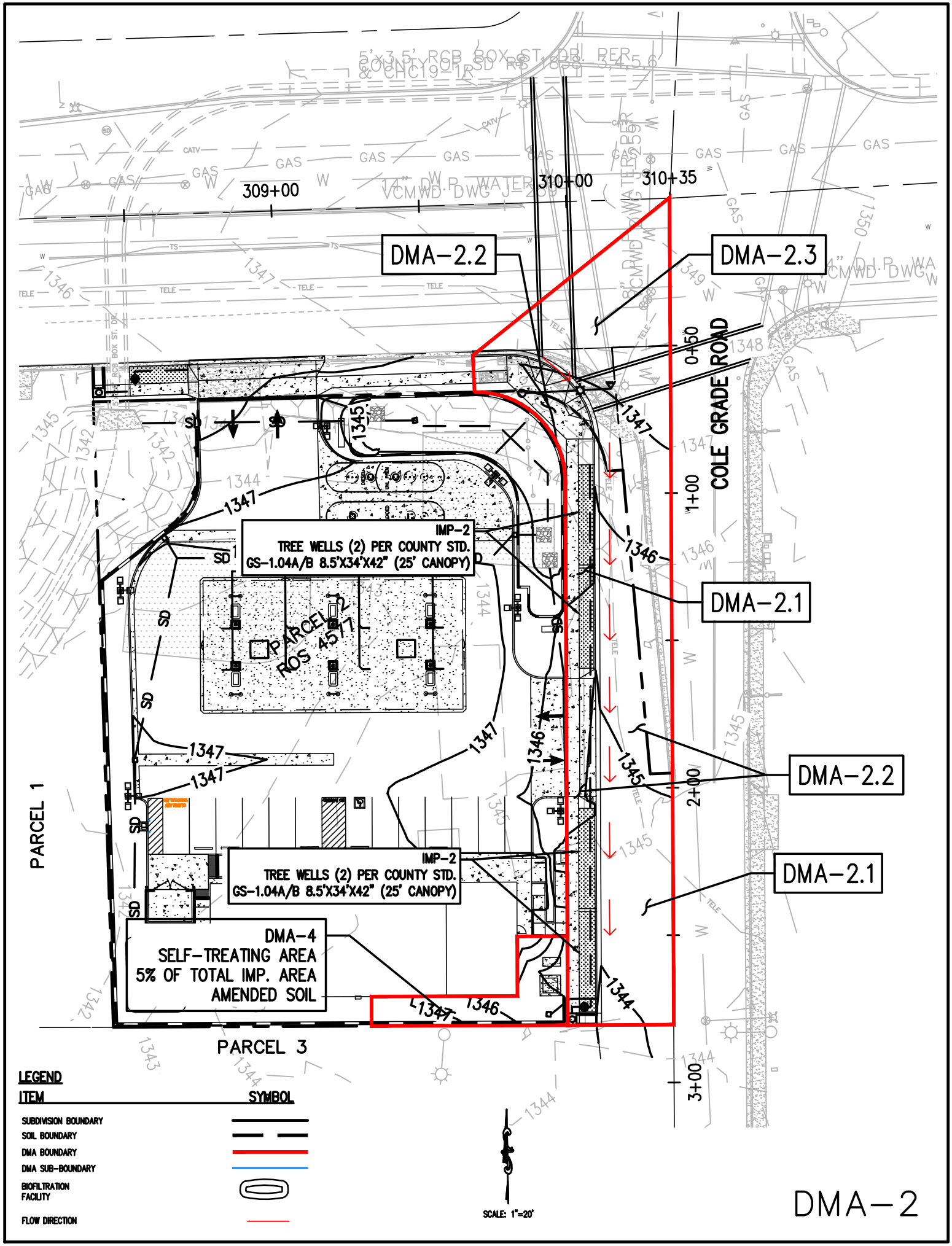
CLW JOB NO. 1269D
SCALE 1"=20'
DATE 1/20/21
DESIGNER I

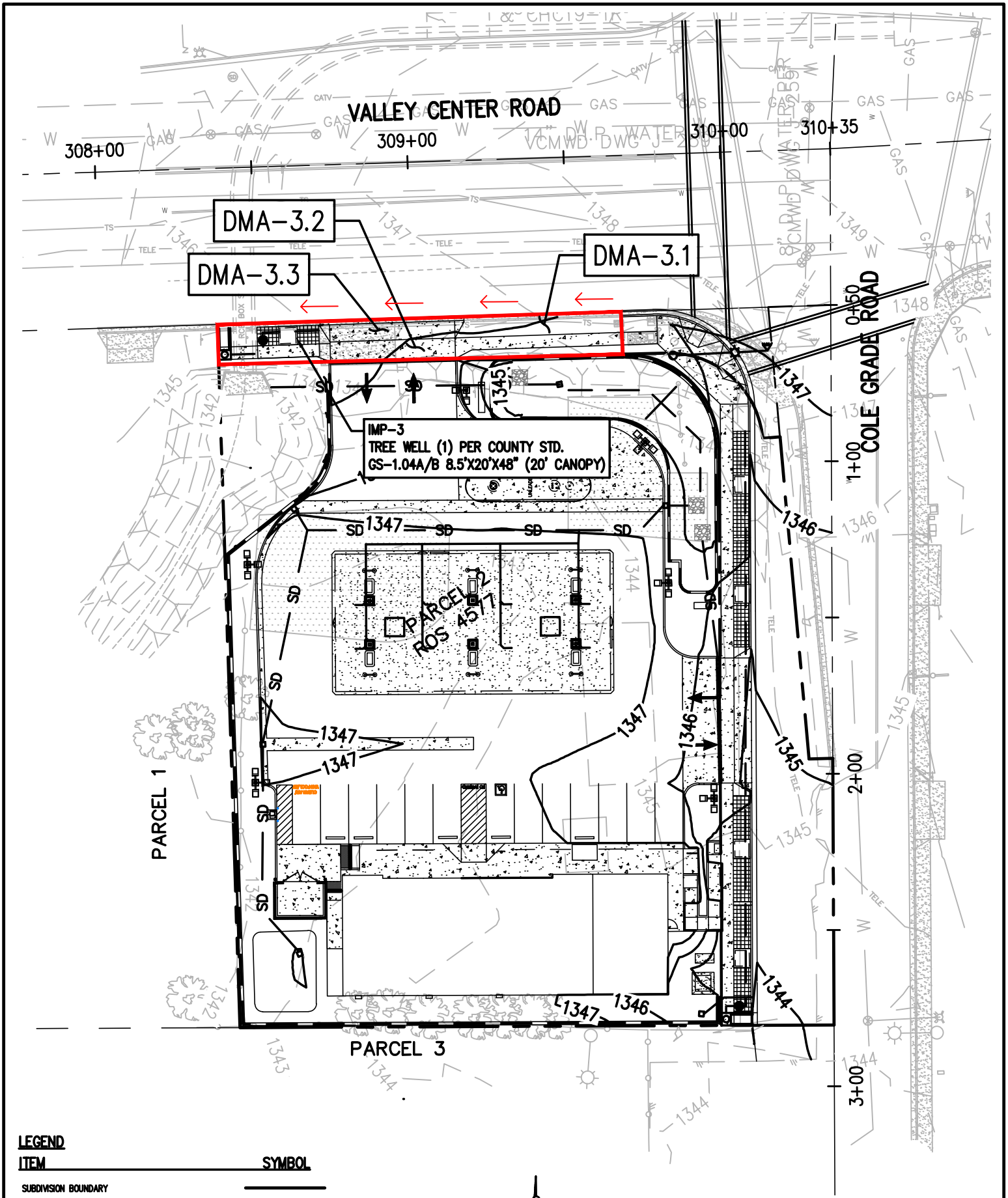
2/8/21

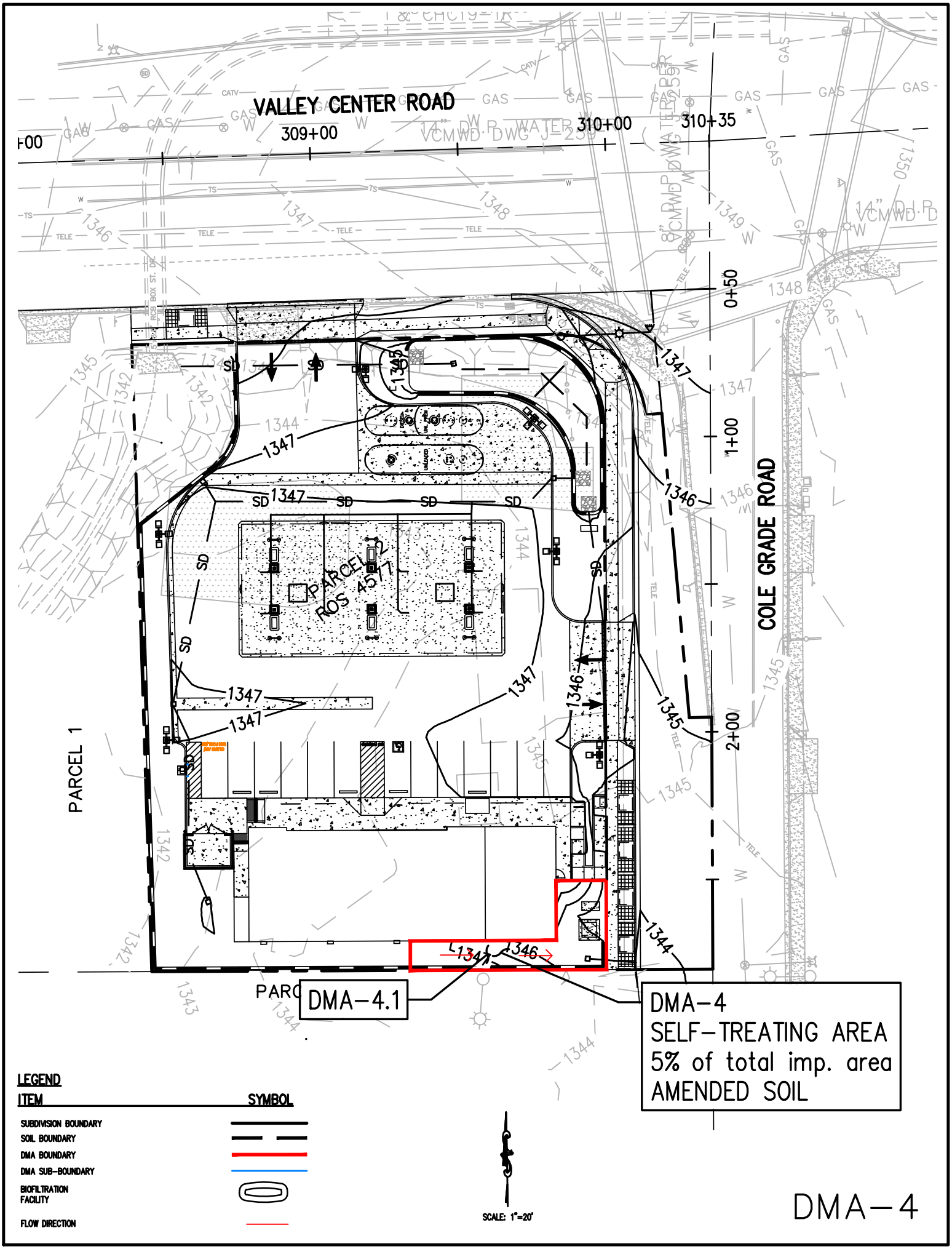
Attachment 1d

Individual Structural BMP DMA Mapbook


VALLEY CENTER ROAD
308+00
309+00
310+00
310+35
IMP-1
BIOFILTRATION BASIN
2,000 SF
DMA-1.2
DMA-1.4
DMA-1.1
DMA-1.3
DMA-1.3
4.3.4
4.3.7
4.3.3
4.2.6Q
4.3.6
4.2.6A
SD
4.3.3
4.3.4
4.3.7
4.2.6Q
4.2.6A
4.2.6H
4.2.5
4.3.5
4.2.6A
4.3.3
4.3.4
4.3.7
4.3.8
4.2.6Q
4.2.6Q
4.2.1
4.2.60
1347
1346
1345
1344
COLE GRADE ROAD
0+50
1+00
2+00
3+00
PARCEL 1
PARCEL 3
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-1


DMA-2.2
DMA-2.3
DMA-2.1
DMA-2.2
DMA-2.1
IMP-2
TREE WELLS (2) PER COUNTY STD.
GS-1.04A/B 8.5'X34'X42" (25' CANOPY)
IMP-2
TREE WELLS (2) PER COUNTY STD.
GS-1.04A/B 8.5'X34'X42" (25' CANOPY)
DMA-4
SELF-TREATING AREA
5% OF TOTAL IMP. AREA
AMENDED SOIL
PARCEL 1
PARCEL 2
PARCEL 3
ROS 4577
COLE GRADE ROAD
309+00
310+00
310+35
0+50
1+00
2+00
3+00
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-2


VALLEY CENTER ROAD
308+00
309+00
310+00
310+35
DMA-3.2
DMA-3.3
DMA-3.1
COLE GRADE ROAD
0+50
1+00
2+00
3+00
IMP-3
TREE WELL (1) PER COUNTY STD.
GS-1.04A/B 8.5'X20'X48" (20' CANOPY)
PARCEL 2
ROS 4517
PARCEL 1
PARCEL 3
SD
1347
1346
1345
1344
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-3


VALLEY CENTER ROAD
309+00
310+00
310+35
0+50
1+00
2+00
COLE GRADE ROAD
PARCEL 1
PARCEL 2
ROS 4577
DMA-4.1
DMA-4
SELF-TREATING AREA
5% of total imp. area
AMENDED SOIL
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-4

Attachment 2

BACKUP FOR PDP

HYDROMODIFICATION CONTROL MEASURES

ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☒ Included ☐ Submitted as separate stand-alone document
Attachment 2b	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the BMP Design Manual.	☐ Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☐ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☒ Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☐ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☐ Existing topography
- ☐ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed grading
- ☐ Proposed impervious features
- ☐ Proposed design features and surface treatments used to minimize imperviousness
- ☐ Point(s) of Compliance (POC) for Hydromodification Management
- ☐ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☐ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

Attachment 2a

Calculations

Flow Control Facility Design

Attachment 2b

Hydromodification Management Exhibit

Hydromodification Management Plan

ARCO Valley Center
Valley Center, CA
APN: 180-260-31
PDS2015-STP-15-015, PDS2015-AMC-15-006

Prepared For:

Rafat Mikhail
14109 Calle De Vista
Valley Center, CA 92082

Prepared By:

David Caron, R.C.E. 70066, Exp. 9-30-18
Civil Landworks Corp.
110 Copperwood Way, Suite P
Oceanside, CA 92058
760-908-8745

Civil Landworks

July 5, 2018

TABLE OF CONTENTS

SECTION

APPENDICES

1.0 PROJECT DESCRIPTION

The proposed site development consists of preparing the site for the construction of a fuling station, convenience store, concrete walkways, parking spaces, driveways, and a bioretention basin. Incidental underground storm drain utilities, retaining walls, hardscape, and site landscaping are also proposed with this development. The project site is disturbed land with site elevations ranging from 1346 to 1342 feet above mean sea level (msl).

See Attachment 1 for the site location and vicinity maps.

2. SITE ANALYSIS

2.1 Geotechnical Conditions

According to the USDA soils map, the site has soil Type "C." Type "C" has low infiltration rate when thoroughly wet.
A review of the infiltration study of the infiltration test by Southern California Geotechnical on December 23, 2014 indicates that there would be adverse effects from infiltration, thus infiltration will not be utilized in the calculations for stormwater management. The project will be using biofiltration basins for treatment and hydromodification management.
See Attachment 2 for USDA Soils Map, and SWQMP Attachment 1b for the infiltration study.

2.2 Drainage Patterns

The existing site is partially developed and comprises of two hydrologic basins. The southeastern basin drains southeasterly into Cole Grade Road. The majority of the site sheet flows southwesterly into an existing drainage channel located west of the site.

The proposed conditions will consists of 8 basins. The most southeastern corner of the site will discharge into Cole Grade Road through a sidewalk underdrain. The remainder of the site will be captured in a storm drain system that will ultimately discharge into a bioretention basin located at the northeastern corner of the site. This basin will detain the increase runoff and discharge into the existing drainage channel to the left of the site at a lower peak flow than existing.

See Attachment 3 and 4 for existing and proposed hydromodification maps.

2.3 Design Assumptions

The following are design criteria and assumption for the hydromodification calculations.

- Hydraflow IDF Curves from the Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2015 Version 10.4. The values were taken from the NOAA Atlas 14, Volume 6, Version 2 Valley Center. California
- Hydrologic Soil Type "C"
- The existing area was modelled as partially developed

3. CALCULATIONS AND RESULTS

The calculations resulted in biofiltration basins is included in Appendixes 5.

Draw down calculations were also included in the report with the minimum drawdown times complying with the Department of Environmental Health (DEH) guidelines is 96 hours. This project complies with the DEH guidelines, therefore a separate vector control maintenance plan is not required. See Attachment 5 for drawdown time.

Based on the output from the Hydraflow Hydrogrpahs Extension program, the biofiltration basins and orifice flow control were sized to treat low flows and reduce peak flows.

4. SUMMARY AND CONCLUSIONS

This Hydromodification Management report shows the proposed project design complies with the hydromodification requirements, as outlined in the County requirements. Also, the treatment facilities meet the DEH drawdown guidelines for vector control. The calculations and results in this report indicated that run-off rates and time of concentration are controlled to reduce project downstream flows, mitigating downstream erosion possibility and protect downstream habitat.

ATTACHMENT 1

Location Map

SITE LOCATION MAP

DATE: 6/8/18	ARCO – VALLEY CENTER RD	
SCALE: AS SHOWN		DRAWN BY: A. GRISWOLD

SITE VICINITY MAP

DATE: 6/8/18	ARCO – VALLEY CENTER RD	
SCALE: AS SHOWN		DRAWN BY: A. GRISWOLD

ATTACHMENT 2

SOIL MAP

And Rainfall Station Map

Hydrologic Soil Group—San Diego County Area, California
(ARCO - Valley Center Rd)

Map Scale: 1:1,240 if printed on A landscape (11" x 8.5") sheet.

N

0 15 30 60 90 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 12, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Feb 2, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	0.1	1.1%
PeC	Placentia sandy loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	7.8	98.9%
VaA	Visalia sandy loam, 0 to 2 percent slopes	A	0.0	0.0%
Totals for Area of Interest			**7.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

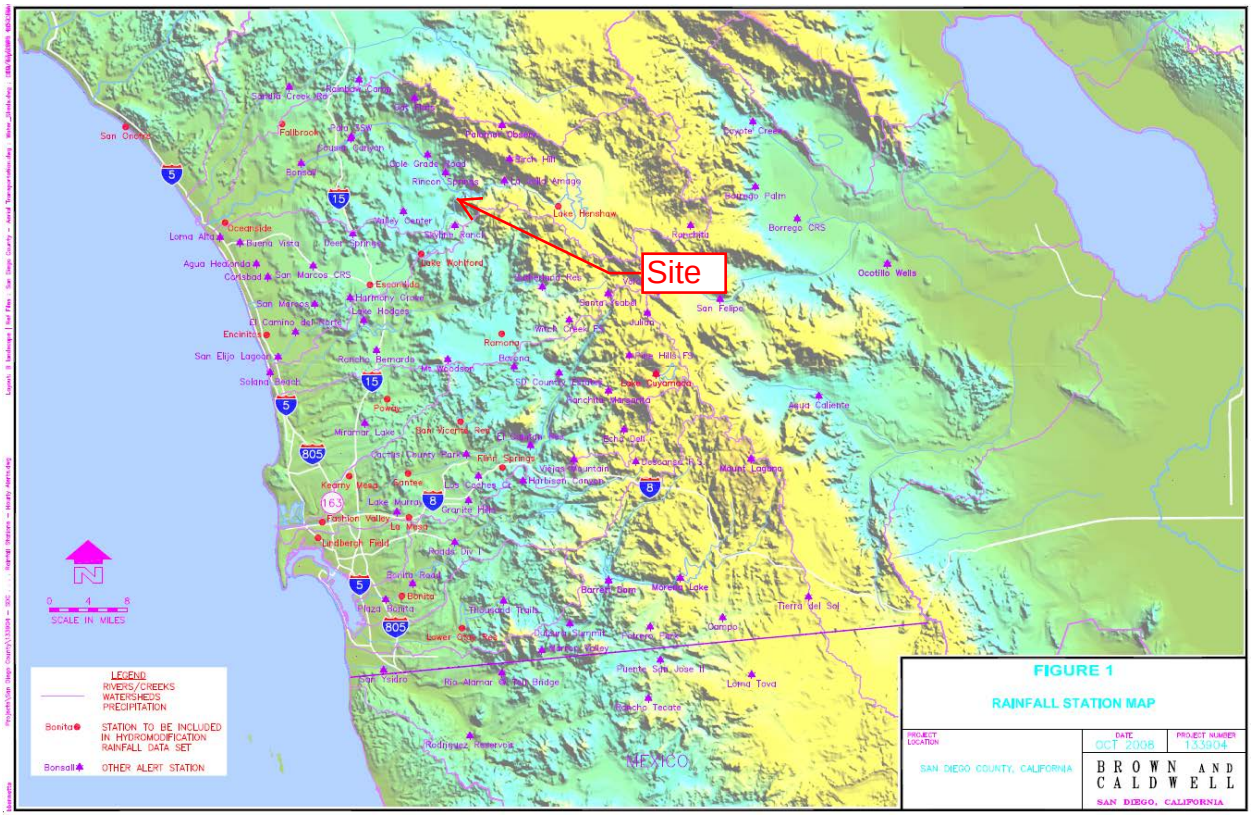


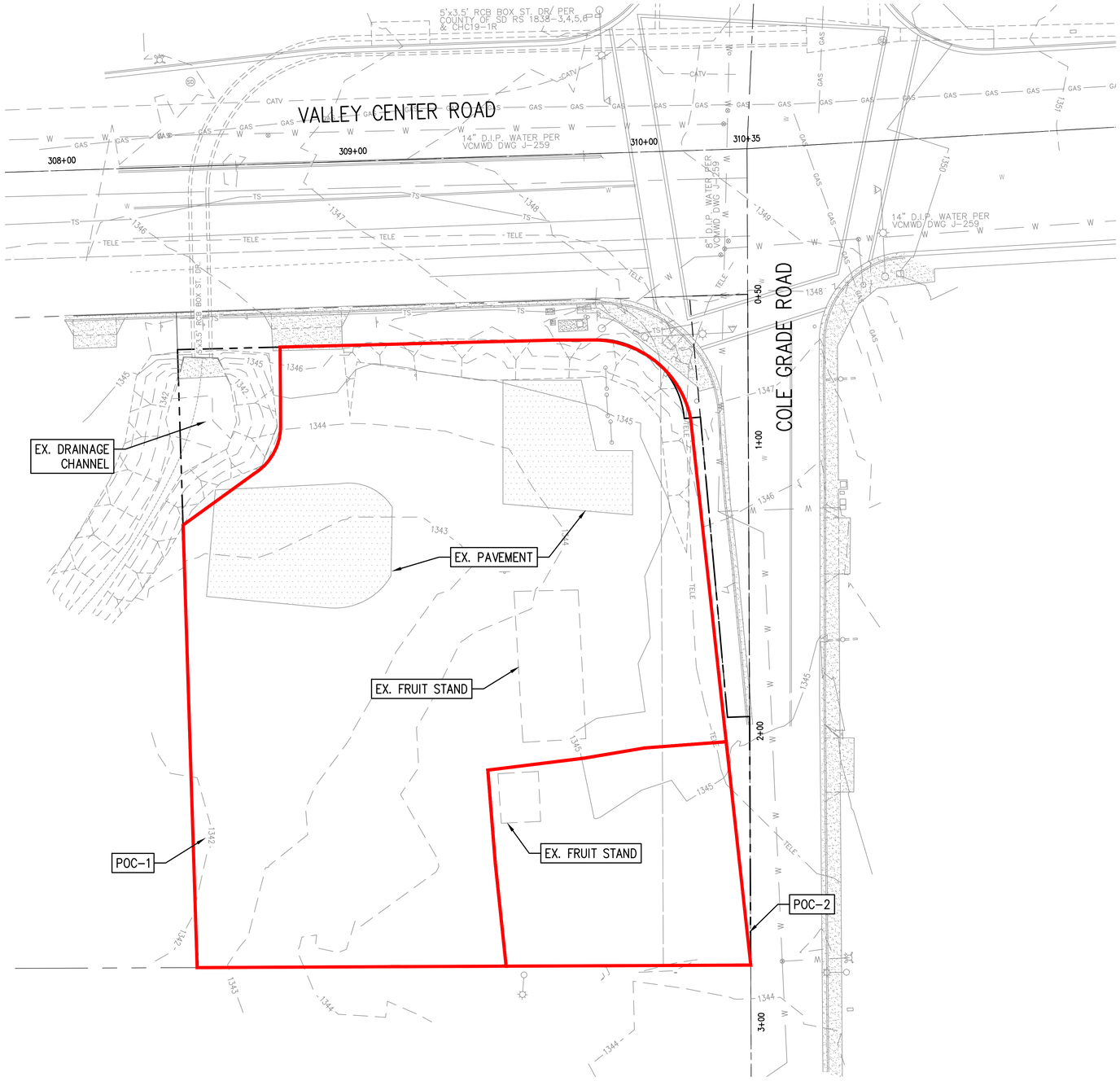
Figure G.1-1: Rainfall Station Map

Project applicants preparing continuous simulation models must select the most appropriate rainfall data set from the rainfall record files provided on the Project Clean Water website. For a given project location, the following factors should be considered in the selection of the appropriate rainfall data set:

- In most cases, the rainfall data set in closest proximity to the project site will be the appropriate choice (refer to the rainfall station map).
- In some cases, the rainfall data set in closest proximity to the project site may not be the most applicable data set. Such a scenario could involve a data set with an elevation significantly different from the project site. In addition to a simple elevation comparison, the project proponent may also consult with the San Diego County's average annual precipitation isopluvial map, which is provided in the San Diego County Hydrology Manual (2003). Review of this map could provide an initial estimate as to whether the project site is in a similar rainfall zone as compared to the rainfall stations. Generally, precipitation totals in San Diego County increase with increasing elevation.
- Where possible, rainfall data sets should be chosen so that the data set and the project location are both located in the same topographic zone (coastal, foothill, mountain) and

ATTACHMENT 3

Existing Hydromodification POC Plan



LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
EXISTING CONTOUR (MAJOR)	540
EXISTING CONTOUR (MINOR)	
HYDROLOGIC BASIN BOUNDARY	
HYDROLOGIC FLOW PATH	

20 0 20 40

GRAPHIC SCALE
SCALE: 1"= 20'

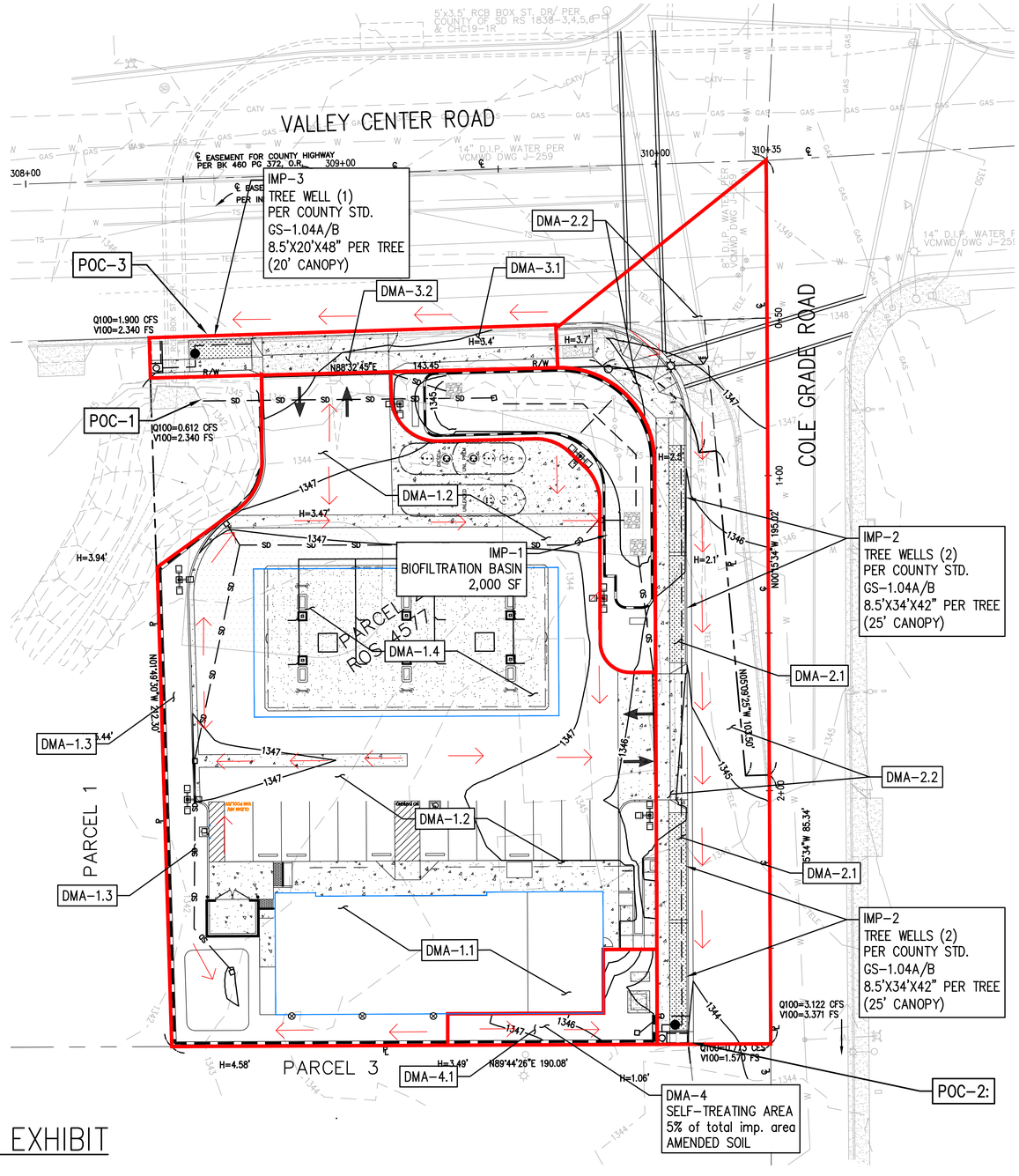
EXISTING HMP EXHIBIT

ARCO VALLEY CENTER
VALLEY CENTER, CALIFORNIA

7/5/18

ATTACHMENT 4

Proposed Hydromodification POC Plan



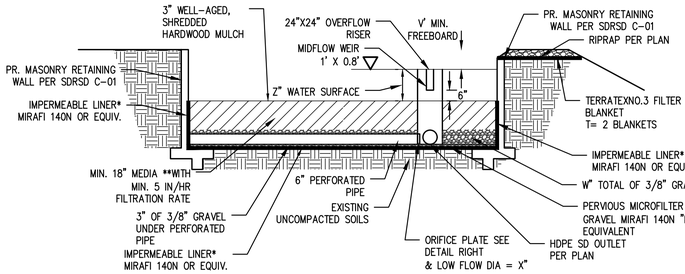
DMA EXHIBIT

LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	
PCC HARDSCAPE	
RAIN BARRELS	

NOTE

1. GROUNDWATER DEPTH RANGING BETWEEN 25 TO 35 FEET PER ENVIRONMENTAL STUDY BY AVOCET ENVIRONMENTAL, INC.
2. CRITICAL COARSE SEDIMENT YIELD AREAS NOT LOCATED ON SITE.



*IMPERMEABLE LINER TO BE PLACED ALONG THE SIDES OF THE BIOFILTRATION BASIN
**ENGINEERED SOIL LAYER SHALL BE MINIMUM 18" DEEP THE MIX SHALL CONTAIN 70-80% SAND, 15-20% SILT, AND 5-10% CLAY. ENGINEERED MIX TO BE APPROVED BY COUNTY PRIOR TO PLACEMENT. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

WALLED BIOFILTRATION BASIN

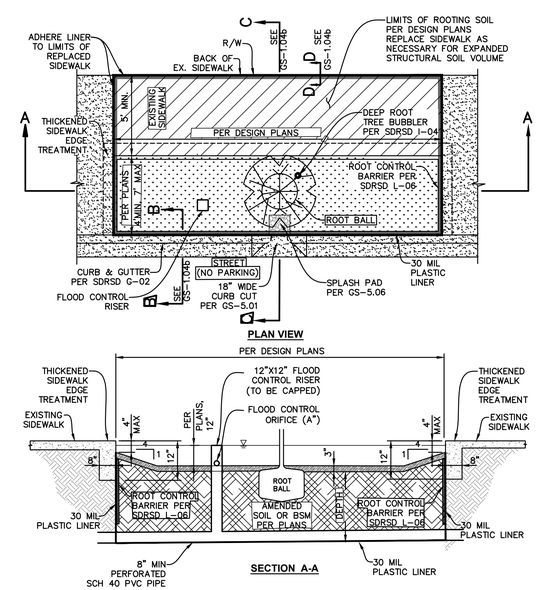
NTS

DMA-4, SELF MITIGATION NOTES

- VEGETATION IN THE NATURAL OR LANDSCAPED AREA IS NATIVE AND/OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERANT SPECIES THAT DO NOT REQUIRE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.
- SOILS ARE UNDISTURBED NATIVE TOPSOIL, OR DISTURBED SOILS THAT HAVE BEEN AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE TOPSOIL.
- THE INCIDENTAL IMPERVIOUS AREAS ARE LESS THAN 5 PERCENT OF THE SELF-MITIGATING AREA.
- IMPERVIOUS AREA WITHIN THE SELF-MITIGATED AREA SHOULD NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPERVIOUS AREAS UNLESS IT IS A STORM WATER CONVEYANCE SYSTEM (SUCH AS A BROW DITCH).
- THE SELF-MITIGATING AREA IS HYDRAULICALLY SEPARATE FROM DMAS THAT CONTAIN PERMANENT STORM WATER POLLUTANT CONTROL BMPS.

BMP TABLE

ID#	TYPE	AREA(SF)	FREE BOARD "V" (FT)	STORAGE LAYER "W" (IN)	ORIFICE SIZE "X" (IN)	RISER HEIGHT "Z" (FT)	MID WEIR DIM.
IMP-1	BIOFILTRATION (BF-1)	2,000	0.25	14.5	0.97	1.5	1'X0.8'



NOTES:
1. REFER TO GS-1.00 FOR ALL DETAILS NOT SHOWN HERE.
2. TREE SIZE & TYPE PER DESIGN PLANS.

(MODIFIED) TREE WELL WITH OPEN SPACE

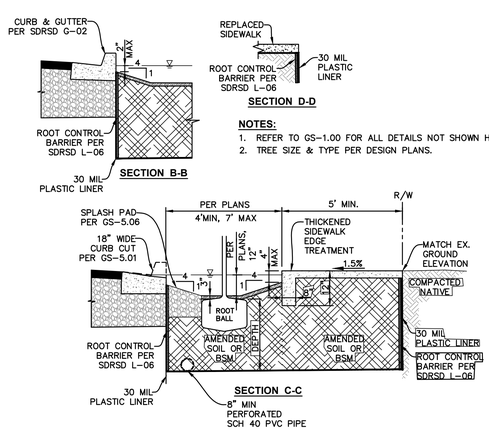
NTS

GS-1.04a

TREE WELL TABLE

ID#	CANOPY / NUMBER	AREA(SF)	DEPTH (IN)	TYPE	UNDERDRAIN (IN)	HYDRO ORIFICE "A" (IN)
IMP-2	25' CANOPY - 4 TREES	289	42	3	8	2.5
IMP-3	20' CANOPY - 1 TREE	169	48	3	8	(4) 4.5

NOTE: VALUES LISTED ABOVE ARE FOR EACH INDIVIDUAL TREE



(MODIFIED) TREE WELL WITH OPEN SPACE

NTS

GS-1.04b

DMA ID 1	Type	Total Area SF	Total Area Acres
DMA-1.1	Roof	3,959	0.091
DMA-1.2	Pavement	15,868	0.364
DMA-1.3	Landscape (Soil C)	4,131	0.095
DMA-1.4	Canopy area	4,549	0.104
TOTAL		28,507	0.654
Drains to BMP IMP-1 (2000 SF)			

DMA ID 2	Type	Total Area SF	Total Area Acres
DMA-2.1	Landscape (Soil C)	987	0.023
DMA-2.2	Sidewalk and AC	6,009	0.138
DMA-2.3	Ex. Impervious (Untreated - Green Streets)	3,532	0.081
TOTAL		10,529	0.242
Drains to BMP IMP-2			

DMA ID 3	Type	Total Area SF	Total Area Acres
DMA-3.1	Landscape (Soil C)	626	0.014
DMA-3.2	Sidewalk	573	0.013
DMA-3.3	Ex. Impervious (Untreated - Green Streets)	503	0.012
TOTAL		1,703	0.039
Drains to BMP IMP-3			

DMA ID 4	Type	Total Area SF	Total Area Acres
DMA-4	Landscape (Soil C)	1,007	0.023
TOTAL		1,007	0.023
Drains to BMP IMP-3			

20 0 20 40

GRAPHIC SCALE
SCALE: 1"= 20'

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

PROPOSED HMP EXHIBIT

ARCO VALLEY CENTER
VALLEY CENTER, CALIFORNIA

1/21/21

ATTACHMENT 5

SDHM Output

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	ARCO
Site Name:	ARCO
Site Address:	Valley Center Road
City:	
Report Date:	1/20/2021
Gage:	LAKE WOH
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2020/04/07

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year
Low Flow Threshold for POC2:	10 Percent of the 2 Year
High Flow Threshold for POC2:	10 Year

Landuse Basin Data

Predeveloped Land Use

EX-1-POC-1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Flat	0.688
Pervious Total	0.688
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.688

Element Flows To:

Surface	Interflow	Groundwater

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Flat	0.023
Pervious Total	0.023
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.023

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA-1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,UrbNoIrr,Flat	0.095
Pervious Total	0.095

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.56
Impervious Total	0.56
Basin Total	0.655

Element Flows To:

Surface	Interflow	Groundwater
Surface iltration 1	Surface iltration 1	

DMA-4

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Flat	0.023
Pervious Total	0.023
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.023

Element Flows To:

Surface	Interflow	Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 1

Bottom Length:	44.83 ft.
Bottom Width:	44.83 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1.21
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.97
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	26.156
Total Outflow (ac-ft.):	29.84
Percent Through Underdrain:	87.65
Discharge Structure	
Riser Height:	1.5 ft.
Riser Diameter:	24 in.
Notch Type:	Rectangular
Notch Width:	0.800 ft.
Notch Height:	1.000 ft.

Element Flows To:
Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0461	0.0000	0.0000	0.0000
0.0512	0.0461	0.0007	0.0000	0.0000
0.1024	0.0461	0.0014	0.0000	0.0000
0.1536	0.0461	0.0021	0.0000	0.0000
0.2048	0.0461	0.0028	0.0000	0.0000
0.2560	0.0461	0.0035	0.0000	0.0000
0.3073	0.0461	0.0043	0.0000	0.0000
0.3585	0.0461	0.0050	0.0000	0.0000
0.4097	0.0461	0.0057	0.0000	0.0000
0.4609	0.0461	0.0064	0.0000	0.0000
0.5121	0.0461	0.0071	0.0000	0.0000
0.5633	0.0461	0.0078	0.0000	0.0000
0.6145	0.0461	0.0085	0.0000	0.0000
0.6657	0.0461	0.0092	0.0000	0.0000
0.7169	0.0461	0.0099	0.0000	0.0000
0.7681	0.0461	0.0106	0.0000	0.0000
0.8193	0.0461	0.0113	0.0000	0.0000
0.8705	0.0461	0.0120	0.0000	0.0000
0.9218	0.0461	0.0128	0.0000	0.0000
0.9730	0.0461	0.0135	0.0000	0.0000
1.0242	0.0461	0.0142	0.0000	0.0000
1.0754	0.0461	0.0149	0.0000	0.0000
1.1266	0.0461	0.0156	0.0000	0.0000
1.1778	0.0461	0.0163	0.0000	0.0000
1.2290	0.0461	0.0170	0.0000	0.0000
1.2802	0.0461	0.0177	0.0000	0.0000

1.3314	0.0461	0.0184	0.0000	0.0000
1.3826	0.0461	0.0191	0.0018	0.0000
1.4338	0.0461	0.0198	0.0027	0.0000
1.4851	0.0461	0.0206	0.0041	0.0000
1.5363	0.0461	0.0213	0.0048	0.0000
1.5875	0.0461	0.0220	0.0058	0.0000
1.6387	0.0461	0.0227	0.0063	0.0000
1.6899	0.0461	0.0234	0.0072	0.0000
1.7411	0.0461	0.0241	0.0076	0.0000
1.7923	0.0461	0.0251	0.0083	0.0000
1.8435	0.0461	0.0261	0.0086	0.0000
1.8947	0.0461	0.0270	0.0093	0.0000
1.9459	0.0461	0.0280	0.0096	0.0000
1.9971	0.0461	0.0290	0.0101	0.0000
2.0484	0.0461	0.0300	0.0104	0.0000
2.0996	0.0461	0.0310	0.0109	0.0000
2.1508	0.0461	0.0319	0.0112	0.0000
2.2020	0.0461	0.0329	0.0114	0.0000
2.2532	0.0461	0.0339	0.0117	0.0000
2.3044	0.0461	0.0349	0.0125	0.0000
2.3556	0.0461	0.0359	0.0135	0.0000
2.4068	0.0461	0.0368	0.0146	0.0000
2.4580	0.0461	0.0378	0.0156	0.0000
2.5092	0.0461	0.0388	0.0166	0.0000
2.5604	0.0461	0.0398	0.0176	0.0000
2.6116	0.0461	0.0408	0.0185	0.0000
2.6629	0.0461	0.0417	0.0194	0.0000
2.7141	0.0461	0.0427	0.0203	0.0000
2.7653	0.0461	0.0437	0.0211	0.0000
2.8165	0.0461	0.0447	0.0219	0.0000
2.8677	0.0461	0.0457	0.0227	0.0000
2.9189	0.0461	0.0466	0.0234	0.0000
2.9600	0.0461	0.0474	0.0420	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.9600	0.0461	0.0474	0.0000	0.2326	0.0000
3.0112	0.0461	0.0498	0.0000	0.2326	0.0000
3.0624	0.0461	0.0522	0.0000	0.2873	0.0000
3.1136	0.0461	0.0545	0.0000	0.2952	0.0000
3.1648	0.0461	0.0569	0.0000	0.3031	0.0000
3.2160	0.0461	0.0592	0.0000	0.3111	0.0000
3.2673	0.0461	0.0616	0.0000	0.3190	0.0000
3.3185	0.0461	0.0640	0.0000	0.3270	0.0000
3.3697	0.0461	0.0663	0.0000	0.3349	0.0000
3.4209	0.0461	0.0687	0.0000	0.3428	0.0000
3.4721	0.0461	0.0711	0.0035	0.3508	0.0000
3.5233	0.0461	0.0734	0.0424	0.3587	0.0000
3.5745	0.0461	0.0758	0.1032	0.3667	0.0000
3.6257	0.0461	0.0782	0.1797	0.3746	0.0000
3.6769	0.0461	0.0805	0.2691	0.3826	0.0000
3.7281	0.0461	0.0829	0.3699	0.3905	0.0000
3.7793	0.0461	0.0852	0.4807	0.3984	0.0000
3.8305	0.0461	0.0876	0.6009	0.4064	0.0000
3.8818	0.0461	0.0900	0.7297	0.4143	0.0000
3.9330	0.0461	0.0923	0.8665	0.4223	0.0000
3.9842	0.0461	0.0947	1.0110	0.4302	0.0000
4.0354	0.0461	0.0971	1.1627	0.4381	0.0000

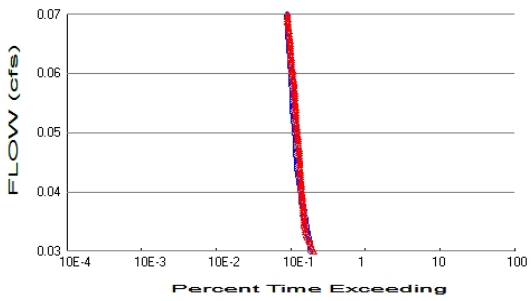
4.0866	0.0461	0.0994	1.3213	0.4461	0.0000
4.1378	0.0461	0.1018	1.4866	0.4540	0.0000
4.1890	0.0461	0.1041	1.6582	0.4620	0.0000
4.2402	0.0461	0.1065	1.8359	0.4699	0.0000
4.2914	0.0461	0.1089	2.0196	0.4778	0.0000
4.3426	0.0461	0.1112	2.2091	0.4858	0.0000
4.3938	0.0461	0.1136	2.4041	0.4937	0.0000
4.4451	0.0461	0.1160	2.6045	0.5017	0.0000
4.4963	0.0461	0.1183	2.8106	0.5096	0.0000
4.5475	0.0461	0.1207	3.2125	0.5175	0.0000
4.5987	0.0461	0.1230	3.7573	0.5255	0.0000
4.6499	0.0461	0.1254	4.4108	0.5334	0.0000
4.6600	0.0461	0.1259	5.1510	0.5350	0.0000

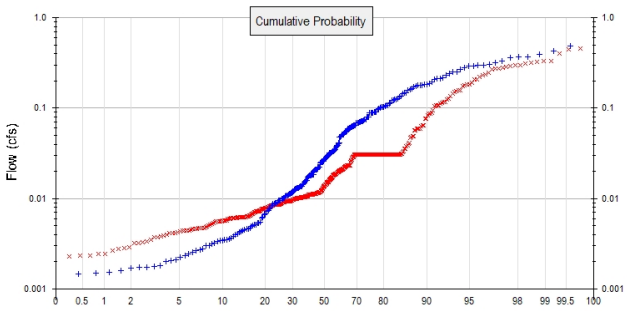
Surface iltration 1

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 1

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.688
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.095
Total Impervious Area: 0.56

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.208701
5 year	0.302624
10 year	0.366649
25 year	0.429542

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.191788
5 year	0.299491
10 year	0.334642
25 year	0.452141

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0316	734	804	109	Pass
0.0320	727	780	107	Pass
0.0323	715	749	104	Pass
0.0327	708	729	102	Pass
0.0330	699	706	101	Pass
0.0334	691	695	100	Pass
0.0337	680	669	98	Pass
0.0341	668	646	96	Pass
0.0344	658	623	94	Pass
0.0348	650	617	94	Pass
0.0351	645	611	94	Pass
0.0355	636	606	95	Pass
0.0358	626	601	96	Pass
0.0362	621	595	95	Pass
0.0365	612	590	96	Pass
0.0369	599	588	98	Pass
0.0373	591	584	98	Pass
0.0376	587	580	98	Pass
0.0380	580	578	99	Pass
0.0383	573	575	100	Pass
0.0387	562	571	101	Pass
0.0390	559	565	101	Pass
0.0394	555	564	101	Pass
0.0397	551	562	101	Pass
0.0401	545	559	102	Pass
0.0404	540	553	102	Pass
0.0408	534	547	102	Pass
0.0411	527	544	103	Pass
0.0415	522	542	103	Pass
0.0418	514	541	105	Pass
0.0422	513	539	105	Pass
0.0425	502	535	106	Pass
0.0429	500	530	105	Pass
0.0432	493	528	107	Pass
0.0436	487	527	108	Pass
0.0439	483	523	108	Pass
0.0443	482	521	108	Pass
0.0446	477	519	108	Pass
0.0450	474	518	109	Pass
0.0453	473	516	109	Pass
0.0457	469	512	109	Pass
0.0460	468	508	108	Pass
0.0464	467	506	108	Pass
0.0467	466	506	108	Pass
0.0471	466	500	107	Pass
0.0474	464	498	107	Pass
0.0478	460	495	107	Pass
0.0481	459	492	107	Pass
0.0485	456	489	107	Pass
0.0488	451	484	107	Pass
0.0492	448	479	106	Pass
0.0496	446	477	106	Pass
0.0499	443	474	106	Pass

0.0503	441	468	106	Pass
0.0506	437	467	106	Pass
0.0510	435	463	106	Pass
0.0513	433	462	106	Pass
0.0517	426	462	108	Pass
0.0520	425	462	108	Pass
0.0524	424	460	108	Pass
0.0527	423	456	107	Pass
0.0531	422	455	107	Pass
0.0534	420	452	107	Pass
0.0538	418	450	107	Pass
0.0541	417	447	107	Pass
0.0545	415	446	107	Pass
0.0548	413	441	106	Pass
0.0552	412	441	107	Pass
0.0555	411	439	106	Pass
0.0559	409	439	107	Pass
0.0562	405	439	108	Pass
0.0566	402	433	107	Pass
0.0569	401	430	107	Pass
0.0573	400	422	105	Pass
0.0576	399	419	105	Pass
0.0580	397	416	104	Pass
0.0583	397	412	103	Pass
0.0587	396	409	103	Pass
0.0590	394	406	103	Pass
0.0594	391	403	103	Pass
0.0597	390	399	102	Pass
0.0601	388	397	102	Pass
0.0604	387	396	102	Pass
0.0608	383	393	102	Pass
0.0611	382	392	102	Pass
0.0615	377	391	103	Pass
0.0619	376	389	103	Pass
0.0622	374	388	103	Pass
0.0626	371	385	103	Pass
0.0629	369	380	102	Pass
0.0633	368	375	101	Pass
0.0636	366	375	102	Pass
0.0640	364	372	102	Pass
0.0643	359	368	102	Pass
0.0647	359	366	101	Pass
0.0650	358	362	101	Pass
0.0654	358	361	100	Pass
0.0657	357	360	100	Pass
0.0661	356	357	100	Pass
0.0664	356	356	100	Pass

Water Quality

Drawdown Time Results

Pond: Surface iltration 1

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

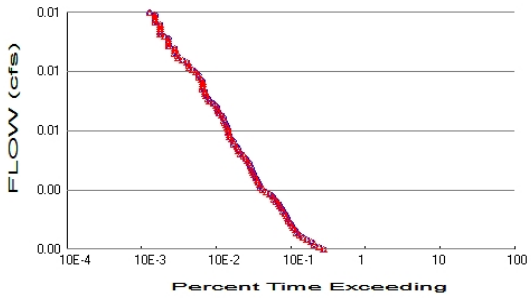
Maximum Stage: 1.500 Drawdown Time: Less than 1 day

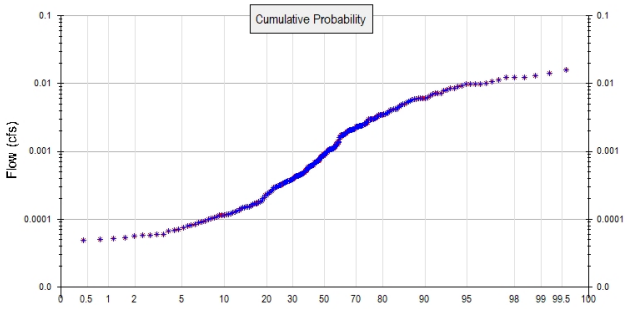
Pond: Biofiltration 1

Days	Stage(feet)	Percent of Total Run Time
1	2.504	1.5658
2	0.000	N/A
3	0.000	N/A
4	0.000	N/A
5	0.000	N/A

Maximum Stage: 2.960 Drawdown Time: 01 04:29:30

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0.023
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.023
Total Impervious Area: 0

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.006977
5 year	0.010117
10 year	0.012257
25 year	0.01436

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.006977
5 year	0.010117
10 year	0.012257
25 year	0.01436

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0007	1091	1091	100	Pass
0.0008	948	948	100	Pass
0.0009	818	818	100	Pass
0.0010	739	739	100	Pass
0.0012	649	649	100	Pass
0.0013	573	573	100	Pass
0.0014	514	514	100	Pass
0.0015	474	474	100	Pass
0.0016	452	452	100	Pass
0.0017	424	424	100	Pass
0.0019	409	409	100	Pass
0.0020	392	392	100	Pass
0.0021	370	370	100	Pass
0.0022	356	356	100	Pass
0.0023	345	345	100	Pass
0.0024	328	328	100	Pass
0.0026	312	312	100	Pass
0.0027	297	297	100	Pass
0.0028	284	284	100	Pass
0.0029	273	273	100	Pass
0.0030	255	255	100	Pass
0.0031	239	239	100	Pass
0.0033	224	224	100	Pass
0.0034	206	206	100	Pass
0.0035	184	184	100	Pass
0.0036	166	166	100	Pass
0.0037	155	155	100	Pass
0.0039	150	150	100	Pass
0.0040	143	143	100	Pass
0.0041	140	140	100	Pass
0.0042	134	134	100	Pass
0.0043	127	127	100	Pass
0.0044	123	123	100	Pass
0.0046	119	119	100	Pass
0.0047	116	116	100	Pass
0.0048	113	113	100	Pass
0.0049	109	109	100	Pass
0.0050	102	102	100	Pass
0.0051	98	98	100	Pass
0.0053	92	92	100	Pass
0.0054	84	84	100	Pass
0.0055	79	79	100	Pass
0.0056	77	77	100	Pass
0.0057	74	74	100	Pass
0.0058	68	68	100	Pass
0.0060	67	67	100	Pass
0.0061	63	63	100	Pass
0.0062	60	60	100	Pass
0.0063	59	59	100	Pass
0.0064	58	58	100	Pass
0.0065	57	57	100	Pass
0.0067	56	56	100	Pass
0.0068	54	54	100	Pass

0.0069	52	52	100	Pass
0.0070	50	50	100	Pass
0.0071	49	49	100	Pass
0.0072	47	47	100	Pass
0.0074	43	43	100	Pass
0.0075	42	42	100	Pass
0.0076	41	41	100	Pass
0.0077	39	39	100	Pass
0.0078	36	36	100	Pass
0.0079	32	32	100	Pass
0.0081	31	31	100	Pass
0.0082	29	29	100	Pass
0.0083	28	28	100	Pass
0.0084	28	28	100	Pass
0.0085	26	26	100	Pass
0.0086	26	26	100	Pass
0.0088	26	26	100	Pass
0.0089	26	26	100	Pass
0.0090	25	25	100	Pass
0.0091	23	23	100	Pass
0.0092	23	23	100	Pass
0.0093	21	21	100	Pass
0.0095	19	19	100	Pass
0.0096	17	17	100	Pass
0.0097	17	17	100	Pass
0.0098	16	16	100	Pass
0.0099	14	14	100	Pass
0.0100	12	12	100	Pass
0.0102	12	12	100	Pass
0.0103	11	11	100	Pass
0.0104	11	11	100	Pass
0.0105	11	11	100	Pass
0.0106	9	9	100	Pass
0.0107	9	9	100	Pass
0.0109	9	9	100	Pass
0.0110	9	9	100	Pass
0.0111	8	8	100	Pass
0.0112	7	7	100	Pass
0.0113	7	7	100	Pass
0.0114	7	7	100	Pass
0.0116	7	7	100	Pass
0.0117	7	7	100	Pass
0.0118	6	6	100	Pass
0.0119	6	6	100	Pass
0.0120	6	6	100	Pass
0.0121	6	6	100	Pass
0.0123	5	5	100	Pass

Water Quality

Drawdown Time Results

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

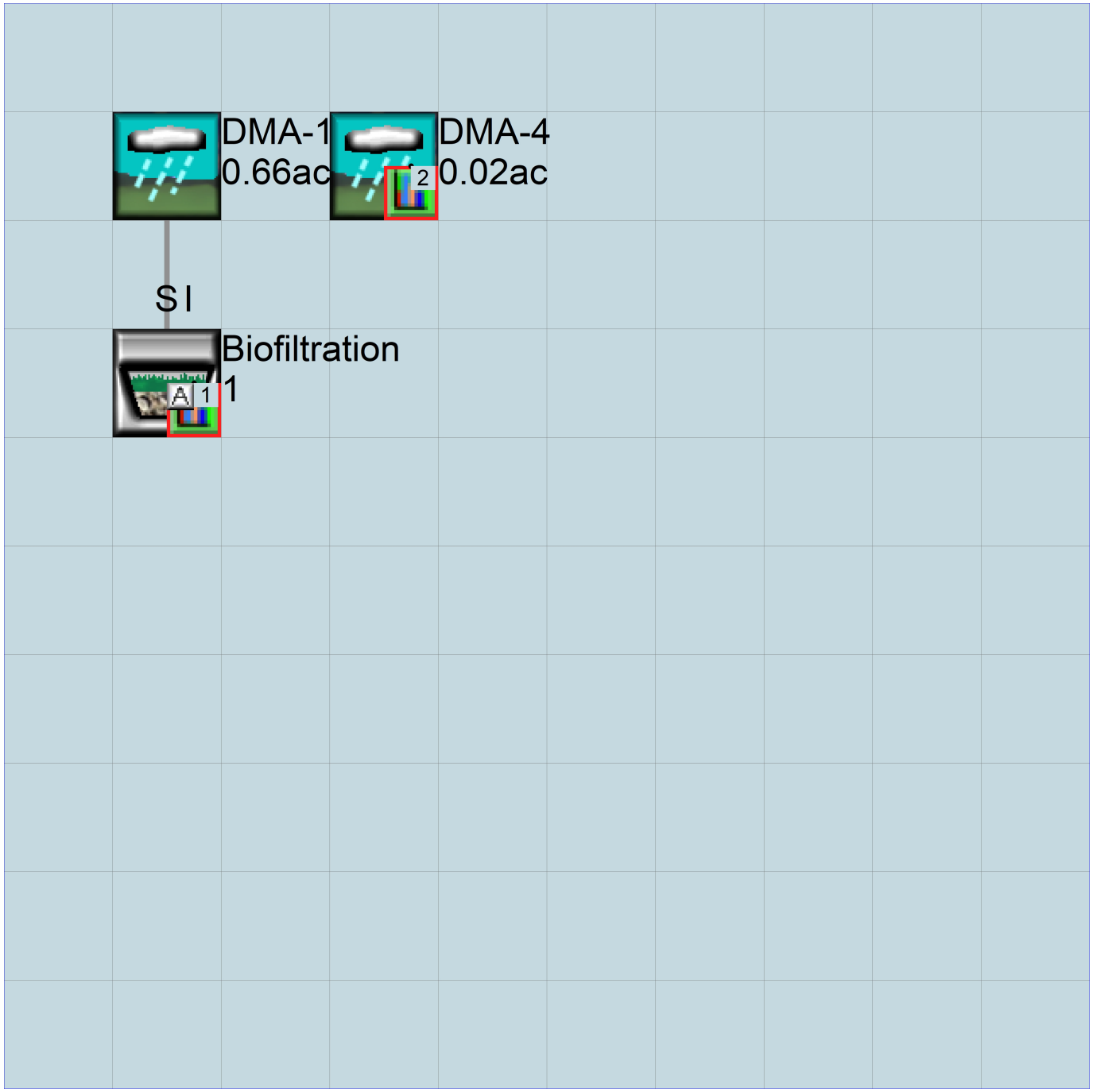
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   ARCO.wdm
MESSU       25   PreARCO.MES
            27   PreARCO.L61
            28   PreARCO.L62
            30   POCARCO1.dat
            31   POCARCO2.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      19
      COPY       501
      COPY       502
      DISPLY       1
      DISPLY       2
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        EX-1-POC-1                 MAX                    1    2   30    9
    2        Basin  2                   MAX                    1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   19      C,NatVeg,Flat          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   19         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   19         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   19         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   19              0       3.8     0.035       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   19              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   19             0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   19       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   19       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   19             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
EX-1-POC-1***
PERLND  19                       0.688     COPY   501     12
PERLND  19                       0.688     COPY   501     13
Basin  2***
PERLND  19                       0.023     COPY   502     12
PERLND  19                       0.023     COPY   502     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   12.1        DISPLY   2     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     12.1      WDM    502 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   ARCO.wdm
MESSU       25   MitARCO.MES
            27   MitARCO.L61
            28   MitARCO.L62
            31   POCARCO2.dat
            30   POCARCO1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      55
      IMPLND       1
      PERLND      19
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY       502
      COPY         1
      COPY       501
      DISPLY       2
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    2        DMA-4                       MAX                   1    2   31    9
    1        Surface iltration  1        MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  502         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   55      C,UrbNoIrr,Flat        1    1    1    1   27    0
   19      C,NatVeg,Flat          1    1    1    1   27    0
  END GEN-INFO
```

```
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   55         0    0    1    0    0    0    0    0    0    0    0    0
   19         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   55         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   19         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   55         0    1    1    1    0    0    0    0    1    1    0
   19         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR      KVARY      AGWRC
   55              0       3.8      0.04        50      0.05        2.5      0.915
   19              0       3.8     0.035       100      0.05        2.5      0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   55              0         0         2         2         0      0.05      0.05
   19              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   55              0       0.6      0.03         1       0.3         0
   19              0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   55       0.4  0.4  0.4  0.4  0.7  0.7  0.7  0.7  0.7  0.4  0.4  0.4
   19       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   55       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
   19       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   55              0         0      0.01         0       0.4      0.01         0
   19              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
```

```
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
DMA-1***
PERLND  55                      0.095     RCHRES   1      2
PERLND  55                      0.095     RCHRES   1      3
IMPLND   1                       0.56     RCHRES   1      5
DMA-4***
PERLND  19                      0.023     COPY   502     12
PERLND  19                      0.023     COPY   502     13

******Routing******
PERLND  55                      0.095     COPY     1     12
IMPLND   1                       0.56     COPY     1     15
PERLND  55                      0.095     COPY     1     13
RCHRES   1                          1     RCHRES   2      8
RCHRES   2                          1     COPY   501     16
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   502 OUTPUT MEAN   1 1   12.1        DISPLY   2     INPUT  TIMSER 1
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
```

```
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                         in  out                            ***
    1     Surface iltratio-004    2    1    1    1   28    0    1
    2     Biofiltration  1-003    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ****************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  1  0  0  0        2  1  2  2  2
    2        0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.01       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
```

```
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  2217.67
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   59    4
      Depth      Area    Volume  Outflow1 Velocity  Travel Time***
       (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.046137  0.000000  0.000000
  0.051209  0.046137  0.000709  0.000000
  0.102418  0.046137  0.001418  0.000000
  0.153626  0.046137  0.002126  0.000000
  0.204835  0.046137  0.002835  0.000000
  0.256044  0.046137  0.003544  0.000000
  0.307253  0.046137  0.004253  0.000000
  0.358462  0.046137  0.004962  0.000000
  0.409670  0.046137  0.005670  0.000000
  0.460879  0.046137  0.006379  0.000000
  0.512088  0.046137  0.007088  0.000000
  0.563297  0.046137  0.007797  0.000000
  0.614505  0.046137  0.008505  0.000000
  0.665714  0.046137  0.009214  0.000000
  0.716923  0.046137  0.009923  0.000000
  0.768132  0.046137  0.010632  0.000000
  0.819341  0.046137  0.011341  0.000000
  0.870549  0.046137  0.012049  0.000000
  0.921758  0.046137  0.012758  0.000000
  0.972967  0.046137  0.013467  0.000000
  1.024176  0.046137  0.014176  0.000000
  1.075385  0.046137  0.014885  0.000000
  1.126593  0.046137  0.015593  0.000000
  1.177802  0.046137  0.016302  0.000000
  1.229011  0.046137  0.017011  0.000000
  1.280220  0.046137  0.017720  0.000000
  1.331429  0.046137  0.018428  0.000000
  1.382637  0.046137  0.019137  0.001804
  1.433846  0.046137  0.019846  0.002707
  1.485055  0.046137  0.020555  0.004092
  1.536264  0.046137  0.021264  0.004784
  1.587473  0.046137  0.021972  0.005818
  1.638681  0.046137  0.022681  0.006335
  1.689890  0.046137  0.023390  0.007164
  1.741099  0.046137  0.024099  0.007578
  1.792308  0.046137  0.025079  0.008284
  1.843516  0.046137  0.026060  0.008637
  1.894725  0.046137  0.027040  0.009262
  1.945934  0.046137  0.028021  0.009574
  1.997143  0.046137  0.029001  0.010141
  2.048352  0.046137  0.029982  0.010424
  2.099560  0.046137  0.030962  0.010947
  2.150769  0.046137  0.031943  0.011208
  2.201978  0.046137  0.032923  0.011425
  2.253187  0.046137  0.033904  0.011683
  2.304396  0.046137  0.034884  0.012481
  2.355604  0.046137  0.035865  0.013489
  2.406813  0.046137  0.036845  0.014553
  2.458022  0.046137  0.037826  0.015608
  2.509231  0.046137  0.038806  0.016627
```

```
  2.560440  0.046137  0.039787  0.017603
  2.611648  0.046137  0.040767  0.018535
  2.662857  0.046137  0.041748  0.019426
  2.714066  0.046137  0.042728  0.020280
  2.765275  0.046137  0.043708  0.021101
  2.816484  0.046137  0.044689  0.021893
  2.867692  0.046137  0.045669  0.022660
  2.918901  0.046137  0.046650  0.023409
  2.960000  0.046137  0.050911  0.042033
  END FTABLE  2
  FTABLE      1
   35    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.046137  0.000000  0.000000  0.000000
  0.051209  0.046137  0.002363  0.000000  0.232608
  0.102418  0.046137  0.004725  0.000000  0.287258
  0.153626  0.046137  0.007088  0.000000  0.295199
  0.204835  0.046137  0.009450  0.000000  0.303140
  0.256044  0.046137  0.011813  0.000000  0.311081
  0.307253  0.046137  0.014176  0.000000  0.319022
  0.358462  0.046137  0.016538  0.000000  0.326963
  0.409670  0.046137  0.018901  0.000000  0.334904
  0.460879  0.046137  0.021264  0.000000  0.342845
  0.512088  0.046137  0.023626  0.003540  0.350786
  0.563297  0.046137  0.025989  0.042423  0.358727
  0.614505  0.046137  0.028351  0.103222  0.366668
  0.665714  0.046137  0.030714  0.179711  0.374609
  0.716923  0.046137  0.033077  0.269149  0.382550
  0.768132  0.046137  0.035439  0.369877  0.390491
  0.819341  0.046137  0.037802  0.480746  0.398432
  0.870549  0.046137  0.040165  0.600902  0.406373
  0.921758  0.046137  0.042527  0.729675  0.414314
  0.972967  0.046137  0.044890  0.866524  0.422255
  1.024176  0.046137  0.047252  1.010997  0.430196
  1.075385  0.046137  0.049615  1.162710  0.438137
  1.126593  0.046137  0.051978  1.321335  0.446079
  1.177802  0.046137  0.054340  1.486581  0.454020
  1.229011  0.046137  0.056703  1.658194  0.461961
  1.280220  0.046137  0.059066  1.835945  0.469902
  1.331429  0.046137  0.061428  2.019629  0.477843
  1.382637  0.046137  0.063791  2.209061  0.485784
  1.433846  0.046137  0.066153  2.404071  0.493725
  1.485055  0.046137  0.068516  2.604503  0.501666
  1.536264  0.046137  0.070879  2.810560  0.509607
  1.587473  0.046137  0.073241  3.212484  0.517548
  1.638681  0.046137  0.075604  3.757289  0.525489
  1.689890  0.046137  0.077967  4.410798  0.533430
  1.700000  0.046137  0.078433  5.150977  0.534998
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
```

```
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1002 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1003 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
COPY     2 OUTPUT MEAN   1 1     12.1      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     12.1      WDM    802 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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Local (360)943-0304

www.clearcreeksolutions.com

Attachment 2c

Management of Critical Coarse Sediment Yield Areas

REACH ID	NAME
1	Santa Margarita River
2	San Luis Rey River
3	Buena Vista Creek
4	Agua Hedionda Creek
5	San Marcos Creek
6	Encinitas Creek
7	Cottonwood Creek (Carlsbad WMA)
8	Escondido Creek
9	San Dieguito Creek - Reach 1
10	San Dieguito Creek - Reach 2
11	Lusardi Creek
12	Los Penasquitos / Poway Creek
13	Rattlesnake Creek
14	Carroll Canyon Creek
15	Rose Creek
16	San Diego River
17	Sycamore Creek
18	Woodglen Vista Creek
19	San Vicente Creek
20	Forester Creek
21	Chollas Creek
22	Sweetwater River - Reach 1
23	Sweetwater River - Reach 2
24	Otay River
25	Jamul / Dulzura Creek
26	Tijuana River
27	Cottonwood Creek (Tijuana WMA)

SITE LOCATION

Legend

- Regional WMAA Streams
- Watershed Boundaries
- Municipal Boundaries
- Rivers & Streams
- Potential Critical Coarse Sediment Yield Areas

Aerial Imagery Source: DigitalGlobe, 06/2012

Miles 0 5 10 15

NORTH

Potential Critical Coarse Sediment Yield Areas

Regional San Diego County Watersheds

Exhibit Date: Sept. 8, 2014

Geosyntec consultants

RICK ENGINEERING COMPANY


CRITICAL
COARSE
SEDIMENT AREA
CRITICAL
COARSE
SEDIMENT AREA
PROJECT SITE
CRITICAL
COARSE
SEDIMENT AREA
1269D - ARCO
1204D - JG - Duffwoo
Little Pond Rd
Shady Creek Rd
Via Encantado
Horse Creek Rd
Misty Oak Rd
Little Creek Ln
Jake Rd
Jenny Vale Ct
Via Piedra
Candle Way
Canyon Rd
Miller Rd
Cole Grade Rd
Schco Bus Ln
Fruitvale Rd
Balerina Ln
Hunza Hill Terrace
Hunza Hill Ct
Blueberry Hill Ln
Valley Center Rd
Chaparral Terrace
Indian Creek Rd
Little Rock Rd
Irish Oaks Rd
Lilac Rd
Calle De Vista
Google Earth
©2018 Google
3000 ft
N

Attachment 2d

Geomorphic Assessment of Receiving Channels

N/A

Attachment 2e

Vector Control Plan

N/A

Attachment 3

STRUCTURAL BMP MAINTENANCE INFORMATION

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☒ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Stormwater Maintenance Notification / Agreement (when applicable)	☒ Included ☐ Not Applicable

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This must be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the County's standard format depending on the Category (PDP applicant to contact County staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the BMP Design Manual for a description of the different categories.

Amendment Log

Storm Water Treatment Operations and Maintenance Plan

Amendment No.	Date	Brief Description of Amendment	Prepared by
Original O&M	<Date>	Original O&M	<Name>

STORM WATER TREATMENT DEVICE
INSPECTION LOG

Inspected By (Name & Title):	
Inspection Date:	
Signature:	

Area to Inspect	Check When Complete	Comments / Corrective Action
Inspect trash enclosures for general condition and cleanliness.		
Inspect the catch basin filters: - Remove trash and debris as necessary. - Ensure that water will flow evenly through them.		
Inspect the area around catch basins: - Remove trash and debris as necessary. - If necessary, clean these areas to prevent material from entering storm drains.		
Ensure signage at catch basin inlets is legible.		
Inspect the underground detention basin: - Remove trash and debris as necessary - Remove accumulated sediment when the lost volume is about 10% of the total original volume.		

- Keep completed inspection forms on file for five (5) years.

Notes / Comments:

_____

_____

EMPLOYEE TRAINING

Purpose To ensure that affected employees are aware of the Storm Water Treatment Operations and Maintenance Plan (Plan) and its requirements

Applicability This training is required for personnel responsible for implementing the O&M.

Review the following items during the training to ensure that employees are aware of O&M requirements:

_____ Review the housekeeping procedures presented in Section 7 of the O&M.

_____ Review the maintenance procedures presented in Sections 7 and 4 of the O&M.

_____ Review the inspection procedures presented in Sections 3 of the O&M.

_____ Ask if employees have questions about the O&M or their responsibilities.

_____ Complete the *Training Verification Form* (see next page). Maintain completed training forms on file for five (5) years.

EMPLOYEE TRAINING VERIFICATION FORM

I hereby certify that I have conducted Storm Water Treatment Operations and Maintenance Plan Training with the undersigned employees.

Instructor's Name (Please print)	Signature	Date

I hereby certify that I have received Storm Water Treatment Device Maintenance O&M training. I am familiar with the O&M and my responsibilities.

Employee Name	**Signature**	**Date**

RECORDING REQUESTED BY:

WHEN RECORDED MAIL TO:

(property owner)

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAINTENANCE NOTIFICATION AGREEMENT FOR CATEGORY 1 STORMWATER TREATMENT CONTROL BMP's

THIS AGREEMENT is made on the _____ day of _____, 20_____.
_____, the Owner(s) of the hereinafter described real property:
Address_____ Post Office _____ Zip Code _____
Assessor Parcel No.(s) _____

List, identify, locate (plan/drawing number) and describe the TC BMP(s)

_____

_____

Owner(s) of the above property acknowledge the existence of the stormwater Treatment Control Best Management Practice (TC BMP) structure(s) on the said property. Perpetual maintenance of the TC BMP(s) is the requirement of the State NPDES Permit, Order No. R9-2007-0001, Section D.1.d.(6) and the County of San Diego Watershed Protection Ordinance (WPO) Ordinance No. 10096 Section 67.812 through Section 67.814, and County Standard Urban Stormwater Mitigation Plan (SUSMP) Chapter 5. In consideration of the requirement to construct and maintain TC BMP(s), as conditioned by Discretionary Permit, Grading Permit, and/or Building Permit (as may be applicable), I/we hereby covenant and agree that:

1. I/We are the owner(s) of the existing (or to be constructed concurrently) premises located on the above described property.
2. I/We shall take the responsibility for the perpetual maintenance of the TC BMP(s) as listed above in accordance with the maintenance plan and in compliance with County's self inspection reporting and verification for as long as I/we have ownership of said property(ies).
3. I/We shall cooperate with and allow the County staff to come onto said property(ies) and perform inspection duties as prescribed by local and state regulators.
4. I/We shall inform future buyer(s) or successors of said property(ies) of the existence and perpetual maintenance requirement responsibilities for TC BMP(s) as listed above and to ensure that such responsibility shall transfer to the future owner(s).
5. I/We will abide by all of the requirements and standards of Section 67.812 through Section 67.814 of the WPO (or renumbering thereof) as it exists on the date of this Agreement, and which hereby is incorporated herein by reference.

This Agreement shall run with the land. If the subject property is conveyed to any other person, firm, or corporation, the instrument that conveys title or any interest in or to said property, or any portion thereof, shall contain a provision transferring maintenance responsibility for TC BMP(s) to the successive owner according to the terms of this Agreement. Any violation of this Agreement is grounds for the County to impose penalties upon the property owner as prescribed in County Code of Regulatory Ordinances, Title 1, Division 8, Chapter 1 Administrative Citations §§18.101-18.116.

_____ _____
Owner(s) Signature(s)

_____ _____
Print Owner(s) Name(s) and Title

STATE OF CALIFORNIA)
COUNTY OF _____)

On _____ before me, _____Notary Public,
personally appeared _____ 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.

Signature _____

TABLE 7-3. Maintenance Indicators and Actions for Vegetated BMPs

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Actions
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, The County must be contacted prior to any additional repairs or reconstruction.
Standing water in vegetated swales	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, County staff in the Watershed Protection Program must be contacted prior to any additional repairs or reconstruction.
Standing water in bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event*	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

Attachment 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

ATTACHMENT 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

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County of San Diego BMP Design Manual Verification Form	
Project Summary Information	
Project Name	ARCO Valley Center
Record ID (e.g., grading/improvement plan number)	PDS2015-STP-15-012, PDS2015-AMC-15-006
Project Address	SWC Valley Center Road and Cole Grade Road Valley Center, CA 92082
Assessor's Parcel Number(s) (APN(s))	188-260-31
Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	San Luis Rey Hydrologic Unit, Lower San Luis Hydrologic Area, Rincon, HSA (903.16)
Responsible Party for Construction Phase	
Developer's Name	Rafat Mikhail
Address	14109 Calle De Vista Valley Center, CA 92082
Email Address	rafatmikhail@att.net
Phone Number	(760) 484-3286
Engineer of Work	Civil Landworks Corp
Engineer's Phone Number	760-908-8745
Responsible Party for Ongoing Maintenance	
Owner's Name(s)*	Rafat Mikhai
Address	14109 Calle De Vista Valley Center, CA 92082
Email Address	rafatmikhail@att.net
Phone Number	(760) 484-3286
*Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.	

County of San Diego BMP Design Manual Verification Form Page 2 of 4					
Stormwater Structural Pollutant Control & Hydromodification Control BMPs* (List all from SWQMP)					
Description/Type of Structural BMP	**Plan Sheet #**	**STRUCT-URAL BMP ID#**	**Maint-enance Category**	**Maintenance Agreement Recorded Doc #**	**Revisions**
Biofiltration	1	IMP-1	1		
*All Priority Development Projects (PDPs) require a Structural BMP					

Note: If this is a partial verification of Structural BMPs, provide a list and map denoting Structural BMPs that have already been submitted, those for this submission, and those anticipated in future submissions.

County of San Diego BMP Design Manual Verification Form Page 3 of 4

Checklist for Applicant to submit to PDCI:

- ☐ Copy of the final accepted SWQMP and any accepted addendum.
- ☐ Copy of the most current plan showing the Stormwater Structural BMP Table, plans/cross-section sheets of the Structural BMPs and the location of each verified as-built Structural BMP.
- ☐ Photograph of each Structural BMP.
- ☐ Photograph(s) of each Structural BMP during the construction process to illustrate proper construction.
- ☐ Copy of the approved Structural BMP maintenance agreement and associated security

By signing below, I certify that the Structural BMP(s) for this project have been constructed and all BMPs are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign your name and seal.

Professional Engineer's Printed Name:

David Caron

Professional Engineer's Signed Name:

[SEAL]

Date:10-25-18

County of San Diego BMP Design Manual Verification Form Page 4 of 4

COUNTY - OFFICIAL USE ONLY:

For PDCI: Verification Package #: _____

PDCI Inspector: _____

Date Project has/expects to close: _____

Date verification received from EOW: _____

By signing below, PDCI Inspector concurs that every noted Structural BMP has been installed per plan.

PDCI Inspector's Signature: _____ Date: _____

FOR WPP:

Date Received from PDCI: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the information provided for the following Structural BMPs is acceptable to enter into the Structural BMP Maintenance verification inventory:

List **acceptable** Structural BMPs:

WPP Reviewer's Signature: _____ Date: _____

Attachment 5

Permanent Storm Water BMPs, Source Control, and Site Design

ATTACHMENT 5

Copy of Plan Sheets Showing Permanent Storm Water BMPs, Source Control, and Site Design

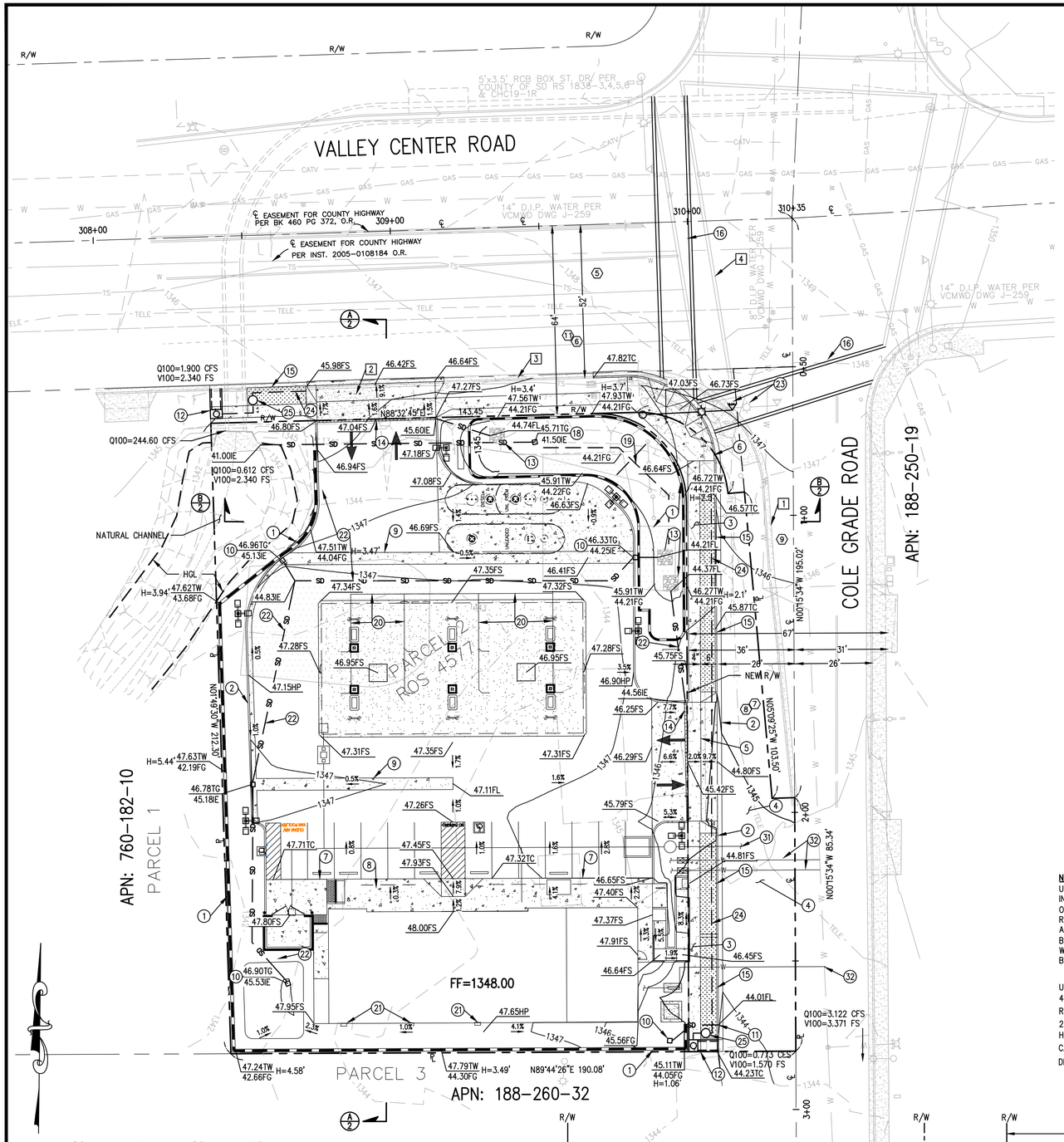
This is the cover sheet for Attachment 5.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Step 6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by County staff
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
- ☐ Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

ARCO - COUNTY OF SAN DIEGO PRELIMINARY GRADING PLAN (NOT FOR CONSTRUCTION)



APPLICANT/OWNER

RAFAT MIKHAIL
14109 CALLE DE VISTA
VALLEY CENTER, CA 92082
(760) 484-3286

CIVIL ENGINEER OF WORK

CIVIL LANDWORKS CORP.
110 COPPERWOOD WAY, SUITE P
OCEANSIDE, CA 92058
760-908-8745

DAVID V. CARON 1-20-21

REGISTERED PROFESSIONAL ENGINEER — DAVID V. CARON — No.C070066 — EXP.09/30/21 — CIVIL — STATE OF CALIFORNIA

PROJECT DESCRIPTION

AN APPLICATION FOR A PROPOSED SITE PLAN TO REVIEW FOR DEVELOPMENT FOR A COMMERCIAL GAS STATION AND NEW PUBLIC IMPROVEMENTS.

LEGAL DESCRIPTION

PARCEL 2 OF RECORD OF SURVEY MAP NO. 4577, FILED IN THE OFFICE OF THE COUNTY RECORDDR OF SAN DIEGO COUNTY, FEBRUARY 6, 1958, SAID SURVEY BEING A PORTION OF SECTIONS 7 AND 18, TOWNSHIP 11 SOUTH, RANGE 1 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA.

EXCEPT THEREFROM THE WESTERLY 100 FEET THEREOF, AS GRANTED TO THOMAS M. CARTER, ET UX, BY DEED RECORDED. NOVEMBER 25, 1959 IN BOOK 8013, PAGE 412, OFFICIAL RECORDS.

TOPOGRAPHY NOTE:

TOPOGRAPHY BASED UPON TOPOGRAPHIC SURVEY DATED DECEMBER 4, 2014,
PREPARED BY:
DCI ENGINEERING, INC.
LAND SURVEYING AND CIVIL ENGINEERING
4420 E. MIRALOMA AVE, SUITE A
(714) 779-3828

ASSESSORS PARCEL NUMBER:

188-260-31-00

BENCHMARK:

BENCH MARK:
COUNTY OF SAN DIEGO BM# 18664
10/1994: SET 2" IRON PIPE W/ BRASS DISC STAMPED "GPS KE31", AT INT. VALLEY CENTER RD & COLE GRADE RD, 68.5' SW'LY OF PP#210362. PT SAT & TIED USING GPS ON ROS 14689.
SEE ALSO MON. "VCRS FP2"
ELEVATION = 1349.30

EASEMENT NOTES

(5) PUBLIC EASEMENT GRANTED TO THE COUNTY OF SAN DIEGO FOR PUBLIC HIGHWAY AND INCIDENTAL PURPOSES, RECORDED ON JANUARY 8, 1936 IN BOOK 460, PAGE 372

(6) PUBLIC EASEMENT GRANTED TO THE COUNTY OF SAN DIEGO FOR PUBLIC HIGHWAY AND INCIDENTAL PURPOSES, RECORDED ON JANUARY 27, 1958 IN BOOK 6923, PAGE 572

(7) EASEMENT FOR ROAD PURPOSES, RECORDED ON AUGUST 26, 1959 IN BOOK 7849, PAGE 11

(8) PUBLIC EASEMENT GRANTED TO THE PACIFIC TELEPHONE AND & TELEGRAPH COMPANY FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED ON JULY 7, 1975 IN OFFICIAL RECORDS 75-173346

(9) PUBLIC EASEMENT GRANTED TO THE COUNTY OF SAN DIEGO FOR PUBLIC HIGHWAY AND INCIDENTAL PURPOSES, RECORDED ON FEBRUARY 12, 1993 IN OFFICIAL RECORDS 1993-0092286

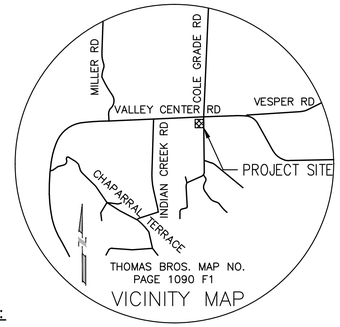
(11) PUBLIC EASEMENT GRANTED TO THE COUNTY OF SAN DIEGO FOR PUBLIC HIGHWAY AND INCIDENTAL PURPOSES, RECORDED ON FEBRUARY 9, 2005 IN OFFICIAL RECORDS 2005-0108184

DEMOLITION NOTES

[1] REMOVE EX. CURB AND GUTTER
[2] REMOVE EX. DRIVEWAY
[3] PROTECT EX. CURB & GUTTER
[4] REMOVE EX. STRIPING

UTILITIES NOTES:

(31) SEWER TO CONNECT TO FUTURE SEWER SYSTEM
(32) CONSTRUCT METER AND BACKFLOW PREVENTER



LEGEND:

PROPERTY LINE
RIGHT OF WAY
CENTERLINE
EXISTING CONTOUR (MAJOR)
EXISTING CONTOUR (MINOR)
EXISTING WATER
EXISTING GAS
EXISTING TELEPHONE
EXISTING RCB BOX
EXISTING CONCRETE
EXISTING ASPHALT
PROPOSED CONTOUR (MAJOR)
PROPOSED CONTOUR (MINOR)
PROPOSED CONCRETE
PROPOSED CURB AND GUTTER
DAYLIGHT LINE
DIRECTION OF DRAINAGE
PR. STORM DRAIN LINE
PR. STORM INLET
RETAINING WALL PER SEPARATE PERMIT
PR. SEWER LINE
PR. WATER LINE
TREE WELLS
PR. COMMERCIAL DRIVEWAY
PR. RIP RAP
PR. TRENCH GRATE
PR. SIDEWALK
PR. WINGED HEADWALL
PR. BACKFLOW PREVENTER

GRADING TABLE:

1. AMOUNT OF CUT: 165 CY
   AMOUNT OF FILL: 3,800 CY.
   IMPORT: 3,635 CY.
2. MAXIMUM DEPTH OF FILL: 6 FEET
3. MAXIMUM DEPTH OF CUT: 3.5 FEET
4. MAXIMUM HEIGHT OF RETAINING WALLS: 5.4 FEET

AREA TABULATIONS

EXISTING (PVT.)

BUILDING/ROAD IMPERVIOUS = 5,164 SF
PERVIOUS = 25,811 SF
TOTAL= 30,975 SF

PROPOSED (PVT.)

BUILDING/HARDSCAPE IMPERVIOUS = 24,376 SF
PERVIOUS= 5,591 SF
TOTAL= 30,975 SF

PROPOSED (PUBLIC)

PAVEMENT/HARDSCAPE IMPERVIOUS = 10,443 SF
PERVIOUS= 1,789 SF
TOTAL= 12,232 SF

NOTICE: THE SUBJECT PROPERTY CONTAINS WETLANDS, A LAKE, A STREAM, AND/OR WATERS OF THE U.S. AND/OR STATE WHICH MAY BE SUBJECT TO REGULATION BY STATE AND/OR FEDERAL AGENCIES, INCLUDING, BUT NOT LIMITED TO, THE REGIONAL WATER QUALITY CONTROL BOARD, U.S. ARMY CORPS OF ENGINEERS AND THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE. IT IS THE APPLICANT'S RESPONSIBILITY TO CONSULT WITH EACH AGENCY TO DETERMINE IF A PERMIT, AGREEMENT OR OTHER APPROVAL IS REQUIRED AND TO OBTAIN ALL NECESSARY PERMITS, AGREEMENTS OR APPROVALS BEFORE COMMENCING ANY ACTIVITY WHICH COULD IMPACT THE WETLANDS, LAKE, STREAM, AND/OR WATERS OF THE U.S. ON THE SUBJECT PROPERTY. THE AGENCY CONTACT INFORMATION IS PROVIDED BELOW.

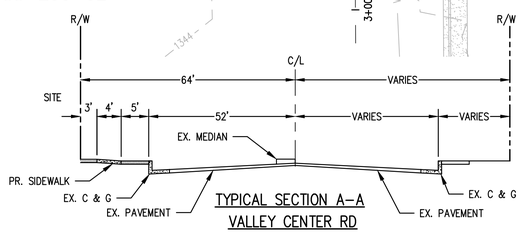
U.S. ARMY CORPS OF ENGINEERS: 915 WILSHIRE BLVD., SUITE 1101, LOS ANGELES, CA 90017; (213) 452-3333; HTTP://WWW.USACE.ARMY.MIL/
REGIONAL WATER QUALITY CONTROL BOARD:
2375 NORTHSIDE DRIVE, SUITE 100, SAN DIEGO, CA 92108; RB9_DREDGEFILL@WATERBOARDS.CA.GOV ; HTTP://WWW.WATERBOARDS.CA.GOV/SANDIEGO/
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE: 3883 RUFFIN RD., SAN DIEGO, CA 92123; (858) 636-3160; ASKR5@WILDLIFE.CA.GOV ; HTTP://WWW.DFG.CA.GOV/

GENERAL DESIGN NOTES

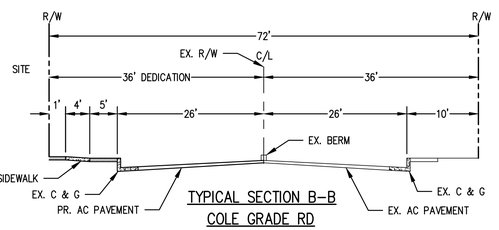
1. CUT/FILL SLOPES ARE 2:1 UNLESS OTHERWISE SPECIFIED.
2. GRADING SHOWN HEREON IS PRELIMINARY AND MAY BE SUBJECT TO CHANGE IN FINAL DESIGN.
3. DRAINAGE FACILITIES TO BE CONSTRUCTED PER COUNTY OF SAN DIEGO STANDARDS.
4. DRAINAGE EASEMENTS SHALL BE PROVIDED AS REQUIRED.
5. ALL LENGTHS, DISTANCES, LOT DIMENSIONS AND CURVE RADIUS ARE APPROXIMATE.
6. ALL UTILITIES SHALL BE UNDERGROUND AND ESEMENTS PROVIDED AS NECESSARY.
7. WATER SYSTEM TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS OF THE OTAY WATER DISTRICT.
8. SANITARY SEWER SYSTEM TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS OF THE OTAY WATER DISTRICT.

CONSTRUCTION NOTES

(1) CONSTRUCT RETAINING WALL
(2) CONSTRUCT CURB & GUTTER PER SDRSD G-2
(3) CONSTRUCT SIDEWALK PER SDRSD G-07
(4) CONSTRUCT AC PAVEMENT (PUBLIC)
(5) CONSTRUCT 46' COMMERCIAL DRIVEWAY PER SDRSD G-14B
(6) CONSTRUCT ADA RAMP PER SDRSD G-27
(7) CONSTRUCT CURB ONLY PER SDRSD G-1
(8) CONSTRUCT SIDEWALK HARDSCAPE
(9) CONSTRUCT CONCRETE RIBBON GUTTER
(10) CONSTRUCT 18" STORM DRAIN INLET
(11) CONSTRUCT SIDEWALK UNDERDRAIN PER SDRSD D-27 TO DRAIN INTO TREE WELL
(12) CONSTRUCT CURB OUTLET PER SDRSD D-25
(13) CONSTRUCT RIP-RAP PER SDRSD D-40
(14) CONSTRUCT TRENCH GRATE
(15) CONSTRUCT TREE WELL PER MODIFIED GS-1.04A/B AND CURB OPENING, SEE SHEET 2 FOR DETAIL
(16) CONSTRUCT STRIPING PER CALTRANS STANDARDS
(17) CONSTRUCT BIORETENTION BASIN. AREA = 1,460 SF SEE SHEET 2 FOR DETAIL
(18) CONSTRUCT STORM DRAIN RISER
(19) CONSTRUCT PERFORATED PIPES PER DETAIL SHEET 2
(20) CONSTRUCT CANOPY DRAINAGE SYSTEM
(21) CONSTRUCT RAIN BARRELS
(22) CONSTRUCT 8" HDPE STORM PIPE
(23) RELOCATE STREET LIGHT
(24) CONSTRUCT 8" PERFORATED PVC UNDERDRAIN
(25) CONSTRUCT STORM WATER PUMP



TYPICAL SECTION A-A
VALLEY CENTER RD
N.T.S.



TYPICAL SECTION B-B
COLE GRADE RD
N.T.S.

NOTE:
EXISTING EDGE OF PAVEMENT AND RIGHT-OF-WAY LINE VARY ALONG THE PROJECT FRONTAGE ON COLE GRADE ROAD

CAUTION!!

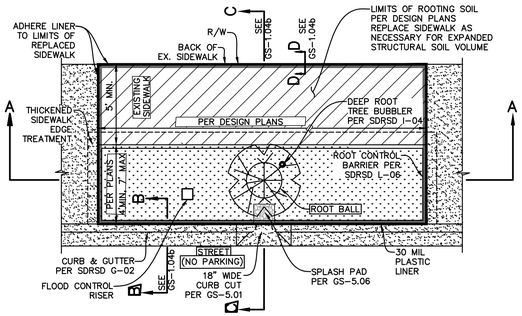
EXISTING UNDERGROUND UTILITIES AND FACILITIES SHOWN ON THESE PLANS HAVE BEEN OBTAINED FROM AVAILABLE RECORDS WHICH IN MOST CASES ARE SCHEMATIC PLANS. THESE PLANS MAY NOT REFLECT ALL EXISTING UTILITIES. EXACT LOCATION AND DEPTH OF EXISTING UTILITIES ARE UNKNOWN. SUBCONTRACTOR TO CONFIRM THE LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF WORK, AND NOTIFY ENGINEER OF WORK OF ANY DISCREPANCIES.

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

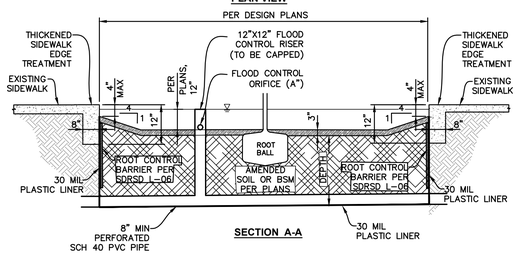
1/21/21

PRELIMINARY GRADING PLAN

ARCO - COUNTY OF SAN DIEGO PRELIMINARY GRADING PLAN (NOT FOR CONSTRUCTION)

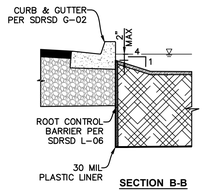


PLAN VIEW

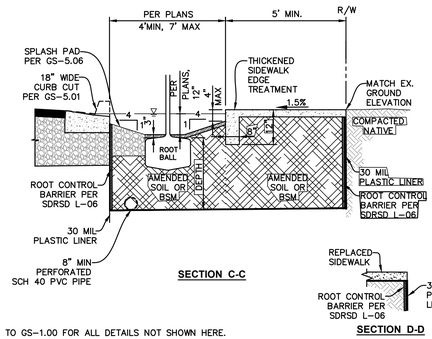


SECTION A-A

NOTES:
1. REFER TO GS-1.00 FOR ALL DETAILS NOT SHOWN HERE.
2. TREE SIZE & TYPE PER DESIGN PLANS.



SECTION B-B



SECTION C-C

SECTION D-D

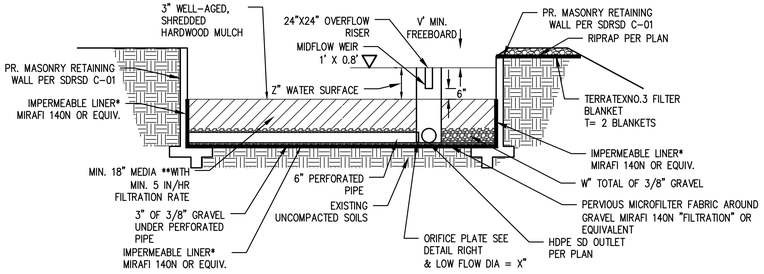
NOTES:
1. REFER TO GS-1.00 FOR ALL DETAILS NOT SHOWN HERE.
2. TREE SIZE & TYPE PER DESIGN PLANS.

(MODIFIED) TREE WELL WITH OPEN SPACE
NTS

GS-1.04a

(MODIFIED) TREE WELL WITH OPEN SPACE
NTS

GS-1.04b



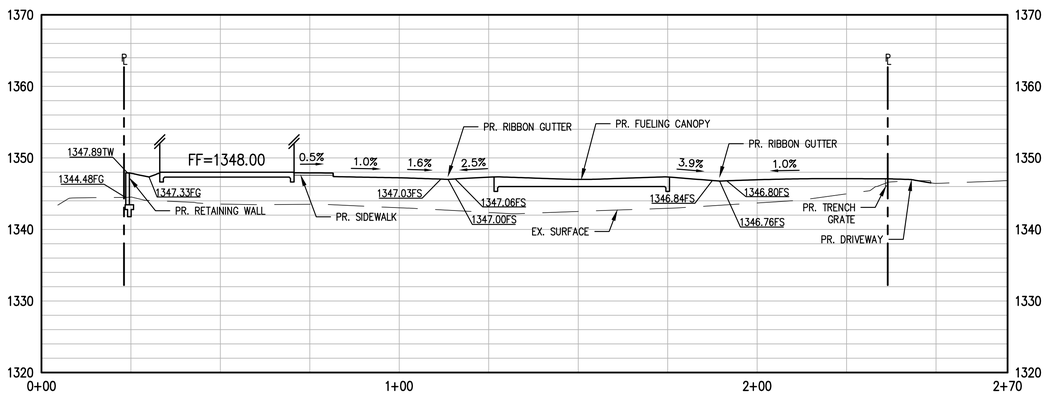
*IMPERMEABLE LINER TO BE PLACED ALONG THE SIDES OF THE BIOFILTRATION BASIN
**ENGINEERED SOIL LAYER SHALL BE MINIMUM 18" DEEP THE MIX SHALL CONTAIN 70-80% SAND, 15-20% SILT, AND 5-10% CLAY. ENGINEERED MIX TO BE APPROVED BY COUNTY PRIOR TO PLACEMENT. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

WALLED BIOFILTRATION BASIN
NTS

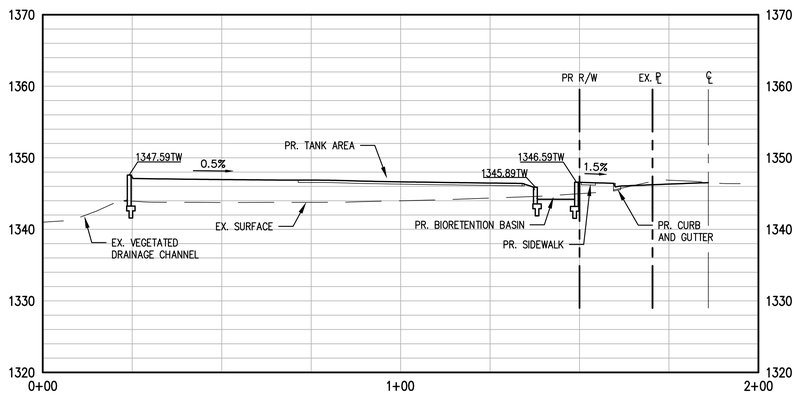
BMP TABLE							
ID#	TYPE	AREA(SF)	FREE BOARD "V" (FT)	STORAGE LAYER "W" (IN)	ORIFICE SIZE "X" (IN)	RISER HEIGHT "Z" (FT)	MID WEIR DIM.
IMP-1	BIOFILTRATION (BF-1)	2,000	0.25	14.5	0.97	1.5	1'X0.8'

TREE WELL TABLE						
ID#	CANOPY / NUMBER	AREA(SF)	DEPTH (IN)	TYPE	UNDERDRAIN (IN)	HYDRO ORIFICE "A" (IN)
IMP-2	25' CANOPY - 4 TREES	289	42	3	8	2.5
IMP-3	20' CANOPY - 1 TREE	169	48	3	8	(4) 4.5

NOTE: VALUES LISTED ABOVE ARE FOR EACH INDIVIDUAL TREE



PROFILE: SECTION A-A
HOR.: 1"=20'
VERT: 1"=10'



PROFILE: SECTION B-B
HOR.: 1"=20'
VERT: 1"=10'

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

REGISTERED PROFESSIONAL ENGINEER DAVID A. LANDWORTH No.C070066 EXP.09/30/22 CIVIL STATE OF CALIFORNIA

1/21/21

PRELIMINARY GRADING PLAN

Attachment 6

Drainage Report

ATTACHMENT 6

Copy of Project's Drainage Report

This is the cover sheet for Attachment 6.

If hardcopy or CD is not attached, the following information should be provided:

Title: Preliminary Hydrology Study
Prepared By: Civil Landworks Corp.
Date: 3-12-19

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Attachment 7

Geotechnical and Groundwater Investigation Report

ATTACHMENT 7

Copy of Project's Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 7.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

This page was left intentionally blank.

GEOTECHNICAL INVESTIGATION
PROPOSED ARCO AM/PM

SWC Valley Center Road at Cole Grade Road
Valley Center (San Diego County), California
for
Mr. Rafat Mikhail

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

December 23, 2014

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Rafat Mikhail
c/o Barghausen Consulting Engineers, Inc.
3883 Ruffin Road, Suite B
San Diego, California 92123

Attention: Ms. Leslie Burnside
Senior Project Manager

Project No.: **14G209-1**

Subject: **Geotechnical Investigation**
Proposed Arco AM/PM
SWC Valley Center Road at Cole Grade Road
Valley Center (San Diego County), California

Gentlemen:

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

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Daniel W. Nielsen, RCE 77915
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL W. NIELSEN
No. 77915
CIVIL
STATE OF CALIFORNIA

John A. Seminara, CEG 2125
Principal Geologist

PROFESSIONAL GEOLOGIST
JOHN A. SEMINARA
No. 2125
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Distribution: (3) Addressee

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

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

Site Preparation

- Initial site stripping should include removal of any weeds and grasses on the building pad. The resulting debris should be disposed of off-site in accordance with all applicable local specifications and regulations. Minor demolition of existing canopy structures will be required. Any demolition debris should be disposed of off-site in accordance with any local regulations.
- The subject site is underlain by artificial fill soils, native alluvium, and bedrock. The artificial fill soils were encountered in the upper 1 to 3± feet below site grades. The underlying bedrock materials are present beneath the artificial fill materials and/or native alluvium at depths of 1½ to 4± feet below the ground surface and consists of very dense, weathered tonalite.
- Remedial grading is recommended to be performed within the new building pad areas and the pump island canopy foundation areas. Overexcavation in the new building pad areas should extend to a depth of 3 feet below existing grade and to a depth of 3 feet below proposed pad grade, whichever is greater. The soils within the proposed foundation influence zones should be overexcavated to a depth of at least 2 feet below proposed foundation bearing grade. The depth of overexcavation should also be sufficient to remove any existing artificial soils from within the building pad area.
- Remediation within the pump island area should consist of overexcavation to a depth of at least 2 feet below the proposed subgrade, and to a depth sufficient to remove all of the existing fill materials. Overexcavation is not required beneath the pump island canopy foundations, provided that these footings are founded upon the very dense bedrock materials.
- We expect that the existing box culvert, which extends from beneath Valley Center Road, and terminates at the northern property line, will be extended through the northwest corner of the site in order to facilitate construction of the proposed driveway. Limited remedial grading may be necessary within the existing drainage course in order to remove any loose, organic, or otherwise unsuitable materials prior to construction of the culvert and backfilling.
- After overexcavation has been completed, the resulting subgrade should be evaluated by the geotechnical engineer to identify any additional materials that should be overexcavated. The previously excavated soils may then be replaced as compacted structural fill.
- The new flatwork, parking, and drive area subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted.
- The site plans indicate that two USTs, for gasoline and diesel fuel, will be constructed at the site. Groundwater was encountered at depths of 10 to 14± feet at the boring locations. Therefore, provisions for dewatering may be necessary in the proposed UST areas.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill. Pump island canopy foundations may be founded on existing high strength bedrock materials.
- 3,000 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of at least two (2) No. 5 rebars (1 top and 1 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slabs

- Conventional Slab-on-Grade, 4½ inches thick.
- Reinforcement is not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab loading.

Pavements

ASPHALT PAVEMENTS (R = 40)			
Materials	**Thickness (inches)**		
	Auto Parking (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Light Truck Traffic (TI = 6.0)
Asphalt Concrete	3	3	3½
Aggregate Base	3	4	6
Compacted Subgrade	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS		
Materials	**Thickness (inches)**	
	Automobile Parking and Drive Areas	Light Truck Traffic Areas (TI =6.0)
PCC	5	5½
Compacted Subgrade (95% minimum compaction)	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 14P410R, dated October 29, 2014. 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 slabs, and driveways 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 subject site is located at the southwest corner of Valley Center Road and Cole Grade Road in Valley Center, California. The site is bounded to the north by Valley Center Road, to the east by Cole Grade Road, to the south by an Armstrong Feed & Supply facility, and to the west by a vacant lot. The general location of the site is illustrated on the Site Location Map, included as Plate 1 in Appendix A of this report.

The site consists of a nearly-rectangular shaped parcel, 0.90± acres in size. The site is currently occupied by a plant nursery that includes two (2) temporary shade structures. The ground surface cover generally consists of exposed soils with isolated areas of native grass and open-graded gravel. Several medium to large size trees are located along the southern property line. A slope of 2 to 3± feet in height descends, from Valley Center Road across the northern property line. An earthen drainage course of 2 to 5± feet in depth is present in the northwest corner of the site. A box culvert, which discharges into the drainage course, extends from beneath Valley Center road and terminates at the northern property line of the subject site. The drainage course extends southwesterly from the culvert to beyond the western property line of the site.

Topographic information was obtained from a topographic survey prepared by DCI Engineering, Inc. Based on this survey, the site topography slopes gently from the east to the west at gradients of 1 to 2± percent, with exception to the aforementioned slope and drainage course. The existing site grades range from a maximum elevation of 1345.3± feet mean sea level (msl) near the eastern property line to a minimum elevation of 1342.0± feet msl near the western property line.

3.2 Proposed Development

A preliminary site plan for the proposed development was provided to our office by the client. This plan indicates that the new facility will include a 3,028± ft^2 convenience store, eight gasoline pump islands covered by a common canopy, and a drive-thru carwash with overall dimensions of 24± feet by 48± feet. The remainder of the site be developed with asphaltic concrete or Portland cement concrete pavements. A temporary waste water tank may be constructed in the area east of the proposed convenience store building.

Detailed structural information was not available at the time of this proposal. It is assumed that the buildings will be a single-story structure of wood-frame, masonry block or light gauge steel frame construction, supported on a shallow foundation system and a concrete slab-on-grade floor. Based on the proposed construction, column and wall loads are expected to be on the order of 30 kips and 1 to 3 kips per linear foot, respectively. The proposed development is not expected to include any significant amounts of below grade construction such as basements or

crawl spaces. Based on the assumed topography, cuts and fills of less than 2± feet are expected to be necessary to achieve the proposed building pad grade.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of six (6) borings advanced to depths of 10 to 50± feet below existing site grades. One (1) of the borings was drilled within the proposed building area to a depth of 50± feet as part of the liquefaction evaluation. A second boring was drilled within the building area to a depth of 15± feet. Two (2) borings were drilled within the proposed canopy area to depths of 10 to 15± feet, and one (1) boring was drilled within the carwash area to depth of 15± feet. Finally, one (1) boring was drilled to a depth of 15± feet east of the proposed convenience store building, since this area may be utilized for construction of a temporary waste water disposal tank. 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 in-situ soil samples were taken during drilling. Relatively undisturbed in-situ 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

Fill soils were encountered in Boring Nos. B-1, B-2, and B-3, extending to depths of 1½ to 3± feet below the existing site grades. The upper 1 to 2± inches of fill material at B-1 consists of open graded gravel. The remaining fill materials at Boring B-1 and the other borings consists of medium dense to dense silty fine sands with varying amounts of medium to coarse sand. The fill soils possess a disturbed appearance and/or artificial debris including timber fragments, resulting in their classification as artificial fill soils.

Alluvium

Native alluvium was encountered beneath the fill materials at Boring Nos. B-1 and B-3 and at the ground surface at Boring Nos. B-4, B-5 and B-6, extending to depths of 1½ to 4± feet below existing site grades. The alluvium consists of loose to very dense silty fine sands with varying medium to coarse sand content with occasional traces of clay.

Tonalite Undivided Bedrock

Tonalite Undivided Bedrock materials were encountered at depths ranging from 1½ to 4± feet at all of the boring locations. These bedrock materials extended to at least the maximum depth explored of 50± feet. The bedrock materials generally consisted of dense to very dense, weathered, friable, fine to coarse grained tonalite.

Groundwater

Free water was encountered during drilling at all of the borings except Boring No. B-4. Free water was encountered at depths of 10 to 14± feet below existing site grades. Based on the water level measurements performed during drilling, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at depths of 10 to 14± feet below existing site grades, at the time of the subsurface exploration.

As part of our research, we reviewed historic groundwater levels obtained from the State Water Resources Control Board – GeoTracker website, http://geotracker.waterboards.ca.gov/. Several monitoring wells are located north of the subject site, within approximately 170± feet of the site. Monitoring well data available for two of these wells, located within Valley Center Road, indicates groundwater depths between 7 and 11± feet during 2012. Monitoring well data for wells located on the north side of Valley Center Road, at an existing gas station, indicates ground water levels between 2 and 7± feet below the ground surface between the years of 2011 and 2014.

4.3 Geologic Conditions

Geologic research indicates that the subject site is underlain by older (Pleistocene), moderately well consolidated, poorly sorted, alluvial flood plain deposits and older (Pleistocene), moderately well consolidated, poorly sorted slopewash deposits (Map Symbols Qoa+Qoc). Tonalite bedrock (Map Symbol Kt) is mapped at the ground surface approximately 900 feet south of the subject site. These materials are described as Cretaceous aged, hornblende-biotite, coarse grained, light gray tonalite. Gabbro bedrock (Map Symbol Kgb) is mapped at the ground surface approximately 750 feet east of the subject site. These materials are described as Cretaceous aged, biotite-hornblende-hypersthene, coarse grained, dark gray, massive gabbro. The primary available reference applicable to the subject site is the Geologic Map of the Valley Center 7.5' Quadrangle, San Diego County, California, prepared by Kennedy, dated 1999. A portion of this map is included as Plate 3 in Appendix A of this report.

Based on the materials encountered in the exploratory borings, it is our opinion that the site is underlain by medium dense to dense artificial fill soils and loose to dense alluvium, consisting of

silty fine sands with varying amounts of medium to coarse sands. Bedrock materials consisting of dense to very dense, weathered, friable fine to coarse grained tonalite were encountered beneath the fill material at depths between 1½ to 4± feet. Based on the conditions encountered at the boring locations, the subsurface soil conditions are generally consistent with the regional geologic mapping.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine 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

All 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.

In-situ Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined 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 determined 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 determine 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 determine 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.

Expansion Index

The expansion potential of the on-site soils was determined 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-5 @ 0 to 5 feet	7	Very Low

Soluble Sulfates

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

Sample Identification	Soluble Sulfates (%)	ACI 318 Classification
B-3 @ 0 to 5 feet	0.023	Negligible
B-5 @ 0 to 5 feet	0.012	Negligible

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. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing and are presented on Plate C-4. Additional testing of other soil types or soil mixes may be necessary at a later date.

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 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.

Seismic Design Parameters

Based on standards in place at the time of this report, the proposed development must be designed in accordance with the requirements of the 2013 California Building Code (CBC). The 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.

The 2013 CBC Seismic Design Parameters have been generated using U.S. Seismic Design Maps, a web-based software application developed by the United States Geological Survey. This software application, available at the USGS web site, calculates seismic design parameters in accordance with the 2013 CBC, utilizing a database of deterministic site accelerations at 0.01 degree intervals. The table below is a compilation of the data provided by the USGS application. A copy of the output generated from this program is included in Appendix E of this report. A

copy of the Design Response Spectrum, as generated by the USGS application is also included in Appendix E. Based on this output, the following parameters may be utilized for the subject site:

2013 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.275
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.486
Site Class	---	C
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.275
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.639
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	0.850
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.426

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 grain size 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). Clayey (cohesive) soils or soils which possess clay particles (d<0.005mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Draft Liquefaction Hazards Mitigation Planning map, published by the County of San Diego, indicates that the subject site is located within a designated liquefaction hazard zone. Therefore, our scope of work included a 50-foot deep boring in order to perform a site specific liquefaction evaluation. However, the subsurface conditions encountered at the boring locations are not considered to be conducive to liquefaction. Very dense tonalite bedrock was encountered at depths of 1½ to 4± feet below the existing site grades at the boring locations. Based on the high strength of these materials, and the recommended remedial grading that will be performed upon the existing fill and alluvium at shallower depths, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

A surficial layer of fill soils was encountered at most of the boring locations, extending to depths of 1½ to 4± feet. These fill soils possess variable strengths and densities and a somewhat varied composition. No documentation regarding the placement of the fill soils is known to exist. The underlying weathered bedrock possesses favorable strengths and favorable consolidation/collapse characteristics. Based on these conditions, remedial grading is considered warranted within the proposed building area in order to remove any undocumented fill materials, and to provide a uniform blanket of structural fill beneath the foundations. The recommended remedial grading will also help mitigate potential differential settlements due to the differing support characteristics of bedrock and soil materials, which vary in depth beneath the proposed convenience store building.

An existing drainage course is present in the northwest corner of the property, in the location of a proposed driveway. An existing reinforced concrete box culvert (RCB) extends from beneath Valley Center Road across the northern property line of the subject site and discharges into the existing drainage course, which extends southwesterly onto the adjacent property. Grading plans are not yet available; however, it is assumed that the existing box culvert will be extended to the west property line, in order to facilitate the backfilling of the drainage course and the construction of the new driveway pavements. Some remedial grading is expected to be necessary within the drainage course in order to remove any loose or unsuitable materials prior to the construction of the culvert and placement of structural fill.

The site plans indicate that two USTs, for gasoline and diesel fuel, will be constructed at the site. Groundwater was encountered at depths of 10 to 14± feet at the boring locations. Therefore, provisions for dewatering may be necessary in the proposed UST areas.

Settlement

The proposed remedial grading will remove the surficial fill soils, as well as the upper portion of the weathered bedrock. The underlying bedrock that will remain in place below the newly placed layer of structural fill possesses high strengths and favorable consolidation characteristics and will not be subject to significant load increases by the foundations of the new structure. Therefore, provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structure are expected to be within tolerable limits.

Expansion

Laboratory testing performed on representative samples of the near surface soils indicates that these materials possess a very low expansion potential (EI = 7). Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing indicate that the selected samples of the on-site soils contain negligible concentrations of soluble sulfates, in accordance with American Concrete Institute (ACI) guidelines. 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.

Shrinkage/Subsidence

Removal and recompaction of the near surface fill and alluvium is estimated to result in an average shrinkage of 10 to 15 percent. Removal and recompaction of the existing bedrock materials is expected to result in minor bulking of 0 to 5± percent. 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 Reviews

Detailed grading and foundation plans were not available at the time of this report. It is therefore recommended that we be provided with copies of these 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 all 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 and Demolition

Site stripping should include any existing vegetation and other organic matter. A few trees are present along the perimeters of the property. If any trees are removed, the associated root masses should also be removed in their entirety.

Two shade structures are present on the property. Removal or demolition of these structures will be required to facilitate the construction of the proposed development. Demolition should also include any remnants of any former development including pavements, floor slabs, foundations, utilities, septic systems, and any other subsurface improvements. Debris resultant from demolition should be disposed of off-site in accordance with local regulations.

Treatment of Existing Soils: Convenience Store and Car Wash Building Pads

Remedial grading should be performed within the building pad areas to remove all of the existing fill and alluvial soils. To provide uniform support characteristics for the proposed structure, it is recommended that the existing soils and bedrock within the proposed building areas be overexcavated to a depth of at least 3 feet below the proposed building pad subgrade elevation, and to a depth of at least 3 feet below existing grade. Within the influence zones of any new foundations, the overexcavation should extend to a depth of 2 feet below proposed foundation bearing grade. The overexcavation must also extend to a sufficient depth to remove all existing fill soils.

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

Following completion of the overexcavation, the subgrade within the building area should be evaluated by the geotechnical engineer to verify its suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. Some localized areas of deeper excavation may be required if overly moist, loose, porous, low density or otherwise unsuitable materials are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed bedrock materials should be scarified to a depth of at least 6 inches, and moisture conditioned to at least 2 to 4 percent above optimum moisture content, 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.

Treatment of Existing Soils: Proposed Pump Island Canopy Area

The existing soils within the proposed pump island area should be overexcavated to a depth of 2 feet below proposed subgrade elevation. Any existing undocumented fill soils within the proposed canopy area should also be removed in their entirety. Based on conditions encountered at Boring Nos. B-3 and B-4, the fill soils extend to depths of 0 to 3 feet. The underlying subgrade soils should then be evaluated and prepared in accordance with the recommendations for the proposed building areas. The previously excavated soils may then be replaced as compacted structural fill.

Based on previous experience with similar structures, it is expected that the foundations for the pump island canopy will extend to depths of 5 to 7± feet, below the depths of the existing fill soils. Since the pump island canopy footings are typically subjected to relatively low axial loads, overexcavation in these foundation areas is not considered warranted. Therefore, once the excavations have been made to reach the nominal foundation bearing grade, the exposed bedrock materials at the subgrade should be evaluated by the geotechnical engineering. Assuming that these excavations are founded in competent bedrock materials, no additional overexcavation will be required. Further details regarding foundation design and construction for the canopy area are presented in Section 6.5 of this report.

It is recommended that a copy of the foundation plan for the pump island canopy be provided to our office for review. Based on the results of our review, additional or modified recommendations for remedial grading in these areas may be warranted.

Treatment of Existing Soils: Parking and Drive Areas

Based on economic considerations, overexcavation of the existing fill soils in the new 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 parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to at least 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 variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

Additionally, a drainage course is present in the northwest corner of the site. It is assumed that the existing box culvert, which discharges into this drainage course, will be extended to the western property line. Limited remedial grading should be performed within the drainage course to remove any loose, porous, organic or otherwise unsuitable materials, to a depth of competent native alluvium or bedrock. The subgrade may be prepared as described above.

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 any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2013 CBC and the grading code of the county of San Diego.
- All 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

All 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, all 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 county of San Diego. All 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 materials generally consist of 1½ to 4± feet of medium dense sands to dense silty sands underlain by very dense weathered tonalite bedrock. These materials are not considered to be subject to caving within shallow excavations. Flattened excavation slopes are expected to be sufficient to provide excavation stability within bedrock materials. On a preliminary basis, the inclination of temporary slopes within the bedrock should not exceed 1h:1v. The inclination of temporary slopes within the near-surface silty sands, which may be subject to some minor caving, 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. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Groundwater

The static groundwater table is considered to have existed at depths of 12 to 14± feet at the time of the subsurface exploration. As noted in Section 4.2 of this report, groundwater was measured at depths of approximately 2 to 11± feet below the ground surface at monitoring wells located within 170 feet north of the subject site. These wells are located at a similar elevation to the subject site. Therefore, groundwater levels may be encountered at shallower depths. Excavations which extend to depths of more than 10± feet may encounter saturated bedrock materials and/or perched groundwater. **Provisions for dewatering should be made in any areas where excavations will extend to depths 10± feet or greater, including the proposed UST area.** Localized dewatering can be accomplished utilizing sump pumps placed in shallow excavations. More sophisticated means of dewatering such as well points or interceptor trenches may be required for excavations extending to depths of 15± feet or more. In this event, the geotechnical engineer should be contacted for supplementary recommendations. Additionally, the designer of the new USTs should verify that the tanks will

not be subject to uplift due to buoyancy, if the groundwater table should rise to historically high levels.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pads will be underlain by structural fill soils used to replace the existing fill soils, alluvium, and a portion of the weathered tonalite bedrock. These new structural fill soils are expected to extend to depths of at least 2 feet below proposed foundation bearing grade, underlain by very dense tonalite bedrock. Based on this subsurface profile, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 3,000 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 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 all exterior doorways. Any 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 geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Pump Island Canopy Foundation Design Parameters

Based on the grading recommendations presented in Section 6.3 of this report, it is assumed that the canopy foundations will be underlain by very dense tonalite bedrock. The foundations to support the new pump island canopy may be designed for a maximum, net allowable soil bearing pressure of 3,000 lbs/ft^2. This bearing pressure may be increased by one-third when considering short duration wind or seismic loads. The pump island canopy foundation should be embedded at least 4 feet below adjacent grade.

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. Any 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 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. 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:

On-site Silty Sands

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

Weathered Bedrock Materials

- Passive Earth Pressure: 400 lbs/ft^3
  Friction Coefficient: 0.40

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 or embedded into weathered bedrock materials (canopy footings only). The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the new structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill, extending to a depth of at least 3 feet below proposed finished grade. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 4½ inches.

- Minimum slab reinforcement: Not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed loading.

- The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

- If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire slab area of the proposed slab. 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. The moisture vapor barrier should be properly constructed in accordance with all 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.

- 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 slabs should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, the proposed development may require some small retaining walls to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site silty sands and weathered bedrock materials for retaining wall backfill.

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 Weathered Bedrock Materials
Internal Friction Angle (ϕ)		32°
Unit Weight		125 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	38 lbs/ft^3
	Active Condition (2h:1v backfill)	59 lbs/ft^3
	At-Rest Condition (level backfill)	58 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.

Retaining Wall Foundation Design

The foundation subgrade soils for the new retaining should be prepared in accordance with the grading recommendations presented in Section 6.3 of this report. The foundations should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Seismic Lateral Earth Pressures

In accordance with the 2013 CBC, any 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.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all 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.

A prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls should be installed between the retaining wall and backfill materials. If the drainage composite 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.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557-91). 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 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 8-foot on-center spacing. The weep holes should include a one cubic foot gravel pocket surrounded by a suitable geotextile 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.

6.8 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 on-site soils generally consist of silty sands underlain by very dense weathered bedrock materials. Based on their classification, these materials are expected to possess good pavement support characteristics. Since R-value testing was not included in the scope of services for this project, the subsequent pavement design is based upon an assumed R-value of 40. Any 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 controlled 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. An alternate pavement section has been provided for use in parking stall areas due to the anticipated lower traffic intensity in these areas. However, truck traffic must be excluded from areas where the thinner pavement section is used; otherwise premature pavement distress may occur. 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.

ASPHALT PAVEMENTS (R = 40)			
Materials	**Thickness (inches)**		
	Auto Parking (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Light Truck Traffic (TI = 6.0)
Asphalt Concrete	3	3	3½
Aggregate Base	3	4	6
Compacted Subgrade	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 determined 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 Portland cement 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		
Materials	**Thickness (inches)**	
	Automobile Parking and Drive Areas	Light Truck Traffic Areas (TI =6.0)
PCC	5	5½
Compacted Subgrade (95% minimum compaction)	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Reinforcing within all pavements should be designed by the structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

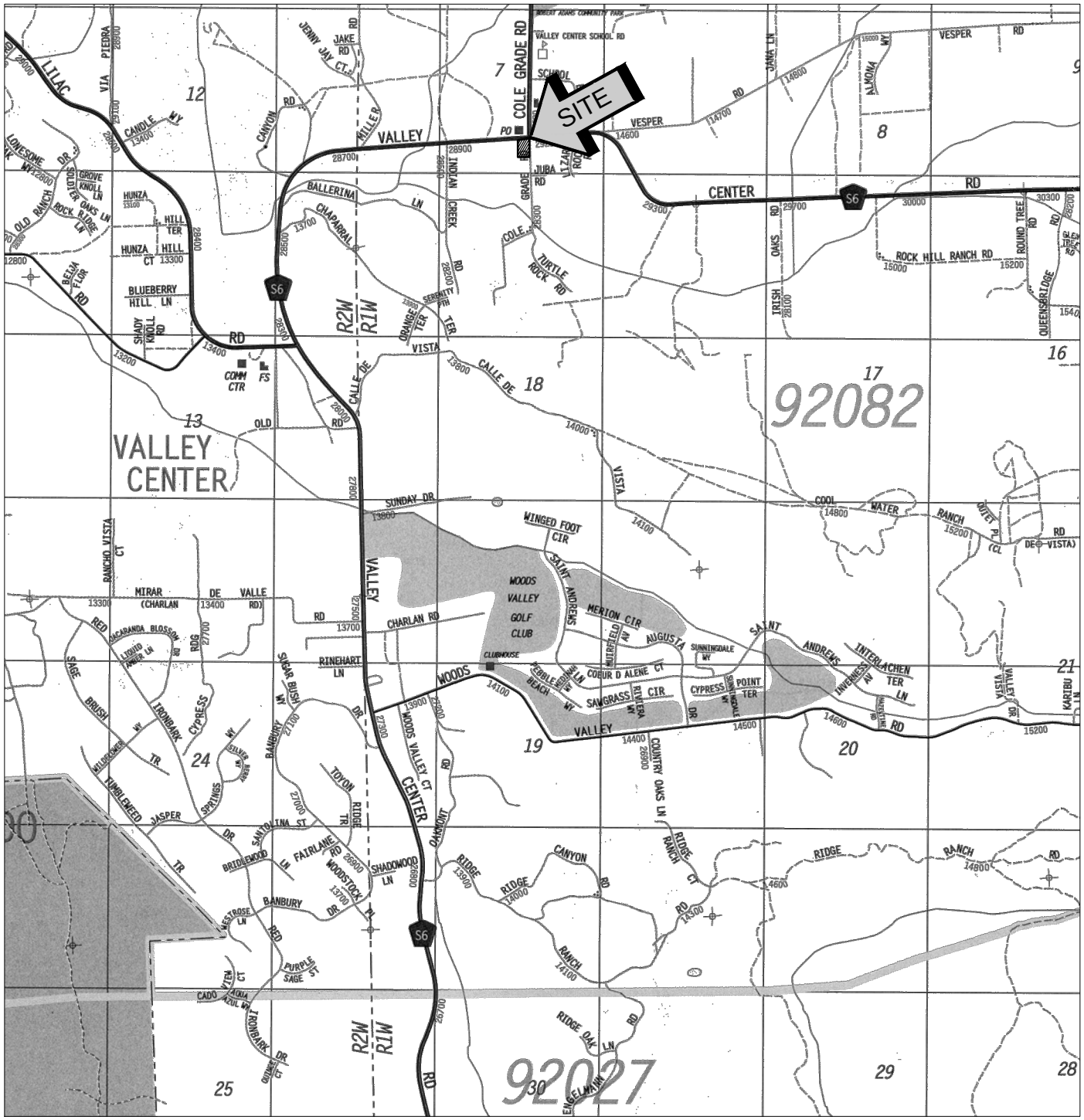
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

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

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to 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:SAN DIEGO COUNTY
THOMAS GUIDE, 2008

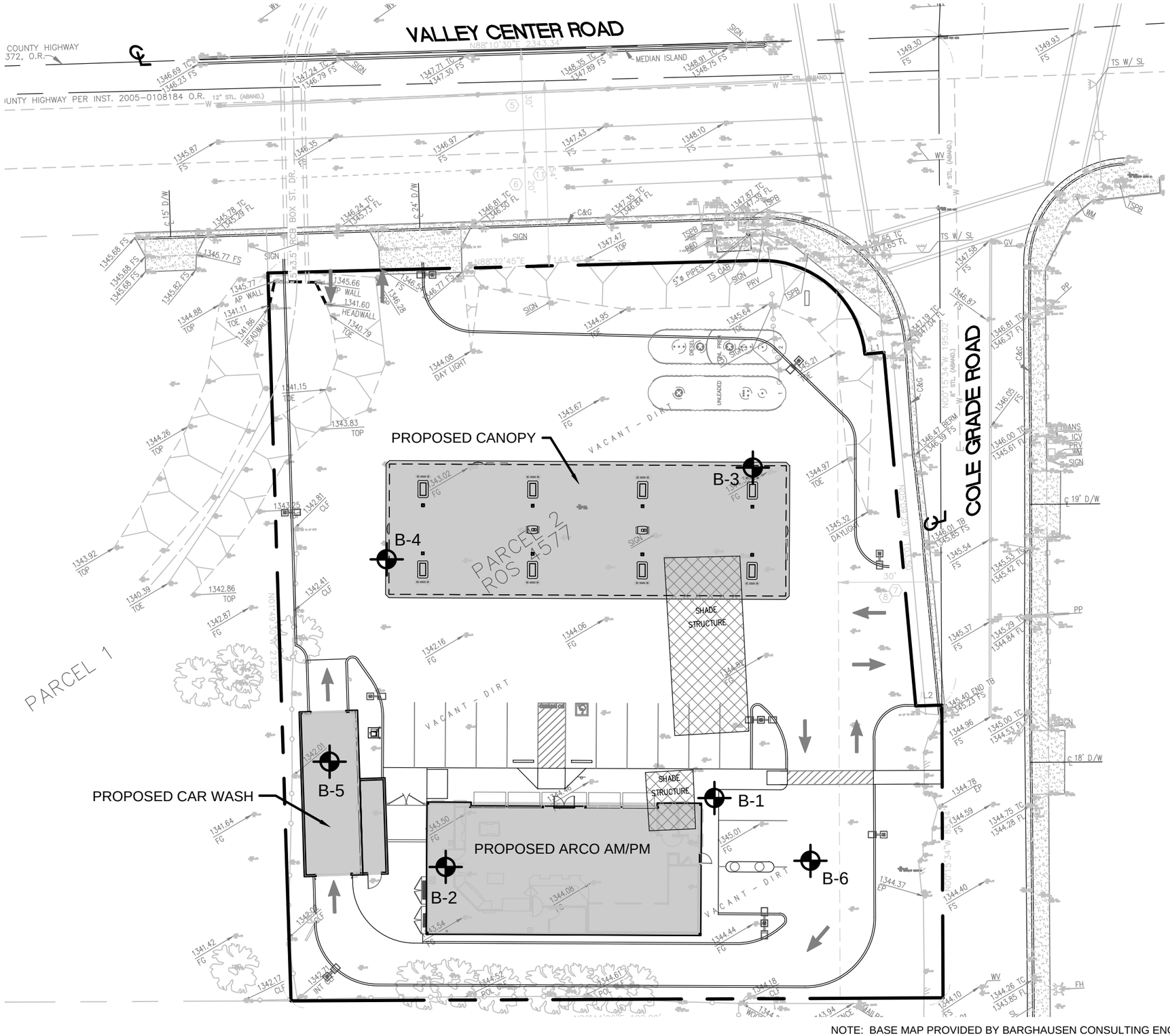
SITE LOCATION MAP

PROPOSED ARCO AM/PM

VALLEY CENTER, CALIFORNIA

SCALE: 1" = 2400'	
DRAWN: RF CHKD: GKM	
SCG PROJECT 14G209-1	
PLATE 1	

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- PROPOSED STRUCTURE
- EXISTING STRUCTURE

NOTE: BASE MAP PROVIDED BY BARGHAUSEN CONSULTING ENGINEERS, INC.
TOPOGRAPHIC SURVEY PREPARED BY DCI ENGINEERING, INC.

BORING LOCATION PLAN

PROPOSED ARCO AM/PM

VALLEY CENTER, CALIFORNIA

SCALE: 1" = 30'	
DRAWN: ENT CHKD: GKM	
SCG PROJECT 14G209-1	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

DESCRIPTION OF MAP UNITS

MODERN SURFICIAL DEPOSITS -- Sediment recently deposited in washes and artificial fills.

Qaf — Artificial fill (late Holocene) - Sand, gravel, and boulders used for "man made" fills.

YOUNG SURFICIAL DEPOSITS -- Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected.

Qya — Young alluvial flood plain deposits (Holocene and late Pleistocene) - Mostly unconsolidated, poorly sorted, permeable flood plain sediment.

Qyc — Young colluvial deposits (Holocene and late Pleistocene) - Mostly poorly consolidated and poorly sorted slope wash and stream deposits.

Qls — Landslide deposits (Holocene to Pleistocene).

OLD SURFICIAL DEPOSITS -- Sedimentary units that are moderately consolidated and slightly to moderately well dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed soils.

Qoa — Older alluvial flood plain deposits (Pleistocene, younger than 500,000 years) - Mostly moderately well consolidated, poorly sorted, permeable flood plain deposits.

Qoc — Older colluvial deposits (Pleistocene, younger than 500,000 years) - Mostly moderately well consolidated, poorly sorted slope wash and stream deposits.

Qof — Older fan deposits (Pleistocene, younger than 500,000 years) - Mostly poorly consolidated fan, debris flow, and talus deposits.

BEDROCK UNITS

Kbm — Granodiorite of Burnt Mountain (Cretaceous) - Leucocratic biotite granodiorite; very fine grained, massive.

Kmm — Monzogranite of Merriam Mountain (Cretaceous) - Leucocratic hornblende-biotite monzogranite; medium to coarse grained, massive.

Kmt — Quartzdiorite of Mountain Meadows (Cretaceous) - Hornblende quartzdiorite; medium grained, dark gray.

Kdl — Granite of Dixon Lake (Cretaceous) - Leucocratic biotite granite; very fine grained, sub-porphyritic.

Kr — Granodiorite of Rimrock (Cretaceous) - Biotite granodiorite; fine grained, sub-porphyritic.

Kbp — Granite of Bottle Peak (Cretaceous) - Leucocratic, hornblende-biotite granite, coarse grained.

Krm — Quartz bearing diorite of Red Mountain (Cretaceous) - Biotite-hornblende diorite; coarse grained, dary gray, massive.

Kvc — Monzogranite of Valley Center (Cretaceous) - Leucocratic biotite monzogranite; coarse grained, massive.

Kis — Granite of Indian Springs (Cretaceous) - Biotite granite: fine grained granite similar in appearance to Kdl.

Kcg — Tonalite of Cole Grade (Cretaceous) - Hornblende-biotite-tonalite; coarse grained, massive.

Kg — Granite undivided (Cretaceous) - Mostly biotite granite, coarse to medium grained, massive.

Kgd — Granodiorite undivided (Cretaceous) - Mostly hornblende-biotite granodiorite, coarse to medium grained.

Kmg — Monzogranite undivided (Cretaceous) - Mostly biotite-hornblende monzogranite, coarse grained.

Kqbd — Quartz bearing diorite undivided (Cretaceous) - Mostly biotite-hornblende, quartz bearing diorite; medium grained, dark gray, massive.

Kd — Diorite undivided (Cretaceous) - Mostly hornblende diorite; medium to coarse grained, dark gray, massive.

Kt — Tonalite undivided (Cretaceous) - Mostly hornblende-biotite tonalite; coarse grained, light gray.

Kgb — Gabbro undivided (Cretaceous) - Mostly biotite-hornblende-hypersthene gabbro; coarse grained, dark gray, massive.

KJ — Metavolcanic and metasedimentary rocks undivided (Cretaceous and Jurassic) - low grade (greenschist facies) rocks that are in part coeval with and in part older than the Cretaceous plutonic rocks they lie in contact with.

KJg — Metagranitic rocks (Cretaceous and Jurassic) - mostly gneiss; very light gray to white, massive.

KJd — Metavolcanic dikes undivided (Cretaceous and Jurassic) - dikes that cut KJ; very fine grained, dark gray, massive.

MAP SYMBOLS

Contact between map units - solid where accurately located, dotted where concealed.

Faults - solid where accurately located; dashed where approximately located or inferred; dotted where concealed. Arrow and number indicate direction and angle of dip of fault plane. (D 65 U)

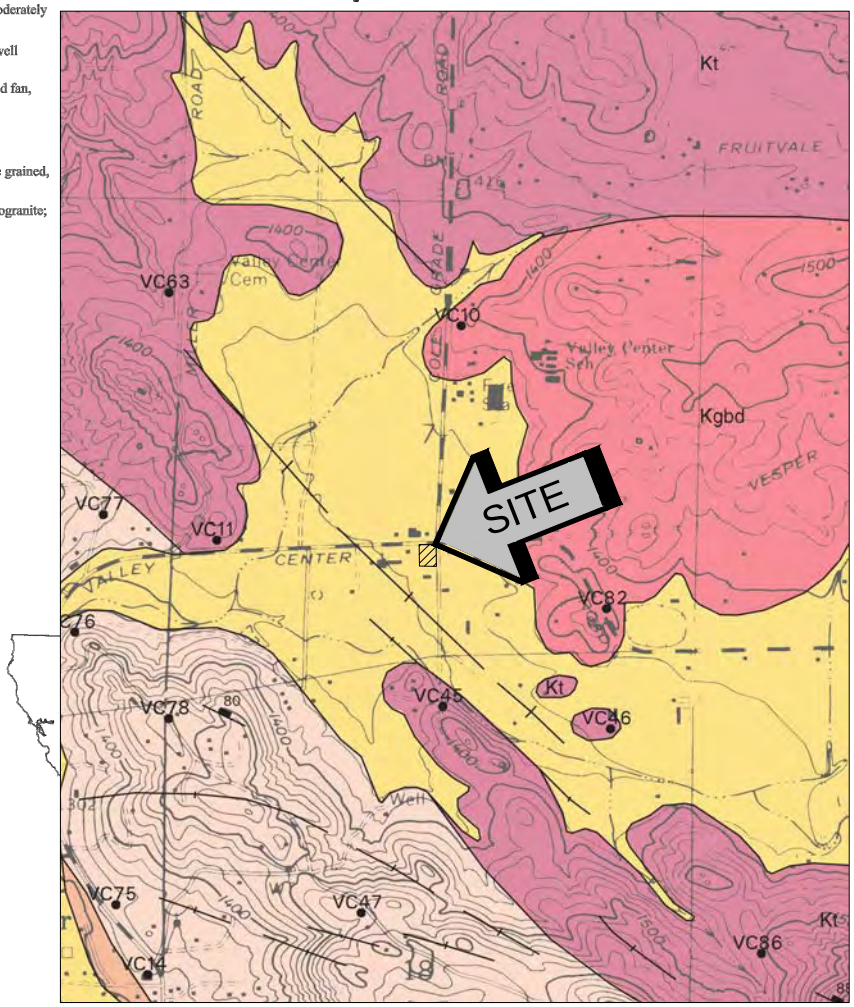
Strike and dip of inclined joints. (18)

Strike of vertical joints.

Airphoto lineament - mostly joints and minor faults.

Pegmatite dike.

VC100 — Location of samples collected for thin section analysis.



SOURCE: "GEOLOGIC MAP OF THE VALLEY CENTER 7.5' QUADRANGLE, SAN DIEGO COUNTY, CALIFORNIA" KENNEDY, 1999

GEOLOGIC MAP

PROPOSED ARCO AM/PM

VALLEY CENTER, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: DRK
CHKD: JAS

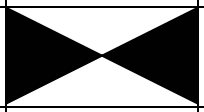
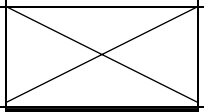
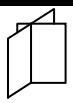
SCG PROJECT 14G209-1

PLATE 3

SoCalGeo — 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.

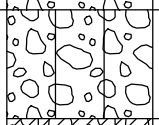
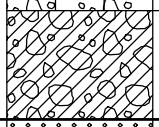
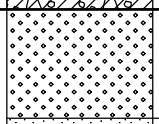
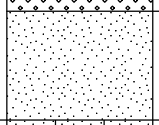
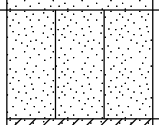
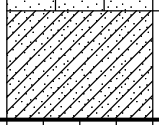
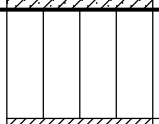
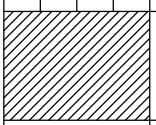
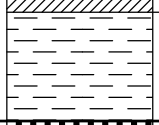
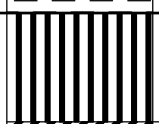
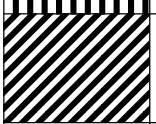
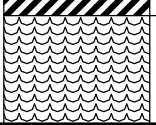
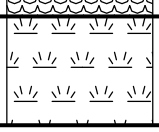
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

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-1

JOB NO.: 14G209 | DRILLING DATE: 12/5/14 | WATER DEPTH: 14 feet
PROJECT: Proposed Arco AM/PM | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 14 feet
LOCATION: Valley Center, California | LOGGED BY: Eric Torres | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					SURFACE ELEVATION: --- MSL							
		29			FILL: Red Brown to Dark Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, mottled, medium dense-damp		5					
		83/10"	3.5		ALLUVIUM: Light Red Brown Silty fine Sand, trace medium Sand, very dense-very moist		15					
5					BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, little Iron oxide staining, friable, dense to very dense-damp to wet		10					
		93/10"	2.5				7					
		50/5"					4					
10												
		50/6"			@ 14 feet, Water encountered during drilling		6					
15												
		50/3"	1.0				16					
20												
		50/4"	1.0				17					
25												
		50/3"	1.0				14					
30												
		50/3"	1.0				15					

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG **PLATE B-1a**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 14G209 | DRILLING DATE: 12/5/14 | WATER DEPTH: 14 feet
PROJECT: Proposed Arco AM/PM | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 14 feet
LOCATION: Valley Center, California | LOGGED BY: Eric Torres | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
40		50/4"	1.5		BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, little Iron oxide staining, friable, dense to very dense-damp to wet		14					
45		50/2"	0.5				13					
50		50/2"	1.0				14					
					Boring Terminated at 50'							

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG **PLATE B-1b**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 14G209 | DRILLING DATE: 12/5/14 | WATER DEPTH: 12 feet
PROJECT: Proposed Arco AM/PM | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 12 feet
LOCATION: Valley Center, California | LOGGED BY: Eric Torres | 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					FILL: Red Brown to Brown Silty fine Sand, trace Wood fragments, medium dense-damp							
		37	4.0		BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, little Iron oxide staining, friable, dense to very dense-moist to wet	116	6					
		61	4.0			127	5					
5		64	4.5+			130	4					
		53	4.0			121	5					
		53	4.5+			127	6					
10					@ 12 feet, Water encountered during drilling							
		50/5"					9					
15					Boring Terminated at 15'							

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG **PLATE B-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 14G209 | DRILLING DATE: 12/5/14 | WATER DEPTH: 14 feet
PROJECT: Proposed Arco AM/PM | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 14 feet
LOCATION: Valley Center, California | LOGGED BY: Eric Torres | 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		43	2.0		FILL: Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, mottled, medium dense to dense-dry to damp	116	4					
					ALLUVIUM: Brown Silty fine Sand, trace Clay, medium dense-damp to moist							
		63	4.5+		BEDROCK (Kt): Gray Brown fine to coarse grained Tonalite, weathered, little Iron oxide staining, friable, dense to very dense-very moist to wet	121	10					
5		89/9"	4.5+			130	5					
		503/3"	2.0			111	5					
		50/5"	4.5+			112	5					
10					@ 12 feet, Water encountered during drilling							
		83/11"	1.0				8					
15					Boring Terminated at 15'							

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 14G209 | DRILLING DATE: 12/5/14 | WATER DEPTH: Dry
PROJECT: Proposed Arco AM/PM | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 8.5 feet
LOCATION: Valley Center, California | LOGGED BY: Eric Torres | 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		12	1.75		ALLUVIUM: Brown Silty fine Sand, loose to medium dense-damp to moist	97	8					
		72/11"	2.5			118	6					
5		87/8"	2.5		BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, little Iron oxide staining, friable, dense to very dense-very moist to wet	109	4					
		50/5"	4.5			117	5					
		87/10"	4.5+			129	6					
10					Boring Terminated at 10'							

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG **PLATE B-4**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 14G209
PROJECT: Proposed Arco AM/PM
LOCATION: Valley Center, California

DRILLING DATE: 12/5/14
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: 10 feet
CAVE DEPTH: 10 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		19			ALLUVIUM: Red Brown Silty fine Sand, trace Clay, medium dense-damp to moist		8					EI = 7 @ 0 to 5'
		65	4.5+		BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, Iron oxide staining, friable, dense to very dense-very moist to wet		7					
5		86/11"	1.25				6					
		90/10"	1.5				8					
10					@ 10 feet, Water encountered during drilling							
		93					10					
15					Boring Terminated at 15'							

TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG **PLATE B-5**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 14G209
PROJECT: Proposed Arco AM/PM
LOCATION: Valley Center, California

DRILLING DATE: 12/5/14
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: 12 feet
CAVE DEPTH: 13 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		55			ALLUVIUM: Red Brown Silty fine Sand, trace Clay, medium dense-damp	130	6					
		70/11"	4.5+		BEDROCK (Kt): Gray fine to coarse grained Tonalite, weathered, Iron oxide staining, friable, dense to very dense-very moist to wet	141	4					
5		50/5"	4.5+			116	4					
		50/4"	4.5+			119	5					
		50/4"	4.0			111	5					
10					@ 12 feet, Water encountered during drilling							
		45	0.5				12					
15					Boring Terminated at 15'							

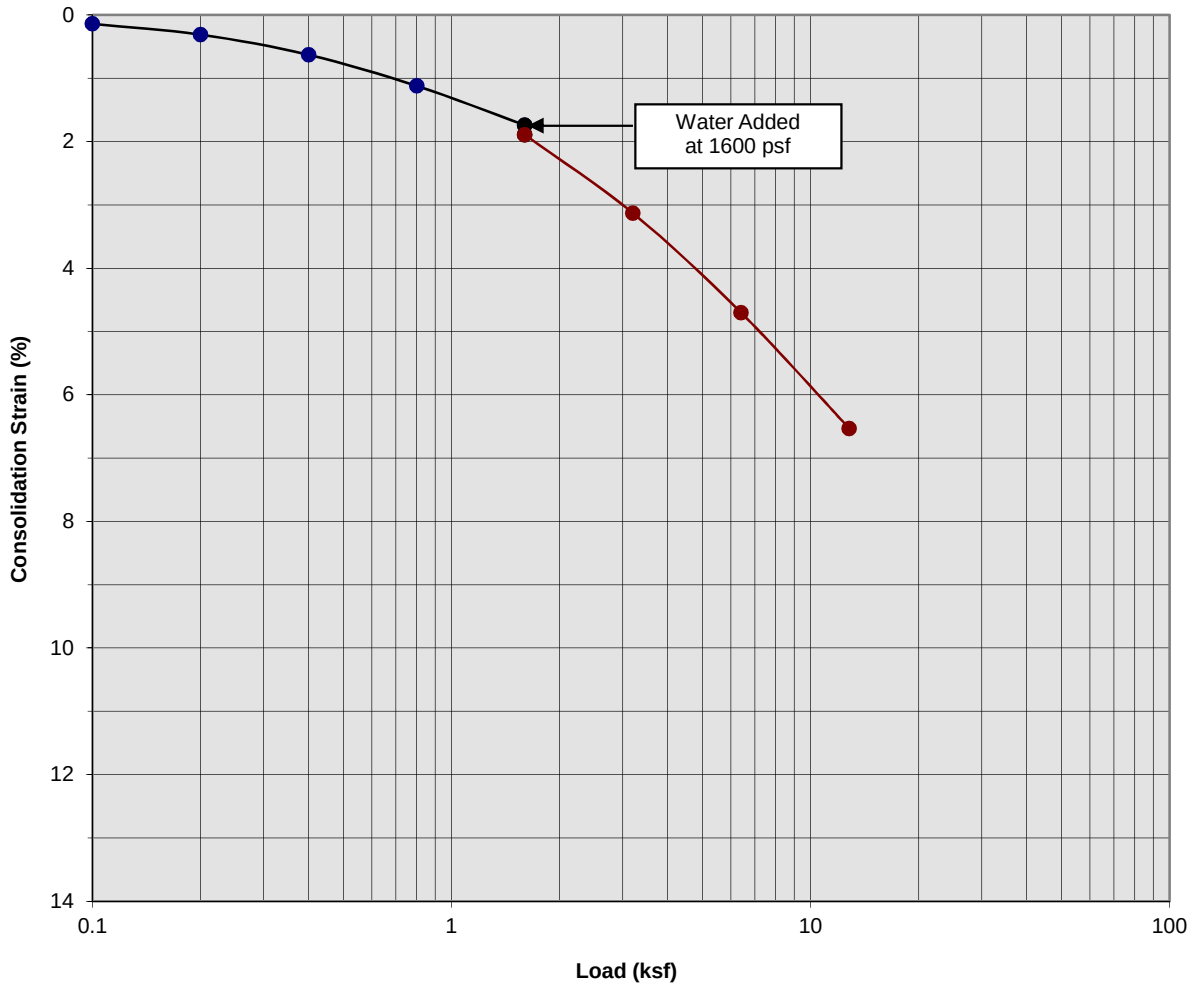
TBL 14G209.GPJ SOCALGEO.GDT 12/23/14

TEST BORING LOG

PLATE B-6

APPENDIX C

Consolidation/Collapse Test Results



Classification: BEDROCK (Kt): Gray fine to coarse grained Tonalite

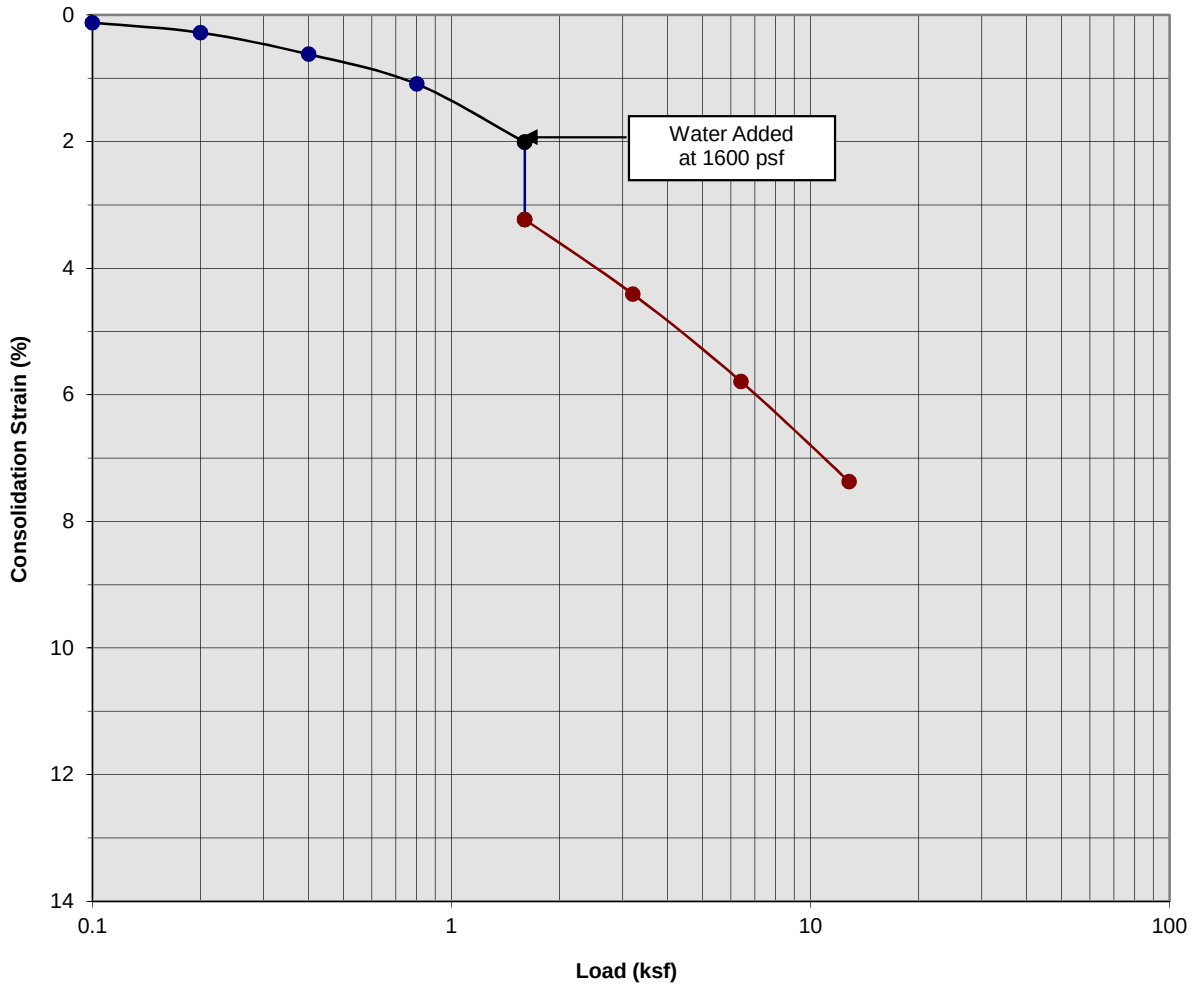
Boring Number:	B-2	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	9
Depth (ft)	3 to 4	Initial Dry Density (pcf)	126.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed Arco AM/PM
Valley Center, California
Project No. 14G209

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: BEDROCK (Kt): Gray fine to coarse grained Tonalite

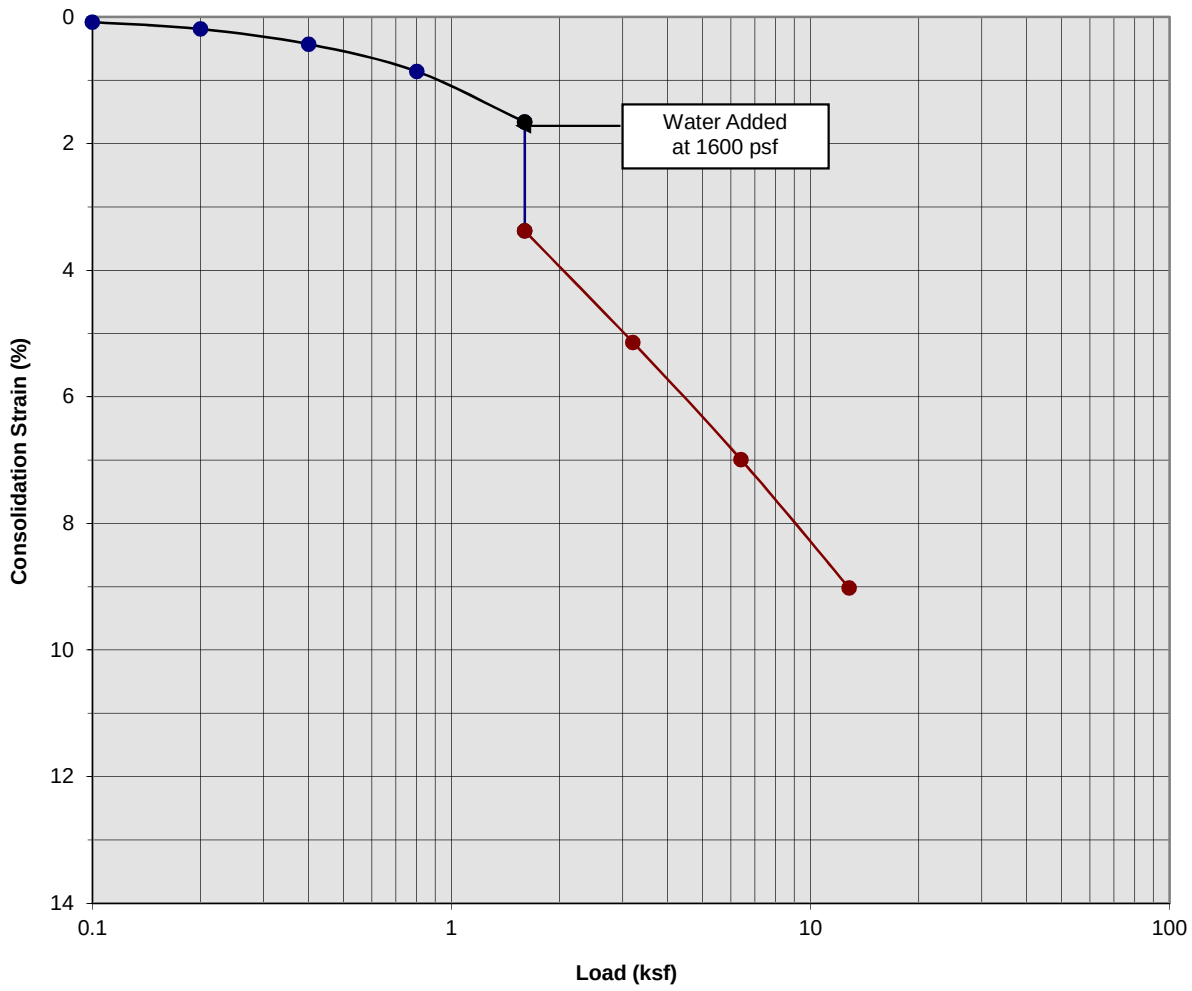
Boring Number:	B-2	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	8
Depth (ft)	5 to 6	Initial Dry Density (pcf)	132.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	143.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.22

Proposed Arco AM/PM
Valley Center, California
Project No. 14G209

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: BEDROCK (Kt): Gray fine to coarse grained Tonalite

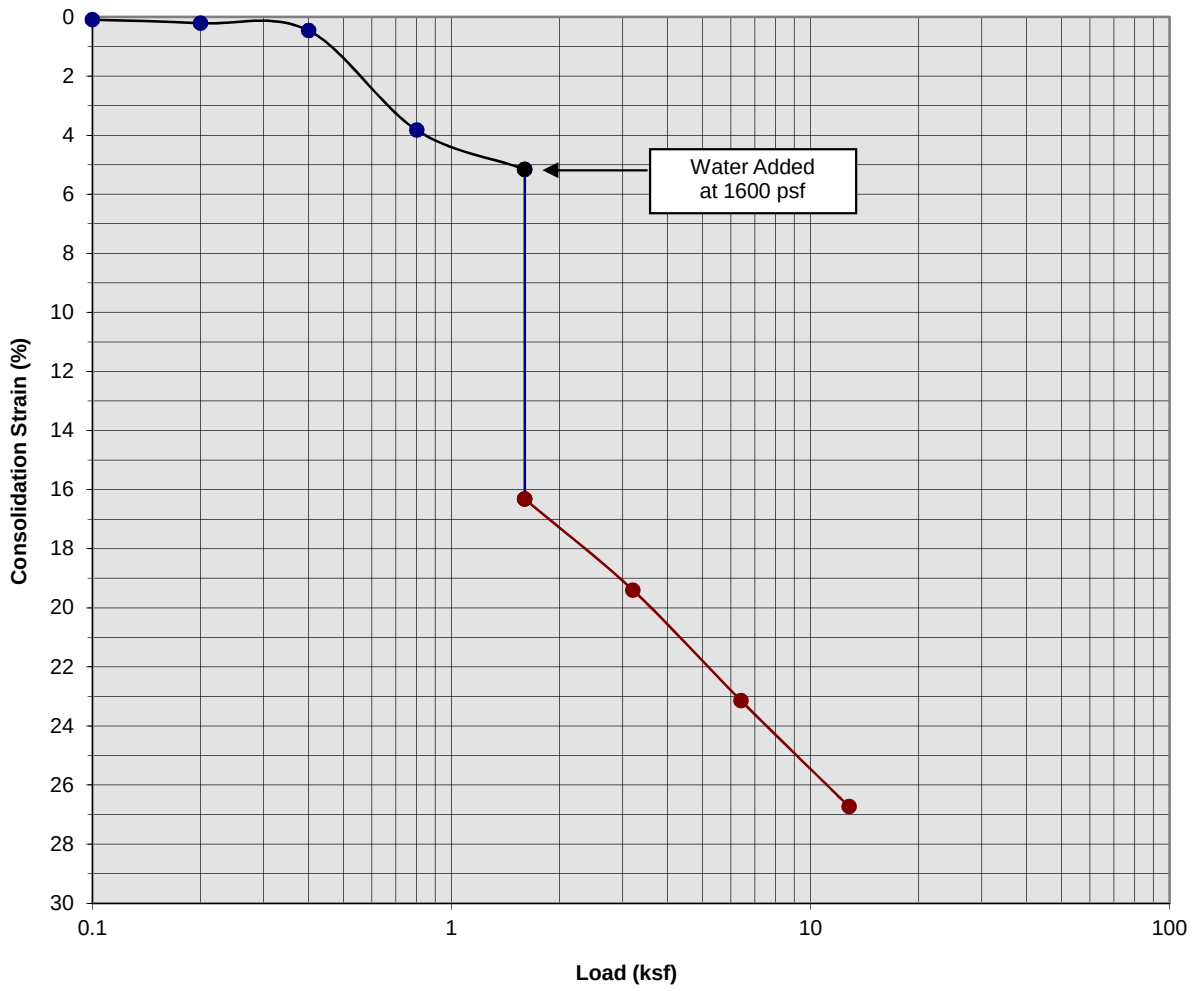
Boring Number:	B-2	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	7 to 8	Initial Dry Density (pcf)	121.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	132.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.72

Proposed Arco AM/PM
Valley Center, California
Project No. 14G209

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: BEDROCK (Kt): Gray fine to coarse grained Tonalite

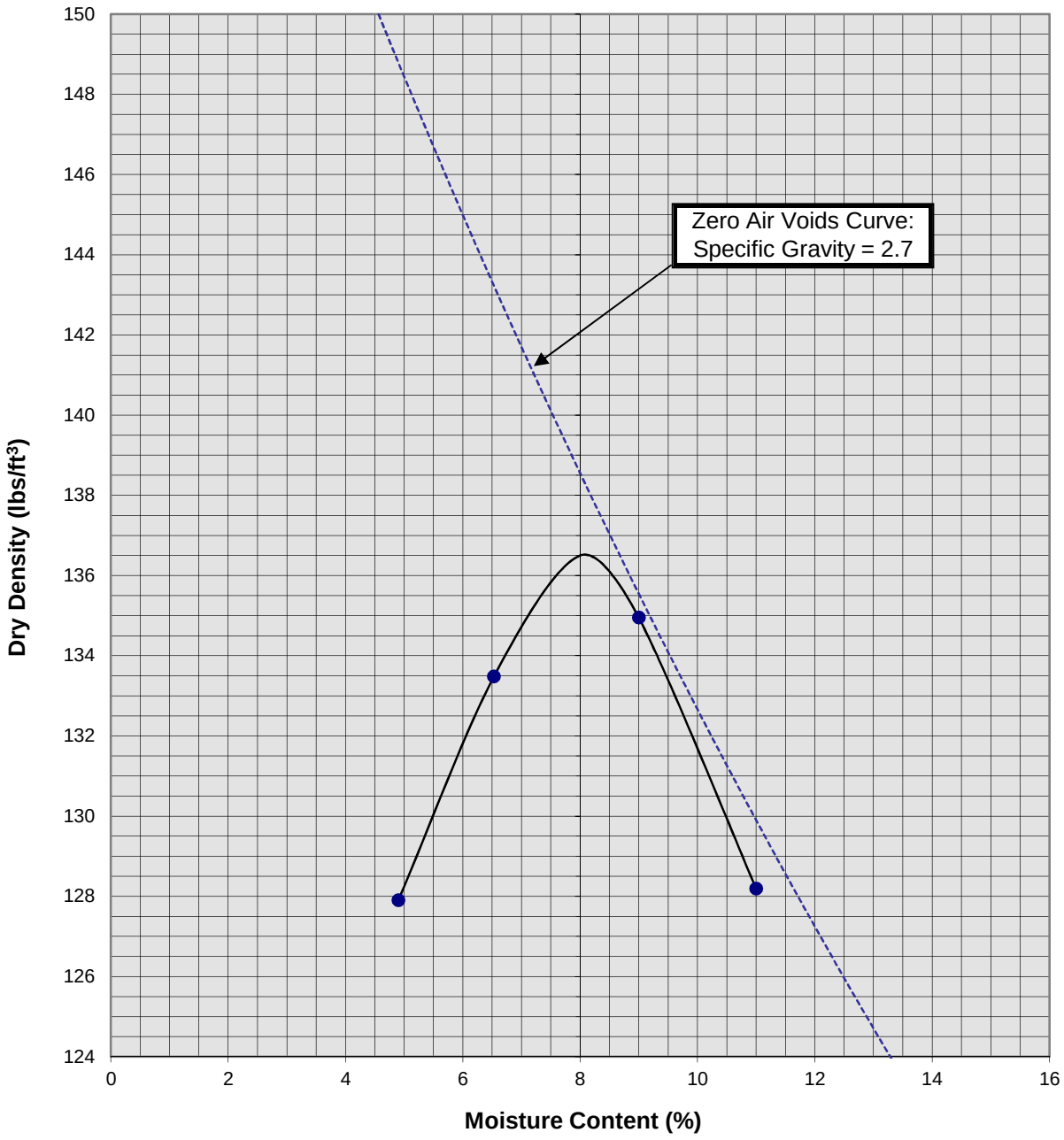
Boring Number:	B-2	Initial Moisture Content (%)	6
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	1 to 2	Initial Dry Density (pcf)	101.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	136.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	11.16

Proposed Arco AM/PM
Valley Center, California
Project No. 14G209

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-1 @ 0 to 5'
Optimum Moisture (%)	8
Maximum Dry Density (pcf)	136.5
Soil Classification	Brown Silty fine Sand, trace medium Sand, trace fine to coarse Gravel

Proposed Arco AM/PM
Valley Center, California
Project No. 14G209

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.

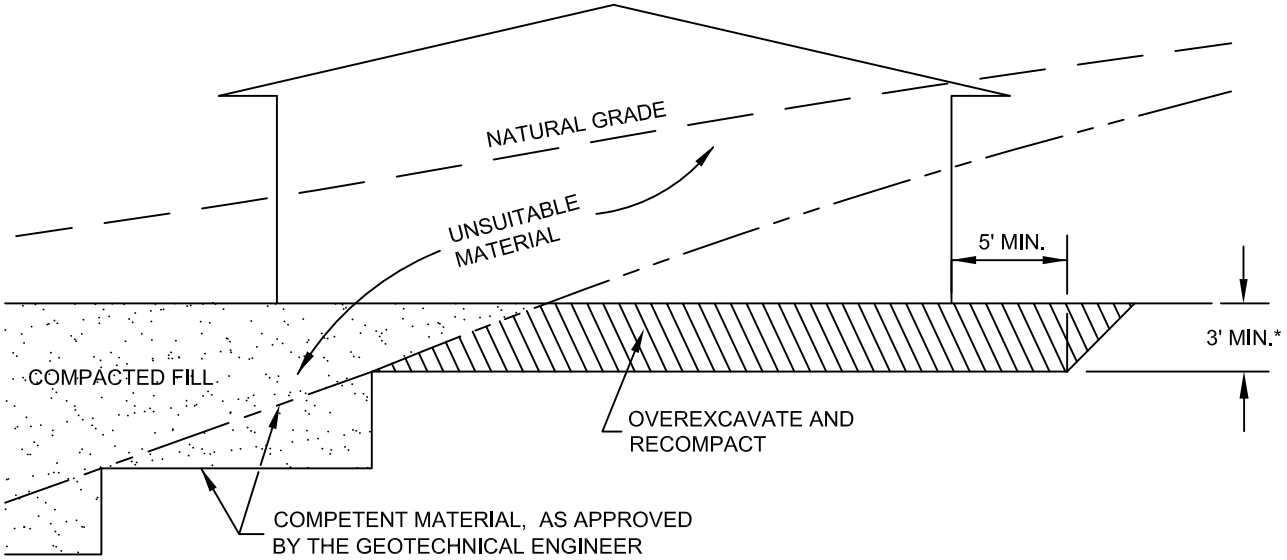
Subdrains

- 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.

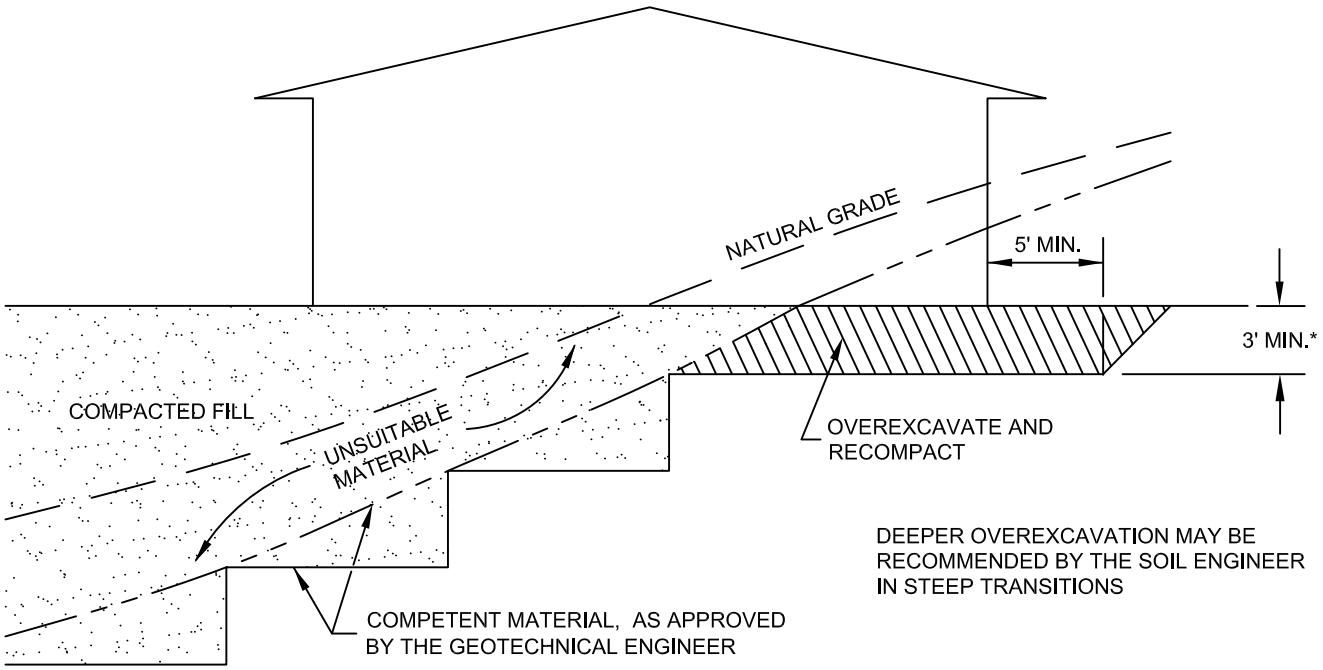
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- 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

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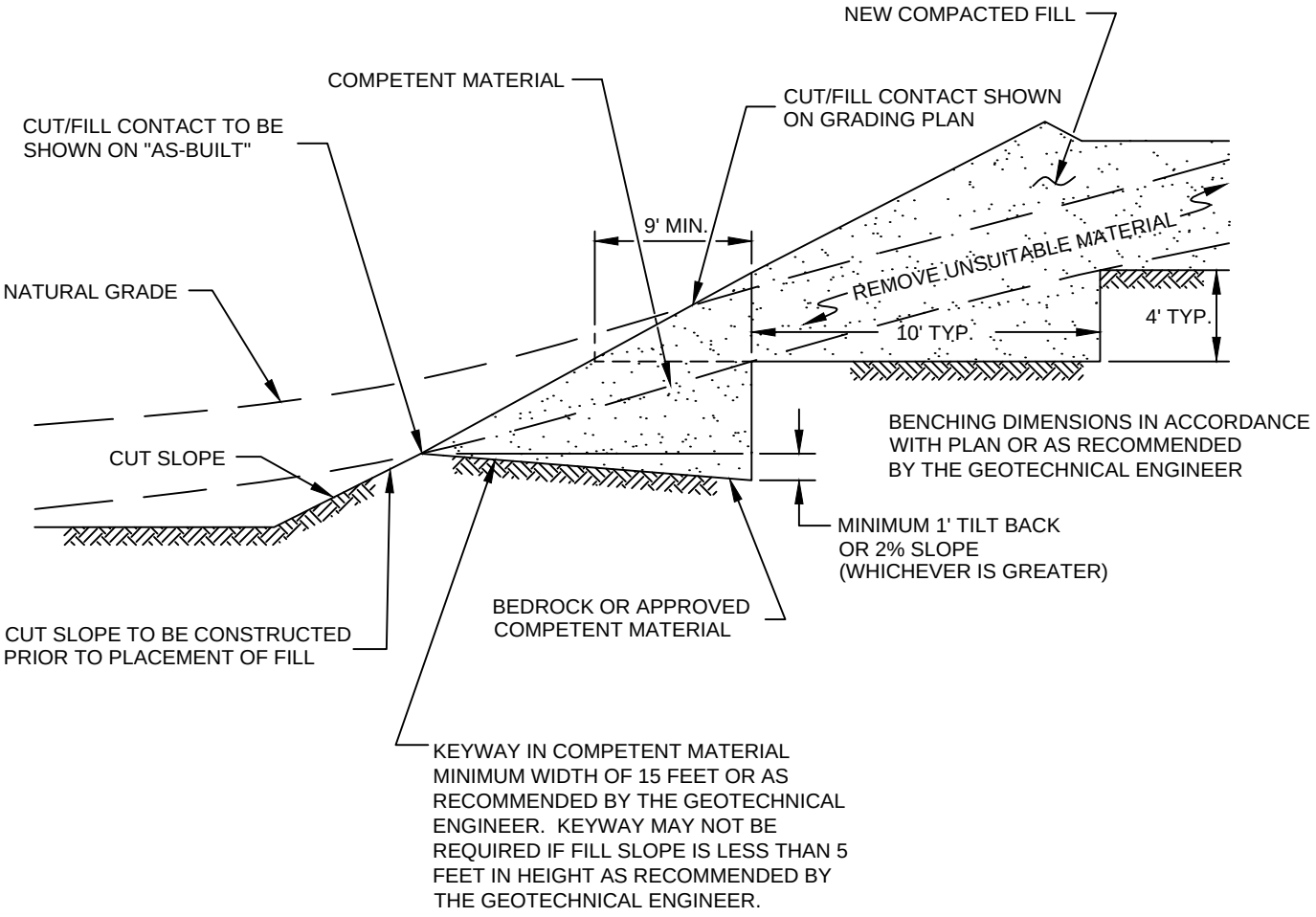
SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

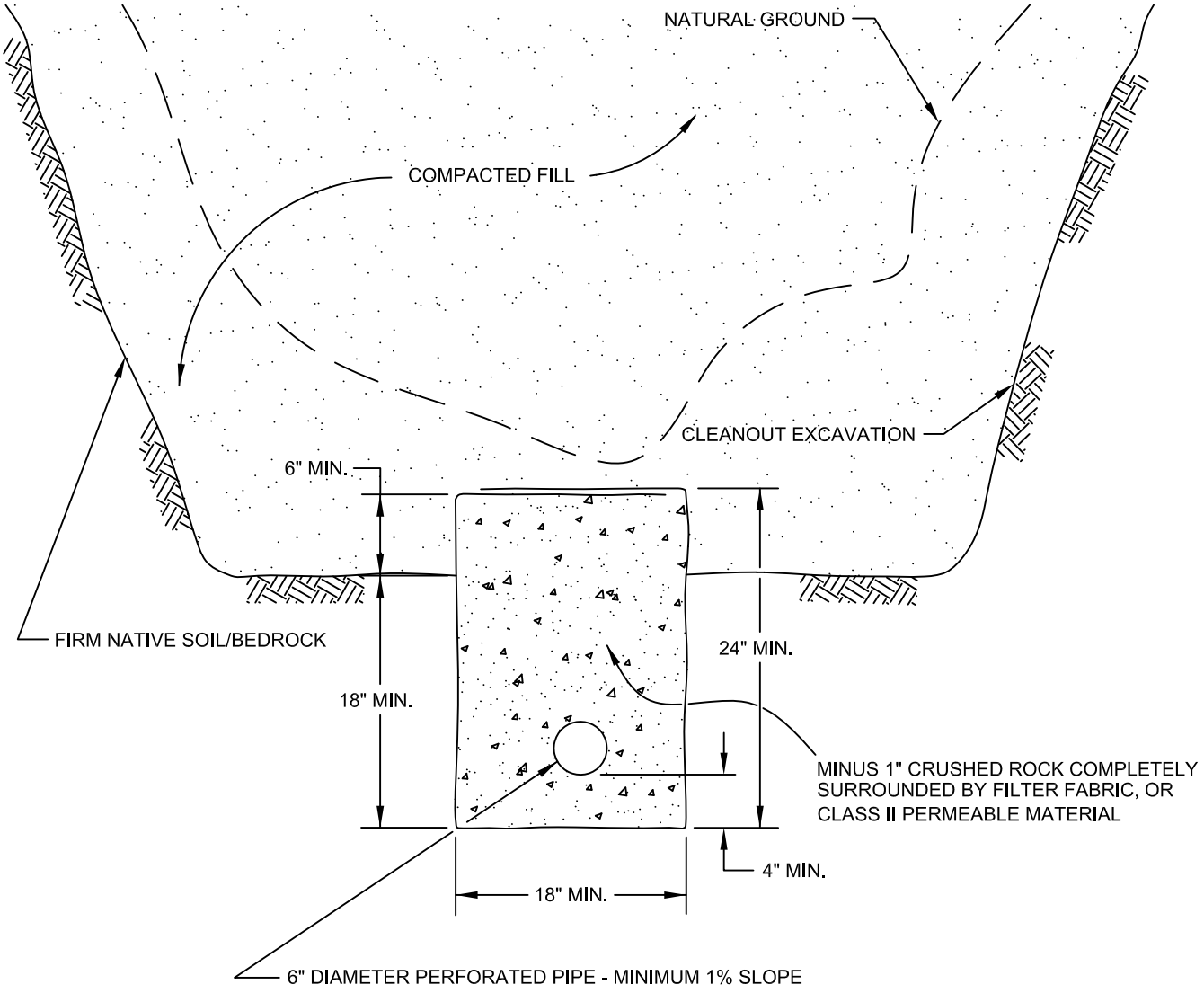
GRADING GUIDE SPECIFICATIONS

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

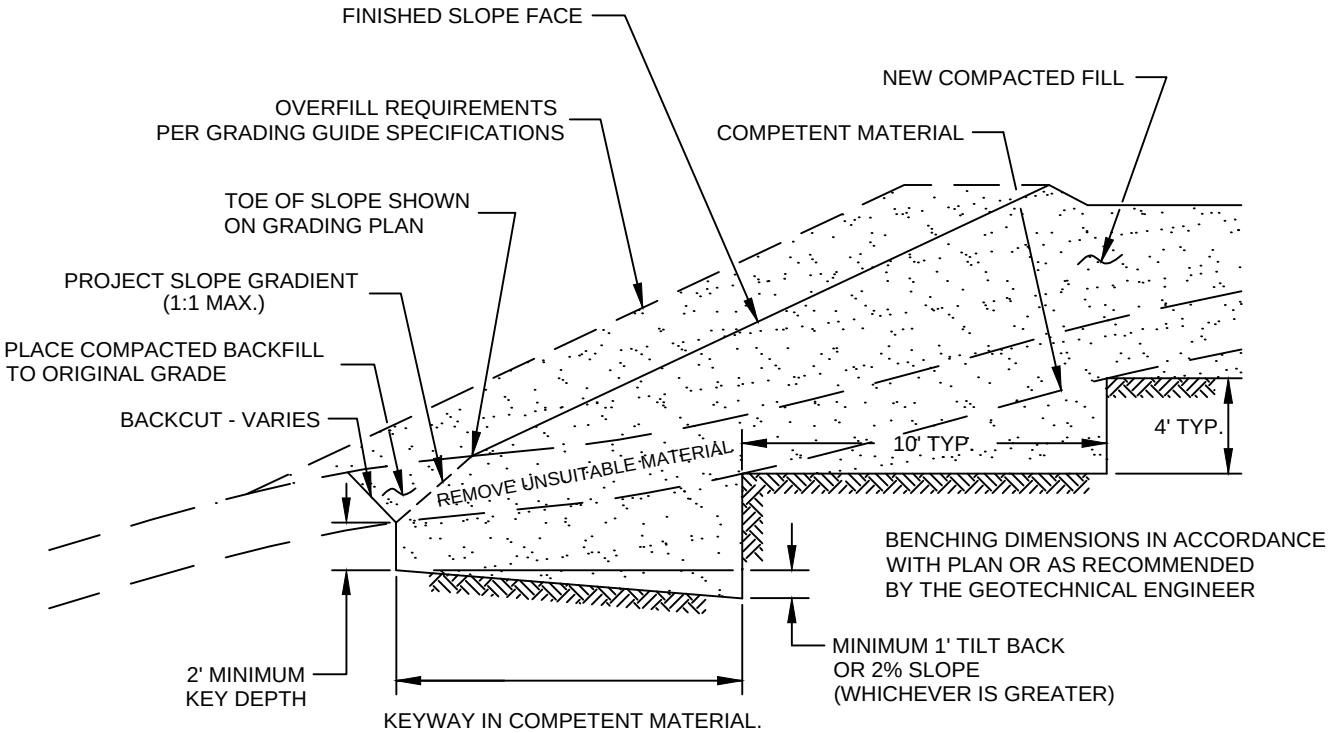
GRADING GUIDE SPECIFICATIONS

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

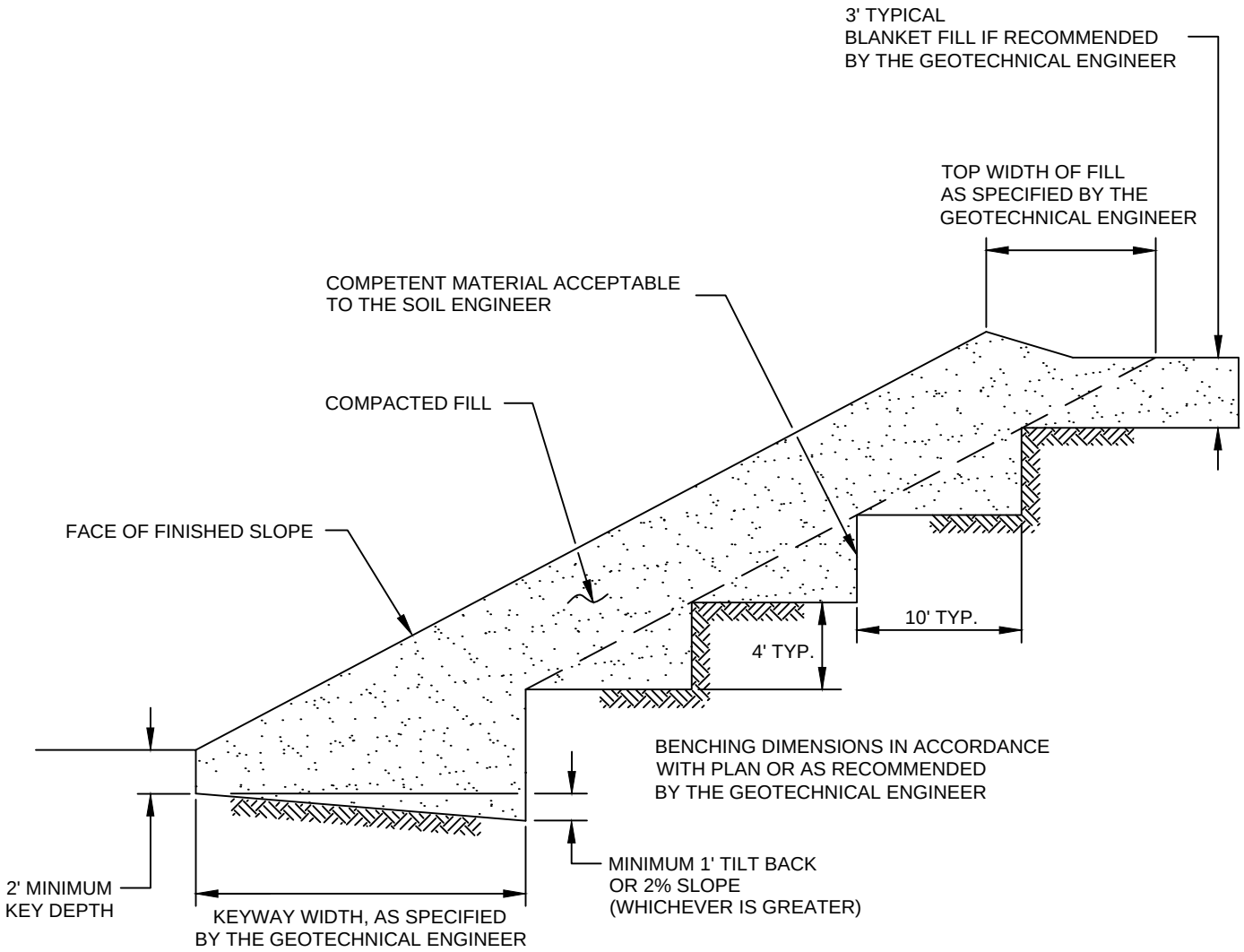
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN
CALIFORNIA
GEOTECHNICAL



STABILIZATION FILL DETAIL

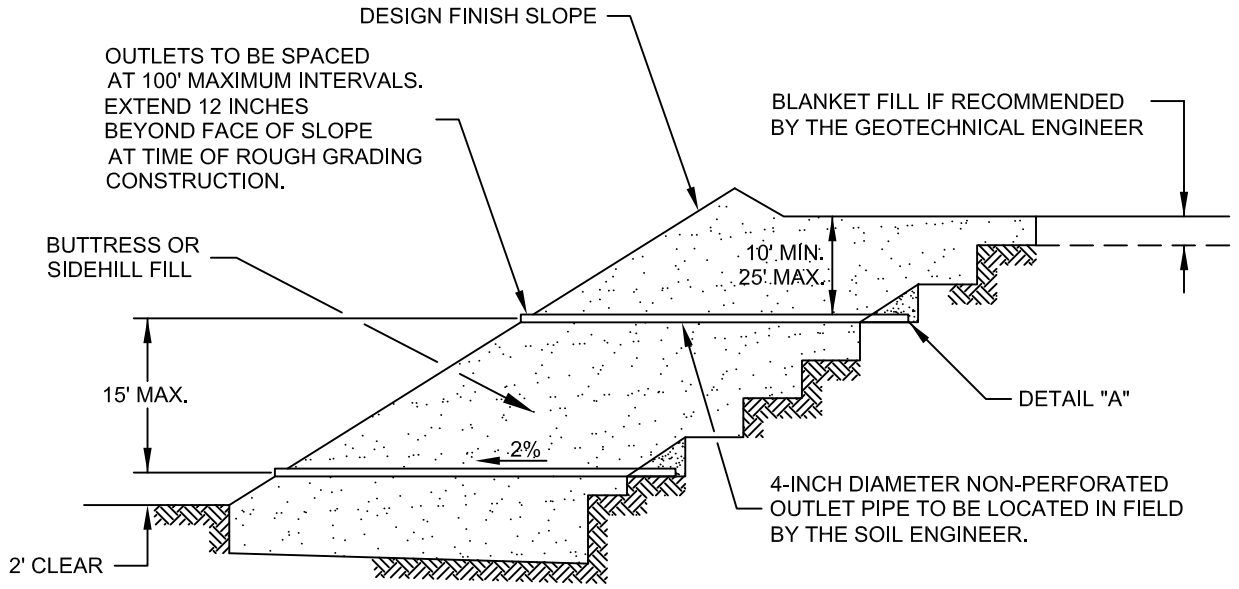
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



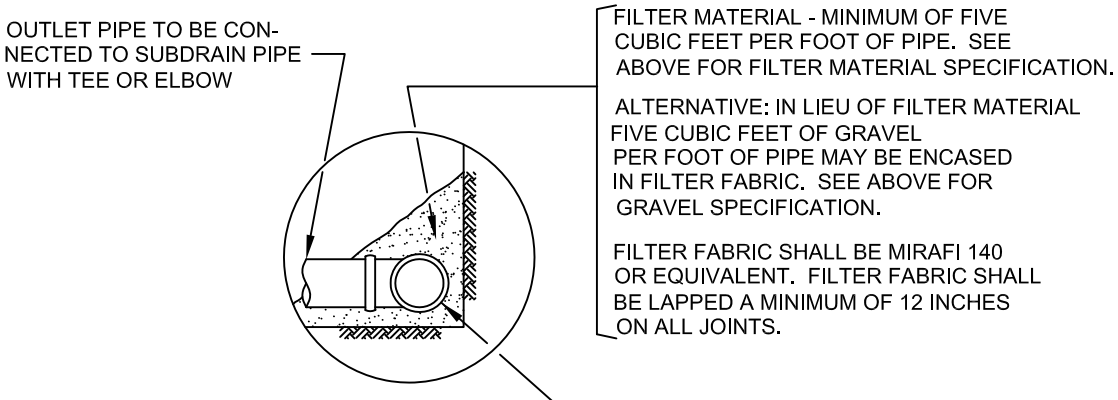
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

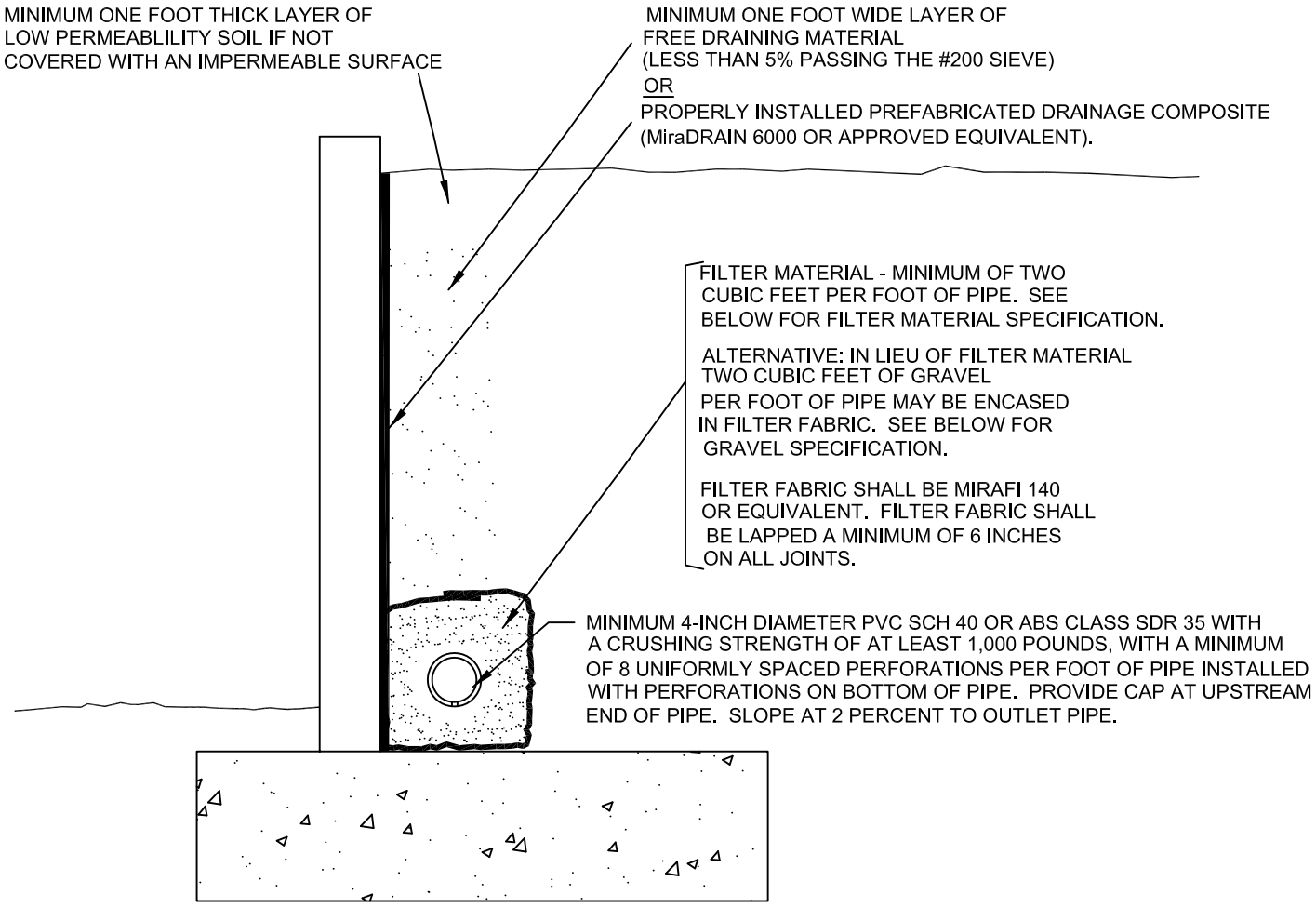
GRADING GUIDE SPECIFICATIONS

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

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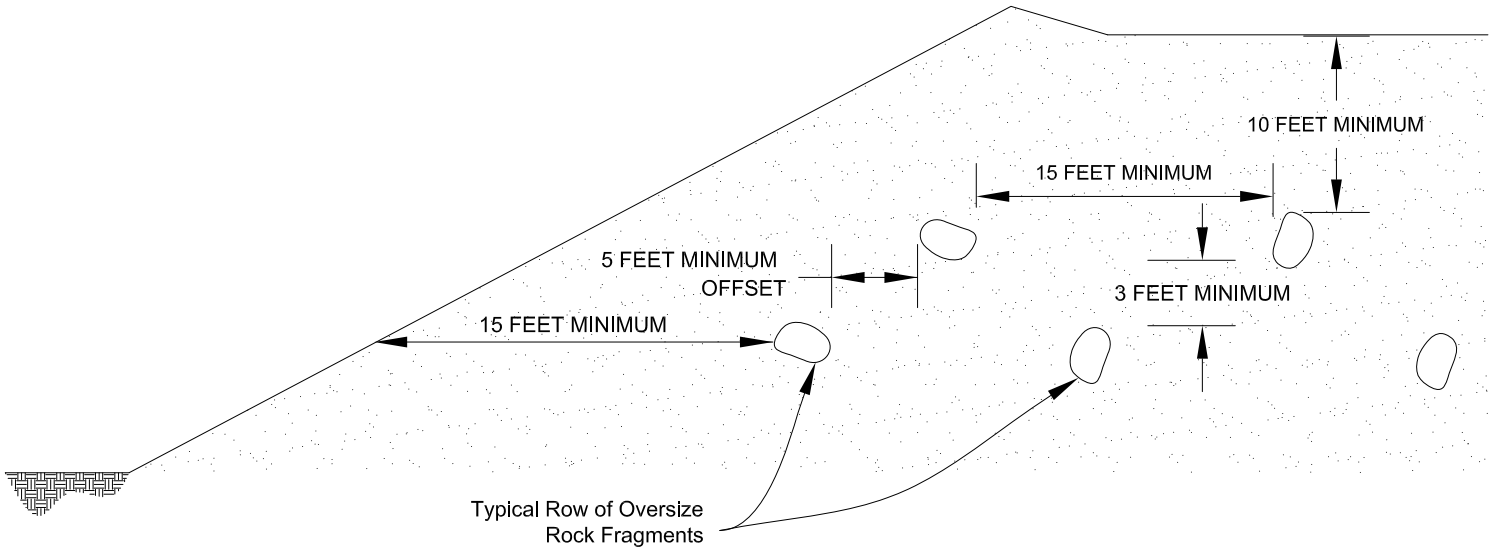
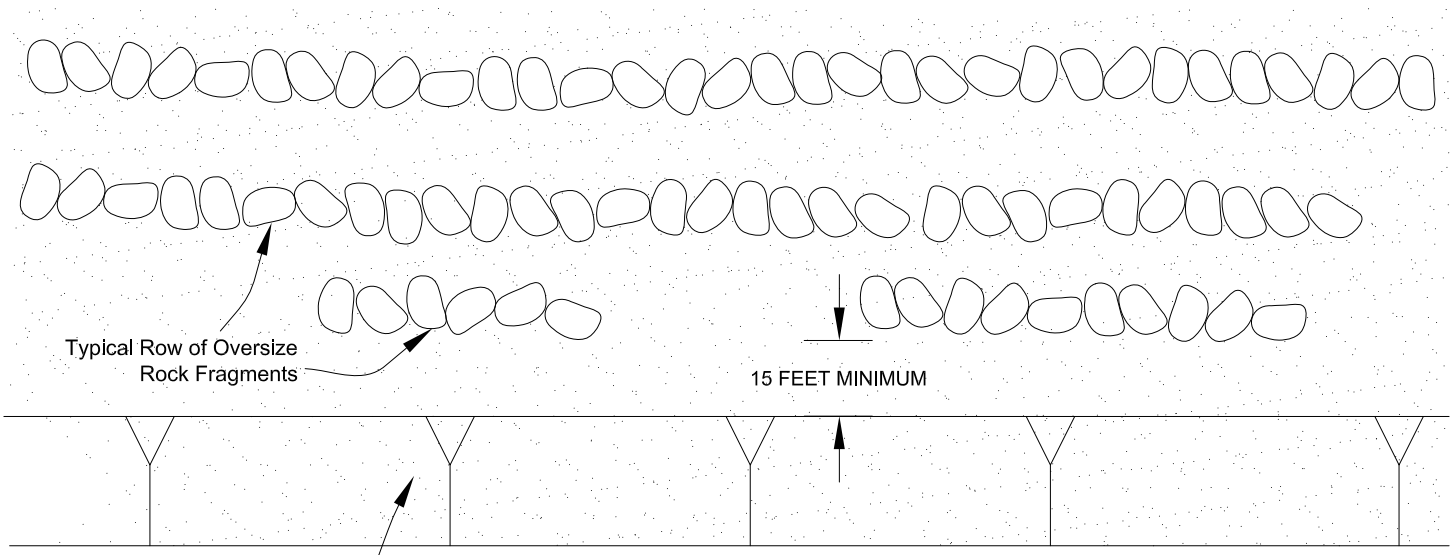
SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

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SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

USGS Design Maps Summary Report

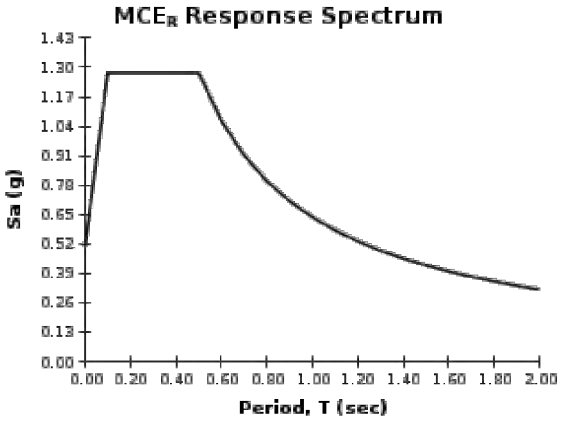
User–Specified Input

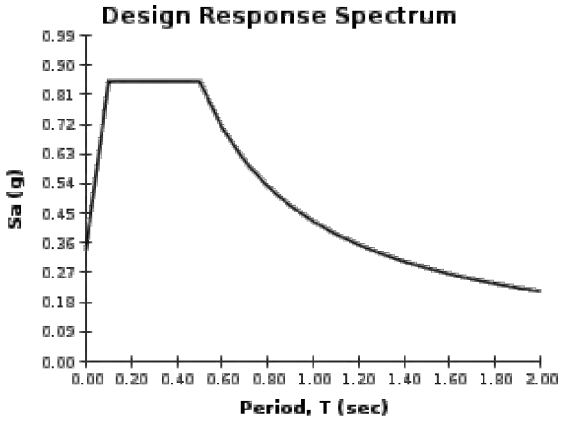
Report Title	Proposed ARCO AM/PM Thu December 11, 2014 18:57:49 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.23071°N, 117.02467°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.275 g	S_{MS} =	1.275 g	S_{DS} =	0.850 g
S_1 =	0.486 g	S_{M1} =	0.639 g	S_{D1} =	0.426 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
<http://geohazards.usgs.gov/designmaps/us/application.php>

SEISMIC DESIGN PARAMETERS
PROPOSED ARCO AM/PM
VALLEY CENTER, CALIFORNIA

DRAWN: ENT
CHKD: GKM
SCG PROJECT
14G209-1
PLATE E-1

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