Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

KA Enterprises C-Store and Car Wash

Permit Application Number: PRJ-1054862

Drawing Number _____, I.O. Number_____

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:

Patric de Boer
Provide Wet Signature and Stamp Above Line

Prepared For:

KA Enterprises
5820 Orbelin Drive, Suite 201
San Diego, CA 92121

Prepared By:

Omega Engineering Consultants
4320 Viewridge Ave, Suite C
San Diego, CA 92113
(858) 634-8620

Date:
08/25/2023

Approved by: City of San Diego Date

The City of SAN DIEGO

Project Name: KA Enteprises C-Store and Car Wash

Table of Contents

- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
- Attachment 4: Copy of Plan Sheets Showing Permanent Storm Water BMPs
- Attachment 5: Project's Drainage Report
- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

Acronyms

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

Certification Page

Project Name: KA Enterprises C-Store and Car Wash
Permit Application PRJ-1054862

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. 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 source control and site design 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 the City Engineer 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

83583 — PE#

03/03/2025 — Expiration Date

Patric T. de Boer

Print Name

Omega Engineering Consultants

Company

8/29/2023

Date

Engineer's Stamp

Project Name: KA Enteprises C-Store and Car Wash

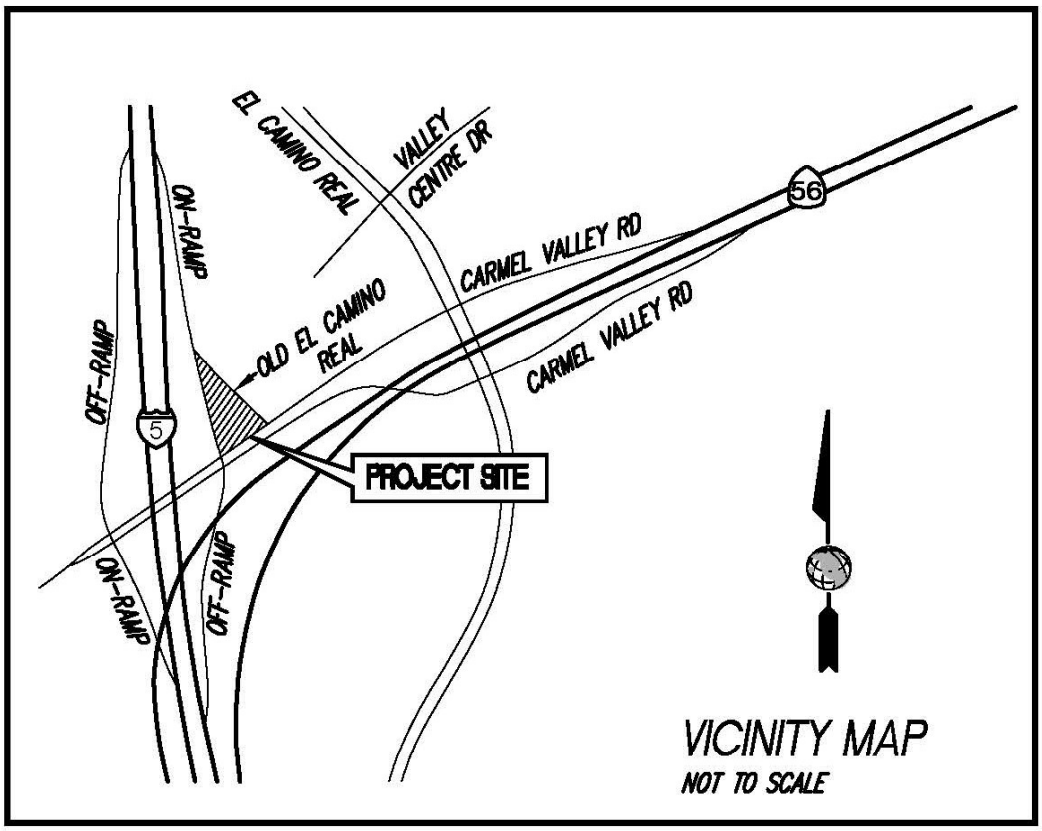
Submittal Record

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 last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	02/01/2022	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	**Initial Submittal**
2	3/21/2023	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	2nd Submittal
3	08/29/2023	☐ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	3rd submittal
4		☐ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	

Project Vicinity Map

Project Name: KA Enterprises C-Store and Car Wash
Permit Application PRJ-1054862



City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

FORM
DS-560
September 2021

Stormwater Requirements Applicability Checklist

Project Address: 3060 Carmel Valley Rd., San Diego, CA 92130 **Project Number:** PRJ-1054862

SECTION 1: Construction Stormwater Best Management Practices (BMP) Requirements

All construction sites are required to implement construction BMPs per the performance standards in the Stormwater Standards Manual. Some sites are also required to obtain coverage under the State Construction General Permit (CGP)[1], administered by the California State Water Resources Control Board.

For all projects, complete Part A - If the project is required to submit a Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP), continue to Part B.

PART A – Determine Construction Phase Stormwater Requirements

1. Is the project subject to California's statewide General National Pollutant Discharge Elimination System (NPDES) permit for Stormwater Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ○ Yes, SWPPP is required; skip questions 2-4. ◉ No; proceed to the next question.

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and/or contact with stormwater?

   ◉ Yes, WPCP is required; skip questions 3-4. ○ No; proceed to the next question.

3. Does the project propose routine maintenance to maintain the original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

   ○ Yes, WPCP is required; skip question 4. ◉ No; proceed to the next question.

4. Does the project only include the following Permit types listed below?

   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, potholing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes, no document is required.

Check one of the boxes below and continue to Part B

○ **If you checked "Yes" for question 1**, an SWPPP is REQUIRED – **continue to Part B**

◉ **If you checked "No" for question 1 and checked "Yes" for question 2 or 3**, a WPCP is REQUIRED. If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to Part B**

○ **If you check "No" for all questions 1-3 and checked "Yes" for question 4,** Part B does not apply, and no document is required. **Continue to Section 2.**

[1] More information on the City's construction BMP requirements as well as CGP requirements can be found at http://www.sandiego.gov/stormwater/regulations/index.shtml

CLEAR FORM

PART B – Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete Part B and continue to Section 2

☐ **1. ASBS**

A. Projects located in the ASBS watershed.

☐ **2. High Priority**

A. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and are not located in the ASBS watershed.
B. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and are not located in the ASBS watershed.

☐ **3. Medium Priority**

A. Projects that are not located in an ASBS watershed or designated as a High priority site.
B. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and are not located in an ASBS watershed.
C. WPCP projects (>5,000 square feet of ground disturbance) located within the Los Peñasquitos watershed management area.

☑ **4. Low Priority**

A. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

Section 2: Construction Stormwater BMP Requirements

Additional information for determining the requirements is found in the Stormwater Standards Manual.

PART C – Determine if Not Subject to Permanent Stormwater Requirements

Projects that are considered maintenance or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Stormwater Standards Manual are not subject to Permanent Stormwater BMPs.

- **If "yes" is checked for any number in Part C**: Proceed to Part F and check "Not Subject to Permanent Stormwater BMP Requirements."
- **If "no" is checked for all the numbers in Part C:** Continue to Part D.

1. Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact stormwater?

   ○ Yes ◉ No

2. Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?

   ○ Yes ◉ No

3. Does the project fall under routine maintenance? Examples include but are not limited to roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay and pothole repair).

   ○ Yes ◉ No

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PART D – PDP Exempt Requirements

PDP Exempt projects are required to implement site design and source control BMPs.

- **If "yes" is checked for any questions in Part D**, continue to Part F and check the box labeled "PDP Exempt."
- **If "no" is checked for all questions in Part D**, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:
   - Are designed and constructed to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
   - Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;
   - Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Stormwater Standards manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Stormwater Standards Manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to next question

PART E – Determine if Project is a Priority Development Project (PDP)

Projects that match one of the definitions below are subject to additional requirements, including preparation of a Stormwater Quality Management Plan (SWQMP).

- **If "yes" is checked for any number in Part E**, continue to Part F and check the box labeled "Priority Development Project."
- **If "no" is checked for every number in Part E**, continue to Part F and check the box labeled "Standard Development Project."

1. **New development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ○ Yes ◉ No

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces 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

3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and beverages for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) 5812), and where the land development creates and/or replaces 5,000 square feet or more of impervious surface. ○ Yes ◉ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ○ Yes ◉ No

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ○ Yes ◉ No

6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ○ Yes ◉ No

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7. **New development or redevelopment discharging directly to an environmentally sensitive area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over the project site), and discharges 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). ○ Yes ◉ No

8. **New development or redevelopment projects of retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ◉ Yes ○ No

9. **New development or redevelopment projects of an automotive repair shop that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534 or 7536-7539. ○ Yes ◉ No

10. **Other Pollutant Generating Project.** These projects are not covered in any of the categories above but involve the disturbance of one or more acres of land and are expected to generate post-construction phase pollutants, including fertilizers and pesticides. This category does not include projects creating less than 5,000 square feet of impervious area and projects containing landscaping without a requirement for the regular use of fertilizers and pesticides (such as a slope stabilization project using native plants). Impervious area calculations need not include linear pathways for infrequent vehicle use, such as emergency maintenance access or bicycle and pedestrian paths if the linear pathways are built with pervious surfaces or if runoff from the pathway sheet flows to adjacent pervious areas. ○ Yes ◉ No

PART F – Select the appropriate category based on the outcomes of Part C through Part E

1. The project is **NOT SUBJECT TO PERMANENT STORMWATER REQUIREMENTS** ○ Yes ◉ No

2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Stormwater Standards Manual for guidance. ○ Yes ◉ No

3. The Project is **PDP EXEMPT**. Site design and source control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance. ○ Yes ◉ No

4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control and structural pollutant control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance on determining if the project requires hydromodification plan management. ◉ Yes ○ No

Rogelio Ruiz
Name of Owner or Agent

Staff Engineer
Title

Rogelio Ruiz
Signature

09/09/2022
Date

CLEAR FORM

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Project Name: KA Enteprises C-Store and Car Wash

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: KA Enterprises C-Store and Car Wash		
Permit Application Number: PRJ-1054862		Date: 10/06/2022
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: KA Enteprises C-Store and Car Wash

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☐ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does not apply:		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody. Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

PROJECT IS NOT HMP EXEMPT. CALCULATIONS AND DMA SHEET ARE PROVIDED IN ATTACHMENT 1

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Project Name: KA Enteprises C-Store and Car Wash

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	KA Enterprises C-Store and Car Wash
Project Address	3060 Carmel Valley Rd. San Diego, CA 92130
Assessor's Parcel Number(s) (APN(s))	307-240-07
Permit Application Number	PRJ-1054862
Project Watershed	Select One: ☐ San Dieguito River ☑ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	906.10
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	0.88 Acres (38,483 Square Feet)
Area to be disturbed by the project (Project Footprint)	0.77 Acres (33,541 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.56 Acres (24,245 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.21 Acres (9,296 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	8 %

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

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

- [x] Existing development
- [ ] Previously graded but not built out
- [ ] Agricultural or other non-impervious use
- [ ] Vacant, undeveloped/natural

Description / Additional Information:

The existing development consists of a convenience store, gas station canopy and asphalt parking lot on the lower portion of the lot. The upper portion of the lot has an asphalt parking lot. The site is currently 68% impervious with a general slope of 4.1%.

Existing Land Cover Includes (select all that apply):

- [x] Vegetative Cover
- [ ] Non-Vegetated Pervious Areas
- [x] Impervious Areas

Description / Additional Information:

The impervious areas consist of a convenience store, gas station canopy, and asphalt parking lots. The pervious areas consist of landscape area and undeveloped portions of the site.

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

- [ ] NRCS Type A
- [ ] NRCS Type B
- [ ] NRCS Type C
- [x] NRCS Type D

Approximate Depth to Groundwater:

- [ ] Groundwater Depth < 5 feet
- [ ] 5 feet < Groundwater Depth < 10 feet
- [x] 10 feet < Groundwater Depth < 20 feet
- [ ] Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- [ ] Watercourses
- [ ] Seeps
- [ ] Springs
- [ ] Wetlands
- [x] None

Description / Additional Information:

N/A

Form I-3B Page 3 of 11

Description of Existing Site Topography and Drainage

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. If runoff from offsite is conveyed through the site? If yes, quantification of 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 storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the 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.

Descriptions/Additional Information

1. The existing drainage conveyance is urban and consists of overland flow and surface flow along the asphalt parking lot.

2. No offsite runoff is expected to enter the site.

3. The existing site does not have an on-site storm drain system. The site drains via overland flow and surface flow to the curb inlets on Carmel Valley Road.

4. The entire site drains to a single discharge point.

The northerly portion of the lot drains towards the southerly developed portion of the lot via an asphalt swale. The runoff then drains via surface flow to Carmel Valley Road and ultimately to the catch basin on the northeasterly corner of the intersection of Carmel Valley Road and the on-ramp to Interstate 5 North. This point is referred to as Discharge Point # 1 in the Drainage Study.

The existing conditions has a 100-year flow of 2.86 cfs for Discharge Point # 1.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes to demo the existing convenience store and construct a new convenience store. In addition, a car wash will be constructed along with its associated improvements. The existing canopy will remain. The proposed improvements include landscape, on-site storm drain system, tree wells subsurface detention facility and Modular Wetland System. The subsurface detention facility and Modular Wetland System will be located along the southerly portion of the site. The conveyed runoff will discharge at the public storm drain system on Carmel Valley Road.

Off-site street improvements include the driveways, sidewalk, and curb and gutter.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

The impervious features of the site consist of building roof, gas station canpy, driveways and hardscape.

List/describe proposed pervious features of the project (e.g., landscape areas):

The pervious features of the site consist of landscape areas and tree wells.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

The proposed project will change the site topography but will keep the same discharge points as the existing conditions.

Form I-3B Page 5 of 11

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 and 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.

Description / Additional Information:

The site was analyzed as a single drainage basin that encompasses the proposed convenience store, car wash, landscape and hardscape. The site will modify the drainage patterns of the site but will keep the same discharge point as the existing conditions.

The project proposes to add an on-site storm drain system with the addition of brow ditches, gutters and catch basins to hep convey runoff to the discharge point.

The runoff generated by the majority of the site will drain to a series of catch basins and drain towards the southwesterly corner of the site where it conveys to a subsurface detention facility. The subsurface detention facility will consist of a 900-sf gravel filled, subsurface detention with a row of 8 Stormtech SC-740 storage arches. The detention system is assumed to be full during the peak of the 100-year storm. No attenuation of peak flows is assumed in this analysis. Following detention and treatment, the flow will drain to an area drain located on the southeasterly landscape area. Finally, a 12” pipe will hard-connect to the existing curb inlet on the public sidewalk. This point is referred to as Discharge Point # 1 in this report.

The southeasterly corner of the site drains to the landscape area located on the southeasterly corner of the site. The runoff then drains to an area drain where it confluences with the runoff discharged from the subsurface detention basin.

See Drainage Study included in Attachment 5 for calculations.

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [ ] Interior parking garages
- [x] Need for future indoor & structural pest control
- [x] 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
- [x] Vehicle and equipment cleaning
- [ ] Vehicle/equipment repair and maintenance
- [x] Fuel dispensing areas
- [ ] Loading docks
- [x] Fire sprinkler test water
- [ ] Miscellaneous drain or wash water
- [x] Plazas, sidewalks, and parking lots

Description/Additional Information:

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) The runoff generated by the site drains at the public inlets on Carmel Valley Rd., thence to Los Penasquitos Lagoon and ultimately to the Pacific Ocean.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations Los Penasquitos Lagoon: BIOL, EST, MAR, MIGR, RARE, REC1, REC2, SHELL, WILD
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations There are no ASBS receiving waters downstream of the project's discharge locations.
Provide distance from project outfall location to impaired or sensitive receiving waters The project's outfall location is approximately 0.25 miles from the Los Penasquitos Lagoon receiving water.
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The site proposes a permanent post-construction Modular Wetland System BMP. The site's discharge point lies approximately 500 feet upstream of City owned MHPA areas identified by the City of San Diego General Plan Conservation Element. The site does not drain to the MHPA area.

Project Name: KA Enteprises C-Store and Car Wash

Form I-3B Page 8 of 11		
Identification of Receiving Water Pollutants of Concern		
List any 303(d) impaired water bodies 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 (Refer to Appendix K)	**Pollutant(s)/Stressor(s) (Refer to Appendix K)**	**TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)**
Los Penasquitos Lagoon	Sedimentation/Siltation	Estimated Completion 2019
	Toxicity	Estimated Required

Identification of Project Site Pollutants*			
*Identification of project site pollutants 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 anticipated from the project site based on all proposed use(s) of the site (see 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	☐	☑	☐

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ 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 for the watershed in which the project resides.

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

N/A

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*
*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

The project is located 0.30 miles from the nearest CCSYA. See attached CCSYA exhibit.

Form I-3B Page 10 of 11

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.

The POC occurs offsite in the existing curb inlet on Carmel Valley Road where all the site flow confluence.

Has a geomorphic assessment been performed for the receiving channel(s)?

☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)

☐ Yes, the result is the low flow threshold is $0.1Q_2$

☐ Yes, the result is the low flow threshold is $0.3Q_2$

☐ Yes, the result is the low flow threshold is $0.5Q_2$

If a geomorphic assessment has been performed, provide title, date, and preparer:

N/A

Discussion / Additional Information: (optional)

N/A

Form I-3B Page 11 of 11

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.

The site was the location of an underground storage gas tank leak and is shown on the map of contaminated sites in the BMP Design Manual. No infiltration is proposed due to this. See case # T06019720520 on GeoTracker.waterboards.ca.gov

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.

N/A

Project Name: KA Enteprises C-Store and Car Wash

Source Control BMP Checklist for PDPs	Form I-4B

Source Control BMPs

All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) 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 and/or Appendix E of the 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 may 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 material storage proposed.			
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 outdoor storage areas proposed.			
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:			

Project Name: KA Enteprises C-Store and Car Wash

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☐ Yes	☐ No	☑ N/A
Need for future indoor & structural pest control	☑ Yes	☐ No	☐ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☑ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☑ Yes	☐ No	☐ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☑ Yes	☐ No	☐ N/A
Miscellaneous Drain or Wash Water	☑ Yes	☐ No	☐ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ 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 all "No" answers shown above.

The potential sources of runoff pollutants checked as "N/A" are not proposed in the project.

Project Name: KA Enteprises C-Store and Car Wash

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) 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 and/or Appendix E of the 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 may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

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: No natural drainage pathways on-site.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☑ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☑ Yes	☐ No	☐ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☑ Yes	☐ No	☐ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☑ Yes	☐ No	☐ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.2 not implemented: No natural areas or vegetation exist on-site.			

Project Name: KA Enteprises C-Store and Car Wash

Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.3 not implemented: Impervious areas have been designed to the minimum areas and widths necessary for the proposed use.			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented: Soil compaction will be minimized on landscape areas and location of trees.			
4.3.5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: The site does not propose sufficient pervious open space to implement impervious area dispersion.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☐ No	☑ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☑ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: KA Enteprises C-Store and Car Wash

Form I-5B Page 3 of 4			
Site Design Requirement	**Applied?**		
4.3.6 Runoff Collection	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.6 not implemented: Sufficient area is not available on site for the proper implementation of runoff collection.			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: The proposed site is a three-story self-storage facility that will present a low demand for harvested rainwater. The low demand does not justify implementing harvesting and use of precipitation, see Attachment 1e.			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: KA Enteprises C-Store and Car Wash

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:
SEE DMA MAP FOR ALL SITE DESIGN BMPS

Project Name: KA Enteprises C-Store and Car Wash

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). 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 City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form 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 (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

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.

The steps of the BMP design manual were followed to select and design the pollutant BMPs.

The DMAs were delineated based on the proposed site design resulting in three areas that require calculations of a design capture volume. The design capture volume is calculated using the method in Appendix B of the BMP design manual.

The first consideration was the feasibility of Harvest and Reuse. Using the calculated DCV and the City of San Diego Worksheet B.3-1, harvest and reuse was considered infeasible due to demand being less than the required DCV.

The second consideration is the feasibility of infiltration. The Soil Hydrologic Group for the site was selected as Group D per the County of San Diego Hydrology Manual. Additionally, the site was the location of an underground tank leak remediation and is shown on the map of contaminated sites in the BMP Design Manual. In addition, the geotechnical investigation does not recommend infiltration due to the historic use and proposed use as a fuel facility. This rules out the use of infiltration.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of 4

(Continued from page 1)

With infiltration and harvest and reuse both infeasible, a 900-sf subsurface detention facility with 8 StormTech arches (BMP-1) and a Modular Wetland System (BMP-2) were chosen for DMA-1. The project will store the DCV in the subsurface detention facility and treat the low flow with the Modular Wetland System.

DMA- 2 and DMA-3 will be treated with 15' diameter tree wells.

Form I-6 Page 1 of 4 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No. Sheet C-3	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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 form DS-563	Andrew J. Kann Omega Engineering Consultants (858) 634-8620
Who will be the final owner of this BMP?	KA Enterprises (858) 404-6091
Who will maintain this BMP into perpetuity?	KA Enterprises (858) 404-6091
What is the funding mechanism for maintenance?	KA Enterprises (858) 404-6091

Form I-6 Page 2 of 4 (Copy as many as needed)
Structural BMP ID No. BMP-1
Construction Plan Sheet No. Sheet C-3
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP-1 consists of a 900-sf gravel filled, detention facility with a row of 8 StormTech SC-740 storage arches. BMP-1 will store the entire DCV (931 CF) of DMA-1. BMP-1 will discharge via a low flow orifice to the Modular Wetland system for treatment. See attached StormTech Manufacturer Spreadsheet for sizing of detention facility.

Project: **3060 Carmel Valley Rd.**

Chamber Model -	SC-740	
Units -	**Imperial**	Click Here for Metric
Number of chambers -	8	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	29.00	ft
Amount of Stone Above Chambers -	6	in
Amount of Stone Below Chambers -	6	in

Include Perimeter Stone in Calculations

Area of system - 900 sf Min. Area - 270 sf min. area

StormTech SC-740 Cumulative Storage Volumes

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Total Chamber (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch & St (cubic feet)	Cumulative Chamber (cubic feet)	Elevation (feet)
42	0.00	0.00	30.00	30.00	1480.56	32.50
41	0.00	0.00	30.00	30.00	1450.56	32.42
40	0.00	0.00	30.00	30.00	1420.56	32.33
39	0.00	0.00	30.00	30.00	1390.56	32.25
38	0.00	0.00	30.00	30.00	1360.56	32.17
37	0.00	0.00	30.00	30.00	1330.56	32.08
36	0.05	0.44	29.82	30.26	1300.56	32.00
35	0.16	1.30	29.48	30.78	1270.30	31.92
34	0.28	2.26	29.10	31.35	1239.52	31.83
33	0.60	4.83	28.07	32.90	1208.16	31.75
32	0.80	6.41	27.43	33.85	1175.27	31.67
31	0.95	7.61	26.96	34.56	1141.42	31.58
30	1.07	8.60	26.56	35.16	1106.85	31.50
29	1.18	9.44	26.22	35.67	1071.70	31.42
28	1.27	10.13	25.95	36.08	1036.03	31.33
27	1.36	10.84	25.66	36.50	999.96	31.25
26	1.45	11.63	25.35	36.98	963.45	31.17
25	1.52	12.20	25.12	37.32	926.47	31.08
24	1.58	12.66	24.94	37.60	889.15	31.00
23	1.64	13.14	24.74	37.88	851.56	30.92
22	1.70	13.60	24.56	38.16	813.67	30.83
21	1.75	14.02	24.39	38.41	775.52	30.75
20	1.80	14.42	24.23	38.65	737.10	30.67
19	1.85	14.84	24.06	38.90	698.45	30.58
18	1.89	15.14	23.94	39.09	659.55	30.50
17	1.93	15.47	23.81	39.28	620.46	30.42
16	1.97	15.80	23.68	39.48	581.18	30.33
15	2.01	16.08	23.57	39.65	541.70	30.25
14	2.04	16.36	23.46	39.82	502.05	30.17
13	2.07	16.60	23.36	39.96	462.23	30.08
12	2.10	16.84	23.26	40.10	422.27	30.00
11	2.13	17.05	23.18	40.23	382.17	29.92
10	2.15	17.23	23.11	40.34	341.94	29.83
9	2.18	17.42	23.03	40.45	301.60	29.75
8	2.20	17.59	22.97	40.55	261.15	29.67
7	2.21	17.66	22.94	40.60	220.60	29.58
6	0.00	0.00	30.00	30.00	180.00	29.50
5	0.00	0.00	30.00	30.00	150.00	29.42
4	0.00	0.00	30.00	30.00	120.00	29.33
3	0.00	0.00	30.00	30.00	90.00	29.25
2	0.00	0.00	30.00	30.00	60.00	29.17
1	0.00	0.00	30.00	30.00	30.00	29.08

Form I-6 Page 3 of 4 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No. Sheet C-3	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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) BF-3	
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 form DS-563	Andrew J. Kann Omega Engineering Consultants (858) 634-8620
Who will be the final owner of this BMP?	KA Enterprises (858) 404-6091
Who will maintain this BMP into perpetuity?	KA Enterprises (858) 404-6091
What is the funding mechanism for maintenance?	KA Enterprises (858) 404-6091

Form I-6 Page 4 of 4 (Copy as many as needed)
Structural BMP ID No. BMP-2
Construction Plan Sheet No. Sheet C-3
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP-2 consists of a Modular Wetland System model # MWS-L-4-4-C that will treat the detained stormwater on BMP-1 via flow-thru requirements of the Modular Wetland System. The stormdrain system will discharge via a 23/32" low flow orifice to the MWS. This will provide a flow rate of 0.033 CFS which is lower than the treatment flow rate of 0.052 CFS of the model MWS-L-4-4-C.

Drawdown Calcs based on treatment volume = 931 CF / [2*0.033 CFS*(3600 sec/hr)]
= 3.91 hours

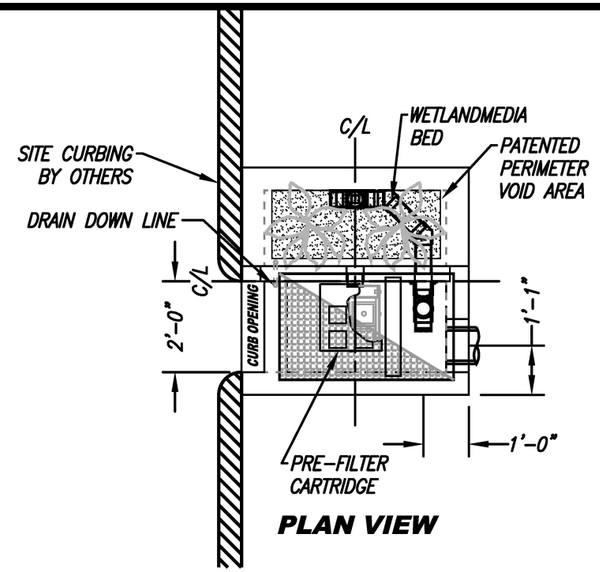
See Attached orifice size spreadsheet and MWS-L-4-4-C Standard Detail.

Orifice Sizing Calculation

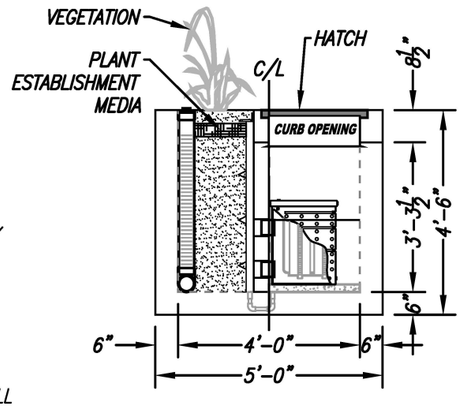
TOTAL PONDING HEIGHT	DIAMETER (in)	Area (sf)	PONDING HEIGHT-RADIUS	$Q_{ORIFICE}$	$Q_{INTENDED}$
5.5	0.710	0.003	5.470	0.033	0.052

Directions:
Enter Intended Outflow (for reference only)
Enter total ponding height
Modify Diameter of orifice until $Q_{ORIFICE} = Q_{INTENDED}$

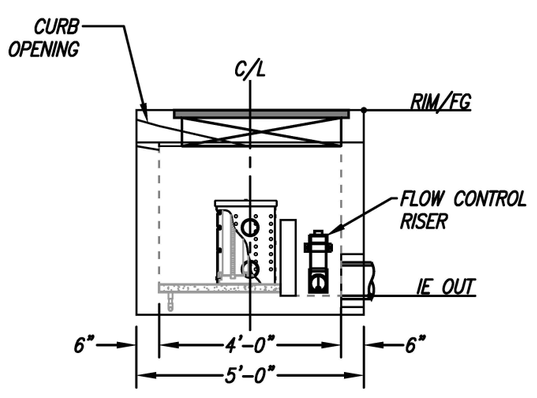
SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	24" X 42"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			



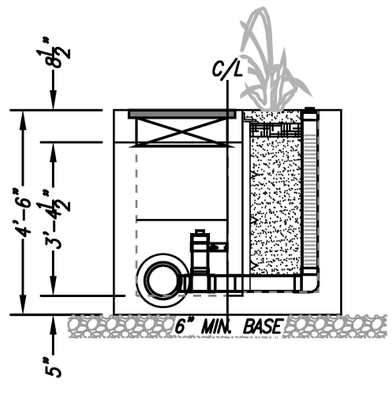
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

INSTALLATION NOTES

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4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING MODULAR WETLANDS FOR ACTIVATION OF UNIT. MANUFACTURES WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A MODULAR WETLANDS REPRESENTATIVE.

GENERAL NOTES

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

TREATMENT FLOW (CFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

Bio Clean
A Forterra Company

MWS-L-4-4-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

	City of San Diego **Development Services** 1222 First Ave., MS-501 San Diego, CA 92101	**Permanent BMP Construction** **Self Certification Form**	**FORM** **DS-563** **December 2016**

Date Prepared: 10/06/2022	Project No./Drawing No.: PRJ-1054862
Project Applicant: Patric de Boer	Phone: (858) 634-8620
Project Address: 3060 Carmel Valley Rd., San Diego, CA 92130	
Project Name: KA Enterprises C-Store and Car Wash	

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Standards Manual documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for Priority Development Projects in order to comply with the City's Storm Water ordinances and applicable San Diego Regional MS4 Permit. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

Certification:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control, hydromodification, and treatment control BMP's required per the Storm Water Standards Manual; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and San Diego Regional MS4 Permit.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____

Date of Signature: _____

Printed Name: Patric de Boer

Title: Project Engineer

Phone No. (858) 634-8620

Engineer's Stamp

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Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: KA Enteprises C-Store and Car Wash

Indicate which Items are Included:

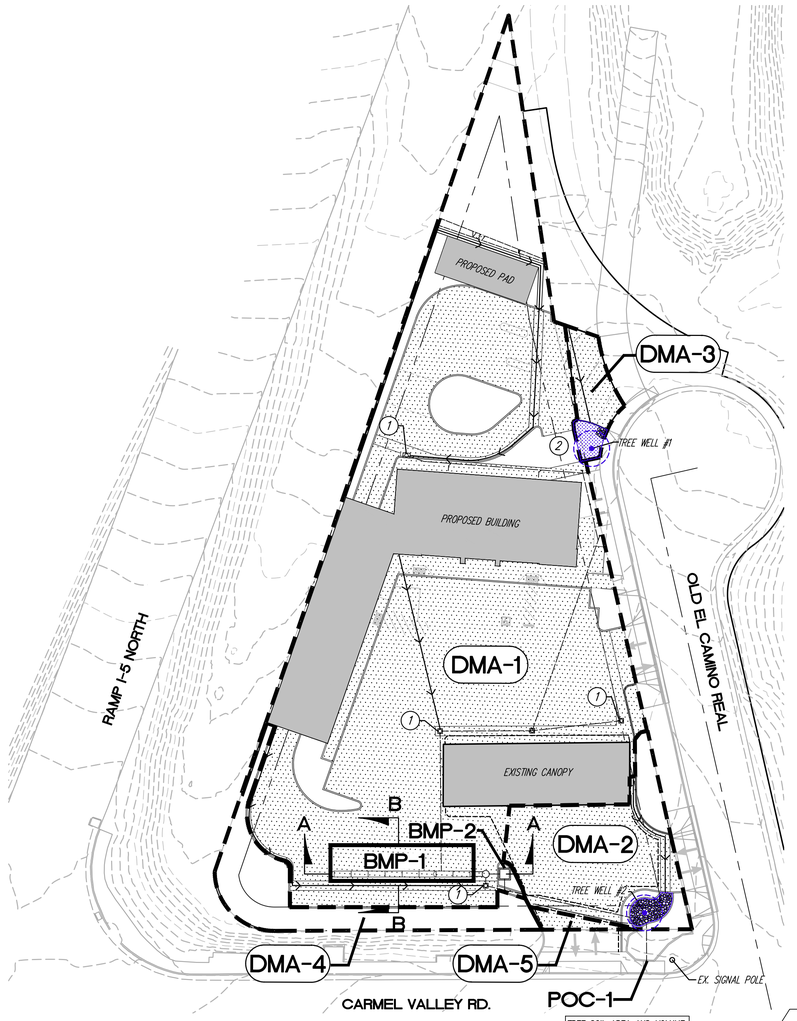
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

Project Name: KA Enteprises C-Store and Car Wash

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

The DMA Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] 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 Form I-3B)
- [x] Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)



DMA DATA TABLE

DMA-NO.	TOT. AREA (SF)	IMPERVIOUS (%)	DESIGN DCV (CF)	TYPE/TREATED BY
DMA-1	32,508	75	931	BMP-1 / BMP-2
DMA-2	3,624	86	71	TREE WELL #2 (15" DIA) (SITE DESIGN BMP)
DMA-3	745	83	23	TREE WELL #1 (15" DIA) (SITE DESIGN BMP)
DMA-4	2,264	0	–	SELF-MITIGATING
DMA-5	195	100	–	DEMINIMIS
TOTAL DCV OF SITE			1,025	

TREATMENT BMP DATA TABLE

BMP-#	TREATING	PROPOSED FOOTPRINT	PROPOSED VOLUME	DESCRIPTION
BMP-1	DMA-1	900 SF	1,480 CF	GRAVEL FILLED, DETENTION FACILITY W/ 8 SC-740 STORAGE ARCHES
BMP-2	DMA-1	4'x4'	N/A	PROPRIETARY BIOFILTRATION FACILITY MODULAR WETLAND MWS-L-4-4-C

STRUCTURAL BMP DATA TABLE

BMP#	TRIBUTARY AREA	DESCRIPTION
BMP-2	DMA-1	BIOCLEAN MODULAR WETLANDS SYSTEM MODEL: MWS-L-4-4-L REQ'D FLOWRATE= 0.033 CFS PROVIDED FLOWRATE= 0.052 CFS

SIDE DESIGN BMP – TREE WELL DATA TABLE

TRIBUTARY BASIN	CANOPY DIAMETER	# OF TREES	AMENDED SOIL DEPTH	PROPOSED AMENDED SOIL VOLUME (CF)	REQUIRED MIN. AMENDED SOIL VOLUME (CF)	TREE WELL VOLUME REDUCTION (CF/TREE)	TOTAL DCV REDUCTION CF
DMA-2	15 FT	1 (*)	2.5 FT	400 CF	353 CF	200 CF	71
DMA-3	15 FT	1 (*)	2.5 FT	400 CF	353 CF	200 CF	23
						TOTAL SITE DCV	1,025
						PERCENT OF DCV TREATED BY TREES	9.1%

(*) SITE DESIGN BMP TREE WELLS TO BE INSTALLED PER SDL-101.
ROOT BARRIERS PER SDL-106 TO BE ADDED WHERE TREE TRUNK IS WITHIN 10' OF ADJACENT HARDSCAPE

BMP INSPECTION NOTES

CONTRACTOR MUST CONTACT ENGINEER FOR INSPECTION OF BMPS AT THE FOLLOWING STAGES OF CONSTRUCTION:

-AFTER EXCAVATION, PRIOR TO GRAVEL/CHAMBER PLACEMENT
-AFTER PLACEMENT OF LOWER 6" OF GRAVEL, CHAMBER AND OUTLET STRUCTURE, PRIOR TO COVERING CHAMBER
-AFTER PLACEMENT OF OUTLET CONTROL STRUCTURE INSIDE MANHOLE

SOURCE CONTROL BMP NOTES

ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE UTILIZED

A. ALL ONSITE INLETS TO BE MARKED "NO DUMPING" OR SIMILAR AND ALL OPERATIONAL PRECAUTIONS TO AVOID NON STORM WATER DISCHARGE SHALL BE FOLLOWED PER THE CITY'S BMP DESIGN MANUAL.

B. PROPOSED REFUSE AREA WILL REMAIN COVERED AND PROTECTED FROM WIND DISPERSAL. SIGNS SHALL BE PLACED WITH WORDS "DO NOT DUMP HAZARDOUS MATERIALS OR LIQUIDS HERE" OR SIMILAR. OWNER SHALL BE RESPONSIBLE TO KEEP THE AREA CLEAN OF LITTER AND SPILLS.

C. OWNER TO BE RESPONSIBLE FOR SWEEPING PLAZAS, SIDEWALKS, AND PARKING LOTS. THIS IS TO BE DONE REGULARLY AND AS NEEDED TO PREVENT ACCUMULATION OF LITTER AND DEBRIS.

D. CONDENSATE DRAIN LINES INCLUDING AIR CONDITIONING SHALL BE ROUTED TO LANDSCAPE.

E. ROOFING, GUTTERS, AND TRIM SHALL NOT BE MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF MUST BE AVOIDED.

LEGEND:

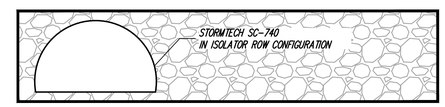
- DMA BOUNDARY
- DRAINAGE ARROWS
- DRAINAGE MANAGEMENT AREA — DMA-#
- TREE WELLS
- GRAVEL STORAGE LIMITS
- STRUCTURAL BEST MANAGEMENT PRACTICE — BMP-#
- POINT OF COMPLIANCE — POC-#
- IMPERVIOUS AREA
- ROOF AREA
- LANDSCAPED AREAS
- ROOF DRAINS — RD

NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP FOR THE SITE IS ASSUMED TO BE TYPE D
2. MODULAR WETLAND SYSTEM IS LOCATED AT GROUND LEVEL OF THE SITE.
3. GROUNDWATER DEPTH IS LOCATED AT APPROXIMATELY 12 FEET BELOW GROUND SURFACE
4. NO EXISTING NATURAL HYDROLOGIC FEATURES
5. NO CRITICAL COARSE SEDIMENT YIELD AREAS ON SITE
6. ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE IMPLEMENTED

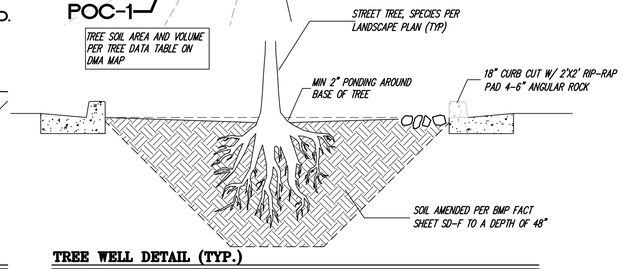
SOURCE CONTROL BMPs

- STORM DRAIN STENCILING — (1)
- TRASH STORAGE AREA — (2)



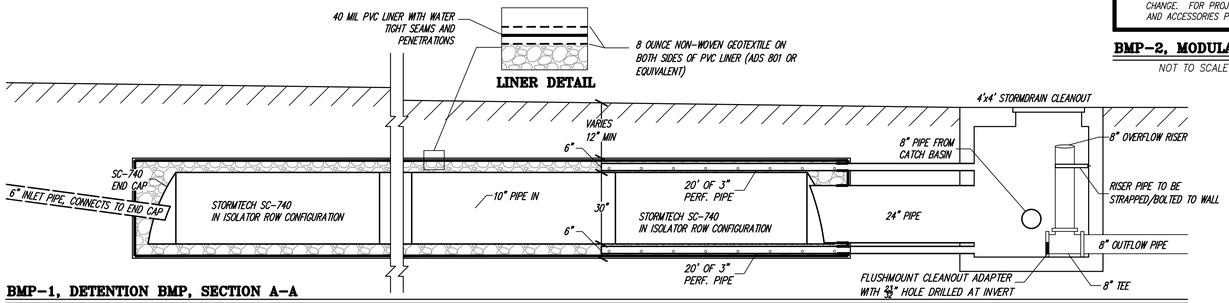
BMP-1, DETENTION BMP, SECTION B-B

NOT TO SCALE



TREE WELL DETAIL (TYP.)

NOT TO SCALE



BMP-1, DETENTION BMP, SECTION A-A

NOT TO SCALE

SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	24" X 42"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

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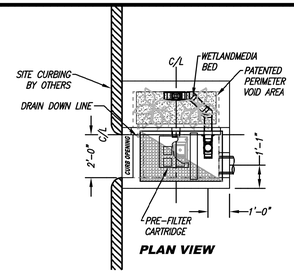
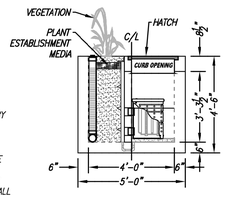
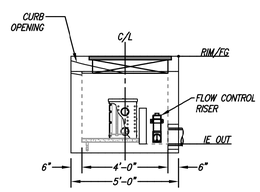


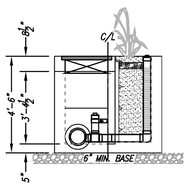
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,253, 7,470,360, 7,674,374, 8,333,615, RELATED FOREIGN PATENTS OR PATENTS PENDING.

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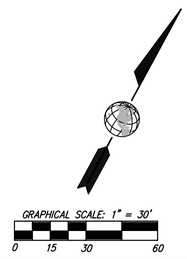
Bio Clean — A Forterra Company

MWS-L-4-4-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

BMP-2, MODULAR WETLAND SYSTEM MWS-L-4-4-C

NOT TO SCALE



OMEGA
ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE. SUITE B
SAN DIEGO, CA 92123
PH:(858) 634-8620 FAX:(858)-634-8627

No.	Date	By	Ckd.	Appr.	Revision

Title:
DMA MAP
KA ENTERPRISES C-STORE AND CAR WASH
3060 CARMEL VALLEY RD
SAN DIEGO, CALIFORNIA

5820 Oberlin Dr Suite 201
San Diego, CA 92121
Contact: Eugene Marini
858/404-6091
fax 858/404-6081

For: KA ENTERPRISES

PRELIMINARY

Scale: Horizontal AS NOTED Vertical

Designed — Drawn — Checked — Approved — Date

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

Job Number 21895

Sheet C-3 of

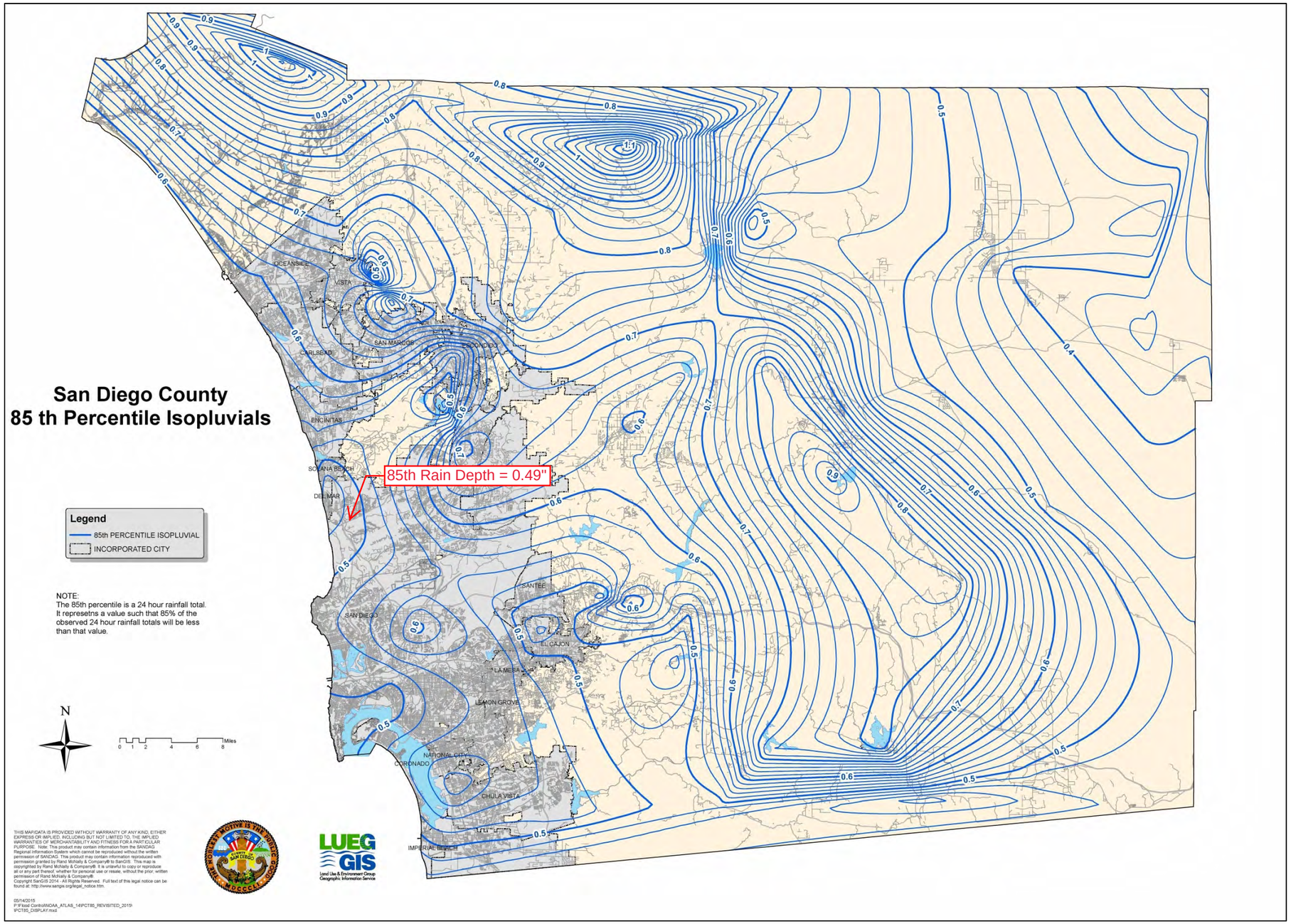


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Diego County Area, California

September 14, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:769 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 16, Sep 13, 2021

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

Date(s) aerial images were photographed: Mar 24, 2022—Apr 29, 2022

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Md	Made land	1.3	100.0%
Totals for Area of Interest		**1.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Diego County Area, California

Md—Made land

Map Unit Composition

Made land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Made Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

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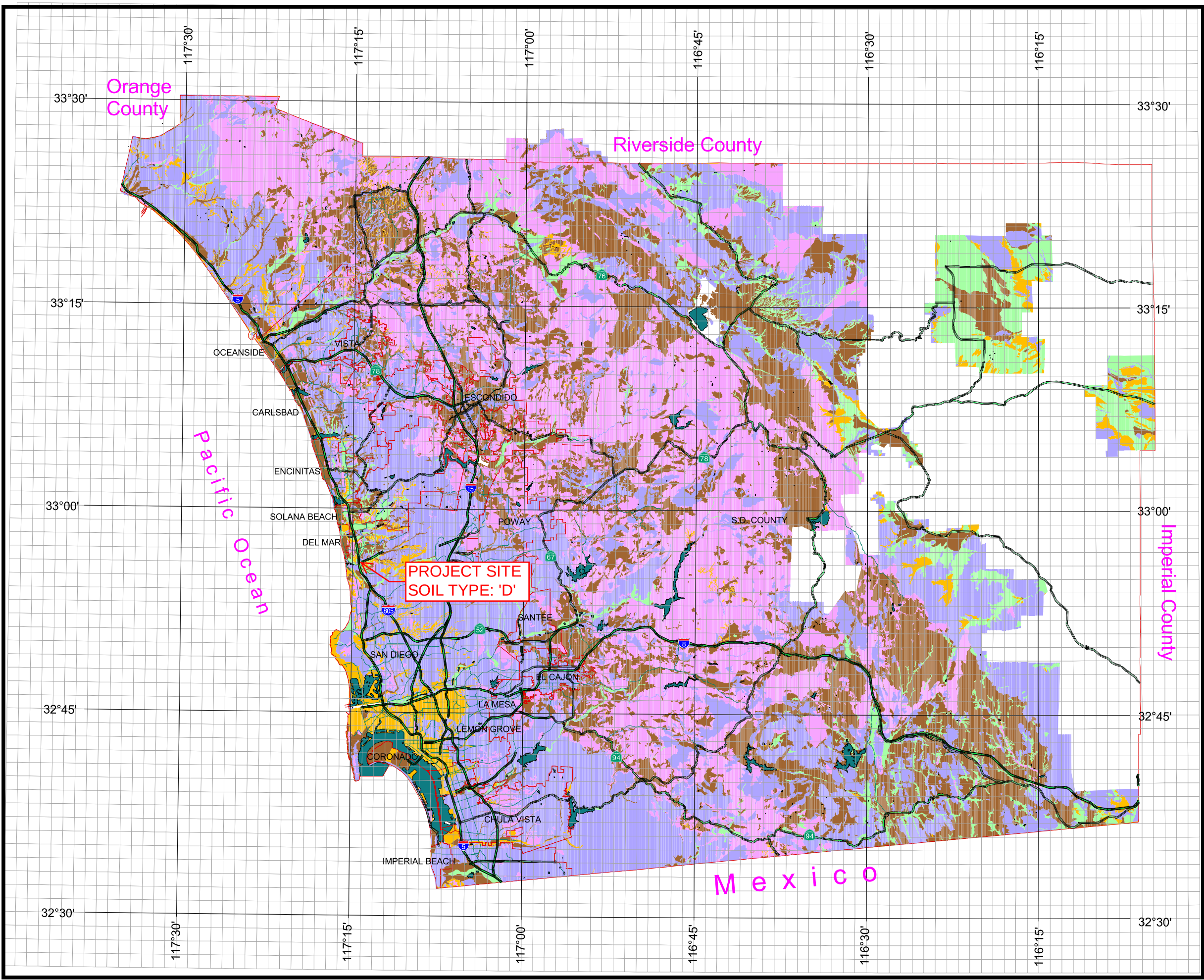
County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

APPENDIX 1.0

Project Name: KA Enteprises C-Store and Car Wash

Tabular Summary of DMAs								Worksheet B-1	
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
DMA-1	0.746	0.561	75	D	0.70	931	BMP-1	MWS	POC-1
DMA-2	0.083	0.071	86	D	0.79	71	N/A	Tree Well	POC-1
DMA-3	0.017	0.014	86	D	0.76	23	N/A	Tree Well	POC-1
DMA-4	0.052	0	0	D	0.10	-	N/A	Self Mitigating	POC-1
DMA-5	0.004	0.004	100	D	0.90	-	N/A	Deminimis	POC-1

Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
1	0.90	0.651	69		0.65	1,024	0.90		1

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

Worksheet B.3-1: Harvest and Use Feasibility Screening

Harvest and Use Feasibility Screening	Worksksheet B.3-1

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
   - ☒ Toilet and urinal flushing
   - ☒ Landscape irrigation
   - ☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]

Office: 7 gallons per day * 1.5 days per 36 hours
Demand = 10.5 Gal/36 hours
Landscaping: 390 Gal*(0.09 Ac*36 hours).
Demand = 35 Gal/36 hours
Total Demand (Gal): 45.5 Gal/36 hours
Total Demand (CF): 6.08 CF/36 hours

3. Calculate the DCV using worksheet B-2.1.
[Provide a results here]

DCV = 931 (cubic feet)

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
Yes / No ⇨	Yes / No ⇨	Yes ⇩
⇩	⇩	
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Note: 36-hour demand calculations are for feasibility analysis only, once the feasibility analysis is complete the applicant may be allowed to use a different drawdown time provided they meet the 80 percent of average annual (long term) runoff volume performance standard.

DMA-1

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.49	inches
2	Area tributary to BMP (s)	A=	0.746	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.70	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	931	cubic-feet

DMA-2

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.49	inches
2	Area tributary to BMP (s)	A=	0.083	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.79	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	200	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	116	cubic-feet

The DCV is reduced to 0 CF after the Tree Credit Volume.

DMA-3

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.49	inches
2	Area tributary to BMP (s)	A=	0.017	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.76	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	200	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	23	cubic-feet

The DCV is reduced to 0 CF after the Tree Credit Volume.

Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	32,508	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.70	
3	85th percentile 24-hour rainfall depth	0.49	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	931	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5/ Line 6]	0.0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	21.41	cu. ft.

Volume Retention for No Infiltration Condition						Worksheet B.5-6	
1	Area draining to the biofiltration BMP					32508	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.7	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					22756	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					683	sq. ft.
5	Biofiltration BMP Footprint					900	sq. ft.
Landscape Area (must be identified on DS-3247)							
	Identification	**A**	**B**	**C**	**D**	**E**	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]						
9	Effective Credit Area If Line 8 >1.5, use Line 6; if not use Line 7/1.5						
10	Sum of Landscape area [sum of Lines 9A-9E]						sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				900		sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, proceed to Line 13					○ Yes ◉ No	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					1.32	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					21.41	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-6.85	cu. ft.
Site Design BMP							
	Identification	**Site Design Type**				**Credit**	
16	**A**						cu. ft.
	B						cu. ft.
	C						cu. ft.
	D						cu. ft.
	E						cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Lines 16A-16E] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0	cu. ft.
17	Is Line 16 ≥ Line 15? If yes, then volume retention performance standard for no infiltration condition is met. If no, implement additional site design BMPs.					◉ Yes ○ No	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions[1]	Worksheet C.4-1: Form I-8A[2]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
All DMA's	Preliminary
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[3]? ◯ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ◯ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ◉ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ◯ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ◯ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ◯ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☐ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ◯ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.

[1] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[2] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[3] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ◉ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ◉ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ◉ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ⊙ No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

Project is located in type D soil. Per the Preliminary Geotechnical Investigation, "due to the historic site use and proposed continued use as a fuel facility (Hydrocarbon) infiltration of surface waters is not a recommendation." Infiltration testing has not yet been perfomed.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	○ Yes	◉ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	◉ Yes	○ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	◉ Yes	○ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	○ Yes	◉ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	◉ Yes	○ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	◉ Yes	○ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	◉ Yes	○ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	○ Yes	◉ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	○ Yes	◉ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	○ Yes	◉ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	○ Yes	◉ No

Summarize findings and basis; provide references to related reports or exhibits.

Per the Preliminary Geotechnical Investigation, "due to the historic site use and proposed continued use as a fuel facility (Hydrocarbon) infiltration of surface waters is not a recommendation." Infiltration testing has not yet been perfomed.

Part 1 Result – Full Infiltration Geotechnical Screening [4]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	○ Full infiltration Condition ◉ Complete Part 2

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
All DMA's	Preliminary
Criteria 3 : Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ○ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ◉ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ○ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ○ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ◉ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ○ Yes; Continue to Criteria 4. ◉ No: Skip to Part 2 Result.
Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate). Project is located in type D soil. Infiltration testing was not performed on the site due to numerous items classifying the site as "No infiltration conditions."	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	○ Yes	◉ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	◉ Yes	○ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	◉ Yes	○ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	○ Yes	◉ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	◉ Yes	○ No
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	◉ Yes	○ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	◉ Yes	○ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	○ Yes	◉ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	◉ Yes	○ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	○ Yes	◉ No
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	○ Yes	◉ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]

Summarize findings and basis; provide references to related reports or exhibits.

Project is located in type D soil. Per the Preliminary Geotechnical Investigation, "due to the historic site use and proposed continued use as a fuel facility (Hydrocarbon) infiltration of surface waters is not a recommendation." Infiltration testing has not yet been perfomed.

Part 2 – Partial Infiltration Geotechnical Screening Result[5]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	○ Partial Infiltration Condition ◉ No Infiltration Condition

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

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	○ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	◉ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

The entire DCV generated from the site will be detained in a proposed detention facility. The DCV will then drain via a low flow orifice to proprietary Modular Wetland System.

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

See Attached Tape Certification for the proposed proprietary Modular Wetland System.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 5:

Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.

See attached information for Modular Wetland Performance document.

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 6:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).

Yes. The MWS Linear has a tested hydraulic rate of no greater than 1 gpm per square foot of WetLandMedia surface area.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

A maintenance agreement will provided in ministerial review.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	◉ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

WASHINGTON STATE DEPARTMENT OF ECOLOGY

July 2017

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

    - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
    - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
    - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

    - Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
    - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
    - Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
    - Standing water remains in the vault between rain events, or
    - Bypass occurs during storms smaller than the design storm.
    - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
    - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant:	Modular Wetland Systems, Inc.
Applicant's Address:	*PO. Box 869* *Oceanside, CA 92054*

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014*
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014.*

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

<u>Laboratory Testing</u>

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

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398 Vi9a El Centro
Oceanside, CA 92058
zach.kent@forterrabp.com

Applicant website: http://www.modularwetlands.com/

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

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Water Quality Program
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Revision History

Date	**Revision**
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants
July 2017	Revised Manufacturer Contact Information (name, address, and email)

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Stormwater Biofiltration

The experts you need to solve your stormwater challenges

Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Restoring Nature's Presence in Urban Areas – Modular Wetlands® Linear

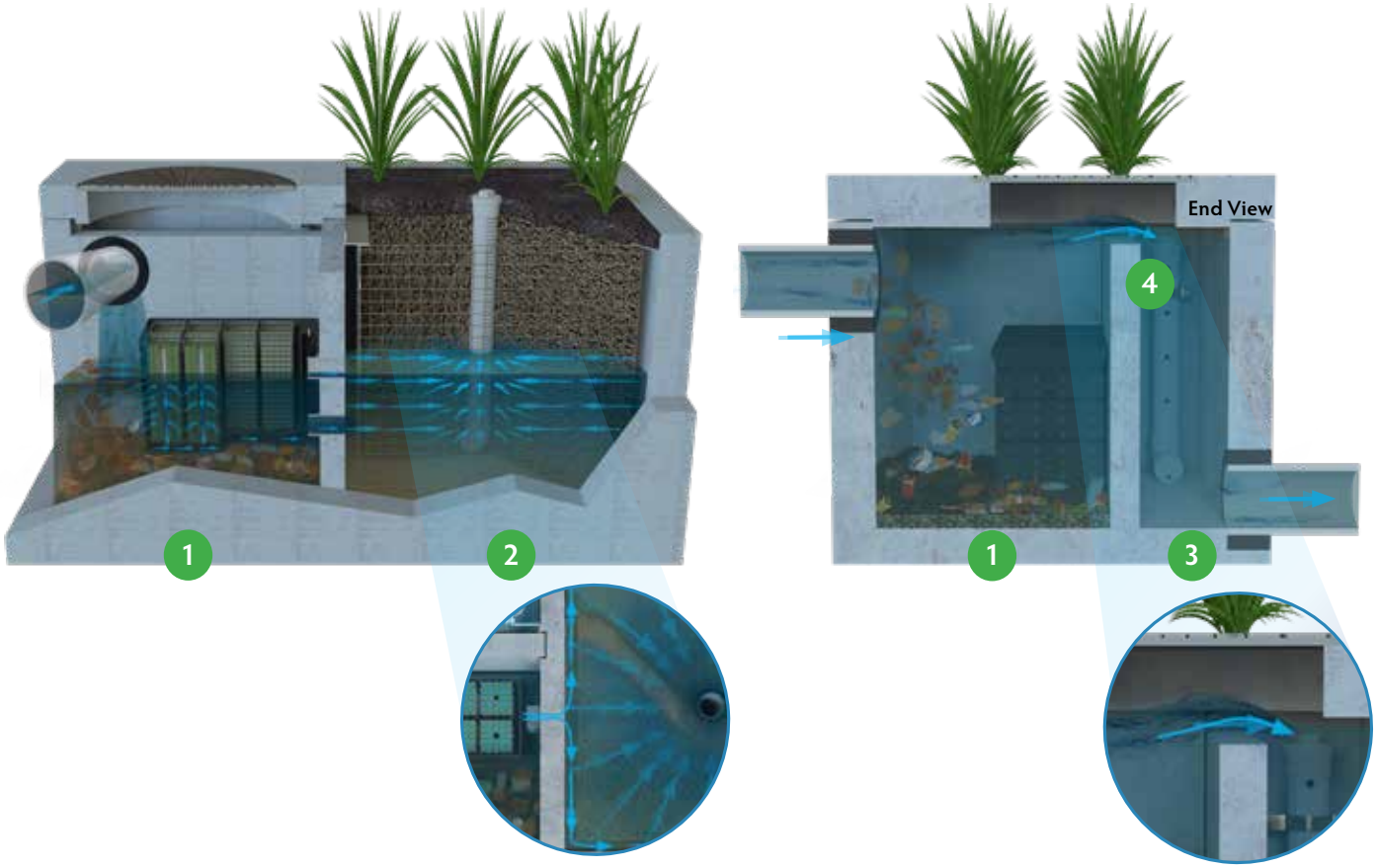
As cities grow, there is less space for natural solutions to treat stormwater. Contech understands this and is committed to providing compact, Low Impact Development (LID) solutions like the Modular Wetlands Linear to protect our nation's waterways.

The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a small footprint, high treatment capacity, and design versatility. It is also the only biofiltration system that can be routinely installed downstream of storage for additional volume control and treatment.

With numerous regulatory approvals, the system's aesthetic appeal and superior pollutant removal make it the ideal solution for a wide range of stormwater applications, including urban development projects, commercial parking lots, residential streets, mixed-use developments, streetscapes, and more.

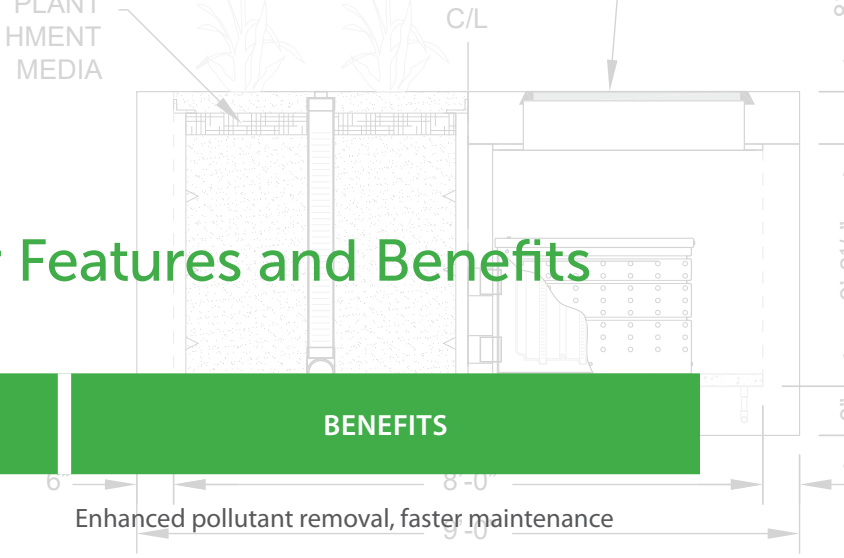
MODULAR WETLANDS®

How the Modular Wetlands® Linear Works



1. **PRETREATMENT** | Stormwater enters the pretreatment chamber where total suspended solids settle, and trash and debris are contained within the chamber. Stormwater then travels through the pretreatment filter boxes that provide additional treatment.
2. **BIOFILTRATION** | As water enters the biofiltration chamber, it fills the void space in the chamber's perimeter. Horizontal forces push the water inward through the biofiltration media, where nutrients and metals are captured. The water then enters the drain pipe to be discharged.
3. **DISCHARGE** | The specially designed vertical drain pipe and orifice control plate control the flow of water through the media to a level lower than the media's capacity, ensuring media effectiveness. The water then enters the horizontal drain pipe to be discharged.
4. **BYPASS** | During peak flows, an internal weir in the side-by-side configuration allows high flows to bypass treatment, eliminating flooding and the need for a separate bypass structure. Bypass is not provided in the end-to end configuration.

Using horizontal flow to improve performance



Modular Wetlands® Linear Features and Benefits

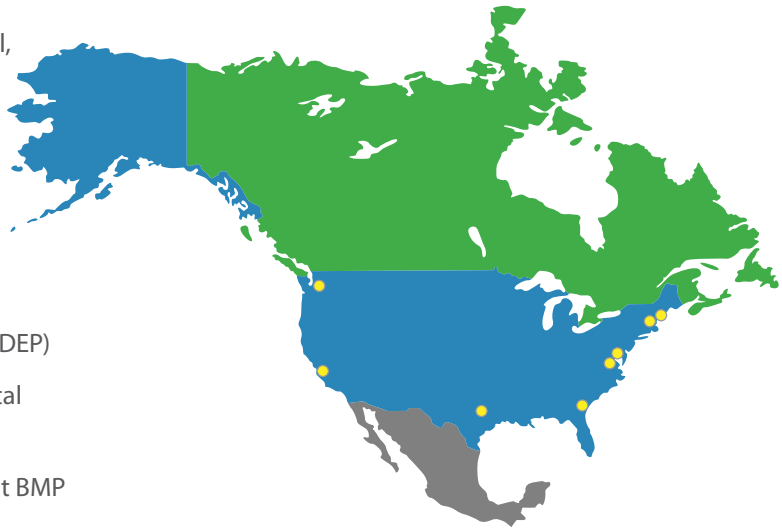
FEATURE	BENEFITS
Pretreatment chamber	Enhanced pollutant removal, faster maintenance
Horizontal flow biofiltration	Greater filter surface area
Performance verified by both the WA DOE and NJ DEP	Superior pollutant capture with confidence
Built-in high flow bypass	Eliminates flooding and the need for a separate bypass structure
Available in multiple configurations and sizes	Flexibility to meet site-specific needs

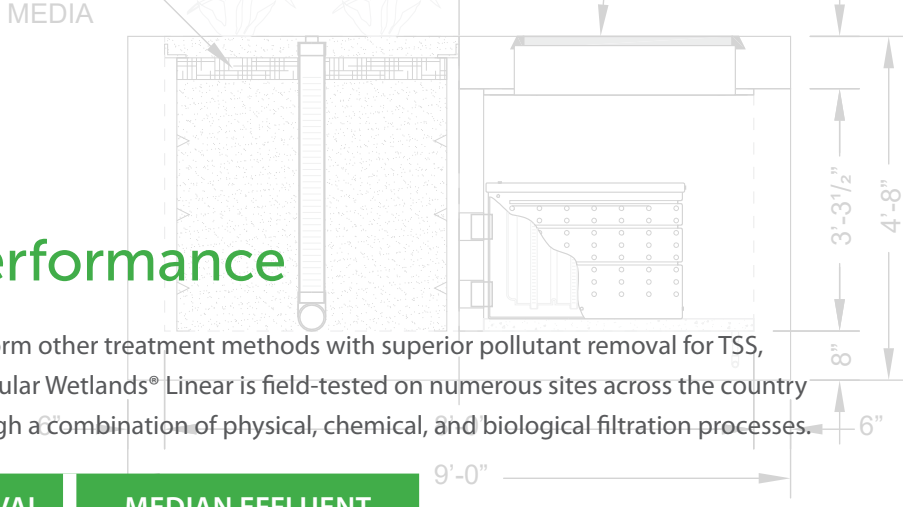
The Modular Wetlands system offers many different configurations.

Select Modular Wetlands® Linear Approvals

Modular Wetlands Linear is approved through numerous local, state and federal programs, including but not limited to:

- Washington State Department of Ecology TAPE
- California Water Resources Control Board, Full Capture Certification
- Virginia Department of Environmental Quality (VA DEQ)
- New Jersey Department of Environmental Protection (NJDEP)
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Rhode Island Department of Environmental Management BMP
- Texas Commission on Environmental Quality (TCEQ)
- Atlanta Regional Commission Certification





Modular Wetlands® Performance

The Modular Wetlands® Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, and hydrocarbons. The Modular Wetlands® Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

POLLUTANT OF CONCERN	MEDIAN REMOVAL EFFICIENCY	MEDIAN EFFLUENT CONCENTRATION (MG/L)
Total Suspended Solids (TSS)	89%	12
Total Phosphorus - TAPE (TP)	61%	0.041
Nitrogen (TN)	23%	1
Total Copper (TCu)	50%	0.006
Total Dissolved Copper	37%	0.006
Total Zinc (TZn)	66%	0.019
Dissolved Zinc	60%	0.0148
Motor Oil	79%	0.8

Sources:
TAPE Field Study - 2012
TAPE Field Study - 2013

Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.

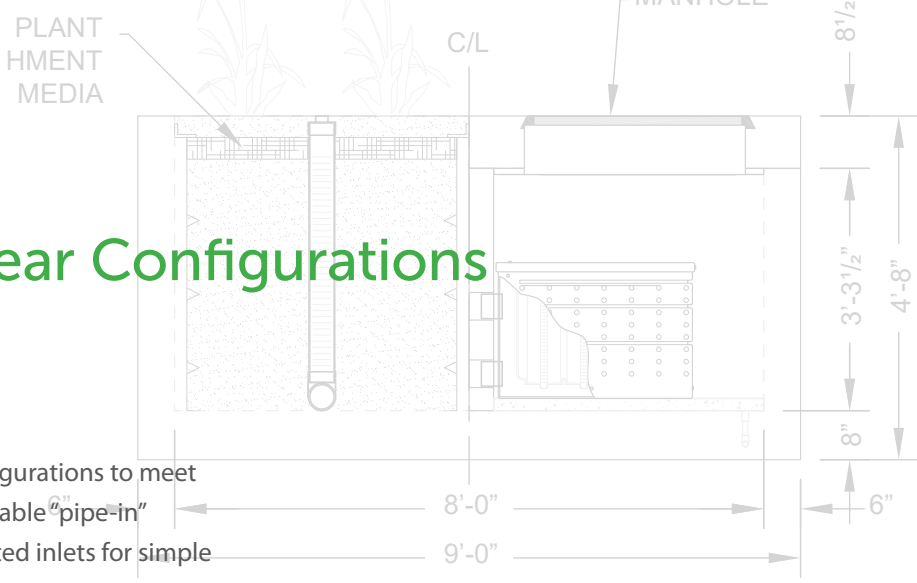
Modular Wetlands® Linear Maintenance

The Modular Wetlands® Linear is a self-contained treatment train. Maintenance requirements for the unit consist of five simple steps that can be completed using a vacuum truck. The system can also be cleaned by hand.

- Remove trash from the screening device
- Remove sediment from the separation chamber
- Periodically replace the pretreatment cartridge filter media
- Replace the drain down filter media
- Trim vegetation

Most Modular Wetland Linear systems can be cleaned in about thirty minutes.

Multiple configurations allow for easy site integration



Modular Wetlands® Linear Configurations

Multiple system configurations integrate with site hydraulic design and layout ...

The Modular Wetlands Linear is offered in multiple configurations to meet site specific needs. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.

Curb Inlet

The Curb Inlet configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions.

Vault

The Vault configuration can be used in end-of-the-line installations. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).

Downspout

The Downspout configuration is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information: www.ContechES.com

CONTECH® ENGINEERED SOLUTIONS

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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.

Project Name: KA Enteprises C-Store and Car Wash

Indicate which Items are Included:

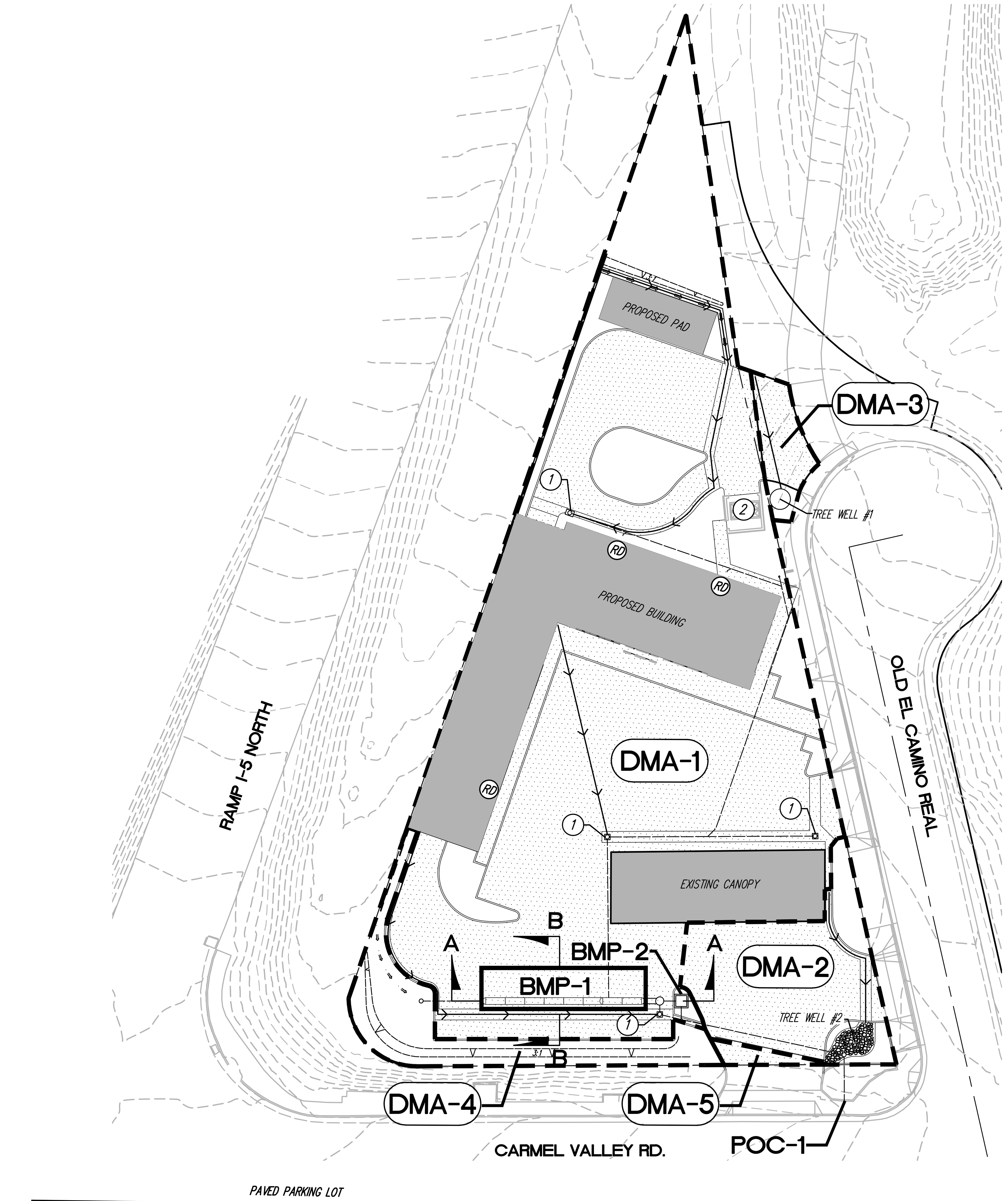
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	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 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: KA Enteprises C-Store and Car Wash

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

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [ ] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] 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)
- [x] Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).



DMA DATA TABLE

DMA-NO.	TOT. AREA (SF)	IMPERVIOUS (%)	DESIGN DCV (CF)	TYPE/TREATED BY
DMA-1	32,508	75	931	BMP-1 / BMP-2
DMA-2	3,624	86	71	15' TREE WELL
DMA-3	745	83	23	15' TREE WELL
DMA-4	2,264	0	--	SELF-MITIGATING
DMA-5	195	100	--	DEMINIMIS
TOTAL DCV OF SITE			1,025	

TREATMENT BMP DATA TABLE

BMP-#	TREATING	PROPOSED FOOTPRINT	PROPOSED VOLUME	DESCRIPTION
BMP-1	DMA-1	900 SF	1,480 CF	GRAVEL FILLED, DETENTION FACILITY W/ 8 SC-740 STORAGE ARCHES
BMP-2	DMA-1	4'x4'	N/A	PROPRIETARY BIOFILTRATION FACILITY MODULAR WETLAND MWS-L-4-4-C

STRUCTURAL BMP DATA TABLE

BMP#	TRIBUTARY AREA	DESCRIPTION
BMP-2	DMA-1	BIOCLEAN MODULAR WETLANDS SYSTEM MODEL: MWS-L-4-4-L REQ'D FLOWRATE= 0.033 CFS PROVIDED FLOWRATE= 0.052 CFS

TREE WELL DATA TABLE

TRIBUTARY BASIN	CANOPY DIAMETER	# OF TREES	AMENDED SOIL DEPTH	TREE WELL VOLUME REDUCTION (CF/TREE)	TOTAL DCV REDUCTION CF
DMA-2	15 FT	1	2.5 FT	200 CF	71
DMA-3	15 FT	1	2.5 FT	200 CF	23
				TOTAL DCV OF SITE	1,025
				PERCENT OF DCV TREATED BY TREES	9.1%

BMP INSPECTION NOTES

CONTRACTOR MUST CONTACT ENGINEER FOR INSPECTION OF BMPS AT THE FOLLOWING STAGES OF CONSTRUCTION:

-AFTER EXCAVATION, PRIOR TO GRAVEL/CHAMBER PLACEMENT
-AFTER PLACEMENT OF LOWER 6" OF GRAVEL, CHAMBER AND OUTLET STRUCTURE, PRIOR TO COVERING CHAMBER
-AFTER PLACEMENT OF OUTLET CONTROL STRUCTURE INSIDE MANHOLE

SOURCE CONTROL BMP NOTES

ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE UTILIZED

A. ALL ONSITE INLETS TO BE MARKED "NO DUMPING" OR SIMILAR AND ALL OPERATIONAL PRECAUTIONS TO AVOID NON STORM WATER DISCHARGE SHALL BE FOLLOWED PER THE CITY'S BMP DESIGN MANUAL.

B. PROPOSED REFUSE AREA WILL REMAIN COVERED AND PROTECTED FROM WIND DISPERSAL. SIGNS SHALL BE PLACED WITH WORDS "DO NOT DUMP HAZARDOUS MATERIALS OR LIQUIDS HERE" OR SIMILAR. OWNER SHALL BE RESPONSIBLE TO KEEP THE AREA CLEAN OF LITTER AND SPILLS.

C. OWNER TO BE RESPONSIBLE FOR SWEEPING PLAZAS, SIDEWALKS, AND PARKING LOTS. THIS IS TO BE DONE REGULARLY AND AS NEEDED TO PREVENT ACCUMULATION OF LITTER AND DEBRIS.

D. CONDENSATE DRAIN LINES INCLUDING AIR CONDITIONING SHALL BE ROUTED TO LANDSCAPE.

E. ROOFING, GUTTERS, AND TRIM SHALL NOT BE MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF MUST BE AVOIDED.

LEGEND:

DMA BOUNDARY	
DRAINAGE ARROWS	
DRAINAGE MANAGEMENT AREA	DMA-#
TREE WELLS	
GRAVEL STORAGE LIMITS	
STRUCTURAL BEST MANAGEMENT PRACTICE	BMP-#
POINT OF COMPLIANCE	POC-#
IMPERVIOUS AREA	
ROOF AREA	
LANDSCAPED AREAS	
ROOF DRAINS	RD

NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP FOR THE SITE IS ASSUMED TO BE TYPE D
2. MODULAR WETLAND SYSTEM IS LOCATED AT GROUND LEVEL OF THE SITE.
3. GROUNDWATER DEPTH IS LOCATED AT APPROXIMATELY 12 FEET BELOW GROUND SURFACE
4. NO EXISTING NATURAL HYDROLOGIC FEATURES
5. NO CRITICAL COARSE SEDIMENT YIELD AREAS ON SITE
6. ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE IMPLEMENTED

SOURCE CONTROL BMPs

STORM DRAIN STENCILING	1
TRASH STORAGE AREA	2

SITE SPECIFIC DATA

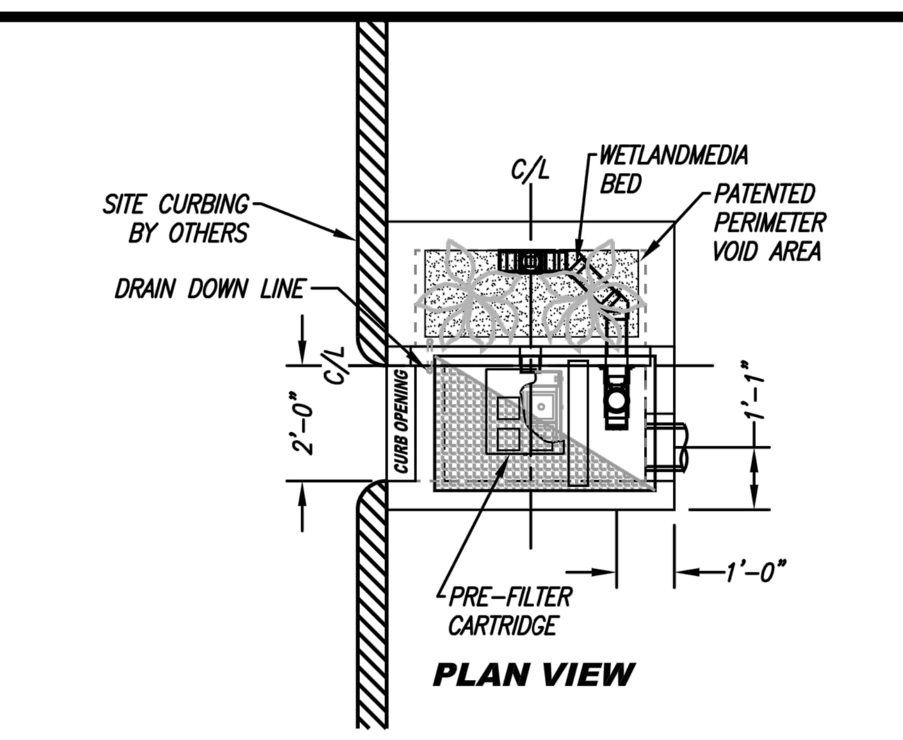
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	24" X 42"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

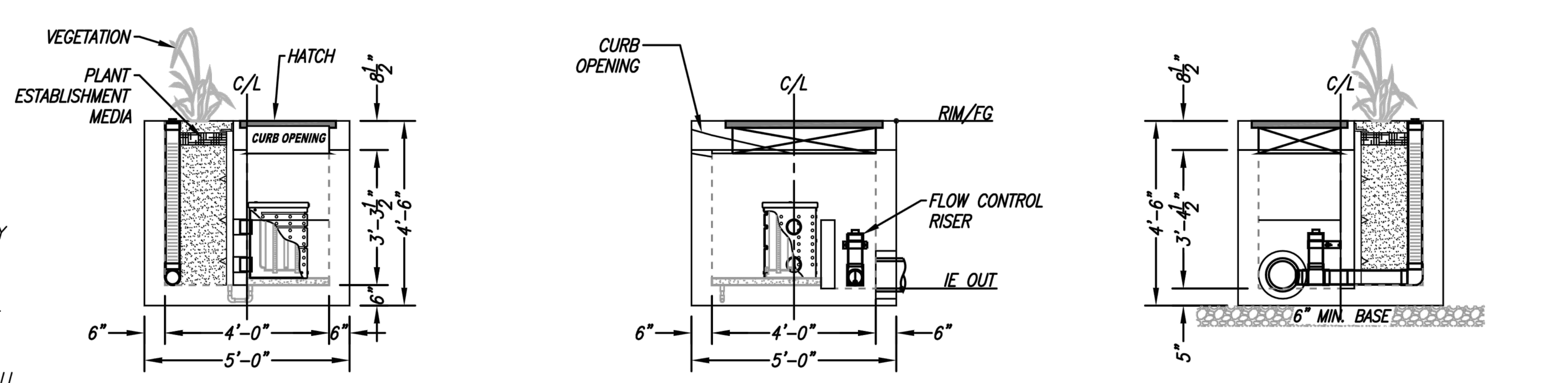
INSTALLATION NOTES

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

GENERAL NOTES

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





TREATMENT FLOW (CFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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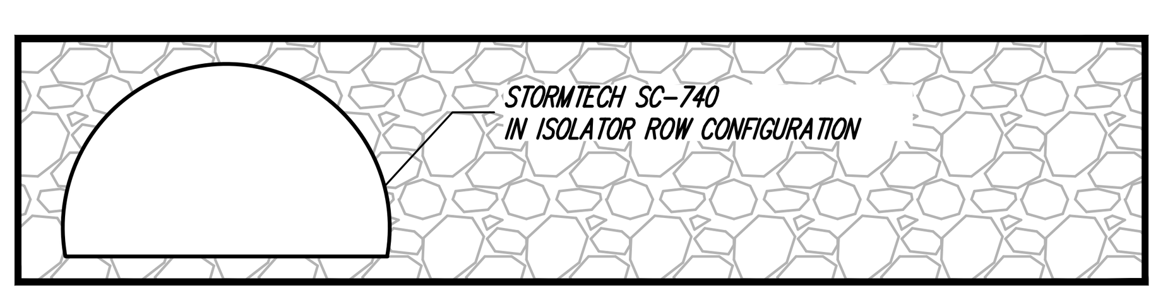
Bio Clean — A Forterra Company

MWS-L-4-4-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

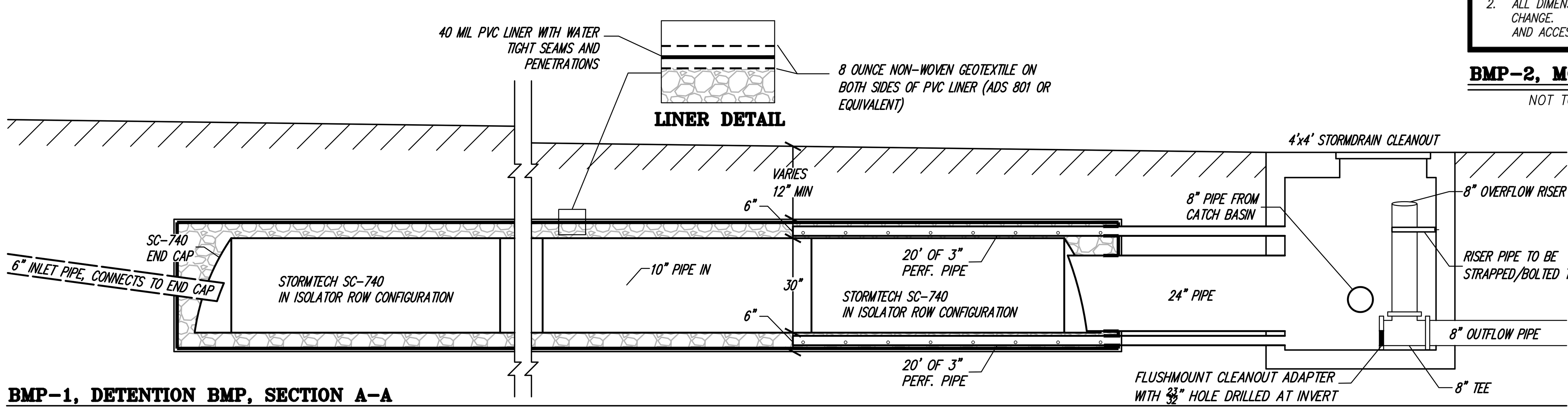
BMP-2, MODULAR WETLAND SYSTEM MWS-L-4-4-C

NOT TO SCALE



BMP-1, DETENTION BMP, SECTION B-B

NOT TO SCALE



BMP-1, DETENTION BMP, SECTION A-A

NOT TO SCALE

GRAPHICAL SCALE: 1" = 30'
0 15 30 60

OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE. SUITE B
SAN DIEGO, CA 92123
PH:(858) 634-8620 FAX:(858)-634-8627

Title: DMA MAP
KA ENTERPRISES C-STORE AND CAR WASH
3060 CARMEL VALLEY RD
SAN DIEGO, CALIFORNIA

For: KA ENTERPRISES
5820 Oberlin Dr Suite 201
San Diego, CA 92121
Contact: Eugene Marini
858/404-6091
fax 858/404-6081

PRELIMINARY

Scale: Horizontal AS NOTED Vertical

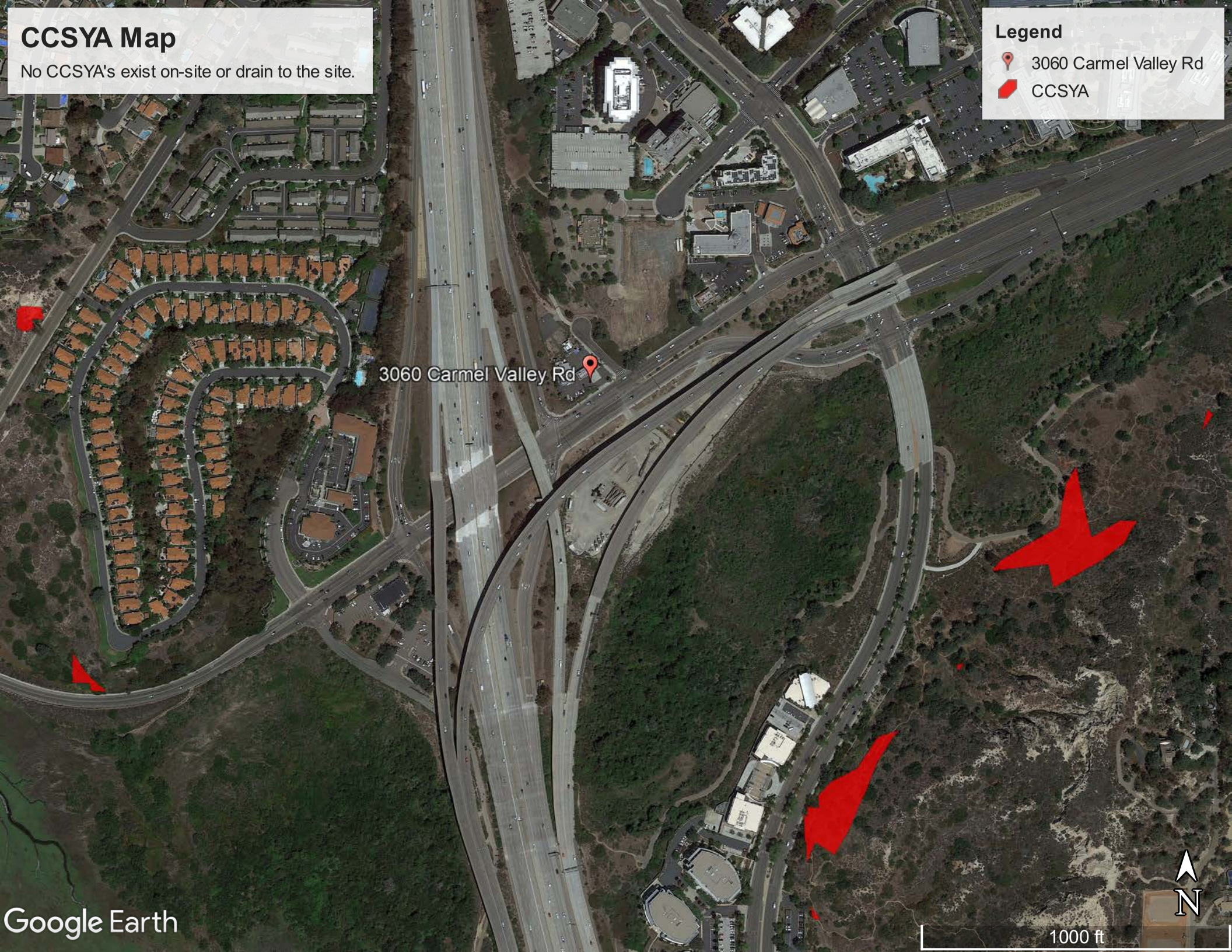
Designed Drawn Checked Approved Date

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

Job Number 21895
Sheet C-3 of

CCSYA Map

No CCSYA's exist on-site or drain to the site.



KA Enterprises C-Store and Car Wash
Hydromodification Analysis

3060 Carmel Valley Rd.
San Diego, CA 92130

Date Prepared:
February 1, 2022

Prepared for:
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5820 Orbelin Drive, Suite 201
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FOR PLAN CHECK
REVIEW ONLY

Patric T. de Boer RCE 83583
Registration Expires 3-31-2023

Introduction

This hydromodification report summarizes the approach and tools used to model the pre and post-development conditions at the project site to determine if the proposed project complies with the hydromodification flow control requirements set forth in the County of San Diego BMP Design Manual dated February 2016, and the San Diego Hydromodification Management Plan dated March 2011.

The analysis was performed using Stormwater Management Model 5.1 (SWMM) provided by the Environmental Protection Agency (EPA). SWMM was used to model the pre and post-development surface conditions as well as the proposed BMPs that will be used for post development flow control.

SWMM Model Development

The predeveloped site drains to a single Point of Compliance (POC). POC-1 is located at the public storm drain system on Carmel Valley Road. Both the pre and post-developed conditions were modeled side by side, within a single SWMM model.

The model uses the Encinitas Rain Gauge data available on ProjectCleanwater.org. This gauge was chosen as it is the closest one to the site, and is located in an area with a similar elevation. The other atmospheric data that the model takes into account is the average evaporation rates in inches per day. Per the California Irrigation Management Information System (CIMIS) ETo map, the site is located in Reference Zone 4.

Catchment Modeling
For the pre-developed conditions, the underlying soil is modeled as Type 'D' soil. This determination is based off the County of San Diego Hydrology Manual Soil Hydrologic Groups Exhibit.

The pre-developed catchment condition was modeled by estimating the slope conditions prior to the construction of the existing development. The slope was estimated by determining the slope of a line drawn from the highest point in the northerly portion of the project to the lowest point being the southerly driveway facing Carmel Valley Road.

The post-developed catchment condition was modeled based on the project design that is proposed. The proposed catchment is modeled as being underlain by hydrologic group 'C' soil. This is in accordance with section G.1.4.3 of the BMP design manual, which allows re-tilled/landscaped areas to be modeled as group 'C'. This accounts for the additional retention provided by landscaping that will be used on the pervious portions of the site.

Infiltration Values from Table G.1-4 of City BMP Design Manual

Condition	Suction Head	Conductivity	Initial Deficit
Pre-developed	9.0	0.025	0.33
Post-developed	6.0	0.10	0.32

Surface Parameters from Table G.1-4 of City BMP Design Manual

	Catchment	Area	Width	Slope	% Imperv	N-Imperv	N-Perv	Dstore Imperv	Dstor Perv
Pre	EX-1	0.90	95	4.5%	0	0.012	0.10	0.05	0.10
Post	DMA-1	0.75	66	2.4%	75	0.012	0.10	0.05	0.10
	DMA-2	0.08	51	1.4%	86	0.012	0.10	0.05	0.10
	DMA-3	0.02	12	3.3%	83	0.012	0.10	0.05	0.10
	DMA-4	0.05	15	2.0%	0	0.012	0.10	0.05	0.10
	DMA-5	0.01	210	10%	100	0.012	0.10	0.05	0.10

The area, width, slope, and % impervious were all determined from the site-specific conditions. N-Impervious and N-Pervious values are taken from the County approved "Improving Accuracy in Continuous Hydrologic Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region", TRWE, 2016. Dstor Imperv and Dstor Perv were taken from table G.1-4 of the San Diego BMP Design Manual.

The N-Perv value of 0.10 for the pre-developed conditions corresponds with the assumed chaparral natural landscape that consists of "shrubs and bushes."

The N-Perv value of 0.10 for the post developed conditions was chosen, as the pervious area will be landscaped and mulched.

The width of the catchments is determined by dividing the catchment area by the flow path length.

Detention Facility Modeling

In the post developed conditions, a 900-sf gravel filles, detention facility with 8 StormTech arches will be utilized for hydromodification purposes. A low flow and overflow orifice will be implemented on the outlet structure. The low flow orifice will drain to a Modular Wetland System for treatment purposes.

Flow Duration Curve Comparison

The Flow Duration Curves (FDCs) for the pre and post-developed conditions were compared at the POC. The FDCs were compared for flows within the flow thresholds. No erosion susceptibility analysis has been performed for the receiving waterway (Los Penasquitos Lagoon). No accepted analyses are known to exist for the portion of Los Penasquitos Lagoon that this project drains to.

The default flow thresholds of 0.1Q2-Q10 were used for this analysis. As can be seen in the plotted FDCs in Attachment 1, the post-developed FDC does not exceed the pre-developed FDC by more than 10% at any point for the peak flows within the flow threshold.

Summary

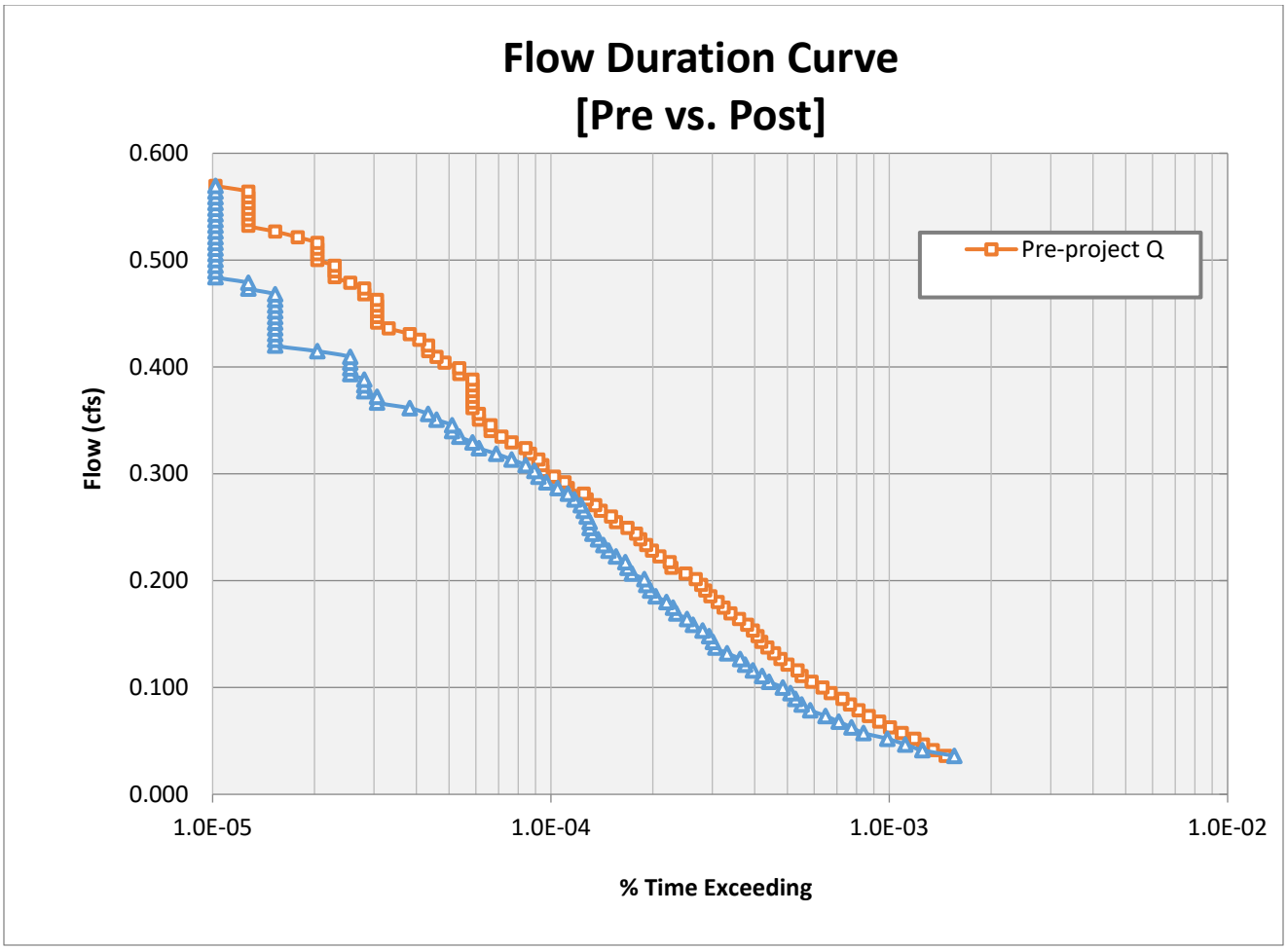
This analysis has found that the proposed underground storage facility will provide sufficient storage and flow attenuation properties to ensure that the proposed project will meet the current HMP requirements.

Attachments

1. Flow Frequency Curve Summary
2. Flow Duration Curve
3. Flow Duration Curve Summary
4. SWMM Model Layout
5. SWMM input file

Pre-developed Flow Frequency

	10-year Q:	0.569	cfs		
	2-year Q:	0.360	cfs		
	Lower Flow Threshold:	10%			
	0.1xQ2 (Pre):	0.036			
Statistics - Node E-POC Total Inflow					
		Event	Event	Exceedance	Return
		Duration	Peak	Frequency	Period
1	1/9/1978	34	0.709	0.44	46
2	3/11/1995	9	0.602	0.89	23
3	10/27/2004	8	0.601	1.33	15.33
4	2/24/1998	4	0.574	1.78	11.5
5	1/9/2005	53	0.567	2.22	9.2
6	11/25/1983	2	0.525	2.67	7.67
7	1/21/1964	3	0.517	3.11	6.57
8	1/6/1979	4	0.514	3.56	5.75
9	3/1/1983	65	0.5	4	5.11
10	12/18/1967	23	0.482	4.44	4.6
11	1/31/1979	3	0.473	4.89	4.18
12	10/28/1974	20	0.463	5.33	3.83
13	1/3/2005	24	0.438	5.78	3.54
14	2/12/1992	16	0.436	6.22	3.29
15	2/19/2005	2	0.434	6.67	3.07
16	3/8/1968	3	0.434	7.11	2.88
17	8/17/1977	2	0.43	7.56	2.71
18	2/15/1986	7	0.422	8	2.56
19	3/7/1974	12	0.417	8.44	2.42
20	2/6/1976	3	0.409	8.89	2.3
21	1/4/1995	6	0.401	9.33	2.19
22	2/18/1980	70	0.392	9.78	2.09
23	1/16/1978	10	0.36	10.22	2
24	2/8/1993	3	0.354	10.67	1.92


Flow Duration Curve
[Pre vs. Post]
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Flow (cfs)
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q

Low-flow Threshold: 10%

0.1xQ2 (Pre): 0.036 cfs

Q10 (Pre): 0.569 cfs

Ordinate #: 100

Incremental Q (Pre): 0.00533 cfs

Total Hourly Data: 392060 hours

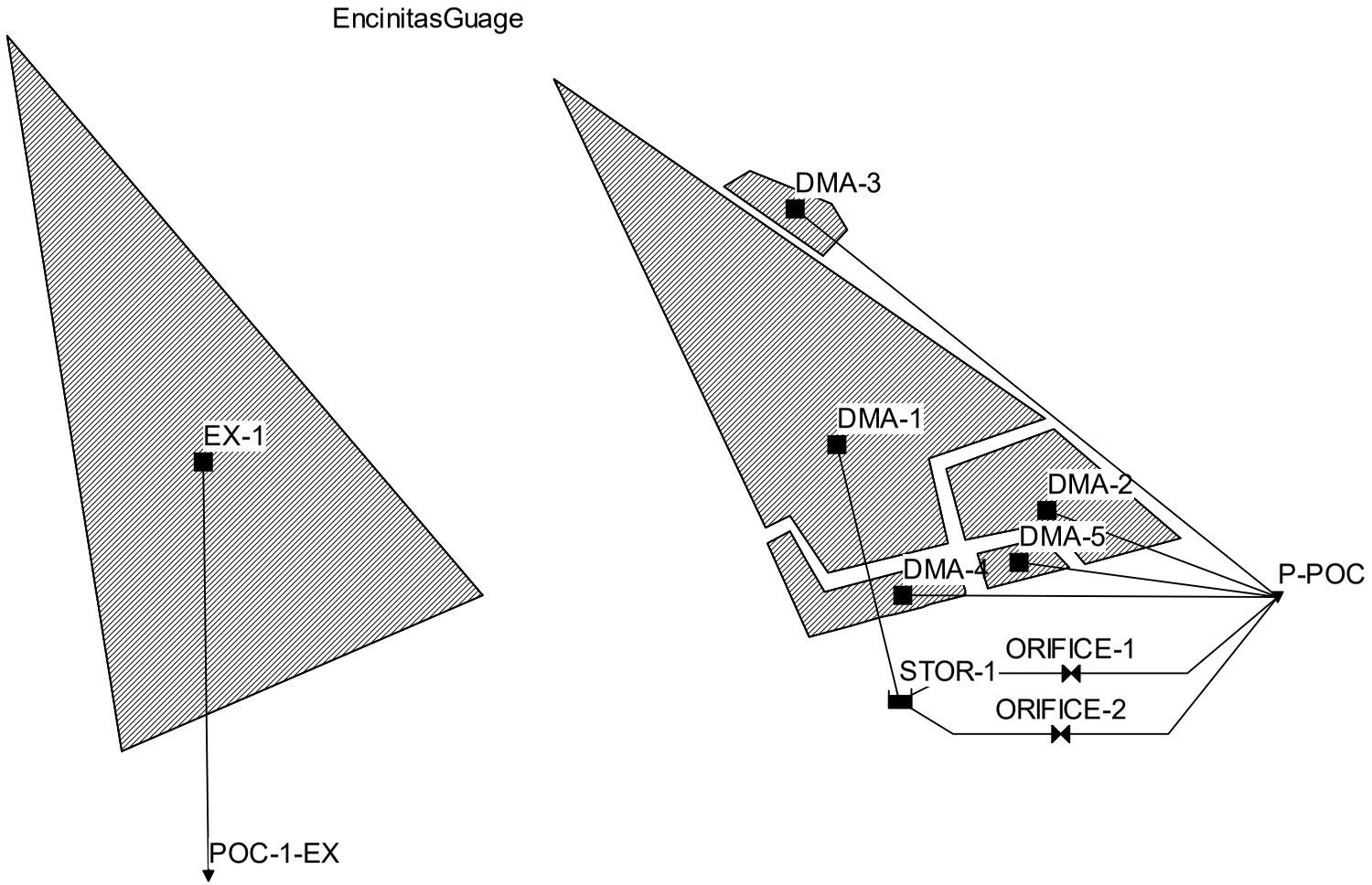
The proposed BMP: PASSED

(cfs)"	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail	
0	0.036	575	1.47E-03	610	1.56E-03	106%	Pass
1	0.041	527	1.34E-03	491	1.25E-03	93%	Pass
2	0.047	493	1.26E-03	437	1.11E-03	89%	Pass
3	0.052	465	1.19E-03	387	9.87E-04	83%	Pass
4	0.057	427	1.09E-03	329	8.39E-04	77%	Pass
5	0.063	394	1.00E-03	303	7.73E-04	77%	Pass
6	0.068	366	9.34E-04	278	7.09E-04	76%	Pass
7	0.073	341	8.70E-04	254	6.48E-04	74%	Pass
8	0.079	318	8.11E-04	229	5.84E-04	72%	Pass
9	0.084	300	7.65E-04	216	5.51E-04	72%	Pass
10	0.089	285	7.27E-04	207	5.28E-04	73%	Pass
11	0.095	263	6.71E-04	200	5.10E-04	76%	Pass
12	0.100	249	6.35E-04	190	4.85E-04	76%	Pass
13	0.105	231	5.89E-04	173	4.41E-04	75%	Pass
14	0.111	216	5.51E-04	165	4.21E-04	76%	Pass
15	0.116	210	5.36E-04	155	3.95E-04	74%	Pass
16	0.121	196	5.00E-04	147	3.75E-04	75%	Pass
17	0.127	187	4.77E-04	142	3.62E-04	76%	Pass
18	0.132	179	4.57E-04	130	3.32E-04	73%	Pass
19	0.137	171	4.36E-04	120	3.06E-04	70%	Pass
20	0.143	164	4.18E-04	118	3.01E-04	72%	Pass
21	0.148	160	4.08E-04	115	2.93E-04	72%	Pass
22	0.153	155	3.95E-04	110	2.81E-04	71%	Pass
23	0.159	149	3.80E-04	103	2.63E-04	69%	Pass
24	0.164	141	3.60E-04	99	2.53E-04	70%	Pass
25	0.169	133	3.39E-04	92	2.35E-04	69%	Pass
26	0.175	127	3.24E-04	90	2.30E-04	71%	Pass
27	0.180	122	3.11E-04	86	2.19E-04	70%	Pass
28	0.185	116	2.96E-04	80	2.04E-04	69%	Pass
29	0.191	112	2.86E-04	77	1.96E-04	69%	Pass
30	0.196	109	2.78E-04	75	1.91E-04	69%	Pass

31	0.201	105	2.68E-04	74	1.89E-04	70%	Pass
32	0.207	98	2.50E-04	68	1.73E-04	69%	Pass
33	0.212	89	2.27E-04	66	1.68E-04	74%	Pass
34	0.217	88	2.24E-04	65	1.66E-04	74%	Pass
35	0.223	82	2.09E-04	61	1.56E-04	74%	Pass
36	0.228	78	1.99E-04	58	1.48E-04	74%	Pass
37	0.233	75	1.91E-04	56	1.43E-04	75%	Pass
38	0.239	72	1.84E-04	54	1.38E-04	75%	Pass
39	0.244	70	1.79E-04	52	1.33E-04	74%	Pass
40	0.249	66	1.68E-04	51	1.30E-04	77%	Pass
41	0.255	61	1.56E-04	51	1.30E-04	84%	Pass
42	0.260	59	1.50E-04	50	1.28E-04	85%	Pass
43	0.265	55	1.40E-04	49	1.25E-04	89%	Pass
44	0.271	53	1.35E-04	48	1.22E-04	91%	Pass
45	0.276	50	1.28E-04	46	1.17E-04	92%	Pass
46	0.281	49	1.25E-04	44	1.12E-04	90%	Pass
47	0.287	44	1.12E-04	41	1.05E-04	93%	Pass
48	0.292	43	1.10E-04	38	9.69E-05	88%	Pass
49	0.297	40	1.02E-04	36	9.18E-05	90%	Pass
50	0.303	37	9.44E-05	35	8.93E-05	95%	Pass
51	0.308	37	9.44E-05	33	8.42E-05	89%	Pass
52	0.313	36	9.18E-05	30	7.65E-05	83%	Pass
53	0.319	34	8.67E-05	27	6.89E-05	79%	Pass
54	0.324	33	8.42E-05	24	6.12E-05	73%	Pass
55	0.329	30	7.65E-05	23	5.87E-05	77%	Pass
56	0.335	28	7.14E-05	21	5.36E-05	75%	Pass
57	0.340	26	6.63E-05	20	5.10E-05	77%	Pass
58	0.345	26	6.63E-05	20	5.10E-05	77%	Pass
59	0.351	24	6.12E-05	18	4.59E-05	75%	Pass
60	0.356	24	6.12E-05	17	4.34E-05	71%	Pass
61	0.361	23	5.87E-05	15	3.83E-05	65%	Pass
62	0.367	23	5.87E-05	12	3.06E-05	52%	Pass
63	0.372	23	5.87E-05	12	3.06E-05	52%	Pass
64	0.377	23	5.87E-05	11	2.81E-05	48%	Pass
65	0.383	23	5.87E-05	11	2.81E-05	48%	Pass
66	0.388	23	5.87E-05	11	2.81E-05	48%	Pass
67	0.393	21	5.36E-05	10	2.55E-05	48%	Pass
68	0.399	21	5.36E-05	10	2.55E-05	48%	Pass
69	0.404	19	4.85E-05	10	2.55E-05	53%	Pass
70	0.409	18	4.59E-05	10	2.55E-05	56%	Pass
71	0.415	17	4.34E-05	8	2.04E-05	47%	Pass
72	0.420	17	4.34E-05	6	1.53E-05	35%	Pass
73	0.425	16	4.08E-05	6	1.53E-05	38%	Pass

74	0.431	15	3.83E-05	6	1.53E-05	40%	Pass
75	0.436	13	3.32E-05	6	1.53E-05	46%	Pass
76	0.441	12	3.06E-05	6	1.53E-05	50%	Pass
77	0.447	12	3.06E-05	6	1.53E-05	50%	Pass
78	0.452	12	3.06E-05	6	1.53E-05	50%	Pass
79	0.457	12	3.06E-05	6	1.53E-05	50%	Pass
80	0.463	12	3.06E-05	6	1.53E-05	50%	Pass
81	0.468	11	2.81E-05	6	1.53E-05	55%	Pass
82	0.473	11	2.81E-05	5	1.28E-05	45%	Pass
83	0.479	10	2.55E-05	5	1.28E-05	50%	Pass
84	0.484	9	2.30E-05	4	1.02E-05	44%	Pass
85	0.489	9	2.30E-05	4	1.02E-05	44%	Pass
86	0.495	9	2.30E-05	4	1.02E-05	44%	Pass
87	0.500	8	2.04E-05	4	1.02E-05	50%	Pass
88	0.505	8	2.04E-05	4	1.02E-05	50%	Pass
89	0.511	8	2.04E-05	4	1.02E-05	50%	Pass
90	0.516	8	2.04E-05	4	1.02E-05	50%	Pass
91	0.521	7	1.79E-05	4	1.02E-05	57%	Pass
92	0.527	6	1.53E-05	4	1.02E-05	67%	Pass
93	0.532	5	1.28E-05	4	1.02E-05	80%	Pass
94	0.537	5	1.28E-05	4	1.02E-05	80%	Pass
95	0.543	5	1.28E-05	4	1.02E-05	80%	Pass
96	0.548	5	1.28E-05	4	1.02E-05	80%	Pass
97	0.553	5	1.28E-05	4	1.02E-05	80%	Pass
98	0.559	5	1.28E-05	4	1.02E-05	80%	Pass
99	0.564	5	1.28E-05	4	1.02E-05	80%	Pass
100	0.569	4	1.02E-05	4	1.02E-05	100%	Pass

SWMM Schematic



```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option            Value
FLOW_UNITS          CFS
INFILTRATION        GREEN_AMPT
FLOW_ROUTING        KINWAVE
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
ALLOW_PONDING       NO
SKIP_STEADY_STATE   YES

START_DATE          09/04/1963
START_TIME          04:00:00
REPORT_START_DATE   09/04/1963
REPORT_START_TIME   04:00:00
END_DATE            05/26/2008
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         01:00:00
WET_STEP            00:15:00
DRY_STEP            04:00:00
ROUTING_STEP        0:01:00
RULE_STEP           00:00:00

INERTIAL_DAMPING    PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP       0.75
LENGTHENING_STEP    0
MIN_SURFAREA        12.557
MAX_TRIALS          8
HEAD_TOLERANCE      0.005
SYS_FLOW_TOL        5
LAT_FLOW_TOL        5
MINIMUM_STEP        0.5
THREADS             1

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------------
MONTHLY         .03   .05   .08   .11   .13   .15   .15   .13   .11   .08   .04   .02
DRY_ONLY        NO

[RAINGAGES]
```

```
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
EncinitasGuage   INTENSITY 1:00     1.0      TIMESERIES EncinitaGauge

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
EX-1             EncinitasGuage   POC-1-EX         0.90     0        95       4.5      0
DMA-1            EncinitasGuage   STOR-1           0.75     75       66       2.4      0
DMA-2            EncinitasGuage   P-POC            0.08     86       51       1.4      0
DMA-4            EncinitasGuage   P-POC            0.05     0.0      15       2        0
DMA-5            EncinitasGuage   P-POC            0.01     100      210      10       0
DMA-3            EncinitasGuage   P-POC            0.02     83       12       3.3      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
EX-1             0.012      0.1        0.05       0.10       25         OUTLET
DMA-1            0.012      0.1        0.05       0.10       25         OUTLET
DMA-2            0.012      0.1        0.05       0.10       25         PERVIOUS   100
DMA-4            0.012      0.1        0.05       0.10       25         PERVIOUS   100
DMA-5            0.012      0.1        0.05       0.10       25         OUTLET
DMA-3            0.012      0.1        0.05       0.10       25         PERVIOUS   100

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
EX-1             9          .025       .33
DMA-1            6.0        0.10       0.32
DMA-2            6.0        0.10       0.32
DMA-4            6.0        0.10       0.32
DMA-5            6.0        0.10       0.32
DMA-3            6.0        0.10       0.32

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-1-EX         0          FREE                        NO
P-POC            0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- -------- -------- -------- --------
STOR-1           0        6          0          TABULAR    BIO-1                        0        0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
```

```
ORIFICE-1       STOR-1          P-POC           SIDE        0.0       0.6       NO      0
ORIFICE-2       STOR-1          P-POC           SIDE        3.25      0.65      NO      0

[XSECTIONS]
;;Link          Shape       Geom1           Geom2     Geom3     Geom4     Barrels    Culvert
;;--------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
ORIFICE-1       CIRCULAR    0.06            0         0         0
ORIFICE-2       CIRCULAR    0.833           0         0         0

[CURVES]
;;Name          Type      X-Value    Y-Value
;;--------------- ---------- ---------- ----------
BIO-1           Storage   0          360
BIO-1                     3.5        360
BIO-1                     3.51       2
BIO-1                     5.5        2

[TIMESERIES]
;;Name          Date       Time       Value
;;--------------- ---------- ---------- ----------
EncinitaGauge   9/4/1963   4:00       0.01
EncinitaGauge   9/4/1963   5:00       0.12
EncinitaGauge   9/4/1963   6:00       0.15
EncinitaGauge   9/4/1963   7:00       0.01
EncinitaGauge   9/4/1963   9:00       0.09
EncinitaGauge   9/4/1963   10:00      0.07
EncinitaGauge   9/4/1963   11:00      0.03
EncinitaGauge   9/17/1963  3:00       0.05
EncinitaGauge   9/17/1963  4:00       0.02
EncinitaGauge   9/17/1963  5:00       0.02
EncinitaGauge   9/17/1963  6:00       0.09
EncinitaGauge   9/17/1963  7:00       0.05
EncinitaGauge   9/17/1963  8:00       0.03
EncinitaGauge   9/17/1963  9:00       0.02
EncinitaGauge   9/17/1963  10:00      0.01
EncinitaGauge   9/17/1963  11:00      0.02
EncinitaGauge   9/17/1963  12:00      0.04
EncinitaGauge   9/17/1963  13:00      0.02
EncinitaGauge   9/17/1963  15:00      0.03
EncinitaGauge   9/17/1963  16:00      0.1
EncinitaGauge   9/17/1963  17:00      0.1
EncinitaGauge   9/17/1963  18:00      0.12
EncinitaGauge   9/17/1963  19:00      0.07
EncinitaGauge   9/17/1963  20:00      0.02
EncinitaGauge   9/17/1963  21:00      0.01
EncinitaGauge   9/18/1963  3:00       0.07
EncinitaGauge   9/18/1963  5:00       0.01
EncinitaGauge   9/18/1963  6:00       0.03
```

THE FULL TIME SERIES IS NOT INCLUDED HERE, AS THE FULL SET IS 150+ PAGES LONG. THE FULL DATA SET CAN BE FOUND ON PROJECTCLEANWATER.ORG

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: KA Enteprises C-Store and Car Wash

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)	☐ Included ☐ Not applicable

WILL BE PROVIDED IN MINISTERIAL REVIEW

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

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: KA Enteprises C-Store and Car Wash

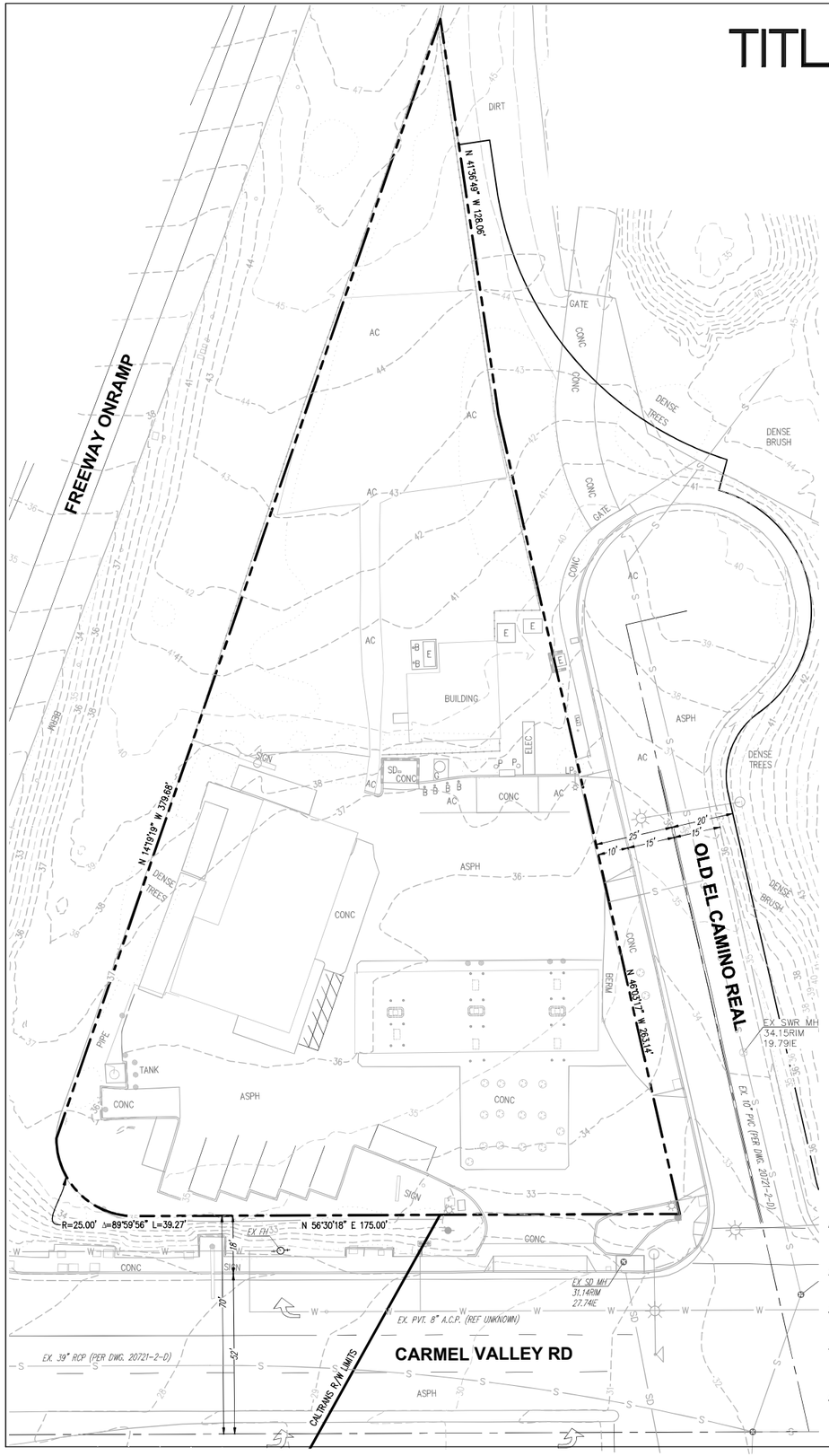
Use this checklist to ensure the required information has been included on the plans:

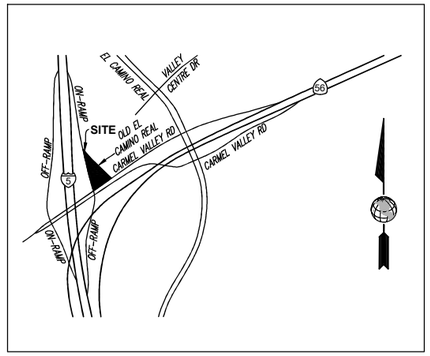
The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] Details and specifications for construction of structural BMP(s)
- [x] Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- [ ] 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)
- [x] 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)
- [x] All BMPs must be fully dimensioned on the plans
- [x] When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

TITLE + CONSTRAINTS MAP

CARMEL VALLEY SHELL





VICINITY MAP:

NO SCALE

LEGAL DESCRIPTION:

THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 25, TOWNSHIP 14 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATES GOVERNMENT SURVEY APPROVED JANUARY 18, 1876, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID SECTION 25, THE EAST LINE OF SAID SECTION BEARING SOUTH 0°45'08" WEST FROM SAID NORTHEAST CORNER; THENCE SOUTH 31°52'53" WEST 478.54 FEET TO THE TRUE POINT OF BEGINNING; THENCE SOUTH 56°30'31" WEST 175 FEET TO THE BEGINNING OF A NON-TANGENT 25 FOOT RADIUS CURVE CONCAVE NORTHERLY, THE RADIUS OF SAID CURVE BEARING SOUTH 33°29'26" EAST TO SAID POINT; THENCE WESTERLY AND NORTHERLY ALONG SAID CURVE 39.27 FEET THROUGH AN ANGLE OF 89°59'56"; THENCE NORTH 14°19'06" WEST 379.68 FEET; THENCE SOUTH 41°36'36" EAST 128.06 FEET; THENCE SOUTH 46°03'04" EAST 263.13 FEET TO THE TRUE POINT OF BEGINNING, AND ALSO KNOWN AS LOT 1, CHURCH HIGHLAND SUBDIVISION UNIT NO. 1, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE MAP THEREOF NO. 5837, FILED IN THE OFFICE OF THE COUNTY RECORDER ON FEBRUARY 10, 1967.

EXCEPTING THEREFROM ANY OIL, GAS, AND OTHER MINERALS (INCLUDING, WITHOUT LIMITATION, HELIUM, LIGNITE, SULFUR, PHOSPHATE AND OTHER SOLID, LIQUID AND GASEOUS SUBSTANCES), REGARDLESS OF THE NATURE THEREOF AND WHETHER SIMILAR OR DISSIMILAR BUT ONLY TO THE EXTENT ANY OF THE FOREGOING IS IN ITS NATURAL STATE AND NATURAL LOCATION AND NOT SUBJECT TO THE DOMINION AND CONTROL OF ANY PERSON, AND, UPON THIRTY (30) DAYS PRIOR WRITTEN NOTICE TO GRANTEE, THE RIGHT TO EXPLORE FOR, DEVELOP AND PRODUCE SAME, AS WELL AS THE RIGHT TO LEASE SUCH PORTION OF THE PROPERTY HEREBY RESERVED FOR SUCH PURPOSES, AND ALL MINERAL AND ROYALTY RIGHTS WHATSOEVER IN, ON, UNDER AND PERTAINING TO THE PROPERTY; BUT GRANTOR, ITS SUCCESSORS AND ASSIGNS, SHALL HAVE NO RIGHT TO USE, OR RIGHT OF INGRESS TO OR EGRESS FROM ANY PART OF THE SURFACE OF THE PROPERTY FOR EXPLORATION AND PRODUCING PURPOSES, EXCEPT WITH RESPECT TO (I) CURRENT ACTIVITIES AT AND ANY EXISTING CONTRACTUAL OR LEASEHOLD RIGHTS GRANTED TO THIRD PARTIES AND (II) ANY ADDITIONAL ACTIVITIES WHICH HAVE BEEN CONSENTED TO IN WRITING BY GRANTEE, WHOSE CONSENT SHALL NOT BE UNREASONABLY WITHHELD. EXCEPT AS SET FORTH IN THE PRECEDING SENTENCE, ANY OIL AND GAS DRILLING OPERATIONS, SHALL BE CONDUCTED BY MEANS OF WELLS, THE SURFACE LOCATIONS OF WHICH ARE ON OTHER LANDS AND WHICH MAY BE DRILLED INTO AND BOTTOMED IN OR UNDER THE PROPERTY. GRANTOR SHALL EXERCISE ITS RIGHTS UNDER THE FOREGOING MINERAL, OIL AND GAS RESERVATION SO AS NOT TO DISTURB, ANY IMPROVEMENTS, INSTALLATIONS, PETROLEUM OR OTHER PRODUCES CONTAINED IN SUCH IMPROVEMENTS OR INSTALLMENTS OR SURFACE ACTIVITIES ON THE PROPERTY, GRANTOR IS TO RECEIVE AND RETAIN ALL BONUSES, RENTALS AND ROYALTIES PAYABLE UNDER ANY SUCH MINERAL, OIL AND GAS LEASE OR LEASES. GRANTOR MAY ASSIGN, TRANSFER, SELL OR CONVEY SUCH OIL, GAS AND MINERAL RESERVATION TO ANY PERSON, CORPORATION, PARTNERSHIP OR OTHER ENTITY, AS RESERVED IN THE DEED FROM OTHER OIL COMPANY RECORDED SEPTEMBER 8, 1998 AS INSTRUMENT NO. 98-570037 OF OFFICIAL RECORDS.

TITLE INFORMATION:

TITLE INFORMATION FOR THIS SURVEY BASED ON A PRELIMINARY REPORT PREPARED BY STEWART TITLE GUARANTY COMPANY COMMERCIAL SERVICES AS ORDER NO. 2100048078I, DATED: JULY 16, 2021.

VERTICAL BENCHMARK:

DESCRIPTION: BRASS PLUG IN TOP OF CURB INLET AT THE NORTHEAST CORNER OF VALLEY CENTRE DRIVE (FORMERLY CARMEL VIEW ROAD) AND EL CAMINO REAL AS LISTED IN THE CITY OF SAN DIEGO VERTICAL CONTROL BENCHBOOK.

ELEVATION: 55.345' (MSL/NGVD29)

WATER/SEWER UTILITY NOTES:

1. ALL PROPOSED WATER AND SEWER FACILITIES (PUBLIC AND PRIVATE) WITHIN THE PUBLIC ROW OR PUBLIC EASEMENT MUST BE DESIGNED AND CONSTRUCTED, OR ABANDONED, IN ACCORDANCE WITH THE CRITERIA ESTABLISHED WITHIN THE CITY OF SAN DIEGO'S CURRENT WATER AND SEWER FACILITY DESIGN GUIDELINES, REGULATIONS, STANDARDS, AND PRACTICES PERTAINING THERETO.
2. ALL WATER SERVICES TO THE SITE MUST PASS THROUGH A PRIVATE ABOVE GROUND BACK FLOW PREVENTION DEVICE (BFPD). BFPDs ARE TO BE LOCATED ABOVE GROUND, ON PRIVATE PROPERTY, IN LINE WITH THE SERVICE, AND IMMEDIATELY ADJACENT TO THE RIGHT-OF-WAY.
3. NO TREES OR SHRUBS WHOSE HEIGHT WILL BE 3' OR GREATER AT MATURITY SHALL BE INSTALLED OR RETAINED WITHIN 5' OF ANY PUBLICLY MAINTAINED WATER FACILITIES OR WITHIN 10' OF ANY PUBLICLY MAINTAINED SEWER FACILITIES.
4. AN ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA) WILL BE PREPARED WITH THE MINISTERIAL PERMITTING PROCESS (CONSTRUCTION PLANS) FOR ANY EXISTING OR PROPOSED PRIVATE IMPROVEMENTS WITHIN THE PUBLIC RIGHT OF WAY OR PUBLIC UTILITY EASEMENTS (EXISTING OR PROPOSED).
5. THERE ARE NO WATER OR SEWER EASEMENTS ON OR ADJACENT TO THE PROPERTY.

OWNER:

KA CARMEL VALLEY, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

SITE ADDRESS:

3060 CARMEL VALLEY ROAD
SAN DIEGO, CA 92130

ASSESSOR'S PARCEL NUMBER:

307-240-07-00

SOURCE OF TOPOGRAPHY:

TOPOGRAPHY SHOWN HEREON IS BASED ON AERIAL PHOTOGRAMMETRIC MAPPING CONDUCTED BY PHOTOGEODETIC, INC AS PHOTOGRAPHED ON OCTOBER 28, 2014. HORIZONTAL AND VERTICAL GROUND CONTROL WERE ESTABLISHED BY OMEGA LAND SURVEYING, INC. ON OCTOBER 27, 2014 WITH ADDITIONAL BOUNDARY TIES AND SUPPLEMENTAL DATA COLLECTED ON AUGUST 17-23, 2021.

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE NORTHEASTERLY SIDE LINE OF (OLD) EL CAMINO REAL AS SHOWN ON PM 18484, SAID BEING BEING "N 46°03'17" E".

EASEMENTS:

THERE ARE NO EXISTING PLOTTABLE EASEMENTS ON THE SITE.

AREA SUMMARY:

% IMPERVIOUS (EXISTING)	68%
% IMPERVIOUS (PROPOSED)	76%

SLOPE ANALYSIS NOTE:

THERE ARE NO EXISTING NATURAL SLOPES GREATER THAN 15% OR GREATER. THE ENTIRE SITE HAS BEEN PREVIOUSLY GRADED AND IMPROVED.

GRADING QUANTITIES:

GRADED AREA	0.77 [ACRES]
MAX FILL	2.08 [FT]
MAX CUT	4.56 [FT]
FILL QUANTITIES	331 [CY]
CUT QUANTITIES	1,044 [CY]
UNDERCUT QUANTITIES	712 [CY]
EXPORT CONDITION	1,425 [CY]

SHEET INDEX:

ABBREVIATIONS:

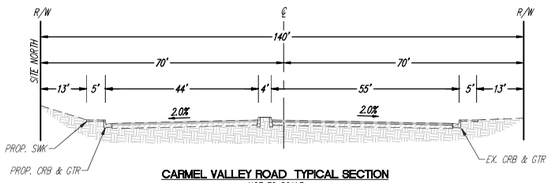
AC	ASPHALT CONCRETE	LP	LIGHT POLE
B	BOLLARD	P	PAVEMENT
BB	BIO BASIN	PL	PROPERTY LINE
BW	BOTTOM OF WALL	PVT	PRIVATE
CONC	CONCRETE	R/W	RIGHT-OF-WAY
ELEC	ELECTRICAL UTILITIES	SCO	SEWER CLEAN-OUT
FF	FINISH FLOOR	SD	STORM DRAIN UTILITIES
FG	FINISH GRADE	SMH	SEWER MANHOLE
FH	FIRE HYDRANT	TC	TOP OF CURB
FL	FLOW LINE	TW	TOP OF WALL
GAS	GAS FACILITIES	WM	WATER METER BOX
		WV	WATER VALVE

EXISTING LEGEND:

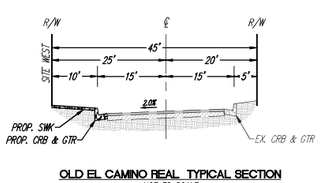
ITEM	SYMBOL
CENTERLINE	
RIGHT-OF-WAY	
EX. PROPERTY LINE	
EX CONTOUR	275
EX. SPOT ELEVATION	965.8'
EX ELECTRICAL OR COMMUNICATIONS MANHOLE	E
EX SANITARY SEWER & MANHOLE	S
EX WATER	W
EX FIRE HYDRANT ASSEMBLY	
EX CURB & GUTTER	
EX TREE	
EX. POWER POLE	
EX. AC BERM	

PROPOSED LEGEND:

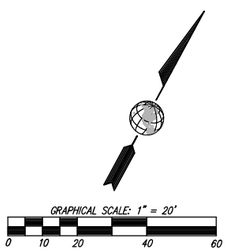
ITEM	SYMBOL
PROPOSED FINISH FLOOR ELEVATION	FF=52.00
PROPOSED TOP OF CURB ELEVATION	374.00TC
PROPOSED PAVEMENT ELEVATION	374.00P
PROPOSED FLOWLINE ELEVATION	374.00FL
PROPOSED FINISHED GRADE ELEVATION	374.00FG
PROPOSED GRADIANT	1.75%
PROPOSED CURB (PVT)	
PROPOSED CURB & GUTTER (PVT)	
PROPOSED PCC SIDEWALK (PVT)	
PROPOSED AC PAVEMENT (PVT)	
PROPOSED PCC PAVEMENT (PVT)	
PROPOSED AC GRIND & OVERLAY (PVT)	
PROPOSED PCC PAVEMENT (PUBLIC)	
PROPOSED PCC SIDEWALK (PUBLIC)	
PROPOSED LANDSCAPING (PVT)	
PROPOSED DRIVEWAY (PUBLIC)	
PROPOSED STORM DRAIN (PVT)	SIZE & TYPE PER PLAN
PROPOSED ROOF DRAIN (PVT)	RD
PROPOSED MODULAR WETLAND SYSTEM (PVT)	
PROPOSED HMP STORMWATER STORAGE (PVT)	
PROPOSED CMU WALL	
PROPOSED BUILDING FOOTPRINT	
PROPOSED STORM DRAIN STRUCTURE	
PROPOSED WIDE RIBBON GUTTER	
PROPOSED BROW DITCH	
PROPOSED RIP RAP	
PROPOSED WATER (PVT)	SIZE & TYPE PER PLAN
PROPOSED SEWER (PVT)	SIZE & TYPE PER PLAN
PROPOSED WATER POINT OF CONNECTION (PVT)	W
PROPOSED SEWER POINT OF CONNECTION (PVT)	S
PROPOSED IRRIGATION POINT OF CONNECTION (PVT)	IR
PROPOSED BFP (PVT)	



CARMEL VALLEY ROAD TYPICAL SECTION
NOT TO SCALE



OLD EL CAMINO REAL TYPICAL SECTION
NOT TO SCALE



OMEGA
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No.	Date	By	Chkd.	Apprr.	Revision

Title: TITLE AND CONSTRAINTS

KA ENTERPRISES C-STORE AND CAR WASH
3060 CARMEL VALLEY RD
SAN DIEGO, CALIFORNIA

5820 Oberlin Dr Suite 201
San Diego, CA 92121
Contact: Eugene Marini
858/404-6091
fax 858/404-6081

For: KA ENTERPRISES

PRELIMINARY

Scale: Horizontal AS NOTED Vertical

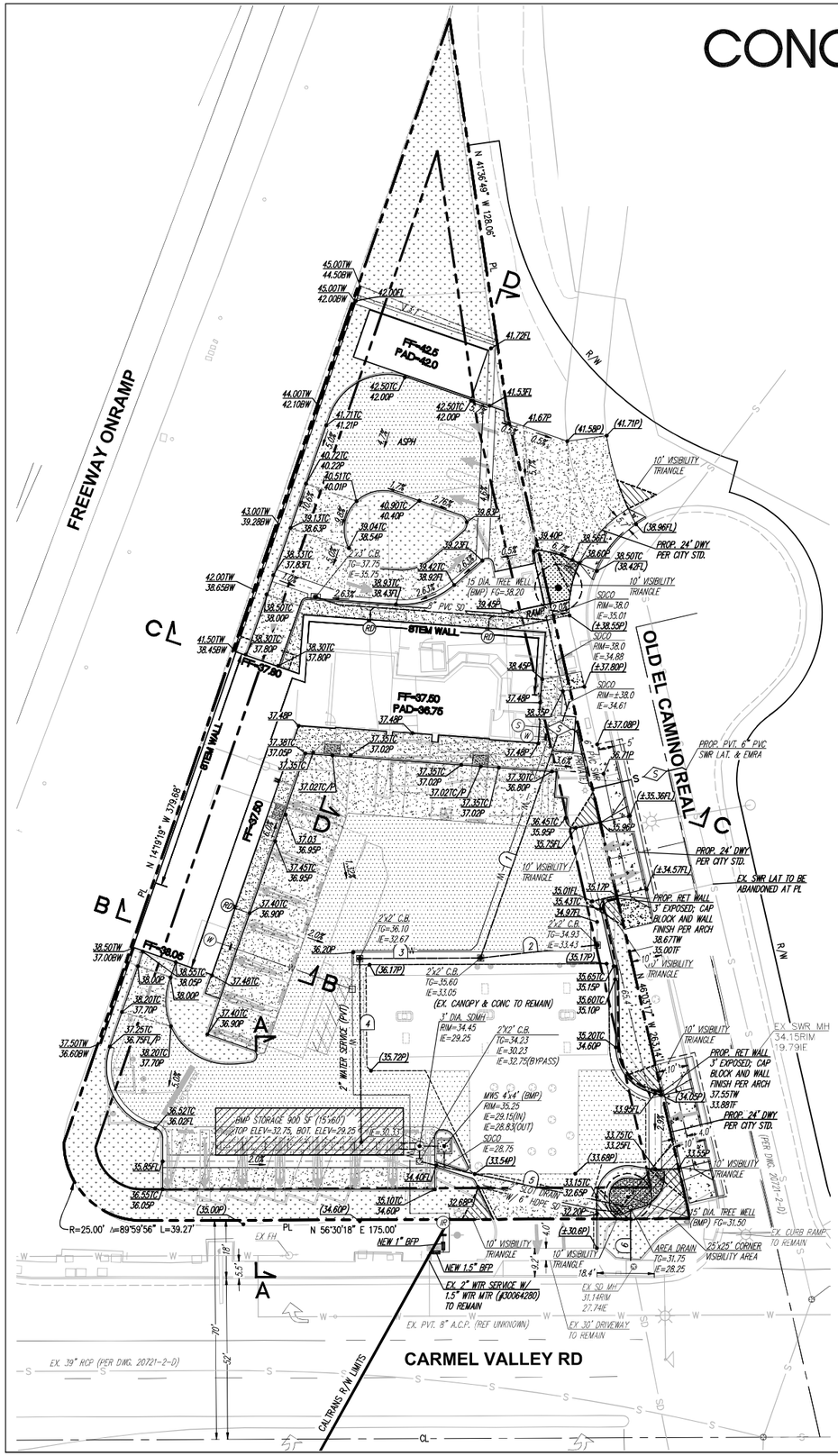
Designed | Drawn | Checked | Approved | Date

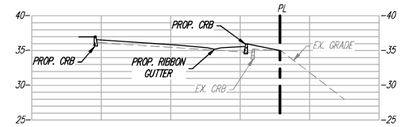
Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

Job Number 21895

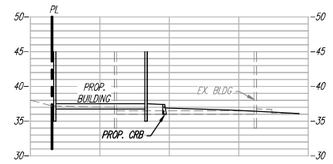
Sheet C-1 of

CONCEPTUAL GRADING PLAN

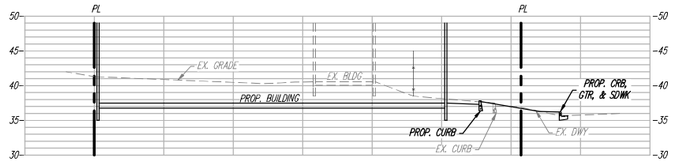




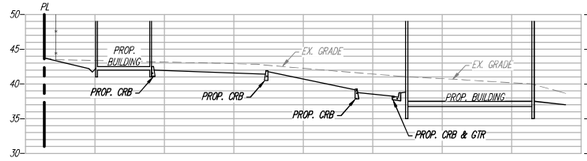
SECTION A-A
HORIZONTAL SCALE 1"=20'
VERTICAL SCALE 1"=10'



SECTION B-B
HORIZONTAL SCALE 1"=20'
VERTICAL SCALE 1"=10'



SECTION C-C
HORIZONTAL SCALE 1"=20'
VERTICAL SCALE 1"=10'



SECTION D-D
HORIZONTAL SCALE 1"=20'
VERTICAL SCALE 1"=10'

GRAPHICAL SCALE: 1" = 20'
0 10 20 40 60

LEGEND:

ITEM	SYMBOL
CENTERLINE	
RIGHT-OF-WAY	
EX. PROPERTY LINE	
EX. CONTOUR	275
EX. SPOT ELEVATION	965.8'
EX SANITARY SEWER	S S S
EX WATER	W W
EX FIRE HYDRANT ASSEMBLY	
EX CURB & GUTTER	
PROPOSED FINISH FLOOR ELEVATION	
PROPOSED TOP OF CURB ELEVATION	374.00TC
PROPOSED PAVEMENT ELEVATION	374.00P
PROPOSED FLOWLINE ELEVATION	374.00FL
PROPOSED FINISHED GRADE ELEVATION	374.00FG
PROPOSED GRADIANT	1.75%
PROPOSED CURB (PVT)	
PROPOSED CURB & GUTTER (PVT)	
PROPOSED PCC SIDEWALK (PVT)	
PROPOSED AC PAVEMENT (PVT)	
PROPOSED PCC PAVEMENT (PVT)	
PROPOSED AC GRIND & OVERLAY (PVT)	
PROPOSED PCC PAVEMENT (PUBLIC)	
PROPOSED PCC SIDEWALK (PUBLIC)	
PROPOSED LANDSCAPING (PVT)	
PROPOSED DRIVEWAY (PUBLIC)	SIZE & TYPE PER PLAN
PROPOSED STORM DRAIN (PVT)	RD
PROPOSED ROOF DRAIN (PVT)	
PROPOSED MODULAR WETLAND SYSTEM (PVT)	
PROPOSED HMP STORMWATER STORAGE (PVT)	
PROPOSED CMU WALL	
PROPOSED BUILDING FOOTPRINT	
PROPOSED STORM DRAIN STRUCTURE	
PROPOSED WIDE RIBBON GUTTER	
PROPOSED BROW DITCH	
PROPOSED RIP RAP	SIZE & TYPE PER PLAN
PROPOSED WATER (PVT)	SIZE & TYPE PER PLAN
PROPOSED SEWER (PVT)	W
PROPOSED WATER POINT OF CONNECTION (PVT)	S
PROPOSED SEWER POINT OF CONNECTION (PVT)	IR
PROPOSED IRRIGATION POINT OF CONNECTION (PVT)	
PROPOSED BFP (PVT)	

STORMWATER NOTE:

THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT bmp STANDARDS ARE INCORPORATED INTO THE PROJECT.

(X) PRIVATE STORM DRAIN DATA TABLE:

LINE #	LENGTH	REMARKS
1	86.25'	8" PVC SDR-35
2	36.79'	6" PVC SDR-35
3	37.86'	10" PVC SDR-35
4	57.94'	10" PVC SDR-35
5	67.56'	12" PVC SDR-35
6	16.31'	12" PVC SDR-35 (EMRA REQUIRED)

INTERSECTION SITE VISIBILITY NOTE:

10' MIN
10' MIN

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No. | Date | By | Ckd. | Appr. | Revision

Title: CONCEPTUAL GRADING PLAN
KA ENTERPRISES C-STORE AND CAR WASH
3060 CARMEL VALLEY RD
SAN DIEGO, CALIFORNIA

5820 Oberlin Dr Suite 201
San Diego, CA 92121
Contact: Eugene Marini
858/404-6091
fax 858/404-6081

For: KA ENTERPRISES

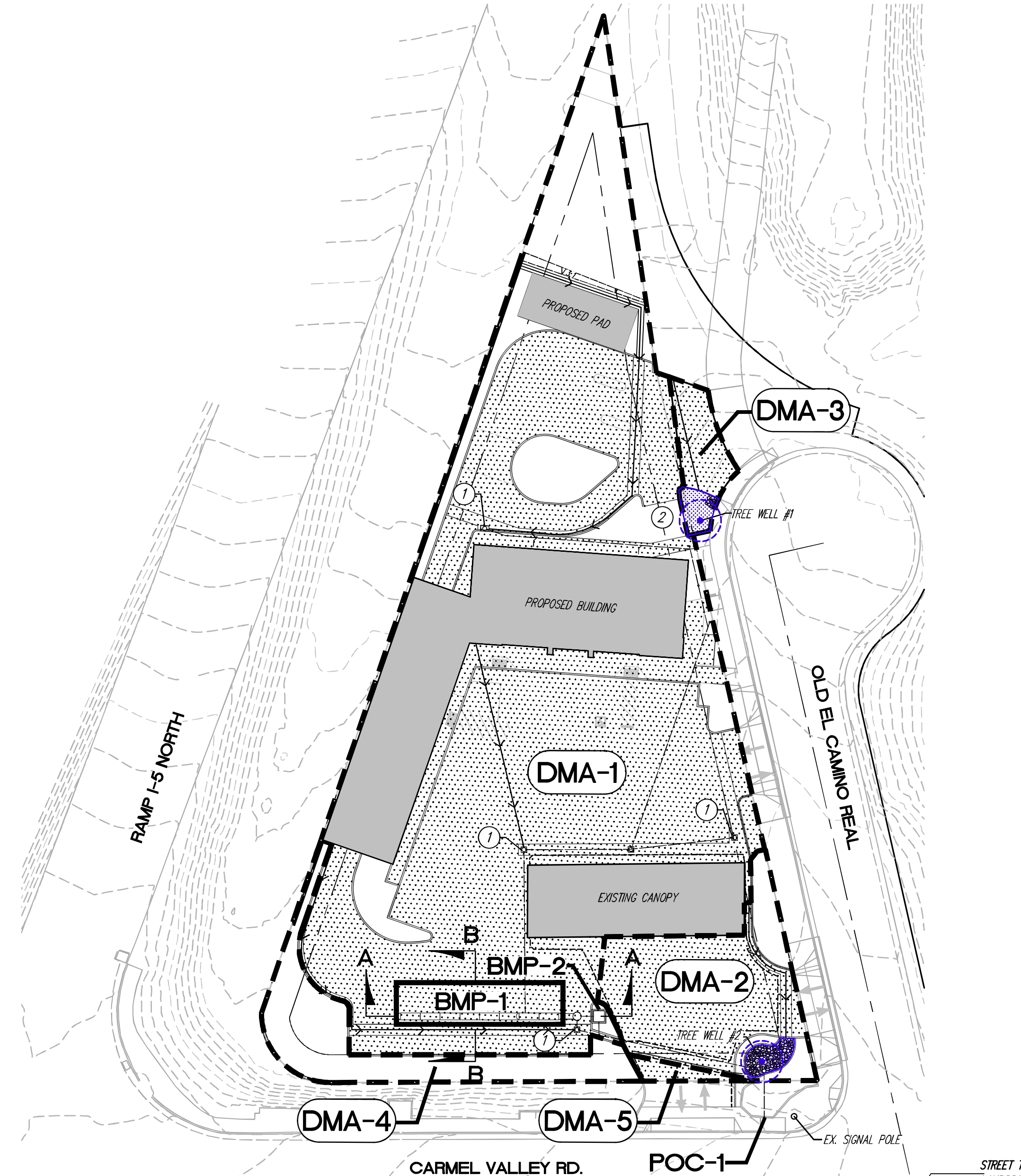
PRELIMINARY

Scale: Horizontal AS NOTED Vertical

Designed | Drawn | Checked | Approved | Date

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

Job Number 21895 | Sheet C-2



DMA DATA TABLE

DMA-NO.	TOT. AREA (SF)	IMPERVIOUS (%)	DESIGN DCV (CF)	TYPE/TREATED BY
DMA-1	32,508	75	931	BMP-1 / BMP-2
DMA-2	3,624	86	71	TREE WELL #2 (15' DIA) (SITE DESIGN BMP)
DMA-3	745	83	23	TREE WELL #1 (15' DIA) (SITE DESIGN BMP)
DMA-4	2,264	0	–	SELF-MITIGATING
DMA-5	195	100	–	DEMINIMIS
TOTAL DCV OF SITE			1,025	

TREATMENT BMP DATA TABLE

BMP-#	TREATING	PROPOSED FOOTPRINT	PROPOSED VOLUME	DESCRIPTION
BMP-1	DMA-1	900 SF	1,480 CF	GRAVEL FILLED, DETENTION FACILITY W/ 8 SC-740 STORAGE ARCHES
BMP-2	DMA-1	4'x4'	N/A	PROPRIETARY BIOFILTRATION FACILITY MODULAR WETLAND MWS-L-4-4-C

STRUCTURAL BMP DATA TABLE

BMP#	TRIBUTARY AREA	DESCRIPTION
BMP-2	DMA-1	BIOCLEAN MODULAR WETLANDS SYSTEM MODEL: MWS-L-4-4-L REQ'D FLOWRATE= 0.033 CFS PROVIDED FLOWRATE= 0.052 CFS

SIDE DESIGN BMP – TREE WELL DATA TABLE

TRIBUTARY BASIN	CANOPY DIAMETER	# OF TREES	AMENDED SOIL DEPTH	PROPOSED AMENDED SOIL VOLUME (CF)	REQUIRED MIN. AMENDED SOIL VOLUME (CF)	TREE WELL VOLUME REDUCTION (CF/TREE)	TOTAL DCV REDUCTION CF
DMA-2	15 FT	1 (*)	2.5 FT	400 CF	353 CF	200 CF	71
DMA-3	15 FT	1 (*)	2.5 FT	400 CF	353 CF	200 CF	23
						TOTAL SITE DCV	1,025
						PERCENT OF DCV TREATED BY TREES	9.1%

(*) SITE DESIGN BMP TREE WELLS TO BE INSTALLED PER SDL-101. ROOT BARRIERS PER SDL-106 TO BE ADDED WHERE TREE TRUNK IS WITHIN 10' OF ADJACENT HARDSCAPE

BMP INSPECTION NOTES

CONTRACTOR MUST CONTACT ENGINEER FOR INSPECTION OF BMPS AT THE FOLLOWING STAGES OF CONSTRUCTION:

- AFTER EXCAVATION, PRIOR TO GRAVEL/CHAMBER PLACEMENT
- AFTER PLACEMENT OF LOWER 6" OF GRAVEL, CHAMBER AND OUTLET STRUCTURE, PRIOR TO COVERING CHAMBER
- AFTER PLACEMENT OF OUTLET CONTROL STRUCTURE INSIDE MANHOLE

SOURCE CONTROL BMP NOTES

ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE UTILIZED

A. ALL ONSITE INLETS TO BE MARKED "NO DUMPING" OR SIMILAR AND ALL OPERATIONAL PRECAUTIONS TO AVOID NON STORM WATER DISCHARGE SHALL BE FOLLOWED PER THE CITY'S BMP DESIGN MANUAL.

B. PROPOSED REFUSE AREA WILL REMAIN COVERED AND PROTECTED FROM WIND DISPERSAL. SIGNS SHALL BE PLACED WITH WORDS "DO NOT DUMP HAZARDOUS MATERIALS OR LIQUIDS HERE" OR SIMILAR. OWNER SHALL BE RESPONSIBLE TO KEEP THE AREA CLEAN OF LITTER AND SPILLS.

C. OWNER TO BE RESPONSIBLE FOR SWEEPING PLAZAS, SIDEWALKS, AND PARKING LOTS. THIS IS TO BE DONE REGULARLY AND AS NEEDED TO PREVENT ACCUMULATION OF LITTER AND DEBRIS.

D. CONDENSATE DRAIN LINES INCLUDING AIR CONDITIONING SHALL BE ROUTED TO LANDSCAPE.

E. ROOFING, GUTTERS, AND TRIM SHALL NOT BE MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF MUST BE AVOIDED.

LEGEND:

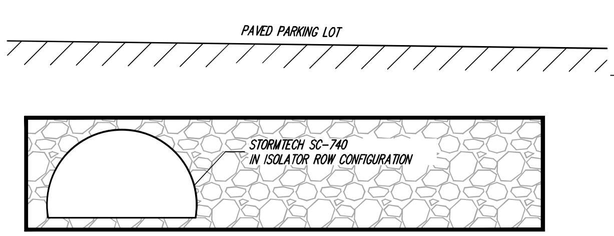
DMA BOUNDARY	(heavy dashed line)
DRAINAGE ARROWS	→
DRAINAGE MANAGEMENT AREA	DMA-#
TREE WELLS	○
GRAVEL STORAGE LIMITS	▭
STRUCTURAL BEST MANAGEMENT PRACTICE	BMP-#
POINT OF COMPLIANCE	POC-#
IMPERVIOUS AREA	(stippled)
ROOF AREA	(shaded)
LANDSCAPED AREAS	(blank)
ROOF DRAINS	(RD)

NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP FOR THE SITE IS ASSUMED TO BE TYPE D
2. MODULAR WETLAND SYSTEM IS LOCATED AT GROUND LEVEL OF THE SITE.
3. GROUNDWATER DEPTH IS LOCATED AT APPROXIMATELY 12 FEET BELOW GROUND SURFACE
4. NO EXISTING NATURAL HYDROLOGIC FEATURES
5. NO CRITICAL COARSE SEDIMENT YIELD AREAS ON SITE
6. ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE IMPLEMENTED

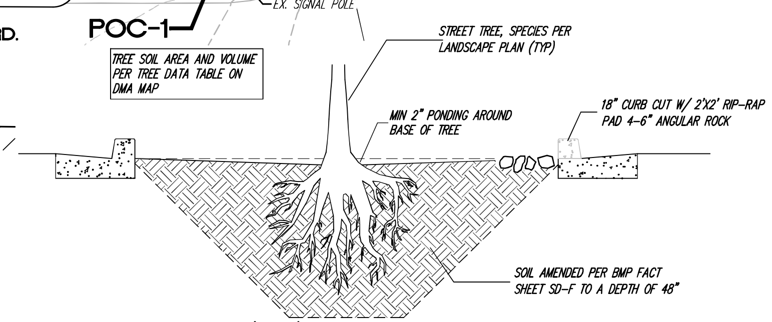
SOURCE CONTROL BMPs

STORM DRAIN STENCILING	(1)
TRASH STORAGE AREA	(2)



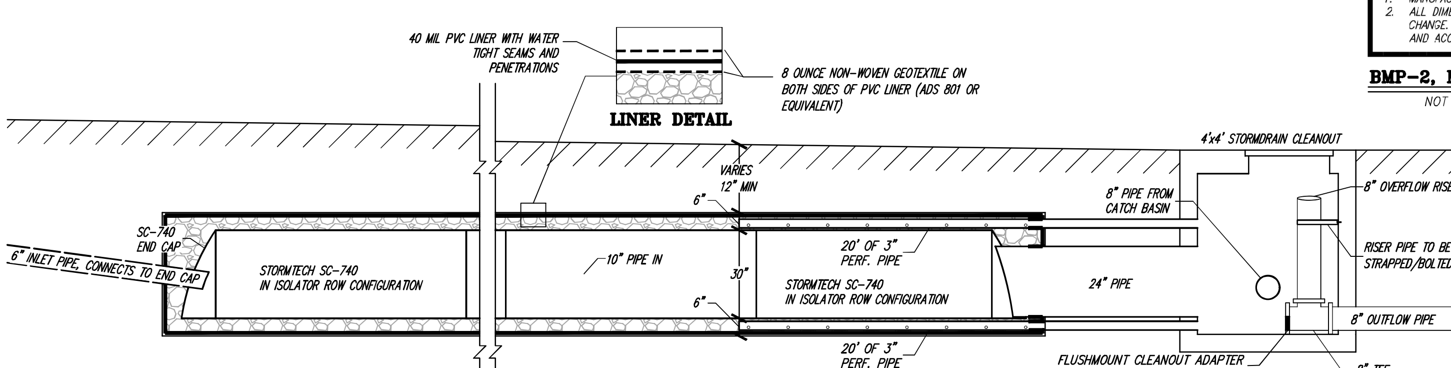
BMP-1, DETENTION BMP, SECTION B-B

NOT TO SCALE



TREE WELL DETAIL (TYP.)

NOT TO SCALE



BMP-1, DETENTION BMP, SECTION A-A

NOT TO SCALE

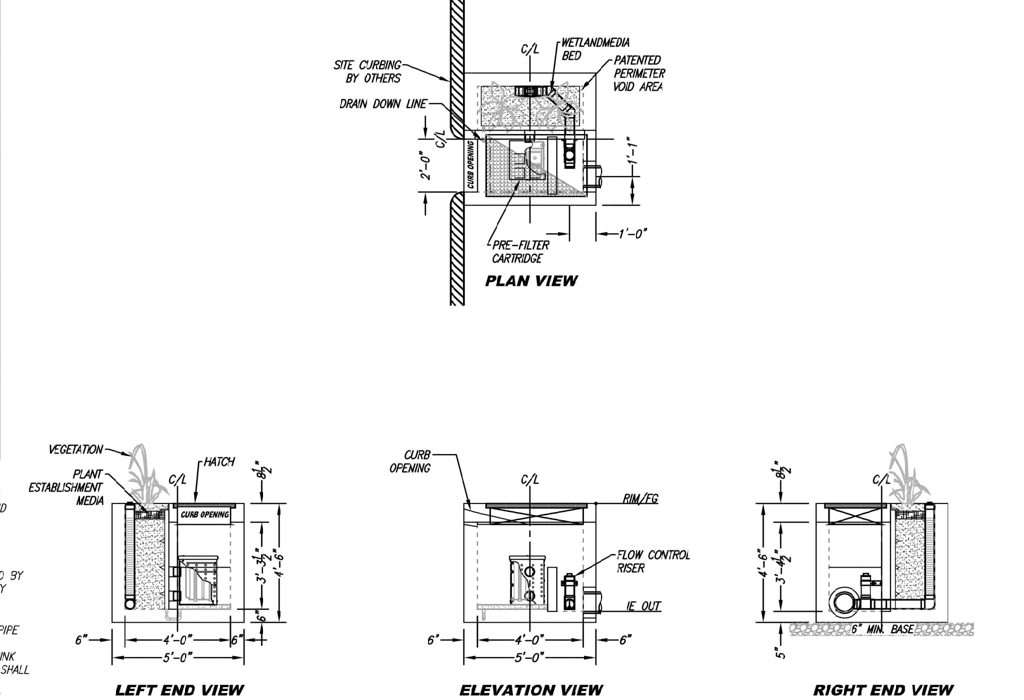
SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	24" X 42"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

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

GENERAL NOTES

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



TREATMENT FLOW (CFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS — THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF FORTERRA AND ITS COMPANIES. THIS DOCUMENT, NOR ANY PART THEREOF, MAY BE USED, REPRODUCED OR MODIFIED IN ANY MANNER WITH OUT THE WRITTEN CONSENT OF FORTERRA.

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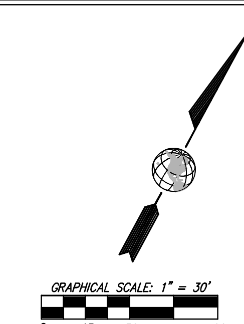
MWS-L-4-4-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

BMP-2, MODULAR WETLAND SYSTEM MWS-L-4-4-C

NOT TO SCALE



OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVE. SUITE B
SAN DIEGO, CA 92123
PH:(858) 634-8620 FAX:(858)-634-8627

Title: DMA MAP
KA ENTERPRISES C-STORE AND CAR WASH
3060 CARMEL VALLEY RD
SAN DIEGO, CALIFORNIA

For: KA ENTERPRISES
5820 Oberlin Dr Suite 201
San Diego, CA 92121
Contact: Eugene Marini
858/404-6091
fax 858/404-6081

PRELIMINARY

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

No.	Date	By	Ckd.	Appr.	Revision

Scale: Horizontal AS NOTED; Vertical

Designed — Drawn — Checked — Approved — Date —

Job Number 21895

Sheet C-3 of

Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

KA Enterprises C-Store and Car Wash
Drainage Study

3060 Carmel Valley Rd.
San Diego, CA 92130

Date Prepared:
August 25, 2023

Prepared for:
KA Enterprises
5820 Orbelin Drive, Suite 201
San Diego, CA 92121

Prepared By:

ΩMEGA
ENGINEERING CONSULTANTS
4320 Viewridge Ave, Suite C
San Diego, CA 92113
Ph: (858) 634-8620

Declaration of Responsible Charge:
I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards. I understand that the check of the project drawings and specifications by the City of San Diego is confined to a review only and does not relieve me, as an engineer of work, of my responsibilities for project design.

_____

Patric T. de Boer RCE 83583
Registration Expires 3-31-2025

Table of Contents

Appendices

Site & Project Description

This drainage study has been prepared for the development located at 3060 Carmel Valley Rd., San Diego, CA 92130. The project site is currently occupied by a convenience store, gas station canopy, and asphalt parking lot. The project will involve the demo of the existing convenience store and construction of a proposed convenience store and a car wash along with its corresponding improvements. The existing gas station canopy, pumps and tanks will remain. The total area of analysis is 0.88 acres.

A gravel filled, detention facility with StormTech arches and a Modular Wetland System will be constructed for HMP and treatment purposes. The HMP and treatment properties of the facility are detailed in a separate Stormwater Quality Report (SWQMP).

The site is located adjacent to the on-ramp to Interstate 5 North. See figure No. 1 for a Vicinity Map. See Figure 2 for the existing drainage limits. See Figure 3 for the proposed drainage limits.

Methodology

This drainage report has been prepared in accordance with the current City of San Diego regulations and procedures. The Modified Rational Method was used to compute the anticipated runoff.

The proposed storm drain pipes and channels were sized using Manning's Equation in *The Handbook of Hydraulics*, by Brater & King.

The 100-yr, 6-hr storm depth (P_6) was determined using the isopluvial map included as Appendix 2 of this report.

The initial time of concentration (Ti) and maximum overland flow length (Lm) were determined using Appendix 6.

The total time of concentration was determined by adding the Ti value to the travel time (Tt). Tt was determined via the Kirpich Formula as described on Appendix 7 on this report. Tt for surface flow on an asphalt swale was determined by modeling the approximate existing grades of the existing parking lot using Hydraflow Express to determine a velocity. Tt for proposed ribbon gutter was also determined modeling the proposed gutter using Hydraflow Express to determine a velocity. See Appendix 8 for Hydraflow Exhibits. Then the length of flow was divided by the flow velocity to determine Tt.

$$\mathbf{Tc = Ti+Tt}$$

The Tc and the P_6 values were entered into the peak intensity formula from Appendix 4 to determine the intensity of the rainfall during the peak of the 100-year, 6-hr storm.

$$\mathbf{I = 7.44 \times P_6 \times Tc^{-0.645}}$$

The peak discharge rate was determined using the Rational Method Formula.

Rational Method

$$Q=CIA$$

Where:

Q=peak discharge, in cubic feet per second (cfs)

C=runoff coefficient, proportion of the rainfall that runs off the surface (no units)
Table A-1, City of San Diego Drainage Design Manual (Appendix 5)

I =average rainfall intensity for a duration equal to the Tc for the area, (in/hr)
= 7.44*P6*Tc^-0.645

A = drainage area contributing to the design location, in acres

Cp= Pervious Coefficient Runoff Value, minimum of 0.35

$$Tc= \frac{1.8\ (1.1-C)*(L)^{0.5}*}{S^{0.33}}$$

S= Slope of drainage course

See the attached calculations for particulars. The following references have been used in preparation of this report:

(1) Handbook of Hydraulics, E.F. Brater & H.W. King, 6th Ed., 1976.
(2) City of San Diego Drainage Design Manual, 2017
(3) County of San Diego Hydrology Manual, 2003
(4) Modern Sewer Design, American Iron & Steel Institute, 1st Ed., 1980

Existing Conditions

The existing site is graded and terraced into two tiers being the northerly portion of the lot at the highest elevation and sloping towards Carmel Valley Rd., south of the site. The site is a triangular shaped 0.88-acre lot that consists of an asphalt parking lot on the northerly portion of the site and convenience store with a gas station canopy on the southerly portion of the lot. The site currently does not have an on-site storm drain system.

The northerly portion of the lot drains towards the southerly development via an asphalt swale. The runoff then drains via surface flow to Carmel Valley Road and ultimately to the existing catch basin on the northeasterly corner of the intersection in Carmel Valley Road and the on-ramp to Interstate 5 North. This point is referred to as Discharge Point # 1 in this report.

Proposed Conditions

The proposed development involves the construction of a convenience store and a car wash along with its corresponding improvements. The project proposes to modify the onsite drainage system with the addition of catch basins, gutters and brow ditches to help convey runoff to the discharge point. The project will increase the impervious footprint of the site by 8%.

The site was analyzed as a single drainage basin. The runoff generated by the majority of the site will drain to a series of catch basins and drain towards the southwesterly corner of the site where it conveys to a subsurface detention facility. The subsurface detention facility will consist of a 900-sf gravel filled, subsurface detention with a row of 8 Stormtech SC-740 storage arches. The detention system is assumed to be full during the peak of the 100-year storm. No attenuation of peak flows is

assumed in this analysis. Following detention and treatment, the flow will drain to an area drain located on the southeasterly landscape area. Finally, a 12" pipe will hard-connect to the existing curb inlet on the public sidewalk. This point is referred to as Discharge Point # 1 in this report.

The southeasterly corner of the site drains to the landscape area located on the southeasterly corner of the site. The runoff then drains to an area drain where it confluences with the runoff discharged from the subsurface detention basin.

Existing Rational Analysis

The existing area of site was modeled as a single basin. The existing basin is referred to as E-1 in this report. The average slope of the basin is approximately 4.1%. The weighted runoff coefficient is 0.85.

Below is a summary of the input data and the resulting flowrate for the 100-year, 6-hour storm.

Existing Rational Calculation Summary

Basin	Impervious %	C	I_{100} (in/hr)	Tc (mins)	Area (ac)	Q_{100} (cfs)
E-1	68%	0.85	3.80	11.7	0.88	2.86

The existing peak runoff flowrate DP-1 is 2.86 cfs. See the attached calculations for details.

Proposed Rational Analysis

The proposed site is modeled as a single basin. The proposed basin is referred to as P-1 in this report. The average slope of the basin is approximately 3.9%. The weighted runoff coefficient is 0.85.

Below is a summary of the input data and the resulting flowrate for the 100-year, 6-hour storm.

Proposed Rational Calculation Summary

Basin	Impervious %	C	I_{100} (in/hr)	Tc (mins)	Area (ac)	Q_{100} (cfs)
P-1	76%	0.85	3.59	12.8	0.88	2.70

The proposed peak runoff flowrate DP-1 is 2.70 cfs. See the attached calculations for details.

Results and Conclusions

The proposed improvements result in a decrease of generated runoff during the peak of the 100-year, 6-hr storm. The result is a peak storm water flowrate that is less than the existing conditions by 0.16 cfs.

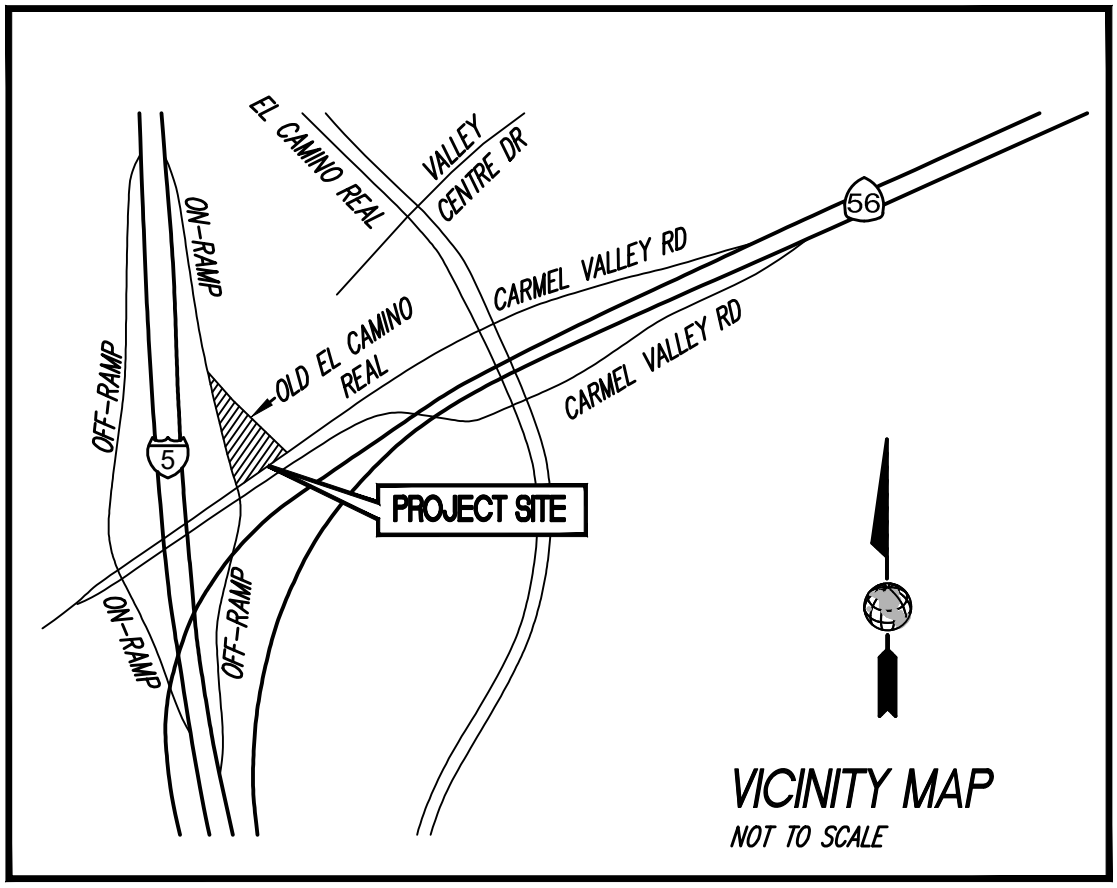
The project is not anticipated to exceed the capacity of the proposed onsite conveyances, as well as the existing offsite storm drain system conveyances.

It is the opinion of Omega Engineering Consultants that the project will not place any structures in the 100-year flood hazard areas or flood plain and is not located in an area that is exposed to the risk of flooding as a result of a dam levee failure, thus the project will not expose people or structured to significant risk of loss, injury or death involving flooding as a result of a failure of a levee or dam.

The redevelopment of the site is not anticipated to create the risk of substantial erosion on or offsite due to the decrease in calculated peak flows and the implementation of hydromodification controls.

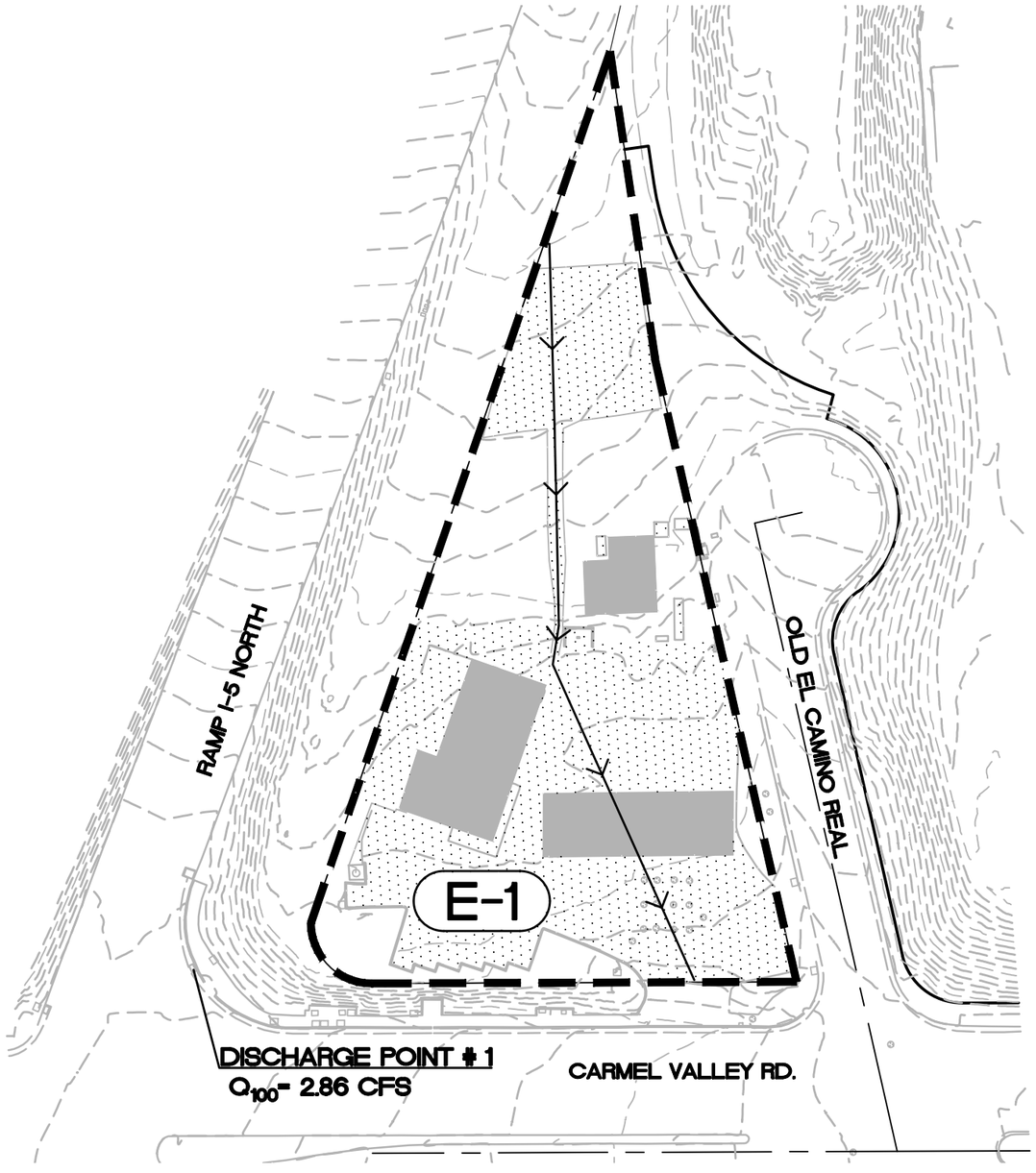
Project does not propose to discharge fill or dredged materials to the Waters of the State, therefore no CWA 401 or 404 permit is required. It is the opinion of Omega Engineering Consultants that the project will not create new adverse effects to the downstream facilities or receiving waters as a result of stormwater flowrates produced by the site.

It is the opinion of Omega Engineering Consultants that the project will not cause adverse effects to the downstream facilities or receiving waters. A separate Storm Water Quality Management Plan has been prepared to discuss the water quality impacts for the proposed development.



VICINITY MAP

NOT TO SCALE



LEGEND

- BASIN NUMBER ..... E-#
- AREA LIMITS .....
- DRAINAGE FLOW PATH .....
- BUILDING AREA .....
- PAVEMENT AREA .....
- PERVIOUS AREA .....

DRAINAGE BASIN DATA

BASIN #	AREA (AC)	C-VALUE	T_c (MINS)	I_{100} (IN/HR)	Q_{100} (CFS)
E-1	0.88	0.85	11.7	3.80	2.86
-	-	-	-	-	-

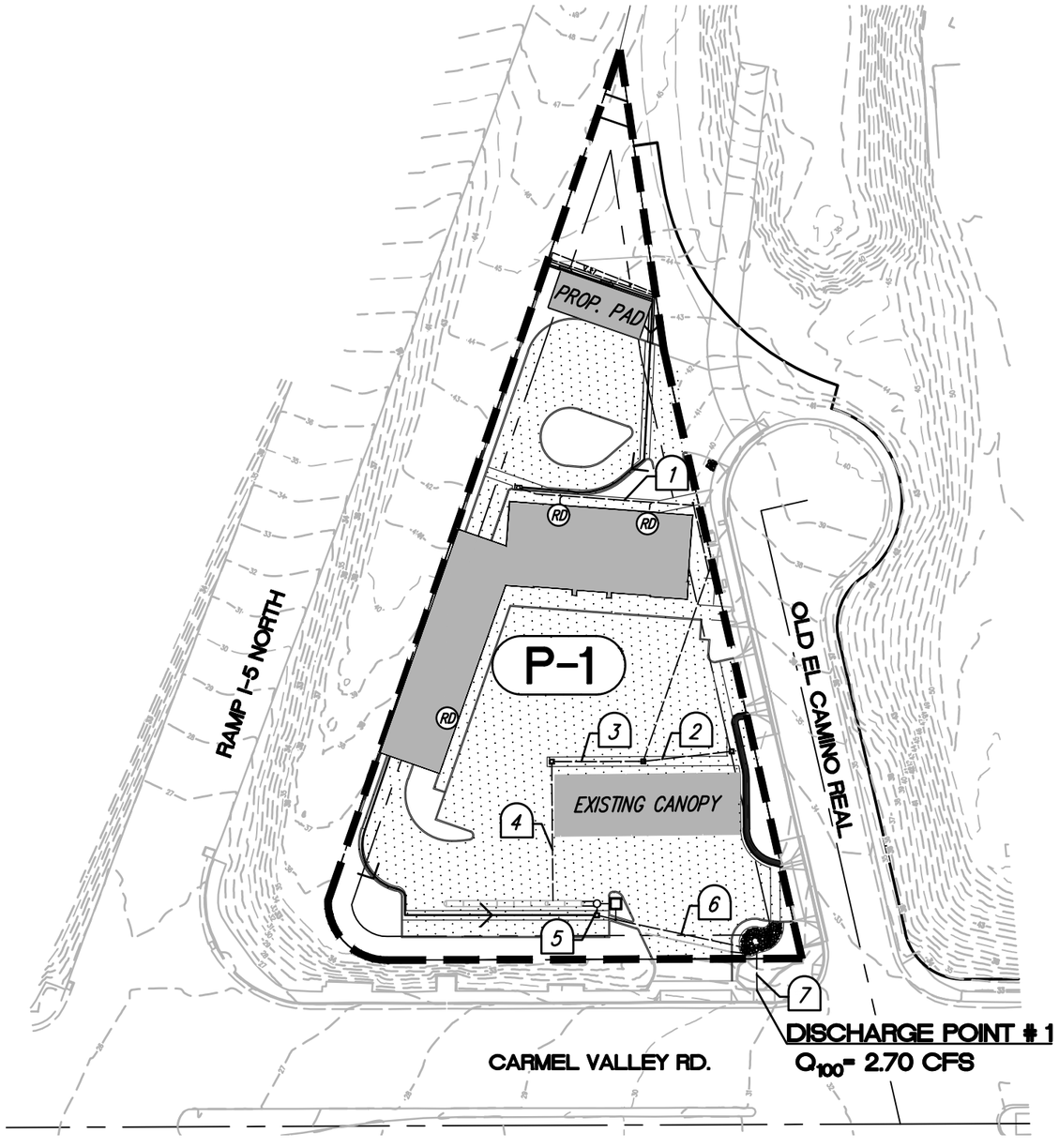
GRAPHICAL SCALE: 1" = 60'

0 30 60 120

KA ENTERPRISES
C-STORE AND CAR WASH
EXISTING HYDROLOGY EXHIBIT

OMEGA

EX. HYDROLOGY EXHIBIT



LEGEND

BASIN NUMBER ..... P-#

AREA LIMITS .....

DRAINAGE FLOW PATH .....

BUILDING AREA .....

PAVEMENT AREA .....

PERVIOUS AREA .....

DRAINAGE BASIN DATA

BASIN #	AREA (AC)	C-VALUE	T_C (MINS)	I_{100} (IN/HR)	Q_{100} (CFS)
P-1	0.88	0.85	12.8	3.59	2.70

(X) PIPE DATA

PIPE #	DIAMETER (INCHES)	SLOPE (%)	DEPTH /DIA	V_{100} (FPS)	Q_{100} (CFS)
1	8	1.0	0.69	3.79	1.00
2	6	0.5	0.18	1.25	0.03
3	8	1.95	0.56	5.12	1.03
4	10	3.9	0.48	7.96	2.06
5	8	10.0	0.42	10.21	1.42
6	10	6.4	0.49	10.16	2.70
7	12	1.0	0.65	5.00	2.70

GRAPHICAL SCALE: 1" = 60'

0 30 60 120

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C-STORE AND CAR WASH
PROPOSED HYDROLOGY EXHIBIT

OMEGA

PROP. HYDROLOGY EXHIBIT

KA ENTERPRISES C-STORE AND CAR WASH
HYDROLOGY AND HYDRAULICS CALCS

2/1/2022

BASIN	AREA (SF)	AREA (AC)	% Imp	"C" Value
E-1	38,483	0.88	68.4%	0.85
EX. TOTAL	**38,483**	**0.88**		
P-1	38,483	0.88	75.8%	0.85
PROP TOTAL	**38,483**	**0.88**		

Basin Confluence	Symbol

(A) DP # - Existing/Proposed Discharge Point
CP # - Existing/Proposed Confluence Point

(B) C value for Commercial, 80% Impervious, is 0.85 (Table A-1 City of San Diego Drainage Design Manual)
(Type 'D' soil)

KA ENTERPRISES C-STORE AND CAR WASH
HYDROLOGY AND HYDRAULICS CALCS

Sub-Basin	AREA Ac.	"C"	Overland flow length	Concentrated Flow Length, (ft)	S(%) (avg.)	Ti mins	Tt mins	T_c mins	I in/hr	Q cfs	NOTES 100-year, 6 hr storm
											P(6) 2.5
E-1	0.88	0.85	100.0	238.0	4.1%	10.3	1.42	11.7	3.80	2.86	
								11.7	**3.80**	**2.86**	**Discharge Point-1**
P-1	0.88	0.85	100.0	257.0	3.9%	10.9	1.91	12.8	3.59	2.70	
								12.8	**3.59**	**2.70**	**Discharge Point-1**

CONDUIT SIZING CALCULATIONS

The following chart details the sizing parameters and for conduits that convey runoff on the site.

K'= Discharge factor	=	$(Q*n)/(d^{8/3}*s^{1/2})$
n= Mannings coefficient	=	0.013 for PVC & HDPE
d=diameter of conduit (ft)	=	per chart
Q= Discharge	=	based off portions of basins tributary to outlet
s=Minimum Pipe Slope (ft/ft)	=	per chart
D=depth of flow	=	From table 7-4 See right
C_a= Flow factor	=	From table 7-14 See right
A=Cross sectional area of flow	=	C_a*d^2
V=Velocity	=	Q/A

Pipe Flow

Pipe	Tributary Areas	Q (cfs)	S (%)	d (in)	K'	D/d	C_a	A (sf)	V (fps)
1	**Northwesterly portion of basin P-1 and northerly portion of proposed building**	1.00	1	8	0.3833	0.69	0.578	0.257	3.89
2	**Portion of 4' ribbon gutter on easterly driveway**	0.03	0.5	6	0.035	0.18	0.096	0.024	1.25
3	**Confluence Flow Pipes # 1 & 2**	1.03	1.95	8	0.2827	0.56	0.453	0.201	5.12
4	**Confluence Flow Pipes # 1, 2 & 3**	2.06	3.9	10	0.2205	0.48	0.373	0.259	7.96
5	**Southwesterly portion of basin P-1**	1.42	10	8	0.1721	0.42	0.313	0.139	10.21
6	**Confluence Flow Pipes # 1, 2, 3, 4, 5 & 6**	2.70	6.4	10	0.2256	0.49	0.383	0.266	10.16
7	**Entire Site**	2.70	1	12	0.351	0.65	0.54	0.540	5.00

Table 7-4. For Determining the Area a of the Cross Section of a Circular Conduit Flowing Part Full

Let $\frac{\text{depth of water}}{\text{diameter of channel}} = \frac{D}{d}$ and C_a = the tabulated value. Then $a = C_a d^2$.

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0013	.0037	.0069	.0105	.0147	.0192	.0242	.0294	.0350
.1	.0409	.0470	.0534	.0600	.0668	.0739	.0811	.0885	.0961	.1039
.2	.1118	.1199	.1281	.1365	.1449	.1535	.1623	.1711	.1800	.1890
.3	.1982	.2074	.2167	.2260	.2355	.2450	.2546	.2642	.2739	.2836
.4	.2934	.3032	.3130	.3229	.3328	.3428	.3527	.3627	.3727	.3827
.5	.393	.403	.413	.423	.433	.443	.453	.462	.472	.482
.6	.492	.502	.512	.521	.531	.540	.550	.559	.569	.578
.7	.587	.596	.605	.614	.623	.632	.640	.649	.657	.666
.8	.674	.681	.689	.697	.704	.712	.719	.725	.732	.738
.9	.745	.750	.756	.761	.766	.771	.775	.779	.782	.784

Table 7-14. Values of K' for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{8/3} s^{1/2}$$

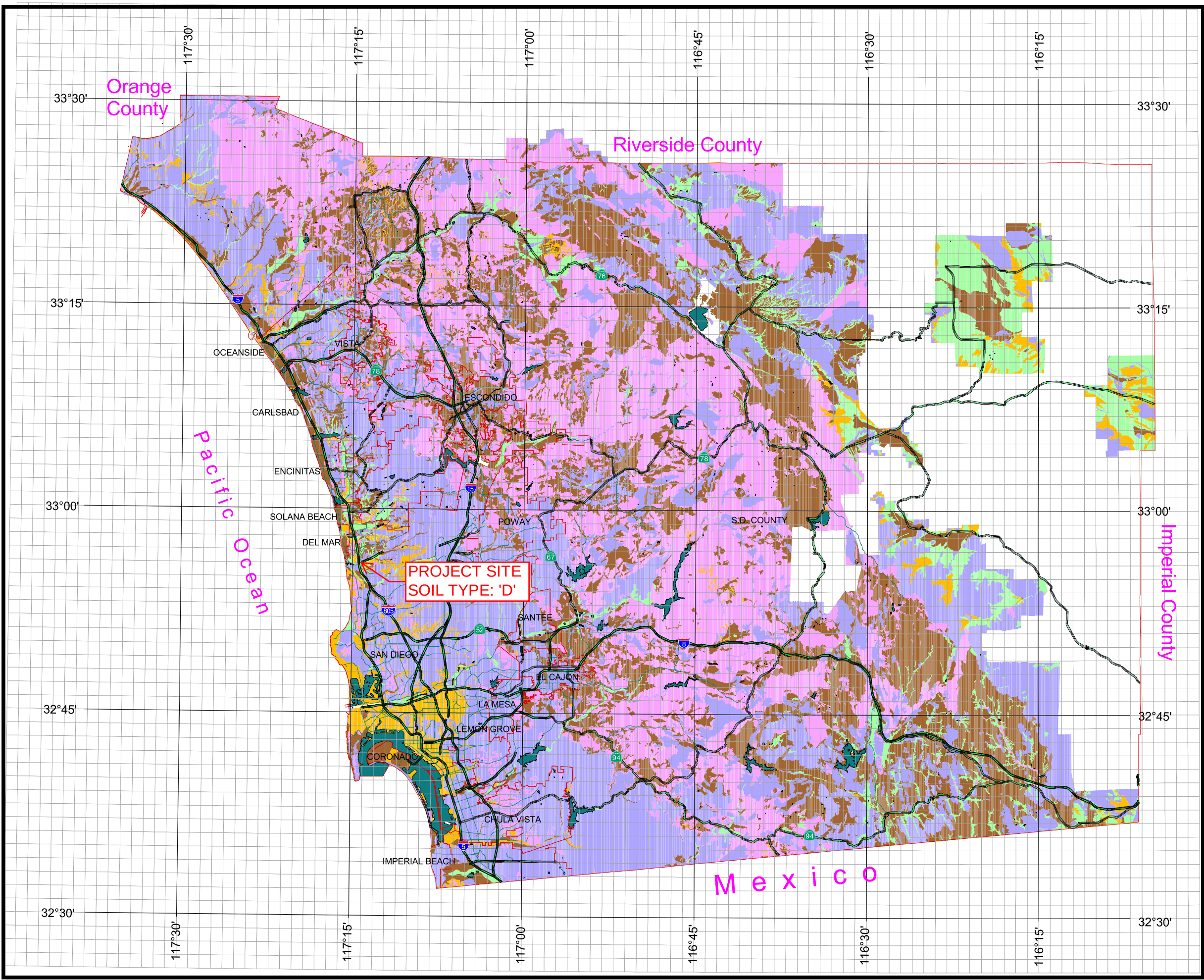
D = depth of water d = diameter of channel

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00007	.00031	.00074	.00138	.00222	.00328	.00455	.00604	.00775
.1	.00967	.0118	.0142	.0167	.0195	.0225	.0257	.0291	.0327	.0366
.2	.0406	.0448	.0492	.0537	.0585	.0634	.0686	.0738	.0793	.0849
.3	.0907	.0966	.1027	.1089	.1153	.1218	.1284	.1352	.1420	.1490
.4	.1561	.1633	.1705	.1779	.1854	.1929	.2005	.2082	.2160	.2238
.5	.232	.239	.247	.255	.263	.271	.279	.287	.295	.303
.6	.311	.319	.327	.335	.343	.350	.358	.366	.373	.380
.7	.388	.395	.402	.409	.416	.422	.429	.435	.441	.447
.8	.453	.458	.463	.468	.473	.477	.481	.485	.488	.491
.9	.494	.496	.497	.498	.498	.498	.496	.494	.489	.483
1.0	.463									

Appendix 1

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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Geographic Information Services

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3 0 3 Miles

APPENDIX 1.0

Appendix 2

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

PROJECT SITE
P_6=2.5"

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
S.D. COUNTY
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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3 0 3 Miles

APPENDIX 2.0

Appendix 3

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE
P_{24}=4.0"

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
S.D. COUNTY
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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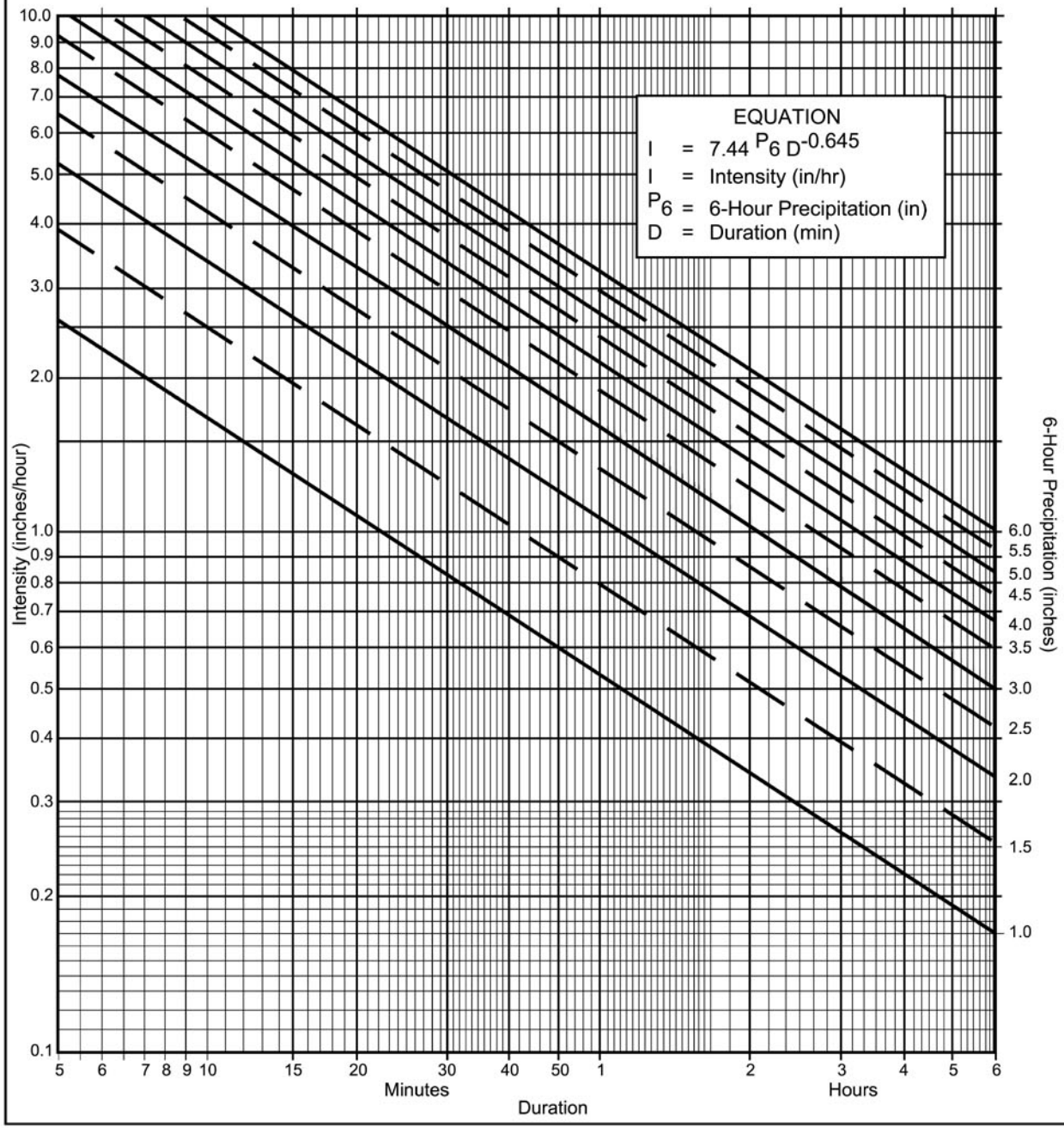
N W E S

3 0 3 Miles

APPENDIX 3.0

Appendix 4



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.5" in., P_{24} = 4.0", $\frac{P_6}{P_{24}}$ = 62.5 %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min. see calculations for values of each basin

(e) I = _____ in./hr. See methodology to see the equations used for Intensity and time of concentration

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

Appendix 5

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_C for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_C calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

Appendix 6

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

Basin P-1

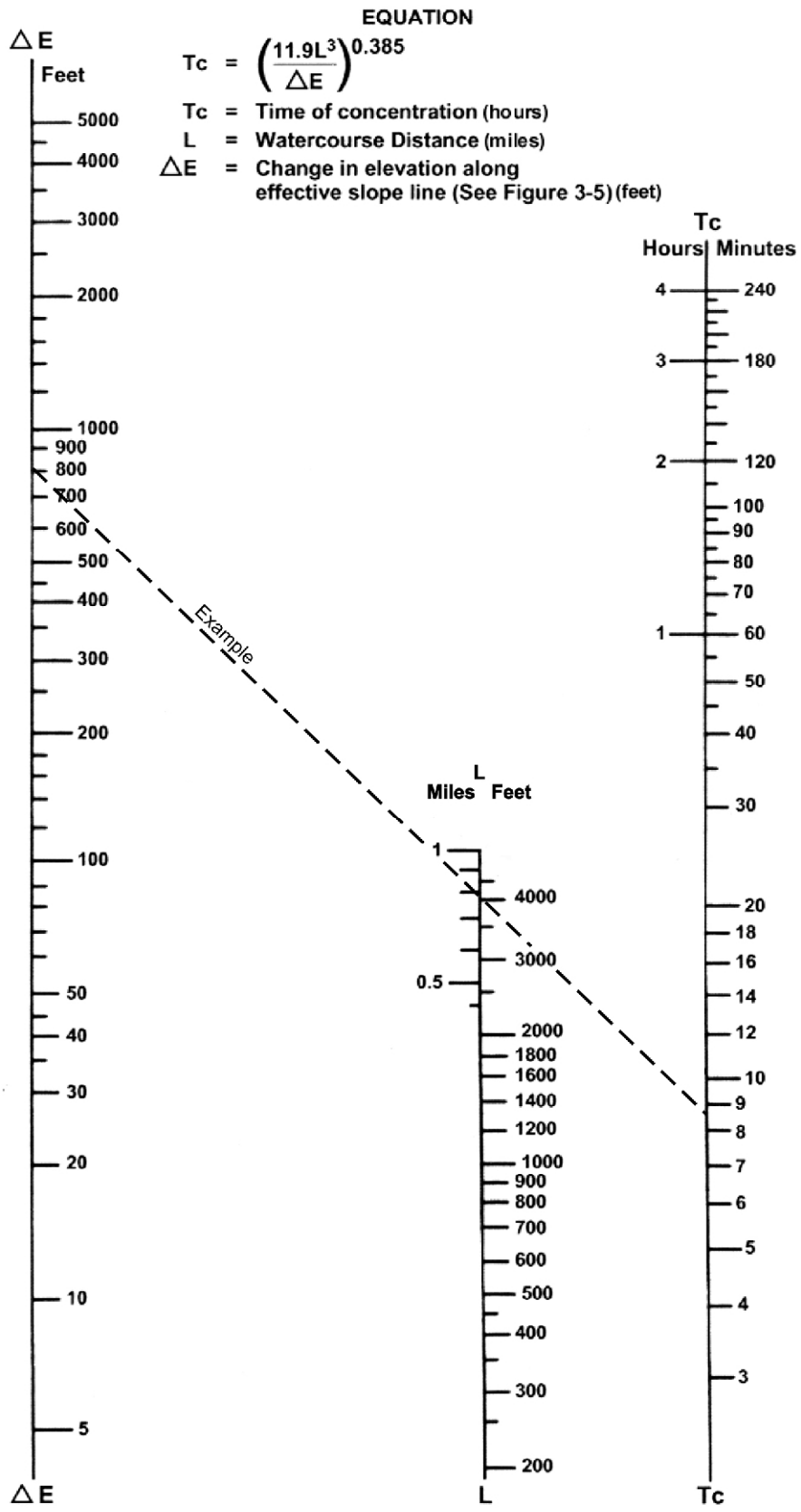
Basin E-1

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

% IMP	Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
			L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
0	Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
10	LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
20	LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
25	LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
30	MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
40	MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
45	MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
50	MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
65	HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
80	HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
80	N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
85	G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
90	O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
90	Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
95	General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

Appendix 7



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds

Appendix 8

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 26 2022

Basin E-1 - Asphalt Swale

User-defined

Invert Elev (ft)	= 34.88
Slope (%)	= 3.40
N-Value	= Composite

Calculations

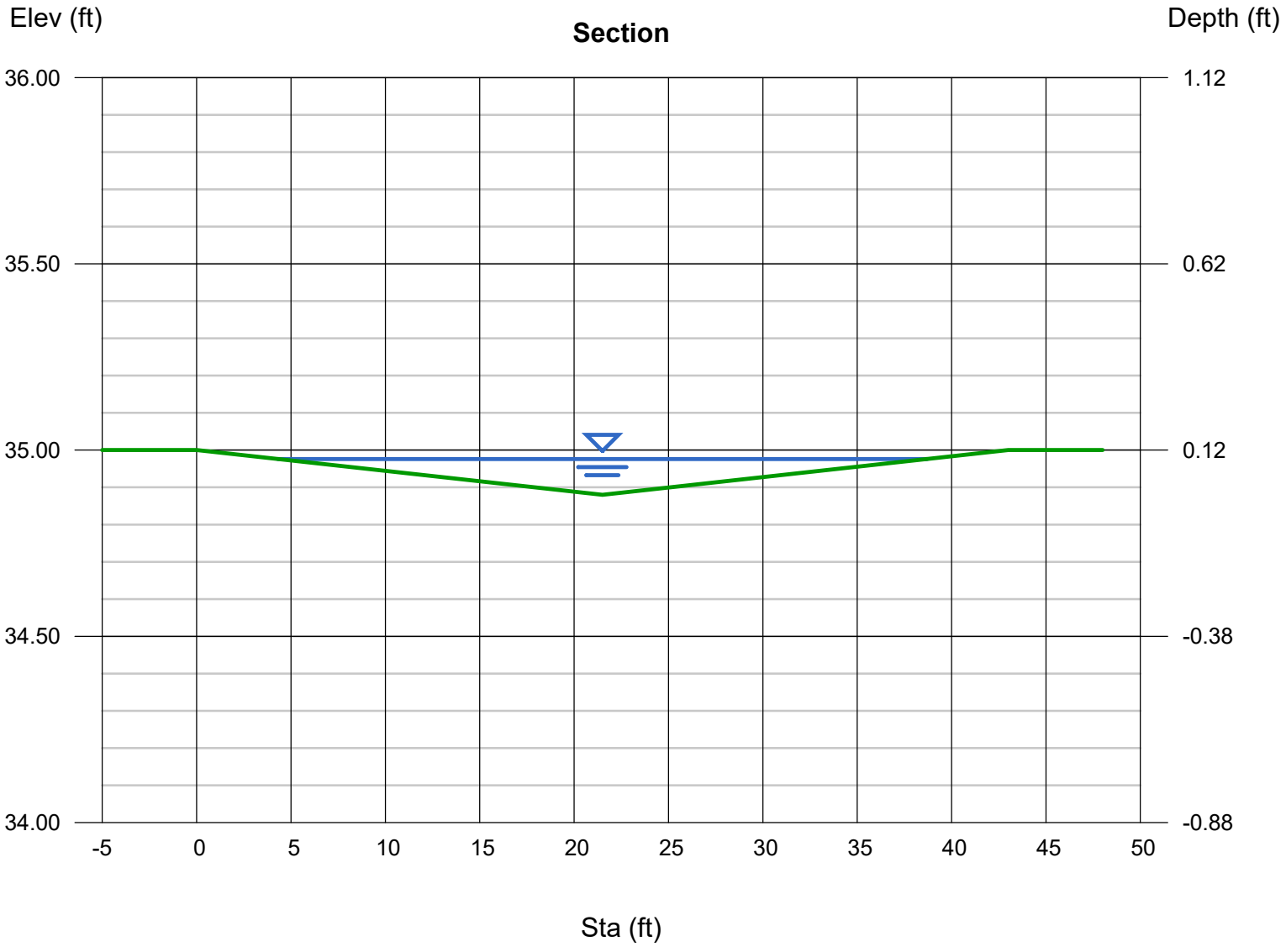
Compute by:	Q vs Depth
No. Increments	= 10

(Sta, El, n)-(Sta, El, n)...

(0.00, 35.00)-(21.50, 34.88, 0.013)-(43.00, 35.00, 0.013)

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 4.602
Area (sqft)	= 1.65
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 34.40
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 34.40
EGL (ft)	= 0.22



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 26 2022

Basin P-1 - 2.5' Curb & Gutter Analysis

User-defined

Invert Elev (ft)	= 39.56
Slope (%)	= 3.00
N-Value	= Composite

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.611
Area (sqft)	= 0.19
Velocity (ft/s)	= 3.27
Wetted Perim (ft)	= 2.80
Crit Depth, Yc (ft)	= 0.21
Top Width (ft)	= 2.73
EGL (ft)	= 0.32

(Sta, El, n)-(Sta, El, n)...

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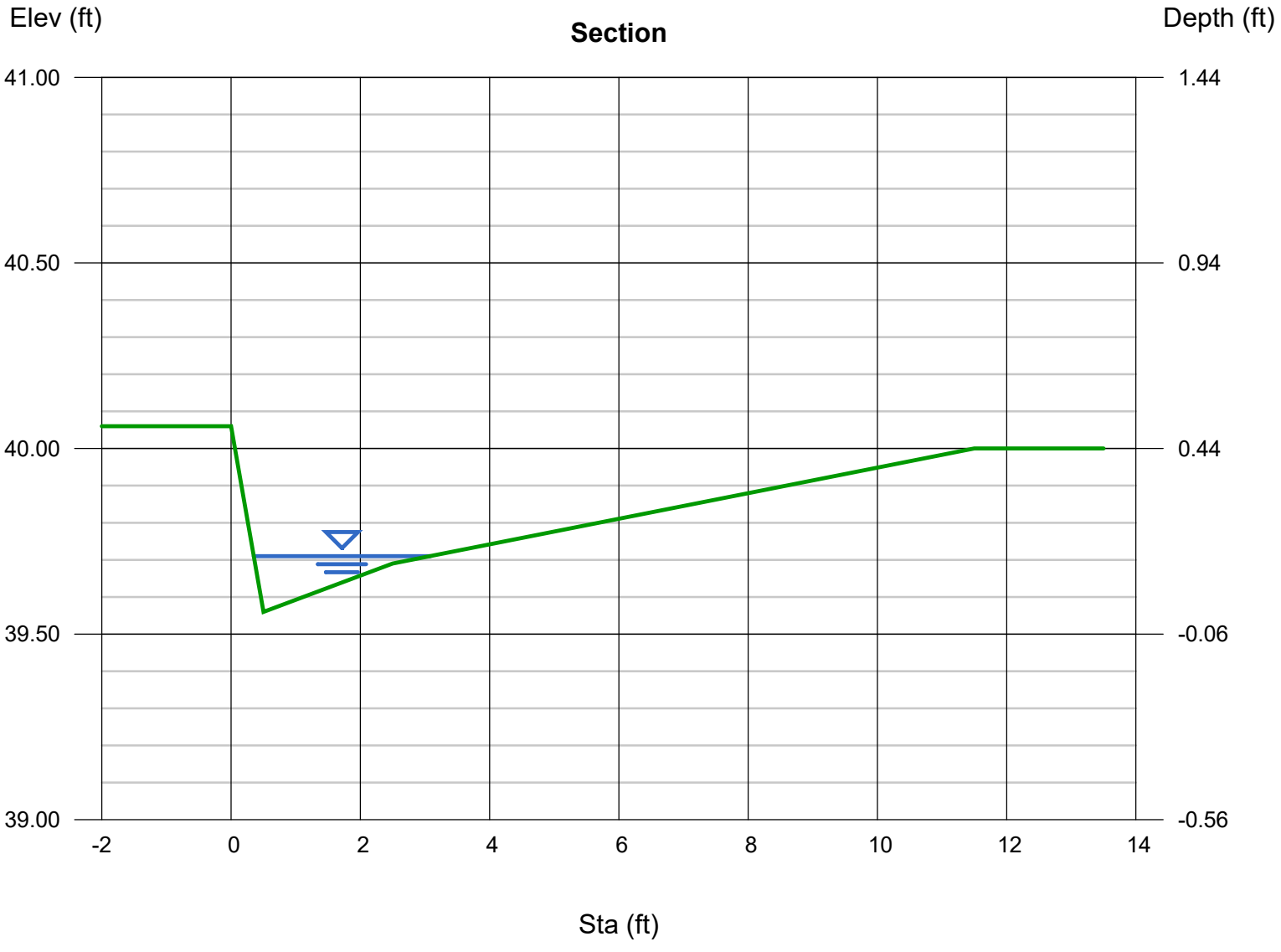


Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 24 2022

Basin P-2 - 4' Gutter Analysis

User-defined

Invert Elev (ft)	= 35.43
Slope (%)	= 1.20
N-Value	= Composite

Calculations

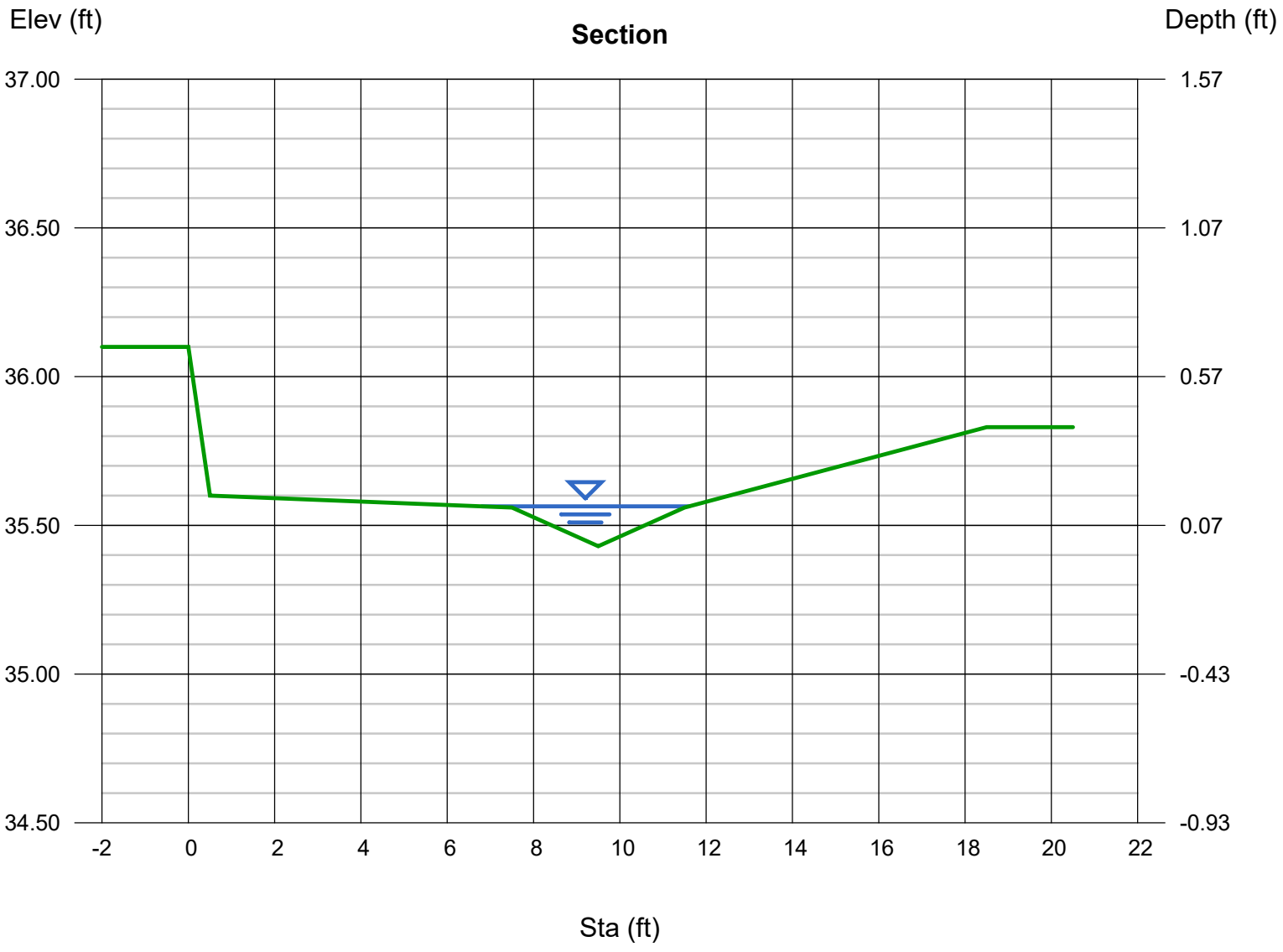
Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 0.520
Area (sqft)	= 0.28
Velocity (ft/s)	= 1.87
Wetted Perim (ft)	= 4.81
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 4.80
EGL (ft)	= 0.19

(Sta, El, n)-(Sta, El, n)...

(0.00, 36.10)-(0.50, 35.60, 0.013)-(7.50, 35.56, 0.013)-(9.50, 35.43, 0.013)-(11.50, 35.56, 0.013)-(18.50, 35.83, 0.013)



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Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

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GEOTEK

PRELIMINARY GEOTECHNICAL EVALUATION
FOR
PROPOSED CONVENIENCE STORE AND CARWASH
3060 CARMEL VALLEY ROAD
SAN DIEGO, CALIFORNIA 92130

PREPARED FOR

KA ENTERPRISES
5820 OBERLIN DRIVE SUITE 201
SAN DIEGO, CALIFORNIA 92121

PREPARED BY

GEOTEK, INC.
1384 POINSETTIA AVENUE, SUITE A
VISTA, CALIFORNIA 92081

PROJECT NO. 3778-SD **JUNE 23, 2022**

GeoTek, Inc.
1384 Poinsettia Avenue, Suite A Vista, CA 92081-8505
(760) 599-0509 Office (760) 599-0593 Fax www.geotekusa.com

June 23, 2022
Project No. 3778-SD

KA Enterprises
5820 Oberlin Drive Suite 201
San Diego, California 92121

Attention: Mr. Eugene Marini

Subject: Preliminary Geotechnical Evaluation
Proposed Convenience Store and Carwash
3060 Carmel Valley Road
San Diego, California 92130

Dear Mr. Marini:

GeoTek, Inc. (GeoTek) is pleased to provide herein the results of a preliminary geotechnical evaluation for the subject project located in the City of San Diego, California. This report presents the results of GeoTek's evaluation and provides preliminary geotechnical recommendations for earthwork, foundation design, and construction. Based upon review, site development appears feasible from a geotechnical viewpoint provided that the recommendations included herein are incorporated into the design and construction phases of site development.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call GeoTek.

Respectfully submitted,
GeoTek, Inc.

CERTIFIED ENGINEERING GEOLOGIST
Christopher D. Livesey
2733
STATE OF CALIFORNIA

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FARHAD J. BASTANI
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Project Engineer

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ENCLOSURES

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the geotechnical conditions of the project site. Services provided for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site.
- Excavation of six exploratory borings and collection of relatively undisturbed ring and bulk soil samples for subsequent laboratory testing.
- Laboratory testing of the soil samples collected during the field investigation.
- Compilation of this geotechnical report which presents GeoTek's findings of pertinent site geotechnical conditions and geotechnical recommendations for site development.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject property is located at the address of 3060 Carmel Valley Road, San Diego, California 92130 (see Figure 1). The subject site is bounded to the north by a descending driveway, to the west by the I-5 freeway, to the east by Old El Camino Real, and to the south by Carmel Valley Road. The site is currently improved with a gas station in the southeast, a True-zero Hydrogen Fuel station in the northeast, a convenience store in the west, a few parking spaces in the southwest, and a vacant asphalt pad in the north which is enclosed by a metal fence. Topography relief across the entire site ranges from 46 to 33 feet above mean sea level (msl). Surface drainage is directed towards the south.

2.2 PROPOSED DEVELOPMENT

Based on the conceptual grading plan provided by Barghausen Consulting Engineers, Inc. (BCEI, 2021), proposed improvements include demolition of the existing store facility (fuel canopy and underground storage tanks will remain) and a new convenience store and new car wash. Multiple vacuum stalls with be constructed along with additional parking spaces and a car wash driveway entrance in the north, off Old El Camino Real. A proposed BMP stormwater tank is anticipated

in the southwest portion of the subject site. Assumed improvements for the building pads are considered to include a single-story commercial building, underground wet and dry utilities and some landscaping. Cuts and fills are proposed to be within a few feet of existing grades.

It is anticipated that the convenience store and car wash will be of wood frame construction and will be supported by conventional shallow foundations (continuous and isolated pad) and a conventional slab on-grade or raised-wood floor. For the purposes of this report, it is assumed maximum column and wall loads will be approximately 25 kips and 2 kips per foot, respectively. Once actual loads are known that information should be provided to GeoTek to determine if modifications to the recommendations presented in this report are warranted.

As site planning progresses and additional or revised plans become available, they should be provided to GeoTek for review and comment. If plans vary significantly, additional geotechnical field exploration, laboratory testing and engineering analyses may be necessary to provide specific earthwork recommendations and geotechnical design parameters for actual site development plans.

3. FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

GeoTek's field study, conducted on April 8th, 2022, consisted of a site reconnaissance and excavation of six exploratory borings with a truck mounted drill rig. Borings B-1 through B-6 were drilled to depths ranging between 15 to 30 feet below existing grade. A representative from GeoTek visually logged the test borings, collected ring, standard penetration test (SPT), and loose bulk soil samples for laboratory analysis, and transported the samples to GeoTek's laboratory. Approximate locations of the exploratory borings and percolation test holes are presented on the Geotechnical Map, Figure 2. A description of material encountered in the test pits is included in the Boring Logs in Appendix A.

3.2 LABORATORY TESTING

Laboratory testing was performed on ring, SPT, and bulk soil samples collected during the field explorations. The purpose of the laboratory testing was to evaluate their physical and chemical properties for use in engineering design and analysis. Results of the laboratory testing program, along with a brief description and relevant information regarding testing procedures, are included in Appendix B.

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The subject property is located in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends roughly 975 miles from the north and northeasterly adjacent the Transverse Ranges geomorphic province to the peninsula of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zones trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province. The Newport-Inglewood-Rose Canyon Fault zone meanders the southwest margin of the province. No faults are shown in the immediate site vicinity on the map reviewed for the area.

4.2 EARTH MATERIALS

A brief description of the earth materials encountered during the current subsurface exploration is presented in the following sections. Based on the field observations and review of published geologic maps the subject site is locally underlain by artificial fill and young alluvial flood plain deposits over Torrey Sandstone.

4.2.1 Artificial Fill (Map Symbol Af)

Artificial fill was encountered in all borings to a maximum depth of 5 feet from existing grades. The artificial fill consisted of silty fine to medium sand, dry, very loose, with some surficial vegetation and roots in the upper 6 inches for some of the borings (SM soil type). The fill was observed to increase in moisture with depth.

4.2.2 Young Alluvial Flood-Plain Deposits (Map Symbol Qya)

Young alluvial deposits were encountered in all the exploratory borings at depths ranging between 1.5 and 29 feet below existing grades. The alluvial deposits consisted of silty fine to medium sand, light brown to dark brown in color, damp to saturated, loose to very dense with depth, and some surficial vegetation and roots in the upper 6 inches (SM soil type). The density and moisture of the deposits were observed to increase with depth until sandstone material was encountered or the hole was terminated. Localized perched groundwater tables were

encountered in borings B-2 through B-6 within this earth material at depths ranging between 12 to 25 feet below existing grades.

4.2.3 Torrey Sandstone (Map Symbol Tt)

Torrey Sandstone was encountered in boring, B-5, at a depth of 29 feet below existing grades. This material consisted of sandstone, light brown with green siltstone gravel, slightly moist, and very dense (SP soil type based upon USCS). The formation was found to be slightly weathered at the upper half foot but became less weathered with depth.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

Surface water was not observed during the recent site exploration. If encountered during earthwork construction, surface water on this site will most likely be the result of precipitation. Overall site area drainage is in a southeastern direction. Provisions for surface drainage will need to be accounted for by the project civil engineer.

4.3.2 Groundwater

Perched groundwater was encountered during exploration of the subject site in Borings B-2 through B-6 at depths ranging between 12 and 25 feet below existing grades. Based on the anticipated depth of removals and the underlying sandstone formation, groundwater is not anticipated to be a factor in site development.

4.4 EARTHQUAKE HAZARDS

4.4.1 Surface Fault Rupture

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is not in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone or a Special Studies Zone (Bryant and Hart, 2007). No faults transecting the site were identified on the readily available geologic maps reviewed. The nearest known active fault is the Newport Inglewood-Rose Canyon fault located about 2.63 miles to the southeast of the site.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint provided that the following recommendations are incorporated in the design and construction phases of the development. The following sections present general recommendations for currently anticipated site development plans.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of San Diego, the 2019 (or current) California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix C outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix C.

5.2.2 Site Clearing and Preparation

Site preparation should start with removal of existing improvements conflict with the proposed improvements, deleterious materials, vegetations, and trees/shrubs in the proposed improvement areas. These materials should be disposed of properly off site. Any existing underground improvements, utilities and trench backfill should also be removed or be further evaluated as part of site development operations.

5.2.3 Remedial Grading

Prior to placement of fill materials and in all structural areas, the upper variable, potentially compressible materials should be removed. Removals should include at a minimum the upper 3 feet of artificial fill or young alluvium below existing grade or proposed grade, or 2 ft below bottom of footing, whichever is deeper. The bottom of the removals should be observed by a GeoTek representative prior to processing the bottom for receiving placement of compacted fills. Depending on actual field conditions encountered during grading, locally deeper and/or shallower areas of removal may be necessary.

Prior to fill placement, the bottom of all removals should be scarified to a minimum depth of six (6) inches, moisture conditioned to slightly above optimum moisture content, and then compacted to at least 90% of the soil's maximum dry density as determined by ASTM D1557 test

procedures. The resultant voids from remedial grading/over-excavation should be filled with materials placed in general accordance with Section 5.2.4 Engineered Fill of this report.

5.2.4 Engineered Fill

Onsite materials are generally considered suitable for reuse as engineered fill provided they are free from vegetation, roots, debris, and rock/concrete or hard lumps greater than six (6) inches in maximum dimension. The earthwork contractor should have the proposed excavated materials to be used as engineered fill at this project approved by the soils engineer prior to placement.

Engineered fill materials should be moisture conditioned to at or above optimum moisture content and compacted in horizontal lifts not exceeding 8 inch in loose thickness to a minimum relative compaction of 90% as determined by ASTM D1557 test procedures.

If fill is being placed on slopes steeper than 5:1 (horizontal : vertical), the fill should be properly benched into the existing slopes and a sufficient size keyway shall be constructed in accordance with grading guidelines presented in Appendix C.

5.2.5 Excavation Characteristics

Excavations in the onsite materials can generally be accomplished with medium-duty earthmoving or excavating equipment in good operating condition.

5.2.6 Shrinkage and Bulking

Several factors will impact earthwork balancing on the site, including undocumented fill shrinkage, trench spoil from utilities and footing excavations, as well as the accuracy of topography. Shrinkage and bulking are largely dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of 5 percent may be considered for fills generated from alluvial and colluvial sources. Subsidence should not be a factor on the subject site due to the proposed improvements and proposed improvements and recommendations presented herein are completed as recommended.

5.2.7 Trench Excavations and Backfill

Temporary excavations within the onsite materials should be stable at 1:1 inclinations for short durations during construction, and where cuts do not exceed 10 feet in height. Temporary cuts to a maximum height of 4 feet can be excavated vertically. The contractor should anticipate encounter caving alluvial soils.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90% relative compaction of the maximum dry density as determined by ASTM D1557 test procedures. Under-slab trenches should also be compacted to project specifications.

Onsite materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than 6± inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Stormwater Infiltration

Many factors control infiltration of surface waters into the subsurface, such as consistency of native soils and bedrock, geologic structure, fill consistency, material density differences, and existing groundwater conditions. Current conceptual site plans indicate a proposed BMP stormwater tank in the southwest portion of the subject site. Due to the historic site use and proposed continued use as a fuel facility (Hydrocarbon) infiltration of surface waters is not a recommendation.

5.3.2 Foundation Design Criteria

Preliminary foundation design criteria, in general conformance with the 2019 CBC, are presented herein. These are typical design criteria and are not intended to supersede the design by the structural engineer. The preliminary recommendations presented below.

Based on visual classification of materials encountered onsite and as verified by laboratory testing, site soils are anticipated to exhibit a "very low" (EI < 20) expansion index per ASTM D4829. The following criteria for design of foundations are preliminary. Additional laboratory testing of the samples obtained during grading should be performed and final recommendations should be based on as-graded soil conditions.

MINIMUM DESIGN PARAMETERS FOR CONVENTIONALLY REINFORCED FOUNDATIONS	
Expansion Potential	**"Very Low" Expansion Potential (EI ≤ 20)**
Foundation Embedment Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent finished grade)	12 - Inches
Minimum Foundation Width for continuous / perimeter footings*	12 - Inches
Minimum Foundation Width for isolated / column footings*	18 – Inches (Square)
Minimum Foundation Embedment for Interior Foundations	12- Inches
Minimum Slab Thickness (actual)	4 inches
Minimum Slab Reinforcing	No. 3 rebar 16" on-center, each way, placed in the middle one-third of the slab thickness
Minimum Footing Reinforcement	Two No. 4 reinforcing bars, two top and two bottom
Pre-saturation of Subgrade Soil (percent of optimum moisture content)	Minimum 100% to a depth of 12 inches

*Code minimums per Table 1809.7 of the 2019 CBC should be complied with.

It should be noted that the above recommendations are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

The following recommendations should be implemented into the design:

- An allowable bearing capacity of 2,000 pounds per square foot (psf) may be considered for design of continuous and perimeter footings that meet the depth and width requirements in the table above. This value may be increased by 300 psf for each additional 12 inches in depth and 300 psf for each additional 12 inches in width to a maximum value of 3,000 psf. Additionally, an increase of one-third may be applied when considering short-term live loads (e.g., seismic and wind loads).

- Structural foundations may be designed in accordance with 2019 CBC, and to withstand a total settlement of 1 inch and maximum differential settlement of one-

half of the total settlement over a horizontal distance of 40 feet. Seismically induced settlement is considered to be minimal.

- The passive earth pressure may preliminarily be computed as an equivalent fluid having a density of 350 psf per foot of depth, to a maximum earth pressure of 2,000 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.35 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

- A grade beam should be utilized across large entrances. The beam should be a minimum of 12 inches wide and be at the same elevation as the bottom of the adjoining footings.

5.3.3 Under Slab Moisture Membrane

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2 and the 2019 CBC Section 1907.1

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g., stake penetrations, tears, punctures from walking on the vapor retarder placed atop the underlying aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture that thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a 6-mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10 mil membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired performance level.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarder systems should be designed and constructed in

accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek does not practice in the field of moisture vapor transmission evaluation/migration since that practice is not a geotechnical discipline. Therefore, GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, architect, and/or other experts specializing in moisture control within the building be consulted to evaluate the general and specific moisture and vapor transmission paths and associated potential impact on the proposed construction. That person (or persons) should provide recommendations relative to the slab moisture and vapor retarder systems and for migration of potential adverse impact of moisture vapor transmission on various components of the structures, as deemed appropriate. In addition, the recommendations in this report and GeoTek's services in general are not intended to address mold prevention; since GeoTek, along with geotechnical consultants in general, do not practice in the area of mold prevention. If specific recommendations addressing potential mold issues are desired, then a professional mold prevention consultant should be contacted.

5.3.4 Miscellaneous Foundation Recommendations

- To reduce moisture penetration beneath the slab on grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.

- Spoils from the footing excavations should not be placed in the slab-on-grade areas unless properly moisture-conditioned, compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

5.3.5 Foundation Setbacks

Where applicable, the following setbacks should apply to all foundations. Any improvements not conforming to these setbacks may be subject to lateral movements and/or differential settlements:

- The outside bottom edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least 7 feet and need not exceed 40 feet.

- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 projection upward from the bottom inside edge of the wall

stem. This applies to the existing retaining walls along the perimeter if they are to remain.

- The bottom of any existing foundations for structures should be deepened to extend below a 1:1 projection upward from the bottom of the nearest excavation.

5.3.6 Seismic Design Parameters

The site is located at approximately 33.2440 degrees west latitude and -117.2658 degrees north longitude. Site spectral accelerations (Ss and S1), for 0.2 and 1.0 second periods for a risk targeted two (2) percent probability of exceedance in 50 years (MCER) were determined using the web interface provided by SEAOC/OSHPD (https://seismicmaps.org) to access the USGS Seismic Design Parameters. Due to the apparent density of the underlying fill material, a Site Class "D" is considered appropriate for this site. The results, based on NEHRP-2015 and the 2019 CBC, are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	1.169g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.414g
Site Coefficient for Site Class "D", F_a	1.032
Site Coefficient for Site Class "D", F_v	1.886
Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration for 0.2 Second, S_{MS}	1.207g
Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration for 1.0 Second, S_{M1}	0.781g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	0.805g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.521g
Site Modified Peak Ground Acceleration (PGA_M)	0.577g
Seismic Design Category	D

5.3.7 Soil Sulfate Content

Sulfate content test results indicate water soluble sulfate is less than 0.1 percent by weight, which is considered "S0" as per Table 19.3.1.1 of ACI 318-14. Based upon the test results, no special recommendations for concrete are required for this project due to soil sulfate exposure.

5.3.8 Preliminary Pavement Design

Traffic indices have not been provided during this stage of site planning. In addition, site conditions have not been graded to a final design to evaluate specific pavement subgrade

conditions. Therefore, the minimum structural sections based on the City of San Diego's Standard Drawings Criteria (City of San Diego, 2016) are presented below.

PRELIMINARY ASPHALT PAVEMENT STRUCTURAL SECTION FOR SUBJECT SITE		
Design Criteria	Asphaltic Concrete (AC) Thickness (inches)	Aggregate Base (AB) Thickness (inches)
Local (Low Volume Road)	3.0	5.0
Local (Residential)	3.0	5.0

As noted in the Standard Drawings document, actual structural pavement design is to be determined by the geotechnical engineer's testing (R-Value) of the 12" material located immediately below the first layer of base, or pavement. Thus, the actual R-Value of the subgrade soils can only be determined at the completion of grading for street subgrades and the above values are subject to change based on laboratory testing of the as-graded soils near subgrade elevations.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density as determined by ASTM D 1557 test procedures

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of San Diego specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

5.3.9 Portland Cement Concrete (PCC)

As an option, Portland Cement concrete (PCC) pavements could also be used at the site for the pavement areas. Based on the traffic loading provided, the following recommended minimum PCC pavement section is provided for these areas:

6 Inches Portland Cement Concrete (PCC) over
6 Inches Aggregate Base (AB) over
12-inches compacted subgrade to 95% per ASTM D 1557

For the PCC options, it is recommended concrete having a minimum 28-day flexural strength of 650 psi be used. A maximum joint spacing of 15 feet is also recommended.

5.4 RETAINING WALL DESIGN AND CONSTRUCTION

5.4.1 General Design Criteria

Preliminary grading plans are not yet available. If retaining walls are added at a later date, the recommendations presented herein may apply to typical masonry or concrete vertical retaining walls to a maximum height of 6 feet. The 2019 CBC only requires the additional earthquake induced lateral force be considered on retaining walls in excess of six (6) feet in height. Therefore, additional review and recommendations should be requested for higher walls.

Retaining wall foundations embedded a minimum of 18 inches into engineered fill or dense formational materials should be designed using an allowable bearing capacity of 2,000 psf. This value may be increased by 300 psf for each additional 12 inches in depth and 300 psf for each additional 12 inches in width to a maximum value of 3,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g., seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 350 psf per foot of depth, to a maximum earth pressure of 3,500 psf. A coefficient of friction between soil and concrete of 0.35 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

An equivalent fluid pressure approach may be used to compute the horizontal active pressure against the wall. The appropriate fluid unit weights are given in the table below for specific slope gradients of retained materials utilizing on site materials.

Surface Slope of Retained Materials (H:V)	Equivalent Fluid Pressure (PCF) Select Backfill*
Level	40
2:1	65

*Select backfill should consist of approved materials with an EI≤20 and should be provided throughout the active zone.

The above equivalent fluid weights do not include other superimposed loading conditions such as expansive soil, vehicular traffic, structures, seismic conditions or adverse geologic conditions.

5.4.2 Restrained Retaining Walls

Any retaining wall that will be restrained prior to placing backfill or walls that have male or reentrant corners should be designed for at-rest soil conditions using an equivalent fluid pressure of 65 pcf (select backfill), plus any applicable surcharge loading. For areas having male or reentrant corners, the restrained wall design should extend a minimum distance equal to twice the height of the wall laterally from the corner, or as otherwise determined by the structural engineer.

5.4.3 Wall Backfill and Drainage

Wall backfill should include a minimum one (1) foot wide section of ¾ to 1-inch clean crushed rock (or approved equivalent). The rock should be placed immediately adjacent to the back of wall and extend up from the backdrain to within approximately 12 inches of finish grade. The upper 12 inches should consist of compacted onsite materials. If the walls are designed using the "select" backfill design parameters, then the "select" materials shall be placed within the active zone as defined by a 1:1 (H:V) projection from the back of the retaining wall footing up to the retained surface behind the wall. Presence of other materials might necessitate revision to the parameters provided and modification of wall designs.

The backfill materials should be placed in lifts no greater than 8-inches in thickness and compacted to a minimum of 90% of the maximum dry density as determined in accordance with ASTM Test Method D 1557. Proper surface drainage needs to be provided and maintained. Water should not be allowed to pond behind retaining walls. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining walls should be provided with an adequate pipe and gravel back drain system to reduce the potential for hydrostatic pressures to develop. A 4-inch diameter perforated collector pipe (Schedule 40 PVC, or approved equivalent) in a minimum of one (1) cubic foot per lineal foot of 3/8 to one (1) inch clean crushed rock or equivalent, wrapped in filter fabric should be placed near the bottom of the backfill and be directed (via a solid outlet pipe) to an appropriate disposal area.

As an alternative to the drain, rock and fabric, a pre-manufactured wall drainage product (example: Mira Drain 6000 or approved equivalent) may be used behind the retaining wall. The wall drainage product should extend from the base of the wall to within two (2) feet of the ground surface. The subdrain should be placed in direct contact with the wall drainage product.

Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements.

6. CONCRETE FLATWORK

6.1 GENERAL CONCRETE FLATWORK

6.1.1 Exterior Concrete Slabs and Sidewalks

Exterior concrete slabs, sidewalks and driveways should be designed using a four-inch minimum thickness. Some shrinkage and cracking of the concrete should be anticipated because of typical mix designs and curing practices typically utilized in construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.
Subgrade soils should be pre-moistened prior to placing concrete. The subgrade soils below exterior slabs, sidewalks, driveways, etc. should be pre-saturated to a minimum of 100 percent (for "very low" expansivity) of the optimum moisture content to a depth of 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of San Diego specifications, and under the observation and testing of GeoTek, Inc. and a City inspector, if necessary.

6.1.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 1/8 inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete undergoes chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek, Inc. suggests that control joints be placed in two directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

7. POST CONSTRUCTION CONSIDERATIONS

7.1 LANDSCAPE MAINTENANCE AND PLANTING

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. The soils should be maintained in a solid to semi-solid state as defined by the materials Atterberg Limits. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundation. This type of landscaping should be avoided. If used, then extreme care should be exercised with regard to the irrigation and drainage in these areas. Waterproofing of the foundation and/or subdrains may be warranted and advisable. GeoTek could discuss these issues, if desired, when plans are made available.

7.2 DRAINAGE

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings. Site drainage should conform to Section 1804.4 of the 2019 CBC. Roof gutters and downspouts should discharge onto paved surfaces sloping away from the structure or into a closed pipe system which outfalls to the street gutter pan or directly to the storm drain system. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

7.3 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

GeoTek recommends that site grading, specifications, retaining wall/shoring plans and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. Additional recommendations may be necessary based on these reviews. It is also recommended that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek's representative perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement, including utility trenches.
- Observe and test the fill for field density and relative compaction.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. GeoTek recommends that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

8. LIMITATIONS

The scope of this evaluation is limited to the area explored that is shown on the Geotechnical Map (Figure 2). This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of proposed construction as indicated to us by the client. The scope is based on GeoTek's understanding of the project and the client's needs, GeoTek's proposal (Proposal No. P-0200522-SD) dated February 14th, 2022, and geotechnical engineering standards normally used on similar projects in this region.

The materials observed on the project site appear to be representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops, or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other

factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since GeoTek's recommendations are based on the site conditions observed and encountered, and laboratory testing, GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

9. SELECTED REFERENCES

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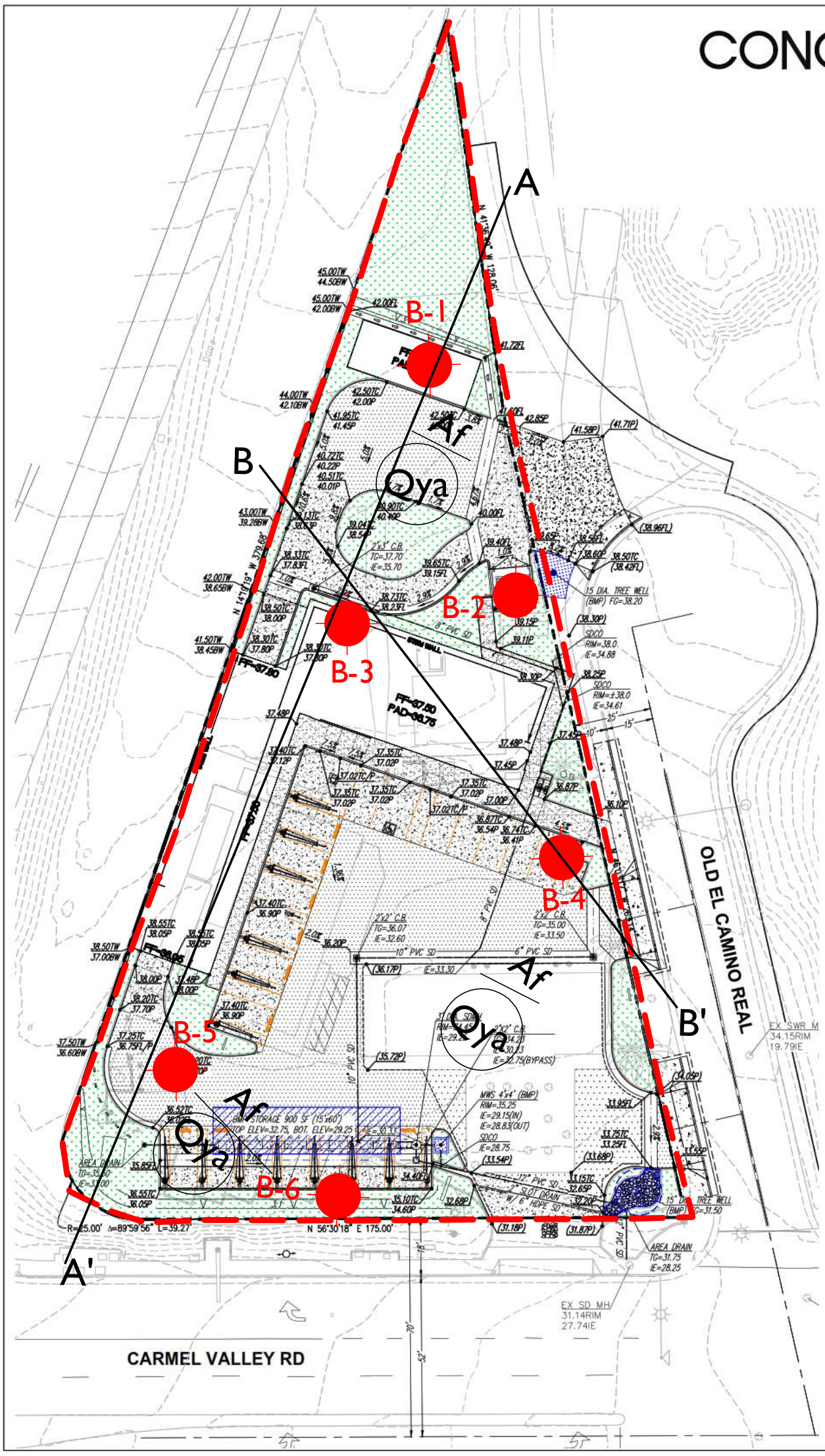
KA Enterprises 3060 Carmel Vally Road San Diego, California	Figure 1 Site Location Map	GEOTEK 1384 Poinsettia Avenue, Suite A Vista, California 92081
PN: 3778-SD | DATE: June 2022		

CONCEPTUAL GRADING



LEGEND

B-6 ●	Approximate Location of Boring
Af	Artificial Fill
Qya	Quaternary Young Alluvial Flood Plain Deposits, Circled where Buried
– – –	Approximate Limits of Study, this report

Scale: 1" = 40'

0 20 40 80

N

Plan adapted from "Conceptal Grading Plan" by Barghausen Consulting Engineers, Inc.

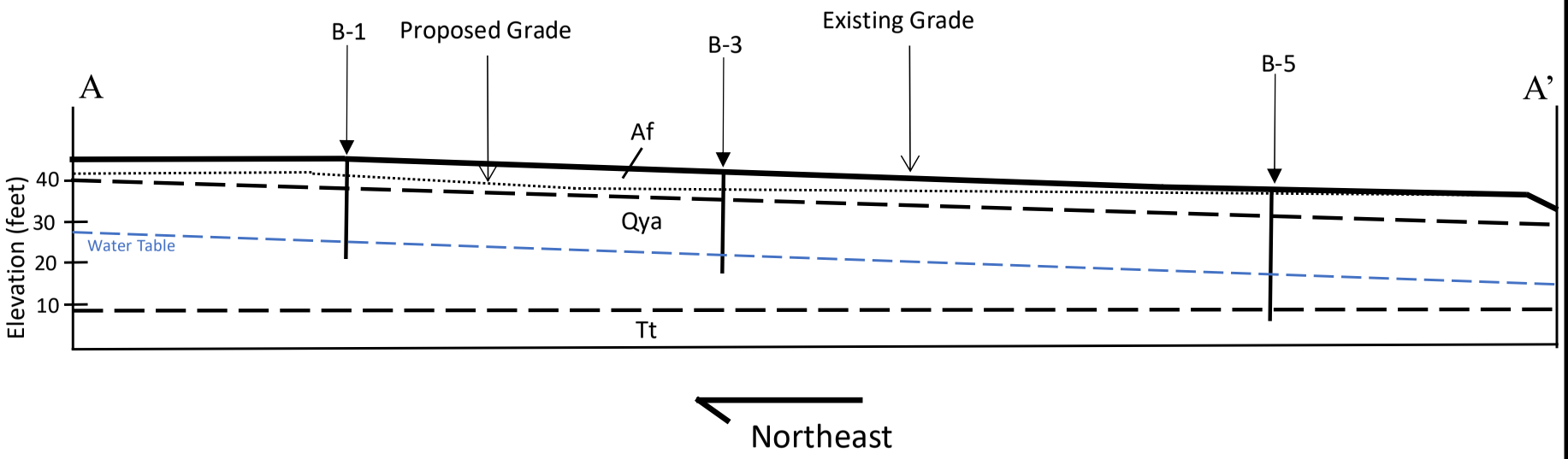
KA Enterprises
3060 Carmel Vally Road
San Diego, California

PN: 3778-SD | DATE: June 2022

Figure 2

Geotechnical Map

GEOTEK
1384 Poinsettia Avenue, Suite A
Vista, California 92081



1" = 40'

LEGEND

B-1	Approximate Borehole Location
Af	Artificial Fill
Qya	Quaternary Young Alluvium
Tt	Tertiary Torrey Sandstone

GEOTEK
1384 Poinsettia Avenue, Suite A
Vista, California 92081

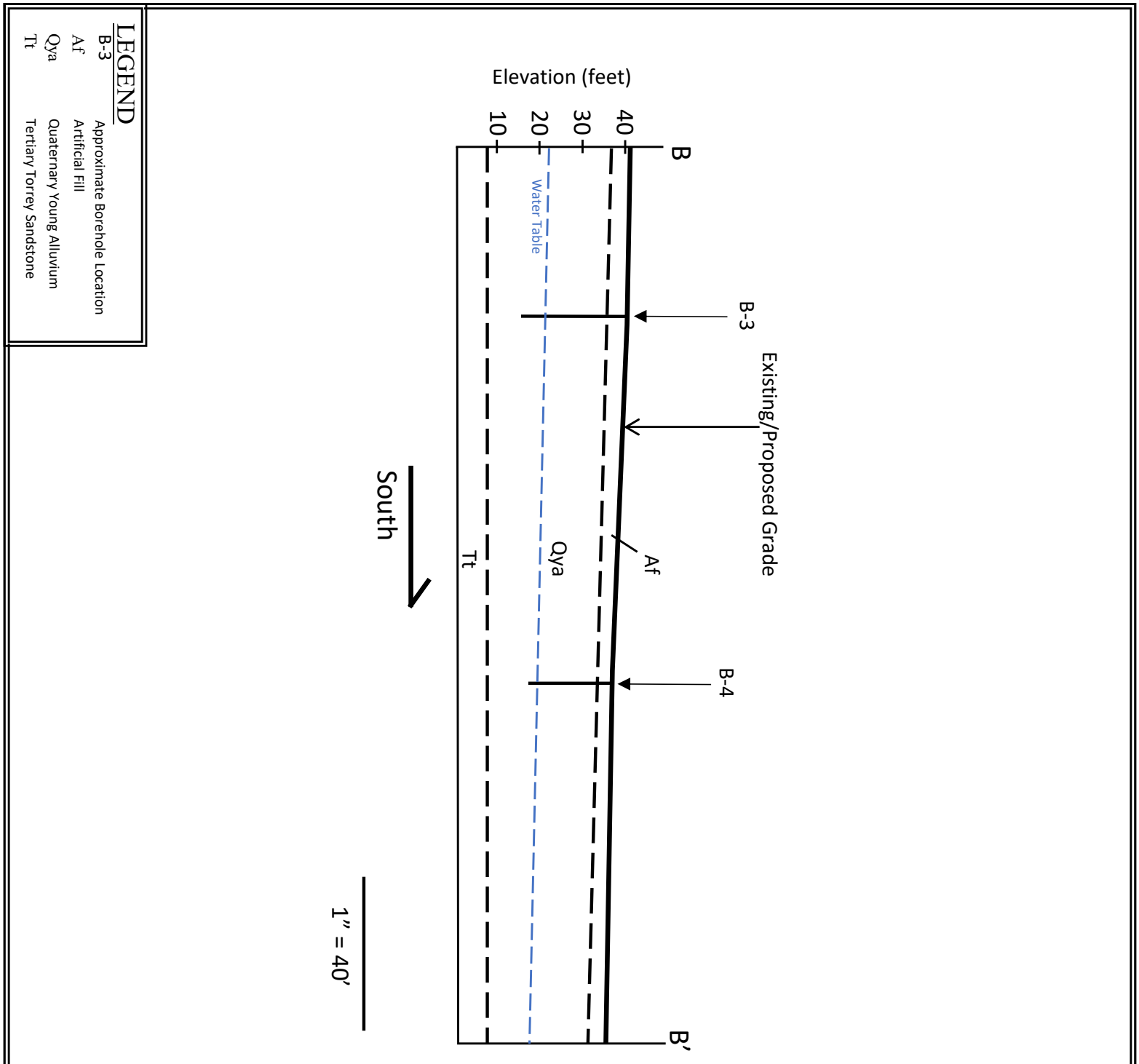
Figure 3

Geologic Cross Section A-A'

KA Enterprises
3060 Carmel Valley Rd.
San Diego, California

June 2022

PN: 3778-SD



KA Enterprises
3060 Carmel Valley Rd.
San Diego, California

PN: 3778-SD

June 2022

Figure 4

Geologic Cross Section B-B'

GEOTEK

1384 Poinsettia Avenue,
Suite A
Vista, California 92081

APPENDIX A

BORING LOGS

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

Ring Samples

These samples are normally airtight cylinders 6" in length containing 6 thin rings weighing approximately 45 grams each. These rings are sampled by means of the modified California Sampler (3" outer diameter, 2.5" inner diameter) to determine in-situ moisture content, density, and classification indices.

Bulk Samples (SPT)

These samples are normally airtight plastic bag samples containing less than 5 pounds in weight of earth materials collected from the field. These samples were collected by means of Standard Penetration Tests (SPT) to determine moisture content, density, and classification indices.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

B – BORING/TRENCH LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of borings/trenches:

SOILS

USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium

GEOLOGIC

B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip

C: Contact line

……..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
———	Thick solid line denotes end of boring/trench

(Additional denotations and symbols are provided on the log of borings/trenches)

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	44 Ft	**DATE:**	4/8/2022

BORING NO.: B-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					6" asphalt and base			
					Artificial Fill (Af)			
				CK	Silty fine to medium SAND, dark brown, dry, very loose			
			BB-1					EI, SR
		2	R-1			7	129.4	
		3						
		5		SM	Silty fine to medium SAND, dark brown, dry, very loose			
5								
		3	S-1		**Young Alluvial Flood-Plain Deposits (Qya)**			
		3		SP	Fine to medium SAND, light brown, dry to slightly moist, loose			
		3						
						8.3	121.2	
10		8	R-2	SP	Fine to medium SAND, light brown, moist to very moist with depth, medium dense			
		12						
		17						
			S-2					
15		4	S-2	SP	Fine to medium SAND, light brown, moist to very moist, loose, medium dense			
		4						
		7						
20								
					HOLE TERMINATED AT 20 FEET			
					No groundwater encountered			
					Backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	42 Ft	**DATE:**	4/8/2022

BORING NO.: B-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
				SP	**Artificial Fill (Af)** Fine to medium SAND, light brown, slightly moist, loose, moisture increasing with depth			
					Young Alluvial Flood-Plain Deposits (Qya)			
5		3 4 5	S-1	SP	Fine to medium SAND, light brown, slightly moist, loose			
10		8 13 14	R-1	SP	Fine to medium SAND, light brown, slightly moist, loose, moisture increasing with depth	9.8	106.3	
15		3 5 5	S-2	SP	Fine to medium SAND, light brown, slightly moist, loose, moisture increasing with depth			
20				▽	Groundwater encountered			
					HOLE TERMINATED AT 20.5 FEET Groundwater encountered at 20.5 feet Backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	41 Ft	**DATE:**	4/8/2022

BORING NO.: B-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
			BB-1	SP	**Artificial Fill (Af)** Fine to medium SAND, light brown, dry, loose to medium dense			
		8 13 15	R-1	SP	**Young Alluvial Flood Plain Deposits (Qya)** Fine SAND, light brown, dry, medium dense	3.7	133.8	
		6	S-1					
5		6 7	BB-2	SP	Fine SAND, light brown, dry, medium dense, poor recovery, sample falls out			MD, DS
10		8 8 14	R-2	SP	Fine SAND, light brown, dry to moist, loose, moist increasing with depth, medium dense	1.6	131.3	
15		4 3 3	S-2	SP	Fine SAND, light brown, moist, loose, groundwater encountered at 19 feet			
				▽				
20		3 4 10	R-3	SP	Fine SAND, light brown, very moist, loose	16.1	134.6	
25		3 6 7	S-3	SP	Fine SAND, light brown, very moist, medium dense , moisture starting to decrease with depth			
					HOLE TERMINATED AT 26.5 FEET Groundwater encountered at 19 feet Backfilled with soil cuttings			
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	37 Ft	**DATE:**	4/8/2022

BORING NO.: B-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
			BB-1	SP	Asphalt and Base in upper 6" **Artifical Fill (Af)** Fine to medium SAND, light brown, slightly moist, loose			
5		4 5 5	S-1	SP	**Young Alluvial Flood Plain Deposits (Qya)** Fine to medium SAND, light brown, very moist with moisture increasing with depth, loose	17.1	135.6	
10		5 6 8	R-1	SP	Fine to medium SAND, light brown, very moist, medium dense to dense			
15		5 14 34	S-2	SP	Fine to medium SAND, light brown,moisture increasing with depth, very dense			
				▽	Groundwater encountered, some gravels, no sample recovery			
20					**HOLE TERMINATED AT 20 FEET** Groundwater encountered at 18 feet Backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	36 Ft	**DATE:**	4/8/2022

BORING NO.: B-5

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Asphalt and Base in upper 6"			
				SP	**Artifical Fill (Af)** Fine to medium SAND, dark brown, moist, loose			
				SP	**Young Alluvial Flood Plain Deposits (Qya)** Fine to medium SAND, light brown, moist, loose, some gravels, density increasing with depth			
5								
10		6 7 7	S-1	SP	Fine to medium SAND, light brown, moist to very moist with depth, medium dense, density increasing with depth			
15								
				▽	Groundwater encountered	14.8	141.9	
20		8 19 19	R-1	SP	Fine to medium SAND, light brown, saturated to very moist with depth, medium dense, density increasing with depth			
25				SP	Fine to medium SAND, light brown, very dense, moisture declining to slightly moist with depth			
					Torrey Sandstone (Tt)			
30					SANDSTONE, light brown with green tints, slightly moist, very dense			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	36 Ft	**DATE:**	4/8/2022

BORING NO.: B-5 Cont.

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
30		19 32 45	S-2		SANDSTONE, light brown with green mottling and oxidization, slightly moist, very dense, slightly weathered in upper 6'			
					HOLE TERMINATED AT 31.5 FEET			
					Groundwater encountered at 18 feet Backfilled with soil cuttings			
35								
40								
45								
50								
55								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	KA Enterprises	**DRILLER:**	Baja Exploration	**LOGGED BY:**	CH
PROJECT NAME:	3060 Carmel Valley Rd	**DRILL METHOD:**	8" Hollow-Stem Auger	**OPERATOR:**	Victor
PROJECT NO.:	3778-SD	**HAMMER:**	140lbs/30in	**RIG TYPE:**	CME-75 Drill Rig
LOCATION:	See Geotechnical Map	**ELEVATION:**	35 Ft	**DATE:**	4/8/2022

BORING NO.: B-6

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Asphalt and Base in upper 6"			
					Artifical Fill (Af)			
				SP	Fine to medium SAND, dark brown, moist, loose			
					Young Alluvial Flood Plain Deposits (Qya)			
				SP	Fine to medium SAND, dark brown, moist, loose			
5		3 4 5	S-1	SP	Fine to medium SAND, dark brown, moist, loose	13.9	129.9	
10		7 9 9	R-1	SP	Fine to medium SAND, dark brown, very moist to saturated with depth, medium dense			
				▽	Groundwater encountered			
15		3 3 7	S-2	SP	Fine to medium SAND, dark brown, very moist to saturated, medium dense			
					HOLE TERMINATED AT 15 FEET			
					Groundwater encountered at 12 feet Backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

APPENDIX B

RESULTS OF LABORATORY TESTING

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SUMMARY OF LABORATORY TESTING

Identification and Classification
Soils were identified visually in general accordance with the standard practice for description and identification of soils (ASTM D 2488). The soil identifications and classifications are shown on the Logs of Exploration in Appendix A.

Moisture Density Modified Proctor
Laboratory testing was performed on one sample collected during the subsurface exploration for compaction characteristics. The laboratory maximum dry density and optimum moisture content for the soil was determined in general accordance with ASTM Test Method D 1557 procedures. The test results are graphically presented in Appendix B.

Expansion Index Test
Expansion Index testing was performed on one sample collected during the subsurface exploration from boring B-1. The expansion index was determined in general accordance with ASTM Test Method D 4829 procedures. The test results are presented in Appendix B.

Sulfate Content
A full corrosion series was performed in general accordance with several ASTM Test Methods on one representative sample collected during the subsurface exploration. The sample was obtained from boring B-1 and tested by Project X Engineering.

Direct Shear Remolded
Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM Test Method D 3080 procedures. The rate of deformation is approximately 0.025 inches per minute. The samples were sheared under varying confining loads to determine the coulomb shear strength parameters, angle of internal friction and cohesion. One test was performed on a bulk sample that was remolded to approximately 90 percent of the maximum dry density as determined by ASTM D 1557. The results of the testing are graphically presented in Appendix B.

R-Value
A sample collected during the subsurface exploration was tested for its R-Value in general accordance with California Test Method 301 by Labelle-Marvin Professional Pavement Engineering. The test result is presented in Appendix B.

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EXPANSION INDEX TEST

(ASTM D4829)

Project Name:	3060 Carmel Valley Rd	***Tested/ Checked By:***	***CH*** Lab No 3943
Project Number:	3778-SD	***Date Tested:***	5/23/2022
Project Location:	San Diego, CA	***Sample Source:***	B-1 BB-1
		Sample Description:	Fine Dark Brown Silty Sand

Ring Id: 12 Ring Dia. " : 4" Ring H 1"

Loading weight: 5516. grams

DENSITY DETERMINATION

A	Weight of compacted sample & ring	**772.5**
B	Weight of ring	369.7
C	Net weight of sample	402.8
D	Wet Density, lb / ft3 (C*0.3016)	121.5
E	Dry Density, lb / ft3 (D/1.F)	**111.1**

SATURATION DETERMINATION

	Wet Weight of sample & tare	**248.2**
	Dry Weight of sample & tare	**227.3**
	Tare	**4.8**
F	Initial Moisture Content, %	**9.4**
G	(E*F)	1043.1
H	(E/167.232)	0.66
I	(1.-H)	0.34
J	(62.4*I)	21.0
K	(G/J)= **L** % Saturation	**49.8**

READINGS

DATE	TIME	READING	
5/23/2022	10:44	168	Initial
	10:54	168	10 min/Dry
	10:55	165	1 min/Wet
	11:00	165	5 min/Wet
5/24/2022	10:44	164	Random
	10:54	164	Final

FINAL MOISTURE

Weight of wet sample & tare	Wt. of dry sample & tare	Tare	% Moisture
201.1	176.3	4.8	14.5%

EXPANSION INDEX = 0

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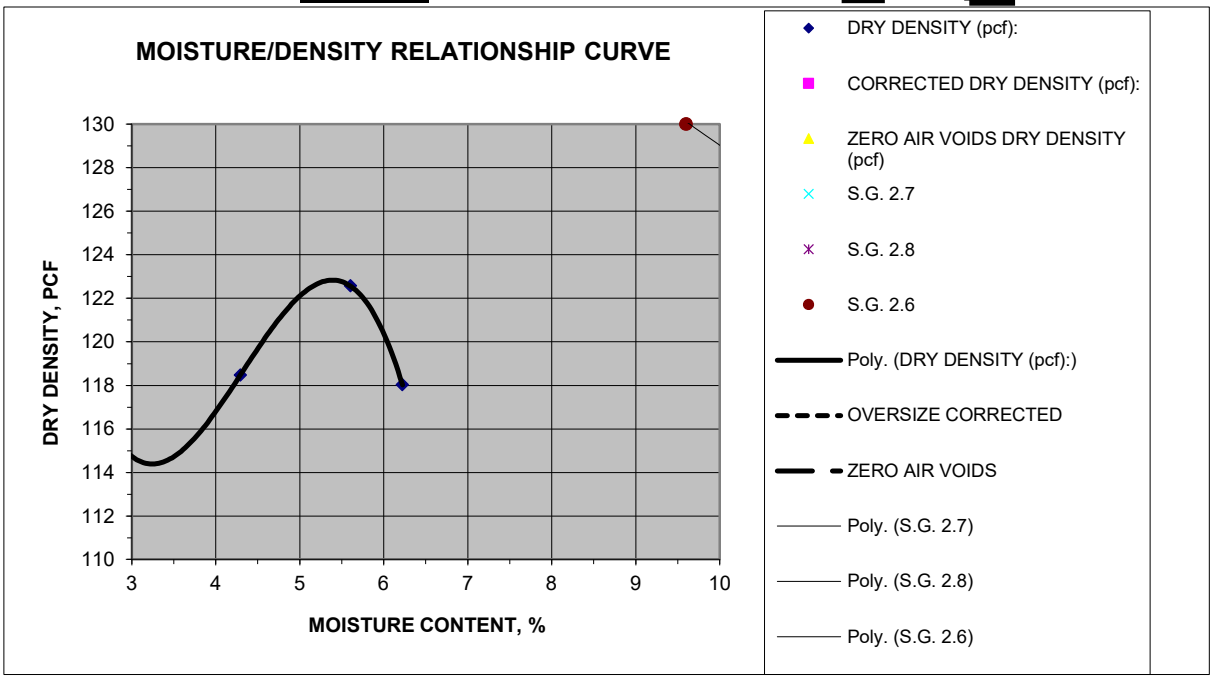
MOISTURE/DENSITY RELATIONSHIP

Client:	KA Enterprises	**Job No.:**	3778-SD
Project:	3060 Carmel Valley Rd	**Lab No.:**	3973
Location:	San Diego, CA		
Material Type:	Fine Silty Sand Light Brown		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-3, BB-2		
	-		
Sampled By:	CH	**Date Sampled:**	4/8/2022
Received By:	CH	**Date Received:**	4/8/2022
Tested By:	FJB	**Date Tested:**	4/29/2022
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 0.0 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	123.0	**@ Optimum Moisture, %**	5.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Classification:

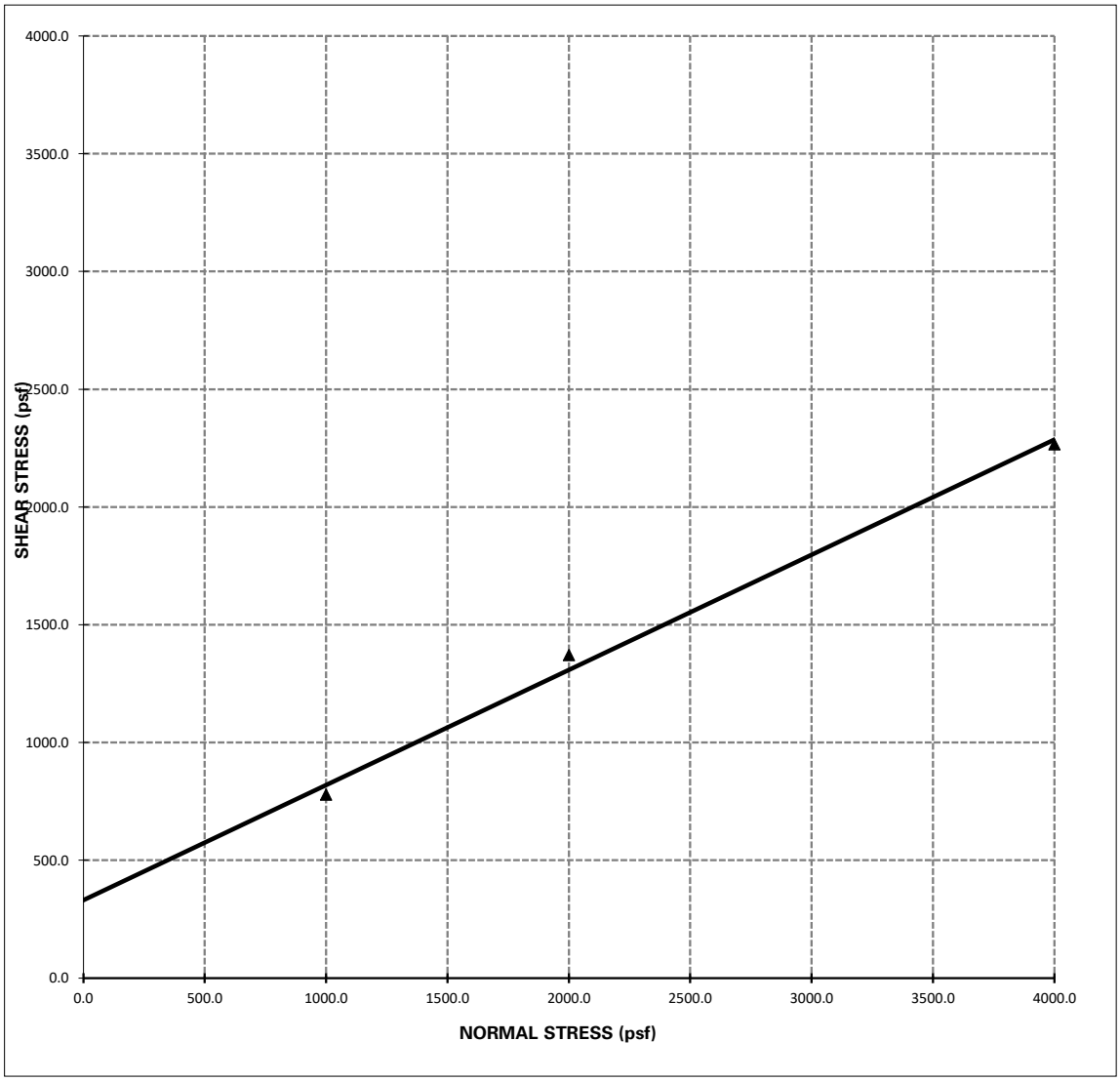
Unified Soils Classification:

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

DIRECT SHEAR TEST

Project Name:	3060 Carmel Valley Road	***Sample Location:***	B-3 BB-2 @ 5'-10'
Project Number:	3778-SD	***Date Tested:***	2/1/2022



Shear Strength: Φ = 26 ° C = 332 psf

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

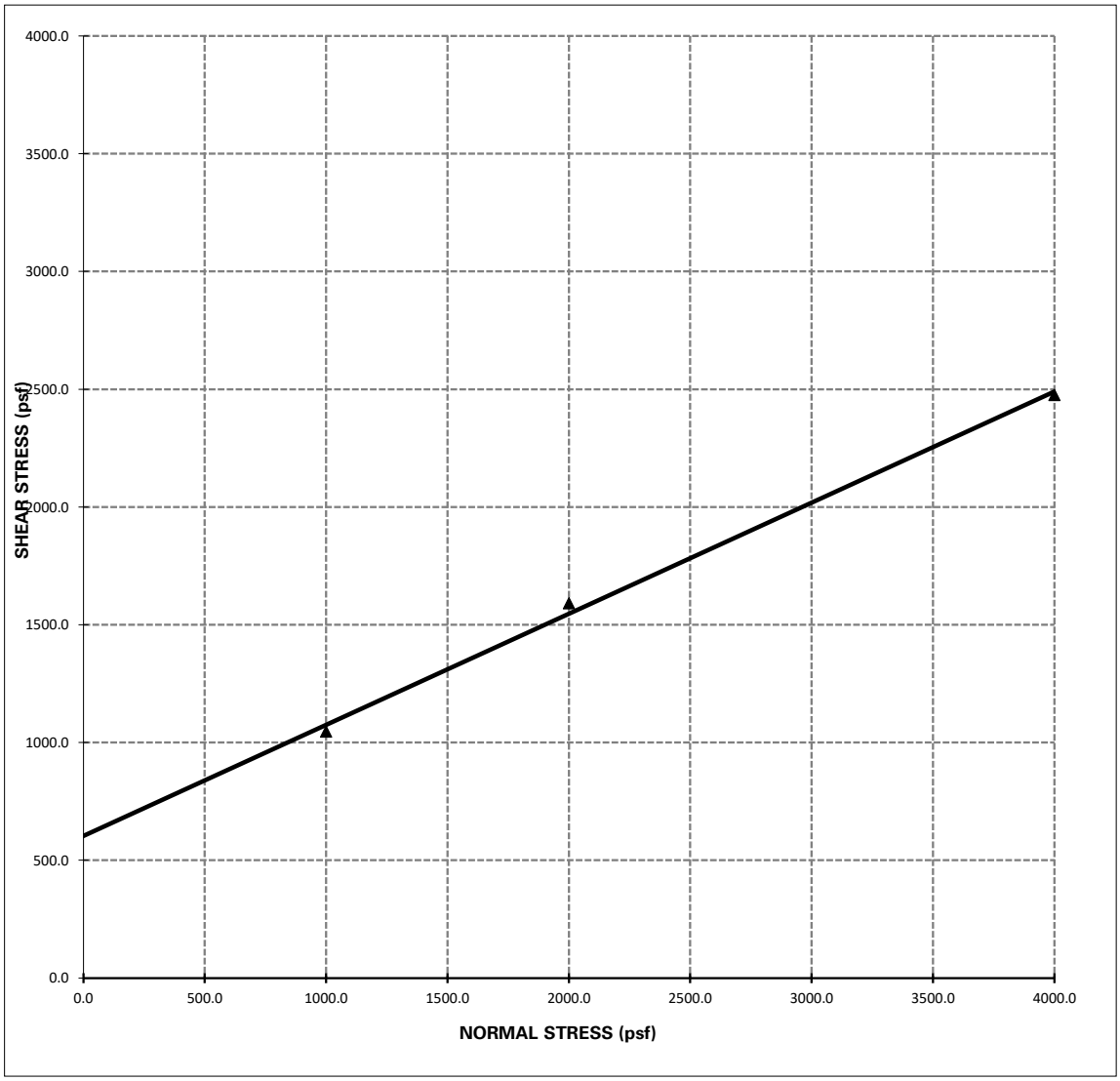
2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

DIRECT SHEAR TEST

Project Name:	3060 Carmel Valley Road	***Sample Location:***	B-3 BB-2 @ 5'-10'
Project Number:	3778-SD	***Date Tested:***	2/1/2022

PEAK VALUE



Shear Strength: Φ = 25 ° , C = 604 psf

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

Results Only Soil Testing for 3060 Carmel Valley Rd

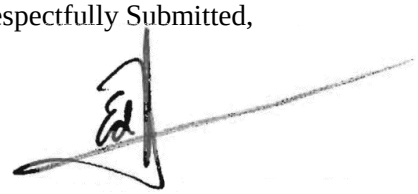
May 31, 2022

Prepared for:

Chris Livesey
GeoTek, Inc.
1384 Poinsettia Ave, Suite A
Vista, CA, 92081
clivesey@geotekusa.com

Project X Job#: S220527D
Client Job or PO#: 3778-SD

Respectfully Submitted,



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

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: 3060 Carmel Valley Rd
Client Job Number: 3778-SD
Project X Job Number: S220527D
May 31, 2022

	Method	ASTM D4327	
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}	
	(ft)	**(mg/kg)**	**(wt%)**
B-1 BB-1 Silty Sand Brown	1-4	11.4	0.0011

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

Project X
Corrosion Engineering

Lab Request Sheet Chain of Custody
Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com

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

Project X Job Number: 5220527D Geotek 3778-SD 3060 Carmel 1504

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

Company Name:	GeoTek, Inc.	Contact Name:	Chris Livesey
Phone No:	949-338-9233		
Mailing Address:	1384 Poinsetta Ave, Ste A, Vista, CA 92081	Contact Email:	clivesey@geotekusa.com
Accounting Contact:	Accounts Payable	Invoice Email:	ap@geotekusa.com; lwhite@geotekusa.com
Client Project No:	3778-SD	Project Name:	3060 Carmel Valley Rd
P.O. #:	Vista		

(Business Days) Turn Around Time: 5 Day Standard ✓ | 2 Day | Same

Results By: ☐ Phone ☐ Fax ☑ Email

Date & Received by : | Default Method

Special Instructions:

ANALYSIS REQUESTED (Please circle)

SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED
394 B-1 BB-1	Silty Sand Brown	1'-4'	4/8/22
2			
4			
6			
8			
10			
12			
14			

Method	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	Sulfide	Ammonia	Nitrate	Flouride	Phosphate	Lithium	Sodium	Potassium	Magnesium	Calcium	BiCarbonate
	Gen Quad				Full Corrosion Series											
Caltrans CTM643																
Caltrans CTM643																
Caltrans CTM417																
Caltrans CTM422																
AASHTO T288																
AASHTO T289																
AASHTO T 290																
AASHTO T 291																
SM 2580B																
SM 4500-S2																
SM 4500-NO3																
SM 4500-NO3																
ASTM G187																
ASTM G 51																
ASTM D4327																
ASTM D4327																
ASTM D4327																
SM 4500-S2																
ASTM D6919																
ASTM D4327																
ASTM D6919																
ASTM D6919																
ASTM D6919																
ASTM D6919																
SM 2320B																

Method	Full Corrosion Series	Soil Corrosivity Evaluation Report	Water Corrosivity Mini Report	Moisture Content	Total Alkalinity	Thermal Resistivity	Metallurgical Analysis	Langelier Index	Puckorius Index	XRF Elemental Analysis	Water Hardness
		Reports									
*Req: Min 3 Samples, site map, and groundwater info											
ASTM D2216											
SM 2320B											

APPENDIX C

GENERAL EARTHWORK GRADING GUIDELINES

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will

be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.

7. Procedures for testing of fill slopes are as follows:
   a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
   b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to

obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.

3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
   a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
   b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
   a) They are not placed in concentrated pockets;
   b) There is a sufficient percentage of fine-grained material to surround the rocks;
   c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

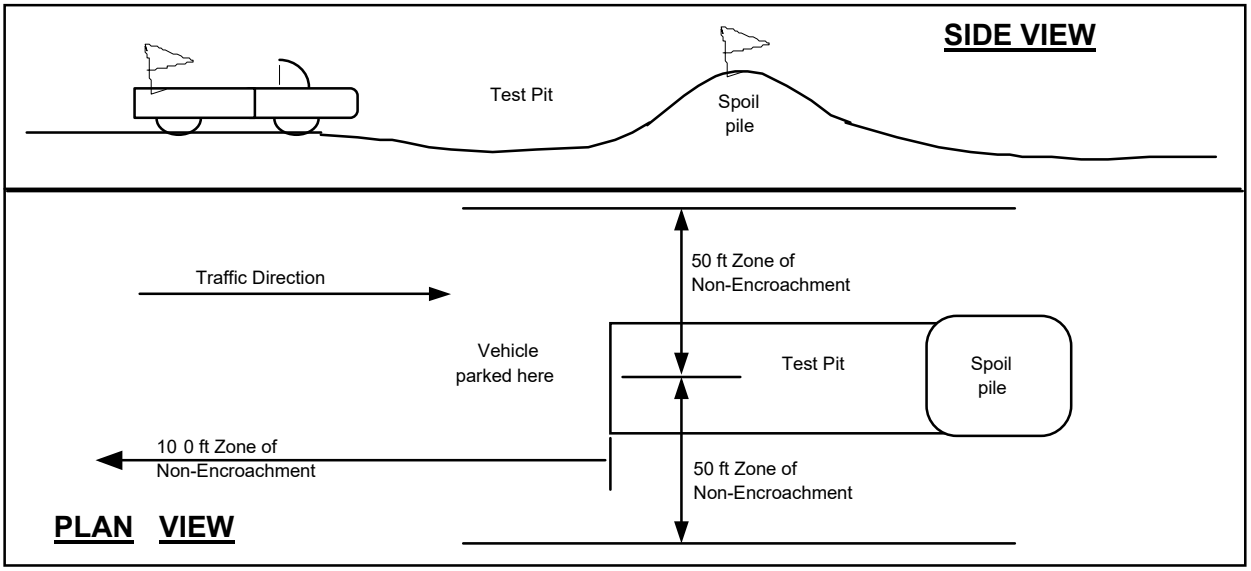
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

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