The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

COPLEY AVENUE VENTURES

PTS:_____

ENGINEER OF WORK:

_____

Patric de Boer RCE #83583 Expires 3/31/19
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Jeff Lynn
2245 San Diego Ave. #125
San Diego, CA 92116

PREPARED BY:

Omega Engineering Consultants
4340 Viewridge Ave, Suite B
San Diego, CA 92123
(858) 634-8620

DATE:

October 30, 2017

_____

Approved by: City of San Diego Date

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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

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CERTIFICATION PAGE

Project Name: Copley Ave Homes
Permit Application Number: TBD

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, PE Number & Expiration Date

Patric de Boer
Print Name

Omega Engineering Consultants
Company

Insert Date
Date

Engineer's Stamp

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Project Name: Copley Avenue Homes

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	4/11/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Initial Submittal
2	10/31/17	◉ Preliminary Design/Planning/CEQA ○ Final Design	Redlines addressed
3	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.
4	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.

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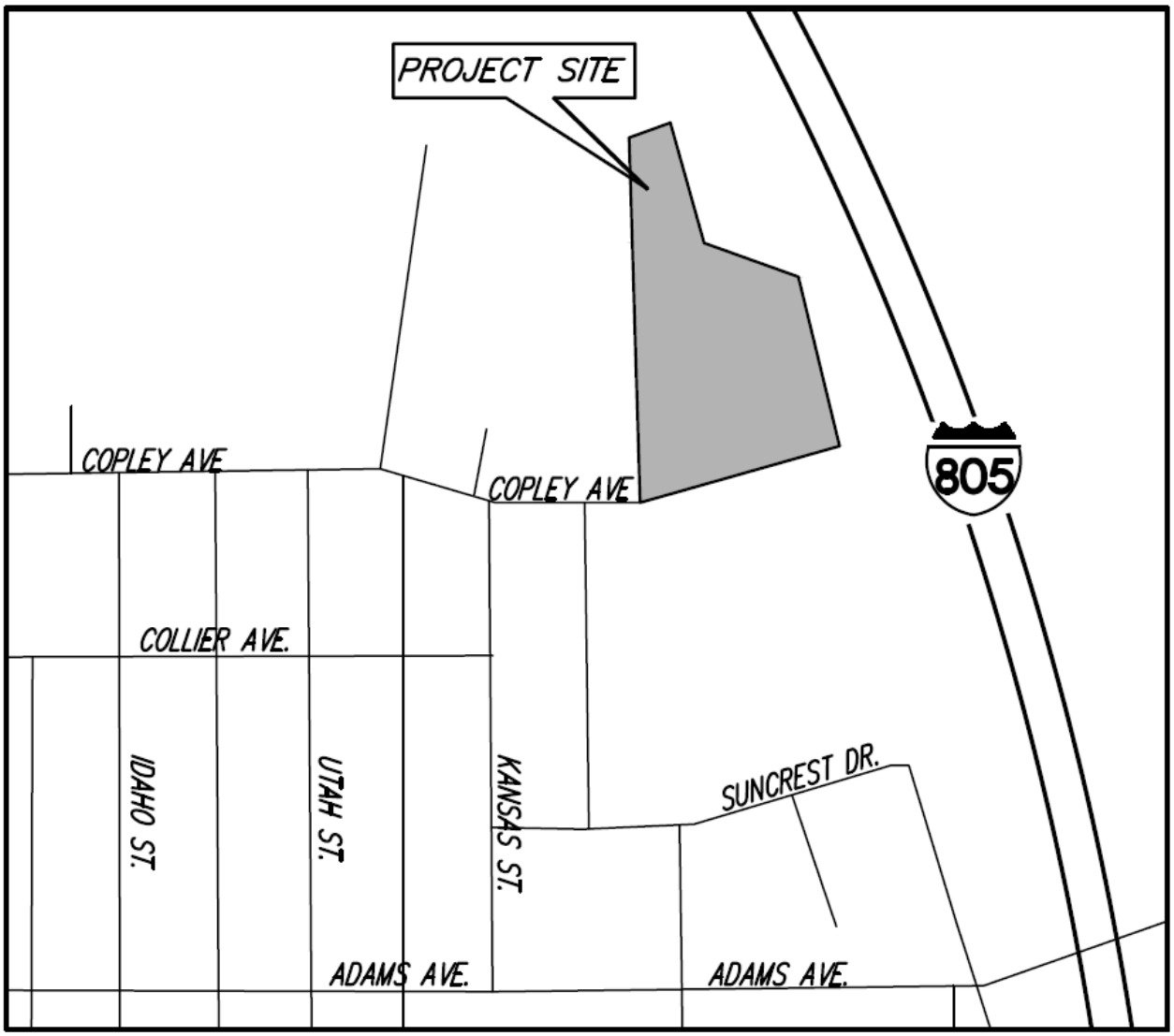
Project Name: Copley Avenue Homes

PROJECT VICINITY MAP

Project Name: Copley Ave Homes
Permit Application Number: _____



VICINITY MAP
NOT TO SCALE

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Project Name: Copley Avenue Homes

THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Storm Water Requirements Applicability Checklist**	FORM **DS-560** February 2016

Project Address:	Project Number *(for the City Use Only)*:
2936 Copley Ave. San Diego, CA 92116	Click here to enter project number

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administrated by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water 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 required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity that results in ground disturbance and contact with storm water runoff?

   ☐ Yes; WPCP required, skip questions 3-4 ☐ No; next question

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

   ☐ Yes; WPCP required, skip questions 4 ☐ No; 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 one of the following activities and associated curb/ sidewalk repair: water services, sewer lateral, storm drain lateral, or dry 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, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes to the right, and continue to PART B:

☐ If you checked "Yes" for question 1,
a 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 processes 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 checked "No" for all question 1-3, and checked "Yes" for question 4
PART B **does not apply and no document is required. Continue to Section 2.**

More information on the City's construction BMP requirements as well as CGP requirements can be found at:
www.sandiego.gov/stormwater/regulations/swguide/constructing.shtml

Project Name: Copley Avenue Homes

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 Stat e 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 continued to Section 2

1. ☐ ASBS

a. Projects located in the ASBS watershed. A map of the ASBS watershed can he found here *<placeholder for ASBS map link>*

2. ☐ High Priority

a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ Medium Priority

a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☒ Low Priority

a. Projects not subject to ASBS, high or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

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

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

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

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of 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 storm water?	☐ 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

Project Name: Copley Avenue Homes

PART D: PDP Exempt Requirements.

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

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."
If "no" was 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 storm water 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 Storm Water Standards manual?

   ☐ Yes; PDP exempt requirements apply ☉ No; 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 Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☉ No; PDP not exempt. PDP requirements apply.

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 Storm Water 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 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 drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 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

Project Name: Copley Avenue Homes

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
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 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 a retail gasoline outlet that creates 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 of 100 or more vehicles per day.	☒ Yes ☒ No
9. **New development or redevelopment projects of an automotive repair shops 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.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☒ 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 STORM WATER REQUIREMENTS**.	☐
2. The project is a **STANDARD PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires hydromodification management.	☒

Name of Owner or Agent *(Please Print):* Patric de Boer	Title: Agent
Signature:	Date: Insert Date

Project Name: Copley Avenue Homes

Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)	**Form I-1**

Project Identification	
Project Name: Copley Ave Homes	
Permit Application Number: TBD	Date: TBD

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 Part 1 of Storm Water Standards 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 BMP Design 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): **N/A**		
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete 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: **N/A**		

Project Name: Copley Avenue Homes

Form I-1 Page 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 BMP Design 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): **N/A**		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the BMP Design 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: **N/A**		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the BMP Design 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: **Project is not located within or downstream of a critical coarse sediment yield area**		

Project Name: Copley Avenue Homes

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Copley Avenue Homes
Project Address	2936 Copley Ave. San Diego, CA 92116
Assessor's Parcel Number(s) (APN(s))	438-220-10
Permit Application Number	TBD
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)	907.11
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	4.23 Acres (398,643 Square Feet)
Area to be disturbed by the project (Project Footprint)	0.64 Acres (91,914 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.26 Acres (87,109 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.38 Acres (4,805 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.	+183 %

Project Name: Copley Avenue Homes

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):
☒ Existing development
☐ Previously graded but not built out
☐ Agricultural or other non-impervious use
☐ Vacant, undeveloped/natural
Description / Additional Information:
Existing single family home with detached garage. Site drains via surface flow to 2 discharge points.

Existing Land Cover Includes (select all that apply):
☒ Vegetative Cover
☒ Non-Vegetated Pervious Areas
☒ Impervious Areas
Description / Additional Information:
Existing site contains pervious and non-pervious surfaces including: Vegetated and non-vegetated surfaces, as well as roofs and concrete walkways/driveways respectively.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):
☐ NRCS Type A
☐ NRCS Type B
☐ NRCS Type C
☒ NRCS Type D

Approximate Depth to Groundwater (GW):
○ GW Depth < 5 feet
○ 5 feet < GW Depth < 10 feet
○ 10 feet < GW Depth < 20 feet
◉ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒ None
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.

Description / Additional Information:

1) The existing drainage is considered Urban.

2) There is no offsite runoff that flows across the surface of the project site. An existing storm drain conveys water from Copley Avenue under the westerly portion of the site to a headwall north of the site.

3) The existing site drains via surface flow. There is no private storm drain system. There is however, a public storm drain that runs along the westerly boundary of the site. This conduit will be removed and replaced with 18" RCP.

4) The two discharge points are located downslope of the project on the north and east sides of the project site. The discharge points are headwalls where private storm drains discharge to the surface of the slope. See below for hydrology specifics.

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)
EX-1	0.43	0.44	21%	1.03
EX-2	0.66	0.37	24%	1.17

Project Name: Copley Avenue Homes

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Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes to demolish and remove the existing structures and hardscape and construct several single family residences. The proposed improvements include four single family dwellings, drive ways, a storm-drain system, and two biofiltration basins. The existing vegetated area surrounding the project site will remain as is and minimally disturbed.

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 will include AC paving, building roof, and paved walkways.

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

The pervious features of the site include: Native vegetation, bare dirt, and landscaping.

Does the project include grading and changes to site topography?

- [x] Yes
- [ ] No

Description / Additional Information:

Project will include grading, which will be done in a manner to minimize earthwork by following the general grade of the existing conditions and implementing retaining walls along the northeasterly side of the site.

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

- [x] 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 project will be constructed with a storm drain system that will route runoff from the disturbed area of the project to either the southerly or northerly biofiltration areas. Storm water will be conveyed via surface flow and a private storm drain system. Biofiltration areas will be used to treat runoff as well as store it for flow attenuation for hydromodification purposes. Below is a summary of the existing and proposed peak flows for the 100 year storm

Existing Conditions

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)	Discharge Pt Q_{100} (cfs)
EX-1	0.43	0.44	21%	1.03	1.03
EX-2	0.66	0.37	24%	1.17	1.17

Proposed Conditions

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)	Discharge Pt Q_{100} (cfs)
A-1.1	0.34	0.65	1%	0.38	0.67*
A-1.2	0.20	0.35	60%	0.45	
A-2.1	0.20	0.58	1%	0.45	0.97
A-2.2	0.35	0.35	67%	0.76	

*Flow to Discharge Point 1 is attenuated by storage in the biofiltration basin.

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

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

Description / Additional Information:
N/A

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) Site surface flows storm water to proposed inlets, thence conduit flows to a proposed browditch leaving said brow ditch to a canyon on vegetated slope, thence surface flows to an area adjacent to the I-805 freeway, and then surface flows to the San Diego River which carries and discharges the storm water to the Pacific Ocean.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. The following uses shall benefit the San Diego River downstream water: COLD, IND, MUN, RARE, REC1, REC2, WARM, WILD The following uses shall benefit the Pacific Ocean downstream water: AQUA, BIOL, COMM, IND, MAR, MIGR, NAV, RARE, REC1, REC2, SHELL, SPWN, 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 project discharge location**.
Provide distance from project outfall location to impaired or sensitive receiving waters. **Approximately 1.4 miles to the San Diego River.**
Sumarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands Permanent hydromodification basin BMP's are to be installed at two locations on the project site. A privately MHPA is located approximately 800 feet downstream of discharge locations.

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	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
Lower San Diego River	Enterococcus	Estimated Completion 2021
	Fecal Coliform	Estimated Completion 2009
	Low Disssolved Oxygen	Estimated Completion 2019
	Maganese	Estimated Completion 2021
	Nitrogen	Estimated Completion 2021
	Phsophorus	Estimated Completion 2019
	Total Dissolved Solids	Estimated Completion 2019
	Toxicity	Estimated Completion 2021

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 BMP Design Manual (Part 1 of Storm Water Standards) 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	☐	☐	☐

Project Name: Copley Avenue Homes

Form I-3B Page 9 of 11

Hydromodification Management Requirements

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

- ◉ 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

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, No critical coarse sediment yield areas to be protected based on WMAA maps

Discussion / Additional Information:
Based on WMAA map, project site is not located within or downstream of a CCSYA location.

Project Name: Copley Avenue Homes

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 points of compliance for flow control is at the north and east edges of the disturbed area, runoff is discharged to a proposed private storm drain pipe system..
Has a geomorphic assessment been performed for the receiving channel(s)? ◉ No, the low flow threshold is 0.1Q2 (default low flow threshold) ○ Yes, the result is the low flow threshold is 0.1Q2 ○ Yes, the result is the low flow threshold is 0.3Q2 ○ Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide title, date, and preparer: 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.

N/A

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

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Project Name: Copley Avenue Homes

Source Control BMP Checklist for All Development Projects	Form I-4

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 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?		
SC-1 Prevention of Illicit Discharges into the MS4	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented: **N/A**			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: **N/A**			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-3 not implemented: **N/A**			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-4 not implemented: **N/A**			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☒ No	☐ N/A
Discussion / justification if SC-5 not implemented: **No trash storage areas proposed. Each residence will have its own city provided trash bin.**			

Project Name: Copley Avenue Homes

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-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-related Uses	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above. **N/A**			

Project Name: Copley Avenue Homes

Site Design BMP Checklist for All Development Projects	Form I-5

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 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?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-1 not implemented: **The general drainage patterns will be maintained.**			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☒ N/A
1-2 Are street trees implemented? If yes, are they shown on the site map?	☐ Yes	☒ No	☐ N/A
1-3 Implemented street trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☒ N/A
1-4 Is street tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
SD-2 Have natural areas, soils and vegetation been conserved?	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-2 not implemented: Natural soil and vegetation areas have been disturbed on the northerly portion of the site, due to design requirements. However, minimum grading disturbance has been implemented to reduce the effect.			

Project Name: Copley Avenue Homes

Form I-5 Page 2 of 4			
Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☉ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented: **N/A**			
SD-4 Minimize Soil Compaction	☉ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented: **N/A**			
SD-5 Impervious Area Dispersion	☐ Yes	☐ No	☐ N/A
Discussion / justification if SD-5 not implemented: SD-5 will not be implemented, because all of the on-site impervious areas will drain to on-site pervious areas.			
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 SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☐ NA
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☉ N/A

Project Name: Copley Avenue Homes

Form I-5 Page 3 of 4			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-6 not implemented: **N/A**			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented: **N/A**			
SD-8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-8 not implemented: **The proposed single family dwellings will present a low demand for harvested rainwater. The low demand does not justify implementing harvesting and use of precipitation.**			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A

Project Name: Copley Avenue Homes

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:
SEE DMA EXHIBIT: ATTACHMENT 1A

Project Name: Copley Avenue Homes

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.

Project site is underlain by soils with low infiltration rates. Infiltration of any runoff is not feasible. This prevented the use of bioretention or biofiltration with partial retention. We instead chose to use fully lined biofiltration basin areas to treat site runoff. Two biofiltration basins (BMP-1), and (BMP-2) will serve the purpose of pollutant control, but also as a detention element to allow the site to be in compliance with hydromodification requirements.

Both BMP-1 and BMP-2 will be constructed with 24" of gravel, 18" of planting soil and 6" of surface ponding. Each facility will be surrounded by a retaining wall and will be fully lined with a 30 mil HDPE or PVC liner. Riprap stabilization will be installed at the locations where stormwater enters the facilities as well as where water is discharged from the facilities. BMP-1 will have a subdrain restricting orifice 0.60" in diameter and BMP-2 will have one that is 0.36" in diameter. The basins provide sufficient detention for mitigation of the DCV, hydromodification impacts, and 100 year storm flow reduction.

(Continue on page 2 as necessary.)

Project Name: Copley Avenue Homes

Form I-6 Page 2 of X
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1) N/A

Project Name: Copley Avenue Homes

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No. TBD	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ 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 ☐ 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 858-634-8620
Who will be the final owner of this BMP?	Property Owner_____
Who will maintain this BMP into perpetuity?	Property Owner_____
What is the funding mechanism for maintenance?	Property Owner_____

Project Name: Copley Avenue Homes

Form I-6 Page 4 of X (Copy as many as needed)	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No. TBD	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☉ Biofiltration (BF-1) ☐ 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 ☐ 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 858-634-8620
Who will be the final owner of this BMP?	Property Owner_____
Who will maintain this BMP into perpetuity?	Property Owner_____
What is the funding mechanism for maintenance?	Property Owner_____

Project Name: Copley Avenue Homes

THE CITY OF SAN DIEGO City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Permanent BMP Construction** **Self Certification Form**	FORM DS-563 January 2016

Date Prepared: Click here to enter text.	Project No.: Click here to enter text.
Project Applicant: Click here to enter text.	Phone: Click here to enter text.
Project Address: Click here to enter text.	
Project Engineer: Click here to enter text.	Phone: Click here to enter text.

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 Quality Management Plan (SWQMP) 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 all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. 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 and structural BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

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

Signature: _____

Date of Signature: _ Insert Date___

Printed Name: _Click here to enter text._

Title: _Click here to enter text._

Phone No. _Click here to enter text._

Engineer's Stamp

DS-563 (12-15)

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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: Copley Avenue Homes

Indicate which Items are Included:

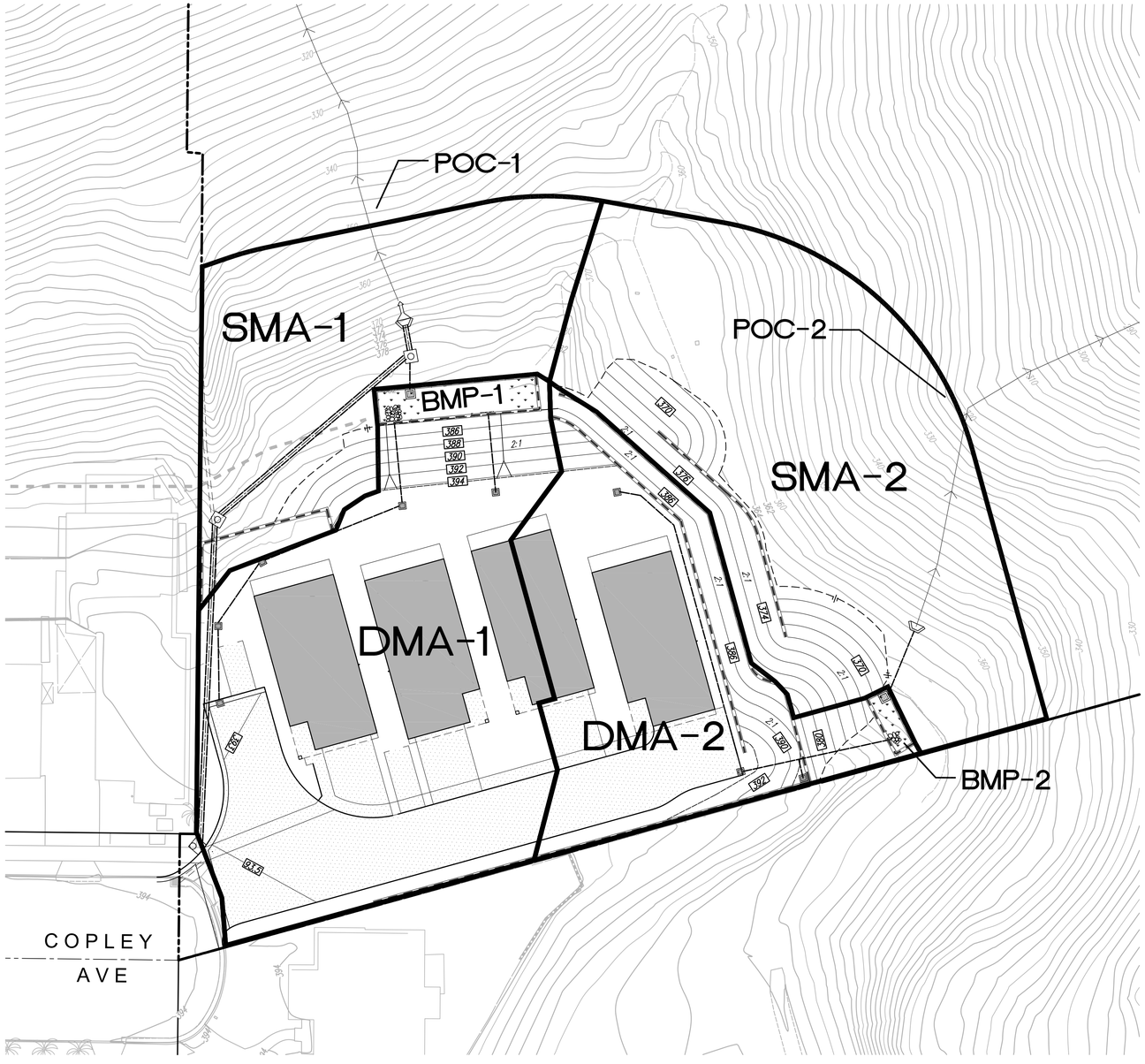
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	◉ Included 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	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	◉ Included ○ Not included because the entire project will use harvest and use BMPs
Attachment 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

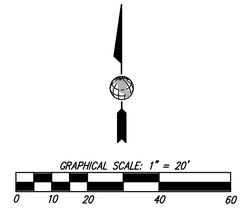
Project Name: Copley Avenue Homes

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

The DMA Exhibit must identify:

☐ Underlying hydrologic soil group
☐ Approximate depth to groundwater
☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☐ Critical coarse sediment yield areas to be protected
☐ Existing topography and impervious areas
☐ Existing and proposed site drainage network and connections to drainage offsite
☐ Proposed grading
☐ Proposed impervious features
☐ Proposed design features and surface treatments used to minimize imperviousness
☐ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☐ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
☐ Structural BMPs (identify location, type of BMP, and size/detail)





LEGEND:

BASIN BOUNDARY

DRAINAGE ARROWS

DRAINAGE MANAGEMENT AREA NO. A-#

BIOFILTRATION AREA BIO-#

BUILDING AREA

PAVEMENT AREA

LANDSCAPED AREA

DMA DATA TABLE

DMA-NO.	TOT. AREA	IMPERVIOUS %	DMA TYPE	DCV
DMA-1	14,878 SF	55%	DRAINS TO BMP-1	400 CF
DMA-2	8,805 SF	43%	DRAINS TO BMP-2	196 CF
SMA-1	8,816 SF	0%	SELF MITIGATING AREA	N/A
SMA-2	15,030 SF	0%	SELF MITIGATING AREA	N/A

STRUCTURAL BMP DATA TABLE

BMP-#	TREATING	IMP TYPE	REQ'D FOOTPRINT	PROP. FOOTPRINT
BMP-1	DMA-1	BIOFILTRATION	267 SF	150 SF
BMP-2	DMA-2	BIOFILTRATION	136 SF	150 SF

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.

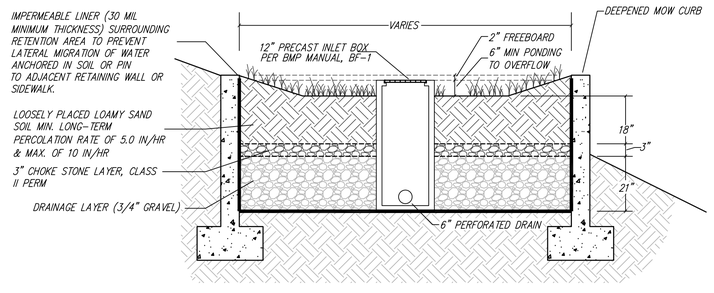
B. PROPOSED REFUSE AREA WILL REMAIN COVERED AND PROTECTED FROM WIND DISPERSAL. SIGNS SHALL BE PLACED WITH WORDS "DO NOT DUMP HAZARDOUS MATERIALS OR LIQUIDS HERE" OR SIMILAR. OWNER SHALL BE RESPONSIBLE TO KEEP THE AREA CLEAN OF LITTER AND SPILLS.

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. FIRE SPRINKLER TEST WATER SHALL BE DRAINED TO THE SANITARY SEWER

NOTES

1. UNDERLYING NRCS HYDROLOGIC SOIL GROUP FOR SITE IS TYPE D
2. GROUNDWATER DEPTH IS GREATER THAN 20 FEET. GROUNDWATER IS NOT CONSIDERED TO BE PRESENT. PLEASE SEE SOILS REPORT.
3. NO EXISTING NATURAL HYDROLOGIC FEATURES
4. NO CRITICAL COARSE SEDIMENT YIELD AREAS ON SITE



BIOFILTRATION CROSS SECTION (TYPICAL)

NOT TO SCALE

COPLEY AVE HOMES
DMA MAP

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

Harvest and Use Feasibility Checklist	Appendix E.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 BMP Design Manual Appendix B, Section B.3.2.

Residential: 4 units * 3 residents per unit * 9.3 gallons per day * 1.5 days per 36 hours = 167 gal
Total demand = 167 gallons
167 gallons = 22 cubic feet

3. Provide the total DCV calculated for the project site, as presented in Appendix C.

DCV = **596** (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.

Is harvest and use feasible based on further evaluation?

☐ Yes, refer to Appendix E to select and size harvest and use BMPs.

☒ No, select alternate BMPs.

Categorization of Infiltration Feasibility Condition

Form I-8

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

Based on SanGIS data and the USDA Naural Resources Conservation Service soil data the soil is type D.

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

The site is located on and adjacent to a steep hillside (+25%). Attempting to infiltrate stormwater into the native type D soil creates the risk of water moving laterally and seeping out the face of the slope, causing landslides or other geotechnical risks.

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: This project is not anticipated to generate pollutants that would result in groundwater contamination.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltrated water would not be anticipated to create water balance issues.			
Part 1 Result *	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		Full infiltration is NOT feasible

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

Form I-8 Page 3 of 4

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

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

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

Provide basis:

Soil is type D soil and is not suitable for infiltration in any appreciable volume.

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

Provide basis:

The site is located on and adjacent to a steep hillside (+25%). Attempting to infiltrate stormwater into the native type D soil creates the risk of water moving laterally and seeping out the face of the slope, causing landslides or other geotechnical risks.

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

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

DMA-1 TREATED BY BIO-1

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	400	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0	in/hr.
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	0	inches
7	Assumed surface area of the biofiltration BMP	500	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7	0	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	400	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	24	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	30	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	18.6	inches
19	Total Depth Treated [Line 17 + Line 18]	48.6	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (continued)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 2 of 2)	
Option 1 – Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	600	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	148	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	300	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	194	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	14,874	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.60	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	267	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	267	sq-ft
Check for Volume Reduction [Not applicable for No Infiltration Condition]			
29	Calculate the fraction of DCV retained in the BMP [Line 9/Line 1]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes	☐ No

Note:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.
4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

BMP design follows the City of San Diego Storm Water Standards Manual. The BMP is sized using standard ensuring maximization of retention and pollutant removal.
This BMP is sized to have a minimum footprint of 3% of the contributing area adjusted by the runoff factor. With the proposed BMP parameters the minimum footprint exceeds the footprint required to Biofilter 1.5 times the DCV. It also exceeds the footprint required to store 0.75 of the remaining DCV in pores and ponding

DMA-2 TREATED BY BIO-2

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	196	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0	in/hr.
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	0	inches
7	Assumed surface area of the biofiltration BMP	150	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7	0	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	196	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	24	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	30	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	18.6	inches
19	Total Depth Treated [Line 17 + Line 18]	48.6	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (continued)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 2 of 2)	
Option 1 – Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	294	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	73	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	147	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	94	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	8,805	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.50	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	132	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	132	sq-ft
Check for Volume Reduction [Not applicable for No Infiltration Condition]			
29	Calculate the fraction of DCV retained in the BMP [Line 9/Line 1]	N/A	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes	☐ No

Note:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.
4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

BMP design follows the City of San Diego Storm Water Standards Manual. The BMP is sized using standard ensuring maximization of retention and pollutant removal.
This BMP is sized to have a minimum footprint of 3% of the contributing area adjusted by the runoff factor. With the proposed BMP parameters the minimum footprint exceeds the footprint required to Biofilter 1.5 times the DCV. It also exceeds the footprint required to store 0.75 of the remaining DCV in pores and ponding

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	.54	inches
2	Area tributary to BMP (s)	A=	0.34	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.60	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	400	cubic-feet

- See Calculation table for details

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.54	inches
2	Area tributary to BMP (s)	A=	0.20	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.50	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	196	cubic-feet

- See Calculation table for details

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.

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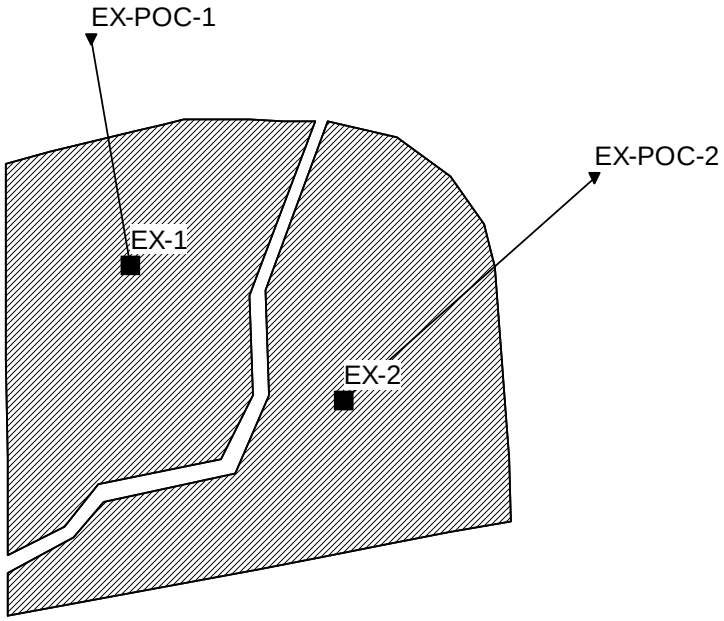
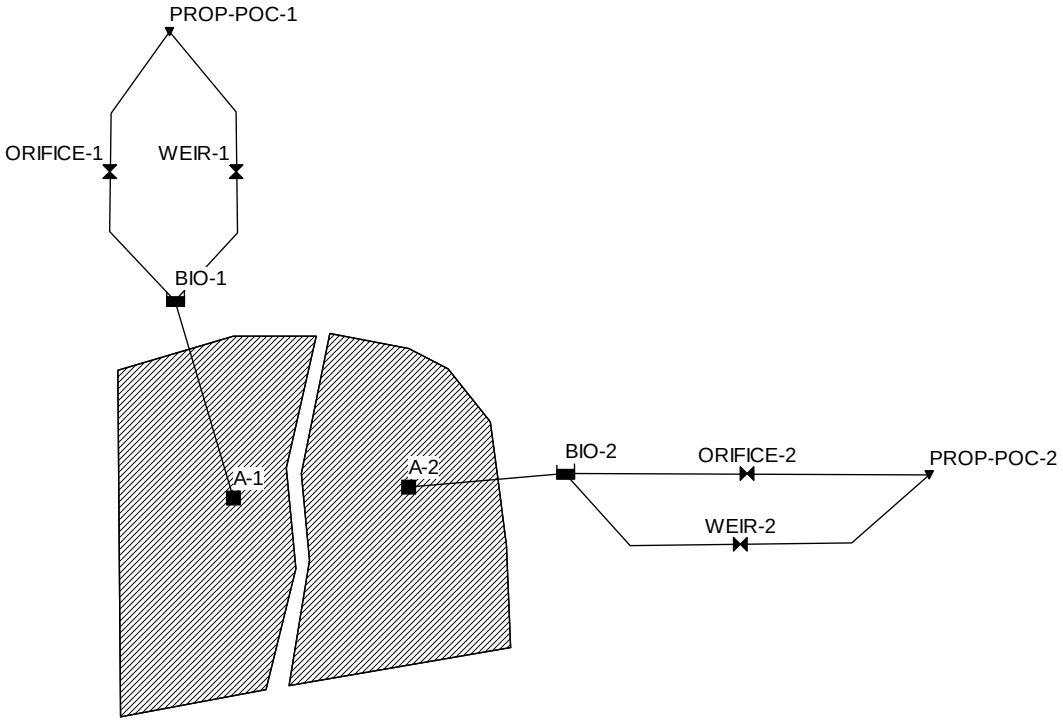
Project Name: Copley Avenue Homes

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
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ◉ Not required because BMPs will drain in less than 96 hours

FashionValley




PROP-POC-1
ORIFICE-1
WEIR-1
BIO-1
A-1
A-2
BIO-2
ORIFICE-2
PROP-POC-2
WEIR-2

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node EX-POC-1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1/1/1900	2/20/1980	3	0.374	0.46	41
2	12/28/2004	20	0.336	0.92	20.5
3	11/16/1972	21	0.33	1.38	13.67
4	12/4/1987	1	0.329	1.83	10.25
5	1/31/1979	15	0.326	2.29	8.2
6	2/28/1970	2	0.308	2.75	6.83
7	3/11/1995	22	0.306	3.21	5.86
8	1/25/1995	16	0.295	3.67	5.13
9	1/9/1978	13	0.269	4.13	4.56
10	10/27/2004	20	0.265	4.59	4.1
11	3/4/2005	6	0.259	5.05	3.73
12	3/8/1968	2	0.254	5.5	3.42
13	11/5/1987	1	0.253	5.96	3.15
14	1/31/1993	1	0.248	6.42	2.93
15	12/4/1974	1	0.243	6.88	2.73
16	2/3/1998	5	0.237	7.34	2.56
17	2/14/1998	7	0.222	7.8	2.41
18	2/8/1998	7	0.213	8.26	2.28
19	3/1/1983	66	0.207	8.72	2.16
20	11/17/1984	1	0.204	9.17	2.05
21	11/22/1984	15	0.199	9.63	1.95
22	2/25/2003	6	0.198	10.09	1.86
23	2/17/1998	7	0.196	10.55	1.78
24	3/6/1975	2	0.193	11.01	1.71
25	2/23/1998	5	0.191	11.47	1.64
26	2/12/2003	27	0.19	11.93	1.58
27	2/28/1981	19	0.188	12.39	1.52
28	2/25/1981	1	0.187	12.84	1.46
29	3/17/1982	19	0.182	13.3	1.41
30	1/6/1979	3	0.182	13.76	1.37
31	11/25/1983	1	0.176	14.22	1.32
32	4/28/2005	1	0.173	14.68	1.28
33	2/21/2005	9	0.172	15.14	1.24
34	2/6/1969	2	0.168	15.6	1.21
35	5/8/1977	9	0.164	16.06	1.17
36	12/25/1988	2	0.162	16.51	1.14
37	2/8/1976	8	0.162	16.97	1.11
38	1/18/1993	16	0.16	17.43	1.08
39	12/31/1976	1	0.159	17.89	1.05
40	1/9/2005	2	0.158	18.35	1.02
41	1/12/2001	5	0.154	18.81	1
42	1/14/1969	8	0.153	19.27	0.98
43	2/17/1971	2	0.152	19.72	0.95
44	2/23/2000	2	0.152	20.18	0.93
45	10/19/2004	26	0.151	20.64	0.91
46	2/11/2005	15	0.15	21.1	0.89
47	1/26/2001	1	0.146	21.56	0.87
48	3/25/1998	1	0.139	22.02	0.85
49	1/10/1995	45	0.139	22.48	0.84
50	4/20/1988	26	0.138	22.94	0.82
51	1/4/1995	6	0.137	23.39	0.8
52	3/2/1992	8	0.136	23.85	0.79
53	1/12/1993	2	0.134	24.31	0.77
54	3/20/1973	1	0.133	24.77	0.76
55	3/11/1978	12	0.131	25.23	0.75
56	1/14/1978	15	0.13	25.69	0.73
57	1/5/1977	32	0.128	26.15	0.72
58	4/7/1999	2	0.124	26.61	0.71
59	10/26/1991	1	0.121	27.06	0.69
60	3/23/1992	1	0.12	27.52	0.68
61	12/16/1987	4	0.119	27.98	0.67
62	1/16/1978	3	0.119	28.44	0.66
63	1/4/1987	3	0.118	28.9	0.65
64	2/18/1993	23	0.117	29.36	0.64
65	12/24/1971	4	0.114	29.82	0.63
66	12/6/1997	2	0.114	30.28	0.62
67	3/15/2003	25	0.113	30.73	0.61
68	11/23/1973	4	0.112	31.19	0.6
69	1/9/1998	25	0.109	31.65	0.59
70	11/29/1970	5	0.109	32.11	0.59
71	2/6/1992	6	0.107	32.57	0.58
72	3/19/1981	1	0.106	33.03	0.57
73	12/25/2003	1	0.106	33.49	0.56
74	11/10/1982	1	0.106	33.94	0.55
75	2/8/1993	3	0.105	34.4	0.55
76	2/15/1992	5	0.105	34.86	0.54
77	1/13/1993	2	0.104	35.32	0.53
78	3/11/2006	1	0.104	35.78	0.53
79	3/19/1991	56	0.103	36.24	0.52
80	3/10/1980	5	0.102	36.7	0.51
81	11/22/1996	5	0.102	37.16	0.51
82	1/23/2008	1	0.102	37.61	0.5
83	8/17/1977	2	0.101	38.07	0.49
84	2/22/2004	11	0.1	38.53	0.49
85	2/11/1973	1	0.1	38.99	0.48
86	11/25/1988	1	0.099	39.45	0.48
87	2/7/1983	4	0.099	39.91	0.47
88	4/1/1982	2	0.098	40.37	0.47
89	11/11/1972	1	0.098	40.83	0.46
90	2/10/1982	1	0.097	41.28	0.46
91	12/19/1970	4	0.096	41.74	0.45
92	2/19/2007	1	0.095	42.2	0.45
93	3/5/1981	7	0.095	42.66	0.44
94	1/12/1997	1	0.094	43.12	0.44
95	12/21/1970	2	0.094	43.58	0.43
96	1/29/1981	1	0.094	44.04	0.43
97	3/18/1983	1	0.094	44.5	0.42
98	1/4/1974	1	0.092	44.95	0.42
99	1/7/2005	3	0.092	45.41	0.41
100	1/17/1990	1	0.091	45.87	0.41
101	4/14/2003	1	0.091	46.33	0.41
102	2/12/1992	10	0.091	46.79	0.4
103	3/22/2005	2	0.091	47.25	0.4

10-year Q: 0.329 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.273 cfs
2-year Q: 0.202 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Pre): 0.020 cfs

104	3/11/1973	8	0.09	47.71	0.39
105	1/27/1983	3	0.089	48.17	0.39
106	1/11/2005	8	0.089	48.62	0.39
107	3/4/1978	14	0.089	49.08	0.38
108	3/6/1980	3	0.089	49.54	0.38
109	2/21/2000	17	0.087	50	0.38
110	2/22/2005	9	0.087	50.46	0.37
111	3/17/1979	4	0.087	50.92	0.37
112	3/20/1979	19	0.087	51.38	0.37
113	2/2/1983	17	0.085	51.83	0.36
114	3/24/1983	3	0.084	52.29	0.36
115	1/29/1980	20	0.083	52.75	0.36
116	1/11/2001	5	0.083	53.21	0.35
117	2/10/1976	6	0.083	53.67	0.35
118	12/29/1991	2	0.081	54.13	0.35
119	4/12/1999	2	0.081	54.59	0.34
120	1/15/1993	26	0.08	55.05	0.34
121	1/14/1990	2	0.08	55.5	0.34
122	4/18/1995	1	0.08	55.96	0.34
123	4/7/1978	1	0.08	56.42	0.33
124	2/12/1978	4	0.079	56.88	0.33
125	1/25/1969	3	0.078	57.34	0.33
126	2/14/1995	2	0.078	57.8	0.33
127	4/8/1975	24	0.078	58.26	0.32
128	2/22/1969	7	0.078	58.72	0.32
129	3/4/1970	3	0.077	59.17	0.32
130	12/21/1988	1	0.076	59.63	0.32
131	1/6/1993	34	0.075	60.09	0.31
132	12/29/1982	1	0.074	60.55	0.31
133	10/29/2000	2	0.074	61.01	0.31
134	12/4/1972	1	0.072	61.47	0.31
135	1/3/2005	24	0.07	61.93	0.3
136	10/30/1996	2	0.07	62.39	0.3
137	2/27/1983	16	0.069	62.84	0.3
138	3/28/1998	1	0.069	63.3	0.3
139	2/19/1969	6	0.069	63.76	0.29
140	3/21/1983	1	0.069	64.22	0.29
141	3/8/1975	3	0.069	64.68	0.29
142	6/5/1993	1	0.069	65.14	0.29
143	2/6/1976	2	0.068	65.6	0.29
144	12/27/1971	23	0.068	66.06	0.28
145	3/5/1995	1	0.068	66.51	0.28
146	11/28/1981	21	0.067	66.97	0.28
147	12/7/1992	4	0.067	67.43	0.28
148	1/26/1999	11	0.066	67.89	0.28
149	12/21/2002	1	0.066	68.35	0.28
150	1/29/1983	4	0.066	68.81	0.27
151	12/29/1992	1	0.065	69.27	0.27
152	12/31/2004	2	0.065	69.72	0.27
153	3/10/1978	3	0.063	70.18	0.27
154	2/15/1986	9	0.062	70.64	0.27
155	1/9/1980	2	0.062	71.1	0.26
156	11/13/1978	2	0.061	71.56	0.26
157	1/15/1998	1	0.061	72.02	0.26
158	2/26/2004	17	0.06	72.48	0.26
159	1/7/2008	1	0.059	72.94	0.26
160	12/11/1984	4	0.058	73.39	0.26
161	3/14/1982	5	0.058	73.85	0.25
162	10/16/1971	1	0.058	74.31	0.25
163	2/22/2008	1	0.056	74.77	0.25
164	3/8/1974	8	0.055	75.23	0.25
165	3/5/2000	1	0.054	75.69	0.25
166	2/7/1994	17	0.053	76.15	0.25
167	2/18/1980	6	0.053	76.61	0.25
168	2/9/1992	3	0.052	77.06	0.24
169	3/15/1986	8	0.052	77.52	0.24
170	11/30/2007	1	0.051	77.98	0.24
171	3/2/1970	1	0.051	78.44	0.24
172	2/7/1976	1	0.051	78.9	0.24
173	3/25/1991	43	0.051	79.36	0.24
174	11/24/1984	7	0.05	79.82	0.24
175	2/16/1980	1	0.05	80.28	0.23
176	1/25/1997	8	0.05	80.73	0.23
177	11/24/1978	5	0.049	81.19	0.23
178	5/1/1980	2	0.049	81.65	0.23
179	2/13/1973	1	0.048	82.11	0.23
180	1/5/2008	1	0.048	82.57	0.23
181	3/10/1975	27	0.047	83.03	0.23
182	12/21/1997	1	0.047	83.49	0.23
183	2/7/1978	1	0.046	83.94	0.22
184	1/26/1969	2	0.045	84.4	0.22
185	2/9/1981	1	0.043	84.86	0.22
186	1/7/1974	12	0.043	85.32	0.22
187	4/20/1983	2	0.041	85.78	0.22
188	2/25/1969	3	0.04	86.24	0.22
189	12/29/1977	1	0.04	86.7	0.22
190	3/26/1980	1	0.039	87.16	0.22
191	1/21/1969	1	0.038	87.61	0.21
192	11/21/1978	1	0.038	88.07	0.21
193	1/12/1980	1	0.038	88.53	0.21
194	1/15/1979	2	0.038	88.99	0.21
195	2/25/1987	1	0.037	89.45	0.21
196	1/23/1997	3	0.037	89.91	0.21
197	2/10/1978	1	0.031	90.37	0.21
198	12/4/1971	1	0.03	90.83	0.21
199	1/1/1982	1	0.03	91.28	0.21
200	1/31/1996	4	0.029	91.74	0.2
201	1/27/2008	8	0.028	92.2	0.2
202	1/29/1998	1	0.028	92.66	0.2
203	1/16/1970	2	0.026	93.12	0.2
204	3/28/1979	6	0.024	93.58	0.2
205	3/1/1978	5	0.022	94.04	0.2
206	1/8/1995	1	0.02	94.5	0.2
207	4/13/1976	3	0.019	94.95	0.2
208	2/23/1993	2	0.019	95.41	0.2
209	2/18/2005	2	0.018	95.87	0.2
210	12/27/1984	5	0.017	96.33	0.2
211	11/11/1985	2	0.016	96.79	0.19
212	1/17/1988	1	0.016	97.25	0.19
213	2/27/1991	1	0.014	97.71	0.19
214	12/17/1978	24	0.014	98.17	0.19
215	3/31/1978	1	0.014	98.62	0.19

Post-project (Mitigated) Flow Frequency - Long-term Simulation

Statistics - Node PROP-POC-1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/16/1980	119	0.448	0.38	41
2	1/31/1979	33	0.414	0.76	20.5
3	10/27/2004	33	0.345	1.15	13.67
4	3/4/2005	28	0.332	1.53	10.25
5	1/25/1995	36	0.307	1.91	8.2
6	2/3/1998	27	0.264	2.29	6.83
7	3/8/1968	23	0.257	2.67	5.86
8	3/11/1995	37	0.253	3.05	5.13
9	2/28/1970	44	0.249	3.44	4.56
10	2/14/1998	29	0.249	3.82	4.1
11	1/5/1979	28	0.239	4.2	3.73
12	2/21/2005	66	0.223	4.58	3.42
13	2/8/1998	29	0.205	4.96	3.15
14	3/17/1982	39	0.186	5.34	2.93
15	1/4/1995	27	0.184	5.73	2.73
16	3/6/1975	24	0.178	6.11	2.56
17	1/14/1969	28	0.161	6.49	2.41
18	1/10/1995	65	0.161	6.87	2.28
19	12/28/2004	40	0.15	7.25	2.16
20	3/1/1983	72	0.15	7.63	2.05
21	1/14/1978	77	0.143	8.02	1.95
22	2/6/1976	124	0.122	8.4	1.86
23	2/28/1981	42	0.118	8.78	1.78
24	12/4/1974	24	0.114	9.16	1.71
25	1/15/1993	88	0.082	9.54	1.64
26	12/16/1987	25	0.082	9.92	1.58
27	2/17/1998	28	0.078	10.31	1.52
28	11/16/1972	38	0.07	10.69	1.46
29	2/20/2000	57	0.047	11.07	1.41
30	5/8/1977	30	0.043	11.45	1.37
31	2/23/1998	33	0.042	11.83	1.32
32	2/25/2003	25	0.039	12.21	1.28
33	2/11/2003	75	0.037	12.6	1.24
34	11/5/1987	22	0.032	12.98	1.21
35	11/21/1996	31	0.028	13.36	1.17
36	3/5/1981	28	0.028	13.74	1.14
37	2/2/1983	27	0.027	14.12	1.11
38	10/19/2004	46	0.027	14.5	1.08
39	1/9/1978	35	0.026	14.89	1.05
40	12/4/1987	22	0.025	15.27	1.02
41	1/5/1977	52	0.023	15.65	1
42	3/2/1992	28	0.022	16.03	0.98
43	3/10/1978	72	0.022	16.41	0.95
44	1/29/1980	42	0.022	16.79	0.93
45	4/20/1988	40	0.022	17.18	0.91
46	2/8/1993	24	0.021	17.56	0.89
47	1/9/2005	58	0.021	17.94	0.87
48	11/22/1984	71	0.021	18.32	0.85
49	2/15/1992	24	0.021	18.7	0.84
50	1/4/1987	22	0.021	19.08	0.82
51	2/18/1993	42	0.021	19.47	0.8
52	8/16/1977	29	0.021	19.85	0.79
53	3/10/1980	23	0.02	20.23	0.77
54	2/15/1986	31	0.02	20.61	0.76
55	2/23/2000	21	0.02	20.99	0.75
56	1/31/1993	20	0.02	21.37	0.73
57	11/28/1970	42	0.02	21.76	0.72
58	12/19/1970	29	0.02	22.14	0.71
59	12/25/1988	20	0.02	22.52	0.69
60	11/17/1984	19	0.02	22.9	0.68
61	1/3/2005	39	0.02	23.28	0.67
62	1/11/2001	50	0.02	23.66	0.66
63	2/6/1969	20	0.02	24.05	0.65
64	2/14/1995	20	0.02	24.43	0.64
65	12/7/1992	21	0.02	24.81	0.63
66	2/7/1983	27	0.02	25.19	0.62
67	2/17/1971	19	0.02	25.57	0.61
68	2/19/2007	20	0.02	25.95	0.6
69	1/6/1993	43	0.02	26.34	0.59
70	12/24/1971	27	0.02	26.72	0.59
71	12/31/1976	18	0.02	27.1	0.58
72	2/25/1981	18	0.02	27.48	0.57
73	4/12/1999	19	0.02	27.86	0.56
74	2/6/1992	22	0.02	28.24	0.55
75	1/25/1997	24	0.02	28.63	0.55
76	3/25/1991	53	0.02	29.01	0.54
77	10/26/1991	18	0.02	29.39	0.53
78	12/11/1984	20	0.019	29.77	0.53
79	11/25/1983	18	0.019	30.15	0.52
80	3/8/1974	23	0.019	30.53	0.51
81	3/19/1991	71	0.019	30.92	0.51
82	1/7/1974	31	0.019	31.3	0.5
83	12/6/1997	19	0.019	31.68	0.49
84	1/23/2008	17	0.019	32.06	0.49
85	1/4/1974	20	0.019	32.44	0.48
86	11/28/1981	36	0.019	32.82	0.48
87	1/9/1998	32	0.019	33.21	0.47
88	2/12/1992	25	0.019	33.59	0.47
89	3/25/1998	16	0.019	33.97	0.46
90	3/4/1970	18	0.019	34.35	0.46
91	2/11/2005	29	0.019	34.73	0.45
92	1/14/1990	17	0.019	35.11	0.45
93	2/26/2004	25	0.019	35.5	0.44
94	10/30/1996	17	0.018	35.88	0.44
95	3/16/1986	31	0.018	36.26	0.43
96	4/8/1975	33	0.018	36.64	0.43
97	11/11/1985	26	0.018	37.02	0.42
98	4/28/2005	15	0.018	37.4	0.42
99	1/12/1993	46	0.018	37.79	0.41
100	3/15/2003	33	0.018	38.17	0.41
101	11/25/1988	15	0.018	38.55	0.41
102	1/5/2008	54	0.017	38.93	0.4
103	3/4/1978	27	0.017	39.31	0.4

10-year Q: 0.329 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.249 cfs
2-year Q: 0.129 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Post Mit): 0.013 cfs

104	3/17/1979	18	0.017	39.69	0.39
105	2/22/1969	20	0.017	40.08	0.39
106	1/26/2001	15	0.017	40.46	0.39
107	3/14/1982	21	0.017	40.84	0.38
108	3/19/1981	15	0.017	41.22	0.38
109	3/22/2005	15	0.016	41.6	0.38
110	4/7/1999	15	0.016	41.98	0.37
111	1/7/2005	18	0.016	42.37	0.37
112	2/22/2004	24	0.016	42.75	0.37
113	12/29/1991	16	0.016	43.13	0.36
114	1/25/1969	43	0.016	43.51	0.36
115	12/27/1971	28	0.016	43.89	0.36
116	2/19/1969	38	0.016	44.27	0.35
117	3/20/1973	14	0.016	44.66	0.35
118	1/23/1997	17	0.015	45.04	0.35
119	1/27/1983	16	0.015	45.42	0.34
120	2/12/1978	17	0.015	45.8	0.34
121	11/23/1973	17	0.015	46.18	0.34
122	3/10/1975	40	0.015	46.56	0.34
123	1/12/1997	14	0.015	46.95	0.33
124	3/5/1995	20	0.015	47.33	0.33
125	12/4/1972	15	0.014	47.71	0.33
126	3/6/1980	17	0.014	48.09	0.33
127	11/10/1982	15	0.014	48.47	0.32
128	4/18/1995	14	0.014	48.85	0.32
129	2/22/2008	14	0.014	49.24	0.32
130	11/11/1972	22	0.014	49.62	0.32
131	2/11/1973	13	0.014	50	0.31
132	1/29/1981	13	0.014	50.38	0.31
133	12/29/1982	13	0.014	50.76	0.31
134	3/5/2000	14	0.014	51.15	0.31
135	12/21/1970	13	0.014	51.53	0.3
136	1/17/1990	13	0.014	51.91	0.3
137	2/27/1991	14	0.014	52.29	0.3
138	4/13/1976	16	0.013	52.67	0.3
139	3/1/1978	18	0.013	53.05	0.29
140	3/23/1992	12	0.013	53.44	0.29
141	4/14/2003	12	0.013	53.82	0.29
142	12/27/1984	28	0.013	54.2	0.29
143	2/10/1982	12	0.013	54.58	0.29
144	10/29/2000	13	0.013	54.96	0.28
145	4/1/1982	13	0.013	55.34	0.28
146	12/25/2003	12	0.013	55.73	0.28
147	5/1/1980	13	0.013	56.11	0.28
148	1/9/1980	18	0.013	56.49	0.28
149	3/20/1979	39	0.013	56.87	0.28
150	2/25/1969	14	0.013	57.25	0.27
151	3/18/1983	17	0.013	57.63	0.27
152	3/11/1973	19	0.013	58.02	0.27
153	3/24/1983	14	0.013	58.4	0.27
154	2/9/1992	13	0.012	58.78	0.27
155	6/5/1993	11	0.012	59.16	0.26
156	3/31/1978	13	0.012	59.54	0.26
157	2/9/1981	12	0.012	59.92	0.26
158	1/1/1982	12	0.012	60.31	0.26
159	3/11/2006	11	0.012	60.69	0.26
160	11/13/1978	12	0.012	61.07	0.26
161	1/15/1979	12	0.012	61.45	0.25
162	2/18/2005	13	0.012	61.83	0.25
163	3/28/1998	28	0.012	62.21	0.25
164	12/31/2004	11	0.012	62.6	0.25
165	12/17/1978	57	0.012	62.98	0.25
166	12/21/1988	10	0.011	63.36	0.25
167	2/23/1993	12	0.011	63.74	0.25
168	11/24/1978	14	0.011	64.12	0.24
169	3/8/1975	12	0.011	64.5	0.24
170	1/26/1999	20	0.011	64.89	0.24
171	3/1/1979	10	0.011	65.27	0.24
172	12/20/2002	33	0.011	65.65	0.24
173	1/11/1980	44	0.011	66.03	0.24
174	10/16/1971	39	0.011	66.41	0.24
175	2/27/1983	25	0.01	66.79	0.23
176	1/27/2008	15	0.01	67.18	0.23
177	1/15/1998	10	0.01	67.56	0.23
178	4/7/1978	9	0.01	67.94	0.23
179	4/20/1983	10	0.01	68.32	0.23
180	3/25/1989	9	0.01	68.7	0.23
181	1/31/1996	16	0.01	69.08	0.23
182	1/8/1995	11	0.01	69.47	0.23
183	3/28/1979	19	0.01	69.85	0.22
184	1/29/1983	12	0.01	70.23	0.22
185	3/24/1994	10	0.01	70.61	0.22
186	12/4/1971	9	0.01	70.99	0.22
187	11/26/1970	9	0.01	71.37	0.22
188	1/16/1970	10	0.01	71.76	0.22
189	2/2/1988	9	0.009	72.14	0.22
190	3/26/1992	9	0.009	72.52	0.22
191	1/17/1988	8	0.009	72.9	0.21
192	11/30/2007	17	0.009	73.28	0.21
193	3/26/1980	8	0.009	73.66	0.21
194	3/21/1983	8	0.009	74.05	0.21
195	1/16/1973	8	0.009	74.43	0.21
196	3/1/1976	8	0.009	74.81	0.21
197	2/7/1994	21	0.009	75.19	0.21
198	12/21/1997	8	0.009	75.57	0.21
199	12/29/1992	7	0.009	75.95	0.21
200	11/21/1978	7	0.009	76.34	0.2
201	1/21/1969	7	0.008	76.72	0.2
202	4/15/1988	7	0.008	77.1	0.2
203	10/26/1996	7	0.008	77.48	0.2
204	2/24/1987	28	0.008	77.86	0.2
205	2/4/1999	7	0.008	78.24	0.2
206	2/13/1973	7	0.008	78.63	0.2
207	4/29/1980	7	0.008	79.01	0.2
208	12/5/1998	7	0.008	79.39	0.2
209	1/29/1998	7	0.008	79.77	0.2
210	2/7/1978	6	0.008	80.15	0.2
211	9/25/1986	10	0.008	80.53	0.19
212	2/9/1978	31	0.007	80.92	0.19
213	4/1/1999	9	0.007	81.3	0.19
214	12/8/2007	7	0.007	81.68	0.19
215	2/10/1970	6	0.007	82.06	0.19

216	6/9/1990	20	0.007	82.44	0.19
217	11/18/1986	9	0.007	82.82	0.19
218	12/28/1977	18	0.007	83.21	0.19
219	3/21/1995	6	0.007	83.59	0.19
220	12/19/1984	32	0.007	83.97	0.19
221	2/28/2006	6	0.007	84.35	0.19
222	1/2/1990	5	0.007	84.73	0.18
223	5/5/2005	5	0.007	85.11	0.18
224	11/29/1985	10	0.006	85.5	0.18
225	11/12/1976	5	0.006	85.88	0.18
226	1/21/1995	5	0.006	86.26	0.18
227	1/19/1973	5	0.006	86.64	0.18
228	3/8/1973	5	0.006	87.02	0.18
229	3/23/1995	5	0.006	87.4	0.18
230	1/4/1973	4	0.006	87.79	0.18
231	5/22/2006	4	0.006	88.17	0.18
232	3/26/1993	4	0.006	88.55	0.18
233	4/4/2006	21	0.006	88.93	0.18
234	3/21/2006	4	0.006	89.31	0.18
235	12/17/1991	4	0.005	89.69	0.17
236	2/19/1998	3	0.005	90.08	0.17
237	1/25/1999	4	0.005	90.46	0.17
238	2/17/1990	4	0.005	90.84	0.17
239	3/28/1993	4	0.005	91.22	0.17
240	3/25/1999	4	0.005	91.6	0.17
241	4/26/1994	10	0.005	91.98	0.17
242	3/31/1998	3	0.005	92.37	0.17
243	3/29/1982	4	0.005	92.75	0.17
244	3/22/1983	4	0.005	93.13	0.17
245	1/28/1981	3	0.005	93.51	0.17
246	2/14/1980	4	0.005	93.89	0.17
247	1/6/1987	3	0.005	94.27	0.17
248	5/12/1998	2	0.005	94.66	0.17
249	12/9/1982	3	0.005	95.04	0.16
250	12/29/1974	2	0.005	95.42	0.16
251	12/14/1993	2	0.004	95.8	0.16
252	4/1/1992	3	0.004	96.18	0.16
253	4/17/2003	2	0.004	96.56	0.16
254	4/11/1998	2	0.004	96.95	0.16
255	3/10/1986	2	0.004	97.33	0.16
256	1/4/1991	2	0.004	97.71	0.16
257	3/13/1996	1	0.003	98.09	0.16
258	11/18/1973	1	0.003	98.47	0.16
259	4/4/1990	1	0.003	98.85	0.16
260	2/6/1973	1	0.003	99.24	0.16
261	12/6/1986	1	0.003	99.62	0.16

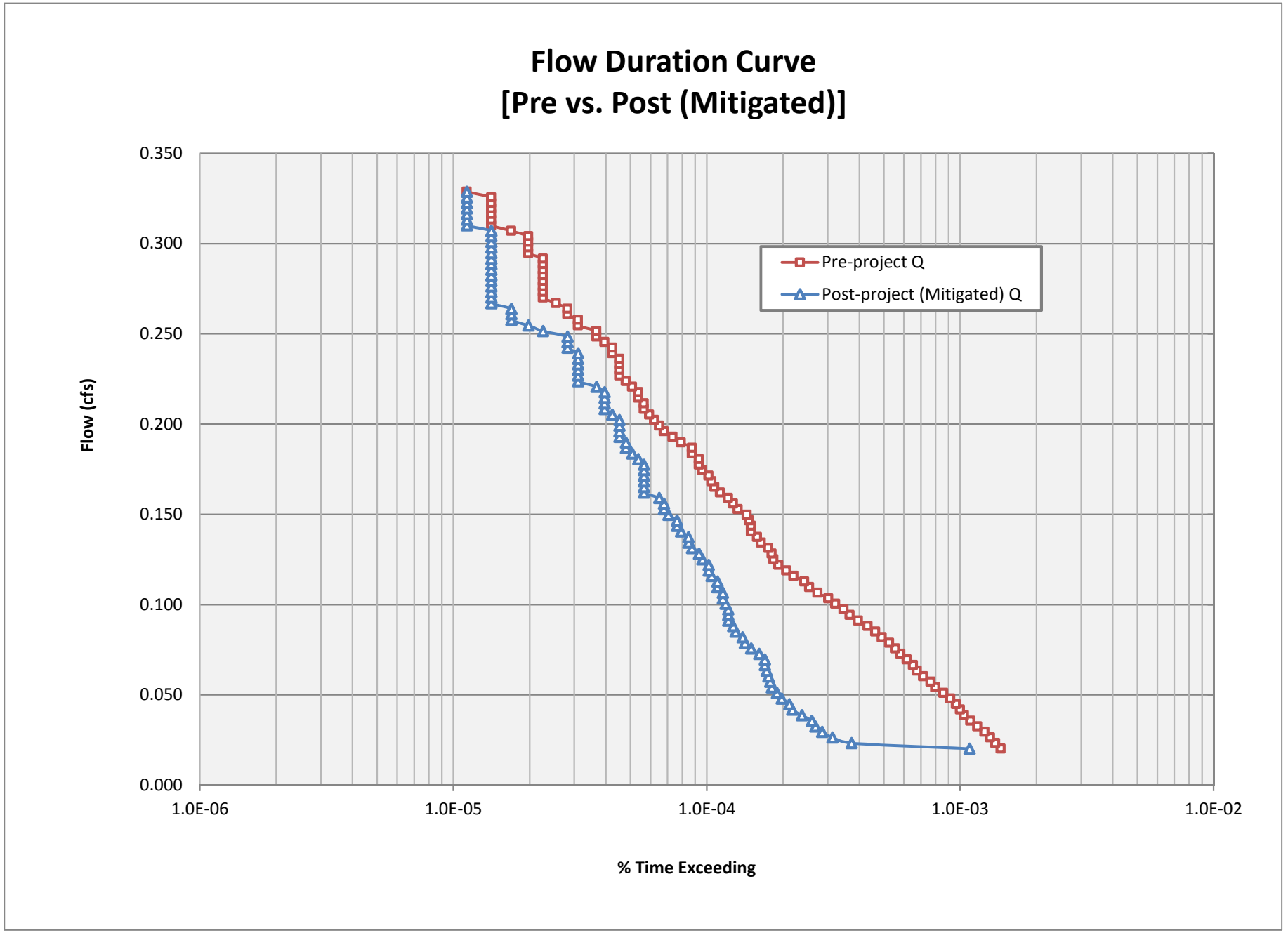
Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.020	0.013
2-year	0.202	0.129
5-year	0.273	0.249
10-year	0.329	0.329

Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.020	cfs
Q10 (Pre):	0.329	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.00308	64
Total Hourly Data:	353925	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.020	512	1.45E-03	386	1.09E-03	75%	Pass
1	0.023	488	1.38E-03	132	3.73E-04	27%	Pass
2	0.026	465	1.31E-03	111	3.14E-04	24%	Pass
3	0.029	442	1.25E-03	101	2.85E-04	23%	Pass
4	0.032	414	1.17E-03	95	2.68E-04	23%	Pass
5	0.036	389	1.10E-03	92	2.60E-04	24%	Pass
6	0.039	367	1.04E-03	84	2.37E-04	23%	Pass
7	0.042	354	1.00E-03	77	2.18E-04	22%	Pass
8	0.045	341	9.63E-04	75	2.12E-04	22%	Pass
9	0.048	324	9.15E-04	70	1.98E-04	22%	Pass
10	0.051	304	8.59E-04	67	1.89E-04	22%	Pass
11	0.054	283	8.00E-04	64	1.81E-04	23%	Pass
12	0.057	271	7.66E-04	63	1.78E-04	23%	Pass
13	0.060	253	7.15E-04	62	1.75E-04	25%	Pass
14	0.063	239	6.75E-04	61	1.72E-04	26%	Pass
15	0.066	231	6.53E-04	60	1.70E-04	26%	Pass
16	0.070	218	6.16E-04	60	1.70E-04	28%	Pass
17	0.073	206	5.82E-04	57	1.61E-04	28%	Pass
18	0.076	196	5.54E-04	53	1.50E-04	27%	Pass
19	0.079	186	5.26E-04	50	1.41E-04	27%	Pass
20	0.082	174	4.92E-04	49	1.38E-04	28%	Pass
21	0.085	164	4.63E-04	46	1.30E-04	28%	Pass
22	0.088	153	4.32E-04	45	1.27E-04	29%	Pass
23	0.091	140	3.96E-04	43	1.21E-04	31%	Pass
24	0.094	130	3.67E-04	43	1.21E-04	33%	Pass
25	0.097	123	3.48E-04	43	1.21E-04	35%	Pass
26	0.100	114	3.22E-04	42	1.19E-04	37%	Pass
27	0.103	107	3.02E-04	41	1.16E-04	38%	Pass
28	0.107	97	2.74E-04	41	1.16E-04	42%	Pass
29	0.110	90	2.54E-04	39	1.10E-04	43%	Pass
30	0.113	86	2.43E-04	39	1.10E-04	45%	Pass
31	0.116	78	2.20E-04	37	1.05E-04	47%	Pass
32	0.119	73	2.06E-04	36	1.02E-04	49%	Pass
33	0.122	68	1.92E-04	36	1.02E-04	53%	Pass
34	0.125	65	1.84E-04	34	9.61E-05	52%	Pass
35	0.128	64	1.81E-04	33	9.32E-05	52%	Pass
36	0.131	62	1.75E-04	31	8.76E-05	50%	Pass
37	0.134	58	1.64E-04	30	8.48E-05	52%	Pass
38	0.137	56	1.58E-04	30	8.48E-05	54%	Pass
39	0.140	53	1.50E-04	28	7.91E-05	53%	Pass
40	0.144	53	1.50E-04	27	7.63E-05	51%	Pass
41	0.147	52	1.47E-04	27	7.63E-05	52%	Pass
42	0.150	51	1.44E-04	25	7.06E-05	49%	Pass
43	0.153	47	1.33E-04	24	6.78E-05	51%	Pass
44	0.156	45	1.27E-04	24	6.78E-05	53%	Pass
45	0.159	43	1.21E-04	23	6.50E-05	53%	Pass
46	0.162	40	1.13E-04	20	5.65E-05	50%	Pass
47	0.165	38	1.07E-04	20	5.65E-05	53%	Pass
48	0.168	37	1.05E-04	20	5.65E-05	54%	Pass
49	0.171	36	1.02E-04	20	5.65E-05	56%	Pass
50	0.174	34	9.61E-05	20	5.65E-05	59%	Pass
51	0.177	33	9.32E-05	20	5.65E-05	61%	Pass
52	0.181	33	9.32E-05	19	5.37E-05	58%	Pass
53	0.184	31	8.76E-05	18	5.09E-05	58%	Pass
54	0.187	31	8.76E-05	17	4.80E-05	55%	Pass
55	0.190	28	7.91E-05	17	4.80E-05	61%	Pass
56	0.193	26	7.35E-05	16	4.52E-05	62%	Pass
57	0.196	24	6.78E-05	16	4.52E-05	67%	Pass
58	0.199	23	6.50E-05	16	4.52E-05	70%	Pass
59	0.202	22	6.22E-05	16	4.52E-05	73%	Pass
60	0.205	21	5.93E-05	15	4.24E-05	71%	Pass
61	0.208	20	5.65E-05	14	3.96E-05	70%	Pass
62	0.211	20	5.65E-05	14	3.96E-05	70%	Pass
63	0.214	19	5.37E-05	14	3.96E-05	74%	Pass
64	0.218	19	5.37E-05	14	3.96E-05	74%	Pass
65	0.221	18	5.09E-05	13	3.67E-05	72%	Pass
66	0.224	17	4.80E-05	11	3.11E-05	65%	Pass
67	0.227	16	4.52E-05	11	3.11E-05	69%	Pass
68	0.230	16	4.52E-05	11	3.11E-05	69%	Pass
69	0.233	16	4.52E-05	11	3.11E-05	69%	Pass
70	0.236	16	4.52E-05	11	3.11E-05	69%	Pass
71	0.239	15	4.24E-05	11	3.11E-05	73%	Pass
72	0.242	15	4.24E-05	10	2.83E-05	67%	Pass
73	0.245	14	3.96E-05	10	2.83E-05	71%	Pass
74	0.248	13	3.67E-05	10	2.83E-05	77%	Pass
75	0.252	13	3.67E-05	8	2.26E-05	62%	Pass
76	0.255	11	3.11E-05	7	1.98E-05	64%	Pass
77	0.258	11	3.11E-05	6	1.70E-05	55%	Pass
78	0.261	10	2.83E-05	6	1.70E-05	60%	Pass
79	0.264	10	2.83E-05	6	1.70E-05	60%	Pass
80	0.267	9	2.54E-05	5	1.41E-05	56%	Pass
81	0.270	8	2.26E-05	5	1.41E-05	63%	Pass
82	0.273	8	2.26E-05	5	1.41E-05	63%	Pass
83	0.276	8	2.26E-05	5	1.41E-05	63%	Pass
84	0.279	8	2.26E-05	5	1.41E-05	63%	Pass
85	0.282	8	2.26E-05	5	1.41E-05	63%	Pass
86	0.285	8	2.26E-05	5	1.41E-05	63%	Pass
87	0.289	8	2.26E-05	5	1.41E-05	63%	Pass
88	0.292	8	2.26E-05	5	1.41E-05	63%	Pass
89	0.295	7	1.98E-05	5	1.41E-05	71%	Pass
90	0.298	7	1.98E-05	5	1.41E-05	71%	Pass
91	0.301	7	1.98E-05	5	1.41E-05	71%	Pass
92	0.304	7	1.98E-05	5	1.41E-05	71%	Pass
93	0.307	6	1.70E-05	5	1.41E-05	83%	Pass
94	0.310	5	1.41E-05	4	1.13E-05	80%	Pass
95	0.313	5	1.41E-05	4	1.13E-05	80%	Pass
96	0.316	5	1.41E-05	4	1.13E-05	80%	Pass
97	0.319	5	1.41E-05	4	1.13E-05	80%	Pass
98	0.322	5	1.41E-05	4	1.13E-05	80%	Pass
99	0.326	5	1.41E-05	4	1.13E-05	80%	Pass
100	0.329	4	1.13E-05	4	1.13E-05	100%	Pass


Flow Duration Curve
[Pre vs. Post (Mitigated)]
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node EX-POC-2 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1/1/1900	2/20/1980	3	0.574	0.46	41
2	12/28/2004	20	0.516	0.92	20.5
3	11/16/1972	21	0.506	1.38	13.67
4	12/4/1987	1	0.505	1.83	10.25
5	1/31/1979	15	0.501	2.29	8.2
6	2/28/1970	2	0.472	2.75	6.83
7	3/11/1995	22	0.469	3.21	5.86
8	1/25/1995	16	0.452	3.67	5.13
9	1/9/1978	13	0.413	4.13	4.56
10	10/27/2004	20	0.407	4.59	4.1
11	3/4/2005	6	0.397	5.05	3.73
12	3/8/1968	2	0.39	5.5	3.42
13	11/5/1987	2	0.389	5.96	3.15
14	1/31/1993	1	0.38	6.42	2.93
15	12/4/1974	1	0.373	6.88	2.73
16	2/3/1998	5	0.364	7.34	2.56
17	2/14/1998	7	0.34	7.8	2.41
18	2/8/1998	7	0.327	8.26	2.28
19	3/1/1983	66	0.318	8.72	2.16
20	11/17/1984	1	0.313	9.17	2.05
21	11/22/1984	15	0.306	9.63	1.95
22	2/25/2003	6	0.303	10.09	1.86
23	2/17/1998	7	0.301	10.55	1.78
24	3/6/1975	2	0.296	11.01	1.71
25	2/23/1998	5	0.294	11.47	1.64
26	2/12/2003	27	0.291	11.93	1.58
27	2/28/1981	19	0.289	12.39	1.52
28	2/25/1981	1	0.287	12.84	1.46
29	3/17/1982	19	0.28	13.3	1.41
30	1/6/1979	3	0.279	13.76	1.37
31	11/25/1983	1	0.269	14.22	1.32
32	2/21/2005	9	0.263	14.68	1.28
33	4/28/2005	1	0.261	15.14	1.24
34	2/6/1969	3	0.257	15.6	1.21
35	5/8/1977	9	0.251	16.06	1.17
36	12/25/1988	2	0.249	16.51	1.14
37	2/8/1976	8	0.248	16.97	1.11
38	1/18/1993	16	0.245	17.43	1.08
39	12/31/1976	1	0.243	17.89	1.05
40	1/9/2005	2	0.242	18.35	1.02
41	1/12/2001	5	0.236	18.81	1
42	1/14/1969	8	0.235	19.27	0.98
43	2/23/2000	2	0.233	19.72	0.95
44	2/17/1971	2	0.232	20.18	0.93
45	10/19/2004	26	0.231	20.64	0.91
46	2/11/2005	15	0.23	21.1	0.89
47	1/26/2001	1	0.224	21.56	0.87
48	3/25/1998	1	0.213	22.02	0.85
49	4/20/1988	26	0.212	22.48	0.84
50	1/4/1995	6	0.21	22.94	0.82
51	3/2/1992	8	0.209	23.39	0.8
52	1/12/1993	2	0.202	23.85	0.79
53	3/20/1973	1	0.201	24.31	0.77
54	3/11/1978	12	0.201	24.77	0.76
55	1/14/1978	15	0.197	25.23	0.75
56	1/5/1977	32	0.196	25.69	0.73
57	4/7/1999	2	0.19	26.15	0.72
58	1/10/1995	46	0.189	26.61	0.71
59	10/26/1991	1	0.184	27.06	0.69
60	12/16/1987	4	0.183	27.52	0.68
61	1/16/1978	4	0.182	27.98	0.67
62	3/23/1992	1	0.181	28.44	0.66
63	1/4/1987	3	0.179	28.9	0.65
64	2/18/1993	23	0.178	29.36	0.64
65	12/6/1997	2	0.175	29.82	0.63
66	12/24/1971	4	0.174	30.28	0.62
67	3/15/2003	25	0.173	30.73	0.61
68	11/23/1973	4	0.17	31.19	0.6
69	1/9/1998	25	0.168	31.65	0.59
70	11/29/1970	5	0.165	32.11	0.59
71	2/6/1992	6	0.163	32.57	0.58
72	2/15/1992	5	0.162	33.03	0.57
73	3/19/1981	1	0.162	33.49	0.56
74	2/8/1993	3	0.162	33.94	0.55
75	12/25/2003	1	0.161	34.4	0.55
76	1/13/1993	2	0.16	34.86	0.54
77	11/10/1982	1	0.16	35.32	0.53
78	3/11/2006	1	0.156	35.78	0.53
79	3/19/1991	56	0.156	36.24	0.52
80	11/22/1996	5	0.156	36.7	0.51
81	3/10/1980	5	0.155	37.16	0.51
82	1/23/2008	2	0.155	37.61	0.5
83	8/17/1977	4	0.153	38.07	0.49
84	2/7/1983	4	0.151	38.53	0.49
85	2/22/2004	11	0.151	38.99	0.48
86	2/11/1973	1	0.15	39.45	0.48
87	11/25/1988	1	0.15	39.91	0.47
88	11/11/1972	1	0.149	40.37	0.47
89	4/1/1982	2	0.146	40.83	0.46
90	2/19/2007	1	0.146	41.28	0.46
91	2/10/1982	1	0.146	41.74	0.45
92	12/19/1970	4	0.145	42.2	0.45
93	3/5/1981	7	0.145	42.66	0.44
94	12/21/1970	2	0.143	43.12	0.44
95	1/12/1997	1	0.141	43.58	0.43
96	3/18/1983	1	0.141	44.04	0.43
97	1/29/1981	1	0.141	44.5	0.42
98	2/12/1992	10	0.139	44.95	0.42
99	1/7/2005	3	0.139	45.41	0.41
100	1/17/1990	1	0.139	45.87	0.41
101	3/22/2005	2	0.139	46.33	0.41
102	1/4/1974	1	0.138	46.79	0.4
103	1/11/2005	8	0.137	47.25	0.4

10-year Q: 0.505 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.419 cfs
2-year Q: 0.307 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Pre): 0.031 cfs

104	4/14/2003	1	0.136	47.71	0.39
105	3/11/1973	8	0.135	48.17	0.39
106	3/6/1980	6	0.135	48.62	0.39
107	2/21/2000	17	0.134	49.08	0.38
108	2/22/2005	9	0.134	49.54	0.38
109	3/4/1978	14	0.133	50	0.38
110	3/17/1979	4	0.133	50.46	0.37
111	3/20/1979	19	0.133	50.92	0.37
112	1/29/1980	20	0.128	51.38	0.37
113	2/2/1983	17	0.127	51.83	0.36
114	2/10/1976	6	0.127	52.29	0.36
115	1/11/2001	5	0.126	52.75	0.36
116	3/24/1983	3	0.125	53.21	0.35
117	4/12/1999	2	0.124	53.67	0.35
118	12/29/1991	2	0.124	54.13	0.35
119	1/27/1983	3	0.123	54.59	0.34
120	1/15/1993	26	0.123	55.05	0.34
121	4/18/1995	1	0.122	55.5	0.34
122	2/12/1978	4	0.121	55.96	0.34
123	1/25/1969	3	0.12	56.42	0.33
124	4/8/1975	24	0.12	56.88	0.33
125	2/14/1995	2	0.12	57.34	0.33
126	3/4/1970	3	0.117	57.8	0.33
127	12/29/1982	1	0.113	58.26	0.32
128	12/21/1988	1	0.113	58.72	0.32
129	1/14/1990	2	0.111	59.17	0.32
130	1/6/1993	34	0.109	59.63	0.32
131	4/7/1978	1	0.109	60.09	0.31
132	1/3/2005	24	0.108	60.55	0.31
133	2/22/1969	7	0.107	61.01	0.31
134	10/30/1996	2	0.107	61.47	0.31
135	10/29/2000	2	0.106	61.93	0.3
136	3/28/1998	1	0.104	62.39	0.3
137	11/28/1981	21	0.103	62.84	0.3
138	3/8/1975	3	0.102	63.3	0.3
139	2/6/1976	2	0.102	63.76	0.29
140	3/5/1995	1	0.101	64.22	0.29
141	12/4/1972	2	0.099	64.68	0.29
142	2/27/1983	16	0.099	65.14	0.29
143	2/19/1969	6	0.099	65.6	0.29
144	3/21/1983	1	0.097	66.06	0.28
145	12/21/2002	1	0.096	66.51	0.28
146	2/15/1986	9	0.095	66.97	0.28
147	12/27/1971	23	0.095	67.43	0.28
148	12/7/1992	4	0.094	67.89	0.28
149	11/13/1978	2	0.094	68.35	0.28
150	1/26/1999	11	0.093	68.81	0.27
151	2/26/2004	17	0.092	69.27	0.27
152	1/29/1983	4	0.091	69.72	0.27
153	1/7/2008	1	0.089	70.18	0.27
154	1/15/1998	2	0.088	70.64	0.27
155	3/14/1982	7	0.088	71.1	0.26
156	12/29/1992	1	0.087	71.56	0.26
157	2/22/2008	1	0.085	72.02	0.26
158	3/10/1978	3	0.084	72.48	0.26
159	1/9/1980	2	0.084	72.94	0.26
160	3/5/2000	1	0.083	73.39	0.26
161	12/11/1984	4	0.08	73.85	0.25
162	3/15/1986	9	0.079	74.31	0.25
163	12/31/2004	2	0.078	74.77	0.25
164	6/5/1993	1	0.078	75.23	0.25
165	3/8/1974	8	0.077	75.69	0.25
166	1/25/1997	8	0.077	76.15	0.25
167	2/16/1980	1	0.076	76.61	0.25
168	2/18/1980	6	0.076	77.06	0.24
169	11/24/1984	7	0.076	77.52	0.24
170	5/1/1980	2	0.075	77.98	0.24
171	2/7/1976	1	0.074	78.44	0.24
172	11/24/1978	5	0.074	78.9	0.24
173	3/25/1991	43	0.074	79.36	0.24
174	1/5/2008	1	0.073	79.82	0.24
175	3/10/1975	28	0.072	80.28	0.23
176	3/2/1970	1	0.072	80.73	0.23
177	2/7/1994	17	0.068	81.19	0.23
178	2/13/1973	1	0.067	81.65	0.23
179	1/26/1969	2	0.066	82.11	0.23
180	1/7/1974	12	0.066	82.57	0.23
181	10/16/1971	1	0.065	83.03	0.23
182	11/30/2007	1	0.065	83.49	0.23
183	2/9/1981	1	0.062	83.94	0.22
184	12/21/1997	1	0.061	84.4	0.22
185	1/23/1997	2	0.057	84.86	0.22
186	2/9/1992	3	0.056	85.32	0.22
187	2/25/1969	3	0.055	85.78	0.22
188	1/15/1979	2	0.054	86.24	0.22
189	2/7/1978	1	0.054	86.7	0.22
190	1/12/1980	2	0.053	87.16	0.22
191	4/20/1983	2	0.047	87.61	0.21
192	2/25/1987	1	0.045	88.07	0.21
193	12/29/1977	1	0.045	88.53	0.21
194	1/21/1969	1	0.045	88.99	0.21
195	1/27/2008	8	0.043	89.45	0.21
196	3/26/1980	1	0.043	89.91	0.21
197	11/21/1978	1	0.039	90.37	0.21
198	1/16/1970	2	0.039	90.83	0.21
199	1/31/1996	4	0.037	91.28	0.21
200	1/1/1982	1	0.036	91.74	0.2
201	2/10/1978	1	0.035	92.2	0.2
202	12/4/1971	1	0.03	92.66	0.2
203	1/29/1998	1	0.029	93.12	0.2
204	2/23/1993	2	0.028	93.58	0.2
205	2/18/2005	2	0.028	94.04	0.2
206	3/1/1978	5	0.027	94.5	0.2
207	3/28/1979	6	0.026	94.95	0.2
208	11/11/1985	6	0.025	95.41	0.2
209	12/27/1984	5	0.021	95.87	0.2
210	1/8/1995	1	0.021	96.33	0.2
211	4/13/1976	3	0.018	96.79	0.19
212	3/31/1978	1	0.018	97.25	0.19
213	12/17/1978	24	0.016	97.71	0.19
214	1/17/1988	1	0.014	98.17	0.19
215	2/27/1991	1	0.013	98.62	0.19

Post-project (Mitigated) Flow Frequency - Long-term Simulation

Statistics - Node PROP-POC-2 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	2/19/1980	30	0.481	0.22	41
2	12/28/2004	32	0.436	0.45	20.5
3	12/4/1987	9	0.43	0.67	13.67
4	11/16/1972	28	0.424	0.9	10.25
5	1/31/1979	23	0.419	1.12	8.2
6	2/28/1970	42	0.403	1.35	6.83
7	3/11/1995	30	0.396	1.57	5.86
8	1/25/1995	23	0.376	1.79	5.13
9	10/27/2004	28	0.344	2.02	4.56
10	1/9/1978	28	0.344	2.24	4.1
11	3/8/1968	9	0.335	2.47	3.73
12	3/4/2005	16	0.334	2.69	3.42
13	11/4/1987	24	0.325	2.91	3.15
14	12/4/1974	11	0.317	3.14	2.93
15	1/31/1993	8	0.312	3.36	2.73
16	2/3/1998	17	0.306	3.59	2.56
17	2/14/1998	17	0.285	3.81	2.41
18	2/8/1998	16	0.274	4.04	2.28
19	3/1/1983	66	0.264	4.26	2.16
20	11/17/1984	8	0.258	4.48	2.05
21	2/25/2003	16	0.254	4.71	1.95
22	2/17/1998	16	0.251	4.93	1.86
23	11/22/1984	20	0.251	5.16	1.78
24	3/5/1975	26	0.25	5.38	1.71
25	2/23/1998	30	0.246	5.61	1.64
26	2/11/2003	75	0.245	5.83	1.58
27	2/28/1981	35	0.244	6.05	1.52
28	1/5/1979	29	0.239	6.28	1.46
29	2/25/1981	9	0.239	6.5	1.41
30	3/17/1982	27	0.234	6.73	1.37
31	2/21/2005	57	0.223	6.95	1.32
32	11/25/1983	9	0.215	7.17	1.28
33	5/8/1977	16	0.21	7.4	1.24
34	2/6/1969	11	0.206	7.62	1.21
35	12/24/1988	10	0.204	7.85	1.17
36	1/14/1969	18	0.202	8.07	1.14
37	1/9/2005	46	0.201	8.3	1.11
38	12/30/1976	27	0.201	8.52	1.08
39	2/8/1976	54	0.2	8.74	1.05
40	1/18/1993	18	0.195	8.97	1.02
41	4/28/2005	8	0.195	9.19	1
42	1/11/2001	43	0.193	9.42	0.98
43	10/19/2004	43	0.187	9.64	0.95
44	2/11/2005	37	0.185	9.87	0.93
45	2/23/2000	9	0.184	10.09	0.91
46	2/17/1971	10	0.184	10.31	0.89
47	3/2/1992	21	0.179	10.54	0.87
48	1/4/1995	16	0.179	10.76	0.85
49	1/26/2001	16	0.177	10.99	0.84
50	3/25/1998	12	0.172	11.21	0.82
51	3/10/1978	62	0.167	11.43	0.8
52	4/20/1988	33	0.165	11.66	0.79
53	1/10/1995	52	0.16	11.88	0.77
54	1/5/1977	41	0.151	12.11	0.76
55	3/20/1973	9	0.15	12.33	0.75
56	1/14/1978	22	0.148	12.56	0.73
57	1/12/1993	40	0.146	12.78	0.72
58	4/7/1999	9	0.146	13	0.71
59	12/16/1987	19	0.144	13.23	0.69
60	12/6/1997	26	0.144	13.45	0.68
61	3/15/2003	33	0.142	13.68	0.67
62	10/26/1991	10	0.141	13.9	0.66
63	1/16/1978	10	0.141	14.13	0.65
64	1/9/1998	29	0.138	14.35	0.64
65	2/15/1992	12	0.137	14.57	0.63
66	2/18/1993	37	0.136	14.8	0.62
67	2/7/1993	15	0.136	15.02	0.61
68	1/4/1987	16	0.135	15.25	0.6
69	11/21/1996	20	0.135	15.47	0.59
70	12/24/1971	25	0.133	15.7	0.59
71	3/23/1992	8	0.131	15.92	0.58
72	3/19/1981	9	0.128	16.14	0.57
73	2/19/2007	13	0.125	16.37	0.56
74	2/6/1992	19	0.123	16.59	0.55
75	11/23/1973	11	0.122	16.82	0.55
76	11/9/1982	23	0.12	17.04	0.54
77	11/29/1970	15	0.119	17.26	0.53
78	1/23/2008	9	0.119	17.49	0.53
79	2/7/1983	25	0.118	17.71	0.52
80	3/5/1981	15	0.118	17.94	0.51
81	2/20/2000	45	0.114	18.16	0.51
82	2/12/1992	20	0.114	18.39	0.5
83	8/16/1977	23	0.113	18.61	0.49
84	3/10/1980	12	0.111	18.83	0.49
85	11/25/1988	12	0.111	19.06	0.48
86	12/19/1970	27	0.11	19.28	0.48
87	2/2/1983	18	0.11	19.51	0.47
88	3/22/2005	11	0.109	19.73	0.47
89	3/17/1979	11	0.108	19.96	0.46
90	2/14/1995	18	0.107	20.18	0.46
91	1/28/1980	31	0.107	20.4	0.45
92	2/22/2004	19	0.107	20.63	0.45
93	4/11/1999	13	0.107	20.85	0.44
94	12/25/2003	25	0.106	21.08	0.44
95	1/7/2005	16	0.105	21.3	0.43
96	11/10/1972	19	0.105	21.52	0.43
97	1/15/1993	36	0.105	21.75	0.42
98	2/9/1982	31	0.105	21.97	0.42
99	3/6/1980	14	0.101	22.2	0.41
100	3/20/1979	26	0.101	22.42	0.41
101	4/8/1975	31	0.101	22.65	0.41
102	1/12/1997	16	0.1	22.87	0.4
103	2/12/1978	15	0.1	23.09	0.4

10-year Q: 0.423 cfs (Adjust Column "I" to interpolate from Table)
5-year Q: 0.344 cfs
2-year Q: 0.251 cfs

Lower Flow Threshold: 10%

0.1xQ2 (Post Mit): 0.025 cfs

104	4/18/1995	9	0.098	23.32	0.39
105	12/29/1991	10	0.098	23.54	0.39
106	3/4/1970	11	0.097	23.77	0.39
107	3/19/1991	63	0.096	23.99	0.38
108	1/4/1974	15	0.096	24.22	0.38
109	4/14/2003	12	0.095	24.44	0.38
110	1/25/1969	42	0.094	24.66	0.37
111	10/30/1996	10	0.094	24.89	0.37
112	1/3/2005	33	0.092	25.11	0.37
113	1/17/1990	9	0.09	25.34	0.36
114	1/6/1993	44	0.089	25.56	0.36
115	12/29/1982	9	0.086	25.78	0.36
116	11/28/1981	30	0.083	26.01	0.35
117	12/27/1971	26	0.081	26.23	0.35
118	2/26/2004	21	0.078	26.46	0.35
119	2/15/1986	24	0.078	26.68	0.34
120	12/7/1992	12	0.077	26.91	0.34
121	11/13/1978	12	0.075	27.13	0.34
122	3/4/1978	21	0.075	27.35	0.34
123	1/14/1990	11	0.073	27.58	0.33
124	3/5/1995	24	0.071	27.8	0.33
125	2/22/2008	11	0.07	28.03	0.33
126	3/14/1982	14	0.07	28.25	0.33
127	3/5/2000	10	0.067	28.48	0.32
128	1/25/1997	16	0.067	28.7	0.32
129	2/22/1969	14	0.066	28.92	0.32
130	3/15/1986	18	0.065	29.15	0.32
131	5/1/1980	11	0.062	29.37	0.31
132	12/11/1984	12	0.062	29.6	0.31
133	3/25/1991	50	0.061	29.82	0.31
134	1/5/2008	55	0.058	30.04	0.31
135	1/7/1974	23	0.053	30.27	0.3
136	1/23/1997	12	0.051	30.49	0.3
137	1/27/1983	11	0.049	30.72	0.3
138	2/15/1980	69	0.048	30.94	0.3
139	2/18/1969	48	0.048	31.17	0.29
140	11/24/1984	14	0.047	31.39	0.29
141	3/7/1974	16	0.044	31.61	0.29
142	3/24/1983	11	0.043	31.84	0.29
143	10/29/2000	9	0.041	32.06	0.29
144	3/8/1975	10	0.036	32.29	0.28
145	12/31/2004	9	0.034	32.51	0.28
146	3/11/1973	15	0.03	32.74	0.28
147	12/21/1970	9	0.028	32.96	0.28
148	1/9/1980	18	0.027	33.18	0.28
149	2/25/1969	10	0.026	33.41	0.28
150	11/11/1985	30	0.025	33.63	0.27
151	2/4/1976	65	0.021	33.86	0.27
152	12/27/1984	28	0.019	34.08	0.27
153	12/4/1972	11	0.017	34.3	0.27
154	4/1/1982	11	0.017	34.53	0.27
155	2/9/1992	9	0.016	34.75	0.26
156	3/10/1975	35	0.015	34.98	0.26
157	1/29/1981	9	0.015	35.2	0.26
158	4/13/1976	12	0.014	35.43	0.26
159	2/11/1973	9	0.014	35.65	0.26
160	2/27/1983	24	0.012	35.87	0.26
161	6/5/1993	9	0.01	36.1	0.25
162	3/28/1998	26	0.01	36.32	0.25
163	3/18/1983	15	0.008	36.55	0.25
164	2/27/1991	40	0.008	36.77	0.25
165	3/11/2006	9	0.008	37	0.25
166	12/21/1988	9	0.008	37.22	0.25
167	2/8/1981	10	0.008	37.44	0.25
168	12/20/2002	33	0.008	37.67	0.24
169	3/24/1994	18	0.008	37.89	0.24
170	11/24/1978	11	0.008	38.12	0.24
171	2/23/1993	10	0.008	38.34	0.24
172	3/25/1989	10	0.008	38.57	0.24
173	1/15/1998	9	0.008	38.79	0.24
174	1/15/1979	9	0.008	39.01	0.24
175	4/7/1978	7	0.008	39.24	0.23
176	4/20/1983	8	0.008	39.46	0.23
177	2/18/2005	9	0.008	39.69	0.23
178	10/16/1971	39	0.007	39.91	0.23
179	11/12/1976	9	0.007	40.13	0.23
180	3/1/1976	9	0.007	40.36	0.23
181	3/31/1978	8	0.007	40.58	0.23
182	4/14/1988	9	0.007	40.81	0.23
183	1/29/1983	9	0.007	41.03	0.22
184	1/10/1980	42	0.007	41.26	0.22
185	1/27/2008	13	0.007	41.48	0.22
186	11/26/1970	12	0.007	41.7	0.22
187	5/22/2006	7	0.007	41.93	0.22
188	3/26/1993	15	0.007	42.15	0.22
189	1/1/1982	27	0.007	42.38	0.22
190	11/30/2007	21	0.007	42.6	0.22
191	1/25/1999	49	0.007	42.83	0.21
192	1/16/1970	8	0.007	43.05	0.21
193	10/26/1996	6	0.007	43.27	0.21
194	12/17/1978	56	0.007	43.5	0.21
195	2/27/1978	43	0.007	43.72	0.21
196	12/3/1971	28	0.007	43.95	0.21
197	4/14/1971	9	0.007	44.17	0.21
198	1/17/1988	14	0.007	44.39	0.21
199	11/17/1986	19	0.007	44.62	0.21
200	2/17/1990	6	0.006	44.84	0.2
201	3/1/1979	8	0.006	45.07	0.2
202	3/21/1995	8	0.006	45.29	0.2
203	3/21/1983	6	0.006	45.52	0.2
204	2/10/1970	24	0.006	45.74	0.2
205	10/11/1987	33	0.006	45.96	0.2
206	3/27/1979	18	0.006	46.19	0.2
207	4/6/1986	14	0.006	46.41	0.2
208	10/14/2006	9	0.006	46.64	0.2
209	1/16/1973	6	0.006	46.86	0.2
210	2/2/1988	20	0.006	47.09	0.2
211	12/16/1988	10	0.006	47.31	0.19
212	6/9/1990	26	0.006	47.53	0.19
213	11/21/1978	6	0.006	47.76	0.19
214	9/25/1986	16	0.006	47.98	0.19
215	3/25/1999	9	0.006	48.21	0.19

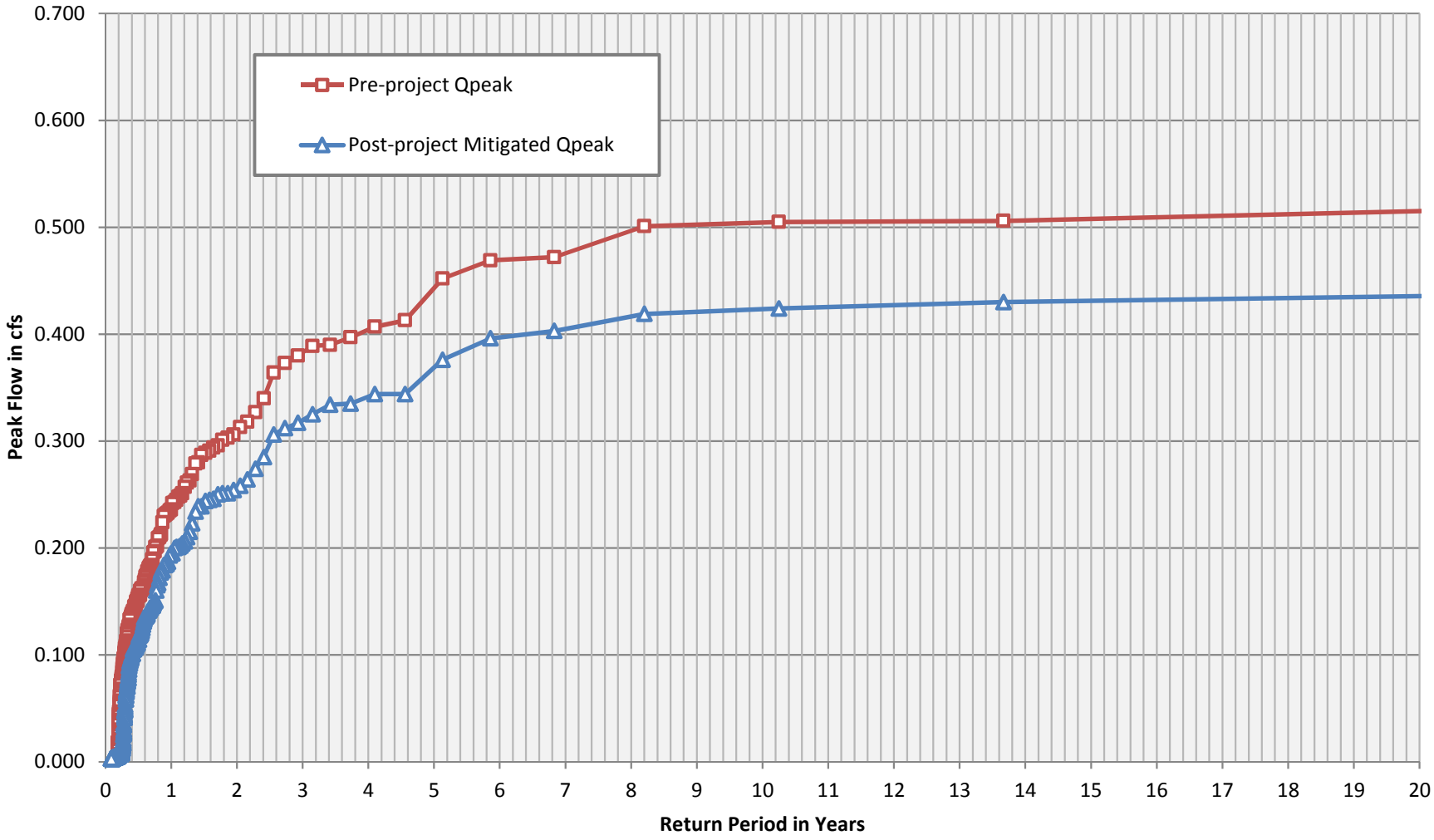
216	3/25/1980	6	0.006	48.43	0.19
217	1/28/1981	5	0.006	48.65	0.19
218	1/4/1973	6	0.006	48.88	0.19
219	2/27/2006	14	0.006	49.1	0.19
220	11/18/1973	9	0.006	49.33	0.19
221	2/7/1994	18	0.006	49.55	0.19
222	12/29/1992	5	0.006	49.78	0.18
223	12/28/1989	8	0.006	50	0.18
224	4/1/1999	9	0.006	50.22	0.18
225	1/31/1996	13	0.006	50.45	0.18
226	4/17/2000	6	0.005	50.67	0.18
227	4/20/2007	10	0.005	50.9	0.18
228	12/17/1991	6	0.005	51.12	0.18
229	3/26/1992	6	0.005	51.35	0.18
230	12/21/1997	6	0.005	51.57	0.18
231	4/6/1984	5	0.005	51.79	0.18
232	5/5/2005	5	0.005	52.02	0.18
233	4/1/2004	4	0.005	52.24	0.18
234	1/7/1995	8	0.005	52.47	0.18
235	4/16/1995	6	0.005	52.69	0.17
236	9/5/1978	5	0.005	52.91	0.17
237	12/24/1983	22	0.005	53.14	0.17
238	12/5/1998	6	0.005	53.36	0.17
239	2/17/1994	11	0.005	53.59	0.17
240	5/28/1971	6	0.005	53.81	0.17
241	2/4/1999	5	0.005	54.04	0.17
242	2/13/1973	4	0.005	54.26	0.17
243	12/28/1974	27	0.005	54.48	0.17
244	1/21/1995	5	0.005	54.71	0.17
245	1/3/1991	18	0.005	54.93	0.17
246	4/4/2006	20	0.005	55.16	0.17
247	10/17/2005	14	0.005	55.38	0.17
248	2/29/1988	4	0.005	55.61	0.17
249	3/28/2006	5	0.005	55.83	0.16
250	11/14/1988	6	0.005	56.05	0.16
251	11/28/1998	5	0.005	56.28	0.16
252	4/28/1980	6	0.005	56.5	0.16
253	12/6/1986	30	0.005	56.73	0.16
254	3/20/1992	5	0.005	56.95	0.16
255	1/2/1990	7	0.005	57.17	0.16
256	1/25/1994	9	0.005	57.4	0.16
257	10/28/1974	26	0.005	57.62	0.16
258	12/11/1993	6	0.005	57.85	0.16
259	2/3/2004	5	0.005	58.07	0.16
260	3/10/1986	11	0.005	58.3	0.16
261	1/21/1969	4	0.005	58.52	0.16
262	2/7/1978	4	0.005	58.74	0.16
263	4/4/1990	4	0.005	58.97	0.16
264	2/24/1983	5	0.005	59.19	0.16
265	12/25/1968	4	0.005	59.42	0.15
266	2/12/2000	5	0.005	59.64	0.15
267	11/27/1975	4	0.005	59.87	0.15
268	1/31/1990	5	0.005	60.09	0.15
269	4/1/1968	4	0.005	60.31	0.15
270	10/25/1971	4	0.005	60.54	0.15
271	2/19/2006	3	0.005	60.76	0.15
272	3/8/1986	8	0.005	60.99	0.15
273	12/23/1982	3	0.005	61.21	0.15
274	12/8/2007	5	0.005	61.43	0.15
275	2/23/1987	42	0.004	61.66	0.15
276	3/12/1996	18	0.004	61.88	0.15
277	2/13/1980	20	0.004	62.11	0.15
278	2/3/1994	18	0.004	62.33	0.15
279	1/18/1973	6	0.004	62.56	0.15
280	12/16/1984	6	0.004	62.78	0.15
281	9/22/1987	3	0.004	63	0.15
282	12/23/1995	3	0.004	63.23	0.15
283	9/10/1976	9	0.004	63.45	0.14
284	10/20/1979	12	0.004	63.68	0.14
285	11/6/1969	7	0.004	63.9	0.14
286	3/21/2006	4	0.004	64.13	0.14
287	10/21/1976	3	0.004	64.35	0.14
288	11/20/1983	5	0.004	64.57	0.14
289	11/1/1995	4	0.004	64.8	0.14
290	2/8/1986	15	0.004	65.02	0.14
291	12/9/1982	4	0.004	65.25	0.14
292	11/25/1985	26	0.004	65.47	0.14
293	9/3/1998	4	0.004	65.7	0.14
294	11/30/1999	3	0.004	65.92	0.14
295	10/28/1998	3	0.004	66.14	0.14
296	2/9/1978	28	0.004	66.37	0.14
297	3/28/1990	5	0.004	66.59	0.14
298	3/23/1995	5	0.004	66.82	0.14
299	1/28/2005	5	0.004	67.04	0.14
300	1/30/1986	8	0.004	67.26	0.14
301	12/9/1983	3	0.004	67.49	0.14
302	1/29/1998	4	0.004	67.71	0.14
304	12/14/1993	3	0.004	68.16	0.13
304	1/9/1991	3	0.004	68.16	0.13
305	12/8/1984	4	0.004	68.39	0.13
306	3/8/1992	6	0.004	68.61	0.13
307	4/3/1987	3	0.004	68.83	0.13
308	2/4/1990	3	0.004	69.06	0.13
309	5/28/1990	5	0.004	69.28	0.13
310	12/28/1977	16	0.004	69.51	0.13
311	1/19/1983	4	0.004	69.73	0.13
312	5/7/1976	3	0.004	69.96	0.13
313	2/14/2008	3	0.004	70.18	0.13
314	4/17/1990	3	0.004	70.4	0.13
315	11/8/1998	7	0.004	70.63	0.13
316	1/16/1984	2	0.004	70.85	0.13
317	2/18/2004	2	0.004	71.08	0.13
319	3/22/1983	3	0.004	71.52	0.13
319	3/18/2002	3	0.004	71.52	0.13
320	1/20/1982	21	0.004	71.75	0.13
321	10/27/2000	12	0.004	71.97	0.13
322	3/2/1988	3	0.004	72.2	0.13
323	12/27/1992	7	0.004	72.42	0.13
324	3/28/1993	4	0.004	72.65	0.13
325	4/18/1996	3	0.004	72.87	0.13
326	2/3/2008	5	0.004	73.09	0.13
327	2/6/1973	3	0.004	73.32	0.13

328	1/21/1996	3	0.004	73.54	0.13
329	1/30/1978	3	0.004	73.77	0.12
330	12/9/1969	3	0.004	73.99	0.12
331	1/6/1987	9	0.004	74.22	0.12
332	10/28/1987	5	0.004	74.44	0.12
333	2/21/1979	3	0.004	74.66	0.12
334	12/30/1981	5	0.004	74.89	0.12
335	3/27/1974	2	0.004	75.11	0.12
336	12/28/1991	4	0.004	75.34	0.12
337	12/9/1996	3	0.004	75.56	0.12
338	11/1/2003	2	0.004	75.78	0.12
339	4/18/1983	2	0.004	76.01	0.12
340	11/24/2001	2	0.004	76.23	0.12
341	11/29/1982	21	0.004	76.46	0.12
342	3/17/1983	5	0.004	76.68	0.12
343	12/7/2007	3	0.004	76.91	0.12
344	11/29/1985	10	0.004	77.13	0.12
345	12/13/1971	2	0.004	77.35	0.12
346	3/8/1973	2	0.004	77.58	0.12
347	11/26/1973	3	0.004	77.8	0.12
348	2/5/1978	2	0.004	78.03	0.12
349	3/16/2008	2	0.004	78.25	0.12
350	11/14/1993	2	0.004	78.48	0.12
351	9/26/1999	2	0.004	78.7	0.12
352	1/2/2006	15	0.004	78.92	0.12
353	12/18/1977	3	0.004	79.15	0.12
354	4/29/1983	2	0.004	79.37	0.12
355	1/8/2001	2	0.004	79.6	0.12
356	4/23/1980	3	0.004	79.82	0.12
357	4/26/2002	2	0.004	80.04	0.11
358	10/22/1987	2	0.004	80.27	0.11
359	11/11/1978	22	0.004	80.49	0.11
360	4/17/2004	2	0.004	80.72	0.11
361	11/7/1979	3	0.004	80.94	0.11
362	10/10/1986	5	0.004	81.17	0.11
363	4/1/1992	2	0.004	81.39	0.11
364	3/21/1969	6	0.004	81.61	0.11
365	2/22/2007	2	0.004	81.84	0.11
366	4/14/2006	6	0.003	82.06	0.11
367	12/9/1970	3	0.003	82.29	0.11
368	9/23/1986	3	0.003	82.51	0.11
369	4/24/1994	1	0.003	82.74	0.11
370	7/31/1991	2	0.003	82.96	0.11
371	10/7/1983	3	0.003	83.18	0.11
372	11/8/1984	2	0.003	83.41	0.11
373	2/19/1998	2	0.003	83.63	0.11
374	3/16/1977	2	0.003	83.86	0.11
375	2/24/2008	2	0.003	84.08	0.11
376	11/5/2001	2	0.003	84.3	0.11
377	3/31/1998	2	0.003	84.53	0.11
378	4/26/1994	8	0.003	84.75	0.11
379	3/3/1976	2	0.003	84.98	0.11
380	12/25/1977	1	0.003	85.2	0.11
381	12/4/1980	4	0.003	85.43	0.11
382	12/22/1971	2	0.003	85.65	0.11
383	3/3/1980	1	0.003	85.87	0.11
384	3/29/1982	2	0.003	86.1	0.11
385	12/19/1984	28	0.003	86.32	0.11
386	2/9/1989	2	0.003	86.55	0.11
387	10/31/1987	2	0.003	86.77	0.11
388	9/16/1978	3	0.003	87	0.11
389	3/25/1977	3	0.003	87.22	0.11
390	2/25/1996	1	0.003	87.44	0.11
391	3/13/1971	1	0.003	87.67	0.1
392	5/7/1971	3	0.003	87.89	0.1
393	4/24/2002	1	0.003	88.12	0.1
394	10/17/1984	2	0.003	88.34	0.1
395	1/3/1977	2	0.003	88.57	0.1
397	5/3/2003	2	0.003	89.01	0.1
397	5/12/1998	2	0.003	89.01	0.1
398	12/25/1994	3	0.003	89.24	0.1
399	11/8/2002	2	0.003	89.46	0.1
400	9/6/1972	3	0.003	89.69	0.1
401	11/14/1972	2	0.003	89.91	0.1
402	3/26/1982	5	0.003	90.13	0.1
403	12/19/1988	1	0.003	90.36	0.1
404	11/27/1981	2	0.003	90.58	0.1
405	4/23/1990	1	0.003	90.81	0.1
406	12/4/1992	1	0.003	91.03	0.1
407	1/21/2001	1	0.003	91.26	0.1
408	11/12/2001	2	0.003	91.48	0.1
409	12/19/1987	1	0.003	91.7	0.1
410	2/28/2007	1	0.003	91.93	0.1
411	12/20/1986	1	0.003	92.15	0.1
412	10/11/2000	1	0.003	92.38	0.1
414	3/3/2006	1	0.003	92.83	0.1
414	3/11/1999	1	0.003	92.83	0.1
415	1/28/1968	2	0.003	93.05	0.1
416	4/22/2001	1	0.003	93.27	0.1
418	8/14/1983	1	0.003	93.72	0.1
418	8/17/1999	1	0.003	93.72	0.1
419	2/3/1976	2	0.003	93.95	0.1
420	11/15/1968	1	0.003	94.17	0.1
421	2/2/1985	4	0.003	94.39	0.1
422	6/15/1995	2	0.003	94.62	0.1
423	6/20/1972	1	0.003	94.84	0.1
424	12/27/1983	1	0.003	95.07	0.1
425	1/5/1982	1	0.003	95.29	0.1
426	12/18/1992	1	0.003	95.52	0.1
427	12/8/1991	1	0.003	95.74	0.1
428	11/12/1983	2	0.003	95.96	0.1
430	4/17/2003	1	0.003	96.41	0.1
430	4/11/1998	1	0.003	96.41	0.1
431	12/31/2005	1	0.003	96.64	0.1
432	3/13/1991	1	0.003	96.86	0.09
433	10/25/1989	1	0.003	97.09	0.09
434	1/3/2004	1	0.003	97.31	0.09
435	1/20/1969	1	0.003	97.53	0.09
436	12/8/1972	1	0.003	97.76	0.09
437	10/8/1985	2	0.003	97.98	0.09
438	10/6/1977	1	0.003	98.21	0.09
439	12/11/2007	1	0.003	98.43	0.09

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.031	0.025
2-year	0.307	0.251
5-year	0.419	0.344
10-year	0.505	0.423

Peak Flow Frequency Curves

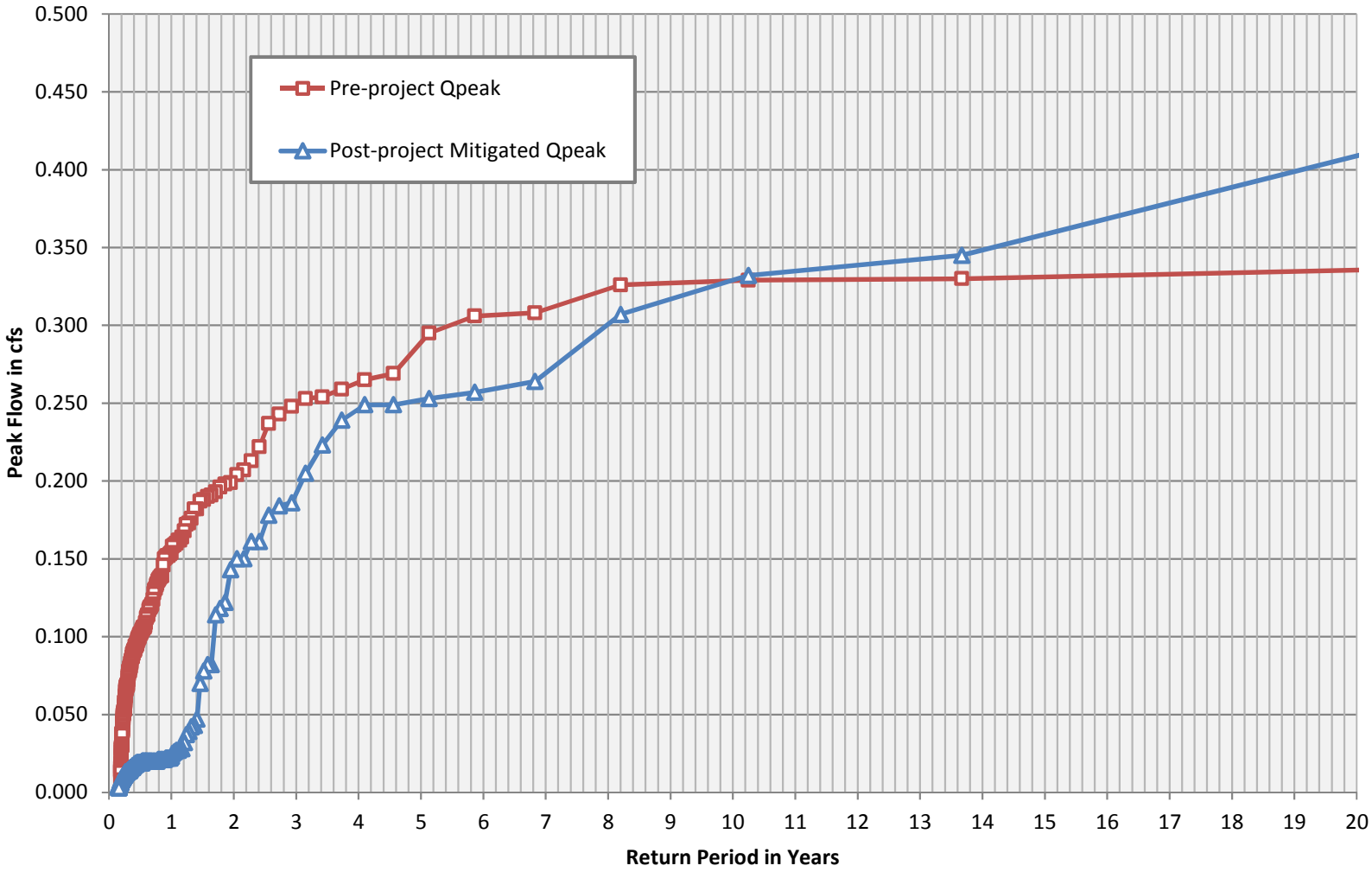


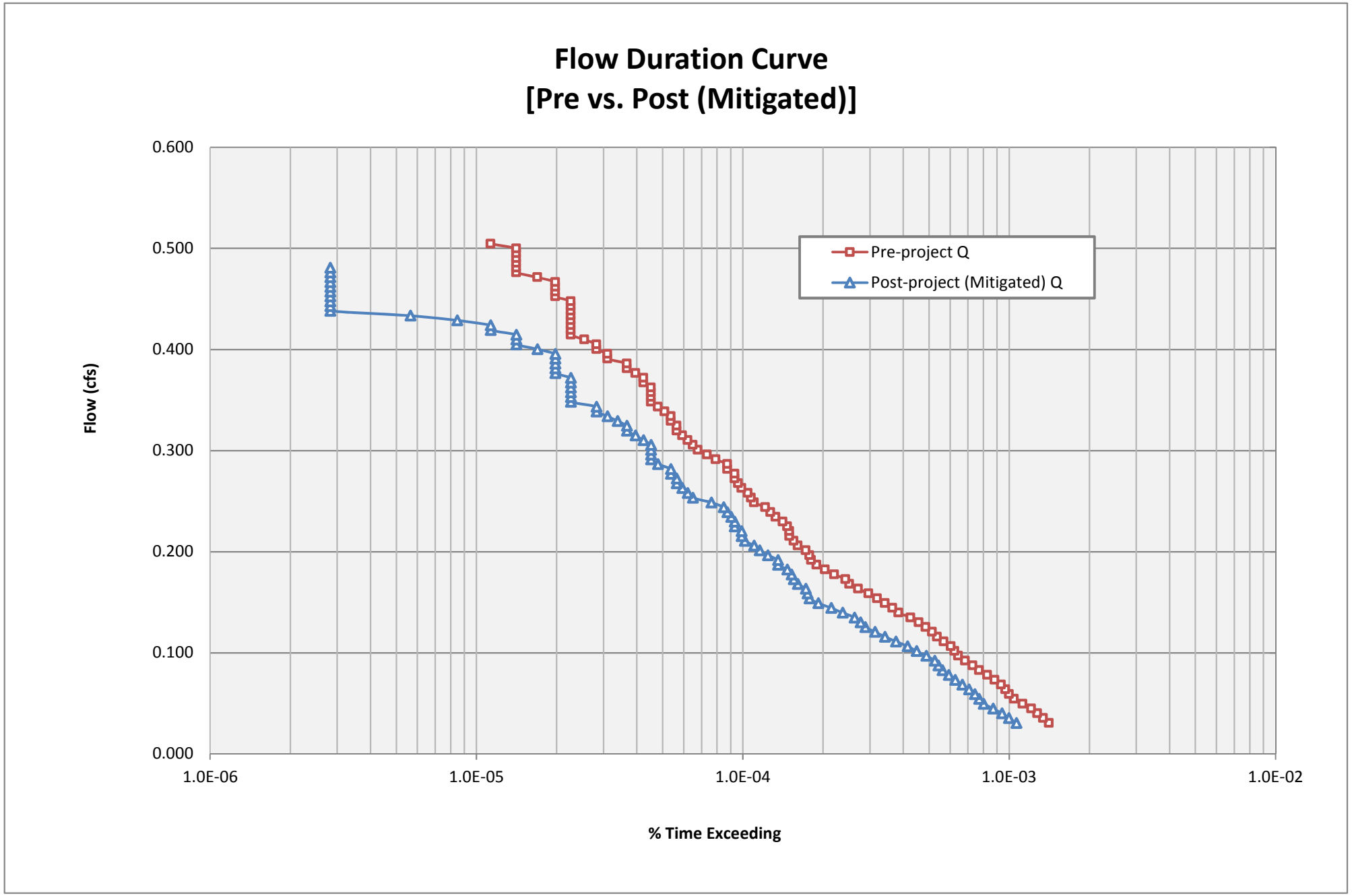
Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.031	cfs
Q10 (Pre):	0.505	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.00474	64
Total Hourly Data:	353925	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.031	499	1.41E-03	377	1.07E-03	76%	Pass
1	0.035	475	1.34E-03	353	9.97E-04	74%	Pass
2	0.040	452	1.28E-03	333	9.41E-04	74%	Pass
3	0.045	429	1.21E-03	308	8.70E-04	72%	Pass
4	0.050	398	1.12E-03	284	8.02E-04	71%	Pass
5	0.054	369	1.04E-03	273	7.71E-04	74%	Pass
6	0.059	354	1.00E-03	263	7.43E-04	74%	Pass
7	0.064	343	9.69E-04	250	7.06E-04	73%	Pass
8	0.069	330	9.32E-04	236	6.67E-04	72%	Pass
9	0.073	312	8.82E-04	222	6.27E-04	71%	Pass
10	0.078	293	8.28E-04	210	5.93E-04	72%	Pass
11	0.083	273	7.71E-04	199	5.62E-04	73%	Pass
12	0.088	258	7.29E-04	192	5.42E-04	74%	Pass
13	0.092	242	6.84E-04	186	5.26E-04	77%	Pass
14	0.097	228	6.44E-04	173	4.89E-04	76%	Pass
15	0.102	221	6.24E-04	159	4.49E-04	72%	Pass
16	0.106	214	6.05E-04	147	4.15E-04	69%	Pass
17	0.111	201	5.68E-04	133	3.76E-04	66%	Pass
18	0.116	190	5.37E-04	121	3.42E-04	64%	Pass
19	0.121	182	5.14E-04	111	3.14E-04	61%	Pass
20	0.125	172	4.86E-04	102	2.88E-04	59%	Pass
21	0.130	162	4.58E-04	98	2.77E-04	60%	Pass
22	0.135	151	4.27E-04	93	2.63E-04	62%	Pass
23	0.140	136	3.84E-04	84	2.37E-04	62%	Pass
24	0.144	129	3.64E-04	76	2.15E-04	59%	Pass
25	0.149	121	3.42E-04	68	1.92E-04	56%	Pass
26	0.154	113	3.19E-04	63	1.78E-04	56%	Pass
27	0.159	105	2.97E-04	62	1.75E-04	59%	Pass
28	0.163	96	2.71E-04	61	1.72E-04	64%	Pass
29	0.168	89	2.51E-04	57	1.61E-04	64%	Pass
30	0.173	86	2.43E-04	55	1.55E-04	64%	Pass
31	0.178	78	2.20E-04	54	1.53E-04	69%	Pass
32	0.182	72	2.03E-04	52	1.47E-04	72%	Pass
33	0.187	67	1.89E-04	48	1.36E-04	72%	Pass
34	0.192	64	1.81E-04	48	1.36E-04	75%	Pass
35	0.197	63	1.78E-04	44	1.24E-04	70%	Pass
36	0.201	61	1.72E-04	41	1.16E-04	67%	Pass
37	0.206	57	1.61E-04	39	1.10E-04	68%	Pass
38	0.211	55	1.55E-04	36	1.02E-04	65%	Pass
39	0.215	53	1.50E-04	35	9.89E-05	66%	Pass
40	0.220	53	1.50E-04	35	9.89E-05	66%	Pass
41	0.225	52	1.47E-04	33	9.32E-05	63%	Pass
42	0.230	50	1.41E-04	33	9.32E-05	66%	Pass
43	0.234	47	1.33E-04	32	9.04E-05	68%	Pass
44	0.239	45	1.27E-04	31	8.76E-05	69%	Pass
45	0.244	43	1.21E-04	30	8.48E-05	70%	Pass
46	0.249	39	1.10E-04	27	7.63E-05	69%	Pass
47	0.253	38	1.07E-04	23	6.50E-05	61%	Pass
48	0.258	37	1.05E-04	22	6.22E-05	59%	Pass
49	0.263	35	9.89E-05	21	5.93E-05	60%	Pass
50	0.268	34	9.61E-05	20	5.65E-05	59%	Pass
51	0.272	33	9.32E-05	20	5.65E-05	61%	Pass
52	0.277	33	9.32E-05	19	5.37E-05	58%	Pass
53	0.282	31	8.76E-05	19	5.37E-05	61%	Pass
54	0.287	31	8.76E-05	17	4.80E-05	55%	Pass
55	0.291	28	7.91E-05	16	4.52E-05	57%	Pass
56	0.296	26	7.35E-05	16	4.52E-05	62%	Pass
57	0.301	24	6.78E-05	16	4.52E-05	67%	Pass
58	0.305	23	6.50E-05	16	4.52E-05	70%	Pass
59	0.310	22	6.22E-05	15	4.24E-05	68%	Pass
60	0.315	21	5.93E-05	14	3.96E-05	67%	Pass
61	0.320	20	5.65E-05	13	3.67E-05	65%	Pass
62	0.324	20	5.65E-05	13	3.67E-05	65%	Pass
63	0.329	19	5.37E-05	12	3.39E-05	63%	Pass
64	0.334	19	5.37E-05	11	3.11E-05	58%	Pass
65	0.339	18	5.09E-05	10	2.83E-05	56%	Pass
66	0.343	17	4.80E-05	10	2.83E-05	59%	Pass
67	0.348	16	4.52E-05	8	2.26E-05	50%	Pass
68	0.353	16	4.52E-05	8	2.26E-05	50%	Pass
69	0.358	16	4.52E-05	8	2.26E-05	50%	Pass
70	0.362	16	4.52E-05	8	2.26E-05	50%	Pass
71	0.367	15	4.24E-05	8	2.26E-05	53%	Pass
72	0.372	15	4.24E-05	8	2.26E-05	53%	Pass
73	0.377	14	3.96E-05	7	1.98E-05	50%	Pass
74	0.381	13	3.67E-05	7	1.98E-05	54%	Pass
75	0.386	13	3.67E-05	7	1.98E-05	54%	Pass
76	0.391	11	3.11E-05	7	1.98E-05	64%	Pass
77	0.396	11	3.11E-05	7	1.98E-05	64%	Pass
78	0.400	10	2.83E-05	6	1.70E-05	60%	Pass
79	0.405	10	2.83E-05	5	1.41E-05	50%	Pass
80	0.410	9	2.54E-05	5	1.41E-05	56%	Pass
81	0.414	8	2.26E-05	5	1.41E-05	63%	Pass
82	0.419	8	2.26E-05	4	1.13E-05	50%	Pass
83	0.424	8	2.26E-05	4	1.13E-05	50%	Pass
84	0.429	8	2.26E-05	3	8.48E-06	38%	Pass
85	0.433	8	2.26E-05	2	5.65E-06	25%	Pass
86	0.438	8	2.26E-05	1	2.83E-06	13%	Pass
87	0.443	8	2.26E-05	1	2.83E-06	13%	Pass
88	0.448	8	2.26E-05	1	2.83E-06	13%	Pass
89	0.452	7	1.98E-05	1	2.83E-06	14%	Pass
90	0.457	7	1.98E-05	1	2.83E-06	14%	Pass
91	0.462	7	1.98E-05	1	2.83E-06	14%	Pass
92	0.467	7	1.98E-05	1	2.83E-06	14%	Pass
93	0.471	6	1.70E-05	1	2.83E-06	17%	Pass
94	0.476	5	1.41E-05	1	2.83E-06	20%	Pass
95	0.481	5	1.41E-05	1	2.83E-06	20%	Pass
96	0.486	5	1.41E-05	0	0.00E+00	0%	Pass
97	0.490	5	1.41E-05	0	0.00E+00	0%	Pass
98	0.495	5	1.41E-05	0	0.00E+00	0%	Pass
99	0.500	5	1.41E-05	0	0.00E+00	0%	Pass
100	0.505	4	1.13E-05	0	0.00E+00	0%	Pass

Peak Flow Frequency Curves




Flow Duration Curve
[Pre vs. Post (Mitigated)]
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

```
[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    NO

START_DATE           01/02/1968
START_TIME           00:00:00
REPORT_START_DATE    01/02/1968
REPORT_START_TIME    00:00:00
END_DATE             05/17/2008
END_TIME             21:00:00
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

INERTIAL_DAMPING     FULL
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          0.060  0.080  0.110  0.150  0.170  0.190  0.190  0.180  0.150  0.110  0.080  0.060
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
FashionValley    INTENSITY 1:00     1.0      TIMESERIES FashionValley

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
EX-1             FashionValley    EX-POC-1         0.43     0.0      150      25       0
EX-2             FashionValley    EX-POC-2         0.66     0.0      120      25       0
A-1              FashionValley    BIO-1            0.54     34       140      2.5      0
A-2              FashionValley    BIO-2            0.55     16       150      1.0      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
EX-1             0.012      0.04       0.05       0.10       25         OUTLET
EX-2             0.012      0.04       0.05       0.10       25         OUTLET
A-1              0.012      0.060      0.05       0.10       25         PERVIOUS   100
A-2              0.012      0.060      0.05       0.10       25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
EX-1             9.0        0.025      0.33
EX-2             9.0        0.025      0.33
A-1              9.0        0.025      0.33
A-2              9.0        0.025      0.33

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
ROOF             GR
ROOF             SURFACE    1.0        0.0        0.41       2.0        5
ROOF             SOIL       4.0        0.4        0.35       0.1        5.0        5.0        1.5
ROOF             DRAINMAT   1.0        0.5        0.30

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile
 DrainTo
;;-------------- --------------- ------- ---------- ---------- ---------- ---------- ----------
------------------------ ----------------

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
```

```
EX-POC-1         0          FREE                        NO
EX-POC-2         0          FREE                        NO
PROP-POC-1       0          FREE                        NO
PROP-POC-2       0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat
   IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------
-------- --------
BIO-1            0        6.0        0          TABULAR    BIO-1                        0        0
BIO-2            0        6.0        0          TABULAR    BIO-2                        0        0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
ORIFICE-1        BIO-1            PROP-POC-1       SIDE         0          0.65       NO       0
ORIFICE-2        BIO-2            PROP-POC-2       SIDE         0          0.65       NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon   EndCoeff
Surcharge  RoadWidth  RoadSurf
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- -------- ----------
---------- ---------- ----------
WEIR-1           BIO-1            PROP-POC-1       V-NOTCH      4.25       3.33       NO       0        0          YES

WEIR-2           BIO-2            PROP-POC-2       TRANSVERSE   4.0        3.33       NO       0        0          YES


[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
ORIFICE-1        CIRCULAR     0.05             0          0          0
ORIFICE-2        CIRCULAR     0.031            0          0          0
WEIR-1           TRIANGULAR   1.5              3.0        1          1
WEIR-2           RECT_OPEN    1                2.0        0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
BIO-1            Storage    0          200
BIO-1                       2.0        200
BIO-1                       2.01       100
BIO-1                       3.5        100
BIO-1                       3.51       500
BIO-1                       5.0        500
;
BIO-2            Storage    0          40
BIO-2                       2.0        40
BIO-2                       2.01       20
BIO-2                       3.5        20
BIO-2                       3.51       100
BIO-2                       5.0        100

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
FashionValley    1/2/1968   24:00      0.01
FashionValley    1/26/1968  23:00      0.02
FashionValley    1/27/1968  3:00       0.02
FashionValley    1/27/1968  7:00       0.03
FashionValley    1/27/1968  8:00       0.05
FashionValley    1/27/1968  9:00       0.01
FashionValley    1/27/1968  22:00      0.02
FashionValley    1/27/1968  23:00      0.06
FashionValley    1/27/1968  24:00      0.08
FashionValley    1/28/1968  1:00       0.04
FashionValley    1/31/1968  6:00       0.01
FashionValley    2/9/1968   18:00      0.01
FashionValley    2/10/1968  1:00       0.03
FashionValley    2/10/1968  2:00       0.01
FashionValley    2/13/1968  4:00       0.04
FashionValley    2/13/1968  7:00       0.01
FashionValley    2/13/1968  8:00       0.02
FashionValley    2/13/1968  9:00       0.04
FashionValley    2/13/1968  21:00      0.05
FashionValley    2/13/1968  23:00      0.01
FashionValley    3/7/1968   20:00      0.02
FashionValley    3/7/1968   21:00      0.03
FashionValley    3/7/1968   22:00      0.01
FashionValley    3/8/1968   5:00       0.01
FashionValley    3/8/1968   9:00       0.08
FashionValley    3/8/1968   10:00      0.43
FashionValley    3/8/1968   11:00      0.74
FashionValley    3/8/1968   12:00      0.05
FashionValley    3/8/1968   13:00      0.02
FashionValley    3/9/1968   4:00       0.01
FashionValley    3/9/1968   6:00       0.01
FashionValley    3/9/1968   9:00       0.01
FashionValley    3/13/1968  18:00      0.03
FashionValley    3/13/1968  19:00      0.02
FashionValley    3/16/1968  24:00      0.08
```

Project Name: Copley Avenue Homes

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

The Hydromodification Management Exhibit must identify:

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

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Project Name: Copley Avenue Homes

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☒ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	○ Included ◉ Not Applicable

Project Name: Copley Avenue Homes

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

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:

  ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

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

Attachment 3b: For private entity operation and maintenance, Attachment 3b 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).

Project Name: Copley Avenue Homes

THE CITY OF SAN DIEGO
RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

(THIS SPACE IS FOR THE RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

This agreement is made by and between the City of San Diego, a municipal corporation [City] and Click or tap here to enter text.

the owner or duly authorized representative of the owner [Property Owner] of property located at:
Click or tap here to enter text.

(PROPERTY ADDRESS)

and more particularly described as: Click or tap here to enter text.

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): Click or tap here to enter text.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): Click or tap here to enter text.

Continued on Page 2

Project Name: Copley Avenue Homes

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):Click or tap here to enter text..

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)Click or tap here to enter text..

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):Click or tap here to enter text.

(Owner Signature)

Click or tap here to enter text.

(Print Name and Title)

Click or tap here to enter text.

(Company/Organization Name)

Click or tap to enter a date.

(Date)

THE CITY OF SAN DIEGO

APPROVED:

(City Control engineer Signature

(Print Name)

(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDMENTS PER CIVIL CODE SEC. 1180 ET.SEQ

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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Project Name: Copley Avenue Homes

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

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by 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)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When propritery BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

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ATTACHMENT 5
DRAINAGE REPORT

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

PRELIMINARY

HYDROLOGY REPORT

FOR

COPLEY AVENUE RESIDENCES

2936 Copley Ave
San Diego, CA 92119

October 27th 2017

Prepared By:

OMEGA Engineering Consultants

4340 Viewridge Ave, Suite B
San Diego, CA 92123
Ph: (858) 634-8620

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 3-31-2017

TABLE OF CONTENTS

APPENDICES

SITE AND PROJECT DESCRIPTION

The project proposes to demolish and remove an existing single family residence and hardscape and construct four single family homes. The proposed construction will include a private storm drain system as well as a new inlet to capture offsite flows from Copley Ave and convey them through the site.

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 current County of San Diego regulations and procedures. All of the proposed conduits and conveyances have been designed to intercept and convey the 100-year storm. The Soil Conservation Service (SCS) Synthetic Unit Hydrograph method has been used to calculate peak flowrates for the 100-year storm. Autodesk Hydraflow Hydrographs, a hydrology program was used along with precipitation data from the NOAA Atlas 14 database.

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

Culvert Design and Analysis:
The storm drain culverts were sized using the K' values from King's Handbook Appendix 7-14, (Appendix 7.0 of this report). The following formula was used:

Q= (K'/n)*d^(8/3)*s^(0.5)
K'= Discharge Factor
d=Diameter of Conduit (ft)
n=Manning's Coefficient
Q=Runoff Discharge (cfs)
s=Pipe Slope (ft/ft)

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)
=(0.90*(% impervious)+Cp*(1-% Impervious)) page 5, County Hydrology Manual
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, County of San Diego Hydrology Manual minimum of 0.35
Tc= $\frac{1.8\,(1.1-C)*(Tc)^{0.5}}{S^{0.33}}$*
S= Slope of drainage course*

EXISTING CONDITIONS:

The existing site is the location of a single family residence. The ground cover consists of several trees, native brush and bare dirt. The westerly portion of the site drains to the north at slopes between 1% to 25% to a point referred to in this report as Discharge Point-1. The easterly portion of the site drains to the east at slopes between 1% to 25% to a point referred to in this report as Discharge Point-2. No existing private storm drain system exists on the site. A 12" public storm drain runs down the westerly boundary project, conveying runoff from an inlet on Copley Ave to a discharge point north of the project areas.

DEVELOPED CONDITIONS:

The proposed project will construct four, single family residences. The proposed improvements include an access drive aisle, guest parking and a private storm drain system to convey runoff to two biofiltration areas which will provide flow attenuation for Hydromodification Control as well as the 100-yr storm. The westerly portion of the site drains to the north at slopes between 1% to 3% to Discharge Point-1. The easterly portion of the site drains to the east at slopes between 1% to 3% to Discharge Point-2. Portions of natural slope contained in A-1.2 and A-2.2 drain at 60-70 percent to the discharge points.

EXISTING RUNOFF ANALYSIS:

The Modified Rational Method was used for calculating existing peak flow rates for the 100 year, 6 hour storm. Analysis of the existing conditions breaks the site into two separate drainage areas. See the attached calculations for details.

The Soil Hydrologic Groups Map from the San Diego Hydrology Manual reflects group C soil (soil map in Appendix 1.1). Per table 3-1 of the County Hydrology Manual, Runoff coefficients of 0.30 are to be used for undisturbed natural terrain. For basins with impervious area a weighted runoff coefficient was calculated using a value of 0.90 for impervious areas.

Basin #	Area (ac)	C	Slope	Q_{100} (cfs)
EX-1	0.43	0.44	21%	1.03
EX-2	0.66	0.37	24%	1.17

For the 100 year storm, Discharge Point-1 receives a discharge of 1.03 cfs for the 100 year storm and Discharge Point-2 receives a discharge of 1.17 cfs for the 100 year storm.

See the attached calculations for details.

DEVELOPED RUNOFF ANALYSIS:

The Modified Rational Method was used for calculating proposed peak flow rates for the 100-year, 6 hour storm. Analysis of the proposed conditions breaks the site into four drainage areas.

Basins A-1.1 and A-2.1 will feature biofiltration basins to treat stormwater before it is discharged from the site. Basin A-1 will also use its respective biofiltration basin to detain stormwater for the 100-year storm. The storage requirement for this biofiltration basin was determined by creating a hydrograph of the flows generated by Basin A-1.1 This was created using RatHydro, a program written by Rick Engineering which plots a hydrograph based off of input data that was generated via the Rational Method. The peak of the resulting hydrograph matches the Rational Method peak flow rate. This hydrograph was input into Autodesk Hydraflow Hydrographs, a hydrology and hydraulics simulation program and routed through a modeled ponding element with features matching that of the biofiltration basin. The resulting attenuated flow reduces the 100-yr peak discharge rate at Discharge Point 1 to less than the existing conditions.

The biofiltration are sized to store the treatment control volume (From the project SWAMP) and the 100-year flood control volume as determined in the hydrograph in this report.

Below is a summary of the basin input data:

Basin #	Area (ac)	C	Slope	Q100 (cfs)
A-1.1	0.34	0.65	1%	0.38*
A-1.2	0.20	0.35	60%	0.45
A-2.1	0.20	0.58	1%	0.45
A-2.2	0.35	0.35	67%	0.76

*Q_{100} from Basin A-1.1 is attenuated to 0.38 cfs from 0.90 cfs by storage and controlled release from a biofiltration basin. Pond routing calculations were done using Hydraflow Hydrographs. See attached calculations.

For the 100 year storm, Discharge Point-1 receives a confluenced discharge of 0.67cfs for the 100 year storm and Discharge Point-2 receives a discharge of 0.97 cfs for the 100 year storm.

See the attached calculations for details.

RESULTS AND CONCLUSIONS

The redevelopment of the site will result in a decrease in runoff flowrates at the two discharge points. The proposed work will result in a calculated decrease of 0.46 cfs at Discharge Point-1 and a decrease of 0.20 cfs at Discharge Point-2.

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 (SWQMP) has been prepared to discuss the water quality impacts for the proposed development.

San Ysidro Self Storage
HYDROLOGY AND HYDRAULICS CALCS (Table No. 1)

10/27/2017

BASIN	AREA (SF)	AREA (AC)	% Imp	"C" Value
EX-1	18,676	0.43	16%	0.44
EX-2	28,853	0.66	4%	0.37
EX. TOTAL	**47,529**	**1.09**		
A-1.1	14,878	0.34	55%	0.65
A-1.2	8,816	0.20	0%	0.35
A-2.1	8,805	0.20	43%	0.59
A-2.2	15,030	0.35	0%	0.35
PROP TOTAL	**47,529**	**1.09**		

Basin Confluence	Symbol
-	-
-	-

"CP#1" Confluence Point Number 1

(B) C value for bare ground is 0.35 (Table 3-1 County Hydrology Manual)
C value for impervious surfaces is 0.9
Basins with mixed surface type use a weighted average

of these 2 values. (impervious % x 0.9)+(pervious % x 0.35)

San Ysidro Self Storage 10/27/2017

HYDROLOGY AND HYDRAULICS CALCS (Table No. 2)

Sub-Basin	AREA Ac.	"C"	CA	L (ft) Travel	H (ft) (elev)	S(%) (avg.)	Tc min.	T tot mins	I in/hr	Q cfs	Q tot cfs	NOTES 85th % storm
EX-1	0.43	0.44	0.19	210	44.00	21	6.2	6.24	0.20	0.04	0.038	
								Discharge Pt. 1 Ex Q_{100}=			**0.038**	
EX-2	0.66	0.37	0.25	290	70.00	24	7.7	7.74	0.20	0.05	0.049	
								Discharge Pt. 2 Ex Q_{100}=			**0.049**	
A-1.1	0.34	0.65	0.22	130	1.00	1	10.0	10.02	0.20	0.04	0.045	
A-1.2	0.20	0.35	0.07	50	30.00	60	5.0	5.00	0.20	0.01	0.014	
								10.02	0.20		0.059	**Confluence Pt. 1**
								Discharge Pt. 1 prop Q_{100}=			**0.059**	
A-2.1	0.20	0.58	0.12	140	1.50	1	10.8	10.82	0.20	0.02	0.023	
A-2.2	0.35	0.35	0.12	75	50.00	67	5.0	5.00	0.20	0.02	0.024	
								10.82	0.20		0.048	**Confluence Pt. 1**
								Discharge Pt. 2 prop Q_{100}=			**0.048**	

San Ysidro Self Storage 10/27/2017

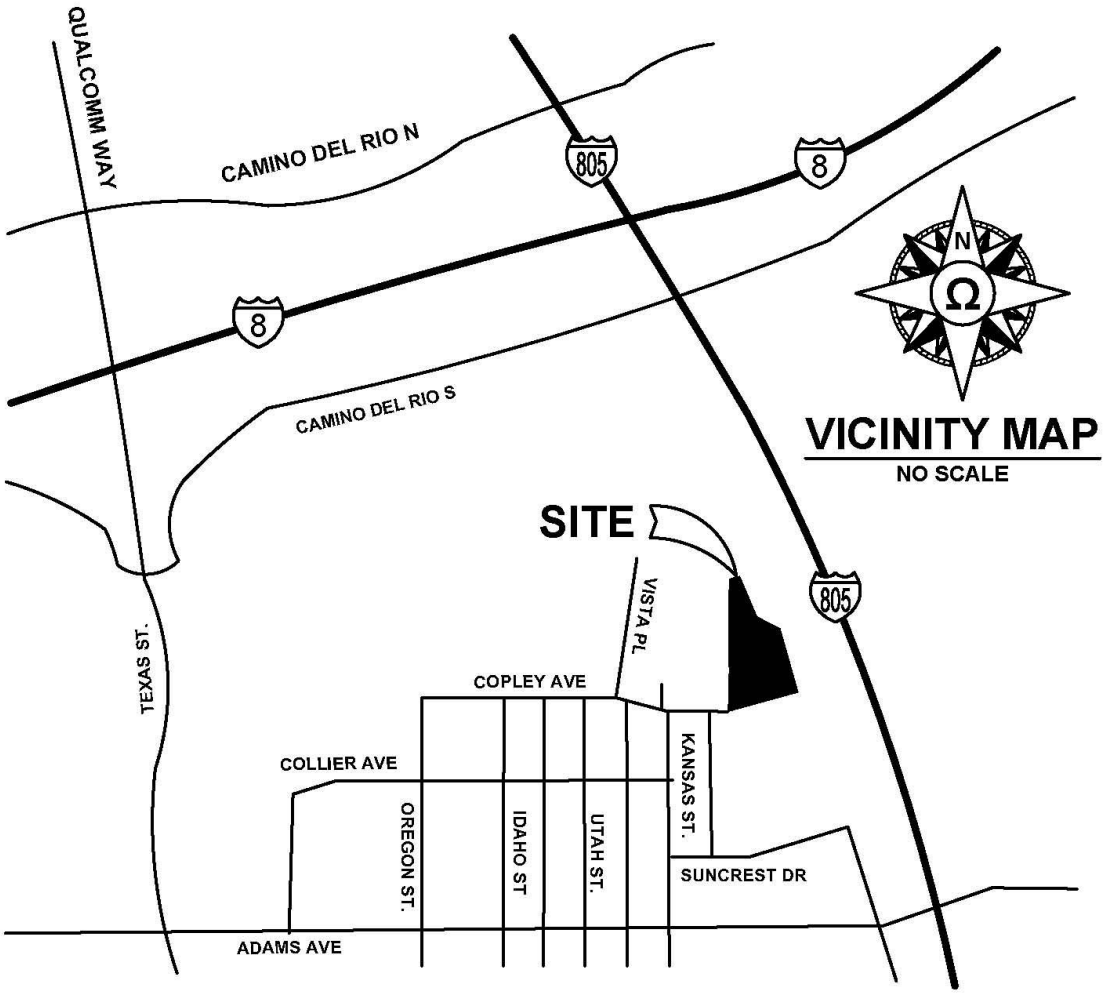
HYDROLOGY AND HYDRAULICS CALCS (Table No. 2)

Sub-Basin	AREA Ac.	"C"	CA	L (ft) Travel	H (ft) (elev)	S(%) (avg.)	Tc min.	T tot mins	I in/hr	Q cfs	Q tot cfs	NOTES 100-yr UNMITIGATED
												P(6)= 2.4
EX-1	0.43	0.44	0.19	210	44.00	21	6.2	6.24	5.48	1.03	1.03	
								Discharge Pt. 1 Ex Q_{100}=			**1.03**	
EX-2	0.66	0.37	0.25	290	70.00	24	7.7	7.74	4.77	1.17	1.17	
								Discharge Pt. 2 Ex Q_{100}=			**1.17**	
A-1.1	0.34	0.65	0.22	130	1.00	1	10.0	10.02	4.04	0.90	0.90	
A-1.2	0.20	0.35	0.07	50	30.00	60	5.0	5.00	6.32	0.45	0.45	
								10.02	6.32		1.19	**Confluence Pt. 1**
								Discharge Pt. 1 prop Q_{100}=			**1.19**	
A-2.1	0.20	0.58	0.12	140	1.50	1	10.8	10.82	3.84	0.45	0.45	
A-2.2	0.35	0.35	0.12	75	50.00	67	5.0	5.00	6.32	0.76	0.76	
								10.82	6.32		0.97	**Confluence Pt. 2**
								Discharge Pt. 2 prop Q_{100}=			**0.97**	

San Ysidro Self Storage 10/27/2017

HYDROLOGY AND HYDRAULICS CALCS (Table No. 2)

Sub-Basin	AREA Ac.	"C"	CA	L (ft) Travel	H (ft) (elev)	S(%) (avg.)	Tc min.	T tot mins	I in/hr	Q cfs	Q tot cfs	NOTES 100-yr MITIGATED
												P(6)= 2.4
EX-1	0.43	0.44	0.19	210	44.00	21	6.2	6.24	5.48	1.03	1.03	
								Discharge Pt. 1 Ex Q_{100}=			**1.03**	
EX-2	0.66	0.37	0.25	290	70.00	24	7.7	7.74	4.77	1.17	1.17	
								Discharge Pt. 2 Ex Q_{100}=			**1.17**	
A-1.1	0.34	0.65	0.22	130	1.00	1	10.0	10.02	4.04	0.90	**0.38**	**Flow from A-1 will be attenuated via storage in a biofiltration area**
A-1.2	0.20	0.35	0.07	50	30.00	60	5.0	5.00	6.32	0.45	0.45	
								10.02	6.32		0.67	**Confluence Pt. 1**
								Discharge Pt. 1 prop Q_{100}=			**0.67**	
A-2.1	0.20	0.58	0.12	140	1.50	1	10.8	10.82	3.84	0.45	0.45	
A-2.2	0.35	0.35	0.12	75	50.00	67	5.0	5.00	6.32	0.76	0.76	
								10.82	6.32		0.97	**Confluence Pt. 2**
								Discharge Pt. 2 prop Q_{100}=			**0.97**	


QUALCOMM WAY
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COLLIER AVE
KANSAS ST.
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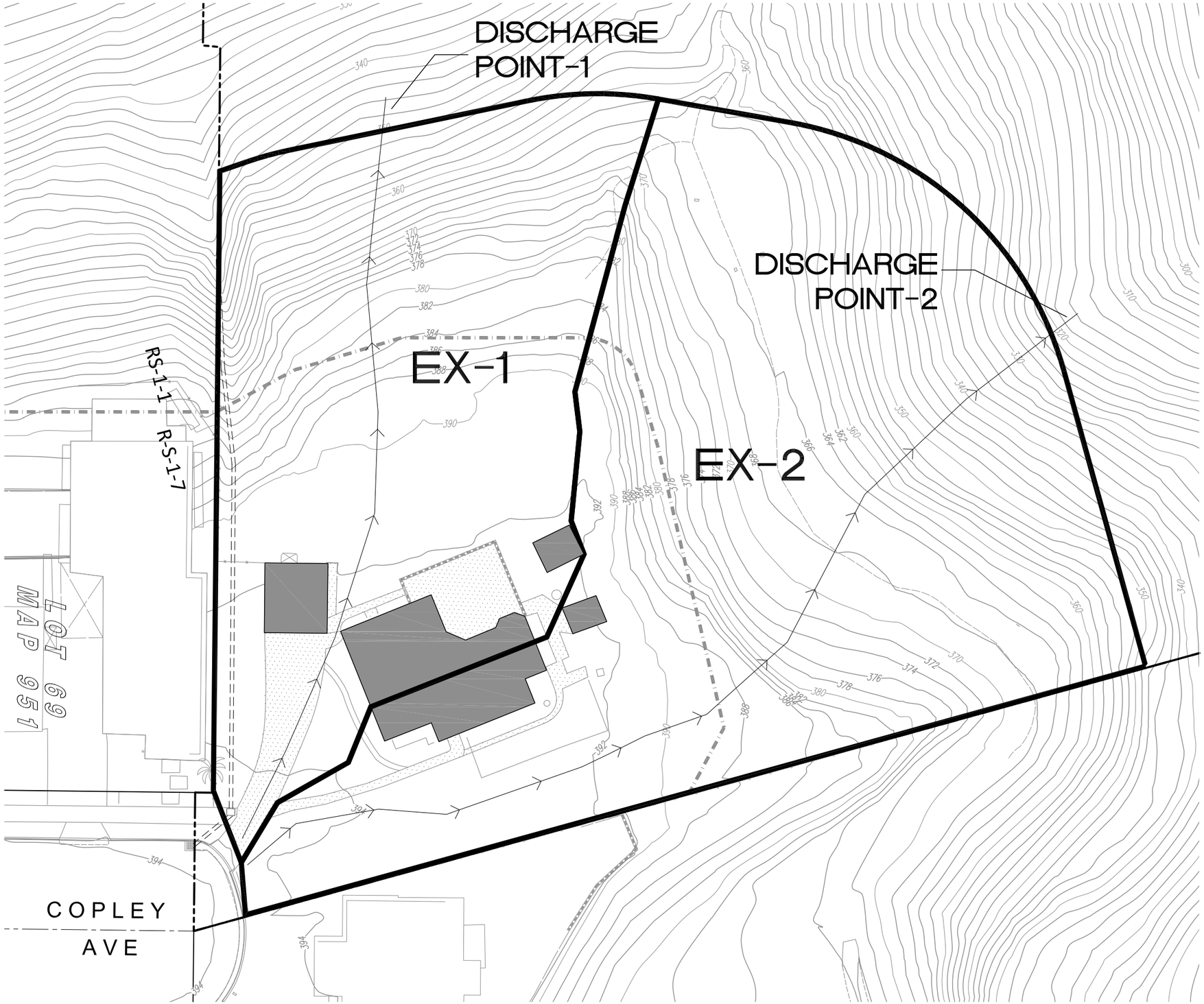
ADAMS AVE



LEGEND:

- AREA LIMITS
- DRAINAGE DIRECTION ARROW
- BASIN NUMBER — A-#
- BUILDING AREA
- PAVEMENT AREA

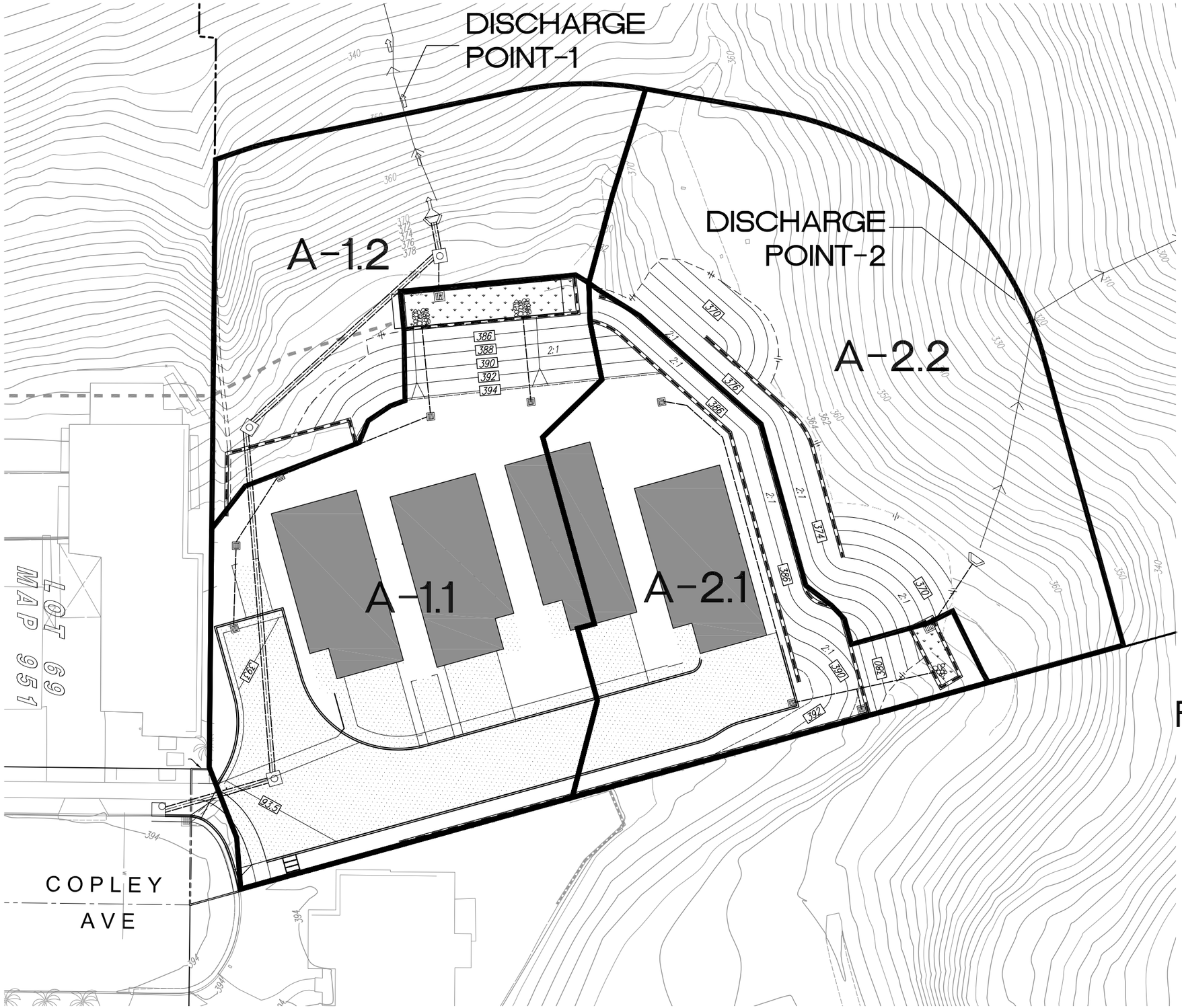
BASIN DATA				
BASIN	AREA	IMPERVIOUS	IMPERVIOUS %	Q_{100}(cfs)
EX-1	18,676 SF	2,903 SF	16%	1.03
EX-2	28,853 SF	1,116 SF	4%	1.17

SCALE: 1" = 30'

0 15 30 60

COPLEY AVE HOMES
EXISTING HYDROLOGY

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



LEGEND:

- *AREA LIMITS*
- *DRAINAGE DIRECTION ARROW*
- *BASIN NUMBER* — A-#
- *BUILDING AREA*
- *PAVEMENT AREA*

BASIN DATA

BASIN	*AREA*	*IMPERVIOUS*	*IMPERVIOUS %*	*Q_{100}(cfs)*
A-1.1	*14,878 SF*	*8,133 SF*	*55%*	*0.38*
A-1.2	*8,805 SF*	*0 SF*	*4.3%*	*0.45*
A-2.1	*8,816 SF*	*3,748 SF*	*0%*	*0.45*
A-2.2	*15,030 SF*	*0 SF*	*0%*	*0.76*

SCALE: 1" = 30'

0 15 30 60

COPLEY AVE HOMES
PROPOSED HYDROLOGY

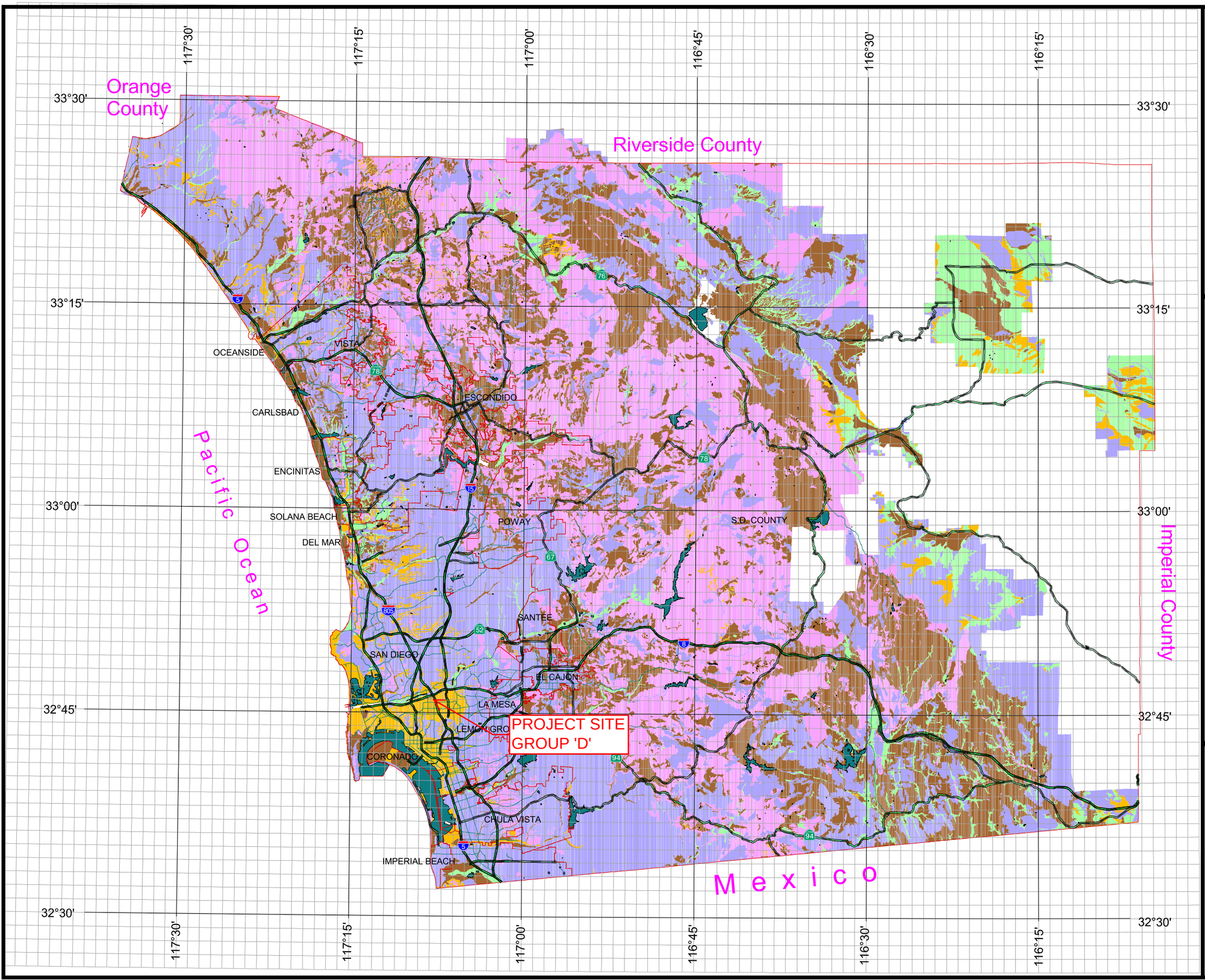
OMEGA ENGINEERING CONSULTANTS
4340 VIEWRIDGE AVENUE, SUITE B
SAN DIEGO, CALIFORNIA 92123
PH:(858) 634-8620 FAX:(858) 634-8627

Appendices

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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Appendix 2

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE

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

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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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

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

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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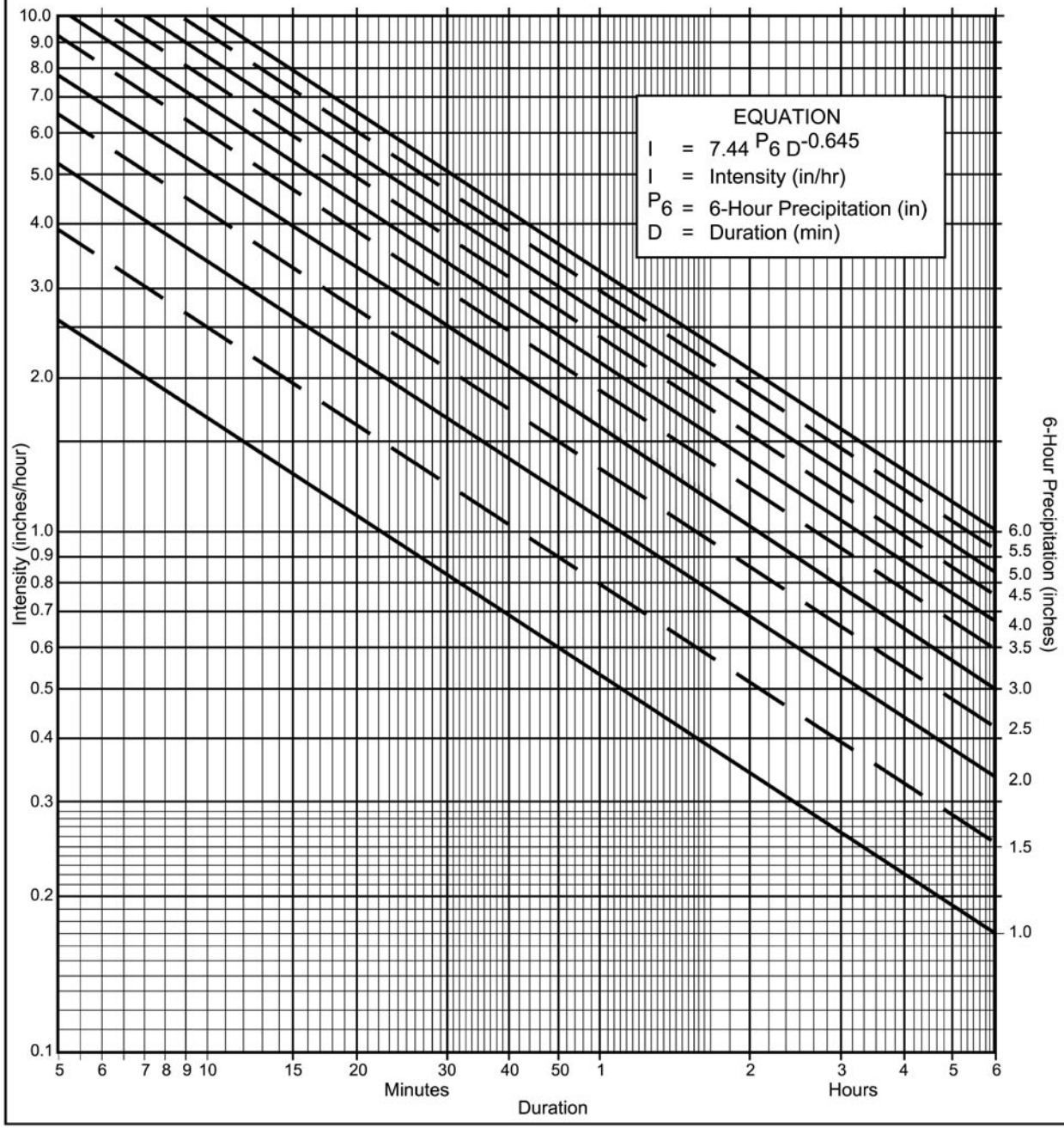


Directions for Application:

(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 _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

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

(d) t_x = _____ min.

(e) I = _____ in./hr.

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 4

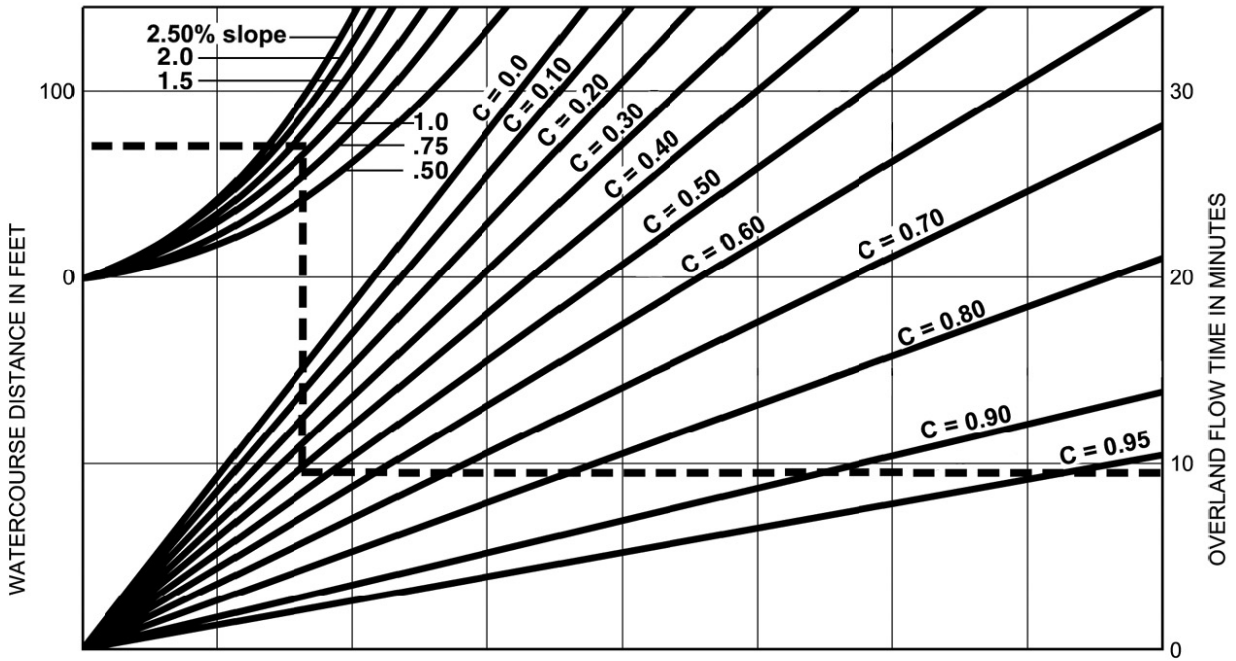
Appendix 5

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Appendix 6



EXAMPLE:

Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

Rational Formula - Overland Time of Flow Nomograph

FIGURE 3-3

Appendix 7

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

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

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

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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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ALDEN ENVIRONMENTAL, INC
3245 University Ave, #1188 | San Diego, CA 92104 | **Phone/Fax:** 619.284.3815

September 25, 2018

Mr. Jeffrey R. Lynn
Copley Avenue Ventures, LLC
2245 San Diego Ave., #125
San Diego, California 92110

Subject: 2936 Copley Avenue Property-Biological Letter Report-Project #488139

Dear Mr. Lynn:

This letter report describes the existing biological resources for the property located at 2936 Copley Avenue (APN 438-22-010) and evaluates the potential impacts to those resources that may occur as a result of project implementation. This report is intended to provide the City of San Diego (City) with information necessary to assess significant impacts to biological resources under the California Environmental Quality Act (CEQA). The approximately 4.2-acre site is located within the City of San Diego (Figures 1 and 2).

PROJECT DESCRIPTION

The 4.2 acre study area is located within the Greater North Park Community Plan and is multi-zoned located with the RS-1-7 and the RS-1-1 (major portion at the rear of the lot) zones. The project proposes a subdivision of the existing lot into 4 lots, demolishing the existing single dwelling unit, and constructing a single dwelling unit within the RS-1-7 portions of each subdivided lot. The lot frontage for the existing lot measures 22 ft. along the curb line. The steep hills within the RS-1-1 portions of each lot will be left as open space. The project includes alternative fuel modification compliance measures for the establishment of Brush Management Zones 1 and 2 (Figure 3). The specific alternative compliance measures are included in the project's construction plans and specifications.

METHODS

Vegetation Mapping

Prior to visiting the site, available maps, air photos, and existing conditions material for the site were reviewed. A California Native Diversity Database (CNDDB) search also was conducted to identify previously mapped resources on the site and in the vicinity. Alden biologist Greg Mason then conducted a site visit on June 5, 2015 to identify and map existing biological resources on site.

The entire project site was walked and observed plant and animal species were recorded. Plant species names followed the Jepson Manual (Baldwin 2012). Vegetation communities were mapped according to Holland's Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland 1986) as updated (Oberbauer 2008).

Jurisdictional Delineation

The site also was assessed for features that could be considered jurisdictional by the U.S. Army Corps of Engineers (Corps), California Department of Fish & Wildlife (CDFW), Regional Water Quality Control Board (RWQCB), and the City.

Rare Plant Survey

During the site visit the project area was searched for rare plant species with the potential to occur, based on the CNDDB results and site specific conditions.

Sensitive Animal Species

No focused sensitive animal species were conducted; however, sensitive animal species were searched for opportunistically during the field visit.

ENVIRONMENTAL SETTING

The parcel is in a partially developed condition with 1 residence and a landscaped yard area occurring on site. Elevations on the overall parcel range between approximately 220 and 400 feet above mean sea level. Soil on site is mapped as Urban Land and Terrace Escarpments.

The project site is located in a residential neighborhood within the City of San Diego Multiple Species Conservation Program (MSCP) Subarea Plan. The entire parcel is designated as a Development Area in the MSCP Subarea Plan and is not within or adjacent to the City's designated Multi-Habitat Planning Area (MHPA) preserve. There are no known occurrences of sensitive plant or animal species occurring on the site.

Regulatory Context

<u>City of San Diego Environmentally Sensitive Lands (ESL) Regulations</u>

Mitigation requirements for sensitive biological resources follow the requirements of the City's Biology Guidelines (2012) as outlined in the City's Municipal Code Environmentally Sensitive Lands (ESL) Regulations (Chapter 14, Article 3, Division 1). Impacts to biological resources within the City's Preserve, the Multi-habitat Planning Area (MHPA), must comply with the ESL Regulations, which also serve as standards for the determination of biological impacts and mitigation under CEQA in the City. ESL include sensitive biological resources, steep hillsides, coastal beaches, sensitive coastal bluffs and 100-year floodplains (San Diego Municipal Code [SDMC] 143.0110). If ESL resources are present then the project will require a SDP.

The project will comply with City ESL regulations, including placement of a covenant of easement over non-impacted ESL areas of the site.

City of San Diego Biology Guidelines

The City's Biology Guidelines (2012) have been formulated by the Development Services Department to aid in the implementation and interpretation of the ESL Regulations; San Diego Land Development Code, Chapter 14, Division 1, Section 143.0101 et seq; and the Open Space Residential (OR-1-2) Zone, Chapter 13, Division 2, Section 131.0201 et seq. Section III of the Biology Guidelines (Biological Impact Analysis and Mitigation Procedures) also serves as standards for the determination of impact and mitigation under CEQA.

The project will comply with applicable City Biology Guidelines requirements.

Federal Government

Administered by the USFWS, the federal Endangered Species Act (ESA) provides the legal framework for the listing and protection of species (and their habitats) that are identified as being endangered or threatened with extinction. Actions that jeopardize endangered or threatened species and the habitats upon which they rely are considered take under the ESA. Section 9(a) of the ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" and "harass" are further defined in federal regulations and case law to include actions that adversely impair or disrupt a listed species' behavioral patterns.

All migratory bird species that are native to the U.S. or its territories are protected under the federal Migratory Bird Treaty Act (MBTA), as amended under the Migratory Bird Treaty Reform Act of 2004 (FR Doc. 05-5127). The MBTA is intended to protect migratory birds but it does not mandate specific protections. Typically, protection of migratory birds through the MBTA is provided through restrictions on disturbance of active bird nests during the nesting season. In addition, the USFWS commonly places restrictions on disturbances allowed near active raptor nests.

Federal wetland regulation (non-marine issues) is guided by the Rivers and Harbors Act of 1899 and the Clean Water Act. The Rivers and Harbors Act deals primarily with discharges into navigable waters, while the purpose of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of all Waters of the U.S. Permitting for projects filling Waters of the U.S. (including wetlands) is overseen by the Corps under Section 404 of the Clean Water Act. Projects could be permitted on an individual basis or be covered under one of several approved nationwide permits. Individual permits are assessed independently based on the type of action, amount of fill, etc. Individual permits typically require substantial time (often longer than 6 months) to review and approve, while nationwide permits are pre-approved if a project meets appropriate conditions. A Section 404 Permit would be required for the proposed project if impacts occur to Corps jurisdictional areas.

The project will comply with applicable federal requirements.

State of California

Primary environmental legislation in California is found in CEQA and its implementing guidelines (State CEQA Guidelines), which require that projects with potential adverse effects (or impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

The California ESA is similar to the federal ESA in that it contains a process for listing of species and regulating potential impacts to listed species. Section 2081 of the California ESA authorizes CDFW to enter into a memorandum of agreement for take of listed species for scientific, educational, or management purposes.

The California Fish and Game Code (Sections 1600 through 1603) requires a CDFW agreement for projects affecting riparian and wetland habitats through issuance of a Streambed Alteration Agreement. A 1602 Streambed Alteration Agreement would be required for the proposed project if impacts occur to CDFW jurisdictional areas. In addition, any project that requires a Section 404 Permit also would require a Water Quality Certification by the California Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. CEQA and its implementing guidelines (CEQA Guidelines) require discretionary projects with potentially significant effects (or impacts) on the environment to be submitted for environmental review. Mitigation for significant impacts to the environment is determined through the environmental review process in accordance with existing laws and regulations.

The project will comply with applicable state requirements.

Vegetation Communities

Three vegetation communities were mapped within the study area: Diegan coastal sage scrub, southern mixed chaparral, and disturbed/developed. (Table 1; Figure 3).

Table 1
EXISTING VEGETATION COMMUNITIES[1,2]

Vegetation Communities	Total
Diegan coastal sage scrub (Tier II)	**2.1**
Southern Mixed Chaparral (Tier IIIB)	**1.4**
Disturbed/Developed (Tier IV)	**0.7**
TOTAL	**4.2**

[1] Upland habitats are rounded to the nearest 0.1 acre
[2] All habitats are outside of the MHPA

Diegan Coastal Sage Scrub

Diegan Coastal sage scrub (Tier II) on site contains a diverse suite of plant species including California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), lemonade berry (*Rhus integrifolia*), and laurel sumac (*Malosma laurina*). Diegan coastal sage scrub is a Tier II (uncommon upland) community (City 2012). Approximately 2.1 acres of this habitat occurs on site (Table 1; Figure 3).

Southern Mixed Chaparral

Southern mixed chaparral (Tier IIIB) is composed of broad-leaved shrubs that grow to about 6 to 10 feet tall and form dense, often nearly impenetrable, stands. This community occurs on dry, rocky, often steep, north-facing slopes with little soil. Plant species observed within this community in the Project study area include Ramona lilac (*Ceanothus tomentosus* ssp. *olivaceus*), black sage (*Salvia mellifera*), and chamise (*Adenostoma fasciculatum*). Approximately 1.4 acres of this habitat occurs on site (Table 1; Figure 3).

Disturbed/Developed

Disturbed/developed (Tier IV) area includes the existing house and associated pavement, driveway, and ornamental landscaping. Disturbed/developed is a Tier IV (other) community and is not considered sensitive by the City of San Diego. Approximately 0.7 acre of this habitat occurs on site (Table 1; Figure 3).

Sensitive Plant Species

No sensitive plant species were observed on the site. The CNDDB database search did not identify any sensitive species that clearly occur on site. This, combined with the developed/disturbed nature of the project footprint, sensitive plant species are not anticipated to occur within the project impact limits.

Sensitive Animal Species

While focused sensitive animal species surveys were not conducted in the study area, none were observed during the site visit, and no sensitive species are known to occur in the area. While not observed, the coastal California gnatcatcher (*Polioptila californica californica*) may occur within the Diegan coastal sage scrub habitat on site. This species is an MSCP covered species and, if present, would not be considered a significant biological impact given that the site is not within or adjacent to the MHPA.

Two sensitive bird species, Bell's sage sparrow (*Amphispiza belli belli*) and Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) have been identified as having moderate potential to occur within the non-impacted portion of the site. While there is a moderate potential for these species to occur within the avoideded portion of the site, the potential for them to occur within the impact footprint is low. As such, no impacts to these two species would occur.

Nesting Birds

The federal Migratory Bird Treaty Act (MBTA), which restricts the killing, taking, collecting, selling, or purchasing of native bird species or their parts, nests, or eggs, also provides legal protection for almost all breeding bird species occurring in the United States. The site supports numerous tree species with the potential to support nesting birds protected by the MBTA.

Jurisdictional Features

The drainage in the northern portion of the study area may be considered jurisdictional by the U.S. Army Corps of Engineers (Corps), California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB). The drainage is ephemeral and does not support wetland vegetation; therefore, it likely would not be considered jurisdictional by the City. The drainage is more than 250 feet north of the proposed project limits and therefore would not be affected by the project.

PROJECT IMPACTS

This section analyzes the Project's effects on the sensitive biological resources. The City's CEQA Significance Determination Thresholds (City 2012) are used to establish whether or not there is a significant effect. A significant effect is defined as a "substantial or potentially substantial adverse change in the environment." Appendix G of the CEQA Guidelines further indicate that there may be a significant effect on biological resources if a project will:

A. Substantially affect an endangered, rare, or threatened species of animal or plant or the habitat of the species;
B. Interfere substantially with the movement of any resident or migratory fish or wildlife species; or
C. Substantially diminish habitat for fish, wildlife, or plants.

Impacts to biological resources are evaluated by City staff through the CEQA review process, the Environmentally Sensitive Lands Regulations and Biology Guidelines, and through the review of a project's consistency with the City's MSCP Subarea Plan.

For projects within the City or carried out by the City which may affect sensitive biological resources, potential impacts to such sensitive biological resources must be evaluated using the following significance criteria:

1. Would the project result in substantial adverse impacts, either directly or through habitat modifications, to any species identified as a candidate, sensitive or special status species in the MSCP or other local or regional plans, policies or regulations, of by the CDFW or USFWS?

2. Would the project result in a substantial adverse impacts on any Tier I, Tier II, Tier IIIA or Tier IIIB habitats as identified in the Biology Guidelines of the Land Development Code or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS?

3. Would the project result in a substantial adverse impact on wetlands (including, but not limited to, marsh, vernal pools, riparian areas, etc.) through direct removal, filling, hydrological interruption, or other means?

4. Would the project substantially interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, including linkages identified in the MSCP Plan, or impede the use of native wildlife nursery sites?

5. Would the project conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Conservation Community Plan (NCCP) or other approved local, regional or state habitat conservation plan, either within the MSCP plan area or in the surrounding region?

6. Would the project introduce a land use within an area adjacent to the Multiple Habitat Planning Area (MHPA) that would result in adverse edge effects?

7. Would the project conflict with any local policies or ordinances protecting biological resources?

8. Would the project introduce invasive species of plants in to natural open space?

<u>Vegetation Communities</u>

The project would impact approximately 0.611 acre of Developed/Disturbed area, and 0.061 acre of coastal sage scrub (Table 2; Figure 3). The impact would occur entirely on site; there are no off site impacts. Per the City's CEQA Significance Determination Thresholds, combined impacts of less than 0.1 acre of sensitive upland habitat (Tiers I-III) are not considered significant and do not require mitigation. As such, project impacts to coastal sage scrub habitat are not considered significant.

Table 2 **VEGETATION COMMUNITY IMPACTS[1,2]**			
Vegetation Communities	**Project Footprint**	**BMZ I[3]**	**Total**
Diegan coastal sage scrub (Tier II)	**0.057 (2,493 sqft)**	**0.004 (211 sqft)**	**0.061**
Southern Mixed Chaparral (Tier IIIB)	**-**	**-**	**-**
Disturbed/Developed (Tier IV)	**0.611 (26,634 sqft)**	**0.003 (160 sqft)**	**0.614**
TOTAL	**0.668**	**0.007**	**0.675**

[1] All habitats are outside of the MHPA.
[2] BMZ II is impact neutral and therefore acreages are not included in this table.
[3] BMZ I impacts that are not within the project footprint limits.

Sensitive Plant Species

No sensitive plant species were observed on site and none are anticipated; therefore, impacts to sensitive plant species would not occur upon implementation of the proposed project.

Sensitive Animal Species

No sensitive animal species were observed within the proposed project footprint. The coastal California gnatcatcher could occur within the coastal sage scrub habitat on site; however, given that this is a covered species and the project is not within the MHPA, impacts would not be considered significant.

Jurisdictional Features

The project would not impact any area that would be considered jurisdictional by the Corps, CDFW, RWQCB, or the City; therefore, no permits or City wetland deviation findings are required.

Wildlife Corridors

The site is located in an urban neighborhood of the City, west of Interstate 805. The proposed project would not impact any local or regional wildlife corridors; therefore, no permanent or temporary direct impacts to wildlife corridors are anticipated. The MHPA is east of Interstate 805; therefore, the site is not adjacent to the MHPA and the MHPA adjacency guidelines do not apply to this project.

Nesting Birds

The project would result in the removal of vegetation (ornamental trees) with a moderate potential to support nesting migratory birds. Impacts to such species are prohibited under the MBTA and would be considered significant. The project is required to comply with the MBTA nesting season restrictions and therefore would not result in impacts to nesting birds.

MITIGATION MEASURES

Vegetation Communities

The following mitigation measures have been formulated to satisfy the requirements of the City's MSCP (City 1997a) and Biology Guidelines (City 2012). The mitigation ratios used in this report follow the City's ESL categorized five-tier system for impacts to sensitive upland vegetation/habitat communities within the MSCP (City 1997a):

- **Tier I**: Southern foredunes, Torrey pines forest, coastal bluff scrub, maritime succulent scrub, maritime chaparral, scrub oak chaparral, native grasslands and oak woodlands (mitigation ratios range from 1:1 to 2:1)
- **Tier II**: Coastal sage scrub and coastal sage scrub/chaparral ecotone (1:1 to 1.5:1)
- **Tier IIIA**: Mixed chaparral and chamise chaparral (0.5:1 to 1:1)
- **Tier IIIB**: Non-native grasslands (0.5:1 to 1:1)
- **Tier IV**: Disturbed, agricultural, and eucalyptus (0:1)

The project would have a combined, total impact to ESL Tier I-III lands of less than 0.1 acre. This impact is below the significance threshold in the Biology Guidelines and therefore no mitigation is required for sensitive vegetation community impacts.

Nesting Birds

Compliance with the MBTA, State Fish and Game Code, and City guidelines regarding nesting birds would preclude impacts to nesting birds. As such, no mitigation is required.

CONCLUSION

The project would impact less than 0.1 acre (0.061 acre) of sensitive upland habitat (ESL Tier I-III). This impact is less than significant; therefore, no mitigation is required. No sensitive plant or animal species occur on site based on the site visits, historical mapping, the developed condition of the site, and the surrounding land uses. Additionally, the project would not affect any potential jurisdictional (wetland) features so no wetland permits or City deviation findings are required. As noted above, the project also will comply with applicable local, state, and federal requirements. As part of the project's compliance with the ESL, an approximately 3.5 acre covenant of easement will be placed over non-impacted areas supporting ESL features (Figure 3).

Finally, given the small size of the site, minimal sensitive biological resources, urban situation, and lack of connectivity with the MHPA, the project would have no cumulative biological impacts.

Please contact me if you have any questions regarding this letter report.

Sincerely,

Greg Mason
Senior Biologist

Enclosures:
Figure 1 – Regional Location
Figure 2 – Project Locations
Figure 3 – Biological Resources/Impacts
Attachment A – Species Observed
Attachment B – Representative Photographs
Attachment C – MSCP Narrow Endemics with Potential to Occur
Attachment D – Sensitive Plant Species with Potential to Occur
Attachment E – Sensitive Animal Species with Potential to Occur

References:

Baldwin, B. G., et al. 2012. The Jepson Manual: Vascular Plants of California, Second Edition. University of California Press, Berkeley.

Bowman, R. 1973. Soil Survey of the San Diego Area. USDA in cooperation with the USDI, UC Agricultural Experiment Station, Bureau of Indian Affairs, Department of the Navy, and the U.S. Marine Corps.

City of San Diego. 2012. Land Development Code Biology Guidelines. Adopted September 1999. Last amended April 23, 2012 by Resolution No. R-307376. http://www.sandiego.gov/development-services/pdf/industry/landdevmanual/ldmbio.pdf Accessed June 11, 2014.

1997a. City of San Diego MSCP Implementing Agreement Documents.

1997b. Multiple Species Conservation Program. City of San Diego MSCP Subarea Plan. March.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California, The Resources Agency. 156 pp.

Oberbauer, T. 2008. Terrestrial vegetation communities in San Diego County based on Holland's Descriptions. San Diego Association of Governments, San Diego, California. 6 pp.

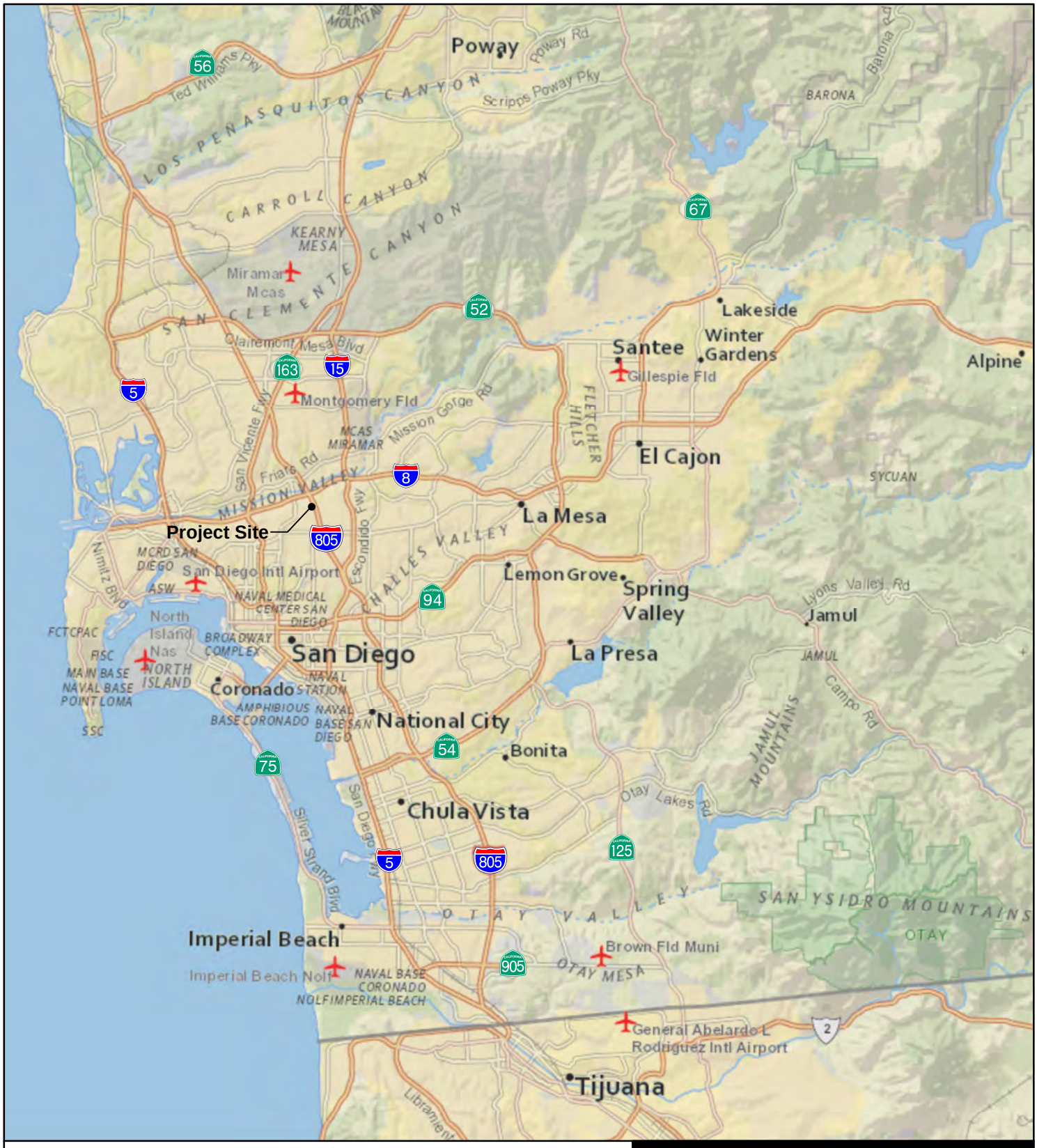

Figure 1

Regional Location

COPLEY AVENUE

N
W E
S

0 2 4 Miles

ALDEN ENVIRONMENTAL, INC

N
W E
S

0 1,000 2,000
Feet

ALDEN
ENVIRONMENTAL, INC

Figure 2

Project Location

COPLEY AVENUE

Project Boundary
Existing Easements
Project Impacts
Brush Management Zone 1
Brush Management Zone 2
Covenant of Easement
Retaining Walls
Storm Drains
Outfall/Energy Dissipators (Rip-rap)

Biological Resources

Diegan Coastal Sage Scrub
Southern Mixed Chaparral
Developed/Disturbed
Potential Waters of the U.S./Streambed

Easements

1. Easement granted to City of San Diego for main water pipes recorded August 12, 1914 in book 662, page 104 of deeds.

2. Easement granted to the state of California for highway slopes recorded January 24, 1968 as file/page no. 13090 of official records.

3. Access rights relinquished on January 24, 1968 as file/page no. 13090 of official records.

4. Easement granted to SDG&E for public utilities recorded April 4th, 1968 as file/page no. 55791 of official records.

5. Easement granted to SDG&E for public utilities recorded October 14, 2014 as doc # 2014-0103044 of official records.

805

Lot 1
Lot 2
Lot 3
Lot 4

Lot 1
Lot 2
Lot 3
Lot 4

Copley Avenue

N
W
E
S

0 30 60 Feet

ALDEN ENVIRONMENTAL, INC

Figure 3

Biological Resources

COPLEY AVENUE

Attachment A

Species Observed

PLANT SPECIES OBSERVED

FAMILY	SCIENTIFIC NAME	COMMON NAME
Amaranthaceae	*Salsola tragus**	Russian thistle
Anacardiaceae	*Malosma laurina*	laurel sumac
Asteraceae	*Artemisia californica*	California sage
	Baccharis sarothroides	broom baccharis
	*Centaurea melitensis**	star thistle
	*Chrysanthemum coronarium**	garland chrysanthemum
	Deinandra fasciculata	fascicled tarplant
	Encelia californica	California encelia
	Erigeron sp.	fleabane
	*Gazania linearis**	treasure flower
	*Hedypnois cretica**	Crete hedypnois
	Heterotheca grandiflora	telegraph weed
	*Lactuca serriola**	wild lettuce
	Lasthenia californica	goldfields
	Logfia arizonica	Arizona filago
	Pseudognaphalium californicum	California everlasting
	Psilocarphus tenellus	slender wooly-heads
	*Sonchus asper**	prickly sow-thistle
	*Sonchus oleraceus**	common sow-thistle
Brassicaceae	*Brassica nigra*	black mustard
	Brassica sp.*	mustard
	*Hirschfeldia incana**	perennial mustard
Cactaceae	*Opuntia littoralis*	coastal prickly pear
Ericaceae	*Xylococcus bicolor*	mission manzanita
Euphorbiaceae	*Croton setigerus*	doveweed
Fabaceae	*Acmispon glaber*	deerweed
	Lupinus succulentus	arroyo lupine
	*Medicago polymorpha**	bur-clover
Geraniaceae	*Erodium cicutarium**	red-stem filaree
	*Erodium moschatum**	green-stem filaree
Iridaceae	*Sisyrinchium bellum*	blue-eyed grass
Lamiaceae	*Marrubium vulgare**	horehound
	Salvia apiana	white sage
	Salvia mellifera	black sage
Malvaceae	*Malva parviflora**	cheeseweed
Oxalidaceae	*Oxalis californica*	California wood-sorrel

FAMILY	SCIENTIFIC NAME	COMMON NAME
Pinaceae	*Pinus* sp.*	ornamental pine tree
Polemoniaceae	*Navarretia hamata* ssp. *leptantha*	skunkweed
Poaceae	*Avena barbata**	slender wild oat
	*Avena fatua**	wild oat
	*Brachypodium distachyon**	purple falsebrome
	*Bromus diandrus**	common ripgut grass
	*Bromus hordeaceus**	soft chess
	Bromus madritensis ssp. *rubens**	foxtail chess
	*Cynodon dactylon**	Bermuda grass
	*Gastridium ventricosum**	
	*Hordeum murinum**	barley
	*Pennisetum setaceum**	African fountain grass
Polygonaceae	*Eriogonum fasciculatum* ssp. *fasciculatum*	California buckwheat
Primulaceae	*Anagallis arvensis**	scarlet pimpernel
Rhamnaceae	*Ceanothus tomentosus* ssp. *olivaceus*	Ramona lilac
Rosaceae	*Adenostoma fasciculatum*	chamise
	Heteromeles arbutifolia	toyon
Scrophulariaceae	*Mimulus aurantiacus*	monkey-flower
Solanaceae	*Nicotiana glauca**	tree tobacco

*Non-native species

ANIMAL SPECIES OBSERVED

SCIENTIFIC NAME	COMMON NAME
Reptiles	
Phrynosomatidae – Earless, Spiny, Tree, Side-blotched, and Horned Lizards	
Sceloporus occidentalis	western fence lizard
Birds	
Columbidae – Doves and Pigeons	
Zenaida macroura	mourning dove
Corvidae – Jays, Magpies, and Crows	
Corvus brachyrhynchos	American crow
Emberizidae – Sparrows, Longspurs, and Emberiza Buntings	
Passer domesticus	house sparrow
Fringillidae – Finches	
Carpodacus mexicanus	house finch
Trochilidae – Hummingbirds	
Calypte costae	Costa's hummingbird
Mammals	
Geomyidae – Gophers	
Thomomys bottae	Botta's pocket gopher (burrows)
Leporidae – Rabbits and Hares	
Sylvilagus auduboni	desert cottontail (scat)

Attachment B

Representative Photographs

Representative Photographs

Southward view of existing house and yard.

Northward view from eastern project limit.

Westward view along northern project limit.

Southward view from western project limit.

Southward view from northwest corner of project.

Westward view from western project limit.

Attachment C

MSCP Narrow Endemic Species with Potential to Occur

MSCP NARROW ENDEMIC SPECIES WITH POTENTIAL TO OCCUR				
SPECIES	**LISTING OR SENSITIVITY**	**HABITAT(S)/ DISTRIBUTION**	**BLOOM PERIOD**	**POTENTIAL TO OCCUR**
San Diego thornmint (*Acanthomintha ilicifolia*)	FT/SE CNPS Rare Plant Rank 1B.1	Occurs on clay lenses in grassy openings in chaparral or sage scrub. Prefers friable or broken, clay soils.	April to June	Very Low. Soils in study area not suitable.
Shaw's agave (*Agave shawii*)	CNPS Rare Plant Rank 2B.1	Coastal sage scrub and coastal bluff scrub.	September to May	Low. Some habitat present in canyon.
San Diego ambrosia (*Ambrosia pumila*)	FE/-- CNPS Rare Plant Rank 1B.1	Found in wetland/riparian associated areas.	June to September	Very Low. Suitable habitat not present.
Aphanisma (*Aphanisma blitoides*)	CNPS Rare Plant Rank 1B.2	Occurs in sandy areas along the coast.	April to May	Very low. No known populations in MSCP Plan Area (City 1997b).
Coastal dunes milk vetch (*Astragal tener* var. *titi*)	FE/SE CNPS Rare Plant Rank 1B.1	Occurs in sandy places along the coast, including coastal dunes.	March to May	Very low. Occurs on coastal dunes, and range does not include the Project area.
Encinitas baccharis (*Baccharis vanessae*)	FT/SE CNPS List 1B.1	Occurs in chaparral associated with nutrient poor soils such as southern maritime chaparral in Encinitas.	April to June	None. No suitable habitat on site. Also, site is outside the known range of the species.
Snake cholla (*Cylindropuntia californica*)	CNPS Rare Plant Rank 1B.1	Open patches in coastal sage scrub, primarily in southern portion of the County and in Florida Canyon.	April to June	Low. Would have been observed if present within project limits.
Otay tarplant (*Deinandra conjugens*)	FT/SE CNPS Rare Plant Rank 1B.1	Occurs in disturbed areas and patches of coastal sage scrub in the Otay Mesa area.	June to August	Very low. Occurs in Otay Mesa, not known from project vicinity.
Short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia*)	--/SE CNPS Rare Plant Rank 1B.1	Occurs on Torrey sandstone soils in chaparral and coastal scrub.	April	Very low. Suitable soils and habitat not present.

MSCP NARROW ENDEMIC SPECIES WITH POTENTIAL TO OCCUR (cont.)				
SPECIES	**LISTING OR SENSITIVITY**	**HABITAT(S)/ DISTRIBUTION**	**BLOOM PERIOD**	**POTENTIAL TO OCCUR**
Variegated dudleya (*Dudleya variegata*)	CNPS Rare Plant Rank 1B.2	Occurs on dry hillside and mesas in chaparral, coastal sage scrub, grasslands and near vernal pools. Ranges from San Diego County south to Baja California, Mexico.	May to June	Very low. Suitable habitat not present. Not known from project vicinity.
Spreading navarretia (*Navarretia fossalis*)	FT/-- CNPS Rare Plant Rank 1B.1	Occurs in chenopod scrub, marshes and swamps (assorted freshwater habitats), playas, and vernal pools.	April to June	None. No suitable habitat (vernal pools) present.
California Ocutt's grass (*Orcuttia californica*)	FT/SE CNPS Rare Plant Rank 1B.1	Occurs within and adjacent to vernal pools.	April to June	None. No suitable habitat (vernal pools) present.
San Diego button-celery (*Eryngium aristulatum* var. *parishii*)	FE/SE CNPS List 1B.1	Occurs within and adjacent to vernal pools.	April to June	None. No suitable habitat (vernal pools) present.
San Diego mesa mint (*Pogogyne abramsii*)	FE/SE CNPS Rare Plant Rank 1B.1	Occurs within and adjacent to vernal pools on the mesas north of Otay Mesa.	March to July	None. No suitable habitat (vernal pools) present.
Otay Mesa mint (*Pogogyne nudiuscula*)	FE/CE CNPS Rare Plant Rank 1B.1	Occurs within and adjacent to vernal pools on Otay Mesa.	March to July	None. No suitable habitat present. Occurs on Otay Mesa, not known from project vicinity.

EXPLANATION OF LISTING OR STATUS CODES
FOR PLANT AND ANIMAL SPECIES

U.S. Fish and Wildlife Service (USFWS)

FE Federally Listed Endangered

FT Federally Listed Threatened

FC Candidate for Federal Endangered Species Act Protection

BCC Bird of Conservation Concern—Represents USFWS' highest conservation priorities and draw attention to species in need of conservation action.

California Department of Fish and Wildlife (CDFW)

SE State Listed Endangered

SSC State Species of Special Concern - Declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.

WL Watch List - Birds that are/were: a) not on the current list of species of special concern but were on previous lists and have not been State listed under the California Endangered Species Act; b) previously State or federally listed and now are on neither list; or c) on the list of "Fully Protected" species.

FP Fully Protected refers to all vertebrate and invertebrate taxa of concern to the California Natural Diversity Data Base regardless of legal or protection status. These species may not be taken or possessed without a permit from the Fish and Game Commission and/or CDFW.

City of San Diego

MSCP Covered Species - Covered Species are those species included in the Incidental Take Authorization issued to the City by the USFWS and CDFW as part of the City's MSCP Subarea Plan.

MSCP Narrow Endemic Species - A species that is confined to a specific geographic region, soil type, and/or habitat. Narrow Endemic species are a subset of Covered Species.

EXPLANATION OF LISTING OR STATUS CODES FOR PLANT AND ANIMAL SPECIES

California Native Plant Society (CNPS)

California Rare Plant Rank

1A Presumed extirpated in California and either rare or extinct elsewhere.
1B Rare, threatened, or endangered in California and elsewhere.

2A Presumed extirpated in California but more common elsewhere.
2B Rare, threatened, or endangered in California but more common elsewhere.
3 More information is needed.
4 A watch list for species of limited distribution.

Threat Rank

.1 Seriously endangered in California (over 80 percent of occurrences threatened/high degree and immediacy of threat)

.2 Moderately endangered in California (20 to 80 percent occurrences threatened/moderate degree and immediacy of threat)

.3 Not very threatened in California (less than 20 percent of occurrences threatened/ low degree and immediacy of threat or no current threats known)

Attachment D

Sensitive Plant Species with Potential to Occur

SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR				
SPECIES	**SENSITIVITY**	**HABITAT(S)/ DISTRIBUTION**	**BLOOM PERIOD**	**POTENTIAL TO OCCUR**
California adolphia (*Adolphia californica*)	CNPS Rare Plant Rank 2B.1	Chaparral, valley grassland, coastal sage scrub in Los Angeles and San Diego counties.	December to May	Low. Some suitable habitat but species not known from vicinity.
San Diego goldenstar (*Bloomeria clevelandii*)	CNPS Rare Plant Rank 1B.1	Clay soils in chaparral, coastal scrub, vernal pools, valley and foothill grassland.	April to May	Very low. Suitable habitat and soils not present.
Palmer's goldenbush (*Ericameria palmeri* ssp. *palmeri*)	CNPS Rare Plant Rank 1B.1	Associated with coastal sage scrub and chaparral habitats.	September to November	Very low. Suitable habitat not present.
San Diego barrel cactus (*Ferocactus viridescens*)	CNPS Rare Plant Rank 2B.1	Associated with coastal sage scrub and chaparral.	May to June	Moderate. Likely would have been observed if present.
Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)	CNPS Rare Plant Rank 1B.2	Associated with coastal sage scrub and chaparral habitats.	January to July	Low. Some habitat present.
Golden-rayed pentachaeta (*Pentachaeta aurea* ssp. *aurea*)	CNPS Rare Plant Rank 4.2	Mesic montane grasslands and sage scrub.	March to July	Very low. Suitable habitat not present.
Purple stemodia (*Stemodia durantifolia*)	CNPS Rare Plant Rank 2B.1	Associated with coastal sage scrub, chaparral, and desert habitats with sandy soils.	January to December	Very low. Suitable habitat not present.
Oil neststraw (*Stylocline citroleum*)	CNPS Rare Plant Rank 1B.1	Associated with coastal sage scrub and chaparral habitats.	March to April	Low. Some habitat present.

Attachment E

Sensitive Animal Species with Potential to Occur

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR			
SPECIES	**LISTING OR SENSITIVITY**	**HABITAT(S)/ DISTRIBUTION**	**POTENTIAL TO OCCUR**
INVERTEBRATES			
San Diego fairy shrimp (*Branchinecta sandiegonensis*)	--/FE	Found in shallow vernal pools and ephemeral wetlands in southern coastal California and northern Baja California, Mexico.	Very low. No suitable ephemeral water holding basins occur on site.
Quino checkerspot butterfly (*Euphydryas editha quino*)	--/FE	Primary larval host plants in San Diego are dwarf plantain (*Plantago erecta*) at lower elevations. Owl's clover (*Castilleja exserta*) may serve as host plant if primary host plants have senesced. Potential habitat includes areas of low-growing and sparse vegetation. Exists only as several, probably isolated, colonies in southwestern Riverside County, southern San Diego County, and northern Baja California, Mexico.	Very low. Host plant not observed on site. Site is outside the recommended survey area for the species (USFWS 2014).
Hermes copper butterfly (*Lycaena hermes*)	--/FC	Southern mixed chaparral and coastal sage scrub with mature specimens of its larval host plant, spiny redberry (*Rhamnus crocea*). Range is San Diego County, south of Fallbrook, to northern Baja California, Mexico.	Very low. Spiny redberry is not present on site.
Salt marsh skipper (*Panoquina errans*)	--/--	Coastal salt and brackish marshes, occasionally nearby fields and wood edges.	Very low. Associated with coastal lagoons and salt marshes. No suitable habitat present on site.
Riverside fairy shrimp (*Streptocephalus woottoni*)	--/FE	Found in moderate to deep (generally ranging from 10 inches to 5-10 feet in depth), longer-lived vernal pools and ephemeral wetlands in southern coastal California and northern Baja California, Mexico.	Very low. No suitable ephemeral water holding basins occur on site.

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR (cont.)			
SPECIES	**LISTING OR SENSITIVITY**[1]	**HABITAT(S)/ DISTRIBUTION**	**POTENTIAL TO OCCUR**
VERTEBRATES			
Amphibians and Reptiles			
Silvery legless lizard (*Anniella pulchra pulchra*)	--/SSC	Areas with loose, sandy soil. Generally found in leaf litter, under rocks, logs, or driftwood in oak woodland, chaparral, and desert scrub. Occurs from the Bay Area south through the Coast and Peninsular Ranges to northern Baja California, Mexico.	Low to moderate. Prefers loose, sandy soil including cobbly and gravelly loams and terrace escarpments.
Arroyo toad (*Bufo californicus*)	--/SSC	Found in washes, streams, and arroyos in semiarid areas. Prefer shallow pools and open, sandy stream terraces or sand bars with cottonwoods, willows, or sycamores. Breeds in shallow pools along stream edges with sand/gravel flats between March and June. Adults use sage scrub, mixed chaparral, oak woodland habitats up to within one mile of breeding sites.	Very low. Found in washes, streams, and arroyos in semiarid areas. Prefer shallow pools and open, sandy stream terraces or sand bars with cottonwoods, willows, or sycamores. No suitable habitat present.
Southwestern pond turtle (*Clemmys marmorata pallida*)	--/SSC	Found in both permanent and intermittent waters, including marshes, streams, rivers, ponds, and lakes throughout northern Baja, California and Oregon.	Very low. Inhabits slow-moving permanent or intermittent streams, small ponds, small lakes, reservoirs and sewage treatment lagoons. No suitable habitat present.
Coastal rosy boa (*Charina trivirgata*)	--/SSC	Dry, desert habitats throughout the southwestern U.S. and northwestern Mexico.	Low. Generally occurs in coastal sage scrub, particularly where rock outcrops are common.
Northern red-diamond rattlesnake (*Crotalus ruber*)	--/SSC	Found in chaparral, coastal sage scrub, and along creek banks, particularly among rock outcrops or piles of debris supporting rodents.	Low to moderate. Prefers rocky outcroppings within coastal sage scrub or chaparral habitats.

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR (cont.)			
SPECIES	**LISTING OR SENSITIVITY**[1]	**HABITAT(S)/ DISTRIBUTION**	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)			
Amphibians and Reptiles			
Red-diamond rattlesnake (*Crotalus rubber ruber*)	--/SSC	Found in chaparral, coastal sage scrub, and along creek banks, particularly among rock outcrops or piles of debris supporting rodents. Ranges from extreme southeastern Los Angeles County (Diamond Bar) into southern San Bernardino County, and south into southern Baja California, Mexico.	Low to moderate. Occurs in coastal sage scrub and chaparral with abundant rocky outcrops.
Coast horned lizard (*Phrynosoma coronatum*)	--/--	Scrubland, grassland, coniferous woods, and broadleaf woodlands, typically in area with sandy soil, scattered shrubs, and ant colonies.	Low in coastal sage scrub.
Coronado skink (*Plestiodon skiltonianus interparietalis*)	--/SSC	Grasslands, coastal sage scrub, open chaparral, pine oak woodland and coniferous forests. Prefers areas where there is abundant leaf litter or low, herbaceous growth. Inland southern California south through the north Pacific coast region of northern Baja California Norte, Mexico.	Low to moderate within coastal sage scrub on site.
Western spadefoot toad *(Spea hammondii)*	--/SSC	Floodplains, washes, and low hills. Southern California habitats include coastal sage scrub, chaparral and grassland. Important habitat components include temporary pools (which form during winter and spring rains) for breeding and friable soils for burrowing.	Very low. No suitable habitat present.
Two-striped garter snake (*Thamnophis hammondii*)	--/SSC	Permanent fresh water, inhabiting streams, ponds, vernal pools. Occupies adjacent coastal sage scrub and grasslands during the winter.	Very low. Habitat is along permanent and intermittent streams bounded by dense riparian vegetation; also found in vernal pools and stock ponds. No suitable habitat present.

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR (cont.)			
SPECIES	**LISTING OR SENSITIVITY**[1]	**HABITAT(S)/ DISTRIBUTION**	**POTENTIAL TO OCCUR**
Birds			
Bell's sage sparrow (*Amphispiza belli belli*)	BCC WL	Chaparral and sage scrub with modest leaf litter. Patchy distribution throughout San Diego County, which often shifts to include partially recovered burned areas.	Low in the project footprint. Moderate in chaparral within the adjacent avoided area, outside of the project footprint. Likely would have been observed if present.
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	WL MSCP Covered Species	Coastal sage scrub and open chaparral as well as shrubby grasslands. Occur throughout coastal lowlands and foothills of San Diego County	Low in the project footprint. Moderate to high in adjacent, avoided area outside of the project limits. Known from vicinity.
Loggerhead shrike (*Lanius ludovicianus*)	BCC SSC	Grassland, open sage scrub, chaparral, and desert scrub. Uncommon year-round resident observed in lower elevations of San Diego County.	Low. Likely would have been observed if present.
Burrowing owl (*Athene cunicularia*)	BCC SSC MSCP Covered Species	Declining species occurring in grassland or open scrub habitats. In 2003, there were an estimated 25 to 30 resident pairs of in San Diego County located primarily in the southern quarter of the county and on North Island (Lincer and Bloom 2007).	Very low. Suitable habitat not present.
Northern harrier (*Circus cyaneus*)	SSC MSCP Covered Species	Coastal, salt, and freshwater marshlands; grasslands; and prairies. Widespread throughout the temperate regions of North America. Winters and migrates throughout California from below sea level to an elevation of 9,800 feet AMSL. Known breeding areas in San Diego County include Torrey Pines, the Tijuana River Valley, and Camp Pendleton.	Low. Habitat generally unsuitable.

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR (cont.)			
SPECIES	**LISTING OR SENSITIVITY**[1]	**HABITAT(S)/ DISTRIBUTION**	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)			
Birds (cont.)			
White-tailed kite (*Elanus leucurus*)	State Fully Protected	Riparian woodlands and oak or sycamore groves adjacent to grassland. Nests in the crowns of trees, especially coast live oak (*Quercus agrifolia*).	Low. Habitat generally unsuitable.
Amphibians and Reptiles			
California horned lark (*Eremophila alpestris actia*)	WL	Sandy beaches, agricultural fields, grasslands and open areas on coastal slopes.	High. Known from vicinity.
Coastal California gnatcatcher (*Polioptila californica californica*)	ST FT MSCP Covered Species	Coastal sage scrub habitat.	Low. Some suitable habitat, but surrounded by chaparral habitat.

GEOTECHNICAL INVESTIGATION

2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

JEFF LYNN
SAN DIEGO, CALIFORNIA

APRIL 22, 2016
REVISED JANUARY 6, 2017
PROJECT NO. G1854-32-01

Project No. G1854-32-01
April 22, 2016
Revised January 6, 2017

Mr. Jeff Lynn
2245 San Diego Avenue, Suite 125
San Diego, California 92110

Subject: GEOTECHNICAL INVESTIGATION
2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

Dear Mr. Lynn:

In accordance with your request we have performed a geotechnical investigation on the subject site located in the University Heights area of San Diego, California. Our original report was submitted on April 22, 2016. A revised development plan and review comments from the City of San Diego, LDR-Geology department required this update.

The accompanying report presents the results of our study and our conclusions and recommendations regarding the geotechnical aspects of development the property as proposed. The results of our study indicate that the site can be developed as planned, provided the recommendations of this report are followed.

Should you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Troy K. Reist
CEG 2408

Trevor E. Myers
RCE 63773

David B. Evans
CEG 1860

TKR:TEM:DBE:ejc

(3) Addressee

TABLE OF CONTENTS

TABLE OF CONTENTS (Concluded)

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical study for the 2936 Copley Avenue property located in San Diego, California (see *Vicinity Map*, Figure 1). The purpose of the study was to investigate the soil and geologic conditions at the site, as well as evaluate geotechnical constraints, if any, that may impact areas of proposed development. This report provides recommendations relative to the geotechnical engineering aspects of the revised development plans based on the conditions encountered during this study.

The scope of our study consisted of the following:

- Reviewing aerial photographs, satellite imagery and readily available published and unpublished geologic literature.
- Reviewing the digital plans prepared by Omega Engineering, Consultants, Inc.
- Excavating eight exploratory trenches using a track-mounted backhoe to evaluate the underlying geologic conditions (see Appendix A for trench logs).
- Performing laboratory tests on selected soil samples collected to evaluate their physical properties (see Appendix B).
- Providing storm water BMP design information (see Appendix C).
- Preparing this report presenting our exploratory information and our conclusions and recommendations regarding the geotechnical aspects of developing the site as presently proposed.

The approximate locations of the exploratory trench excavations are shown on the *Geologic Map*, Figure 2. *Geologic Cross-Sections* A-A′ through C-C′ (Figure 3) represent our interpretation of the geologic conditions across the site.

2. SITE AND PROJECT DESCRIPTION

The approximately 4.1-acre site is located at 2936 Copley Avenue in San Diego, California. The majority of the property is undeveloped with the exception of a single story residence and a detached 2-car garage located in the southwestern portion of the site. Utilities servicing the residence include sewer, water, and gas services, overhead power, telephone, and cable lines. An existing 12-inch storm drain is located along the western boundary of the site that flows to the north.

Topographically, the site is characterized as relatively flat to gently sloping within the buildable southwestern portion of the site and moderately to steeply sloping within the remaining undeveloped areas of the property. Drainage flows generally to the north and northeast. The elevations within the proposed grading limits vary from 395 feet Mean Sea Level (MSL) located in the southwestern portion of the property to approximately 365 feet MSL within the east and northeast portion of the site. Vegetation consists of a few scattered trees, bushes and shrubs around the residence with native vegetation present along the moderate to steeper slopes of the property.

We understand that the property will be subdivided to create 4 detached single-family residences. Based on review of the preliminary grading plan, maximum cuts and fills are expected to be approximately 1 foot and 30 feet, respectively. A 2:1 (horizontal:vertical) fill slope with a maximum height of 30 feet is proposed along the eastern portion of project. In addition, 2 to 6-foot-high retaining walls are proposed along the northern, northeast and eastern portions of the site. It is anticipated that the grading will require import fill material to achieve the desired finish configuration.

3. SOIL AND GEOLOGIC CONDITIONS

Two surficial soil types and three geologic formations were encountered during our research and field investigation. The surficial deposits consist of undocumented fill and topsoil and the formational geologic units consist of the Quaternary-age Very Old Paralic Deposits, Eocene-age San Diego Formation and Mission Valley Formation. Each is discussed below in order of increasing age.

Review of the *Geologic Map of the San Diego 30'x60' Quadrangle [Kennedy and Tan, 2005]*, indicates the site is underlain by sedimentary deposits consisting of Very Old Paralic Deposits, San Diego Formation, and Mission Valley Formation. These geologic units can exhibit massive bedding with some smaller one- to three-foot-thick cobble conglomerate beds with subhorizontal bedding.

3.1 Undocumented Fill (Qudf)

Undocumented fill soils were encountered in several trenches (Trench Nos. T-2, T-5, T-6, and T-7) performed along the transition of the flat portion of the site and moderate descending slopes. The undocumented fill varied in thickness from 1½ to 6 feet and consists primarily of loose, clayey to silty sands with varying amounts of gravel, cobble and boulder size rock fragments up to 14 inches in length. Abundant construction debris (concrete chunks, brick, tile, metal pipe pieces) was observed in Trench No. T-5 and minor caving was noted in Trench No. T-6 within a nested cobble/boulder lens.

This deposit appears to have been placed with little to no compactive effort and will require removal and compaction in areas planned to receive structural fill and/or settlement-sensitive improvements.

3.2 Topsoil (Unmapped)

Topsoil was encountered in four of the exploratory trenches (Trench Nos. T-1, T-2, T-7, and T-8) and varied in thickness from 1½ to 4 feet. In general, the topsoil is characterized as stiff, moist to very moist, dark brown to dark gray, silty, highly plastic clay with varying amounts of gravel and cobble size rock fragments up to 6 inches in length. Our observations and laboratory testing indicate that the topsoil resembles the highly expansive "Normal Heights mudstone" deposit that is mapped adjacent to the site.

Due to the "very high" expansion potential (EI greater than 130) of this deposit, additional remedial grading and placement measures beyond the typical removal and compaction requirements will be required in areas planned to receive structural fill and/or settlement-sensitive structures.

3.3 Very Old Paralic Deposits ($Qvop_8$)

Quaternary-age Very Old Paralic Deposits were encountered beneath the surficial deposits in the majority of the exploratory excavations across the site. This geologic unit is characterized predominately as dense, reddish brown to yellowish brown, clayey to silty, fine to coarse sand with varying percentages of gravel, cobble, and boulder size rock fragments up to 20-inches in length (clast size averaged between 6 to 10-inches). The presence of a high cobble content and some boulders (greater than 12 inches) can create difficult excavation characteristics as noted in Trench Nos. T-1 and T-5.

3.4 San Diego Formation (Tsdcg)

The Eocene-age conglomerate facies of the San Diego Formation was encountered within Trench Nos. T-3 and T-4 along the northeastern portion of the site. It is possible this unit could be part of the Pomerado Formation and/or Stadium Conglomerate based on the similar characteristics between these formations. However, for purposes of this report we have identified this unit as the San Diego Formation based on our review of the published geologic maps.

Where encountered, this formation is characterized as dense, orange-brown, fine to coarse, sandy conglomerate with gravel, cobble and boulder size rock fragments. Clast size averages between 6 to 10 inches, with a maximum length of 16 inches. It is anticipated that exposure of this unit will be limited to the northeastern portion of the site.

3.5 Mission Valley Formation (Tmv)

The Eocene-age Mission Valley Formation underlies the San Diego Formation and this formation was not encountered during our investigation since it crops out approximately 30 feet below the

development area. In our experience, the Mission Valley Formation generally consists of massive sandstone and siltstone, which generally exhibits high shear strength, adequate bearing capacity, and low compressibility characteristics in a natural condition.

4. GROUNDWATER

Groundwater was not encountered during the field investigation and is not anticipated to significantly impact project development as presently proposed. However, it is not uncommon for groundwater or seepage conditions to develop where none previously existed.

5. GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

Based on our reconnaissance and a review of published geologic maps and reports, the site is not located on any known "active," "potentially active" or "inactive" fault traces as defined by the California Geological Survey (CGS).

The Rose Canyon Fault zone and the Newport-Inglewood Fault, located approximately 3.4 miles west of the site, are the closest known active faults. The CGS considers a fault seismically active when evidence suggests seismic activity within roughly the last 11,000 years. The CGS has included portions of the Rose Canyon Fault zone within an Alquist-Priolo Earthquake Fault Zone.

According to the computer program *EZ-FRISK* (Version 7.65), 6 known active faults are located within a search radius of 50 miles from the property. The nearest known active faults are the Newport-Inglewood and Rose Canyon Faults, located approximately 3.4 miles west of the site and are the dominant sources of potential ground motion. Earthquakes that might occur on the Newport-Inglewood or Rose Canyon Fault Zones or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Newport Inglewood Fault are 7.5 and 0.46g, respectively. Table 5.1.1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We calculated peak ground acceleration (PGA) using Boore-Atkinson (2008) NGA USGS 2008, Campbell-Bozorgnia (2008) NGA USGS 2008, and Chiou-Youngs (2007) NGA USGS 2008 acceleration-attenuation relationships.

TABLE 5.1.1
DETERMINISTIC SPECTRA SITE PARAMETERS

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Peak Ground Acceleration		
			Boore-Atkinson 2008 (g)	Campbell-Bozorgnia 2008 (g)	Chiou-Youngs 2008 (g)
Newport-Inglewood	3	7.5	0.36	0.37	0.46
Rose Canyon	3	6.9	0.32	0.36	0.40
Coronado Bank	16	7.4	0.18	0.14	0.17
Palos Verdes Connected	16	7.7	0.20	0.15	0.20
Elsinore	38	7.85	0.12	0.08	0.10
Earthquake Valley	43	6.8	0.06	0.05	0.04

We used the computer program *EZ-FRISK* to perform a probabilistic seismic hazard analysis. The computer program *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mappable Quaternary fault is proportional to the faults slip rate. The program accounts for fault rupture length as a function of earthquake magnitude, and site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore-Atkinson (2008) NGA USGS, Campbell-Bozorgnia (2008) NGA USGS, and Chiou-Youngs (2008) in the analysis. Table 5.1.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 5.1.2
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson, 2007 (g)	Campbell-Bozorgnia, 2008 (g)	Chiou-Youngs, 2008 (g)
2% in a 50 Year Period	0.44	0.47	0.53
5% in a 50 Year Period	0.30	0.31	0.34
10% in a 50 Year Period	0.21	0.21	0.22

While listing peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site. Seismic design of the structures should be evaluated in accordance with the California Building Code (CBC) guidelines currently adopted by the City of San Diego.

The site could be subjected to moderate to severe ground shaking in the event of a major earthquake on any of the referenced faults or other faults in Southern California. With respect to seismic shaking, the site is considered comparable to the surrounding developed area.

5.2 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soils are cohesionless, groundwater is encountered within 50 feet of the surface, and soil densities are less than about 70 percent of the maximum dry densities. If all four criteria are met, a seismic event could result in a rapid increase in pore water pressure from the earthquake-generated ground accelerations. The potential for liquefaction at the site is considered to be negligible due to the dense material encountered, remedial grading recommended, and lack of a shallow groundwater condition.

5.3 Landslides

No evidence of landslide deposits was encountered at the site during the geotechnical investigation.

5.4 Geologic Hazard Category

Based on our review of the 2008 City of San Diego Seismic Safety Study Map Sheet 21 the site is located within Geologic Hazard Category 53. Category 53 indicates *level or sloping terrain, unfavorable geologic structure, low to moderate risk.*

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were encountered that, in the opinion of Geocon Incorporated, would preclude the development of the property as proposed, provided the recommendations of this report are followed.

6.1.2 The site is underlain by topsoil and undocumented fill deposits that are unsuitable in their present condition and will require remedial grading where improvements are planned. The actual extent of unsuitable soil removal will be determined in the field by the geotechnical engineer and/or engineering geologist.

6.1.3 The highly expansive topsoils identified on site should be placed as properly compacted fill at a depth of at least 4 feet below grade and a minimum of 10 feet in from the face of proposed fill slopes. In addition, this material or other highly expansive soil should not be used for retaining wall backfill.

6.1.4 Based on our review of the preliminary grading plans, it is anticipated that import material will be required to achieve the desired grades for the project. Import materials, should consist of granular material with "very low" to "low" expansive (Expansion Index of 50 or less) potential. Prior to importing the material, samples from proposed export site should be obtained and subjected to laboratory testing to determine whether the material conforms to the recommended criteria. At least 3 working days should be allowed for laboratory testing of the soil prior to its importation. Import materials should be free of oversize rock and construction debris.

6.1.5 The existing residence, foundation system and utility lines should be removed and exported from the site prior to grading. Geocon Incorporated should observe the underlying geologic conditions and provide testing and observation services during the backfill of the resulting excavations where necessary.

6.2 Excavation and Soil Characteristics

6.2.1 Excavation of the surficial deposits (topsoils and undocumented fill) should be possible with light to moderate effort using conventional heavy-duty equipment. Excavations within the formational units (Very Old Paralic Deposits and San Diego Formation) will require moderate to heavy effort due to the presence of a high cobble content and potential for randomly occurring cemented zones. In addition, although limited, excavations will encounter boulder size (12 inches or greater) material. Oversize rock encountered during

grading should be placed in accordance with *Recommended Grading Specifications* (Appendix D) and the requirements of the City of San Diego.

6.2.2 The soil encountered in the field investigation is considered to be "expansive" (expansion index [EI] of 20 or more) as defined by 2013 California Building Code (CBC) Section 1803.5.3. Table 6.2 presents soil classifications based on the expansion index. The soil materials collected and tested for expansion index indicate a "very low" to "very high" expansion potential (expansion index of 130 or more).

TABLE 6.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification	2013 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

6.3 Corrosion

6.3.1 Geocon Incorporated does not practice in the field of corrosion engineering; therefore, if improvements that could be susceptible to corrosion are planned, it is recommended that further evaluation by a corrosion engineer be performed.

6.4 Slope Stability

6.4.1 Slope stability analyses for the proposed maximum height fill slope was performed utilizing average drained direct shear strength parameters from the laboratory test results. These analyses indicate that the proposed 2:1 fill slope, constructed of granular on-site materials, should have calculated factors of safety of at least 1.5 under static conditions for both deep-seated failure and shallow sloughing conditions to heights of at least 30 feet, respectively. Slope stability calculations for both deep-seated and surficial fill slope stability are presented on Figures 4 and 5, respectively.

6.4.2 The fill slopes should be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not to exceed 4 feet and should be track-walked at the completion of each slope such that the fill soils are uniformly compacted to at least 90 percent relative

compaction to the face of the finished sloped. Alternatively, the fill slope may be over-built at least 3 feet and cut back to yield a properly compacted slope face.

6.4.3 Following removal of the surficial soils, a 15-foot-wide, 2-foot-deep, undrained keyway should be constructed at the toe of the proposed fill slope prior to placing compacted fill. The keyway should be constructed with a minimum 5 percent inclination away from the toe of slope.

6.4.4 All slopes should be landscaped with drought-tolerant vegetation, having variable root depths and requiring minimal landscape irrigation. In addition, all slopes should be drained and properly maintained to reduce erosion.

6.5 Grading

6.5.1 All grading should be performed in accordance with the attached *Recommended Grading Specifications* (Appendix D). Where the recommendations of this section conflict with Appendix C, the recommendations of this section take precedence. All earthwork should be observed and all fills tested for proper compaction by Geocon Incorporated.

6.5.2 Earthwork should be observed and compacted fill tested by representatives of Geocon Incorporated.

6.5.3 A pre-construction conference with a City of San Diego representative, owner, contractor, civil engineer, and geotechnical engineer should be held at the site prior to the beginning of grading. Special soil handling requirements can be discussed at that time.

6.5.4 Site preparation should begin with the removal of all deleterious material and vegetation. The depth of removal should be such that material exposed in cut areas or soils to be used as fill are relatively free of organic matter. Material generated during stripping and/or site demolition should be exported from the site.

6.5.5 All topsoil and undocumented fill deposits present within areas where structural improvements are planned should be removed to firm natural ground and properly compacted prior to placing additional fill and/or structural loads. The actual extent of unsuitable soil removals will be determined in the field during grading by the geotechnical engineer and/or engineering geologist.

6.5.6 After removal of unsuitable materials is performed, the site should then be brought to final subgrade elevations with structural fill compacted in layers. In general, soils native to the

site are suitable for re-use as fill if free from vegetation, debris and other deleterious material. Layers of fill should be no thicker than will allow for adequate bonding and compaction. All fill, including backfill and scarified ground surfaces, should be compacted to at least 90 percent of maximum dry density at or above optimum moisture content, as determined in accordance with ASTM Test Procedure D1557. Fill materials below optimum moisture content will require additional moisture conditioning prior to placing additional fill.

6.5.7 Grading operations should be scheduled to permit the placement of oversize material (defined as material greater than 12 inches in nominal dimension) and expansive soils in the deeper fill areas and to cap the building pads with granular materials having a "very low" to "low" expansive potential. Oversize material should be placed at least 3 feet below finish grade and 2 feet below all utilities.

6.5.8 The existing highly expansive topsoil should be placed at least 4 feet below proposed grade. In addition, expansive fill material should not be used to construct fill slopes or for retaining wall backfill.

6.5.9 Where practical, the upper 4 feet of the building pads should be comprised of soil with a "very low" to "low" expansion potential. The more highly expansive fill soils should be placed in the deeper fill areas and properly compacted, if encountered. "Very low" to "low" expansive soils are defined by the 2013 California Building Code (CBC) Section 1803.5.3 as those soils that have an Expansion Index of 50 or less.

6.5.10 The bedrock portion of cut/fill transitions, if any, exposed in building pads should be undercut at least 3 feet and replaced with properly compacted granular materials having a "very low" to "low" expansion potential.

6.5.11 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations in order to maintain safety and maintain the stability of adjacent existing improvements.

6.5.12 Import fill (if necessary) should consist of granular materials with a "very low" to "low" expansion potential (EI of 50 or less) free of deleterious material or stones larger than 3 inches and should be compacted as recommended above. Geocon Incorporated should be notified of the import soil source and should perform laboratory testing of import soil prior to its arrival at the site to determine its suitability as fill material, in particular with respect to the minimum shear strength requirements for slope stability.

6.6 Seismic Design Criteria

6.6.1 We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. Table 6.6.1 summarizes site-specific design criteria obtained from the 2013 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class C. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2013 CBC and Table 20.3-1 of ASCE 7-10. The values presented in Table 6.6.1 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 6.6.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC Reference
Site Class	C	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.070g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.410g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.000	Table 1613.3.3(1)
Site Coefficient, F_V	1.390	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.070g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.570g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.713g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.380g	Section 1613.3.4 (Eqn 16-40)

6.6.2 Table 6.6.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.6.2
2013 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.46g	Figure 22-7
Site Coefficient, F_{PGA}	1.00	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.46g	Section 11.8.3 (Eqn 11.8-1)

6.6.3 Conformance to the criteria in Tables 6.6.1 and 6.6.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

6.7 Foundation and Concrete Slabs-On-Grade Recommendations

6.7.1 The following foundation recommendations are for proposed one- to three-story residential structures. The foundation recommendations have been separated into three categories based on either the maximum and differential fill thickness or Expansion Index. The foundation category criteria are presented in Table 6.7.1.

TABLE 6.7.1
FOUNDATION CATEGORY CRITERIA

Foundation Category	Maximum Fill Thickness, T (Feet)	Differential Fill Thickness, D (Feet)	Expansion Index (EI)
I	$T<20$	--	$EI \leq 50$
II	$20 \leq T<50$	$10 \leq D<20$	$50<EI \leq 90$
III	$T \geq 50$	$D \geq 20$	$90<EI \leq 130$

6.7.2 Final foundation categories for each building or lot will be provided after finish pad grades have been achieved and laboratory testing of the subgrade soil has been completed.

6.7.3 Table 6.7.2 presents minimum foundation and interior concrete slab design criteria for conventional foundation systems.

TABLE 6.7.2
CONVENTIONAL FOUNDATION RECOMMENDATIONS BY CATEGORY

Foundation Category	Minimum Footing Embedment Depth (inches)	Continuous Footing Reinforcement	Interior Slab Reinforcement
I	12	Two No. 4 bars, one top and one bottom	6 x 6 - 10/10 welded wire mesh at slab mid-point
II	18	Four No. 4 bars, two top and two bottom	No. 3 bars at 24 inches on center, both directions
III	24	Four No. 5 bars, two top and two bottom	No. 3 bars at 18 inches on center, both directions

6.7.4 The embedment depths presented in Table 6.7.2 should be measured from the lowest adjacent pad grade for both interior and exterior footings. The conventional foundations should have a minimum width of 12 inches and 24 inches for continuous and isolated footings, respectively. A typical wall/column footing detail is presented on Figure 6.

6.7.5 The concrete slabs-on-grade should be a minimum of 4 inches thick for Foundation Categories I and II and 5 inches thick for Foundation Category III. The concrete slabs-on-grade should be underlain by 4 inches and 3 inches of clean sand for 4-inch thick and 5-inch-thick slabs, respectively. Slabs expected to receive moisture sensitive floor coverings or used to store moisture sensitive materials should be underlain by a vapor inhibitor covered with at least 2 inches of clean sand or crushed rock. If crushed rock will be used, the thickness of the vapor inhibitor should be at least 10 mil to prevent possible puncturing.

6.7.6 As a substitute, the layer of clean sand (or crushed rock) beneath the vapor inhibitor recommended in the previous section can be omitted if a vapor inhibitor that meets or exceeds the requirements of ASTM E 1745-97 (Class A), and that exhibits permeance not greater than 0.012 perm (measured in accordance with ASTM E 96-95) is used. This vapor inhibitor may be placed directly on properly compacted fill or formational materials. The vapor inhibitor should be installed in general conformance with ASTM E 1643-98 and the manufacturer's recommendations. Two inches of clean sand should then be placed on top of the vapor inhibitor to reduce the potential for differential curing, slab curl, and cracking. Floor coverings should be installed in accordance with the manufacturer's recommendations.

6.7.7 As an alternative to the conventional foundation recommendations, consideration should be given to the use of post-tensioned concrete slab and foundation systems for the support of the proposed structures. The post-tensioned systems should be designed by a structural

engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI), Third Edition, as required by the 2013 California Building Code (CBC Section 1808.6). Although this procedure was developed for expansive soil conditions, it can also be used to reduce the potential for foundation distress due to differential fill settlement. The post-tensioned design should incorporate the geotechnical parameters presented on Table 6.7.3 for the particular Foundation Category designated. The parameters presented in Table 6.7.3 are based on the guidelines presented in the PTI, Third Edition design manual.

TABLE 6.7.3
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI), Third Edition Design Parameters	Foundation Category		
	I	II	III
Thornthwaite Index	-20	-20	-20
Equilibrium Suction	3.9	3.9	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	5.3	5.1	4.9
Edge Lift, y_M (inches)	0.61	1.10	1.58
Center Lift Moisture Variation Distance, e_M (feet)	9.0	9.0	9.0
Center Lift, y_M (inches)	0.30	0.47	0.66

6.7.8 Foundation systems for the lots that possess a foundation Category I and a "very low" expansion potential (expansion index of 20 or less) can be designed using the method described in Section 1808 of the 2013 CBC. If post-tensioned foundations are planned, an alternative, commonly accepted design method (other than PTI Third Edition) can be used. However, the post-tensioned foundation system should be designed with a total and differential deflection of 1 inch. Geocon Incorporated should be contacted to review the plans and provide additional information, if necessary.

6.7.9 The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer. If a post-tensioned mat foundation system is planned, the slab should possess a thickened edge with a minimum width of 12 inches and extend below the clean sand or crushed rock layer.

6.7.10 If the structural engineer proposes a post-tensioned foundation design method other than PTI, Third Edition:

- The deflection criteria presented in Table 6.7.3 are still applicable.
- Interior stiffener beams should be used for Foundation Categories II and III.
- The width of the perimeter foundations should be at least 12 inches.
- The perimeter footing embedment depths should be at least 12 inches, 18 inches and 24 inches for foundation categories I, II, and III, respectively. The embedment depths should be measured from the lowest adjacent pad grade.

6.7.11 Our experience indicates post-tensioned slabs are susceptible to excessive edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. Current PTI design procedures primarily address the potential center lift of slabs but, because of the placement of the reinforcing tendons in the top of the slab, the resulting eccentricity after tensioning reduces the ability of the system to mitigate edge lift. The structural engineer should design the foundation system to reduce the potential of edge lift occurring for the proposed structures.

6.7.12 During the construction of the post-tension foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints be allowed to form between the footings/grade beams and the slab during the construction of the post-tension foundation system.

6.7.13 Category I, II, or III foundations may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf) (dead plus live load). This bearing pressure may be increased by one-third for transient loads due to wind or seismic forces.

6.7.14 Isolated footings, if present, should have the minimum embedment depth and width recommended for conventional foundations for a particular foundation category. The use of isolated footings, which are located beyond the perimeter of the building and support structural elements connected to the building, are not recommended for Category III. Where this condition cannot be avoided, the isolated footings should be connected to the building foundation system with grade beams.

6.7.15 For Foundation Category III, consideration should be given to using interior stiffening beams and connecting isolated footings and/or increasing the slab thickness. In addition, consideration should be given to connecting patio slabs, which exceed 5 feet in width, to the building foundation to reduce the potential for future separation to occur.

6.7.16 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisture conditioned, as necessary, to maintain a moist condition as would be expected in any such concrete placement.

6.7.17 Where buildings or other improvements are planned near the top of a slope steeper than 3:1 (horizontal:vertical), special foundations and/or design considerations are recommended due to the tendency for lateral soil movement to occur.

- For fill slopes less than 20 feet high, building footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.

- When located next to a descending 3:1 (horizontal:vertical) fill slope or steeper, the foundations should be extended to a depth where the minimum horizontal distance is equal to H/3 (where H equals the vertical distance from the top of the fill slope to the base of the fill soil) with a minimum of 7 feet but need not exceed 40 feet. The horizontal distance is measured from the outer, deepest edge of the footing to the face of the slope. An acceptable alternative to deepening the footings would be the use of a post-tensioned slab and foundation system or increased footing and slab reinforcement. Specific design parameters or recommendations for either of these alternatives can be provided once the building location and fill slope geometry have been determined.

- If swimming pools are planned, Geocon Incorporated should be contacted for a review of specific site conditions.

- Swimming pools located within 7 feet of the top of cut or fill slopes are not recommended. Where such a condition cannot be avoided, the portion of the swimming pool wall within 7 feet of the slope face be designed assuming that the adjacent soil provides no lateral support. This recommendation applies to fill slopes up to 30 feet in height, and cut slopes regardless of height. For swimming pools located near the top of fill slopes greater than 30 feet in height, additional recommendations may be required and Geocon Incorporated should be contacted for a review of specific site conditions.

- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures, which would permit some lateral soil movement without causing extensive distress. Geocon Incorporated should be consulted for specific recommendations.

6.7.18 The recommendations of this report are intended to reduce the potential for cracking of slabs due to expansive soil (if present), differential settlement of existing soil or soil with varying thicknesses. However, even with the incorporation of the recommendations

presented herein, foundations, stucco walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.7.19 Geocon Incorporated should be consulted to provide additional design parameters as required by the structural engineer.

6.8 Lateral Loading

6.8.1 To resist lateral loads, a passive pressure exerted by an equivalent fluid weight of 300 pounds per cubic foot (pcf) should be used for design of footings or shear keys poured neat against properly compacted granular fill soils. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance.

6.8.2 If friction is to be used to resist lateral loads, an allowable coefficient of friction between soil and concrete of 0.35 should be used for design for footings founded in compacted fill. The recommended passive pressure may be used concurrently with frictional resistance without reduction and may be increased by one-third for transient wind or seismic loading.

6.9 Retaining Walls

6.9.1 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the CBC. If the project possesses a seismic design category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 1803.5.12 of the 2013 CBC. The seismic load is dependent on the retained height, where H is the height of the wall, in feet, and the calculated loads result in pounds per square foot (psf) exerted at the base of the wall and zero at the top of the wall. A seismic load of 22H should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.46g calculated from ASCE 7-10 Section 11.8.3 and applied a pseudo-static coefficient of 0.33.

6.9.2 Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 35 pcf. Where the backfill will be inclined at 2:1 (horizontal:vertical), an active soil

pressure of 50 pcf is recommended. Expansive soils should not be used as backfill material behind retaining walls. All soil placed for retaining wall backfill should have an Expansion Index less than 50 for a width equal to the height of the wall.

6.9.3 Unrestrained walls are those that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall) at the top of the wall. Where walls are restrained from movement at the top, an additional uniform pressure of 7H psf should be added to the above active soil pressure. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to 2 feet of fill soil should be added.

6.9.4 Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and waterproofed as required by the project architect. The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The above recommendations assume a properly compacted granular (EI less than 50) free-draining backfill material with no hydrostatic forces or imposed surcharge load. Figure 7 presents a typical retaining wall drainage detail.

6.9.5 If conditions different than those described are anticipated, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations. If on-site highly expansive soils are used as retaining wall backfill, modifications to the design parameters provided above would be required.

6.10 Site Drainage and Moisture Protection

6.10.1 Adequate site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2013 CBC 1804.3 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from proposed structure.

6.10.2 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

6.11 Slope Maintenance

6.11.1 Slopes that are steeper than 3:1 (horizontal:vertical) may, under conditions that are both difficult to prevent and predict, be susceptible to near-surface (surficial) slope instability. The instability is typically limited to the outer 3 feet of a portion of the slope and usually does not directly impact the improvements on the pad areas above or below the slope. The occurrence of surficial instability is more prevalent on fill slopes and is generally preceded by a period of heavy rainfall, excessive irrigation, or the migration of subsurface seepage. The disturbance and/or loosening of the surficial soils, as might result from root growth, soil expansion, or excavation for irrigation lines and slope planting, may also be a significant contributing factor to surficial instability. It is therefore recommended that, to the maximum extent practical: (a) disturbed/loosened surficial soils be either removed or properly recompacted, (b) irrigation systems be periodically inspected and maintained to eliminate leaks and excessive irrigation, and (c) surface drains on and adjacent to slopes be periodically maintained to preclude ponding or erosion. Although the incorporation of the above recommendations should reduce the potential for surficial slope instability, it will not eliminate the possibility and, therefore, it may be necessary to rebuild or repair a portion of the project's slopes in the future.

6.12 Grading and Foundation Plan Review

6.12.1 Geocon Incorporated should review the grading plans and foundation plans for the project prior to final design submittal to evaluate whether additional analyses and/or recommendations are required

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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N

NO SCALE

VICINITY MAP

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2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

JP / RA		DSK/GTYPD

DATE 01 - 06 - 2017	PROJECT NO. G1854 - 32 - 01	FIG. 1

Plotted:01/06/2017 8:51AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\DETAILS\G1854-32-01 Vic Map.dwg

GEOLOGIC MAP

2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

GEOCON LEGEND

Qudf .....UNDOCUMENTED FILL

$Qvop_8$ .....VERY OLD PARALIC DEPOSITS

Tsdcg .....SAN DIEGO FORMATION
(Cobble Conglomerate Facies)

.....APPROX. LOCATION OF GEOLOGIC CONTACT
(Queried Where Uncertain)

T-8 .....APPROX. LOCATION OF EXPLORATORY TRENCH

PT-2 .....APPROX. LOCATION OF IN-SITU PERMEABILITY TEST

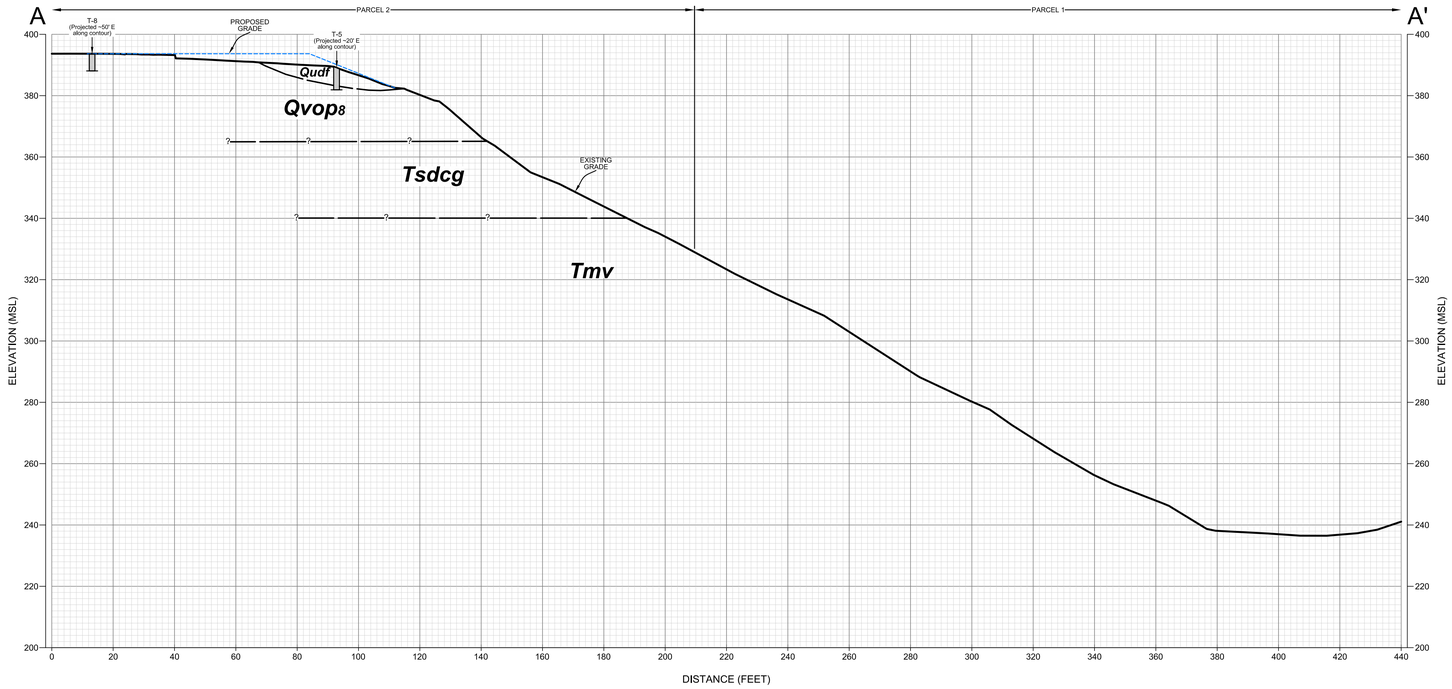
(6) .....APPROX. THICKNESS OF SURFICIAL SOILS
REQUIRING REMEDIAL GRADING (In Feet)

C C' .....APPROX. LOCATION OF GEOLOGIC CROSS-SECTION

0' 20' 40' 60' 80'
SCALE 1"=20' (On 36x24)

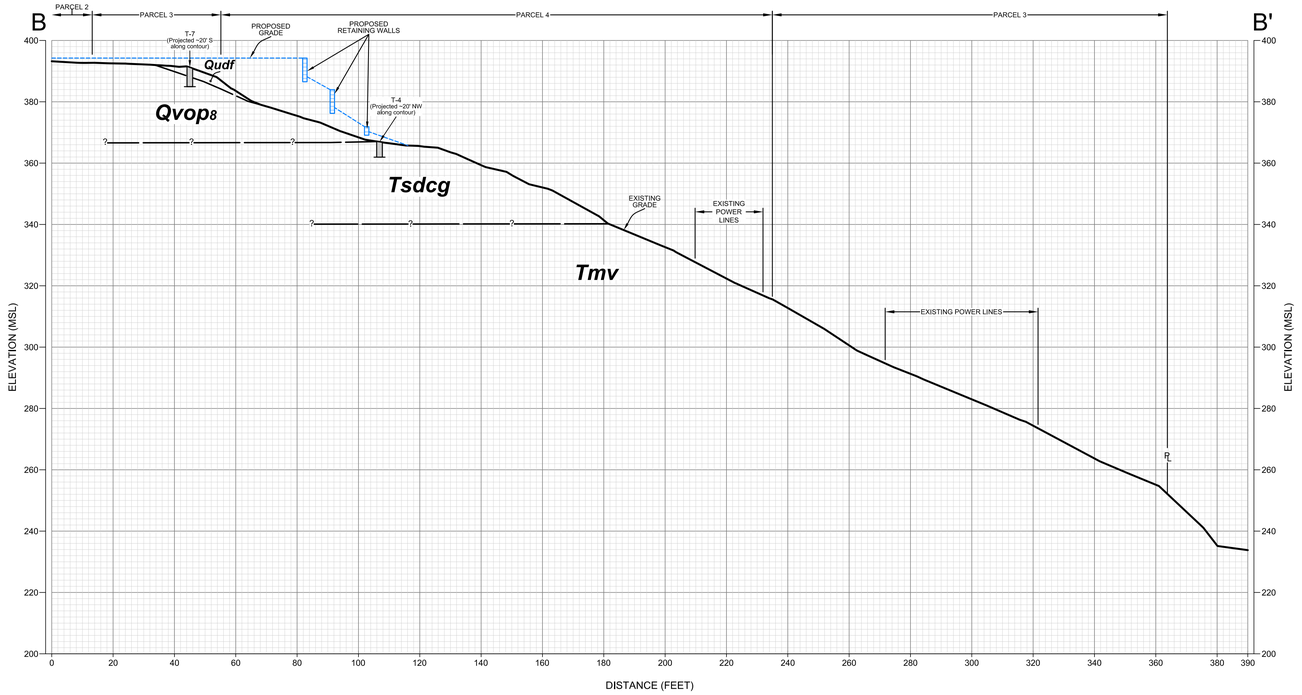
GEOCON INCORPORATED GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS 6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974 PHONE 858 558-6900 - FAX 858 558-6159	SCALE 1" = 20' DATE 01 - 06 - 2017 PROJECT NO. G1854 - 32 - 01 FIGURE 2 SHEET 1 OF 1

Plotted:01/06/2017 9:10AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\SHEETS\G1854-32-01 GeoMap.dwg



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 20' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION B-B'

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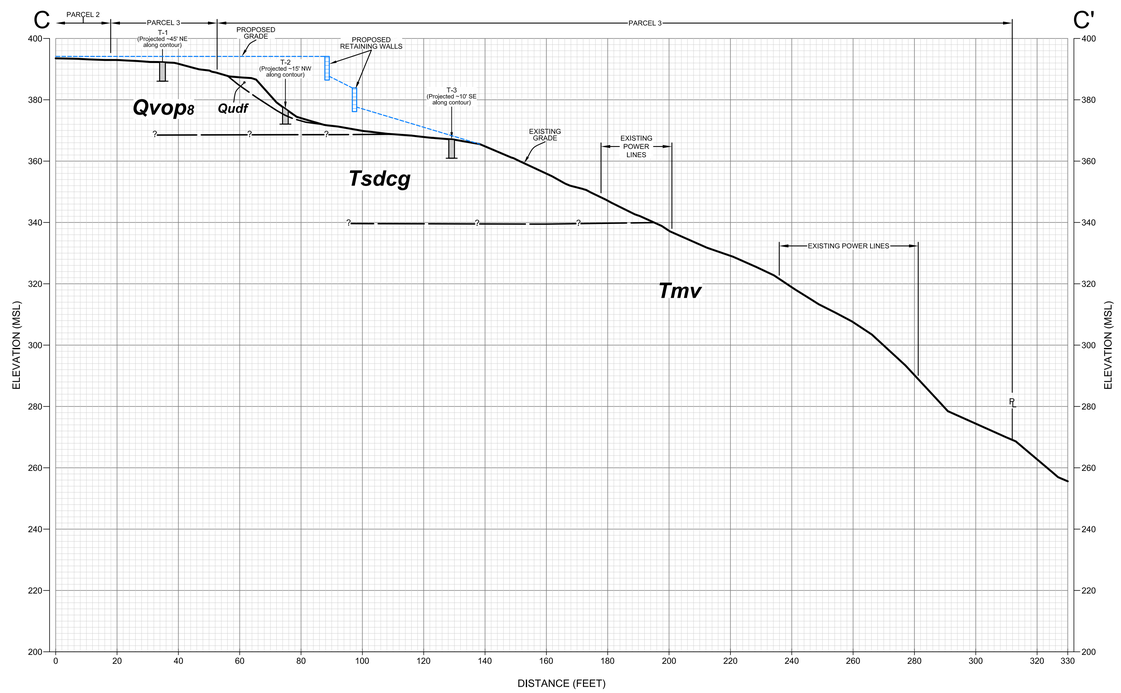

GEOLOGIC CROSS-SECTION C-C'

SCALE: 1" = 20' (Vert. = Horiz.)

GEOCON LEGEND

- *Qudf* ..... UNDOCUMENTED FILL
- *Qvop*$_8$ ..... VERY OLD PARALIC DEPOSITS
- *Tsdcg* ..... SAN DIEGO FORMATION (Cobble Conglomerate Facies)
- ~?~ ..... APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- T-8 ..... APPROX. LOCATION OF EXPLORATORY TRENCH

GEOLOGIC CROSS - SECTIONS

2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

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SCALE	1" = 20'	DATE	01 - 06 - 2017
PROJECT NO.	G1854 - 32 - 01	FIGURE	3
SHEET	1 OF 1		

Plotted:01/06/2017 8:49AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\SOURCE\SECTION Profiles-Existing\Surface1 (0311TOPO).dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	30 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	125 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	27 degrees
APPARENT COHESION	C	=	300 pounds per square foot
NO SEEPAGE FORCES			

ANALYSIS :

$\gamma_{c\phi}$	=	$\frac{\gamma_t H \tan\phi}{C}$	EQUATION (3-3), REFERENCE 1
FS	=	$\frac{NcfC}{\gamma_t H}$	EQUATION (3-2), REFERENCE 1
$\gamma_{c\phi}$	=	6.4	CALCULATED USING EQ. (3-3)
Ncf	=	24	DETERMINED USING FIGURE 10, REFERENCE 2
FS	=	1.9	FACTOR OF SAFETY CALCULATED USING EQ. (3-2)

REFERENCES :

1.....Janbu, N., Stability Analysis of Slopes with Dimensionless Parameters, Harvard Soil Mechanics, Series No. 46, 1954

2.....Janbu, N., Discussion of J.M. Bell, Dimensionless Parameters for Homogeneous Earth Slopes, Journal of Soil Mechanics and Foundation Design, No. SM6, November 1967.

FILL SLOPE STABILITY ANALYSIS

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Plotted:01/06/2017 8:52AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\DETAILS\Slope Stability Analyses-Fill (SSAF).dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	3 feet
SLOPE INCLINATION	2 : 1		(Horizontal : Vertical)
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	125 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	27 degrees
APPARENT COHESION	C	=	300 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ cos^2\ i\ tan\ \phi}{\gamma_t\ Z\ sin\ i\ cos\ i} = 2.5$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL FILL SLOPE STABILITY ANALYSIS

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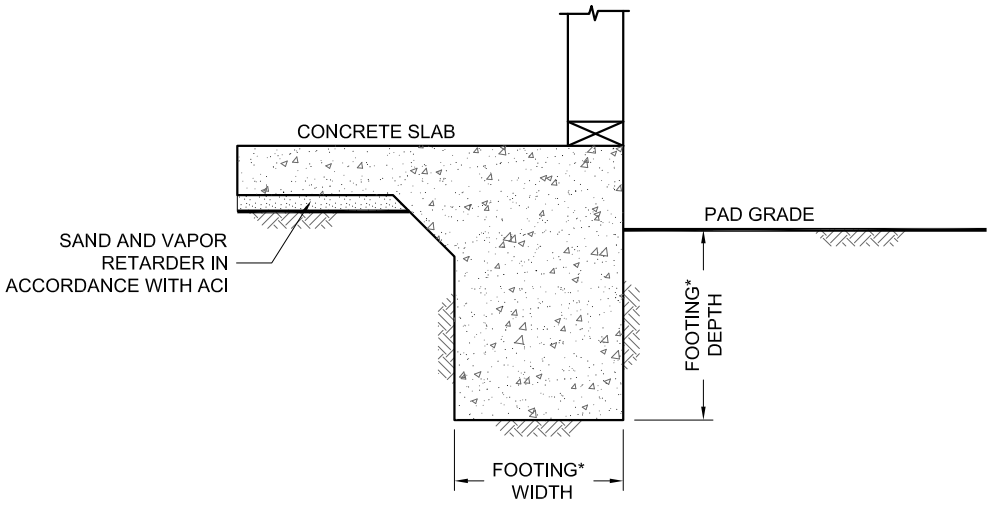
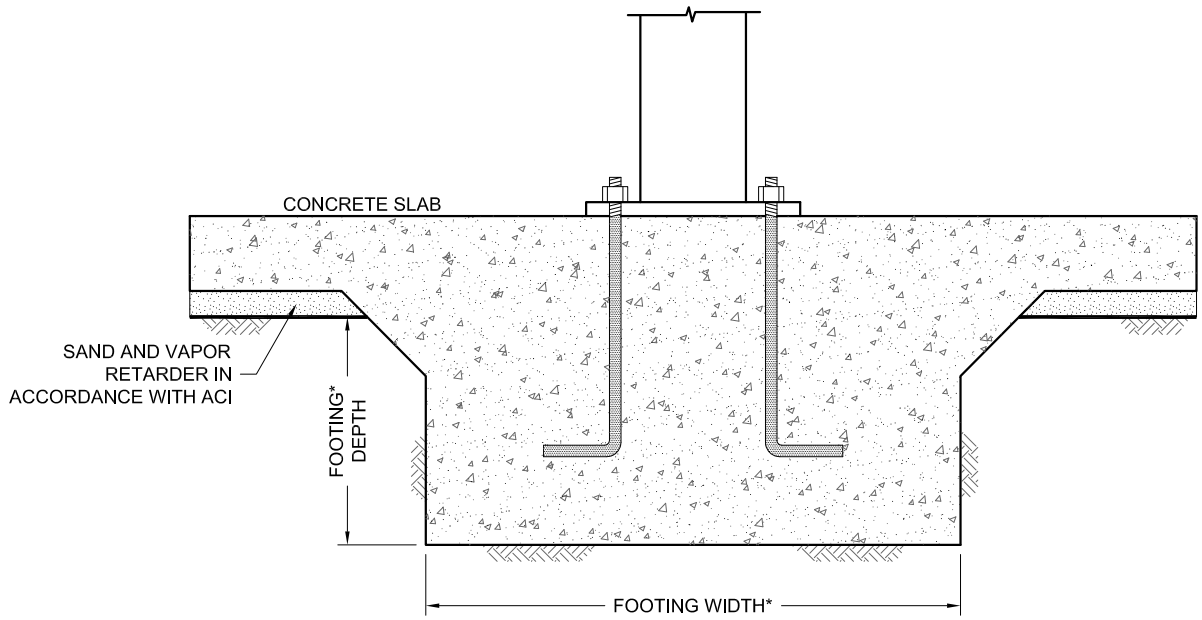
JP / RA		DSK/GTYPD	DATE 01 - 06 - 2017	PROJECT NO. G1854 - 32 - 01	FIG. 5

Plotted:01/06/2017 8:53AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\DETAILS\Slope Stability Analyses-Surficial (SFSSA).dwg





*....SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

WALL / COLUMN FOOTING DIMENSION DETAIL

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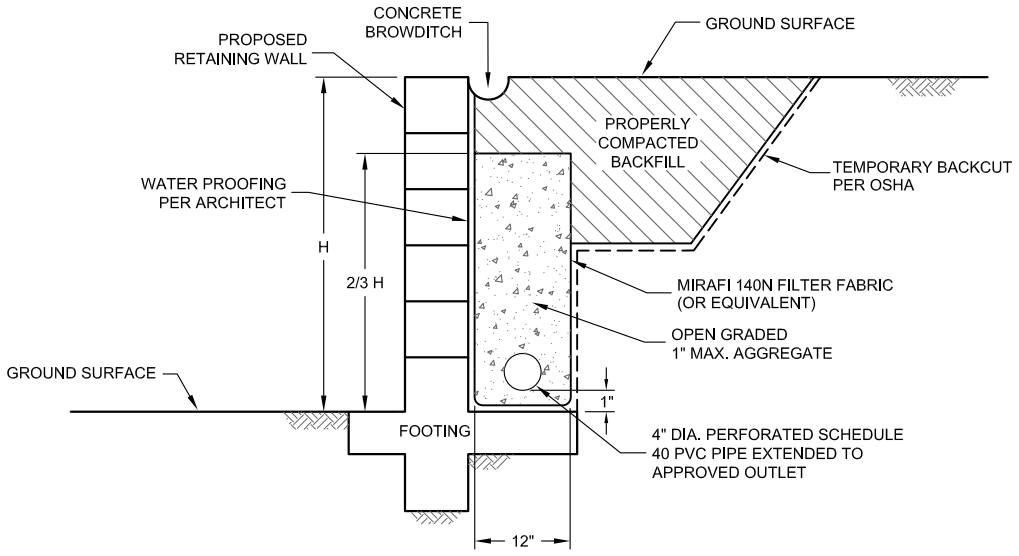
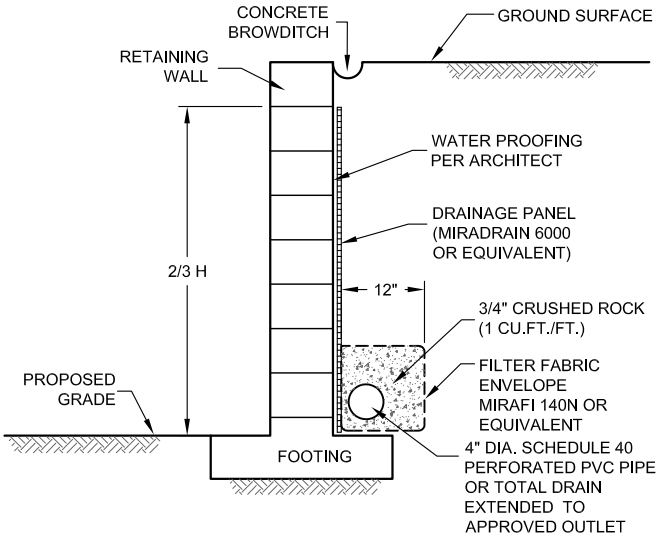
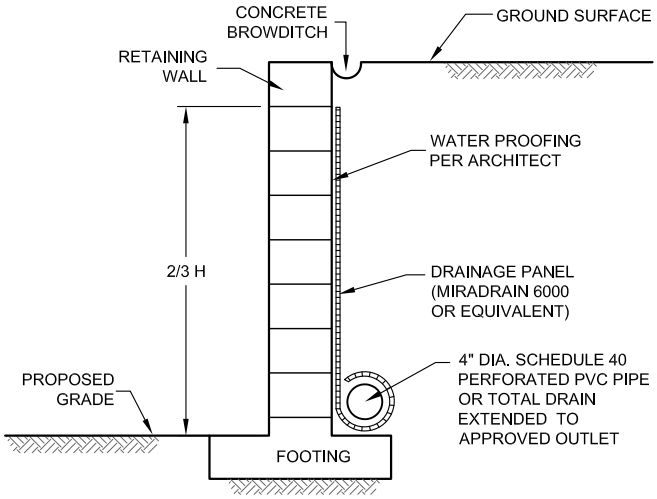
DATE 01 - 06 - 2017	PROJECT NO. G1854 - 32 - 01	FIG. 6

Plotted:01/06/2017 8:55AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\DETAILS\Wall-Column Footing Dimension Detail (COLFOOT2).dwg







NOTE :

DRAIN SHOULD BE UNIFORMLY SLOPED TO GRAVITY OUTLET
OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPING

NO SCALE

TYPICAL RETAINING WALL DRAIN DETAIL

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DATE 01 - 06 - 2017	PROJECT NO. G1854 - 32 - 01	FIG. 7

Plotted:01/06/2017 8:54AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\G1854-32-01 Copley Avenue Project\DETAILS\Typical Retaining Wall Drainage Detail (RWDD7A).dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The field investigation was performed on March 18, 2016 and consisted of a visual site reconnaissance, excavating eight exploratory trenches (Trench Nos. T-1 through T-8) at various locations across the site. The approximate locations of the trenches are shown on the *Geologic Map*, Figure 2.

The exploratory trenches performed by Hillside Excavating were advanced to depths of 5 to 8 feet using a John Deere 555 track hoe equipped with a 24-inch-wide bucket. Bulk samples were obtained for laboratory testing.

The soils encountered in the excavations were visually classified and logged in general accordance with American Society for Testing and Materials (ASTM) practice for Description and Identification of Soils (Visual Manual Procedure D 2488).

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 1 ELEV. (MSL.) 392.5' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T1-1			CH	**TOPSOIL** Stiff, moist, to very moist, dark brown to dark gray, Silty, highly plastic CLAY with 10-20% cobble size rock fragments up to 6-inches			
2								
4	T1-2			SC	**VERY OLD PARLIC DEPOSITS** Dense, damp, reddish brown, Clayey, fine to coarse SAND with 10-20% gravel, cobble and boulder size rock fragments up to 16-inches; difficult trenching			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-1,
Log of Trench T 1, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 2 ELEV. (MSL.) 377' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**UNDOCUMENTED FILL** Stiff, moist, brown to dark gray, Silty CLAY with trace cobble			
2				CH	**TOPSOIL** Stiff, moist, to very moist, dark brown to dark gray, Silty, highly plastic CLAY with 10-20% cobble size rock fragments up to 6-inches			
4				SC/SM	**VERY OLD PARALIC DEPOSITS** Dense, damp, yellowish-brown, Clayey to Silty, fine to medium SAND with trace cobble size rock fragments up to 8-inches			
					TRENCH TERMINATED AT 5 FEET			

Figure A-2,
Log of Trench T 2, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1854-32-01

TRENCH T 3

ELEV. (MSL.) **367'** DATE COMPLETED **03-18-2016**

EQUIPMENT **JD 555 TRACK HOE** BY: **T. REIST**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**SAN DIEGO FORMATION (Cobble Conglomerate Facies)** Dense, damp, orange brown, Silty, fine to coarse SAND with some gravel and cobble size rock fragments; lower cohesion			
2								
4	T3-1			GM	Dense, damp, orange brown, fine to coarse, Sandy CONGLOMERATE with 40-60% gravel, cobble and boulder size rock fragments up to 16-inches; difficult trenching			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-3,
Log of Trench T 3, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 4** ELEV. (MSL.) **367'** DATE COMPLETED **03-18-2016** EQUIPMENT **JD 555 TRACK HOE** BY: **T. REIST**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				GM	**SAN DIEGO FORMATION (Cobble Conglomerate Facies)** Dense, damp, orange-brown, fine to coarse, Sandy CONGLOMERATE with 40-60% gravel, cobble and boulder size rock fragments up to 14-inches			
2								
4					-Difficult trenching due to boulder and cobble content			
					TRENCH TERMINATED AT 5 FEET			

Figure A-4,
Log of Trench T 4, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 5 ELEV. (MSL.) 389' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM/SC	**UNDOCUMENTED FILL** Loose, dark brown, Silty/Clayey, fine to medium SAND with abundant debris (concrete chunks, brick, tile, metal pipe pieces) and 10-20% cobble and boulder size rock fragments up to 14-inches			
2								
4								
6				SM/SC	**VERY OLD PARALIC DEPOSITS** Dense, damp, reddish brown, Silty/Clayey, fine to coarse SAND with 20-30% cobble and boulder size rock fragments up to 20-inches; difficulty trenching			
					PRACTICAL REFUSAL AT 7 FEET			

Figure A-5,
Log of Trench T 5, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 6 ELEV. (MSL.) 390' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM/SC	**UNDOCUMENTED FILL** Loose, dry, dark brown, Silty/Clayey, fine to medium SAND with some cobble and boulder size rock fragments up to 14-inches			
2					-1-foot thick, nested cobble and boulder lens at 3 feet; minor caving			
4				SM	**VERY OLD PARALIC DEPOSITS** Dense, damp, mottled reddish brown and pale green, Silty, fine to coarse SAND with 20-30% cobble and boulder size rock fragments up to 20-inches			
6				SC	Dense, damp to moist, pale green, Clayey, fine to medium SAND			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-6,
Log of Trench T 6, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 7 ELEV. (MSL.) 391' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T7-1			SM	**UNDOCUMENTED FILL** Loose, moist to very moist, dark brown, Silty, fine to medium SAND with 10-15% gravel and cobble size rock fragments up to 8-inches			
2				CH	**TOPSOIL** Stiff, very moist, dark brown to dark gray, Silty, highly plastic CLAY			
4				SM/SC	**VERY OLD PARALIC DEPOSITS** Dense, damp, reddish brown, Silty/Clayey fine to coarse SAND with 10-20% cobble and boulder size rock fragments up to 18-inches			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-7,
Log of Trench T 7, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... DISTURBED OR BAG SAMPLE
... STANDARD PENETRATION TEST
... CHUNK SAMPLE
... DRIVE SAMPLE (UNDISTURBED)
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G1854-32-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 8 ELEV. (MSL.) 393' DATE COMPLETED 03-18-2016 EQUIPMENT JD 555 TRACK HOE BY: T. REIST	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CH	**TOPSOIL** Stiff, very moist, dark brown to dark gray, Silty, highly plastic CLAY with some gavel and cobble size rock fragments up to 6-inches			
2								
4				SM/SC	**VERY OLD PARALIC DEPOSITS** Dense, damp, reddish brown and gray, Silty/Clayey, fine to medium SAND with 10-20% gravel and cobble size rock fragments up to 6-inches			
					TRENCH TERMINATED AT 5 FEET			

Figure A-8,
Log of Trench T 8, Page 1 of 1

G1854-32-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected bulk samples were tested for maximum dry density and optimum moisture content, shear strength, and expansion characteristics. The results of our laboratory tests are summarized on Tables B-I through B-III.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557

Sample No. [Geologic Unit]	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T1-2 [$Qvop_{8]}$	Reddish brown, Clayey, fine to coarse SAND with some gravel and cobble	124.9	11.7
T3-1 [Tsdcg]	Orange-brown, Silty, fine to coarse SAND with gravel and cobble	125.9	10.8

TABLE B-II
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

Sample No.	Geologic Unit [Soil Class]	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion Peak (psf)	Angle of Shear Resistance Peak (degrees)
T1-2	$Qvop_8$ [SC]	112.7	11.7	340	23
T3-1	Tsdcg [GM]	114.1	10.9	415	31

Samples were remolded to 90 percent relative density at near optimum moisture content.

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No. [Geologic Unit]	Moisture Content		Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
T1-1 [Topsoil]	12.4	30.1	99.7	133
T7-1 [Qudf]	6.7	10.5	123.5	2

APPENDIX C

APPENDIX C

STORM WATER MANAGEMENT INVESTIGATION

We understand storm water management devices are being proposed in accordance with the *2016 Model BMP Design Manual, San Diego Region*, commonly referred to as the *Storm Water Standards* (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table C-1 presents the descriptions of the hydrologic soil groups. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property is underlain by 2 units identified as terrace escarpments (TeF) and urban land (Ur). No hydrologic soil group info was provided for these two units. However, based on soil types and in-situ

permeability testing, the underlying highly plastic clay soil is considered a Hydrologic Soil Group D soil.

In-Situ Testing

The infiltration rate, percolation rates and saturated hydraulic conductivity are different and have different meanings. Percolation rates tend to overestimate infiltration rates and saturated hydraulic conductivities by a factor of 10 or more. Table C-2 describes the differences in the definitions.

TABLE C-2
SOIL PERMEABILITY DEFINITIONS

Term	Definition
Infiltration Rate	The observation of the flow of water through a material into the ground downward into a given soil structure under long term conditions. This is a function of layering of soil, density, pore space, discontinuities and initial moisture content.
Percolation Rate	The observation of the flow of water through a material into the ground downward and laterally into a given soil structure under long term conditions. This is a function of layering of soil, density, pore space, discontinuities and initial moisture content.
Saturated Hydraulic Conductivity (k_{SAT}, Permeability)	The volume of water that will move in a porous medium under a hydraulic gradient through a unit area. This is a function of density, structure, stratification, fines content and discontinuities. It is also a function of the properties of the liquid as well as of the porous medium.

The degree of soil compaction or in-situ density has a significant impact on soil permeability and infiltration. Based on our experience and other studies we performed, an increase in compaction results in a decrease in soil permeability.

We performed 2 Aardvark Permeameter Tests, PT-1 and PT-2, at locations shown on the attached Geologic Map, Figure 2. The test borings were 4 inches in diameter and approximately 16 inches deep. The results of the tests provide parameters regarding the saturated hydraulic conductivity characteristics of on-site soil and geologic units. Table C-3 presents the results of the estimated field saturated hydraulic conductivity and estimated infiltration rates obtained from the Aardvark Permeameter tests. The field sheets are also attached herein. We applied a feasibility factor of safety of 2 to the field results for use in preparation of Worksheet C.4-1. The results of the testing indicate an adjusted soil infiltration rate of 0.0 inches per hour after applying a Factor of Safety of 2. Based on a discussion in the County of Riverside *Design Handbook for Low Impact Development Best Management Practices*, the infiltration rate should be considered equal to the saturated hydraulic conductivity rate.

TABLE C-3
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	Geologic Unit	Test Depth (feet)	Field-Saturated Hydraulic Conductivity, k_{sat} (inch/hour)	Worksheet[1] Saturated Hydraulic Conductivity, k_{sat} (inch/hour)
PT-1	Topsoil/Qvop8	1.33	0.00	0.00
PT-2	Topsoil/Qvop8	1.33	0.00	0.00

[1] Using a factor of safety of 2 for Worksheet C.4-1.

Storm Water Management Conclusions

The Geologic Map, Figure 2, depicts the existing property, proposed conceptual development, the approximate lateral limits of the geologic units, the locations of the field excavations and the in-situ infiltration test locations.

Soil Types

Proposed Compacted Fill – Compacted fill will be placed across the entire property during site development. Proposed remedial grading will consist of removing the undocumented fill and topsoil and replacement as compacted fill. The proposed storm water BMP's will be founded in compacted fill placed above Very Old Paralic deposits (Qvop8). The compacted fill will be comprised of on-site silty clays. Imported soils will also be required to achieve proposed grades. The properties of the proposed import are unknown at this time. The fill will be compacted to a dry density of at least 90 percent of the laboratory maximum dry density. In our experience, compacted fill does not possess infiltration rates appropriate for infiltration BMP's. Hazards that occur as a result of fill soil saturation include a potential for hydro-consolidation of the granular fill soils and/or swelling of the expansive soils, long term fill settlement, differential fill settlement, and lateral movement associated with saturated fill relaxation. The potential for lateral water migration to adversely impact existing or proposed structures, foundations, utilities, and roadways, is high. Therefore, full and partial infiltration should be considered infeasible.

Section D.4.2 of the *2016 Storm Water Standards* (SWS) provides a discussion regarding fill materials used for infiltration. The SWS states:

- *For engineered fills, infiltration rates may still be quite uncertain due to layering and heterogeneities introduced as part of construction that cannot be precisely controlled.* Due to these uncertainties, full and partial infiltration should be considered geotechnically infeasible and liners and subdrains should be used in areas where infiltration BMP's are founded in compacted fill.

- *Where possible, infiltration BMPs on fill material should be designed such that their infiltrating surface extends into native soils.* The underlying Qvop8 below the compacted fill is expected between 5 to 30 feet below proposed finish grades after remedial grading is performed. The underlying Terrace Deposits are highly expansive. Full and partial infiltration should be considered geotechnically infeasible within the compacted fill or Terrace Deposits and liners and subdrains should be used.

- *Because of the uncertainty of fill parameters as well as potential compaction of the native soils, an infiltration BMP may not be feasible.* Therefore, full and partial infiltration should be considered geotechnically infeasible and liners and subdrains should be used in the fill areas.

- *If the source of fill material is defined and this material is known to be of a granular nature and that the native soils below are permeable and will not be highly compacted, infiltration through compacted fill materials may still be feasible. In this case, a project phasing approach could be used including the following general steps, (1) collect samples from areas expected to be used for fill, (2) remold samples to approximately the proposed degree of compaction and measure the saturated hydraulic conductivity of remolded samples using laboratory methods, (3) if infiltration rates appear adequate for infiltration, then apply an appropriate factor of safety and use the initial rates for preliminary design, (4) following placement of fill, conduct in-situ testing to refine design infiltration rates and adjust the design as needed.* However, based on the discussion above, it is our opinion that infiltrating into compacted fill should be considered geotechnically infeasible and liners and subdrains should be used.

Infiltration Rates

The results of the infiltration rates obtained within the topsoil/Very Old Paralic Deposits was 0.00 inches per hour. Therefore, based on the results of the infiltration testing, full and partial infiltration is considered infeasible.

Groundwater Elevations

We did not encounter groundwater during our field exploration. Groundwater is not expected to be a geotechnical constraint. We expect to encounter groundwater greater than 100 feet below the ground surface.

Soil or Groundwater Contamination

Soil or groundwater contamination is not expected.

New or Existing Utilities

Existing utilities are present within right of ways adjacent to the existing streets, generally beneath sidewalks and roadways. We expect that all on-site utilities would be removed prior to site development. Full or partial infiltration near existing or proposed utilities should be avoided to prevent lateral water migration into the permeable trench backfill materials.

Existing and Planned Structures

Existing residential developments exists to the south and west. Moderate to steep sloping terrain exists to the north and east. Copley Avenue is located immediately adjacent to the western property boundary. If water is allowed to infiltrate into the soil, the water could migrate laterally and into other properties in the vicinity of the subject site. The water migration may negatively affect other buildings and improvements in the area.

Slopes

Moderate to steep natural slopes descend to the north and east. Full or partial infiltration should be avoided to reduce the potential for daylight water seepage, lateral water migration, and slope instability from adversely impacting down gradient properties and improvements.

Recommendations

Liners and subdrains should be incorporated into the design and construction of the planned storm water devices. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride, PVC) to prevent water migration. The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. Seams and penetrations of the liners should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or I-8) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table C-4 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE C-4
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., Infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Based on our geotechnical investigation and Table C-4, Table C-5 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE C-5
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	3	0.75
Predominant Soil Texture	0.25	3	0.75
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \sum p$			2.25

[1] The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data on this table. Additional information is required to evaluate the design factor of safety.

Categorization of Infiltration Feasibility Condition			Worksheet C.4-1
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: Based on results of permeability testing in two locations within the topsoil/Very Old Old Paralic Deposits, the unfactored infiltration rate was measured to be 0.00 inches/hour using a constant head borehole permeameter. If applying a feasibility factor of safety of 2.0, the infiltration rates would be 0.00 iph. It should be noted that the proposed compacted fill that will be placed across the site will exhibit a very low infiltration rate, similar to these test results. The Aardvark Permeameter test results are attached. In accordance with the Riverside County storm water procedures, which reference the United States Bureau of Reclamation Well Permeameter Method (USBR 7300), the saturated hydraulic conductivity is equal to the unfactored infiltration rate.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: Moderate to steeply descending natural slopes exist to the north and east. The potential for slope instability, if water was allowed to infiltrate into the ground, is moderate. The potential for lateral water migration to adversely impact existing and proposed utilities, adversely impact proposed foundations and improvements is high. The potential for daylight water seepage to adversely impact down gradient properties and improvements is high. Compacted fill will be placed across the property and result in fills of approximately 5 to 30 feet thick. Infiltration BMP's founded in compacted fill should be avoided to prevent adverse shrinking/swelling of the expansive soils, and adverse hydro-consolidation of the granular fill soils which causes differential settlement. The underlying terrace deposits are highly expansive. Infiltration BMP's founded in expansive soils should be avoided to reduce the potential for heaving and distress to surrounding improvements.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater is not located within 10 feet from any proposed infiltration BMP, therefore the risk of storm water infiltration BMP's adversely impacting groundwater is considered negligible.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We are not aware of any wells within 100 feet of the site, and given the amount of water that would infiltrate into the ground, it is our opinion there are no adverse impacts to groundwater, water balance impacts to stream flow, or impacts on any downstream water rights. It should be noted that researching downstream water rights or evaluating water balance issues to stream flows is beyond the scope of the geotechnical consultant.			
Part 1 Result*	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	No Infiltration	

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

Worksheet C.4-1 Page 3 of 4

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

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

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

Provide basis: The measured infiltration rate was 0.00 iph, which is below the lowest threshold for any infiltration BMP feasibility. The proposed basins will be founded in compacted fill compacted to 90% of the maximum dry density or the underlying highly expansive Terrace Deposits. Infiltration BMP's in compacted fill or highly expansive formational materials are not recommended due to the shrink/swell characteristics of the soils and high potential for lateral water migration to adversely impact proposed structures and improvements, as well as existing utilities and roadways.

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

Provide basis: Moderate to steeply descending natural slopes exist to the north and east. The potential for slope instability, if water was allowed to infiltrate into the ground, is moderate. The potential for lateral water migration to adversely impact existing and proposed utilities, adversely impact proposed foundations and improvements is high. The potential for daylight water seepage to adversely impact down gradient properties and improvements is high. Compacted fill will be placed across the property and result in fills of approximately 5 to 30 feet thick. Infiltration BMP's founded in compacted fill should be avoided to prevent adverse shrinking/swelling of the expansive soils, and adverse hydro-consolidation of the granular fill soils which causes differential settlement. The underlying terrace deposits are highly expansive. Infiltration BMP's founded in expansive soils should be avoided to reduce the potential for heaving and distress to surrounding improvements.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater is not located within 10 feet from any proposed infiltration BMP, therefore the risk of storm water infiltration BMP's adversely impacting groundwater is considered negligible.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Geocon is not aware of any downstream water rights that would be affected by incidental infiltration of storm water. Researching downstream water rights is beyond the scope of the geotechnical consultant.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	No Partial Infiltration	

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

Soil Map—San Diego County Area, California
(2936 Copley Avenue)

Map Scale: 1:720 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 10, Sep 12, 2016

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

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

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

San Diego County Area, California (CA638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
TeF	Terrace escarpments	0.8	63.6%
Ur	Urban land	0.5	36.4%
Totals for Area of Interest		**1.2**	**100.0%**

San Diego County Area, California

TeF—Terrace escarpments

Map Unit Composition

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

Description of Terrace Escarpments

Setting

Landform: Escarpments
Landform position (three-dimensional): Riser

Typical profile

H1 - 0 to 60 inches: variable

Interpretive groups

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

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 10, Sep 12, 2016

San Diego County Area, California

Ur—Urban land

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban 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

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 10, Sep 12, 2016

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	2936 Copley Avenue	Date:	12/23/2016
Project Number:	G1854-32-01	By:	S. KEFFER
Borehole Location:	PT1	Ref. EL (feet, MSL):	392.5
		Bottom EL (feet, MSL):	391.2

Borehole Diameter (inches):	4.00
Borehole Depth, **H** (inches):	16.00
Distance Between Reservoir & Top of Borehole (inches)	27.50
Depth to Water Table, **s** (feet):	100.00
Height APM Raised from Bottom (inches):	2.00

Wetted Area, **A** (in^2): 83.12

Distance Between Resevoir and APM, **D** (inches):	2.85
Head Height Calculated, **h** (inches):	5.61
Head Height Recorded, **h** (inches):	5.50
Distance Between Constant Head and Water Table, **L** (inches):	1190

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (lbs)	Reset Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00	0.00	22.480				
2	2.00	2.00	22.480		0.000	0.000	0.000
3	12.00	10.00	22.475		0.005	0.005	0.014
4	22.00	10.00	22.475		0.000	0.005	0.000
5	32.00	10.00	22.475		0.000	0.005	0.000
6	42.00	10.00	22.470		0.005	0.010	0.014
7	52.00	10.00	22.470		0.000	0.010	0.000
8	62.00	10.00	22.470		0.000	0.010	0.000
9	72.00	10.00	22.470		0.000	0.010	0.000
10	82.00	10.00	22.470		0.000	0.010	0.000
11							
12							
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17							
18							
19							
20							
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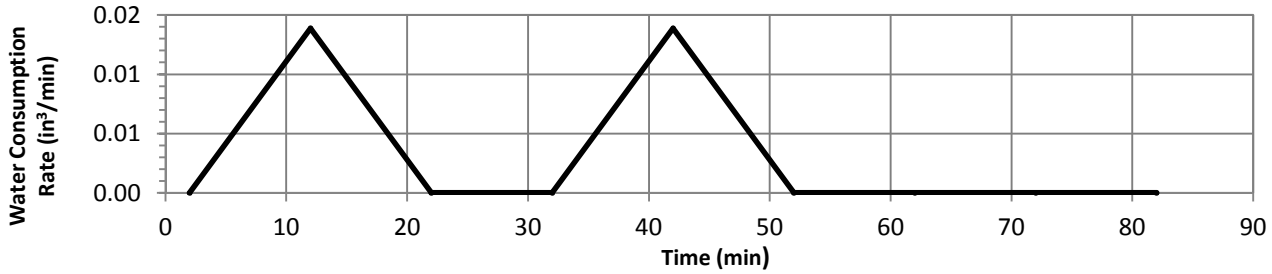
25							
26							
27							
28							

Steady Flow Rate, Q (in^3/min): 0.000



Field-Saturated Hydraulic Conductivity (Infiltration Rate)

Case 1: L/h > 3 K_{sat} = **0.000E+00** in/min **0.000** in/hr

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	2936 Copley Avenue	Date:	12/23/2016
Project Number:	G1854-32-01	By:	S. KEFFER
Borehole Location:	PT2	Ref. EL (feet, MSL):	394.0
		Bottom EL (feet, MSL):	392.7

Borehole Diameter (inches):	4.00
Borehole Depth, **H** (inches):	16.00
Distance Between Reservoir & Top of Borehole (inches)	26.50
Depth to Water Table, **s** (feet):	100.00
Height APM Raised from Bottom (inches):	2.00

Wetted Area, **A** (in^2): 83.07

Distance Between Resevoir and APM, **D** (inches):	2.77
Head Height Calculated, **h** (inches):	5.61
Head Height Recorded, **h** (inches):	5.50
Distance Between Constant Head and Water Table, **L** (inches):	1190

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (lbs)	Reset Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00		22.795				
2	2.00	2.00	22.745		0.050	0.050	0.693
3	7.00	5.00	22.720		0.025	0.075	0.139
4	17.00	10.00	22.715		0.005	0.080	0.014
5	27.00	10.00	22.715		0.000	0.080	0.000
6	37.00	10.00	22.710		0.005	0.085	0.014
7	47.00	10.00	22.710		0.000	0.085	0.000
8	57.00	10.00	22.710		0.000	0.085	0.000
9	67.00	10.00	22.705		0.005	0.090	0.014
10	77.00	10.00	22.705		0.000	0.090	0.000
11							
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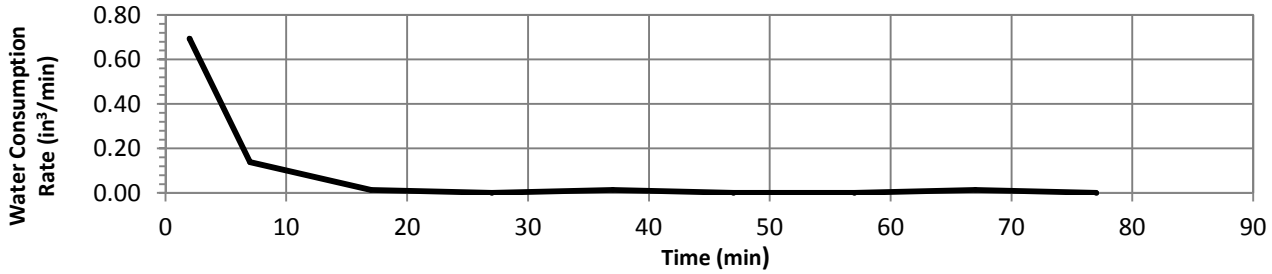
Steady Flow Rate, Q (in^3/min): 0.000



Field-Saturated Hydraulic Conductivity (Infiltration Rate)

Case 1: L/h > 3 K_{sat} = **0.000E+00** in/min **0.000** in/hr

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

PROJECT NO. G1854-32-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9

and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition.

4. CLEARING AND PREPARING AREAS TO BE FILLED

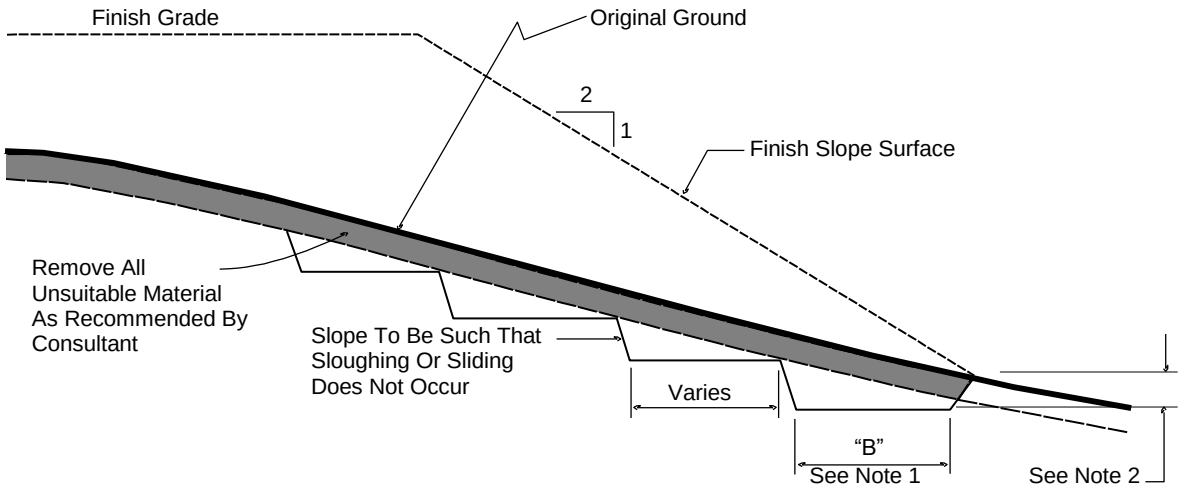
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES: (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection

variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

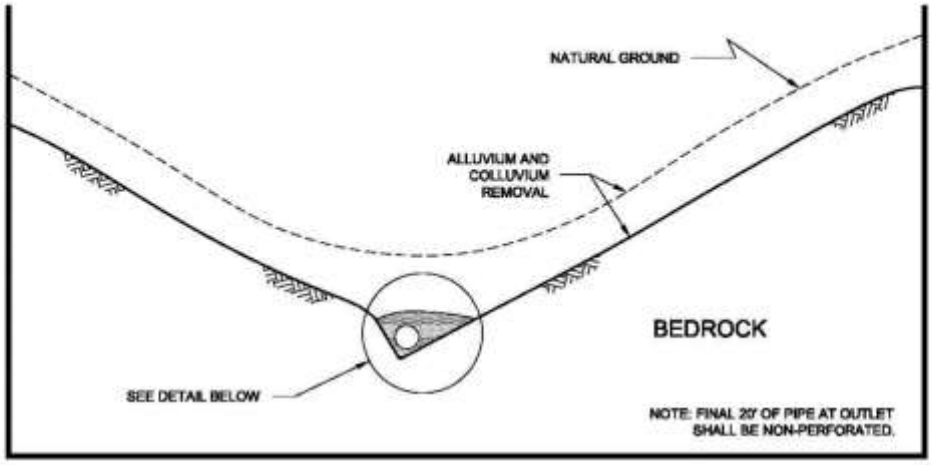
6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

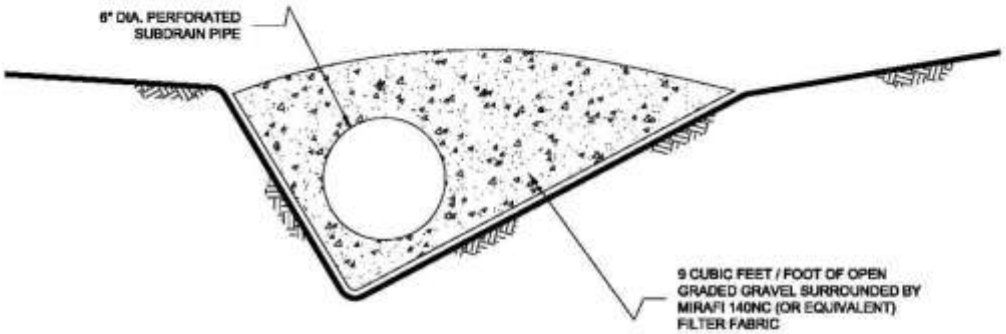
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL





NOTES:

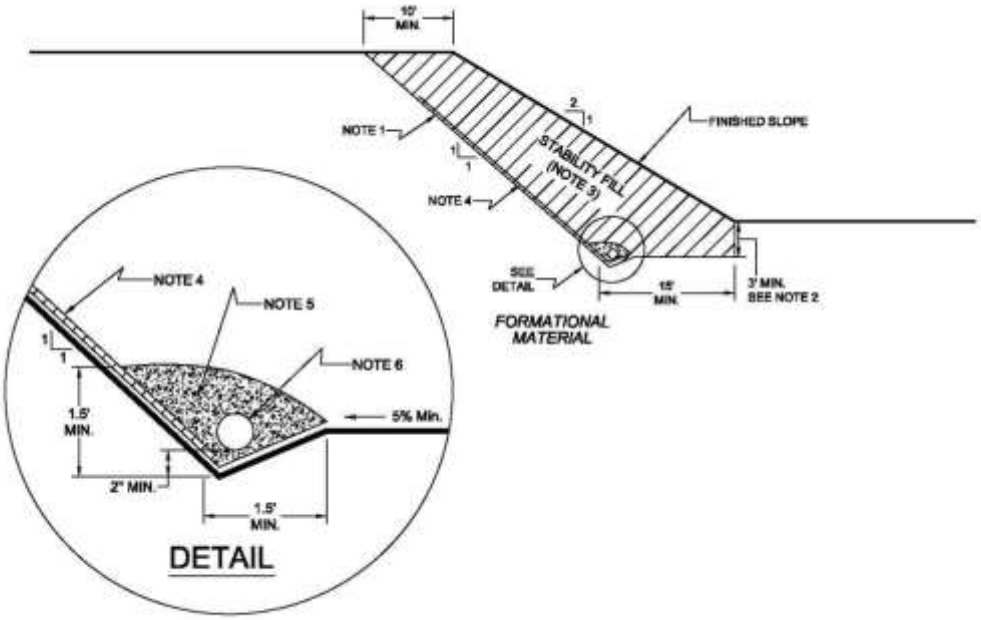
1.....6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

2.....6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

NO SCALE

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or lager) pipes.

TYPICAL STABILITY FILL DETAIL



NOTES:

1....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).

2....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.

3....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.

4....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.

5....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).

6....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

NO SCALE

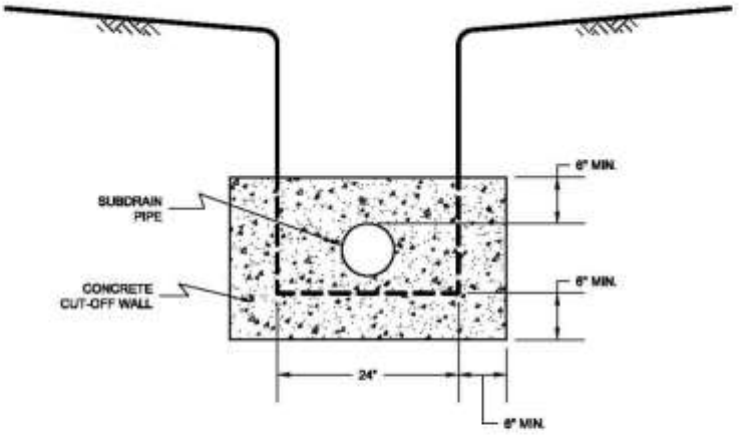
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.

7.4 *Rock* fill or *soil-rock* fill areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock* fill drains should be constructed using the same requirements as canyon subdrains.

7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

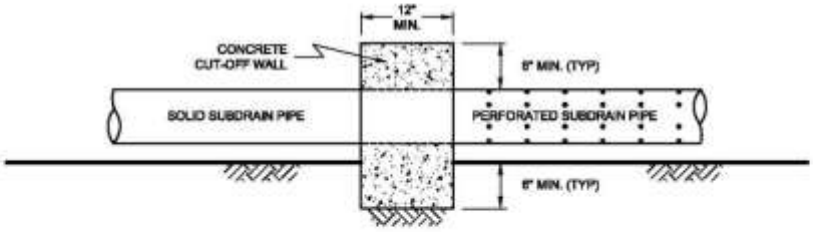
TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW

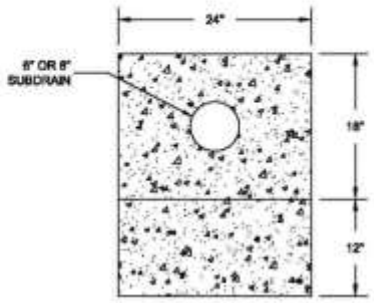


NO SCALE

7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

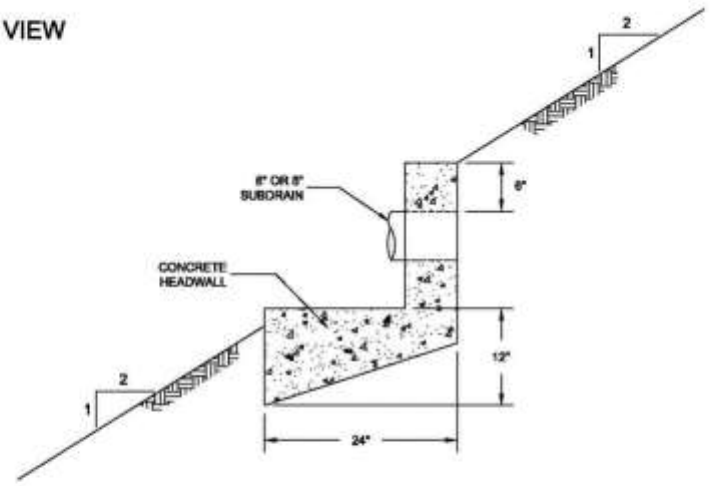
TYPICAL HEADWALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW



NOTE: HEADWALL SHOULD OUTLET AT TOE OF FILL SLOPE OR INTO CONTROLLED SURFACE DRAINAGE

NO SCALE

7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an "as-built" map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

8. OBSERVATION AND TESTING

8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.

8.6 Testing procedures shall conform to the following Standards as appropriate:

8.6.1 Soil and Soil-Rock Fills:

8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method.*

8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

8.6.1.4. Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

9. PROTECTION OF WORK

9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

10. CERTIFICATIONS AND FINAL REPORTS

10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

LIST OF REFERENCES

1. Boore, D. M., and G. M Atkinson (2008), *Ground-Motion Prediction for the Average Horizontal Component of PGA, PGV, and 5%-Damped PSA at Spectral Periods Between 0.01 and 10.0 S*, Earthquake Spectra, Volume 24, Issue 1, pages 99-138, February 2008.

2. California Department of Conservation, Division of Mines and Geology, *Probabilistic Seismic Hazard Assessment for the State of California*, Open File Report 96-08, 1996.

3. California Geological Survey, *Seismic Shaking Hazards in California*, Based on the USGS/CGS Probabilistic Seismic Hazards Assessment (PSHA) Model, 2002 (revised April 2003). 10% probability of being exceeded in 50 years. http://redirect.conservation.ca.gov/cgs/rghm/pshamap/pshamain.html

4. Campbell, K. W., and Y. Bozorgnia, *NGA Ground Motion Model for the Geometric Mean Horizontal Component of PGA, PGV, PGD and 5% Damped Linear Elastic Response Spectra for Periods Ranging from 0.01 to 10 s*, Preprint of version submitted for publication in the NGA Special Volume of Earthquake Spectra, Volume 24, Issue 1, pages 139-171, February 2008.

5. City of San Diego, *Seismic Safety Study, Geologic Hazards and Faults*, 2008 edition, Map Sheet 21.

6. Chiou, Brian S. J., and Robert R. Youngs, *A NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra*, preprint for article to be published in NGA Special Edition for Earthquake Spectra, Spring 2008.

7. *http://www.water.ca.gov.*

8. *http://websoilsurvey.nrcs.usda.gov.*

9. *http://earthquake.usgs.gov/designmaps/us/application.php.*

10. Kennedy, M. P., and S. S. Tan, *Geologic Map of the San Diego 30'x60' Quadrangle, California*, USGS Regional Map Series, Scale 1:100,000, 2008.

11. Reed, Leslie D., *Normal Heights Mudstones: A New Upper Pleistocene Marine Sedimentary Unit, San Diego, California*, Circa 1991.

12. Risk Engineering, *EZ-FRISK*, 2015.

13. Unpublished reports and maps on file with Geocon Incorporated.

14. USGS computer program, *Seismic Hazard Curves and Uniform Hazard Response Spectra.*

15. United States Department of Agriculture, *1953 Stereoscopic Aerial Photographs, Flight AXN-3M*, Photos Nos. 97 and 98 (scale 1:20,000).

Project No. G1854-32-01
January 10, 2017

Mr. Jeff Lynn
2245 San Diego Avenue, Suite 125
San Diego, California 92110

Subject: RESPONSE TO LDR-GEOLOGY REVIEW COMMENTS
2936 COPLEY AVENUE
SAN DIEGO, CALIFORNIA

Reference: *Geotechnical Investigation, 2936 Copley Avenue, San Diego, California*, dated April 22, 2016, revised January 6, 2017 (Project No. G1854-32-01).

Dear Mr. Lynn:

This correspondence has been prepared to respond to comments contained in the August 2, 2016, *Cycle Issues* prepared by Mr. Jacobe Washburn from the City of San Diego, LDR-Geology department. Each issue along with our response is presented below.

Issue 2: *Submit an addendum geotechnical report or update letter that specifically addresses the proposed development for the purposes of environmental review.*

Response: This correspondence and the referenced report serves as the requested report.

Issue 3: *Storm water requirements for the proposed conceptual development will be evaluated by LDR-Engineering review. Priority Development Projects (PDP's) may require an investigation of storm water infiltration feasibility in accordance with the Storm Water Standards (including Appendix C and D). Check with your LDR-Engineering reviewer on requirements. LDR-Engineering may determine that LDR-Geology review of a storm water infiltration evaluation is required.*

Response: We have evaluated the feasibility of using storm water infiltration best management practices (BMP's). Please refer to the referenced report.

Issue 4: *Provide an updated geologic/geotechnical map that shows the distribution of fill, geologic units, and the location of the exploratory trenches on a base map that shows topography and the proposed construction of the entire site.*

Response: We have revised our geologic map including the updated development plan and requested information. As requested, a copy of the revised report is included with this submittal.

Issue 5: *Update the existing and/or provide new geologic cross sections that span the entire site.*

Response: Revised Geologic Cross-Sections are included in the referenced report.

Issue 6: *The trench logs in the referenced Geotechnical Investigation Report indicate that the Otay Formation was encountered; however, based on a review of the report and geologic map it appears that this is incorrect. Update the trench logs with the correct geologic unit(s).*

Response: The trench logs have been revised and are presented in the referenced report.

Issue 7: *The project geotechnical consultant should provide a conclusion regarding if the proposed development will destabilize or result in settlement of adjacent property or the right-of-way.*

Response: Based on the results of our study, the proposed development should not destabilize or result in settlement of adjacent property or the right-of-way.

Issue 8: *Based on the City's Seismic Safety Maps, the subject site is located within geologic hazard category 53, level or sloping terrain, unfavorable geologic structure. The geotechnical consultant must provide a statement as to whether or not the geologic structure is favorable and that the site is suitable for the intended use.*

Response: Based on the exploratory information contained in Reference No. 1, the geologic structure on the site is favorable and the site is suitable for the intended use.

Issue 9: *The projects geotechnical consultant must provide a professional opinion that the site will have a factor-of-safety of 1.5 or greater, for both gross and surficial stability, following project completion.*

Response: Based on the results of our study, the project slopes will possess a factor-of-safety of 1.5 or greater, for both gross and surficial stability, following project completion.

Issue 10: *The subject project involves a Tentative Map. Pursuant to Section 66491 of the Subdivision Map Act, indicate if the presence of rocks or liquids containing deleterious chemicals which, if not corrected, could cause construction materials such as concrete, steel or cast iron to corrode or deteriorate.*

Response: We presume that the reviewer is inquiring as to whether or not corrosive soils are present on the property. A corrosion study was beyond the scope of our geotechnical investigation; therefore, we have no opinion in this regard. Typically, corrosion testing is performed during grading when the actual soils that support the improvements are placed.

Issue 11: *The project's designer must show the existing contour lines across the entire site on the plans.*

Response: See Figure 2 in the referenced report.

If there are any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Trevor E. Myers
RCE 63773

David B. Evans
CEG 1860

TEM:DBE:dmc

Attachment: Revised Geotechnical Report (2)

(4) Addressee

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST INTRODUCTION

In December 2015, the City adopted a Climate Action Plan (CAP) that outlines the actions that City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions. The purpose of the Climate Action Plan Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).[1]

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

The Checklist may be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law.

[1] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

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CAP CONSISTENCY CHECKLIST SUBMITTAL APPLICATION

- The Checklist is required only for projects subject to CEQA review.[2]
- If required, the Checklist must be included in the project submittal package. Application submittal procedures can be found in Chapter 11: Land Development Procedures of the City's Municipal Code.
- The requirements in the Checklist will be included in the project's conditions of approval.
- The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Department.

Application Information

Contact Information

Project No./Name: Copley Ave. TM

Property Address: 2936 Copley Ave, San Diego, CA

Applicant Name/Co.: Copley Avenue Venture's, LLC, a California LLC

Contact Phone: (619) 542-1975 Contact Email: jlynn@cri2000.com

Was a consultant retained to complete this checklist? ☐ Yes ☐ No If Yes, complete the following

Consultant Name: D K McKinley Contact Phone: 619-238-1134

Company Name: The McKinley Associates, Inc. Contact Email: kmckinley@themckinleyasociates.com

Project Information

1. What is the size of the project (acres)? 4.232
2. Identify all applicable proposed land uses:
   - ■ Residential (indicate # of single-family units): 4
   - ☐ Residential (indicate # of multi-family units):
   - ☐ Commercial (total square footage):
   - ☐ Industrial (total square footage):
   - ☐ Other (describe):
3. Is the project or a portion of the project located in a Transit Priority Area? ☐ Yes ☐ No
4. Provide a brief description of the project proposed:

Demolish existing 1-sory single family dwelling.
Construction of four two story single family homes with three and four bedrooms and two car garages ranging in size for 2227 to 2374 SF. Other improvements include grading, site retaining walls, a private drive, and landscaping.

[2] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

The first step in determining CAP consistency for discretionary development projects is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
A. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR,		
B. If the proposed project is not consistent with the existing land use plan and zoning designations, and includes a land use plan and/or zoning designation amendment, would the proposed amendment result in an increased density within a Transit Priority Area (TPA)[4] and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?; OR,	☑	☐
C. If the proposed project is not consistent with the existing land use plan and zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?		

If "***Yes***," proceed to Step 2 of the Checklist. For question B above, complete Step 3. For question C above, provide estimated project emissions under both existing and proposed designation(s) for comparison. Compare the maximum buildout of the existing designation and the maximum buildout of the proposed designation.

If "***No***," in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant. The project must nonetheless incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete Step 2 of the Checklist.

The project is consistent with the existing General Plan of the Greater North Park Central Region. The Plan is also consistent with the North Park Community Plan area. The community plan recommends that new developments are "compatible with existing neighborhoods". The proposed development meets this recommendation via the community planning group's positive recommendation for the project. The community plan also supports higher residential densities. The proposed development will be revising the existing dwellings on the property from 1 to 4.

[3] This question may also be answered in the affirmative if the project is consistent with SANDAG Series 12 growth projections, which were used to determine the CAP projections, as determined by the Planning Department.

[4] This category applies to all projects that answered in the affirmative to question 3 on the previous page: Is the project or a portion of the project located in a transit priority area.

Step 2: CAP Strategies Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that would require a certificate of occupancy from the Building Official or projects comprised of one and two family dwellings or townhouses as defined in the California Residential Code and their accessory structures.[5] All other development projects that would not require a certificate of occupancy from the Building Official shall implement Best Management Practices for construction activities as set forth in the Greenbook (for public projects).

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 1: Energy & Water Efficient Buildings			
1. *Cool/Green Roofs*. • Would the project include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under California Green Building Standards Code (Attachment A)?; OR • Would the project roof construction have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot as specified in the voluntary measures under California Green Building Standards Code?; OR • Would the project include a combination of the above two options? Check "N/A" only if the project does not include a roof component. The roof will have sheathing with a a solar reflection index equal to the values in the voluntary measures under CAL green building standards code.	☑	☐	☐

[5] Actions that are not subject to Step 2 would include, for example: 1) discretionary map actions that do not propose specific development, 2) permits allowing wireless communication facilities, 3) special events permits, 4) use permits or other permits that do not result in the expansion or enlargement of a building (e.g., decks, garages, etc.), and 5) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

2. *Plumbing fixtures and fittings* With respect to plumbing fixtures or fittings provided as part of the project, would those low-flow fixtures/appliances be consistent with each of the following: Residential buildings: • Kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute at 60 psi; • Standard dishwashers: 4.25 gallons per cycle; • Compact dishwashers: 3.5 gallons per cycle; and • Clothes washers: water factor of 6 gallons per cubic feet of drum capacity? Nonresidential buildings: • Plumbing fixtures and fittings that do not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the California Green Building Standards Code (See Attachment A); and • Appliances and fixtures for commercial applications that meet the provisions of Section A5.303.3 (voluntary measures) of the California Green Building Standards Code (See Attachment A)? Check "N/A" only if the project does not include any plumbing fixtures or fittings. The residences will provide those requirements as noted for residential buildings in item 2 above.	☑	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use			
3. *Electric Vehicle Charging* • Multiple-family projects of 17 dwelling units or less: Would 3% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official, to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents? • Multiple-family projects of more than 17 dwelling units: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents? • Non-residential projects: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use? Check "N/A" only if the project is a single-family project or would not require the provision of listed cabinets, boxes, or enclosures connected to a conduit linking the parking spaces with electrical service, e.g., projects requiring fewer than 10 parking spaces. The project is a single family project but the homes will include options for EV charging stations within the garages. Conduits will be provided for future wiring for 110 or 220 voltage depending on the requirements of the owners electric vehicle type.	☐	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use (Complete this section if project includes non-residential or mixed uses)			
4. *Bicycle Parking Spaces* Would the project provide more short- and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5)?[6] Check "N/A" only if the project is a residential project. The proposed four single family homes has attached garages where bicycle storage is provided.	☐	☐	☐

[6] Non-portable bicycle corrals within 600 feet of project frontage can be counted towards the project's bicycle parking requirements.

5. *Shower facilities*

If the project includes nonresidential development that would accommodate over 10 tenant occupants (employees), would the project include changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code as shown in the table below?

Number of Tenant Occupants (Employees)	Shower/Changing Facilities Required	Two-Tier (12" X 15" X 72") Personal Effects Lockers Required
0-10	0	0
11-50	1 shower stall	2
51-100	1 shower stall	3
101-200	1 shower stall	4
Over 200	1 shower stall plus 1 additional shower stall for each 200 additional tenant-occupants	1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants

Check "N/A" only if the project is a residential project, or if it does not include nonresidential development that would accommodate over 10 tenant occupants (employees).

The project does not propose nor contain non-residential development.

☐ ☐ ☐

6. *Designated Parking Spaces*

If the project includes a nonresidential use in a TPA, would the project provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles in accordance with the following table?

Number of Required Parking Spaces	Number of Designated Parking Spaces
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10% of total

This measure does not cover electric vehicles. See Question 4 for electric vehicle parking requirements.

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it.

Check "N/A" only if the project is a residential project, or if it does not include nonresidential use in a TPA.

The project does not propose any nonresidential use in a TPA.

☐ ☐ ☐

7. *Transportation Demand Management Program* If the project would accommodate over 50 tenant-occupants (employees), would it include a transportation demand management program that would be applicable to existing tenants and future tenants that includes: At least one of the following components: • Parking cash out program • Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools • Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development And at least three of the following components: • Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees • On-site carsharing vehicle(s) or bikesharing • Flexible or alternative work hours • Telework program • Transit, carpool, and vanpool subsidies • Pre-tax deduction for transit or vanpool fares and bicycle commute costs • Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within 1,320 feet (1/4 mile) of the structure/use? Check "N/A" only if the project is a residential project or if it would not accommodate over 50 tenant-occupants (employees). Project is a residential project. The project is a residential project and does not accommodate over any employees.	☐	☐	☐

Step 3: Project CAP Conformance Evaluation (if applicable)

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option B. The purpose of this step is to determine whether a project that is located in a TPA but that includes a land use plan and/or zoning designation amendment is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. In general, a project that would result in a reduction in density inside a TPA would not be consistent with Strategy 3.The following questions must each be answered in the affirmative and fully explained.

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?**
   Considerations for this question:
   - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
   - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
   - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?**
   Considerations for this question:
   - Does the proposed project support/incorporate identified transit routes and stops/stations?
   - Does the project include transit priority measures?

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
   - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
   - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?**
   Considerations for this question:
   - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
   - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
   - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?**
   Considerations for this question:
   - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
   - Does the proposed project include policies or strategies for preserving existing trees?
   - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST
ATTACHMENT A

This attachment provides performance standards for applicable Climate Action Pan (CAP) Consistency Checklist measures.

Table 1 Roof Design Values for Question 1: Cool/Green Roofs supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan

Land Use Type	Roof Slope	Minimum 3-Year Aged Solar Reflectance	Thermal Emittance	Solar Reflective Index
Low-Rise Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
High-Rise Residential Buildings, Hotels and Motels	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
Non-Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 residential and non-residential voluntary measures shown in Tables A4.106.5.1 and A5.106.11.2.2, respectively. Roof installation and verification shall occur in accordance with the CALGreen Code.

CALGreen does not include recommended values for low-rise residential buildings with roof slopes of ≤ 2:12 for San Diego's climate zones (7 and 10). Therefore, the values for climate zone 15 that covers Imperial County are adapted here.

Solar Reflectance Index (SRI) equal to or greater than the values specified in this table may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

Table 2	Fixture Flow Rates for Non-Residential Buildings related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan
Fixture Type	**Maximum Flow Rate**
Showerheads	1.8 gpm @ 80 psi
Lavatory Faucets	0.35 gpm @60 psi
Kitchen Faucets	1.6 gpm @ 60 psi
Wash Fountains	1.6 [rim space(in.)/20 gpm @ 60 psi]
Metering Faucets	0.18 gallons/cycle
Metering Faucets for Wash Fountains	0.18 [rim space(in.)/20 gpm @ 60 psi]
Gravity Tank-type Water Closets	1.12 gallons/flush
Flushometer Tank Water Closets	1.12 gallons/flush
Flushometer Valve Water Closets	1.12 gallons/flush
Electromechanical Hydraulic Water Closets	1.12 gallons/flush
Urinals	0.5 gallons/flush

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Tables A5.303.2.3.1 and A5.106.11.2.2, respectively. See the California Plumbing Code for definitions of each fixture type.

Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

Acronyms:
gpm = gallons per minute
psi = pounds per square inch (unit of pressure)
in. = inch

Table 3	**Standards for Appliances and Fixtures for Commercial Application related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**	
Appliance/Fixture Type	**Standard**	
Clothes Washers	Maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations*.	
Conveyor-type Dishwashers	0.70 maximum gallons per rack (2.6 L) (High-Temperature)	0.62 maximum gallons per rack (4.4 L) (Chemical)
Door-type Dishwashers	0.95 maximum gallons per rack (3.6 L) (High-Temperature)	1.16 maximum gallons per rack (2.6 L) (Chemical)
Undercounter-type Dishwashers	0.90 maximum gallons per rack (3.4 L) (High-Temperature)	0.98 maximum gallons per rack (3.7 L) (Chemical)
Combination Ovens	Consume no more than 10 gallons per hour (38 L/h) in the full operational mode.	
Commercial Pre-rinse Spray Valves (manufactured on or after January 1, 2006)	Function at equal to or less than 1.6 gallons per minute (0.10 L/s) at 60 psi (414 kPa) and • Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate. • Be equipped with an integral automatic shutoff. • Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gallons per minute (0.08 L/s) or less.	

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Section A5.303.3. See the California Plumbing Code for definitions of each appliance/fixture type.

Acronyms:
L = liter
L/h = liters per hour
L/s = liters per second
psi = pounds per square inch (unit of pressure)
kPa = kilopascal (unit of pressure)