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

Beeler Canyon Road

PTS# 649669

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

Engineer of Work:

Carl M. Fiorica No. 64715

Provide Wet Signature and Stamp Above Line

Prepared For:

Huy Huynh, Joanne Ling Huynh, Lam Ba Huynh, Vycki Nga Huynh, Linh Ba Huynh

11275 Beeler Caynon Rd

Poway, CA 92064

Prepared By:

BWE Inc.,

9449 Balboa Avenue, Suite 270

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(619) 299-5550

Date:

02/02/2022

Approved by: City of San Diego Date

The City of SAN DIEGO

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

Acronyms

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

Certification Page

Project Name: Beeler Canyon Road
Permit Application PTS# 649669

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

64715

PE#

Expiration Date

Carl M. Fiorica

Print Name

Company

02/02/2022

Date

Engineer's Stamp

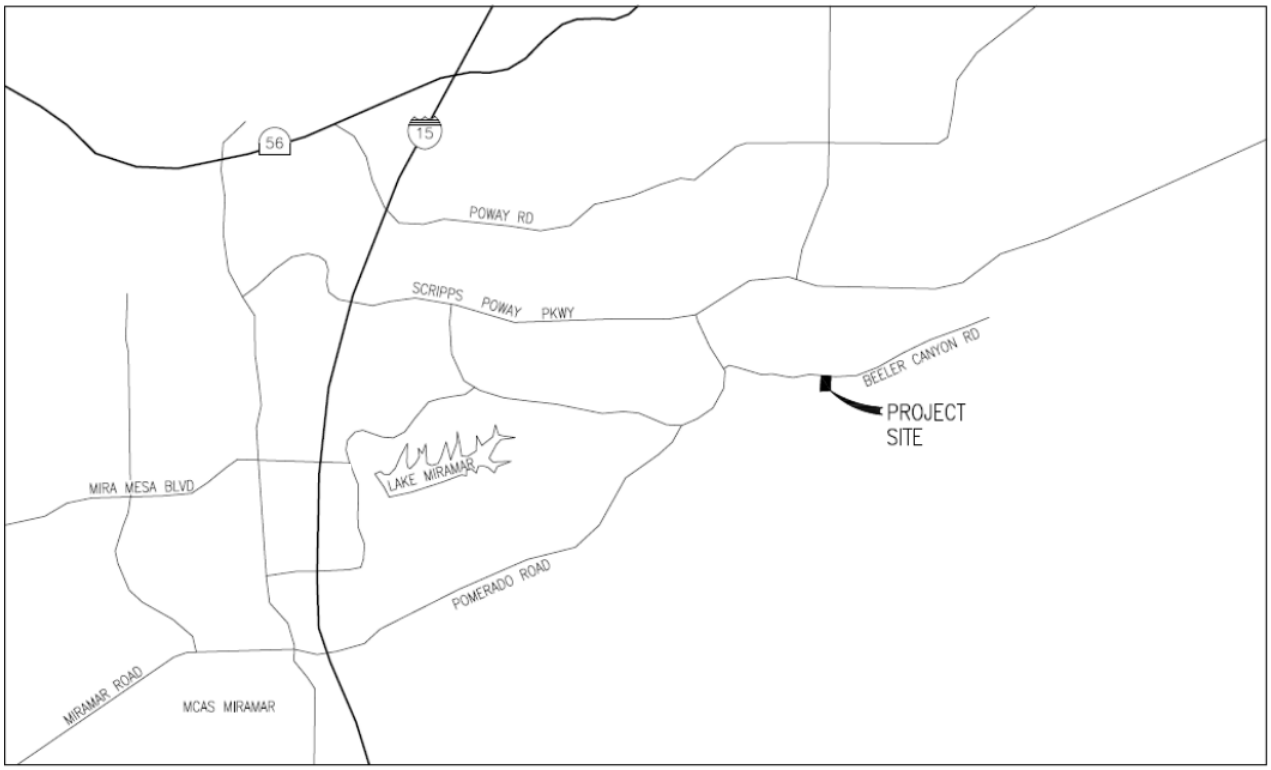
Submittal Record

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	03/02/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	**Initial Submittal**
2	08/30/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Second Submittal
3	02/02/2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Third Submittal
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Vicinity Map

Project Name: Beeler Canyon Road
Permit Application PTS# 649669



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

Attach DS-560 form.

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City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
November 2018

Project Address: Beeler Canyon Road	Project Number: 649669

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 administered by the State Regional Water Quality 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 resulting in ground disturbance and/or contact with storm water?

☒ 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 question 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 only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes below, 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 proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

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

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

PART B: Determine Construction Site Priority

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

Complete PART B and continued to Section 2

1. ☐ **ASBS**

a. Projects located in the ASBS watershed.

2. ☒ **High Priority**

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

b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and not located in the ASBS watershed.

3. ☐ **Medium Priority**

a. Projects that are not located in an ASBS watershed or designated as a High priority site.

b. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and not located in an ASBS watershed.

c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos watershed management area.

4. ☐ **Low Priority**

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

SECTION 2. 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

Clear Page 2

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; project not exempt.

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 Development Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒ Yes ☐ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces**. This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☒ No
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and 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
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

Clear Page 3

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 (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☒ No

9. **New development or redevelopment projects of an automotive repair 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 PERMANENT STORM WATER REQUIREMENTS**. ☐
2. The project is a **STANDARD DEVELOPMENT 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 a hydromodification plan management ☒

Carl M Fiorica	PE
Name of Owner or Agent *(Please Print)*	Title
Signature	Date

Clear Page 4

Clear Form

Applicability of Permanent, Post-Construction Storm Water BMP Requirements	Form I-1

Project Identification

Project Name: Beeler Canyon Road

Permit Application Number: PTS# 649669 | Date: 02/02/2022

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

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

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Beeler Canyon Road
Project Address	11275 Beeler Canyon, San Diego, CA-92064
Assessor's Parcel Number(s) (APN(s))	320-030-3100
Permit Application Number	
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)	Poway #906.20
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	2.795 Acres (121,750 Square Feet)
Area to be disturbed by the project (Project Footprint)	1.73 Acres (75,146 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.45 Acres (19,791 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	1.27 Acres (55,355 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	16.1 %

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 site is undeveloped and in a natural state with shrubs and dense vegetative cover.

Existing Land Cover Includes (select all that apply):

- ☑ Vegetative Cover
- ☐ Non-Vegetated Pervious Areas
- ☐ Impervious Areas

Description / Additional Information:

Existing land cover is dense shrubs and grass.

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:

- ☐ Groundwater Depth < 5 feet
- ☐ 5 feet < Groundwater Depth < 10 feet
- ☐ 10 feet < Groundwater Depth < 20 feet
- ☑ Groundwater Depth > 20 feet

Groundwater Depth Unknown

Existing Natural Hydrologic Features (select all that apply):

- ☑ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☐ None

Description / Additional Information:

An unnamed natural drainage channel is situated at the southwest corner of the site. The flow from upstream tributary drainage area discharges to Beeler Canyon via this channel. The proposed development will not impact this channel.

Form I-3B Page 3 of 11

Description of Existing Site Topography and Drainage

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

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

Descriptions/Additional Information

1. Existing drainage conveyance is natural for the site.

2. The site topography is steep with higher elevations in the south and lower elevations in the northern portion of the site. A portion of the off-site runoff flows north towards a roadside swale located on the south side of Beeler Canyon Rd. this swale discharges to an existing swale on the north of Beeler Canyon Rd, which then discharges to Beeler Creek. The remaining portion of off-site runoff drains to a natural channel located on the southwest side of the site. This channel discharges to Beeler Creek through an existing culvert across Beeler Canyon Rd. Beeler Creek is a tributary to Penasquitos Creek which ultimately discharges to the Pacific Ocean.

3. Existing project site contains a natural channel on the southwest portion of the site and an existing roadside swale on the northern portion of the site, adjacent to Beeler Canyon Rd.

4. The disturbed project area does not drain to the southwest natural channel. Only the runoff for existing and proposed conditions that drains to the northwest portion of the site and is collected by the existing roadside swale south of Beeler Creek was analyzed. A drainage area of 1.73 acres drains north to the roadside swale at a peak rate of 3.69 cfs.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The proposed land use is single family residential (R-1). This project will construct two single family homes with accessory dwelling units, access driveway from Beeler Canyon, new landscape, two stormwater treatment BMPs, and dry and wet utilities.

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

The proposed impervious features are building roofs and concrete access driveways.

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

The proposed pervious features include new landscape and plantings. The majority of the site which is comprised of natural vegetation will be preserved.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

A portion of the site will be graded to construct two single family homes with accessory dwelling units and associated improvements. The majority of the site area will be designated as open space.

Form I-3B Page 5 of 11

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

☑ Yes

☐ No

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

Description / Additional Information:

Runoff from the proposed residences and accessory units is collected by storm drains and directed through storm piping to two biofiltration basins which provide water quality treatment and two underground storage basins/vaults which provide peak rate control and hydromodification control. Roof drains on the site are disconnected. Drainage from the stormwater BMPs is discharged into an existing roadside swale on the south side of Beeler Canyon Rd and flows west off of the project site.

The site is graded to direct off-site flow southwest to an existing natural drainage pathway that eventually connects with the roadside swale on the south side of Beeler Canyon Rd.

Pre- and post- project drainage leaving the site was analyzed in the Drainage Report (see Attachment 5). A summary of drainage areas and design flows leaving the site at Analysis Point 1, located on the northwest corner of the site where the existing roadside swale south of Beeler Canyon Rd leaves the project site.

	Drainage Area (acres)		100 Yr Flow (cfs)			% Mitigated from Existing Condition
	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition (Unmitigated)	Proposed Condition (Mitigated)	
Analysis Point 1 (POC 1)	1.73	1.73	3.69	6.80	3.69	**0**

Form I-3B Page 6 of 11

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

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [ ] Interior parking garages
- [ ] Need for future indoor & structural pest control
- [x] Landscape/outdoor pesticide use
- [ ] Pools, spas, ponds, decorative fountains, and other water features
- [ ] Food service
- [ ] Refuse areas
- [ ] Industrial processes
- [ ] Outdoor storage of equipment or materials
- [ ] 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

Description/Additional Information:

Private on-site drain inlets and storm drain pipe will direct flow from the disturbed project area to two biofiltration basins and two underground storage basins/vaults. Roof drainage is dispersed to landscaping before being collected by storm drain inlets.

Form I-3B Page 7 of 11

Identification and Narrative of Receiving Water

Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)

The project discharges to an existing roadside swale on the south side of Beeler Canyon Road. The site runoff travels west and north through an existing culvert crossing Beeler Canyon Road and to an existing roadside swale on the north side of Beeler Canyon Road. This swale discharges to Beeler Creek, which ultimately discharges to Los Penasquitos Lagoon/Creek and then Pacific Ocean.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations

Los Penasquitos Lagoon (Basin 6.10): REC1, REC2, BIOL, EST, WILD, RARE, MAR, SPWN, SHELL (Existing beneficial uses).
Los Penasquitos Creek: AGR, COLD, IND, REC1, REC2, WARM, WILD. (Existing beneficial uses).
Pacific Ocean: IND, NAV, REC1, REC2, COMM, BIOl, WILD, RARE, MAR, SPWN, AQUA, MIGR, SPWN, SHELL (Existing beneficial uses).

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations

There are no receiving ASBS downstream of the project discharge location.

Provide distance from project outfall location to impaired or sensitive receiving waters

Los Penasquitos Creek, approximately 2.5 miles northwest of the site.

Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands

The project area is not near any environmentally sensitive lands or the City's Multi-Habitat Planning Areas.

Form I-3B Page 8 of 11

Identification of Receiving Water Pollutants of Concern

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

303(d) Impaired Water Body (Refer to Appendix K)	Pollutant(s)/Stressor(s) (Refer to Appendix K)	TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)
Los Penasquitos Lagoon	Sedimentation/Siltation, Toxicity	Sediment
Los Penasquitos Creek	Benthic Community Effects,	Hydromodification, Siltation/Sedimentation
	Bifenthrin, Chlorpyifos,	Freshwater Discharges, Indicator Bacteria
	Indicator Bacteria, Nitrogen,	
	Phosphate, Total Dissolved Solids,	
	Toxicity	

Identification of Project Site Pollutants*

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

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

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

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

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

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

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

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

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

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

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

☐ Yes

☑ No

Discussion / Additional Information:

No critical coarse sediment yield areas to be protected within project footprint or draining to project footprint.

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.

Runoff from the disturbed project area flows north to underground basins/vaults for peak flow and hydromodification control. The flow from these basins/vaults is discharged to an existing roadside swale south of Beeler Canyon Rd and then flows west. The only hydromodification point of compliance (POC #1) is where this existing swale crosses the property line at the northwest corner of the site. See HMP exhibit in attachment 2a for details.

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

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

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

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

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

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

Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11

Other Site Requirements and Constraints

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

The site contains Hydrologic Soil Group D soils, which have low infiltration rate capacity and high runoff potential. Infiltration-based BMPs are not effective for this site.

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.

Source Control BMP Checklist for PDPs	Form I-4B

Source Control BMPs

All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.2.2 not implemented: Private storm inlets direct flow to biofiltration basins and underground storage basins, which then discharge to existing roadside swale.			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented: No permanent outdoor materials storage areas on-site.			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented: No permanent outdoor work areas on-site.			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.5 not implemented: Residential/single-family trash collection, no permanent trash storage areas on-site.			

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☐ Yes	☑ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☐ Yes	☐ No	☑ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☐ Yes	☐ No	☑ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			
Private storm inlets direct flow to biofiltration basins and underground storage basins, which then discharge to existing roadside swale.			

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

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

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.1 not implemented: Site is designed to maintain the existing drainage pattern to the maximum extent practicable. Natural drainage pathway on southwest portion of the site will be maintained, no disturbed project area runoff flows to this pathway. Hydromodification/ peak rate control will be provided by underground basins/vaults to maintain existing flow conditions to the existing roadside swale on the north portion of the site.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☑ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.2 not implemented: The majority of the site and existing vegetation is not disturbed and will be preserved in the proposed condition.			

Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.3 not implemented: The majority of the site is kept as undeveloped to minimize impervious area. The site contains Hydrologic Soil Group D soils, which are not conducive to infiltration and infiltration-based practices such as permeable pavement.			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: Roof downspouts are not directly connected to storm sewer. Roof drainage is dispersed to pervious surface before being collected by storm drain inlets, but the site does not meet the design criteria in 4.3.5 Fact Sheet.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Form I-5B Page 3 of 4			
Site Design Requirement	**Applied?**		
4.3.6 Runoff Collection	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.6 not implemented: With Hydrologic Soil D soils onsite, infiltration and infiltration-based BMPs like permeable pavers are not feasible on-site. Alternative BMPs are proposed on-site.			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: The 36-hr water demand is too small to be considered for harvest and reuse.			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Form I-5B Page 4 of 4

Insert Site Map with all site design BMPs identified:

See DMA Exhibit in Attachment 1a.

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

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

The Proposed BMPs are selected by following the criteria in Chapter 5 of the City of San Diego Storm Water Standards Manual (January 2018). The Design Capture Volume (DCV) is calculated for each Drainage Management Area (DMA). Harvest and Use BMPs are determined to be infeasible as the site's 36-hour toilet and landscaping demand is minimal. A Geotechnical investigation has not been performed and mapped Soil Type D is utilized to assume an infiltration rate of 0.05 in/hr. After implementing site design and source control BMPs where feasible, the following structural BMPs were designed.

Bifiltration BMP (BF-1): Two biofiltration basins are used to comply with the pollutant control requirements of the permit. The Design Capture Volume (DCV) is calculated for each DMA considering the 85th percentile, 24-hr rainfall depth of 0.60" for this site.

Beneath each biofiltration basin is an underground storage basin. Each vault is sized to comply with the hydromodification flow control requirements of the site. Additionally, the vaults are sized to provide sufficient storage to meet peak flow rate requirements of the site.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of

(Continued from page 1)

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Carl Fiorica, P.E. (619) 245-3011
Who will be the final owner of this BMP?	
Who will maintain this BMP into perpetuity?	
What is the funding mechanism for maintenance?	

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 2	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Carl Fiorica, P.E. (619) 245-3011
Who will be the final owner of this BMP?	
Who will maintain this BMP into perpetuity?	
What is the funding mechanism for maintenance?	

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

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 3	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☑ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☑ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Carl Fiorica, P.E. (619) 245-3011
Who will be the final owner of this BMP?	
Who will maintain this BMP into perpetuity?	
What is the funding mechanism for maintenance?	

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP 3, Underground Permavoid Vault System is located underneath BMP 1 Biofiltration basin.

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 4	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Carl Fiorica, P.E. (619) 245-3011
Who will be the final owner of this BMP?	
Who will maintain this BMP into perpetuity?	
What is the funding mechanism for maintenance?	

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP 4, Underground Permavoid Vault System is located underneath BMP 2 Biofiltration basin.

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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: Beeler Canyon Road, PTS# 649669

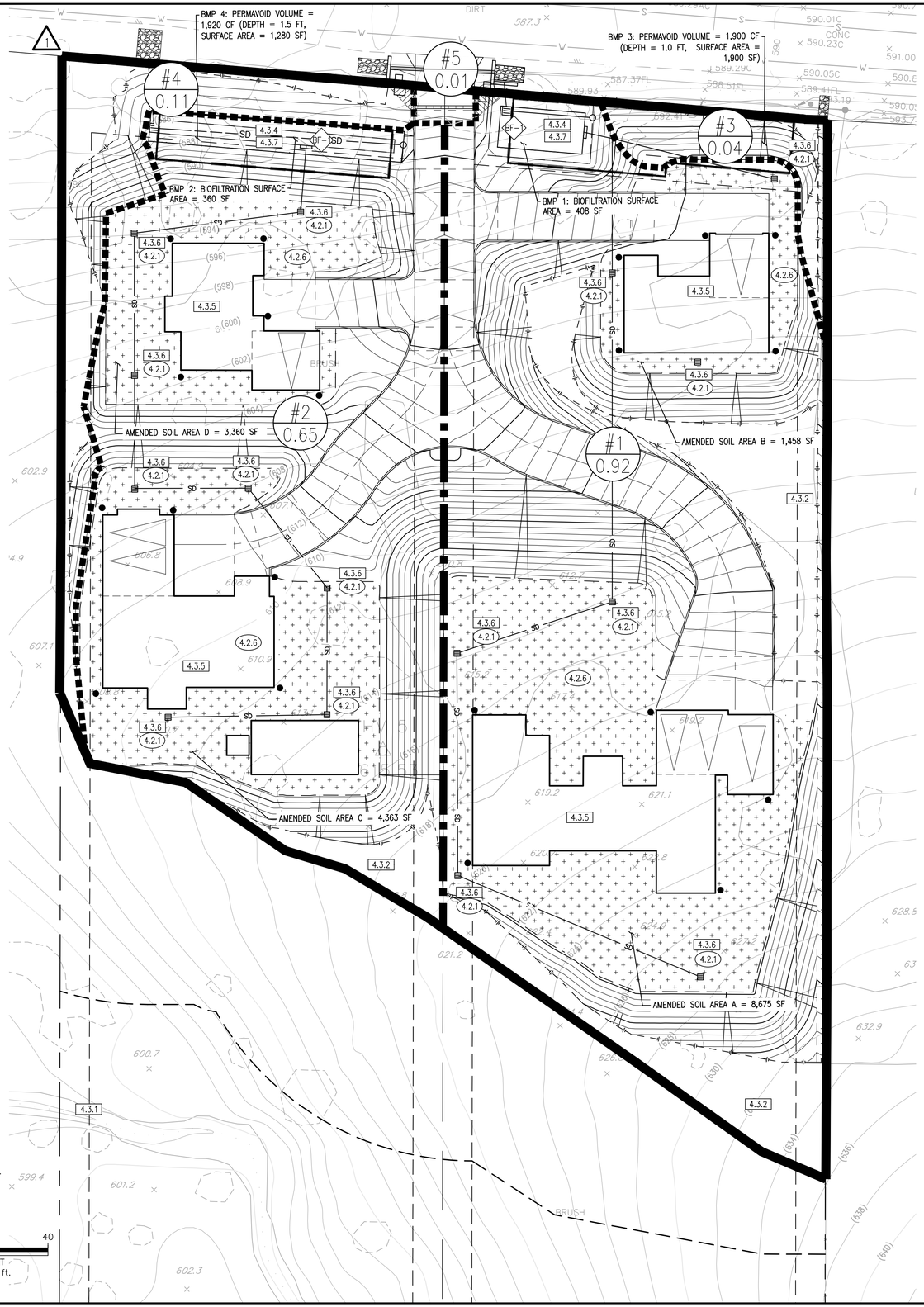
Indicate which Items are Included:

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

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

The DMA Exhibit must identify:

- [x] Underlying hydrologic soil group
- [ ] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- [x] 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, size/detail, and include cross-section)



LEGEND

	SYMBOL
OUTER DMA BOUNDARY	
MAJOR DMA BOUNDARY	
MINOR DMA BOUNDARY	
EXISTING STORM DRAIN	SD
NEW STORM DRAIN	SD
EXISTING CONTOUR	XXX
NEW CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
POINT OF COMPLIANCE (POC)	1
DRAINAGE MANAGEMENT AREA MARKER & AREA (AC)	B–X X.XX
AMENDED LANDSCAPE AREAS MEETING REQUIREMENTS IN SD-B AND SD-F FACT SHEETS	

DMA AREAS

DMA ID	TOTAL AREA (AC)	TOTAL AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	REQUIRED BIOFILTRATION FOOTPRINT (SF)	NOTES
1	0.92	40174	28216	11958	407	TREATED BY BMP#1: BIOFILTRATION BASIN WITH 6" OF PONDING, PROVIDED FOOTPRINT AREA = 408 SF
2	0.65	28360	20376	7984	277	TREATED BY BMP#2: BIOFILTRATION BASIN WITH 6" OF PONDING, PROVIDED FOOTPRINT AREA = 360 SF
3	0.04	1705	1705	0	0	SELF-MITIGATING AREA
4	0.11	4657	4657	0	0	SELF-MITIGATING AREA
5	0.01	250	0	250	0	DE-MINIMIS AREA

SOURCE CONTROL BMP KEYNOTES

4.2.1 PREVENT ILLICIT DISCHARGES INTO THE MS4

4.2.6 ADDITIONAL BMPS DEFINED IN STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

SITE DESIGN BMP KEYNOTES

4.3.1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES

4.3.2 CONSERVE NATURAL AREAS, SOILS, AND VEGETATION

4.3.4 MINIMIZE SOIL COMPACTION

4.3.5 DISPERSE IMPERVIOUS AREAS

4.3.6 COLLECT RUNOFF

4.3.7 LANDSCAPE WITH NATIVE OR DROUGHT TOLERANT SPECIES

STRUCTURAL BMP KEYNOTES

BF BIOFILTRATION BMP

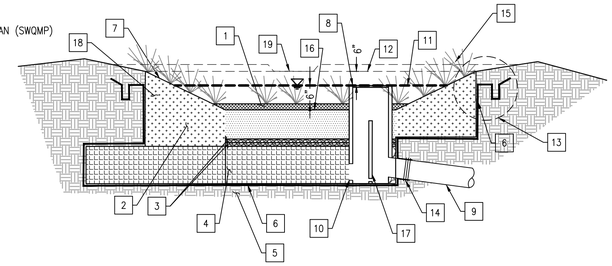
SWQMP NOTES

1. THE SITE IS COMPRISED OF HYDROLOGIC SOIL TYPE D.
2. NO CRITICAL COARSE SEDIMENT YIELD AREAS ARE PRESENT ON SITE.
3. DEPTH TO GROUNDWATER IS UNKNOWN.
4. THERE ARE NO NATURAL HYDROLOGIC FEATURES PRESENT WITHIN DISTURBANCE LIMIT.

VOLUME RETENTION

BMP #1/3 REQUIRED RETENTION VOLUME = 72 CF
LANDSCAPE AREAS A AND B PROVIDED RETENTION VOLUME = 339 CF

BMP #2/4 REQUIRED RETENTION VOLUME = 49 CF
LANDSCAPE AREAS C AND D PROVIDED RETENTION VOLUME = 660 CF



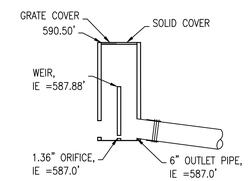
BIOFILTRATION BMP
NO SCALE

BIOFILTRATION NOTES

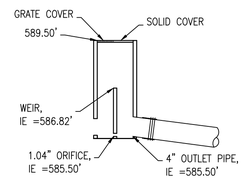
1. 3" WELL-AGED HARDWOOD NON-FLOATABLE MULCH
2. MIN 18" SOIL MEDIA WITH MIN 5 IN/HR FILTRATION RATE
   85% WASHED SAND BY VOLUME
   15% COMPOST OR ALTERNATIVE ORGANIC AMENDMENT BY VOLUME
3. FILTER COURSE: 3" WASHED ASTM 33 SAND OVERLYING 3" ASTM NO 8 STONE
4. PERMAVOID PV150 STORAGE
   (BMP 3 = 12", BMP 4 = 18")
5. EXISTING UNCOMPACTED SUBGRADE
6. 30 MIL IMPERMEABLE LINER
7. SIDE SLOPE (3:1 MAX)
8. OVERFLOW STRUCTURE, TYPE G-2 CATCH BASIN PER SDRSD D-08
9. OUTLET PIPE, SIZE AND MATERIAL PER PLAN
10. PERMAVOID CONNECTION PIPE (PER MANUFACTURER)
    BMP 1 = 587.0IE, BMP 2 = 585.5IE
11. SURFACE PONDING DEPTH (6" ABOVE TOP OF MULCH LAYER)
12. 6" MIN. FREEBOARD
13. SEE ENLARGEMENT DETAIL FOR LINER ANCHOR IN SOIL
14. CLAMP LINER TO OUTLET PIPE FOR WATERTIGHT SEAL
15. PLANTING PER LANDSCAPE PLANS. PLAN TYPE SHALL CONFORM TO THE CITY/COUNTY OF SAN DIEGO LID STANDARDS
16. TOP OF BIOFILTERATION SOIL MEDIA. CALLED OUT AS "FS" ON THE PLAN, ADD 3" TO TOP OF MULCH LAYER
17. LOW FLOW WEIR/ORIFICE STRUCTURE, SEE DETAIL
18. PLANTING SOIL PER LANDSCAPE PLANS
19. OVERFLOW SPILLWAY, LOCATION PER PLANS

LEGEND

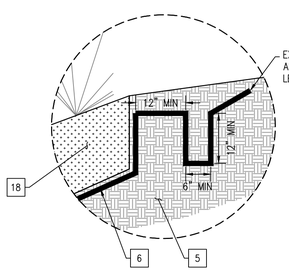
18" SOIL MEDIA
PERMAVOID SYSTEM (BMP 1 = 12", BMP 2=18")
3" MULCH
6" FILTER COURSE
PLANTING SOIL



BMP 1: LOW FLOW WEIR/ORIFICE



BMP 2: LOW FLOW WEIR/ORIFICE



TYPICAL BIOFILTRATION LINER ANCHOR IN SOIL

NOTES

1. BIORETENTION SOIL MEDIA (BSM) SHALL BE LIGHTLY COMPACTED AND PLACED IN LOOSE LIFTS APPROXIMATELY 12 INCHES TO ENSURE REASONABLE SETTLEMENT WITHOUT EXCESSIVE COMPACTION. COMPACTION WITHIN THE BSM AREA SHALL NOT EXCEED 75 TO 85% STANDARD PROCTOR WITHIN THE DESIGNED DEPTH OF THE BSM.
2. CONTRACTOR SHALL HIRE A LICENSED LAND SURVEYOR TO STAKE THE SUBGRADE OF THE ROCK STORAGE LAYER, BIORETENTION PONDING SURFACE, AND TOP SLOPE OF BIORETENTION BASIN. MINIMUM SURFACE AREAS AND DEPTHS SHALL BE PROVIDED PER PLANS.
3. CONTRACTOR IS REQUIRED TO NOTIFY ENGINEER OF RECORD (EOR) DURING CONSTRUCTION FOR INSPECTION OF THE SUBGRADE AND INSTALLATION OF THE LINER, ROCK STORAGE, SUBDRAINAGE, SOIL MEDIA AND OVERFLOW STRUCTURE. IF EOR IS NOT NOTIFIED, CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REMOVING LAYERS AND REPLACING AS NEEDED FOR PROPER INSPECTION.
4. CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY PREPARED BY A LICENSED LAND SURVEYOR OF THE BIORETENTION BASIN.
5. CONTRACTOR SHALL PROVIDE CONTRACTOR SUBMITTALS FOR ALL BIORETENTION MATERIALS FOR THE EOR'S REVIEW. THIS INCLUDES, BUT IS NOT LIMITED TO: SOIL MIX, MULCH, FILTER LAYER, AGGREGATE BASE, IMPERMEABLE LINER AND OVERFLOW STRUCTURE.

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123
619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE: 02/02/2022
DRAWN BY: NJW
CHECKED BY: MGC
BME JOB NUMBER: 1190UL3.00
CLIENT JOB NUMBER:
MUNICIPALITY
PROJECT NUMBER: PTS 649669

SHEET TITLE: DMA EXHIBIT

SHEET 1 OF 1

PROJECT: BEELER CANYON ROAD

SITE ADDRESS

PARCEL 3 OF MAP 6554

PLOT: M:\PROJECTS\11500\1190UL3.00 BEELER CANYON TWYAN RESIDENCE\DWGS\EXHIBITS\SWQMP\1190UL3.00-DMAS-EXHB_FORRESUBMITTAL.DWG Nathan Warner 2/2/2022 3:50 PM

85th % Rainfall Depth= 0.6 inch

Tabular Summary of DMAs									Worksheet B-1
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient (C)	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
#1	0.92	0.27	29.8%	D	0.338	679	BMP #1	Biofiltration	1
#2	0.65	0.18	28.2%	D	0.325	461	BMP #2	Biofiltration	1
#3	0.04	0.00	0.0%	D	0.100	9	Self-Mitigating	N/A	1
#4	0.11	0.00	0.0%	D	0.100	23	Self-Mitigating	N/A	1
#5	0.01	0.01	100.0%	D	0.900	11	De-minimis Area	N/A	1
Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
5	1.73	0.46	26.9%	D	0.315	1183	1.57		1

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

Modified Estimated Total Water Use Calculation

Modified ETWU = ($ET0_{wet}$) x [[∑(PF x HA)/IE] + SLA] x 0.015

where:

Modified ETWU	=	Estimated daily average water usage during wet season
ETo_{Wet}	=	Average reference evapotranspiration from November through April (use 2.7 inches per month, using CIMS Zone 4 from Table G.1-1)
PF	=	Plant Factor
HA	=	Hydrozone Area (sq-ft); A section or zone of the landscaped area having plants with similar water needs. Σ(PF x HA) = The sum of PF x HA for each individual Hydrozone (accounts for different landscaping zones).
IE	=	Irrigation Efficiency (assume 90 percent for demand calculations)
SLA	=	Special Landscape Area (sq-ft); Areas used for active and passive recreation areas, areas solely dedicated to the production of fruits and vegetables, and areas irrigated with reclaimed water.

Enter Irrigation Efficiency (IE)	0.90

Plant Water Use Type	Plant Factor
Low	0.1 - 0.2
Moderate	0.3 - 0.7
High	0.80
SLA	1.00

Hydrozone	Plant Water Use Type (s) (low, medium, high)	Plant Factor (PF)	Hydrozone Area (HA) (ft^2)	PF x HA (ft^2)
1	Moderate	0.50	54,953	27,477
				0
				27,477
	SLA	1	0	0
		Sum		**27,477**

Results

Modified ETWU=	1,236	**gal**	
	165	**cf**	
36 hr Demand=	**248**	**cf**	

Total 36 hr Demand =	**259**	**cf**

Toilet & Urinal Water Usage Calculation

Land Use Type: Single Family Residential

Total Units= 4

Occupancy Factor = 1 (assuming 85% occupancy)

Avg. Occupants per Unit = 2.00

Description	Volume (gallons/flush)	Total Use gal/day/resident	Resident Count	Daily Water Use gal/day
Toilet Flushing	1.28	6.86	8.0	55
Urinals				
			Total Daily Volume	**55**

Total 36 hr Demand =	**82**	**gal**
	11	**cf**

Per table B.3-1 the total use per resident per day is 18.5 based on 3.45 gpf which equals 5.36 flush/day.
Using 1.28 gpf *5.36 flush/day we obtain 6.86 gpd per resident.

gpf= gallon per flush
gpd= gallon per day

Harvest and Use Feasibility Checklist	Worksheet B.3-1 : Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?

☑ Toilet and urinal flushing
☑ Landscape irrigation
☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]
Toilet and urinal flushing = 11 CF
Landscape irrigation = 248 CF
Total 36-hour demand = 259 CF

3. Calculate the DCV using worksheet B-2.1.
DCV = 1,140 (cubic feet)
[Provide a summary of calculations here]

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

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

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

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

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

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

NRCS Soil Survey Maps show the site to contain HSG D soils. Therefore, a minimal infiltration rate of 0.5inhr is assumed. Infiltration testing will be performed during the Final Engineering phase.

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

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

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

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

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

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

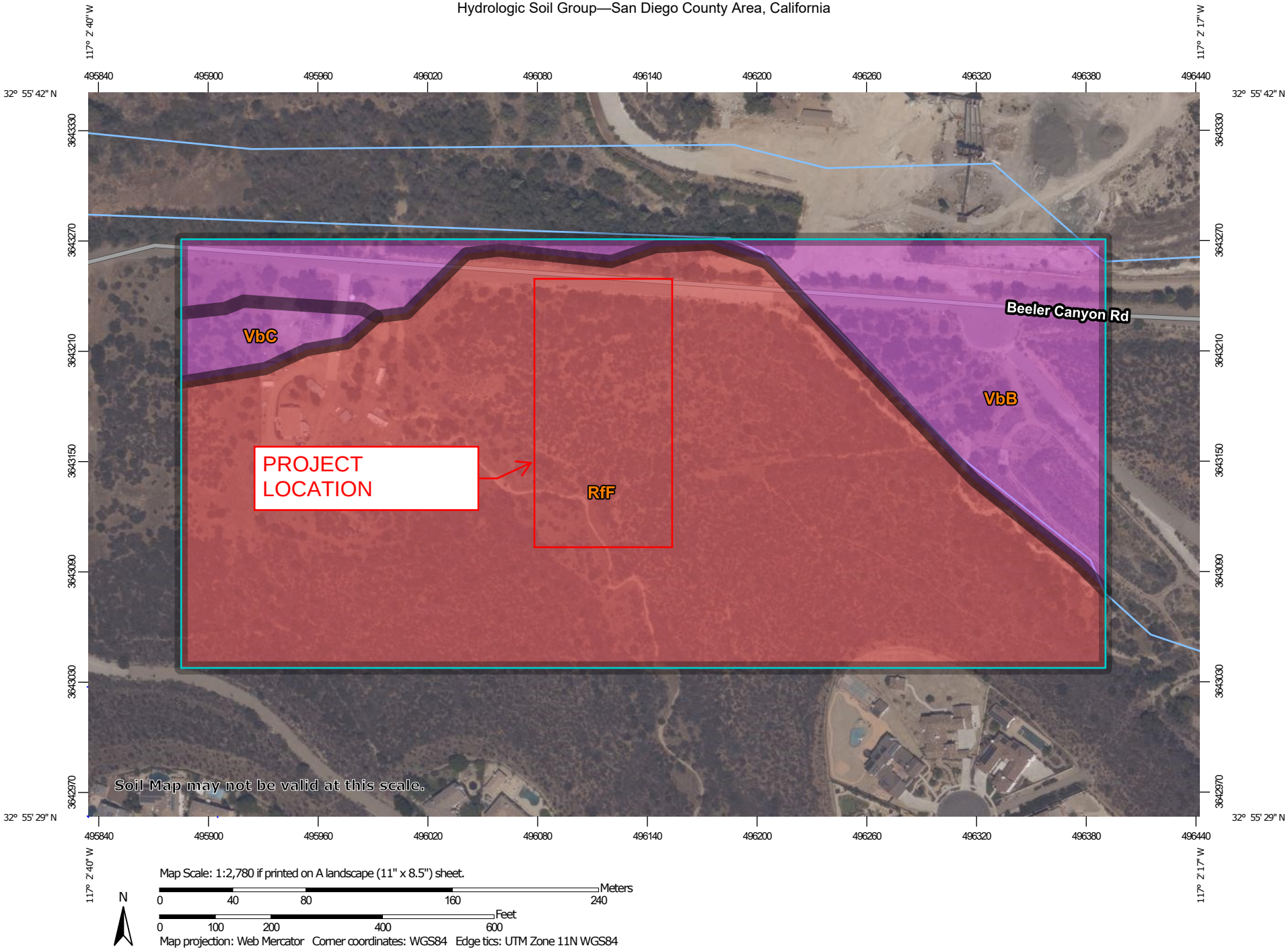
Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result,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

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]
Summarize findings and basis; provide references to related reports or exhibits.	

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

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


117° 2' 40" W
117° 2' 17" W
32° 55' 42" N
32° 55' 29" N
495840
495900
495960
496020
496080
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496200
496260
496320
496380
496440
3643330
3643270
3643210
3643150
3643090
3643030
3642970
VbC
VbB
RfF
Beeler Canyon Rd
PROJECT LOCATION
Soil Map may not be valid at this scale.
Map Scale: 1:2,780 if printed on A landscape (11" x 8.5") sheet.
N
0 40 80 160 240 Meters
0 100 200 400 600 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

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

Date(s) aerial images were photographed: Aug 22, 2018—Aug 31, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RfF	Redding cobbly loam, dissected, 15 to 50 percent slopes	D	22.0	75.2%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	A	6.5	22.2%
VbC	Visalia gravelly sandy loam, 5 to 9 percent slopes	A	0.8	2.6%
Totals for Area of Interest			**29.3**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Project: Beeler Canyon Road

DMA 1 (BMP #1)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	11,958	0.90	10,762	
Landscape	28,216	0.10	2,822	
Gravel/DG	0	0.30	0	
Total	**40,174**		**13,584**	**0.338**

0.92 Acres

Project: Beeler Canyon Road

DMA 1 (BMP #1)

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.6	inches
2	Area tributary to BMP (s)	A=	0.92	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.338	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**679**	cubic-feet

The City of SAN DIEGO	Project Name	Beeler Canyon Road	
	BMP ID	BMP #1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	40,174	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.338	
3	85th percentile 24-hour rainfall depth	0.6	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	679	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	15.6	inches
15	Total Depth Treated [Line 13 + Line 14]	45.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1018	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	268	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	509	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	392	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	407	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	407	sq. ft.
23	Provided BMP Footprint	408	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Beeler Canyon	
	BMP ID	BMP #1/3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	44,170	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.662	
3	85th percentile 24-hour rainfall depth	0.6	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1462	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C	0.1	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.05	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	15.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.106	
10	Target volume retention [Line 9 x Line 4]	155	cu. ft.

The City of SAN DIEGO	Project Name	Beeler Canyon
	BMP ID	BMP #1/3

Volume Retention for No Infiltration Condition							Worksheet B.5-6	
1	Area draining to the biofiltration BMP						44170	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.662	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						29241	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						877	sq. ft.
5	Biofiltration BMP Footprint						408	sq. ft.
Landscape Area (must be identified on DS-3247)								
		Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		8675	1458				
7	Impervious area draining to the landscape area (sq. ft.)		3944	1639				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.45	1.12	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		2629	1093	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					3722		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					4130		sq. ft.
Volume Retention Performance Standard								
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					4.71		
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					72		cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-267.12		cu. ft.
Site Design BMP								
	Identification	**Site Design Type**				**Credit**		
16	**1**							cu. ft.
	2							cu. ft.
	3							cu. ft.
	4							cu. ft.
	5							cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0		cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met					

Project: Beeler Canyon Road

DMA 2 (BMP #2)

Area Weighted Runoff Factor (C)

Surface Type	Area - A (sf)	C - Factor	C X A	Weighted C-Factor
Impervious	7,984	0.90	7,186	
Landscape	20,376	0.10	2,038	
Gravel/DG	0	0.30	0	
Total	**28,360**		**9,223**	**0.325**

0.65 Acres

Project: Beeler Canyon Road

DMA 2 (BMP #2)

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.6	inches
2	Area tributary to BMP (s)	A=	0.65	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.325	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	**DCV=**	**461**	cubic-feet

The City of SAN DIEGO	Project Name	Beeler Canyon Road	
	BMP ID	BMP #2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	28,360	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.325	
3	85th percentile 24-hour rainfall depth	0.6	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	461	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	15.6	inches
15	Total Depth Treated [Line 13 + Line 14]	45.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	691	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	182	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	346	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	266	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	277	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	277	sq. ft.
23	Provided BMP Footprint	360	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Beeler Canyon	
	BMP ID	BMP #2/4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	28,360	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.325	
3	85th percentile 24-hour rainfall depth	0.6	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	461	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C	0.1	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.05	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	15.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.106	
10	Target volume retention [Line 9 x Line 4]	49	cu. ft.

The City of SAN DIEGO	Project Name	Beeler Canyon
	BMP ID	BMP #2/4

Volume Retention for No Infiltration Condition							Worksheet B.5-6	
1	Area draining to the biofiltration BMP						28360	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.325	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						9217	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						277	sq. ft.
5	Biofiltration BMP Footprint						360	sq. ft.
Landscape Area (must be identified on DS-3247)								
		Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		4363	3360				
7	Impervious area draining to the landscape area (sq. ft.)		3372	1679				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.77	0.50	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		2248	1119	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					3367		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					3727		sq. ft.
Volume Retention Performance Standard								
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					13.48		
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					49		cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-611.52		cu. ft.
Site Design BMP								
	Identification	**Site Design Type**				**Credit**		
16	**1**							cu. ft.
	2							cu. ft.
	3							cu. ft.
	4							cu. ft.
	5							cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0		cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met					

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Attachment 2
Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

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

Project Name: Beeler Canyon Road, PTS# 649669

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: Beeler Canyon Road, PTS# 649669

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

The Hydromodification Management Exhibit must identify:

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

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LEGEND	SYMBOL
OUTER BASIN BOUNDARY	(solid heavy line)
MINOR BASIN BOUNDARY	(dashed heavy line)
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	(arrow)
HMP COMPLIANCE POINT	(triangle 1)
DRAINAGE BASIN MARKER & AREA (AC)	B-X / X.XX

HMP NOTES

1. THE SITE IS COMPRISED OF HYDROLOGIC SOIL TYPE D.
2. NO CRITICAL COARSE SEDIMENT YIELD AREAS ARE PRESENT ON SITE.
3. DEPTH TO GROUNDWATER IS UNKNOWN.
4. THERE ARE NO NATURAL HYDROLOGIC FEATURES PRESENT WITHIN DISTURBANCE LIMIT.

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123
619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE:	08/24/2021
DRAWN BY:	MDS
CHECKED BY:	MGC
BWE JOB NUMBER:	11900U3.00
CLIENT JOB NUMBER:	
MUNICIPALITY PROJECT NUMBER:	PTS 649669

SHEET TITLE

EXISTING CONDITION HMP EXHIBIT

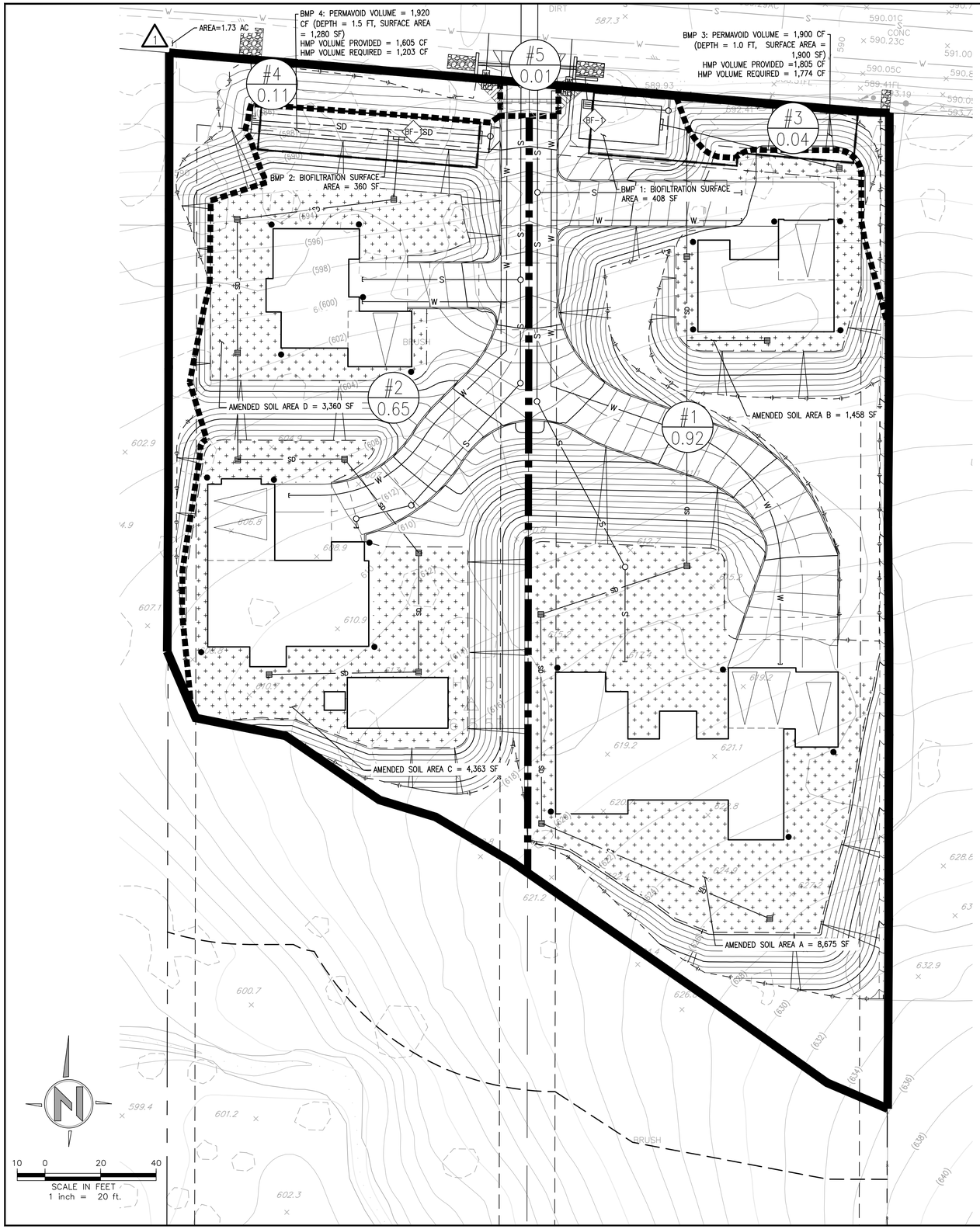
SHEET 1 OF 1

PROJECT

BEELER CANYON ROAD

SITE ADDRESS

PARCEL 3 OF MAP 6554



LEGEND

	SYMBOL
OUTER DMA BOUNDARY	
MAJOR DMA BOUNDARY	
MINOR DMA BOUNDARY	
EXISTING STORM DRAIN	SD
NEW STORM DRAIN	SD
EXISTING CONTOUR	XXX
NEW CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
POINT OF COMPLIANCE (POC)	1
DRAINAGE MANAGEMENT AREA MARKER & AREA (AC)	B–X X.XX
AMENDED LANDSCAPE AREAS MEETING REQUIREMENTS IN SD–B AND SD–F FACT SHEETS	

HMP NOTES

1. THE SITE IS COMPRISED OF HYDROLOGIC SOIL TYPE D.
2. NO CRITICAL COARSE SEDIMENT YIELD AREAS ARE PRESENT ON SITE.
3. DEPTH TO GROUNDWATER IS UNKNOWN.
4. THERE ARE NO NATURAL HYDROLOGIC FEATURES PRESENT WITHIN DISTURBANCE LIMIT.

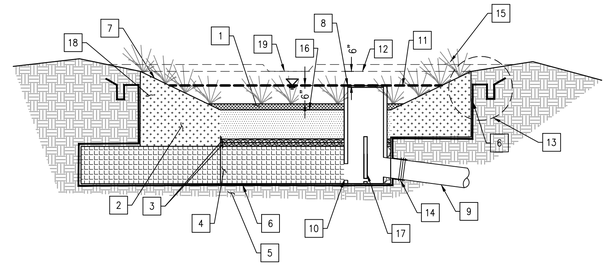
VOLUME RETENTION

BMP #1/3 REQUIRED RETENTION VOLUME = 72 CF
LANDSCAPE AREAS A AND B PROVIDED RETENTION VOLUME = 339 CF

BMP #2/4 REQUIRED RETENTION VOLUME = 49 CF
LANDSCAPE AREAS C AND D PROVIDED RETENTION VOLUME = 660 CF

HYDROMODIFICATION AREAS

DMA ID	TOTAL AREA (AC)	TOTAL AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	HMP STORAGE REQUIRED (CF)	NOTES
1	0.92	40174	28216	11958	1774	HMP PROVIDED BY BMP#3: UNDERGROUND VAULT WITH HMP STORAGE PROVIDED = 1,805 CF
2	0.65	28360	20376	7984	1203	HMP PROVIDED BY BMP#4: UNDERGROUND VAULT WITH HMP STORAGE PROVIDED = 1,605 CF
3	0.04	1705	1705	0	0	SELF–MITIGATING AREA
4	0.11	4657	4657	0	0	SELF–MITIGATING AREA
5	0.01	250	0	250	0	DE–MINIMIS AREA



BIOFILTRATION/UNDERGROUND VAULT BMP
NO SCALE

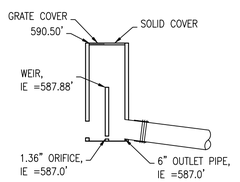
BIOFILTRATION NOTES

1. 3" WELL–AGED HARDWOOD NON–FLOATABLE MULCH
2. MIN 18" SOIL MEDIA WITH MIN 5 IN/HR FILTRATION RATE
   85% WASHED SAND BY VOLUME
   15% COMPOST OR ALTERNATIVE ORGANIC AMENDMENT BY VOLUME
3. FILTER COURSE: 3" WASHED ASTM 33 SAND OVERLYING 3" ASTM NO 8 STONE
4. PERMAVOID PV150 STORAGE
   (BMP 3 = 12" DEPTH, BMP 4 = 18" DEPTH)
5. EXISTING UNCOMPACTED SUBGRADE
6. 30 MIL IMPERMEABLE LINER
7. SIDE SLOPE (3:1 MAX)
8. OVERFLOW STRUCTURE, TYPE G–2 CATCH BASIN PER SDRSD D–08
9. OUTLET PIPE, SIZE AND MATERIAL PER PLAN
10. PERMAVOID CONNECTION PIPE (PER MANUFACTURER)
    BMP 1 = 587.0IE, BMP 2 = 585.5IE
11. SURFACE PONDING DEPTH (6" ABOVE TOP OF MULCH LAYER)
12. 6" MIN. FREEBOARD
13. SEE ENLARGEMENT DETAIL FOR LINER ANCHOR IN SOIL
14. CLAMP LINER TO OUTLET PIPE FOR WATERTIGHT SEAL
15. PLANTING PER LANDSCAPE PLANS. PLAN TYPE SHALL CONFORM TO THE CITY/COUNTY OF SAN DIEGO LID STANDARDS
16. TOP OF BIOFILTERATION SOIL MEDIA. CALLED OUT AS "FS" ON THE PLAN, ADD 3" TO TOP OF MULCH LAYER
17. LOW FLOW WEIR/ORIFICE STRUCTURE, SEE DETAIL
18. PLANTING SOIL PER LANDSCAPE PLANS
19. OVERFLOW SPILLWAY, LOCATION PER PLANS

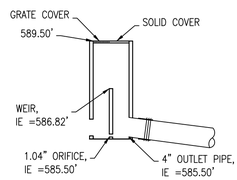
PERMAVOID UNIT

LEGEND

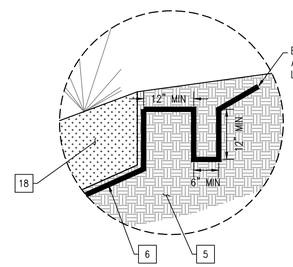
- 18" SOIL MEDIA
- PERMAVOID SYSTEM (BMP 1 = 12", BMP 2=18")
- 3" MULCH
- 6" FILTER COURSE
- PLANTING SOIL



BMP 1: LOW FLOW WEIR/ORIFICE



BMP 2: LOW FLOW WEIR/ORIFICE



TYPICAL BIOFILTRATION LINER ANCHOR IN SOIL

NOTES

1. BIORETENTION SOIL MEDIA (BSM) SHALL BE LIGHTLY COMPACTED AND PLACED IN LOOSE LIFTS APPROXIMATELY 12 INCHES TO ENSURE REASONABLE SETTLEMENT WITHOUT EXCESSIVE COMPACTION. COMPACTION WITHIN THE BSM AREA SHALL NOT EXCEED 75 TO 85% STANDARD PROCTOR WITHIN THE DESIGNED DEPTH OF THE BSM.
2. CONTRACTOR SHALL HIRE A LICENSED LAND SURVEYOR TO STAKE THE SUBGRADE OF THE ROCK STORAGE LAYER, BIORETENTION PONDING SURFACE, AND TOP SLOPE OF BIORETENTION BASIN. MINIMUM SURFACE AREAS AND DEPTHS SHALL BE PROVIDED PER PLANS.
3. CONTRACTOR IS REQUIRED TO NOTIFY ENGINEER OF RECORD (EOR) DURING CONSTRUCTION FOR INSPECTION OF THE SUBGRADE AND INSTALLATION OF THE LINER, ROCK STORAGE, SUBDRAINAGE, SOIL MEDIA AND OVERFLOW STRUCTURE. IF EOR IS NOT NOTIFIED, CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REMOVING LAYERS AND REPLACING AS NEEDED FOR PROPER INSPECTION.
4. CONTRACTOR SHALL PROVIDE AN AS–BUILT SURVEY PREPARED BY A LICENSED LAND SURVEYOR OF THE BIORETENTION BASIN.
5. CONTRACTOR SHALL PROVIDE CONTRACTOR SUBMITTALS FOR ALL BIORETENTION MATERIALS FOR THE EOR'S REVIEW. THIS INCLUDES, BUT IS NOT LIMITED TO: SOIL MIX, MULCH, FILTER LAYER, AGGREGATE BASE, IMPERMEABLE LINER AND OVERFLOW STRUCTURE.

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123
619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE: 02/02/2022
DRAWN BY: NJW
CHECKED BY: MGC
BME JOB NUMBER: 11900IL3.00
CLIENT JOB NUMBER:
MUNICIPALITY
PROJECT NUMBER: PTS 649669

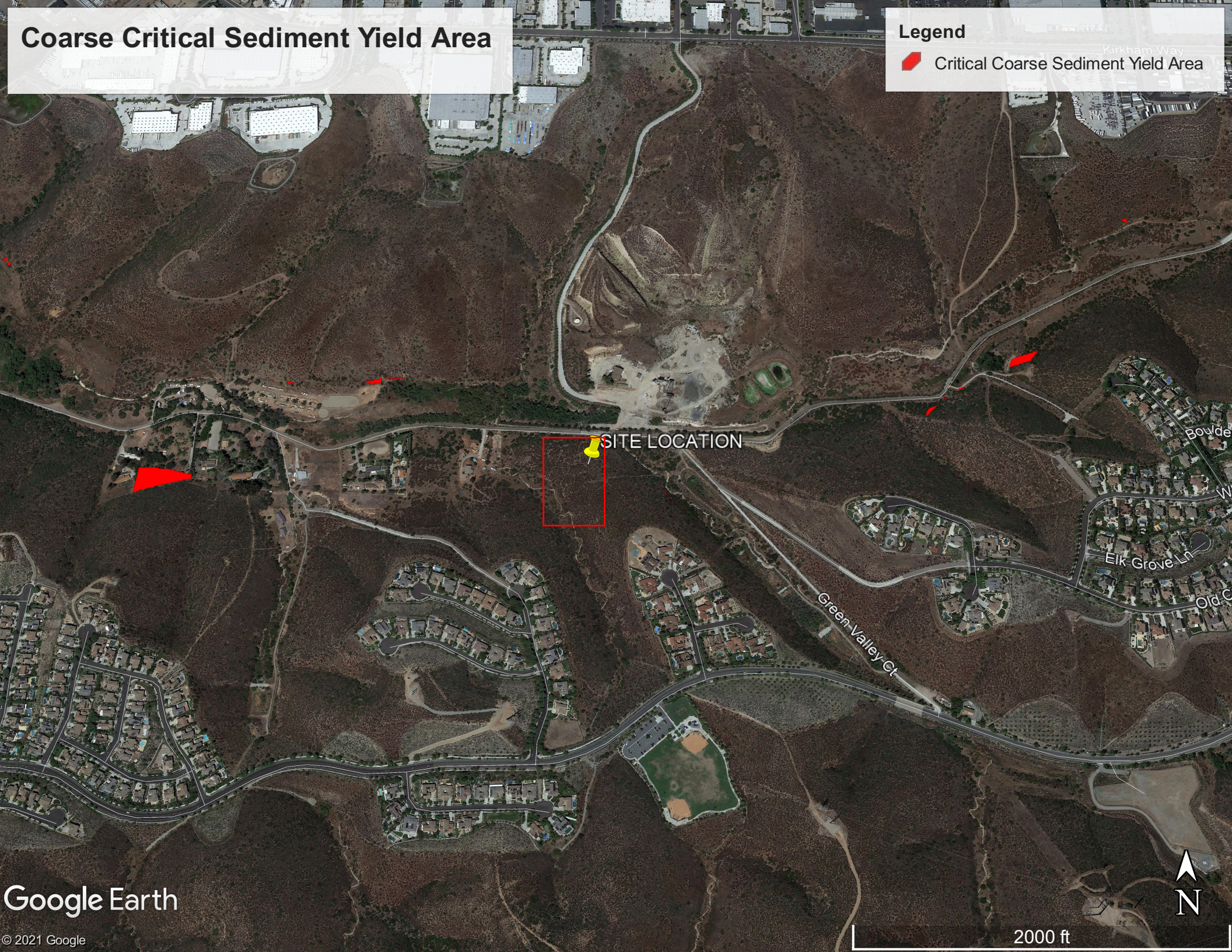
SHEET TITLE
PROPOSED CONDITION HMP EXHIBIT

SHEET 1 OF 1

PROJECT
BEELER CANYON ROAD

SITE ADDRESS
PARCEL 3 OF MAP 6554

Coarse Critical Sediment Yield Area



BMP Sizing Spreadsheet V3.1

Project Name:	Beeler Canyon
Project Applicant:	BWE Inc
Jurisdiction:	City of San Diego
Parcel (APN):	320-030-31
Hydrologic Unit:	Penaquitos
Rain Gauge:	Oceanside
Total Project Area (sf):	75,146
Channel Susceptibility:	High

BMP Sizing Spreadsheet V3.1			
Project Name:	Beeler Canyon	Hydrologic Unit:	Penaquitos
Project Applicant:	BWE Inc	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	75,146
Parcel (APN):	320-030-31	Low Flow Threshold:	0.1Q2
BMP Name:	BMP #1	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
1	5,621	D	Flat	Roofs	1.0	0.12	675
1	6,337	D	Moderate	Concrete	1.0	0.12	760
1	28,216	D	Moderate	Amended, mulched soils	0.1	0.12	339
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	40,174					Minimum BMP Size	1774
						Proposed BMP Size*	1774

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	1.0	ft
Minimum Required Cistern Footprint)	1774	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	Beeler Canyon	Hydrologic Unit:	Penaquitos
Project Applicant:	BWE Inc	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	75,146
Parcel (APN):	320-030-31	Low Flow Threshold:	0.1Q2
BMP Name	BMP #1	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
1	Oceanside	D	Flat	0.571	0.129	0.007	**0.20**
1	Oceanside	D	Moderate	0.575	0.145	0.008	**0.23**
1	Oceanside	D	Moderate	0.575	0.648	0.037	**1.03**

1.00	**0.053**	**1.46**	**1.36**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.053**	**1.45**	**1.360**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

BMP Sizing Spreadsheet V3.1			
Project Name:	Beeler Canyon	Hydrologic Unit:	Penaquitos
Project Applicant:	BWE Inc	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	75,146
Parcel (APN):	320-030-31	Low Flow Threshold:	0.1Q2
BMP Name:	BMP #2	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
2	4,230	D	Flat	Roofs	1.0	0.12	508
2	3,754	D	Moderate	Concrete	1.0	0.12	450
2	20,376	D	Moderate	Amended, mulched soils	0.1	0.12	245
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	28,360					Minimum BMP Size	1203
						Proposed BMP Size*	1203

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	1.5	ft
Minimum Required Cistern Footprint)	802	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
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BMP Sizing Spreadsheet V3.1			
Project Name:	Beeler Canyon	Hydrologic Unit:	Penaquitos
Project Applicant:	BWE Inc	Rain Gauge:	Oceanside
Jurisdiction:	City of San Diego	Total Project Area:	75,146
Parcel (APN):	320-030-31	Low Flow Threshold:	0.1Q2
BMP Name	BMP #2	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
2	Oceanside	D	Flat	0.571	0.097	0.006	**0.12**
2	Oceanside	D	Moderate	0.575	0.086	0.005	**0.11**
2	Oceanside	D	Moderate	0.575	0.468	0.027	**0.61**

1.50	**0.037**	**0.84**	**1.04**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.038**	**0.85**	**1.040**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Indicate which Items are Included:

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

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

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

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

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: Beeler Canyon Road, PTS# 649669

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 proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

SITE DEVELOPMENT PERMIT
FOR
BEELER CANYON ROAD

PROJECT TEAM

CIVIL ENGINEER
CARL FIORICA, P.E.
5220 GLEN VERDE DR
BONITA, CA 919902
619-245-3011

ARCHITECT
PAUL CRUZ
1461 HOLLOW GLEN ROAD
JULIAN, CA 92036
760-522-7487

LANDSCAPE ARCHITECT
S.R. CLARKE
110 COPPERWOOD WAY, #P
OCEANSIDE, CA 92058
760-716-3100
SEAN R. CLARKE

DEVELOPMENT SUMMARY

- THE PROJECT REQUIRES A SITE DEVELOPMENT PERMIT DUE TO THE PRESENCE OF STEEP HILLSIDES AND SENSITIVE BIOLOGICAL RESOURCES WITHIN THE PROPERTY BOUNDARY.
- NO VARIANCES FROM CURRENT DEVELOPMENT REGULATIONS ARE PROPOSED.
- EXISTING 2.795 ACRE LOT IS VACANT WITH NO STRUCTURES.
- THE PROJECT PROPOSES TO CONSTRUCT A 2,950 SF SINGLE STORY RESIDENCE.
- THE PROJECT PROPOSES TO DEVELOP APPROXIMATELY 0.698 ACRES FOR ACCESS, UTILITIES AND BUILDING PAD.
- THE PROJECT WILL TAKE ACCESS FROM BEELER CANYON ROAD.
- PROPOSED UTILITIES WILL BE LOCATED IN THE DRIVEWAY AND CONNECT TO EXISTING UTILITIES IN BEELER CANYON ROAD.
- THE DEVELOPED AREA, INCLUDING A MINIMUM 35' FROM THE STRUCTURE, WILL BE DESIGNATED AS BRUSH ZONE MANAGEMENT 1.
- ALL AREAS OF BRUSH ZONE MANAGEMENT 1 ARE INCLUDED IN THE DEVELOPED AREA.
- NO STEEP HILLSIDES WILL BE DISTURBED AS PART OF THE DEVELOPMENT
- 0.38 ACRES WILL BE DESIGNATED AS BRUSH ZONE MANAGEMENT 2.
- THE REMAINING PARCEL AREA, 1.69 ACRES, WILL BE DESIGNATED AS OPEN SPACE
- THE OPEN SPACE MITIGATION RATIO IS 1.54:1

LEGAL DESCRIPTION

PARCEL 3 OF MAP 6554

ASSESSORS PARCEL NUMBER

320-030-31

TYPE OF CONSTRUCTION

R-1

OWNER

HUY HUYNH, JOANNE LING HUYNH, LAM BA HUYNH, VYCKI NGA HYUNH, LINH BA HUYNH
11275 BEELER CANYON RD
POWAY, CA 92064

ZONING DEISIGNATION

RS-1-8

AREA

EXISTING:
GROSS SITE AREA - 2.795 ACRES
PROPOSED:
LOT 1 - GROSS SITE AREA - 1.3975 ACRES
FLOOR PLAN AREA - 3,600 SF
LOT 2 - GROSS SITE AREA - 1.3975 ACRES
FLOOR PLAN AREA - 3,600 SF

USE

EXISITING USE - VACANT LAND
PROPOSED USE - LOTS SPLIT WITH ONE SINGLE FAMILY STRUCTURE AND ONE ACCESSORY UNIT ON EACH LOT

STRUCTURES

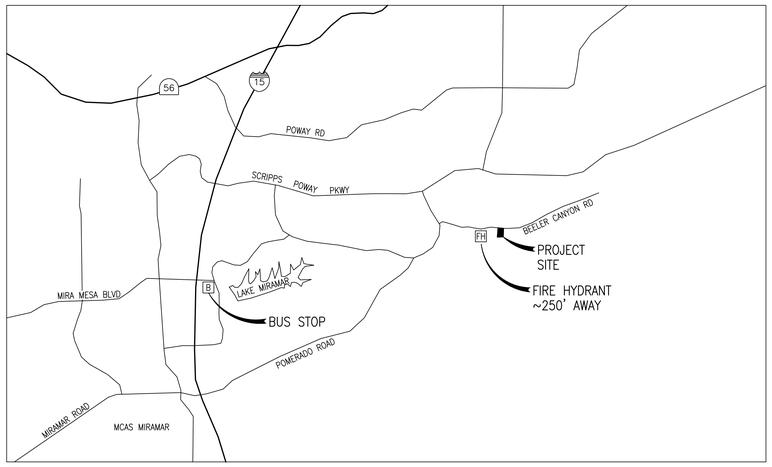
THERE ARE NO EXISTING STRUCTURES ON THE LOT

EASEMENTS

THERE ARE NO EXISTING EASEMENTS ON THE LOT

GEOLOGIC HAZARD CATEGORY

53 - LEVEL OR SLOPING TERRAIN, UNFAVORABLE GEOLOGIC STRUCTURE, LOW TO MODERATE RISK



B NEAREST BUS STOP - MIRA MESA BLVD & SCRIPPS RANCH BLVD (4.8 MILES FROM SITE)
FH NEAREST FIRE HYDRANT - ~250' AWAY FROM SITE

VICINITY MAP
N.T.S.

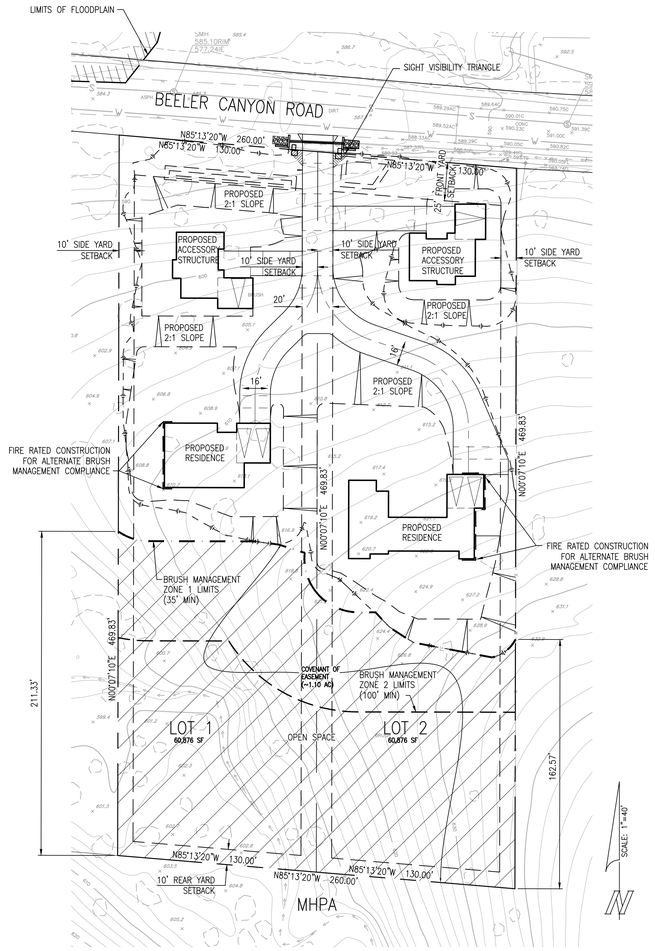
TABLE 131-04D

DEVELOPMENT REGULATIONS	REQUIRED	PROPOSED (LOT 1)	PROPOSED (LOT 2)
MAX PERMITTED DENSITY	1	1	1
MIN LOT AREA (SF)	40,000	60,876	60,876
MIN LOT DIMENSIONS			
LOT WIDTH (FT)	100	130	130
STREET FRONTAGE (FT)	100	130	130
LOT DEPTH (FT)	100	470	470
SETBACK REQUIREMENTS			
MIN FRONT SETBACK (FT)	25	58	25
MIN SIDE SETBACK (FT)	10	30	21
MIN REAR SETBACK (FT)	10	243	206
MAX STRUCTURE HEIGHT (FT)	35	20'	20'
MAX FLOOR AREA RATIO	0.45	0.07	0.07
MAX PAVING/HARDSCAPE	60% OF FRONT YARD	5.60%	10.60%
ACCESSORY USES AND STRUCTURES	25% OF ALLOWABLE GROSS FLOOR AREA	9.3%	9.3%
BUILDING SPACING	MIN. 6 FEET BETWEEN DWELLINGS	75' MIN.	75' MIN.
ARCHITECTURAL PROJECTIONS INTO SETBACKS	5' SIDE/BACK, 6' FRONT	NO PROJECTIONS	NO PROJECTIONS

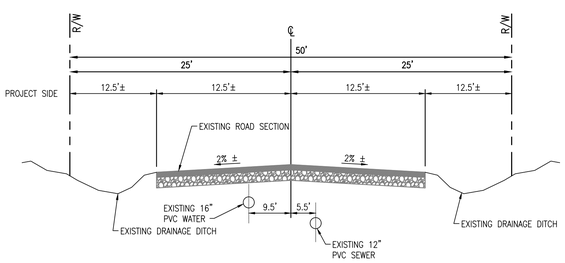
PARKING REQUIREMENTS (141.0302.a.7.D)

- COMPANION UNIT NOT TO EXCEED 1 OFF-STREET PARKING SPACE PER UNIT

SHEET INDEX



SITE PLAN
1"=40'



BEELER CANYON ROAD TYPICAL SECTION
NO SCALE

REVISIONS:

BUILDER:

TITLE: TITLE SHEET

PROJECT AND LOCATION
PTS# 649669
BEELER CANYON ROAD
PARCEL 3 OF MAP 6554

REGISTERED PROFESSIONAL ENGINEER
CARL M. FIORICA
No. 64715
Exp. 06-30-21
CIVIL
STATE OF CALIFORNIA

DRAWN BY CF
CHECKED BY
DATE 04/2020

SHEET NUMBER
1
OF 14 SHEETS

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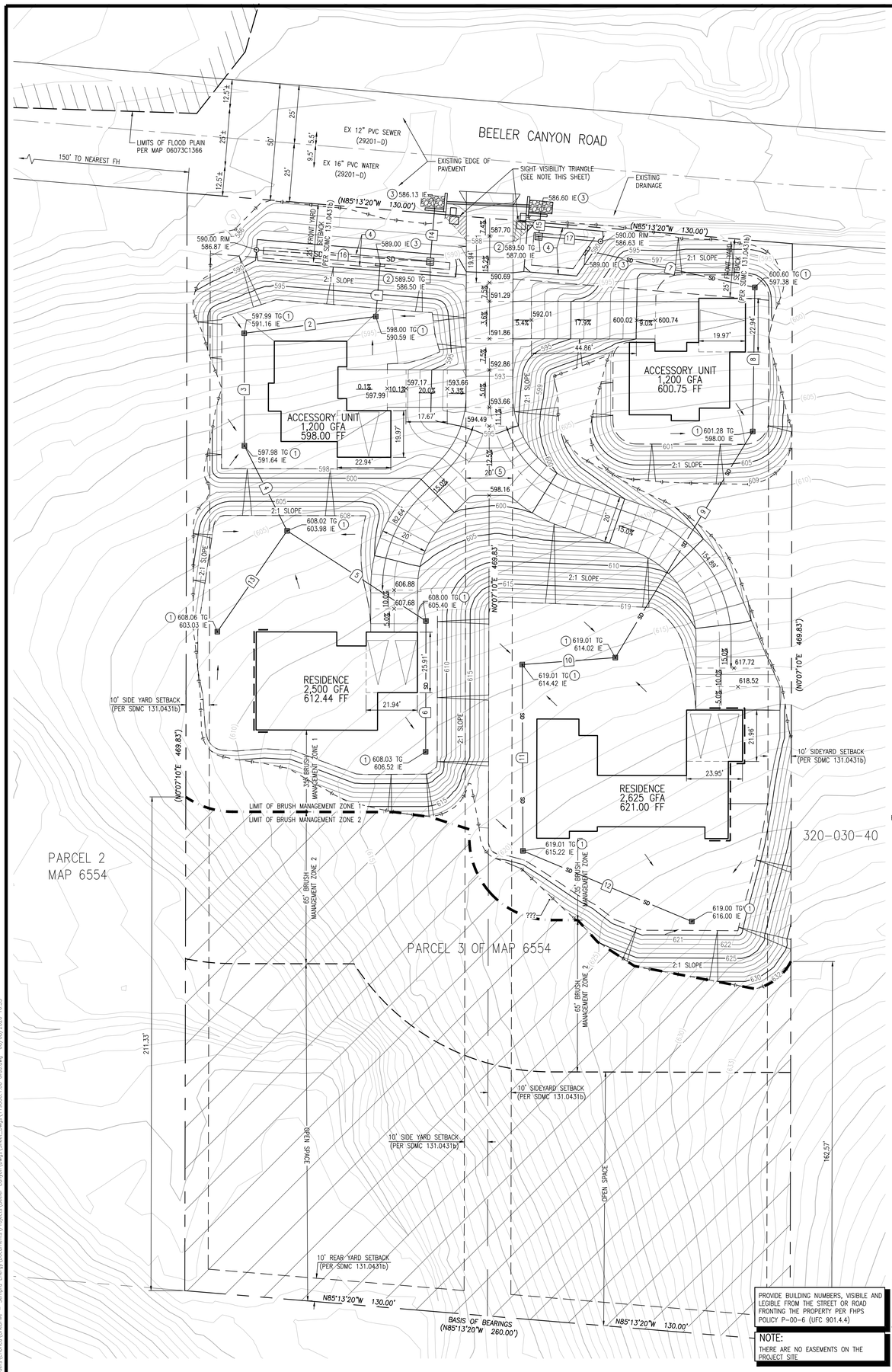
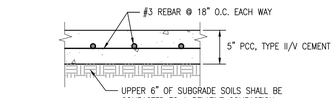
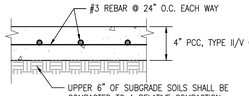




WITHIN RIGHT OF WAY

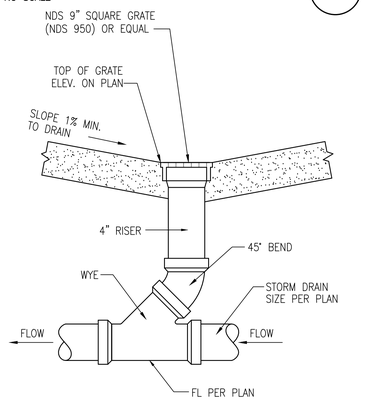


PRIVATE DRIVEWAY

NOTES:
1. CONSTRUCT EXPANSION JOINTS AT CURB RETURNS, ADJACENT TO STRUCTURES AND AT 45' INTERVALS. (SEE SDRSD G-10).
2. CONSTRUCT CONTROL JOINTS PER SDRSD G-10, MAXIMUM SPACING SHALL BE 8' ON CENTER IN EACH WAY.
3. CONCRETE SHALL HAVE A MEDIUM BROOM FINISH.
4. CONCRETE SHALL BE 4000 PSI IN 28 DAYS.
5. THE ABOVE PAVEMENT SECTION IS BASED ON GEOTECHNICAL RECOMMENDATIONS. THE SECTION CAN BE REPLACED WITH AN ASPHALT PAVEMENT SECTION PROVIDED THAT AN R-VALUE TEST IS PERFORMED AND A NEW GEOTECHNICAL PAVEMENT RECOMMENDATION.

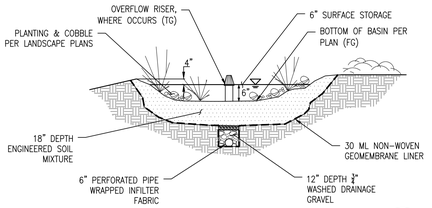
CONCRETE PAVEMENT SECTION(PVT) AUTOMOBILE DRIVEWAY — A

NO SCALE



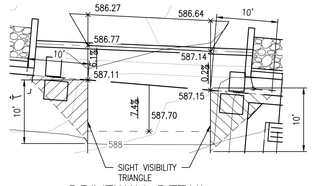
AREA DRAIN (PRIVATE) — B

NO SCALE



BIORETENTION AREA – BMP 1 & 2 — C

NO SCALE



DRIVEWAY DETAIL

1"=10'

STORM DRAIN DATA					STORM DRAIN DATA				
#	BEARING/DELTA	LENGTH	SLOPE	SIZE/TYPE (CLASS)	#	BEARING/DELTA	LENGTH	SLOPE	SIZE/TYPE (CLASS)
1	S4°46'40"W	22.63'	7.03%	12" PVC (SDR 35)	7	S7°36'43"E	74.06'	11.32%	12" PVC (SDR 35)
2	S82°45'55"W	56.78'	1.00%	12" PVC (SDR 35)	8	S0°50'27"W	61.66'	1.00%	12" PVC (SDR 35)
3	S0°06'41"E	48.17'	1.00%	12" PVC (SDR 35)	9	S31°17'44"W	113.27'	14.14%	10" PVC (SDR 35)
4	S26°39'47"E	40.74'	30.29%	8" PVC (SDR 35)	10	S85°43'00"W	39.95'	1.00%	10" PVC (SDR 35)
5	S57°00'24"E	70.85'	2.00%	6" PVC (SDR 35)	11	S0°13'24"E	79.74'	1.00%	6" PVC (SDR 35)
6	S0°07'10"W	56.00'	2.00%	6" PVC (SDR 35)	12	S67°19'32"E	78.35'	1.00%	6" PVC (SDR 35)
13	S34°40'25"W	52.48'	2.00%	6" PVC (SDR 35)	15	N4°46'40"E	9.65'	4.19%	12" PVC (SDR 35)
14	N4°46'40"E	22.77'	1.63%	12" PVC (SDR 35)	17	S85°24'43"E	26.53'	1.39%	6" PVC (SDR 35)
16	N86°08'20"W	74.53'	0.50%	6" PVC (SDR 35)					

GRADING KEYNOTES

#	KEYNOTE
1	12"x12" PRECAST CATCH BASIN
2	18"x18" PRECAST BATCH BASIN
3	CONCRETE HEADWALL
4	BIOFILTRATION TYPE STORM WATER TREATMENT AREA PER DETAIL C THIS SHEET
5	PRIVATE CONCRETE DRIVEWAY

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PITS070112-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), CURRENT EDITION
PITS070112-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION (WHITEBOOK), CURRENT EDITION
PITS070112-04	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION
PITS070112-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD SPECIFICATIONS, CURRENT EDITION

STANDARD DRAWINGS:

DOCUMENT NO.	DESCRIPTION
PITS070112-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION
PITS070112-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD PLANS, CURRENT EDITION

LEGEND

- PROPERTY LINE
- EXISTING SPOT ELEVATION — 500.00x
- EXISTING CONTOURS — 96
- NEW SPOT ELEVATION — 500.00 / 555.00FS
- NEW CONTOURS — 96 / 95
- LIMIT OF WORK/DEVELOPMENT
- VEGETATED/ROCK SWALE
- BROW DITCH TYPE B — PER SDRSD SDD-106
- HEADWALL — SD
- AREA DRAIN (PVT) — PER DETAIL B — SD
- SEWER TYPE CLEAN OUT — SD
- GRADED SLOPE
- GRADE BREAK
- FIRE RATED OPENINGS FOR ALTERNATIVE COMPLIANCE
- CONCRETE PAVEMENT — PER DETAIL A
- TYPE 2 RIP RAP — PER SDRSD SDD-104 ENERGY DISSIPATER L=10', W=4'
- TURF/LANDSCAPE
- LANDSCAPED SLOPE
- HOUSE/BUILDING
- STORM WATER TREATMENT AREA
- LIMITS OF COVENANT OF EASEMENT AND ENVIRONMENTALLY SENSITIVE AREA

STORM WATER NOTES:

- RUNOFF FROM ROOF WILL BE DIRECTED TO LANDSCAPE AREAS FOR TREATMENT PRIOR TO CAPTURE BY THE STORM DRAIN SYSTEM.
- AT THE STORM DRAIN DISCHARGE LOCATION, A SUITABLE ENERGY DISSIPATOR IS TO BE INSTALLED TO REDUCE THE DISCHARGE TO NON-ERODIBLE VELOCITIES.
- NO ADDITIONAL RUN-OFF IS PROPOSED FOR THE DISCHARGE LOCATION.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE SATISFACTORY TO THE CITY ENGINEER.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT THE OWNER/PERMITTEE SHALL SUBMIT A STORM WATER POLLUTION PREVENTION PLAN (SWPPP). THE SWPPP SHALL BE PREPARED IN ACCORDANCE WITH THE CALIFORNIA GENERAL PERMIT.
- THE PROJECT SHALL NOT GRADE INTO THE COVENANT OF EASEMENT OR ENVIRONMENTALLY SENSITIVE AREAS
- THIS PROJECT WILL NOT DISCHARGE ANY INCREASE IN STORM WATER RUN-OFF ONTO THE EXISTING HILLSIDE AREAS, ADJACENT PROPERTIES OR ENVIRONMENTALLY SENSITIVE AREAS

TOPOGRAPHY NOTES

- TOPO SOURCE: PHOTO GEODETIC
  - DATE: 5/20/2006
  - BENCHMARK: POMERADO ROAD & SEMILLON BLVD; NWBP
  - ELEVATION: 781.635 MSL
- VERIFIED BY BWE, INC. 3/10/2014

SIGHT VISIBILITY NOTES

NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALLE XCEED 3 FEET IN HEIGHT PER SDMC SECTION 142.0409(b)(2). PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT OF WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLAN MATERIAL.

SITE DEVELOMENT TABLE

TOTAL DISTURBANCE AREA	67,550 SF
EX. IMPERVIOUS AREA	0 SF
PROP IMPERVIOUS AREA	18,506 SF
TOTAL IMPERVIOUS AREA	18,506 SF
IMPERVIOUS % INCREASE (IMP AREA / LOT AREA)	15.2 %
ROOF AREA	9,056 SF
ROAD AREA	9,450 SF

GRADING TABLE

TOTAL DEVELOPED AREA 35,520 SF
(INCLUDING ZONE 1 BRUSH MANAGEMENT)

TOTAL GRADED AREA	67,550 SF
BUILDING AREA	7,200 SF
IMPERVIOUS/HARDSCAPE	18,356 SF
CUT	4,000 CY
FILL	4,000 CY
CUT/FILL (EXPORT)	0 CY
MAX FILL DEPTH	8.5'
MAX CUT DEPTH	9.5'

EARTHWORK QUANTITIES SHOWN ARE FOR BONDING AND PERMIT PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY WITH SHRINKAGE, LOSSES DUE TO CLEARING OPERATIONS, REMOVAL & RECOMPACTION, SETTLEMENT, ETC. CONTRACTOR SHALL VERIFY EXACT QUANTITIES PRIOR TO BIDDING. QUANTITIES DO NOT INCLUDE TRENCHING, EXISTING IMPROVEMENT DEMOLITION, OVEREXCAVATION REMOVALS OR SLOPE CUTBACKS.

REVISIONS:

BUILDER:

TITLE: SITE PLAN AND GRADING PLAN

PROJECT AND LOCATION
PTS# 649669
BEELER CANYON ROAD
PARCEL 3 OF MAP 6554

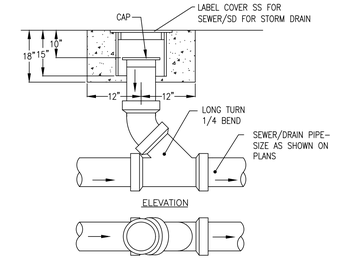
REGISTERED PROFESSIONAL ENGINEER — CARL M. FIORICA — No. 64715 — Exp. 06-30-21 — CIVIL — STATE OF CALIFORNIA

DRAWN BY CF
CHECKED BY
DATE 04/2020

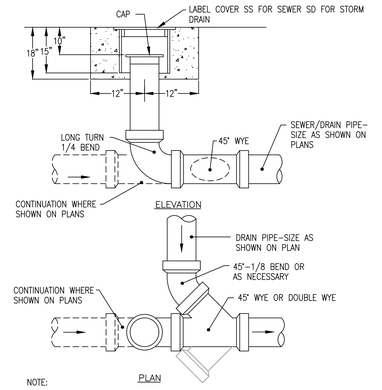
SHEET NUMBER 2 OF 14 SHEETS

C:\Users\cfiorica\OneDrive - Bengard Energy\Documents\Projects\Beler Canyon\Dwgs\Sheet Dwgs\11X17\01 Grading 05/29/2020 16:43

CLEANOUT W/ NO CHANGE IN DIRECTION



CLEANOUT W/ CHANGE IN DIRECTION



NOTE:
4" CLEANOUT RSER. ADD REDUCER AS NEEDED UNLESS OTHERWISE NOTED ON GRADING AND UTILITIES PLANS

SEWER CLEANOUT (PVT) — A

NOT TO SCALE

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

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LEGEND

PROPERTY LINE	
EXISTING SPOT ELEVATION	500.00
EXISTING CONTOURS	96
EXISTING SEWER LINE	S
EXISTING WATER LINE	W
NEW SPOT ELEVATION	500.00 555.00FS
NEW CONTOURS	PER GRADING PLAN 96 / 95
LIMIT OF GRADING	PER GRADING PLAN
VEGETATED/ROCK SWALE	PER GRADING PLAN
BROW DITCH TYPE B	PER GRADING PLAN
GRADED SLOPE	PER GRADING PLAN
6" CURB	PER GRADING PLAN
CONCRETE PAVEMENT	PER GRADING PLAN
SEWER CLEANOUT	PER DETAIL A
SEWER LINE	S
WATER LINE	W

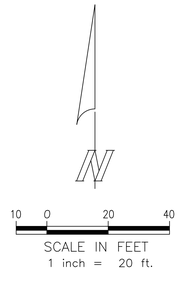
UTILITY KEYNOTES

#	KEYNOTE
1	CONNECT TO EXISTING 16" WATER MAIN PER SDW-150
2	1" WATER METER PER SDW-150, W/ PRIVATE RP BACKFLOW
3	CONNECT TO EXISTING 12" SEWER MAIN PER SDS-105
4	SEWER CLEANOUT PER DETAIL A, THIS SHEET
S	SEWER POINT OF CONNECTION
W	WATER POINT OF CONNECTION

SEWER LATERAL TABLE

IE AT MAIN	DROP TO MAIN	LENGTH IN FEET	IE @ P/L	SLOPE (%)	TC ELEV	DEPTH BELOW TC @ PL	REMARKS
579.00	1.40	32.19	582.20	2	587.20	5.00	4" PVC LATERAL
579.11	1.40	31.98	582.20	2	587.20	5.00	4" PVC LATERAL

SEWER DATA					DOMESTIC WATER DATA			
(L)	BEARING/DELTA	LENGTH	SLOPE	SIZE/TYPE (CLASS)	(L)	BEARING/DELTA	LENGTH	SIZE/TYPE (CLASS)
1	S0°07'10"W	32.19'	9.93%	4" PVC (SDR 35)	1	S3°57'51"W	18.82'	1" PVC (CL235)
2	S0°07'10"W	70.12'	8.41%	4" PVC (SDR 35)	2	S89°52'50"E	7.85'	1" PVC (CL235)
3	S0°07'10"W	37.25'	17.99%	4" PVC (SDR 35)	3	S0°07'10"W	77.86'	1" PVC (CL235)
4	S41°44'48"W	50.54'	13.26%	4" PVC (SDR 35)	4	S0°07'10"W	17.46'	1" PVC (CL235)
5	S0°07'10"W	30.18'	11.48%	4" PVC (SDR 35)	5	S45°07'10"W	31.35'	1" PVC (CL235)
6	N89°52'50"W	56.98'	2.00%	4" PVC (SDR 35)	6	S22°37'10"W	43.98'	1" PVC (CL235)
7	S0°07'10"W	31.98'	9.67%	4" PVC (SDR 35)	7	S0°07'10"W	17.99'	1" PVC (CL235)
8	S0°07'10"W	38.42'	8.33%	4" PVC (SDR 35)	8	N89°52'50"W	51.98'	1" PVC (CL235)
9	S0°07'10"W	75.25'	10.00%	4" PVC (SDR 35)	9	S3°57'51"W	18.64'	1" PVC (CL235)
10	S28°01'07"E	67.51'	29.16%	4" PVC (SDR 35)	10	N89°52'50"W	6.11'	1" PVC (CL235)
11	S0°07'10"W	38.77'	2.00%	4" PVC (SDR 35)	11	S0°07'10"W	46.59'	1" PVC (CL235)
12	S89°52'50"E	85.37'	2.00%	4" PVC (SDR 35)	12	S0°07'10"W	59.73'	1" PVC (CL235)
					15	S71°01'01"E	68.81'	1" PVC (CL235)
					16	S35°26'56"E	32.28'	1" PVC (CL235)
					17	S0°07'10"W	53.13'	1" PVC (CL235)
					18	S89°52'50"E	80.37'	1" PVC (CL235)



REVISIONS:

BUILDER:

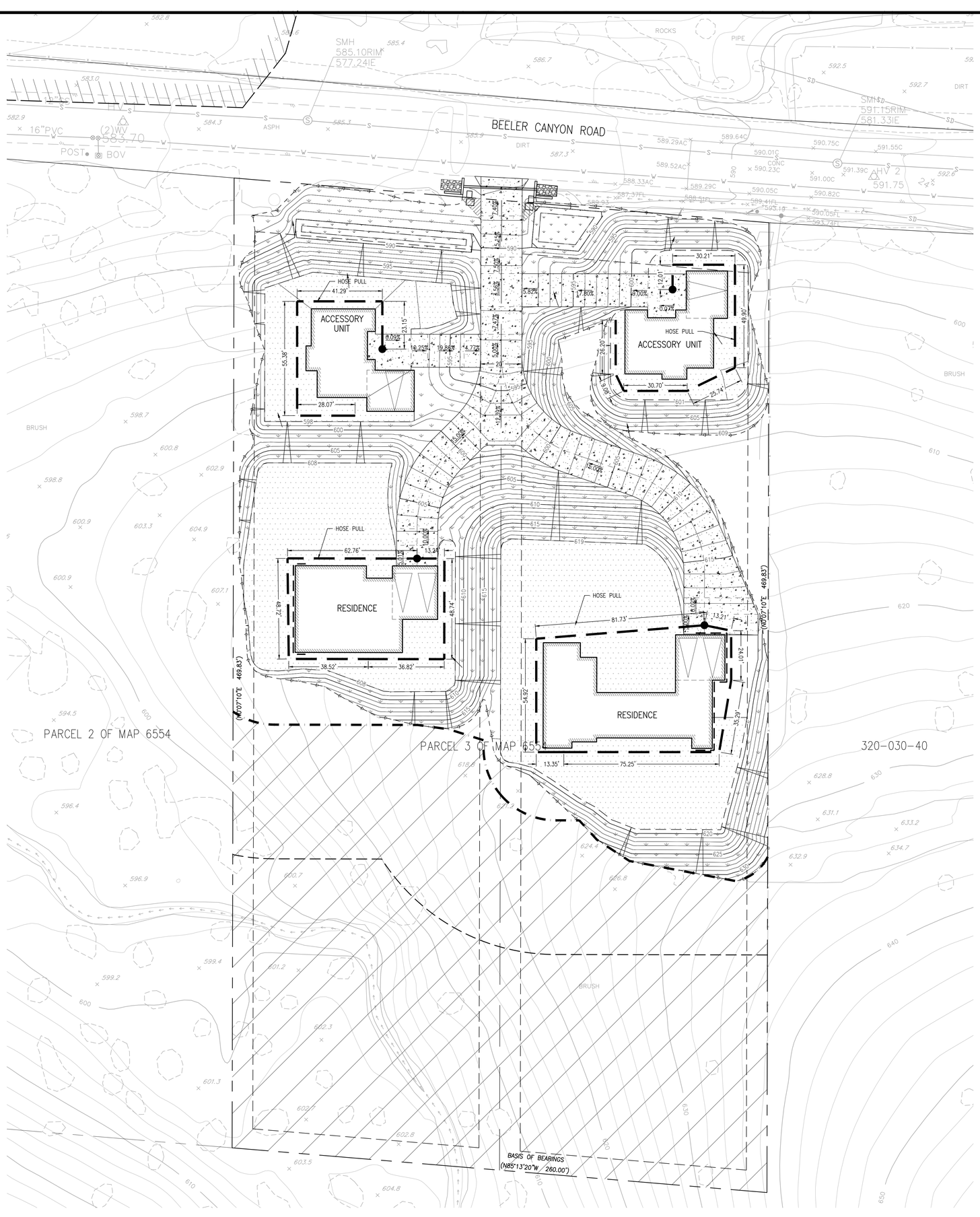
TITLE: UTILITY PLAN

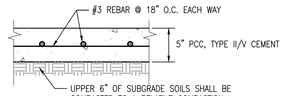
PROJECT AND LOCATION
PTS# 649669
BEELER CANYON ROAD
PARCEL 3 OF MAP 6554

REGISTERED PROFESSIONAL ENGINEER
CARL M. FIORDA
No. 64715
Exp. 06-30-21
CIVIL
STATE OF CALIFORNIA

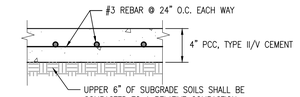
DRAWN BY CF
CHECKED BY
DATE 04/2020

SHEET NUMBER
3
OF 14 SHEETS





WITHIN RIGHT OF WAY



PRIVATE DRIVEWAY

NOTES:

1. CONSTRUCT EXPANSION JOINTS AT CURB RETURNS, ADJACENT TO STRUCTURES AND AT 45' INTERVALS. (SEE SDRSD G-10).
2. CONSTRUCT CONTROL JOINTS PER SDRSD G-10, MAXIMUM SPACING SHALL BE 8' ON CENTER IN EACH WAY.
3. CONCRETE SHALL HAVE A MEDIUM BROOM FINISH.
4. CONCRETE SHALL BE 4000 PSI IN 28 DAYS.
5. THE ABOVE PAVEMENT SECTION IS BASED ON GEOTECHNICAL RECOMMENDATIONS. THE SECTION CAN BE REPLACED WITH AN ASPHALT PAVEMENT SECTION PROVIDED THAT AN R-VALUE TEST IS PERFORMED AND A NEW GEOTECHNICAL PAVEMENT RECOMMENDATION.

CONCRETE PAVEMENT SECTION(PVT) AUTOMOBILE DRIVEWAY

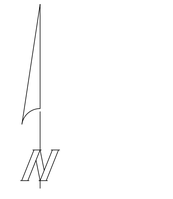
NO SCALE

FIRE ACCESS NOTES

- FIRE APPARATUS ACCESS ROAD SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES PER CFC 503.2.3
- ALL REQUIRED HOSE PULLS ARE SHOWN TO REACH ALL PORTIONS OF THE EXTERIOR OF THE BUILDINGS PER POLICY A-14-A. HOSE PULL IS MEASURED FROM THE FIRE APPARATUS (ENGINE) WHEN THE FIRE ENGINE IS IN A FIRE ACCESS ROAD/LANE. HOSE PULL CAN BE MEASURED FROM MULTIPLE LOCATIONS WITHIN THE ACCESS ROAD/LANE. THE HOSE PULLS MUST CONNECT OR OVERLAP TO SHOW COMPLETE COVERAGE. FOR A SPRINKLERED BUILDING, THE MAXIMUM HOSE PULL IS 200'. FOR NON-SPRINKLERED BUILDINGS THE MAXIMUM HOSE PULL IS 150'. CHANGE IN VERTICAL ELEVATIONS MUST ALSO BE ACCOUNTED FOR
- ALL EXISTING AND/OR PROPOSED FIRE HYDRANTS WITHIN 600' OF THE PROJECT SITE AND A 300' RADIUS OVERLAY SHALL BE SHOWN TO ENCOMPASS ALL PORTIONS OF ALL STRUCTURES AS PART OF SUBMITTED PROJECT PER SAN DIEGO ORDINANCE 17927

LEGEND

PROPERTY LINE		
EXISTING SPOT ELEVATION		500.00
EXISTING CONTOURS		98
NEW SPOT ELEVATION		500.00
NEW CONTOURS		96 / 95
LIMIT OF GRADING		
VEGETATED/ROCK SWALE	PER DETAIL C	
BROW DITCH TYPE B	PER SDRSD SDD-106	
GRADED SLOPE		
6" CURB	PER SDRSD SDC-150	
CONCRETE PAVEMENT	PER DETAIL B	



REVISIONS:

BUILDER:

TITLE: **BMP PLAN**

PROJECT AND LOCATION
PTS# 649669
BEELER CANYON ROAD
PARCEL 3 OF MAP 6554

REGISTERED PROFESSIONAL ENGINEER
CARL M. FIORICA
No. 64715
Exp. 06-30-21
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SHEET NUMBER
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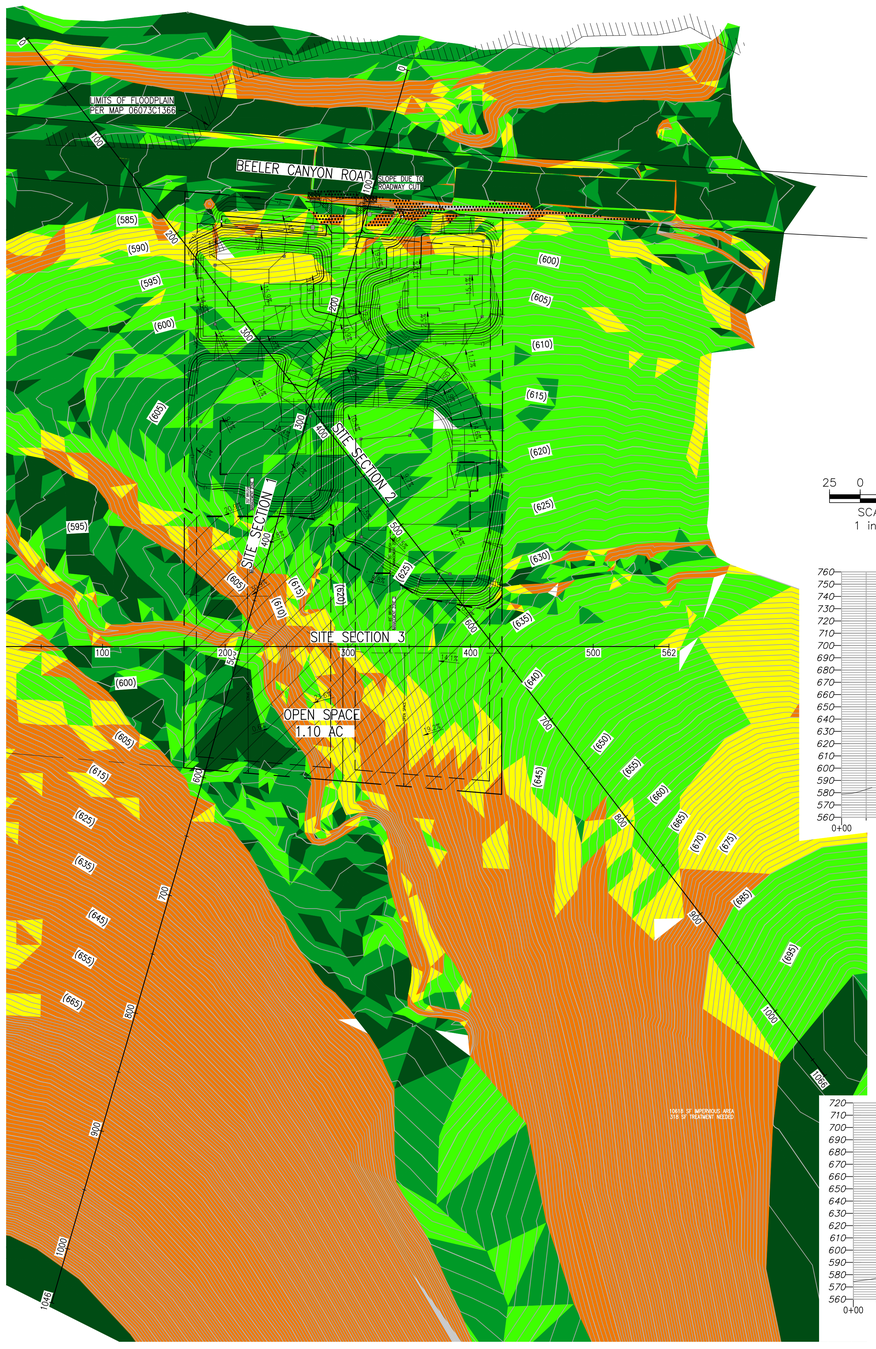


SLOPES TABLE

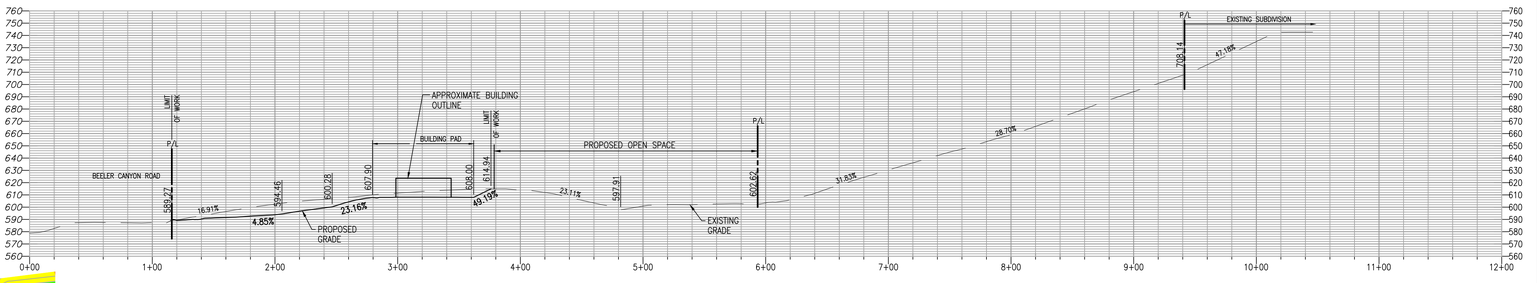
NUMBER	MINIMUM SLOPE	MAXIMUM SLOPE	AREA(SF)	PERCENTAGE OF LOT	COLOR
1	0.00%	4.99%	4,737.40	3.90%	
2	5.00%	9.99%	31,397.33	25.86%	
3	10.00%	19.99%	57,480.84	47.34%	
4	20.00%	24.99%	13,686.71	11.27%	
5	25.00%	100.00%	14,121.37	11.63%	

TOTAL 121,423.65 100%
AVERAGE SLOPE OF LOT = 14.4%
PERCENTAGE OF LOT GREATER THAN 25% = 11.63%
PERCENTAGE OF LOT LESS THAN 25% = 88.37%

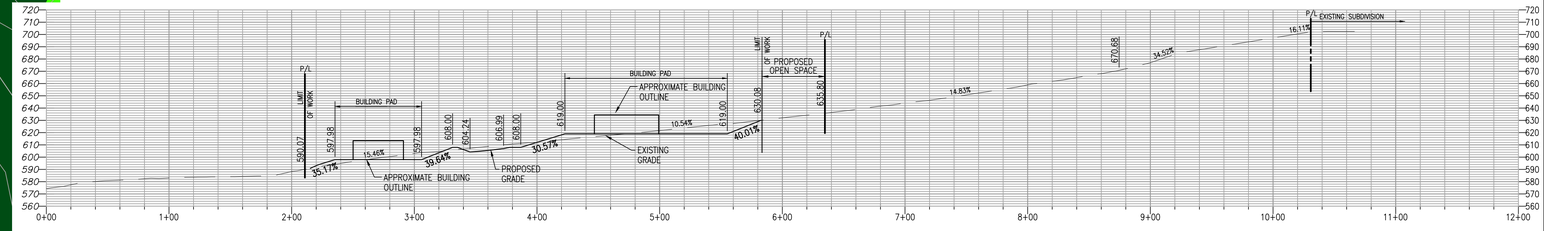
SLOPE DUE TO ROADWAY CUT

SCALE: 1"=50'

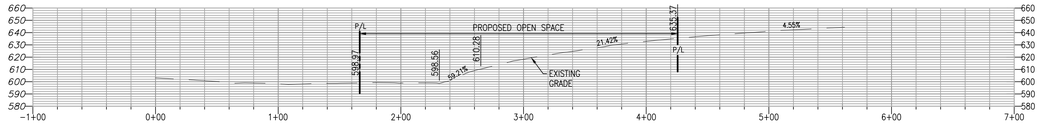
25 0 50 100
SCALE IN FEET
1 inch = 50 ft.



SECTION 1
HORZ – 1"=50'
VERT – 1"=50'



SECTION 2
HORZ – 1"=50'
VERT – 1"=50'



SECTION 3
HORZ – 1"=50'
VERT – 1"=50'

REVISIONS:

BUILDER:

TITLE:
SLOPE ANALYSIS AND
SITE CROSS SECTIONS

PROJECT AND LOCATION
PTS# 649669
BEELER CANYON ROAD
PARCEL 3 OF MAP 6554

REGISTERED PROFESSIONAL ENGINEER
CARL M. FIORICA
No. 64715
Exp. 06-30-21
CIVIL
STATE OF CALIFORNIA

DRAWN BY CF
CHECKED BY
DATE 04/2020

SHEET NUMBER
5
OF 14 SHEETS

PLOT: C:\USERS\CFIORICA\ONEDRIVE - SEMPRA ENERGY\DOCUMENTS\PROJECTS\BEELER CANYON\DWGS\SHEET_DWGS\19000 SLOPE ANALYSIS.DWG Fiorica, Carl M 6/8/2020 4:54 PM

Attachment 5
Drainage Report

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

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DRAINAGE STUDY
for

BEELER CANYON ROAD
SAN DIEGO, CA 92123

Project Nbr. #649669

APN: 320-030-31

Prepared By:

9449 Balboa Avenue, Suite 270
San Diego, CA 92123
BWE Job #: 11900U.3.00

Date: March 2021
Revised: August 2021
February 2022

TABLE OF CONTENTS

Attachments

1. Purpose

The purpose of this drainage study is to analyze the existing and proposed conditions drainage patterns, and peak flow rates for the Beeler Canyon Road project. This study will also provide recommendations to mitigate stormwater runoff in order for the project to match or decrease the pre-development peak flow rates in the proposed condition.

To determine the impacts of the proposed development on the existing drainage patterns, the pre- and post-peak flow rates are analyzed and compared for the 100-year storm event using the Rational Method. This report has been prepared in accordance with the requirements of the City of San Diego Drainage Design Manual (2017).

2. Background

The 1.7 acres project site is located in the City of San Diego, California. The site is located on the south side of the Beeler Canyon Road and approximately 500 feet west of the intersection between Beeler Canyon Road and Green Valley Court. The site is physically located at: 32.927^0 N & 117.040^0 W.

(See Attachment A for Vicinity & Imagery Maps)

The Federal Emergency Management Agency (FEMA) categorizes the site as Zone X, where Zone X is area determined to be outside of 500-year floodplain (FIRM Panel 1366 of 2375). Attachment F illustrates the FEMA floodplain mapping within the vicinity of the project site. The proposed development is located outside of the existing 100 year flood plain limits. Therefore, the redevelopment will not cause any adverse impact to the existing flood plain limits. The site is located adjacent to the Water Quality Sensitive Areas.

The site does not consist of, nor will this project disturb any Waters of the United States. Therefore, the site is not subject to or requires obtaining approval from the Regional Water Quality Control Board requirements under the Federal Clean Water Act section 401 or 404.

3. Existing Condition

The existing site is currently undeveloped and covered with vegetation. The site topography is relatively steep and slopes from the south to the north direction. The majority runoff from the site discharges towards north into a swale located adjacent to Beeler Canyon Road. The existing swale situated along northerly property line ultimately discharges to the Beeler Creek located northerly side of the Beeler Canyon Road. The remaining portion of the site (southerly area) drains to existing natural channel located along the westerly side of the site. The storm runoff originating from the site ultimately confluence at the westerly side of the site before being discharged to Beeler Creek. The Beeler Creek is a tributary to the Penasquitos Creek which ultimately discharges to the Pacific Ocean.

The runoff originating from upstream (offsite) drainage areas is discharged to Penasquitos Creek via two existing culverts located approximately 135' east to the project site. It is assumed that these culverts are sized adequately to convey the anticipated peak flow runoff from the offsite drainage area. Therefore, the hydraulic analysis of these culverts is not required.

The hydrology of the site area within the project boundary can be generally analyzed at 1 discharge point which is shown graphically in the existing conditions hydrology map.

(See Attachment B for Existing Conditions Hydrology Map)

4. Proposed Improvements

The proposed development works include construction of two new residential buildings with accessory dwelling units, access driveways, and new landscaping. The associated improvement work will also include drainage construction, and dry & wet utilities construction.

The drainage improvement work also includes construction of an 18" RCP culvert within the southerly ROW of Beeler Canyon Road where a new driveway is proposed. This culvert is designed to convey the peak runoff from 100-yr storm event.

The on-site drainage patterns will be altered slightly but discharge locations will be maintained. The hydrology of the site can be generally analyzed at one discharge point which is shown graphically in the proposed condition hydrology map.

The proposed culvert within Beeler Canyon Road is designed to convey the offsite runoff.

(See Attachment C for Proposed Conditions Hydrology Map)

5. Soil Characteristics

A conservative assumption that the project site consists of Soil Type "D" is made for the hydrologic analysis as described in the City of San Diego Drainage Design Manual (2017).

6. Methodology

Rational Method:
A rational method is utilized to perform hydrologic calculations in this study;

Rational Equation: $Q = C * I * A$

Where;
Q = Peak discharge, cfs
C = Rational method runoff coefficient
I = Rainfall intensity, inch/hour
A = Drainage area, acre

A computer model CivilD is used to automate the hydrology analysis process. This computer version of the rational method analysis allows user to develop a node-link model of the watershed. CivilD computer program has the capability of performing calculations utilizing mathematical functions. These functions are assigned code numbers, which appear in the printed results. The code numbers and their corresponding functions are described below;

Sub area Hydrologic Processes;

Code 1 - INITIAL subarea input, top of stream
Code 2 - STREET flow through subarea, includes subarea runoff
Code 3 - ADDITION of runoff from subarea to stream
Code 4 - STREET INLET + parallel street & pipe flow + area
Code 5 - PIPEFLOW travel time (program estimated pipe size)**
Code 6 - PIPEFLOW travel time (user specified pipe size)
Code 7 - IMPROVED channel travel time (open or box)**
Code 8 - IRREGULAR channel travel time**
Code 9 - USER specified entry of data at a point
Code 10 - CONFLUENCE at downstream point in current stream
Code 11 - CONFLUENCE of mainstreams
**NOTE: These options do not include subarea runoff
**NOTE: (#) - Required pipe size determined by the hydrology program

7. Calculations

7.a. Impervious and Pervious Areas

The impervious and pervious areas are calculated for both the existing and proposed site conditions. The site is designed to increase the impervious area by 8,710 square feet (=7.1% of total site area) as shown in Table 7-1. See Attachment B for pervious and impervious areas exhibit.

Table 7-1 Summary of Areas

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	1.73	0.00	1.73	0.0%`	100.0%
Proposed	1.73	0.46	1.27	26.6%	73.4%
Percentage Change	**0.0%**	**26.6%**	**-26.6%**		

7.b. Runoff Coefficient

The runoff coefficient for the site is obtained from Table A-1 of the City of San Diego Drainage Design Manual for residential type land use. The C values are estimated as 0.45 & 0.70 for the existing and proposed conditions respectively. (See Appendices B, and C for runoff coefficient calculations for existing and proposed conditions respectively). The lowest C value from Table 2 is assigned for the existing condition whereas, the C value of 0.70 is used for multi-unit residential development.

7.c. Peak Flow Rates

The rational method is used to perform the hydrologic analysis.

The peak flow rates for the 100 year storm events are calculated and summarized in Table 7-4 for comparison purpose. Tables 7-2, & 3 summarize the peak flow runoff rates at each hydrology nodes for the existing and proposed conditions respectively. Table 7-4 summarizes the peak flow rates for the hydrology nodes for the hydrology analysis for the proposed 18 inch culvert. The detailed calculations/results for existing and proposed conditions analysis are located in Appendices B and C respectively.

Table 7-2 Nodal Flow Rates for Existing Condition

Node #	Peak 100-yr Flow Rate (cfs)	Additional Subarea (Ac)	Total Area (Ac)	Drainage Area
100	0.00	0	0	
101	0.19	0.1	0.1	A-1
102	1.51	0.79	0.89	A-2
103	2.86	0.84	1.73	A-3
Total (POC 1)	**2.86**		**1.73**	

Table 7-3 Nodal Flow Rates for Proposed Condition

Node #	Ummitigated Peak 100-yr Flow Rate (cfs)	Mitigated Peak 100-yr Flow Rate (cfs)	Additional Subarea (Ac)	Total Area (Ac)	Drainage Area
100	0	-	0	0	
101	0.65	-	0.21	0.21	A-1
102	0.65	-	0	0.21	
103	1.17	-	0.18	0.39	A-2
104	1.17	-	0	0.39	
106	1.51	-	0.12	0.51	A-3
106	1.51	-	0	0.51	
107	2.62		0.4	0.91	A-4
109 (BMP 1)	2.62	1.50	0	0.91	
110	2.78	1.66	0.06	0.97	A-5,A-6
200	0.00	-	0	0	
201	0.12	-	0.04	0.04	B-1
202	0.39	-	0.09	0.13	B-2
203	0.68	-	0.1	0.23	B-3
204	0.80	-	0.04	0.27	B-4
205	0.80	-	0	0.27	
206	1.00	-	0.07	0.34	B-5
207	1.20	-	0.07	0.41	B-6
208	1.20	-	0	0.41	
209 (BMP 2)	1.83	0.80	0.23	0.64	
111	4.58	2.45	0	1.61	
112	4.89	2.76	0.12	1.73	B-7
Total (POC 1)	**4.89**	**2.76**		**1.73**	

Table 7-4 Existing and Proposed Conditions Peak Flow Rates Summary

	Drainage Area, A (acres)	Rational Coefficient, C	100-Yr Peak Flow , Q (cfs)	100-yr Velocity, V (fps)
Analysis Point 1 (POC 1) – Existing Condition	1.73	0.45	2.86	2.56
Analysis Point 1 (POC 1) – Proposed Condition (Unmitigated)	1.73	0.70	4.89	2.92
Analysis Point 1 (POC 1) – Proposed Condition (Mitigated)	1.73	0.70	2.76	2.57

Note: The peak flow rates from the offsite drainage area analyzed for the culvert analysis is not included in the comparison purpose.

Due to the proposed development of the site the runoff generated from the 100 year storm event can be expected to increase by 2.1 cfs. The increase in peak flow rate is mainly due to the increased impervious area in the proposed condition. The peak flow rate is mitigated by routing the flow through biofiltration basins and underground storage vaults. The overall peak flow reduction due to the routing is 2.2 cfs. Therefore, the peak flow rate in the mitigated condition is 2.8 cfs which is 0.1 cfs less than existing conditions. Detention calculations are provided in the hydraulics calculations in Attachment C.

Culvert Analysis: The hydrology of the tributary drainage area for the proposed culvert is also analyzed for 100-yr storm event. Majority of the drainage area tributary to this culvert lies easterly side of the subject property as shown in the proposed condition hydrology map. A portion of the Beeler Canyon road in between the cul-de-sac and the proposed culvert is also draining to the proposed culvert. For peak flow analysis, a runoff coefficient value of 0.35 was used for pervious rural land use and calculated using City of San Diego Coefficient Calculations methods to determine the runoff flow rate values. Off-site peak flow calculations and map are provided in Attachment D. The peak flow rate for the 100-yr storm event is determined to be 5.1 cfs for the approximate drainage area of 3.5 acres including the subject property. The 18” culvert with the slope of 1.1% can adequately convey the design peak 100-yr flow rate of 5.1 cfs. An energy dissipater with no. 2 backing is also proposed for the inlet and outlet protection.

Table 7-5 Nodal flow rates for Offsite Hydrology for 18 Inch Culvert

Node #	Peak 100-yr Flow Rate (cfs)	Additional Subarea (Ac)	Total Area (Ac)	Drainage Area
300	0.00	0	0	
301	0.13	0.032	0.032	C-1
302	1.62	0.8	0.832	C-2, C-3
303	3.66	1.65	2.482	C-4, C-5
108 (Offsite only)	3.84	0.06	2.542	C-6
Culvert (108 with Onsite Flow)	5.13	0.96	3.502	A-1, A-2, A-3, A-4, A-5, A-6

8. Downstream Drainage Impact Analysis

The onsite drainage patterns will change minimally due to the proposed redevelopment. The runoff will continue to flow in the same general directions, but new storm drain system is added to effectively manage the runoff in the proposed condition.

The runoff from majority site area discharges to an existing swale situated at the northerly side. The proposed condition peak flow rate from the site is maintained to an existing condition peak flow rate. Therefore, negative downstream drainage impacts are not anticipated from the redevelopment.

9. Conclusions

Storm water runoff from the site is collected and conveyed by a system of downspouts, inlets, storm drain pipes, and swales. The proposed development mitigates the water quantity impacts to the maximum extent practicable through the use of best management practices.

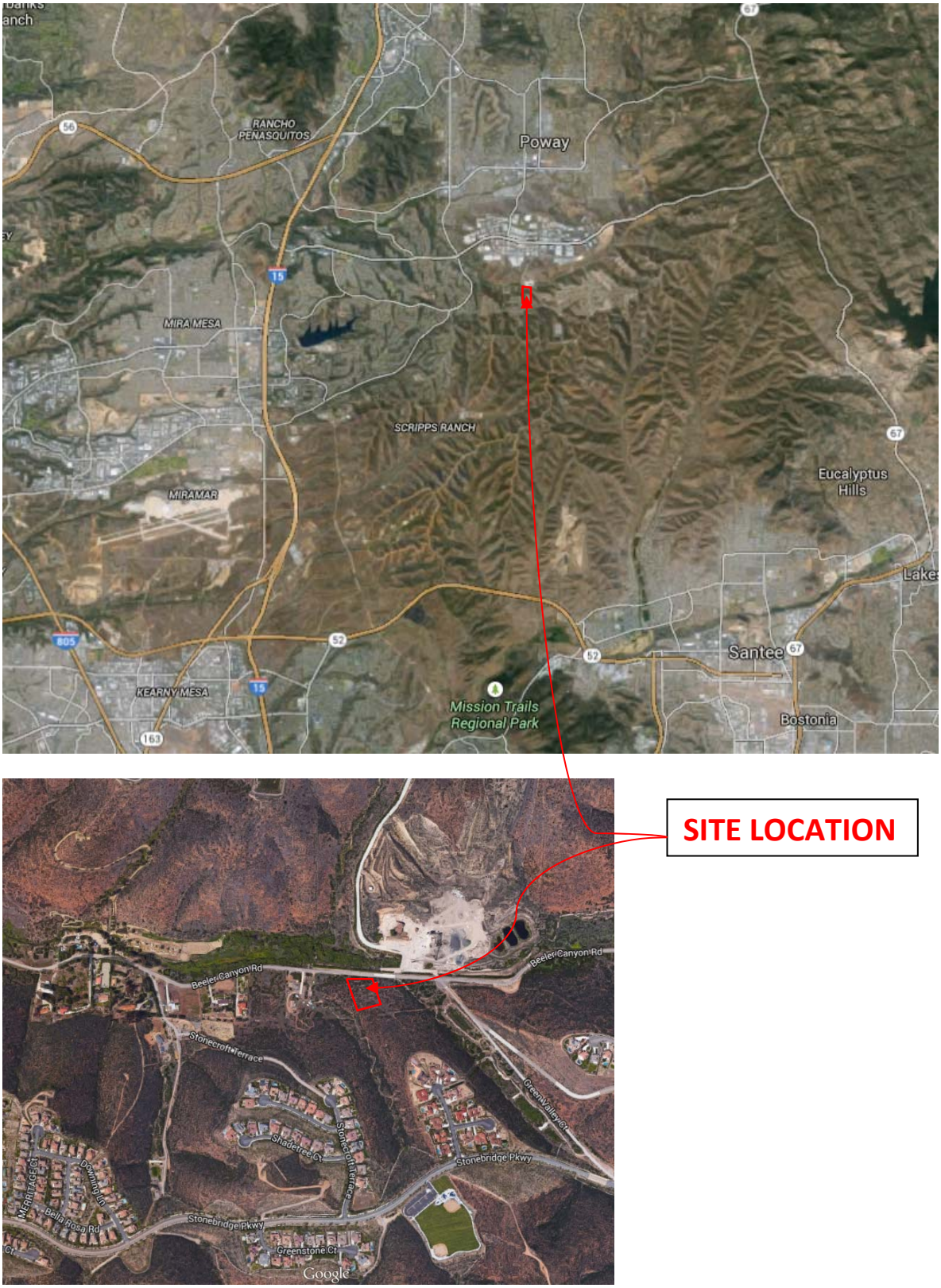
The existing drainage patterns change slightly to accommodate the proposed development. In the proposed condition, the site is expected to reduce the 100 year peak flow rates from 2.9 cfs in existing conditions to 2.8 in proposed conditions. The peak flow attenuation is achieved by routing the flow through two proposed biofiltration basins and two underground storage vaults with total storage volumes of 1,805 cubic feet and 1,824 cubic feet. Approximately 2.2 cfs is mitigated through these detention basins. As a result the proposed condition peak flow rate leaving the site does not increase from the existing condition. Therefore, the negative downstream drainage impacts are not anticipated due to this development. The proposed 18” culvert is designed to convey the peak 100-yr flow rate of 5.1 cfs.

10. References

- City of San Diego, Drainage Design Manual (January 2017).

Attachment A

Site Vicinity Map
Site Imagery Map



VICINITY MAP

IMAGERY MAP

Attachment B

Existing Conditions Runoff Coefficient Calculations
Existing Condition Hydrology Calculations
Existing Condition Hydrology Map

Composite 'C' Value Calculations

Project: Beeler Canyon Road

C-perv = 0.45 Rural - City of San Diego, Table A-1

C-imp= 0.95 (for paved areas)

Existing Conditions

Basin /Exit Point	Area (Acres)			[(Cperv*Ap + Cimp*Ai)]	C-composite
	Total Area (At)	Imp. Area (Ai)	Perv. Area (Ap)		
A/1	1.73	0.00	1.73	0.78	0.45
Overall	**1.73**	**0.00**		**0.78**	**0.45**

Existing	Total (SF)	Imp (SF)	Per (SF)
A-1	4305	0	4305
A-2	34425	0	34425
A-3	36416	0	36416
Total	75146	0	75146

Existing	Total (Ac)	Imp (Ac)	Per (Ac)	C
A-1	0.10	0.00	0.10	0.45
A-2	0.79	0.00	0.79	0.45
A-3	0.84	0.00	0.84	0.45
Total	1.73	0.00	1.73	0.45

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 08/23/21

EXISTING CONDITION
ANALYSIS POINT 1
BEELER CANYON ROAD

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   100.000 to Point/Station   101.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.450 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 5 min.
 (City of Oceanside)
Initial subarea flow distance = 100.000(Ft.)
Highest elevation = 636.000(Ft.)
Lowest elevation = 624.500(Ft.)
Elevation difference =   11.500(Ft.)
TC=[(11.9*0.0189^3)/(11.50)]^.385= 0.62 + 5 min. =   5.62 min.
Rainfall intensity (I) =   4.186(In/Hr) for a   100.0 year storm

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.188(CFS)
Total initial stream area =        0.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.933(CFS)
Depth of flow =   0.091(Ft.), Average velocity =   2.261(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.20
        2             10.00              0.00
        3             20.00              0.20
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      0.933(CFS)
  '     '        flow top width =      9.082(Ft.)
  '     '    velocity=    2.261(Ft/s)
  '     '        area =      0.412(Sq.Ft)
  '     '        Froude number =     1.870

Upstream point elevation =   624.500(Ft.)
Downstream point elevation =   588.100(Ft.)
Flow length =   283.000(Ft.)
Travel time  =    2.09 min.
Time of concentration =    7.71 min.
Depth of flow =   0.091(Ft.)
Average velocity =   2.261(Ft/s)
Total irregular channel flow =     0.933(CFS)
Irregular channel normal depth above invert elev. =   0.091(Ft.)
Average velocity of channel(s) =   2.261(Ft/s)

Sub-Channel No. 1 Critical depth =      0.116(Ft.)
  '     '       '     Critical flow top width =     11.621(Ft.)
  '     '       '     Critical flow velocity=    1.381(Ft/s)
  '     '       '     Critical flow area =      0.675(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity =      3.710(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.319(CFS) for    0.790(Ac.)
Total runoff =      1.507(CFS)  Total area =        0.89(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.219(CFS)
Depth of flow =   0.411(Ft.), Average velocity =   2.629(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              2.50              0.00
        3              5.00              0.50
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =      2.219(CFS)
  '     '        flow top width =      4.109(Ft.)
  '     '    velocity=    2.629(Ft/s)
  '     '        area =      0.844(Sq.Ft)
  '     '        Froude number =     1.022

Upstream point elevation =   588.100(Ft.)
Downstream point elevation =   585.000(Ft.)
Flow length =   130.000(Ft.)
Travel time  =    0.82 min.
Time of concentration =    8.53 min.
Depth of flow =   0.411(Ft.)
Average velocity =   2.629(Ft/s)
Total irregular channel flow =     2.219(CFS)
Irregular channel normal depth above invert elev. =   0.411(Ft.)
Average velocity of channel(s) =   2.629(Ft/s)

Sub-Channel No. 1 Critical depth =      0.414(Ft.)
  '     '       '     Critical flow top width =      4.141(Ft.)
  '     '       '     Critical flow velocity=    2.588(Ft/s)
  '     '       '     Critical flow area =      0.857(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity =      3.574(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.351(CFS) for    0.840(Ac.)
Total runoff =      2.858(CFS)  Total area =        1.73(Ac.)
End of computations, total study area =          1.730 (Ac.)
```

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Feb 2 2022

Ditch, Proposed Mitigated

Trapezoidal

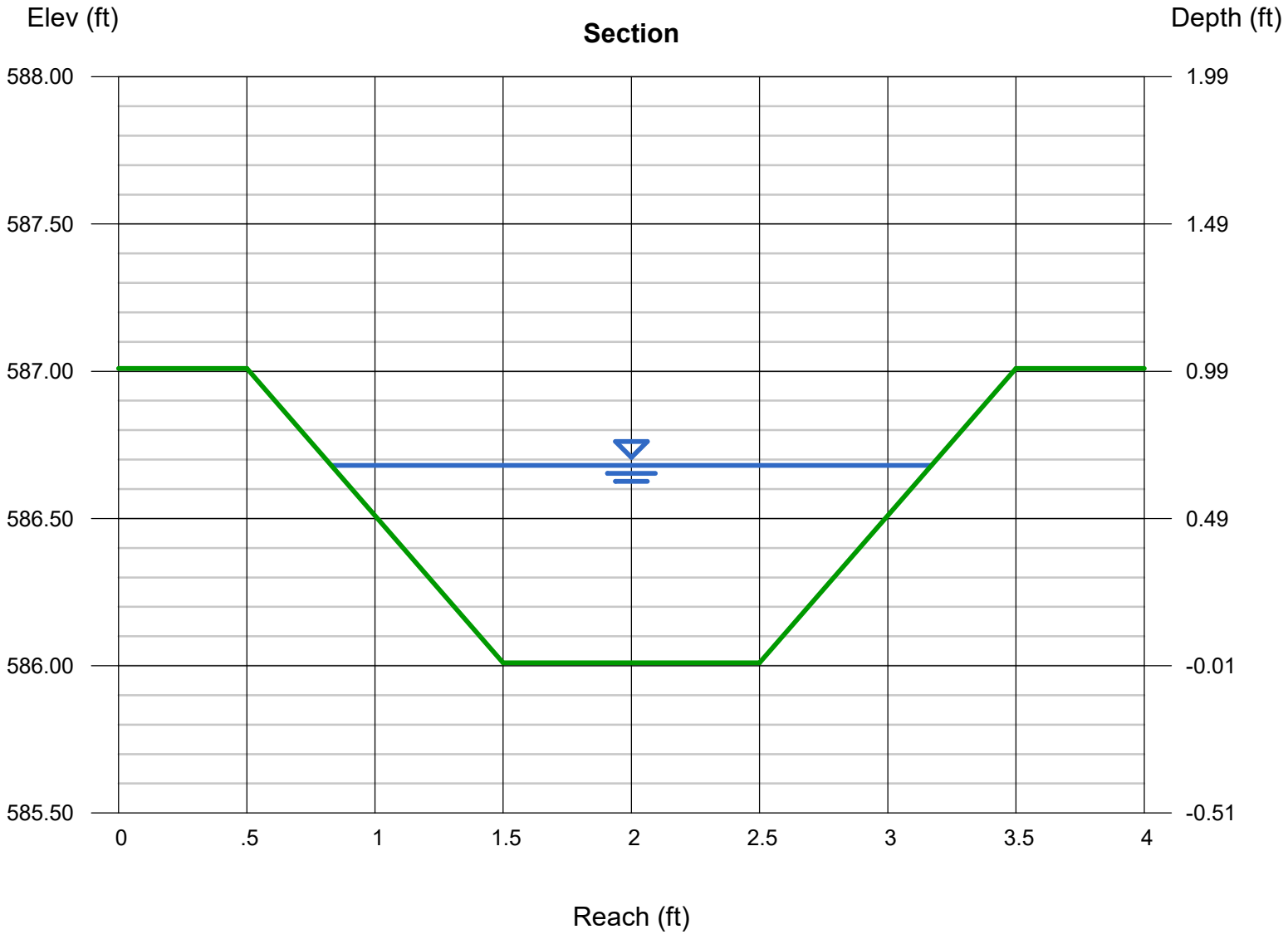
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 586.01
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.86

Highlighted

Depth (ft)	= 0.67
Q (cfs)	= 2.860
Area (sqft)	= 1.12
Velocity (ft/s)	= 2.56
Wetted Perim (ft)	= 2.90
Crit Depth, Yc (ft)	= 0.53
Top Width (ft)	= 2.34
EGL (ft)	= 0.77



LEGEND

SYMBOL	
	OUTER BASIN BOUNDARY
	MAJOR BASIN BOUNDARY
	MINOR BASIN BOUNDARY
SD	EXISTING STORM DRAIN
XXX	EXISTING CONTOUR
	FLOW DIRECTION
L=XX.X'	FLOW PATH FLOW LENGTH
311.00(E) 310.00(E)	NODE ELEVATION
200	HYDROLOGY NODE
	ANALYSIS/EXIT POINT
B-X X.XX	DRAINAGE BASIN MARKER & AREA (AC)

PROJECT	SHEET TITLE	ISSUE DATE: 02/02/2022	SYM	DESCRIPTION	DATE	APPR
BEELER CANYON ROAD	HYDROLOGY EXHIBIT EXISTING CONDITION	DRAWN BY: NJW				
		CHECKED BY: MGC				
SITE ADDRESS		BWE JOB NUMBER: 11900U.3.00				
PARCEL 3 OF MAP 6554		CLIENT JOB NUMBER:				
		MUNICIPALITY PROJECT NUMBER: PTS 649669				
	SHEET 1 OF 1					

BWE
CIVIL • STRUCTURAL • SURVEY • PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

Attachment C

Proposed Conditions Runoff Coefficient Calculations
Proposed Condition Hydrology Calculations
Proposed Condition Hydrology Map

Composite 'C' Value Calculations

Project: Beeler Canyon Road

C 0.7 Multi Family Residential, City of San Diego Table A-1

Total Area At= **Ap + Ai** (sum of pervious & impervious areas)

Proposed Conditions

Basin /Exit Point	Area (Acres)			C-composite
	Total Area (At)	Imp. Area (Ai)	Perv. Area (Ap)	
A-B/1	1.73	0.46	1.27	0.70
Overall	**1.73**	**0.46**		**0.70**

Proposed

Proposed	Total (SF)	Total (Ac)
A-1	9,320	0.21
A-2	7,476	0.18
A-3	5,322	0.12
A-4	17,315	0.4
A-5	1,459	0.03
A-6	1,097	0.03
B-1	1,739	0.04
B-2	4,021	0.09
B-3	4,259	0.1
B-4	1,923	0.04
B-5	3,048	0.07
B-6	2,985	0.07
B-7	10,187	0.23
B-8	4,999	0.12
Total	75,150	1.73

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 02/02/22

PROPOSED CONDITION ANALYSIS
ANALYSIS POINT 1
BEELER CANYON ROAD

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type]
Initial subarea flow distance = 30.000(Ft.)
Highest elevation = 619.750(Ft.)
Lowest elevation = 619.000(Ft.)
Elevation difference = 0.750(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 2.91 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*(30.000^.5)/(2.500^(1/3)]= 2.91
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.389(In/Hr) for a 100.0 year

```
storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
      Subarea runoff =      0.645(CFS)
      Total initial stream area =        0.210(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      101.000 to Point/Station
102.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   616.000(Ft.)
      Downstream point/station elevation =   615.220(Ft.)
      Pipe length  =    89.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.645(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.645(CFS)
      Normal flow depth in pipe =    4.05(In.)
      Flow top width inside pipe =    8.95(In.)
      Critical Depth =    4.38(In.)
      Pipe flow velocity =      3.35(Ft/s)
      Travel time through pipe =    0.44 min.
      Time of concentration (TC) =     5.44 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      102.000 to Point/Station
103.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   615.220(Ft.)
      Downstream point/station elevation =   614.420(Ft.)
      Pipe length  =    75.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.645(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.645(CFS)
      Normal flow depth in pipe =    3.83(In.)
      Flow top width inside pipe =    8.90(In.)
      Critical Depth =    4.38(In.)
      Pipe flow velocity =      3.60(Ft/s)
      Travel time through pipe =    0.35 min.
      Time of concentration (TC) =     5.79 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      103.000 to Point/Station
103.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     5.79 min.
```

```
      Rainfall intensity =      4.138(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.521(CFS) for    0.180(Ac.)
      Total runoff =      1.167(CFS)      Total area =        0.39(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      103.000 to Point/Station
104.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
____
      Upstream point/station elevation =   614.420(Ft.)
      Downstream point/station elevation =   614.020(Ft.)
      Pipe length  =    55.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.167(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     1.167(CFS)
      Normal flow depth in pipe =    6.24(In.)
      Flow top width inside pipe =    8.30(In.)
      Critical Depth =    5.96(In.)
      Pipe flow velocity =      3.57(Ft/s)
      Travel time through pipe =    0.26 min.
      Time of concentration (TC) =     6.05 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      104.000 to Point/Station
106.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
____
      Upstream point/station elevation =   614.020(Ft.)
      Downstream point/station elevation =   598.300(Ft.)
      Pipe length  =    81.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.167(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     1.167(CFS)
      Normal flow depth in pipe =    2.90(In.)
      Flow top width inside pipe =    6.00(In.)
      Critical depth could not be calculated.
      Pipe flow velocity =     12.41(Ft/s)
      Travel time through pipe =    0.11 min.
      Time of concentration (TC) =     6.16 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      106.000 to Point/Station
106.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
```

```
      Time of concentration =     6.16 min.
      Rainfall intensity =      4.040(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.339(CFS) for    0.120(Ac.)
      Total runoff =      1.506(CFS)      Total area =        0.51(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      106.000 to Point/Station
107.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =   598.300(Ft.)
      Downstream point/station elevation =   598.000(Ft.)
      Pipe length  =    30.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.506(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     1.506(CFS)
      Normal flow depth in pipe =    6.74(In.)
      Flow top width inside pipe =    7.81(In.)
      Critical Depth =    6.79(In.)
      Pipe flow velocity =      4.24(Ft/s)
      Travel time through pipe =    0.12 min.
      Time of concentration (TC) =     6.27 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      106.000 to Point/Station
107.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =   597.380(Ft.)
      Downstream point/station elevation =   589.000(Ft.)
      Pipe length  =    73.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.506(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     1.506(CFS)
      Normal flow depth in pipe =    4.03(In.)
      Flow top width inside pipe =    5.63(In.)
      Critical depth could not be calculated.
      Pipe flow velocity =     10.74(Ft/s)
      Travel time through pipe =    0.11 min.
      Time of concentration (TC) =     6.39 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      107.000 to Point/Station
107.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
```

```
      [MULTI - UNITS area type                    ]
      Time of concentration =     6.39 min.
      Rainfall intensity =      3.983(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      1.115(CFS) for    0.400(Ac.)
      Total runoff =      2.621(CFS)      Total area =        0.91(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      107.000 to Point/Station
109.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =   598.000(Ft.)
      Downstream point/station elevation =   590.000(Ft.)
      Pipe length  =   198.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.621(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     2.621(CFS)
      Normal flow depth in pipe =    6.02(In.)
      Flow top width inside pipe =    8.47(In.)
      Critical Depth =    8.41(In.)
      Pipe flow velocity =      8.34(Ft/s)
      Travel time through pipe =    0.40 min.
      Time of concentration (TC) =     6.78 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      109.000 to Point/Station
110.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =   590.000(Ft.)
      Downstream point/station elevation =   586.600(Ft.)
      Pipe length  =    30.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.621(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     2.621(CFS)
      Normal flow depth in pipe =    4.34(In.)
      Flow top width inside pipe =    8.99(In.)
      Critical Depth =    8.41(In.)
      Pipe flow velocity =     12.41(Ft/s)
      Travel time through pipe =    0.04 min.
      Time of concentration (TC) =     6.82 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      110.000 to Point/Station
110.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
```

```
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     6.82 min.
      Rainfall intensity =      3.884(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.082(CFS) for    0.030(Ac.)
      Total runoff =      2.703(CFS)      Total area =        0.94(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      110.000 to Point/Station
110.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     6.82 min.
      Rainfall intensity =      3.884(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.082(CFS) for    0.030(Ac.)
      Total runoff =      2.784(CFS)      Total area =        0.97(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      110.000 to Point/Station
111.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
____
      Upstream point/station elevation =   586.500(Ft.)
      Downstream point/station elevation =   586.100(Ft.)
      Pipe length  =    36.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     2.784(CFS)
      Nearest computed pipe diameter  =     12.00(In.)
      Calculated individual pipe flow  =     2.784(CFS)
      Normal flow depth in pipe =    7.69(In.)
      Flow top width inside pipe =   11.52(In.)
      Critical Depth =    8.58(In.)
      Pipe flow velocity =      5.23(Ft/s)
      Travel time through pipe =    0.11 min.
      Time of concentration (TC) =     6.94 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      100.000 to Point/Station
111.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ------------------------------------------------------------------
____
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      0.970(Ac.)
```

```
      Runoff from this stream =      2.784(CFS)
      Time of concentration =    6.94 min.
      Rainfall intensity =     3.859(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      200.000 to Point/Station
201.000
      **** INITIAL AREA EVALUATION ****
      ------------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Initial subarea flow distance  =   26.000(Ft.)
      Highest elevation =  609.000(Ft.)
      Lowest elevation =  608.750(Ft.)
      Elevation difference =    0.250(Ft.)
      Time of concentration calculated by the urban
      areas overland flow method (App X-C) =     3.72 min.
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.7000)*(  26.000^.5)/(   0.962^(1/3)]=   3.72
      Setting time of concentration to 5 minutes
      Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year
storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
      Subarea runoff =      0.123(CFS)
      Total initial stream area =        0.040(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      201.000 to Point/Station
202.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   605.760(Ft.)
      Downstream point/station elevation =   605.230(Ft.)
      Pipe length  =    54.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.123(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.123(CFS)
      Normal flow depth in pipe =    1.91(In.)
      Flow top width inside pipe =    5.59(In.)
      Critical Depth =    2.09(In.)
      Pipe flow velocity =      2.27(Ft/s)
      Travel time through pipe =    0.40 min.
      Time of concentration (TC) =     5.40 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      202.000 to Point/Station
202.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
```

```
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     5.40 min.
      Rainfall intensity =      4.256(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.268(CFS) for    0.090(Ac.)
      Total runoff =      0.391(CFS)      Total area =        0.13(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      202.000 to Point/Station
203.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
____
      Upstream point/station elevation =   605.230(Ft.)
      Downstream point/station elevation =   604.800(Ft.)
      Pipe length  =    43.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.391(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.391(CFS)
      Normal flow depth in pipe =    3.69(In.)
      Flow top width inside pipe =    5.84(In.)
      Critical Depth =    3.82(In.)
      Pipe flow velocity =      3.09(Ft/s)
      Travel time through pipe =    0.23 min.
      Time of concentration (TC) =     5.63 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      203.000 to Point/Station
203.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     5.63 min.
      Rainfall intensity =      4.185(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.293(CFS) for    0.100(Ac.)
      Total runoff =      0.684(CFS)      Total area =        0.23(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      203.000 to Point/Station
204.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
```

```
____
      Upstream point/station elevation =   604.800(Ft.)
      Downstream point/station elevation =   604.370(Ft.)
      Pipe length  =    43.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.684(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.684(CFS)
      Normal flow depth in pipe =    4.03(In.)
      Flow top width inside pipe =    8.95(In.)
      Critical Depth =    4.51(In.)
      Pipe flow velocity =      3.57(Ft/s)
      Travel time through pipe =    0.20 min.
      Time of concentration (TC) =     5.83 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      204.000 to Point/Station
204.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     5.83 min.
      Rainfall intensity =      4.127(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.116(CFS) for    0.040(Ac.)
      Total runoff =      0.799(CFS)      Total area =        0.27(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------
____
      Upstream point/station elevation =   604.370(Ft.)
      Downstream point/station elevation =   603.980(Ft.)
      Pipe length  =    38.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.799(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.799(CFS)
      Normal flow depth in pipe =    4.38(In.)
      Flow top width inside pipe =    9.00(In.)
      Critical Depth =    4.90(In.)
      Pipe flow velocity =      3.75(Ft/s)
      Travel time through pipe =    0.17 min.
      Time of concentration (TC) =     6.00 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      205.000 to Point/Station
206.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
------------------------------------------------------------------------
____
      Upstream point/station elevation =   603.980(Ft.)
      Downstream point/station elevation =   591.640(Ft.)
      Pipe length  =    38.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.799(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.799(CFS)
      Normal flow depth in pipe =    2.04(In.)
      Flow top width inside pipe =    5.69(In.)
      Critical Depth =    5.33(In.)
      Pipe flow velocity =     13.53(Ft/s)
      Travel time through pipe =    0.05 min.
      Time of concentration (TC) =     6.04 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      206.000 to Point/Station
206.000
      **** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                      ]
      Time of concentration =     6.04 min.
      Rainfall intensity =      4.069(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.199(CFS) for    0.070(Ac.)
      Total runoff =      0.999(CFS)      Total area =        0.34(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      206.000 to Point/Station
207.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
____
      Upstream point/station elevation =   591.640(Ft.)
      Downstream point/station elevation =   591.160(Ft.)
      Pipe length  =    46.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.999(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     0.999(CFS)
      Normal flow depth in pipe =    4.98(In.)
      Flow top width inside pipe =    8.95(In.)
      Critical Depth =    5.51(In.)
      Pipe flow velocity =      3.98(Ft/s)
      Travel time through pipe =    0.19 min.
      Time of concentration (TC) =     6.24 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      206.000 to Point/Station
207.000
```

```
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   590.590(Ft.)
      Downstream point/station elevation =   589.000(Ft.)
      Pipe length  =    22.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.999(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.999(CFS)
      Normal flow depth in pipe =    3.57(In.)
      Flow top width inside pipe =    5.89(In.)
      Critical Depth =    5.67(In.)
      Pipe flow velocity =      8.21(Ft/s)
      Travel time through pipe =    0.04 min.
      Time of concentration (TC) =     6.28 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      207.000 to Point/Station
207.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                    ]
      Time of concentration =     6.28 min.
      Rainfall intensity =      4.009(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.196(CFS) for    0.070(Ac.)
      Total runoff =      1.195(CFS)      Total area =        0.41(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      207.000 to Point/Station
208.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   591.160(Ft.)
      Downstream point/station elevation =   590.590(Ft.)
      Pipe length  =    54.50(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.195(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     1.195(CFS)
      Normal flow depth in pipe =    5.58(In.)
      Flow top width inside pipe =    8.73(In.)
      Critical Depth =    6.04(In.)
      Pipe flow velocity =      4.15(Ft/s)
      Travel time through pipe =    0.22 min.
      Time of concentration (TC) =     6.50 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      208.000 to Point/Station
```

```
209.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   590.590(Ft.)
      Downstream point/station elevation =   590.000(Ft.)
      Pipe length  =    22.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.195(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     1.195(CFS)
      Normal flow depth in pipe =    4.18(In.)
      Flow top width inside pipe =    8.98(In.)
      Critical Depth =    6.04(In.)
      Pipe flow velocity =      5.94(Ft/s)
      Travel time through pipe =    0.06 min.
      Time of concentration (TC) =     6.56 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      209.000 to Point/Station
209.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
____
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      [MULTI - UNITS area type                      ]
      Time of concentration =     6.56 min.
      Rainfall intensity =      3.942(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
      Subarea runoff =      0.635(CFS) for    0.230(Ac.)
      Total runoff =      1.830(CFS)      Total area =        0.64(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      209.000 to Point/Station
111.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =   586.500(Ft.)
      Downstream point/station elevation =   586.010(Ft.)
      Pipe length  =    21.00(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     1.830(CFS)
      Nearest computed pipe diameter  =      9.00(In.)
      Calculated individual pipe flow  =     1.830(CFS)
      Normal flow depth in pipe =    5.68(In.)
      Flow top width inside pipe =    8.69(In.)
      Critical Depth =    7.42(In.)
      Pipe flow velocity =      6.23(Ft/s)
      Travel time through pipe =    0.06 min.
      Time of concentration (TC) =     6.62 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
```

```
      Process from Point/Station      200.000 to Point/Station
111.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ------------------------------------------------------------------------
____
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      0.640(Ac.)
      Runoff from this stream =      1.830(CFS)
      Time of concentration =    6.62 min.
      Rainfall intensity =     3.929(In/Hr)
      Summary of stream data:

      Stream   Flow rate      TC            Rainfall Intensity
       No.       (CFS)       (min)                (In/Hr)


      1        2.784      6.94               3.859
      2        1.830      6.62               3.929
      Qmax(1) =
                1.000 *    1.000 *     2.784) +
                0.982 *    1.000 *     1.830) + =       4.582
      Qmax(2) =
                1.000 *    0.954 *     2.784) +
                1.000 *    1.000 *     1.830) + =       4.486

      Total of 2 main streams to confluence:
      Flow rates before confluence point:
             2.784       1.830
      Maximum flow rates at confluence using above data:
             4.582        4.486
      Area of streams before confluence:
             0.970        0.640


      Results of confluence:
      Total flow rate =      4.582(CFS)
      Time of concentration =     6.938 min.
      Effective stream area after confluence  =      1.610(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      111.000 to Point/Station
112.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ------------------------------------------------------------------------
____
      Depth of flow =   0.728(Ft.), Average velocity =   2.471(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              1.00
            2              3.50              0.00
            3              7.00              1.00
      Manning's 'N' friction factor =   0.030
      ------------------------------------------------------------------
      Sub-Channel flow  =      4.582(CFS)
        '     '    flow top width =      5.095(Ft.)
        '     '    velocity=    2.471(Ft/s)
```

```
  '     '    area =      1.854(Sq.Ft)
  '     '    Froude number =     0.722

Upstream point elevation =   586.100(Ft.)
Downstream point elevation =   585.000(Ft.)
Flow length =   109.000(Ft.)
Travel time  =    0.74 min.
Time of concentration =    7.67 min.
Depth of flow =   0.728(Ft.)
Average velocity =   2.471(Ft/s)
Total irregular channel flow =     4.582(CFS)
Irregular channel normal depth above invert elev. =   0.728(Ft.)
Average velocity of channel(s) =   2.471(Ft/s)

Sub-Channel No. 1 Critical depth =      0.641(Ft.)
  '     '       '     Critical flow top width =      4.484(Ft.)
  '     '       '     Critical flow velocity=    3.190(Ft/s)
  '     '       '     Critical flow area =      1.436(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
Process from Point/Station      210.000 to Point/Station
112.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                    ]
Time of concentration =     7.67 min.
Rainfall intensity =      3.716(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.700
Subarea runoff =      0.312(CFS) for    0.120(Ac.)
Total runoff =      4.894(CFS)      Total area =        1.73(Ac.)
End of computations, total study area =           1.730 (Ac.)
```

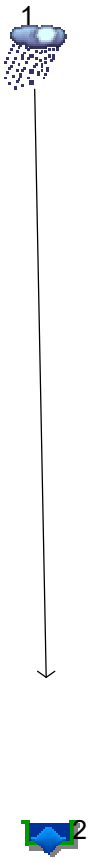
BMP 1

Storage	Incremental Storage (CF)
Permavoid (587 to 588, 1900 SF, 95% void)	1805
Media (588 to 590, 407 SF, 18" at 20% void, 6" at 40% void)	203
Biofiltration (590 to 591), 407 SF at 590, 687 at 591	547

BMP 2

Storage	Incremental Storage (CF)
Permavoid (585.5 to 587, 1280 SF,95% void)	1824
Media (587 to 589, 360 SF, 18" at 20% void, 6" at 40% void)	180
Biofiltration (589 to 590), 360 SF at 589, 906 SF at 590	633

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	BMP1Hydrograph
2	Reservoir	BMP1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	2.600	6	246	5,796	------	------	------	BMP1Hydrograph
2	Reservoir	1.499	6	258	5,777	1	590.11	2,412	BMP1

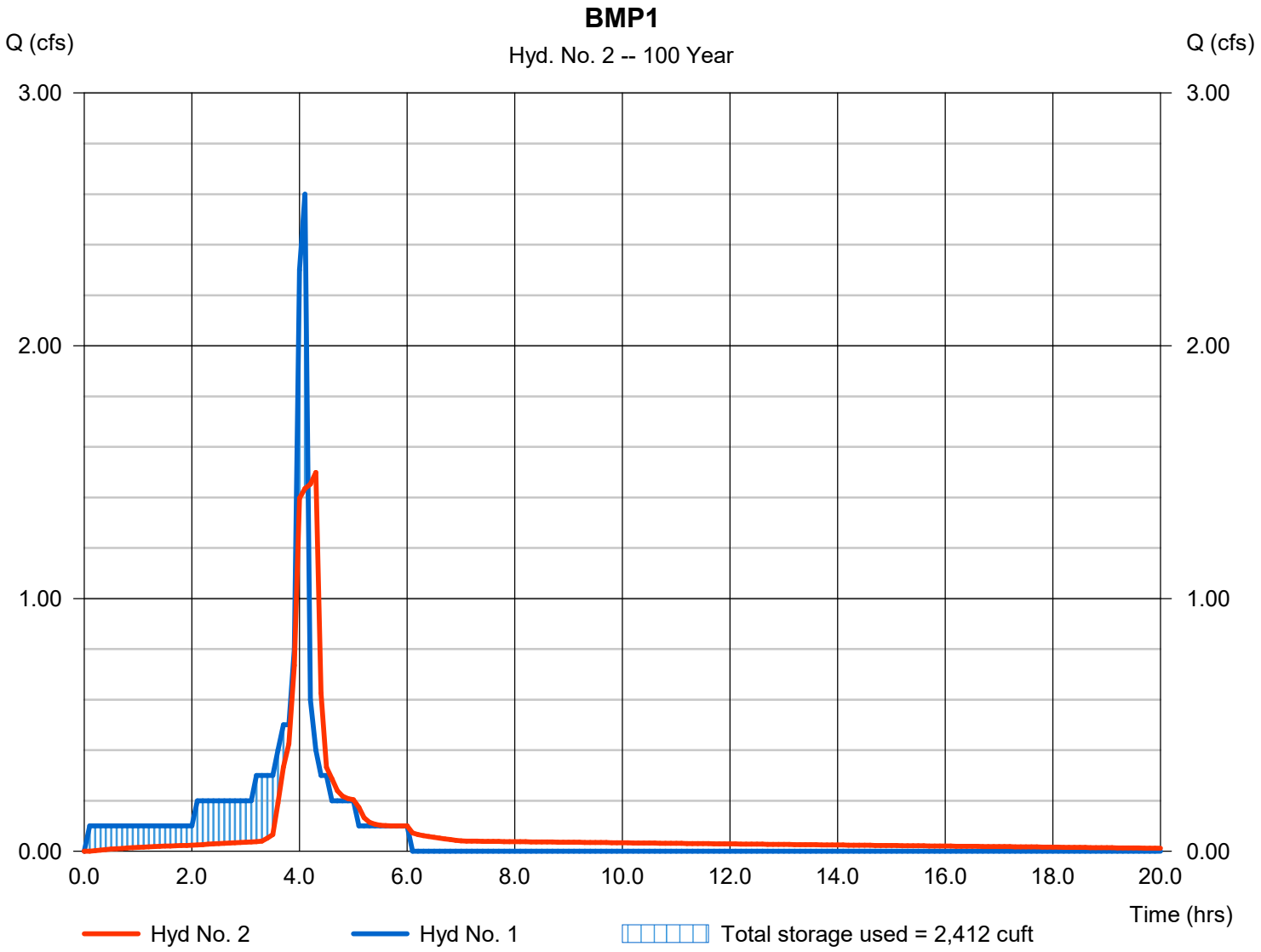
Hydrograph Report

Hyd. No. 2

BMP1

Hydrograph type	=	Reservoir	Peak discharge	=	1.499 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.30 hrs
Time interval	=	6 min	Hyd. volume	=	5,777 cuft
Inflow hyd. No.	=	1 - BMP1Hydrograph	Max. Elevation	=	590.11 ft
Reservoir name	=	BMP1 Permavoid	Max. Storage	=	2,412 cuft

Storage Indication method used.



Pond No. 1 - BMP1 Permavoid

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	587.00	n/a	0	0
1.00	588.00	n/a	1,805	1,805
3.00	590.00	n/a	203	2,008
4.00	591.00	n/a	547	2,555

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	1.36	Inactive	Inactive
Span (in)	= 6.00	1.36	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 587.00	587.00	0.00	0.00
Length (ft)	= 23.10	0.00	0.00	0.00
Slope (%)	= 1.73	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	3.00	Inactive	Inactive
Crest El. (ft)	= 590.50	587.88	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	587.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.10	181	587.10	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.010
0.20	361	587.20	0.02 ic	0.02 ic	---	---	0.00	0.00	0.00	---	---	---	0.017
0.30	542	587.30	0.02 ic	0.02 ic	---	---	0.00	0.00	0.00	---	---	---	0.023
0.40	722	587.40	0.03 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.027
0.50	903	587.50	0.03 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.031
0.60	1,083	587.60	0.04 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.034
0.70	1,264	587.70	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.037
0.80	1,444	587.80	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.040
0.90	1,625	587.90	0.07 ic	0.04 ic	---	---	0.00	0.03	0.00	---	---	---	0.070
1.00	1,805	588.00	0.45 ic	0.04 ic	---	---	0.00	0.42	0.00	---	---	---	0.451
1.20	1,825	588.20	0.90 oc	0.01 ic	---	---	0.00	0.89 s	0.00	---	---	---	0.895
1.40	1,846	588.40	0.98 oc	0.01 ic	---	---	0.00	0.98 s	0.00	---	---	---	0.983
1.60	1,866	588.60	1.06 oc	0.00 ic	---	---	0.00	1.05 s	0.00	---	---	---	1.054
1.80	1,886	588.80	1.13 oc	0.00 ic	---	---	0.00	1.12 s	0.00	---	---	---	1.123
2.00	1,907	589.00	1.19 oc	0.00 ic	---	---	0.00	1.17 s	0.00	---	---	---	1.174
2.20	1,927	589.20	1.26 oc	0.00 ic	---	---	0.00	1.22 s	0.00	---	---	---	1.225
2.40	1,947	589.40	1.32 oc	0.00 ic	---	---	0.00	1.30 s	0.00	---	---	---	1.304
2.60	1,967	589.60	1.37 oc	0.00 ic	---	---	0.00	1.30 s	0.00	---	---	---	1.305
2.80	1,988	589.80	1.43 oc	0.00 ic	---	---	0.00	1.39 s	0.00	---	---	---	1.389
3.00	2,008	590.00	1.48 oc	0.00 ic	---	---	0.00	1.42 s	0.00	---	---	---	1.421
3.10	2,063	590.10	1.50 oc	0.00 ic	---	---	0.00	1.49 s	0.00	---	---	---	1.496
3.20	2,117	590.20	1.53 oc	0.00 ic	---	---	0.00	1.52 s	0.00	---	---	---	1.520
3.30	2,172	590.30	1.55 oc	0.00 ic	---	---	0.00	1.50 s	0.00	---	---	---	1.504
3.40	2,227	590.40	1.58 oc	0.00 ic	---	---	0.00	1.57 s	0.00	---	---	---	1.573
3.50	2,282	590.50	1.60 oc	0.00 ic	---	---	0.00	1.46 s	0.00	---	---	---	1.459
3.60	2,336	590.60	1.62 oc	0.00 ic	---	---	0.04 s	1.43 s	0.00	---	---	---	1.471
3.70	2,391	590.70	1.65 oc	0.00 ic	---	---	0.07 s	1.33 s	0.00	---	---	---	1.402
3.80	2,446	590.80	1.67 oc	0.00 ic	---	---	0.11 s	1.38 s	0.00	---	---	---	1.495
3.90	2,500	590.90	1.69 oc	0.00 ic	---	---	0.15 s	1.44 s	0.00	---	---	---	1.589
4.00	2,555	591.00	1.71 oc	0.00 ic	---	---	0.18 s	1.38 s	0.00	---	---	---	1.559

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

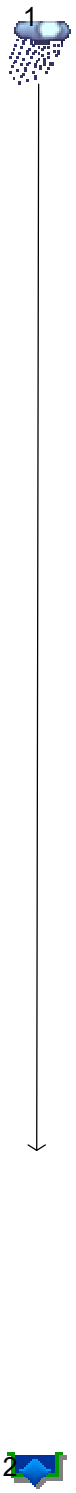
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Manual	BMP2Hydrograph
2	Reservoir	BMP2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	1.910	6	246	4,288	------	------	------	BMP2Hydrograph
2	Reservoir	0.795	6	252	4,266	1	589.48	2,437	BMP2

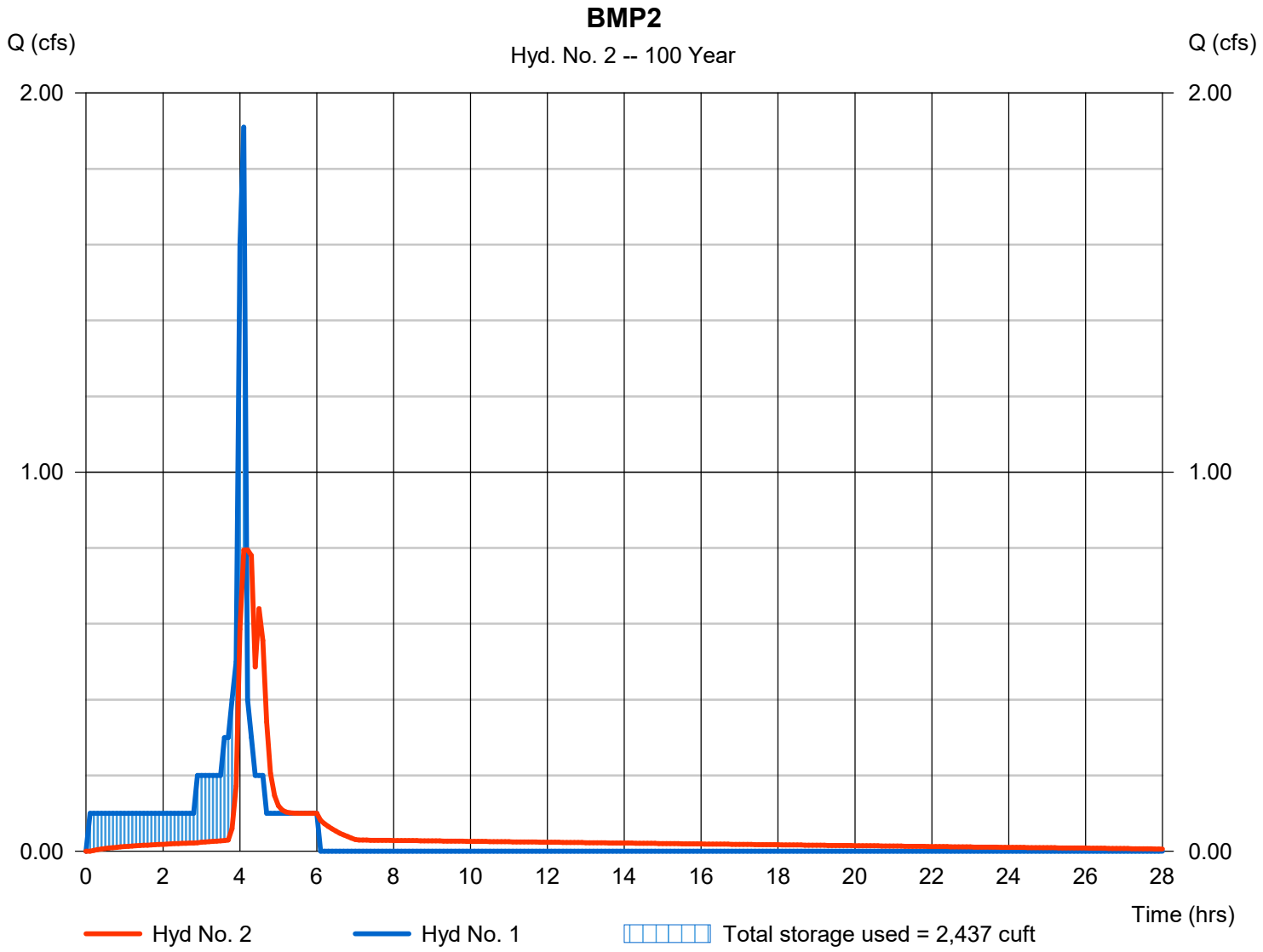
Hydrograph Report

Hyd. No. 2

BMP2

Hydrograph type	=	Reservoir	Peak discharge	=	0.795 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.20 hrs
Time interval	=	6 min	Hyd. volume	=	4,266 cuft
Inflow hyd. No.	=	1 - BMP2Hydrograph	Max. Elevation	=	589.48 ft
Reservoir name	=	BMP2	Max. Storage	=	2,437 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - BMP2

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	585.50	n/a	0	0
1.50	587.00	n/a	1,824	1,824
3.50	589.00	n/a	180	2,004
4.50	590.00	n/a	633	2,637

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	1.04	Inactive	Inactive
Span (in)	= 4.00	1.04	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 585.50	585.50	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 4.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	3.00	Inactive	Inactive
Crest El. (ft)	= 589.50	586.82	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	585.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.15	182	585.65	0.01 ic	0.01 ic	---	---	0.00	0.00	---	---	---	---	0.009
0.30	365	585.80	0.01 ic	0.01 ic	---	---	0.00	0.00	---	---	---	---	0.014
0.45	547	585.95	0.02 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.017
0.60	730	586.10	0.02 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.020
0.75	912	586.25	0.02 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.023
0.90	1,094	586.40	0.03 ic	0.03 ic	---	---	0.00	0.00	---	---	---	---	0.025
1.05	1,277	586.55	0.03 ic	0.03 ic	---	---	0.00	0.00	---	---	---	---	0.028
1.20	1,459	586.70	0.03 ic	0.03 ic	---	---	0.00	0.00	---	---	---	---	0.030
1.35	1,642	586.85	0.08 ic	0.03 ic	---	---	0.00	0.05	---	---	---	---	0.083
1.50	1,824	587.00	0.48 ic	0.01 ic	---	---	0.00	0.47 s	---	---	---	---	0.478
1.70	1,842	587.20	0.52 ic	0.00 ic	---	---	0.00	0.51 s	---	---	---	---	0.517
1.90	1,860	587.40	0.55 ic	0.00 ic	---	---	0.00	0.54 s	---	---	---	---	0.541
2.10	1,878	587.60	0.58 ic	0.00 ic	---	---	0.00	0.57 s	---	---	---	---	0.573
2.30	1,896	587.80	0.61 ic	0.00 ic	---	---	0.00	0.57 s	---	---	---	---	0.570
2.50	1,914	588.00	0.64 ic	0.00 ic	---	---	0.00	0.57 s	---	---	---	---	0.566
2.70	1,932	588.20	0.67 ic	0.00 ic	---	---	0.00	0.60 s	---	---	---	---	0.601
2.90	1,950	588.40	0.69 ic	0.00 ic	---	---	0.00	0.51 s	---	---	---	---	0.506
3.10	1,968	588.60	0.72 ic	0.00 ic	---	---	0.00	0.58 s	---	---	---	---	0.578
3.30	1,986	588.80	0.74 ic	0.00 ic	---	---	0.00	0.65 s	---	---	---	---	0.651
3.50	2,004	589.00	0.77 ic	0.00 ic	---	---	0.00	0.64 s	---	---	---	---	0.636
3.60	2,067	589.10	0.78 ic	0.00 ic	---	---	0.00	0.67 s	---	---	---	---	0.669
3.70	2,131	589.20	0.79 ic	0.00 ic	---	---	0.00	0.43 s	---	---	---	---	0.432
3.80	2,194	589.30	0.80 ic	0.00 ic	---	---	0.00	0.73 s	---	---	---	---	0.734
3.90	2,257	589.40	0.81 ic	0.00 ic	---	---	0.00	0.77 s	---	---	---	---	0.768
4.00	2,321	589.50	0.82 ic	0.00 ic	---	---	0.00	0.80 s	---	---	---	---	0.801
4.10	2,384	589.60	0.83 ic	0.00 ic	---	---	0.01 s	0.51 s	---	---	---	---	0.527
4.20	2,447	589.70	0.84 ic	0.00 ic	---	---	0.00 s	0.00 s	---	---	---	---	0.844
4.30	2,510	589.80	0.85 ic	0.00	---	---	0.00	0.00	---	---	---	---	0.854
4.40	2,574	589.90	0.86 ic	0.00	---	---	0.00	0.00	---	---	---	---	0.864
4.50	2,637	590.00	0.87 ic	0.00	---	---	0.00	0.00	---	---	---	---	0.875

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Feb 2 2022

Ditch, Proposed Mitigated

Trapezoidal

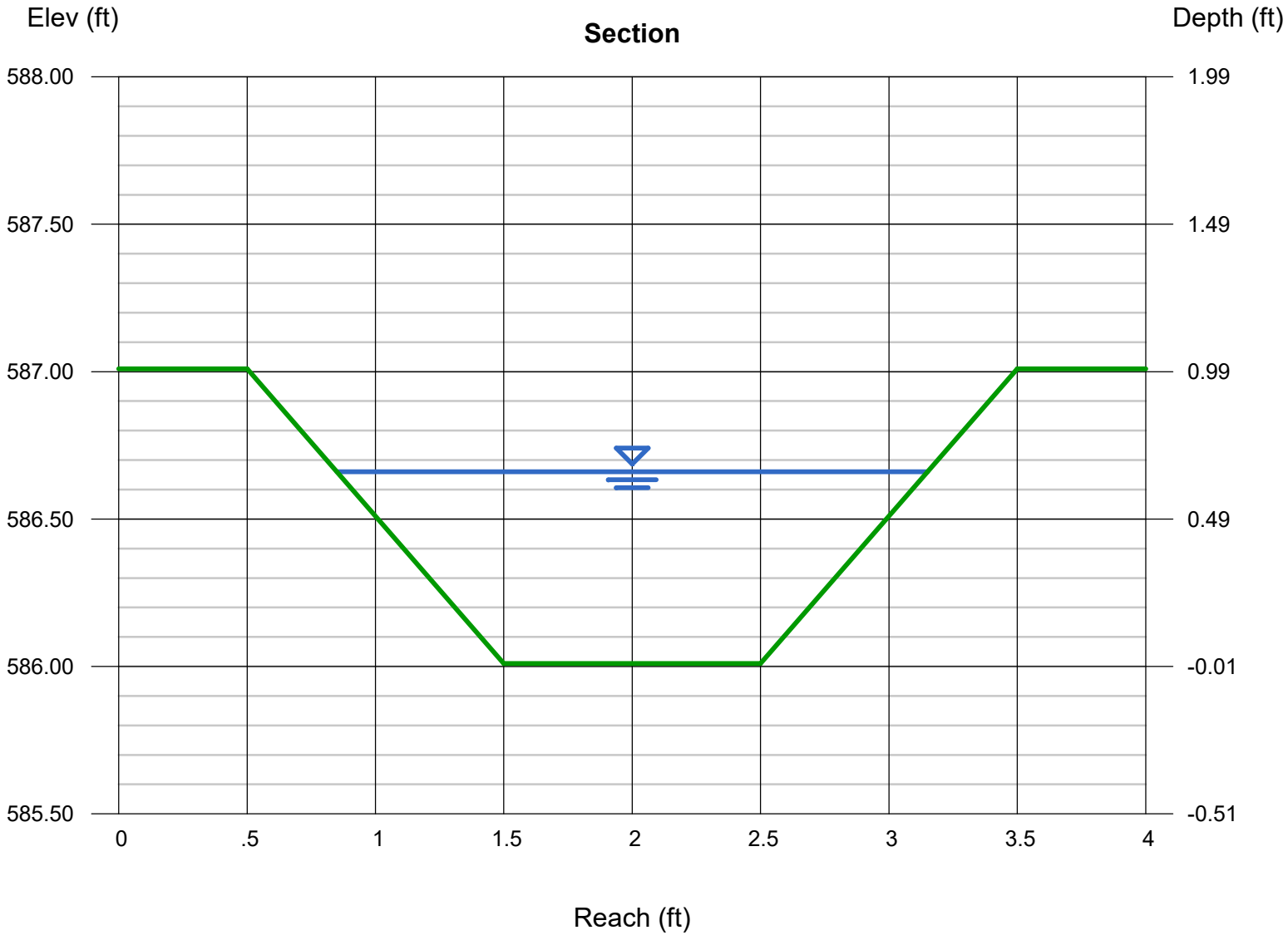
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 586.01
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.76

Highlighted

Depth (ft)	= 0.65
Q (cfs)	= 2.760
Area (sqft)	= 1.07
Velocity (ft/s)	= 2.57
Wetted Perim (ft)	= 2.84
Crit Depth, Yc (ft)	= 0.52
Top Width (ft)	= 2.30
EGL (ft)	= 0.75



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Feb 2 2022

Ditch, Proposed Unmitigated

Trapezoidal

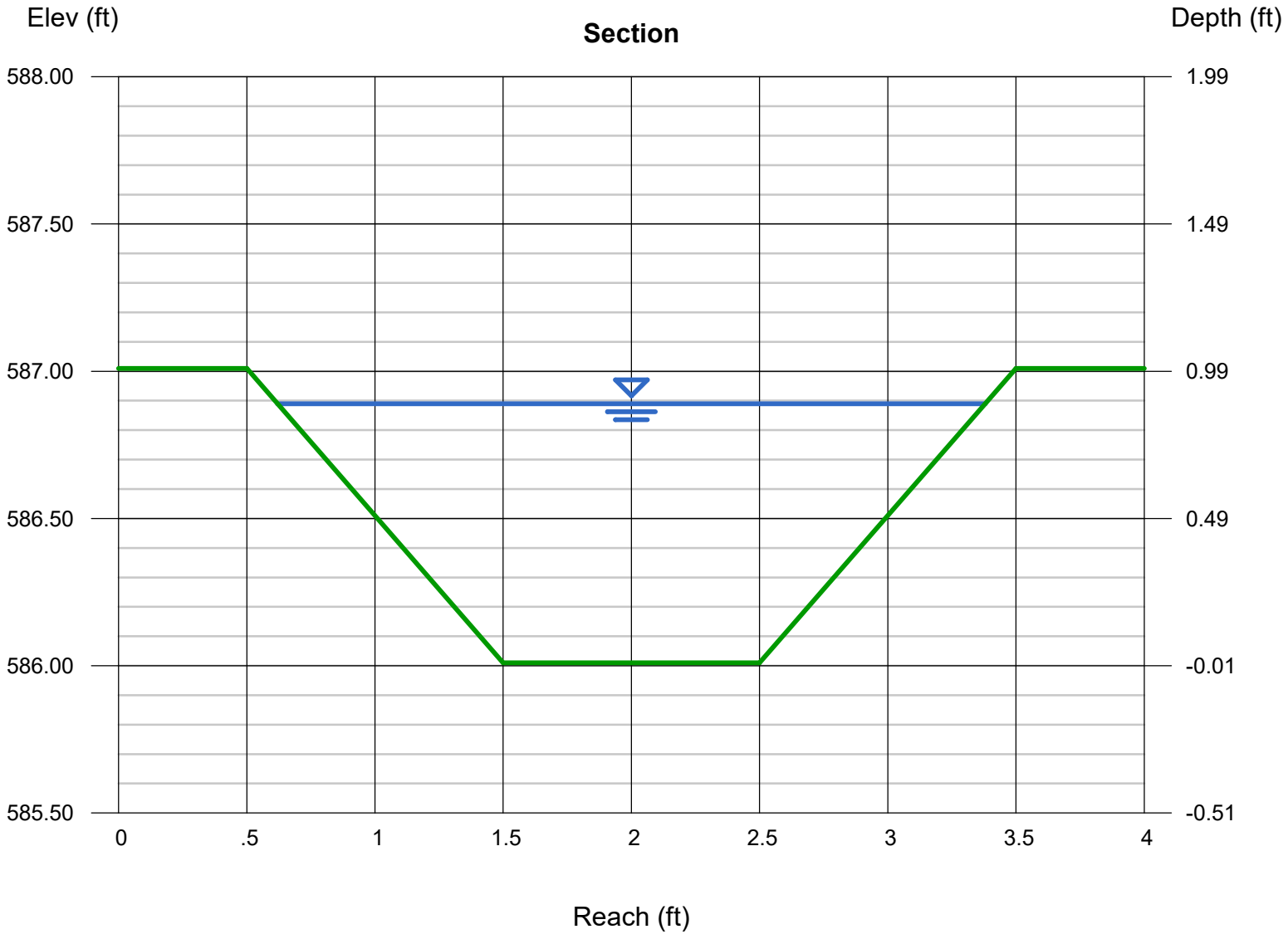
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 586.01
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.89

Highlighted

Depth (ft)	= 0.88
Q (cfs)	= 4.890
Area (sqft)	= 1.65
Velocity (ft/s)	= 2.96
Wetted Perim (ft)	= 3.49
Crit Depth, Yc (ft)	= 0.72
Top Width (ft)	= 2.76
EGL (ft)	= 1.02



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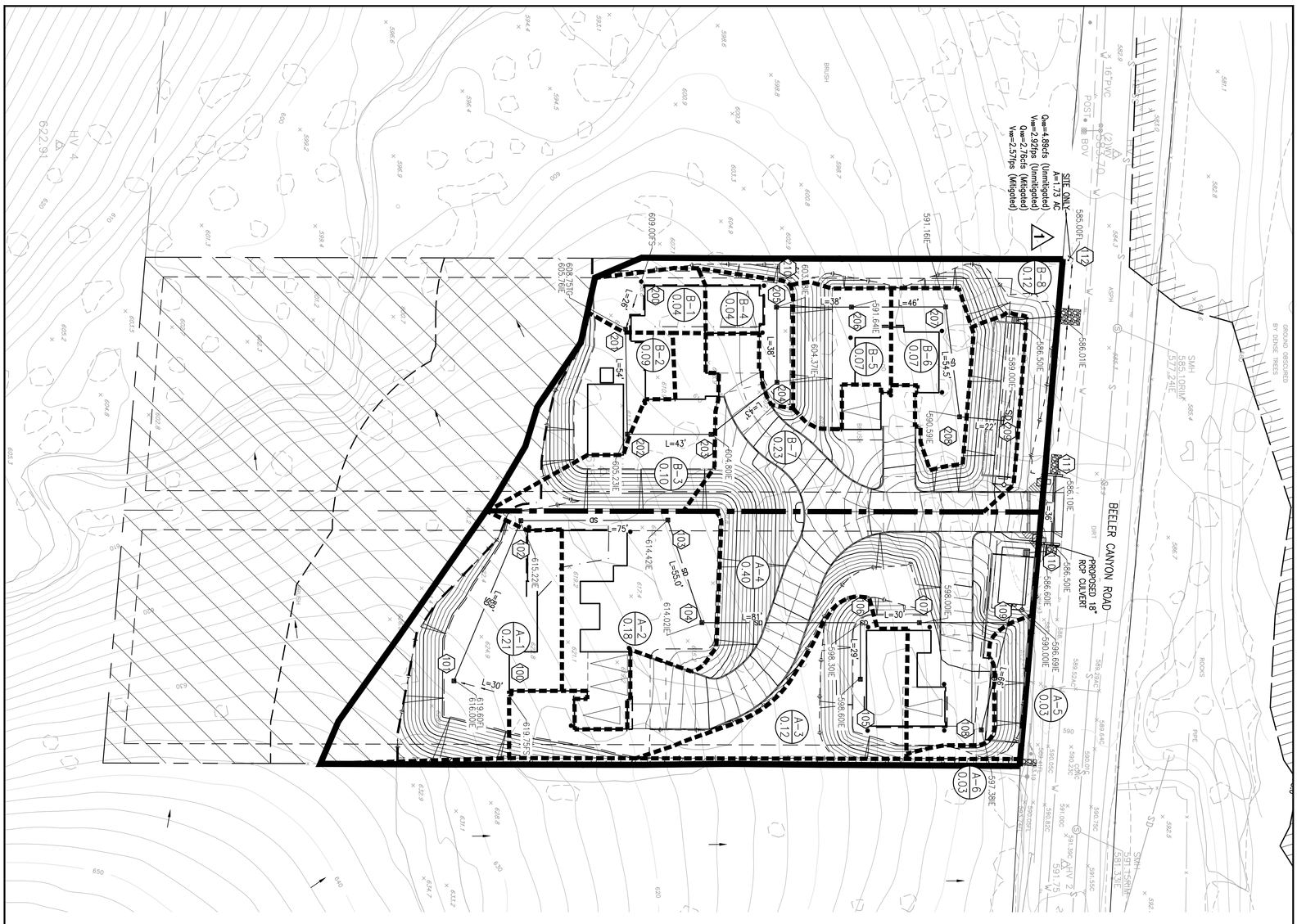

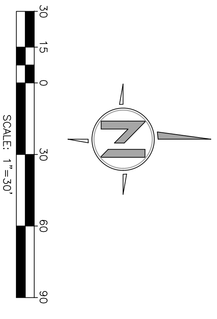

LEGEND

SYMBOL	
	OUTER BASIN BOUNDARY
	MAJOR BASIN BOUNDARY
	MINOR BASIN BOUNDARY
SD	EXISTING STORM DRAIN
SD	NEW STORM DRAIN
XXX	EXISTING CONTOUR
XXX	NEW CONTOUR
	FLOW DIRECTION
	FLOW PATH
L=XX.X'	FLOW LENGTH
327.85FL 304.35E	NODE ELEVATION
200	HYDROLOGY NODE
1	ANALYSIS/EXIT POINT
B-X X.XX	DRAINAGE BASIN MARKER & AREA (AC)

PROJECT	SHEET TITLE	ISSUE DATE: 02/02/2022	SYM	DESCRIPTION	DATE	APPR
BEELER CANYON ROAD	HYDROLOGY EXHIBIT PROPOSED CONDITION	DRAWN BY: NJW				
		CHECKED BY: MGC				
		BWE JOB NUMBER: 11900U.3.00				
		CLIENT JOB NUMBER:				
SITE ADDRESS PARCEL 3 OF MAP 6554		MUNICIPALITY PROJECT NUMBER: PTS 649669				
	SHEET 1 OF 1					

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Attachment D

Off-site Conditions Runoff Coefficient Calculations
Off-site Condition Hydrology Calculations
Off-site Condition Hydrology Map

Composite 'C' Value Calculations

Project: Beeler Canyon Road

C-perv = 0.35 Open Space per County of San Diego Hydrology Manual

C-imp= 0.95 (for paved areas)

C-composite= **[(Cperv*Ap + Cimp*Ai)/At]** …… (1)

Total Area At= **Ap + Ai** (sum of pervious & impervious areas)

Off-site Conditions

Basin /Exit Point	Area (Acres)			[(Cperv*Ap + Cimp*Ai)]	C-composite
	Total Area (At)	Imp. Area (Ai)	Perv. Area (Ap)		
C	2.54	0.47	2.07	1.17	0.46
Overall	**2.54**	**0.47**		**1.17**	**0.46**

Off-site

Off-site	Total (SF)	Imp (SF)	Per (SF)
C-1	1,400	1,400	0
C-2	28,320	4,730	23,590
C-3	6,470	6,470	0
C-4	66,680	0	66,680
C-5	5,310	5,310	0
C-6	2,640	2,640	0

Off-site	Total (Ac)	Imp (Ac)	Per (Ac)	Impervious Fraction	C-County
C-1	0.032	0.032	0.000	1.000	0.950
C-2	0.650	0.109	0.542	0.167	0.450
C-3	0.149	0.149	0.000	1.000	0.950
C-4	1.531	0.000	1.531	0.000	0.350
C-5	0.122	0.122	0.000	1.000	0.950
C-6	0.061	0.061	0.000	1.000	0.950
Total	2.544	0.472	2.072	0.185	0.461

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 08/20/21

OFFSITE HYDROLOGY ANALYSIS
PROPOSED BEELER CANYON ROAD CULVERT
BEELER CANYON ROAD

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 65.000(Ft.)
Highest elevation = 601.500(Ft.)
Lowest elevation = 601.000(Ft.)
Elevation difference = 0.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 2.38 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(65.000^.5)/(0.769^(1/3)]= 2.38
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.389(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.133(CFS)
Total initial stream area = 0.032(Ac.)

```
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      301.000 to Point/Station
302.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ------------------------------------------------------------------------
____
      Estimated mean flow rate at midpoint of channel =      0.444(CFS)
      Depth of flow =   0.113(Ft.), Average velocity =   1.016(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.50
            2              2.00              0.00
            3             15.00              0.20
      Manning's 'N' friction factor =   0.030
      ------------------------------------------------------------------
      Sub-Channel flow  =      0.444(CFS)
        '     '    flow top width =      7.767(Ft.)
        '     '    velocity=    1.016(Ft/s)
        '     '    area =      0.437(Sq.Ft)
        '     '    Froude number =     0.755

      Upstream point elevation =   601.000(Ft.)
      Downstream point elevation =   595.000(Ft.)
      Flow length =   307.000(Ft.)
      Travel time  =    5.04 min.
      Time of concentration =   10.04 min.
      Depth of flow =   0.113(Ft.)
      Average velocity =   1.016(Ft/s)
      Total irregular channel flow =     0.444(CFS)
      Irregular channel normal depth above invert elev. =   0.113(Ft.)
      Average velocity of channel(s) =   1.016(Ft/s)

      Sub-Channel No. 1 Critical depth =      0.101(Ft.)
        '     '       '     Critical flow top width =      6.940(Ft.)
        '     '       '     Critical flow velocity=    1.272(Ft/s)
        '     '       '     Critical flow area =      0.349(Sq.Ft)

       Adding area flow to channel
      User specified 'C' value of 0.950 given for subarea
      Rainfall intensity =      3.370(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.950
      Subarea runoff =      0.477(CFS) for    0.149(Ac.)
      Total runoff =      0.610(CFS)      Total area =        0.18(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      302.000 to Point/Station
302.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
____
      User specified 'C' value of 0.459 given for subarea
      Time of concentration =    10.04 min.
      Rainfall intensity =      3.370(In/Hr) for a   100.0 year storm
```

```
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.459
      Subarea runoff =      1.005(CFS) for    0.650(Ac.)
      Total runoff =      1.616(CFS)      Total area =        0.83(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      302.000 to Point/Station
303.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ------------------------------------------------------------------
____
      Estimated mean flow rate at midpoint of channel =      1.734(CFS)
      Depth of flow =   0.209(Ft.), Average velocity =   1.674(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.50
            2              2.00              0.00
            3             15.00              0.30
      Manning's 'N' friction factor =   0.030
      ------------------------------------------------------------------
      Sub-Channel flow  =      1.734(CFS)
        '     '    flow top width =      9.904(Ft.)
        '     '    velocity=    1.674(Ft/s)
        '     '    area =      1.036(Sq.Ft)
        '     '    Froude number =     0.912

      Upstream point elevation =   595.000(Ft.)
      Downstream point elevation =   590.000(Ft.)
      Flow length =   215.000(Ft.)
      Travel time  =    2.14 min.
      Time of concentration =   12.18 min.
      Depth of flow =   0.209(Ft.)
      Average velocity =   1.674(Ft/s)
      Total irregular channel flow =     1.734(CFS)
      Irregular channel normal depth above invert elev. =   0.209(Ft.)
      Average velocity of channel(s) =   1.674(Ft/s)

      Sub-Channel No. 1 Critical depth =      0.201(Ft.)
        '     '       '     Critical flow top width =      9.522(Ft.)
        '     '       '     Critical flow velocity=    1.811(Ft/s)
        '     '       '     Critical flow area =      0.958(Sq.Ft)

       Adding area flow to channel
      User specified 'C' value of 0.950 given for subarea
      Rainfall intensity =      3.141(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.950
      Subarea runoff =      0.364(CFS) for    0.122(Ac.)
      Total runoff =      1.980(CFS)      Total area =        0.95(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      303.000 to Point/Station
303.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------
```

```
____
      User specified 'C' value of 0.350 given for subarea
      Time of concentration =    12.18 min.
      Rainfall intensity =      3.141(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.350
      Subarea runoff =      1.683(CFS) for    1.531(Ac.)
      Total runoff =      3.663(CFS)      Total area =        2.48(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      303.000 to Point/Station
108.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ------------------------------------------------------------------
____
      Estimated mean flow rate at midpoint of channel =      3.708(CFS)
      Depth of flow =   0.312(Ft.), Average velocity =   2.541(Ft/s)
            ******* Irregular Channel Data ***********
      ------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
            1              0.00              0.50
            2              2.50              0.00
            3             15.00              0.50
      Manning's 'N' friction factor =   0.030
      ------------------------------------------------------------------
      Sub-Channel flow  =      3.708(CFS)
        '     '    flow top width =      9.356(Ft.)
        '     '    velocity=    2.541(Ft/s)
        '     '    area =      1.459(Sq.Ft)
        '     '    Froude number =     1.134

      Upstream point elevation =   590.000(Ft.)
      Downstream point elevation =   586.500(Ft.)
      Flow length =   111.000(Ft.)
      Travel time  =    0.73 min.
      Time of concentration =   12.91 min.
      Depth of flow =   0.312(Ft.)
      Average velocity =   2.541(Ft/s)
      Total irregular channel flow =     3.708(CFS)
      Irregular channel normal depth above invert elev. =   0.312(Ft.)
      Average velocity of channel(s) =   2.541(Ft/s)

      Sub-Channel No. 1 Critical depth =      0.328(Ft.)
        '     '       '     Critical flow top width =      9.844(Ft.)
        '     '       '     Critical flow velocity=    2.296(Ft/s)
        '     '       '     Critical flow area =      1.615(Sq.Ft)

       Adding area flow to channel
      User specified 'C' value of 0.950 given for subarea
      Rainfall intensity =      3.075(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.950
      Subarea runoff =      0.178(CFS) for    0.061(Ac.)
      Total runoff =      3.841(CFS)      Total area =        2.54(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
```

```
      Process from Point/Station      108.000 to Point/Station
108.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ------------------------------------------------------------------------
____
      The following data inside Main Stream is listed:
      In Main Stream number: 1
      Stream flow area =      2.545(Ac.)
      Runoff from this stream =      3.841(CFS)
      Time of concentration =   12.91 min.
      Rainfall intensity =     3.075(In/Hr)
      Program is now starting with Main Stream No. 2


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      107.000 to Point/Station
108.000
      **** USER DEFINED FLOW INFORMATION AT A POINT ****
      ------------------------------------------------------------------------
____
      User specified 'C' value of 0.550 given for subarea
      Rainfall intensity (I) =      3.806(In/Hr) for a   100.0 year
storm
      User specified values are as follows:
      TC =   7.20 min.  Rain intensity =       3.81(In/Hr)
      Total area =        0.960(Ac.)  Total runoff =     2.920(CFS)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      108.000 to Point/Station
108.000
      **** CONFLUENCE OF MAIN STREAMS ****
      ------------------------------------------------------------------------
____
      The following data inside Main Stream is listed:
      In Main Stream number: 2
      Stream flow area =      0.960(Ac.)
      Runoff from this stream =      2.920(CFS)
      Time of concentration =    7.20 min.
      Rainfall intensity =     3.806(In/Hr)
      Summary of stream data:

      Stream   Flow rate      TC            Rainfall Intensity
       No.       (CFS)       (min)                 (In/Hr)


      1        3.841     12.91               3.075
      2        2.920      7.20               3.806
      Qmax(1) =
                1.000 *    1.000 *     3.841) +
                0.808 *    1.000 *     2.920) + =       6.200
      Qmax(2) =
                1.000 *    0.558 *     3.841) +
                1.000 *    1.000 *     2.920) + =       5.063

      Total of 2 main streams to confluence:
      Flow rates before confluence point:
             3.841       2.920
      Maximum flow rates at confluence using above data:
```

```
        6.200        5.063
Area of streams before confluence:
        2.545        0.960


Results of confluence:
Total flow rate =      6.200(CFS)
Time of concentration =    12.906 min.
Effective stream area after confluence  =      3.505(Ac.)
End of computations, total study area =          3.505 (Ac.)
```

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Aug 23 2021

1 x 18

Invert Elev Dn (ft)	=	586.10
Pipe Length (ft)	=	36.00
Slope (%)	=	1.11
Invert Elev Up (ft)	=	586.50
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

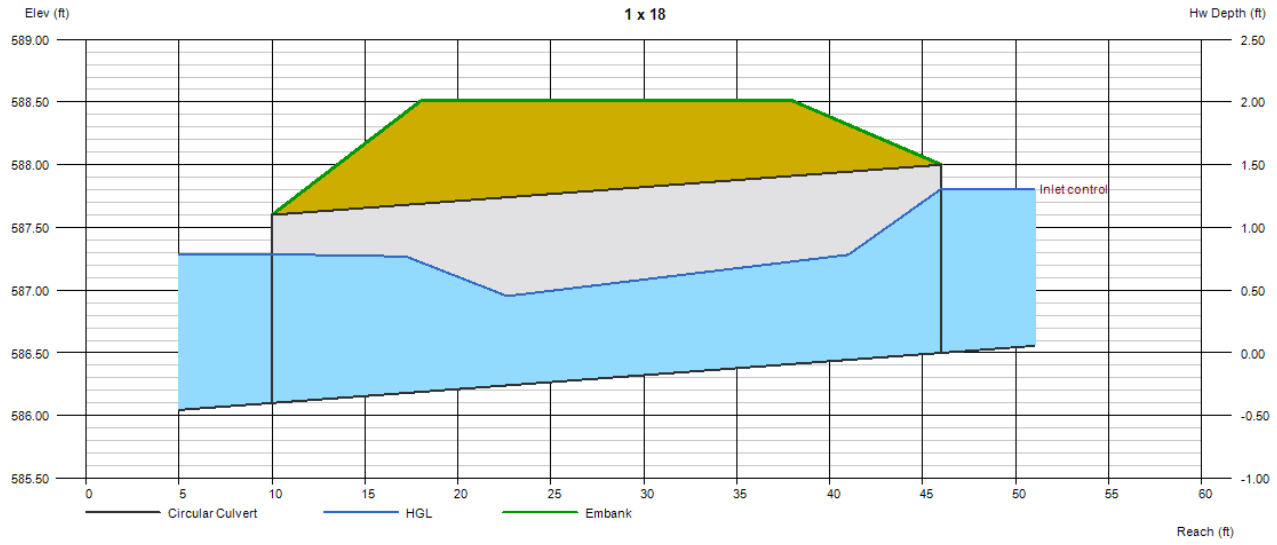
Top Elevation (ft)	=	588.51
Top Width (ft)	=	20.00
Crest Width (ft)	=	10.00

Calculations

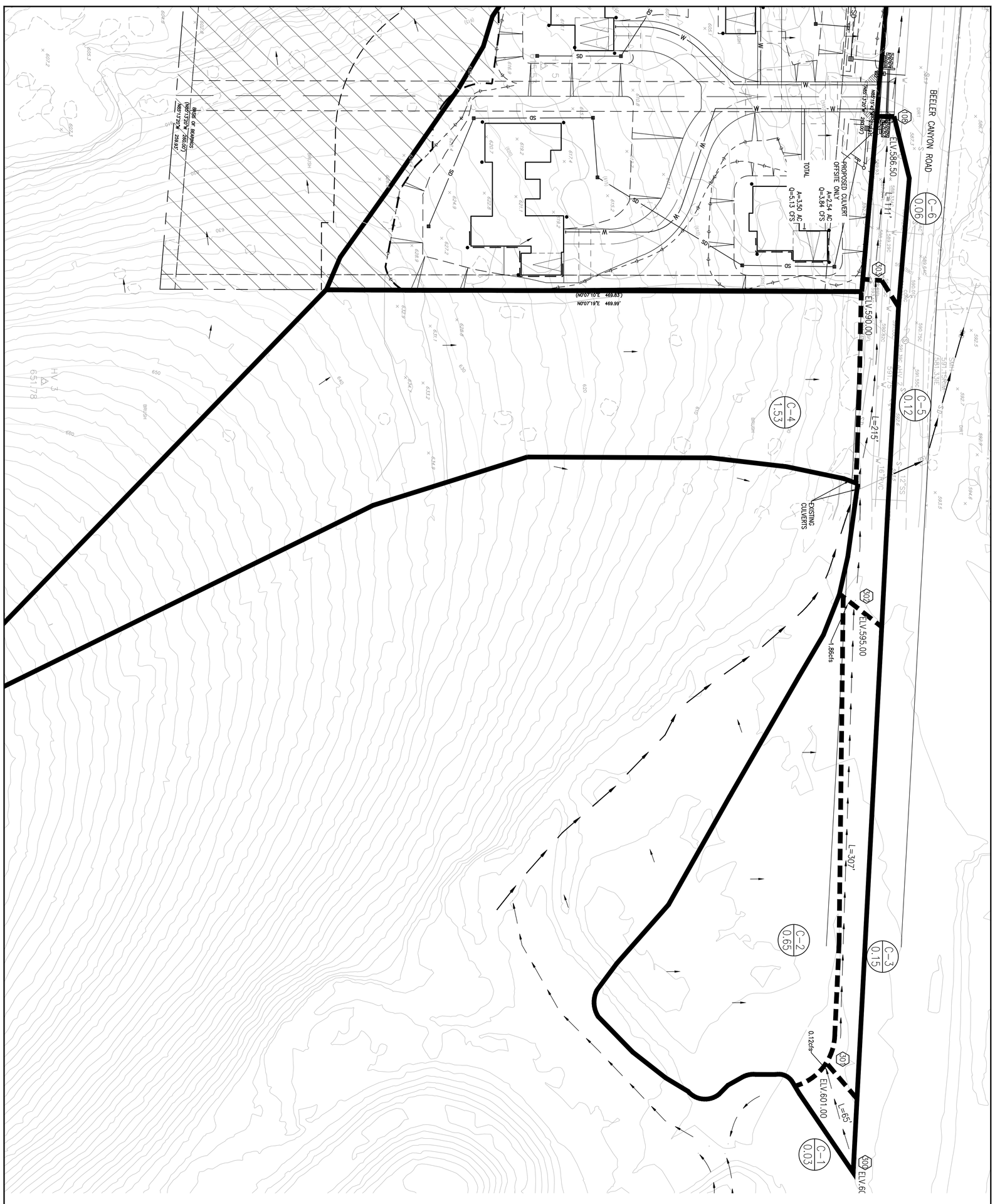
Qmin (cfs)	=	5.14
Qmax (cfs)	=	5.14
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.14
Qpipe (cfs)	=	5.14
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.43
Veloc Up (ft/s)	=	4.82
HGL Dn (ft)	=	587.29
HGL Up (ft)	=	587.37
Hw Elev (ft)	=	587.81
Hw/D (ft)	=	0.87
Flow Regime	=	Inlet Control



PLOT: M:\PROJECTS\11500\11900U.3.00 BEELER CANYON TIVYAN RESIDENCE\DWGS\EXHIBITS\DRAINAGE\11900U.3.00-HYDR-OFFSITE.DWG Nathan Warner 8/23/2021 2:28 PM



PROJECT	SHEET TITLE	ISSUE DATE:	02/05/2021	SYM	DESCRIPTION	DATE	APPR
BEELER CANYON ROAD	HYDROLOGY EXHIBIT PROPOSED CONDITION	DRAWN BY:	MDS				
		CHECKED BY:	MGC				
		BWE JOB NUMBER:	11900U.3.00				
		CLIENT JOB NUMBER:					
SITE ADDRESS PARCEL 3 OF MAP 6554		MUNICIPALITY PROJECT NUMBER:	PTS 649669				
	SHEET 1 OF 1						

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Attachment E

Excerpts from Drainage Design Manual

Chapter 2

Hydrology

The design discharge depends upon many variables. Some of the more important variables are duration and intensity of rainfall; storm frequency; ground cover; and the size, imperviousness, slope, and shape of the drainage area.

2.1. Discharge Flow Methods

The designer should check with Drainage and Flood Plain Management Section, Public Works Department, to determine if there are established storm discharge flows.

If the project involves a watershed of major size or importance, flood flows may already be established through one or more of the following activities:

1. Master Plan Developments in the City and/or County
2. Studies for Development and Road Projects near the proposed project
3. Flood Insurance Studies prepared by FEMA based on existing land use at the time the study was completed. Urbanization may have caused increased flows. FEMA maps can be viewed at the SanGIS web site (www.sangis.org).
4. Recorded flows may be available from the United States Geological Survey (USGS) or the County of San Diego

If no established storm discharge flows are available, the applicable methods are:

1. Rational Method for watersheds less than 0.5 square miles – See Appendix A
2. Modified Rational Method for watersheds between 0.5 and 1.0 square miles – See Appendix A; or,
3. Natural Resources Conservation Service (NRCS) Method (formally called Soil Conservation Service (SCS) Method) for watersheds greater than 1.0 square miles – See Appendix B; or
4. Hydrologic Engineering Center (HEC) computer method.

2.2. Design Storm Frequency

Design storm frequency shall be based upon the following criteria:

1. Within floodplain and floodplain fringe areas as defined by FEMA, the runoff criteria shall be based upon a 100-year frequency storm.

2. For all drainage channels and storm water conveyance systems, which will convey drainage from a tributary area equal to or greater than one (1) square mile, the runoff criteria, shall be based upon a 100-year frequency storm.
3. For tributary areas under one (1) square mile:
    a. The storm water conveyance system shall be designed so that the combination of storm drain system capacity and overflow (streets and gutter) will be able to carry the 100-year frequency storm without damage to or flooding of adjacent existing buildings or potential building sites.
    b. The runoff criteria for the underground storm drain system shall be based upon a 50-year frequency storm.

2.3. Soil Type

For storm drain, culverts, channels, and all associated structures, Type D soil shall be used for all areas.

2.4. Other Requirements

1. Design runoff for drainage and flood control facilities within the City shall be based upon full development of the watershed area in accordance with the land uses shown on the City of San Diego, Progress Guide and General Plan.
2. When determining criteria for floodplain management and flood proofing, design runoff within the City shall be based upon existing conditions in accordance with the City Floodplain Management Requirements and FEMA Regulations.
3. Under City requirements, the minimum elevation of the finished, first floor elevation of any building is 2 feet above the 100-year frequency flood elevation.

2.5. Water Quality Considerations

Requirements for hydrologic studies specific to the design of pollution prevention controls and hydromodification management controls are detailed in the Storm Water Standards. Where the Storm Water Standards specify modifications to the guidelines stated herein on discharge flow methods, design storm frequency, or soil type, the modifications shall supersede these but only for the purposes stated in the Storm Water Standards. Where the Storm Water Standards does not specify a modification, the guidance found here in Chapter 2 shall apply.

Appendix A

Rational Method and Modified Rational Method

A.1. Rational Method (RM)

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and drainage structures. The RM is recommended for analyzing the runoff response from drainage areas for watersheds less than 0.5 square miles. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 0.5 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section A.2); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Appendix B).

A.1.1. Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed in Equation A-1.

Equation A-1. RM Formula Expression

$$Q = C\ I\ A$$

where:

Q	=	peak discharge, in cubic feet per second (cfs)
C	=	runoff coefficient expressed as that percentage of rainfall which becomes surface runoff (no units); Refer to Appendix A.1.2
I	=	average rainfall intensity for a storm duration equal to the time of concetrnatation (T_c) of the contributing draiange area, in inches per hour; Refer to Appendix A.1.3 and Appendix A.1.4
A	=	drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre}\times\text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right)\Rightarrow 1.008\,\text{cfs}$$

For practical purposes, the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Appendix A.2) or the NRCS hydrologic method (discussed in Appendix B), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

1. The discharge resulting from any I is maximum when the I lasts as long as or longer than the T_c.
2. The storm frequency of peak discharges is the same as that of I for the given T_c.
3. The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in the NRCS method).
4. The peak rate of runoff is the only information produced by using the RM.

A.1.2. Runoff Coefficient

The runoff coefficients are based on land use (see Table A–1). Soil type "D" is used throughout the City of San Diego for storm drain conveyance design. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table A–1, as adjustments to these values may be appropriate based on site-specific characteristics.

Table A-1. Runoff Coefficients for Rational Method

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

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

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

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

A.1.3. Rainfall Intensity

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

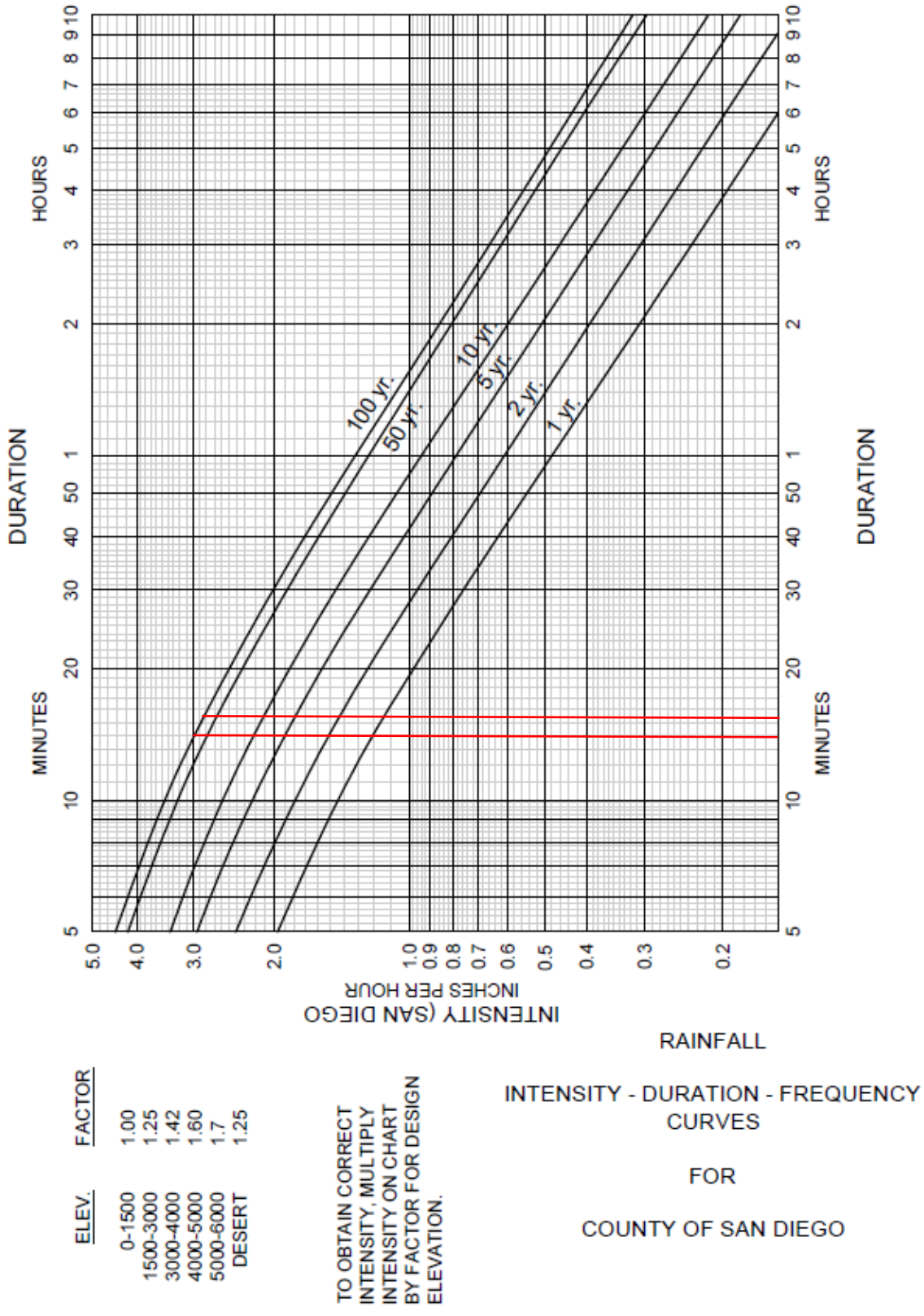


Figure A-1. Intensity-Duration-Frequency Design Chart

A.1.4. Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.

Methods of calculation differ for natural watersheds (non-urbanized) and for urban drainage systems. Also, when designing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for Tc and runoff calculations, and can be determined from the Community Plans.

a. Natural watersheds: Obtain Tc from Figures A.2 and A.3

b. Urban drainage systems: In the case of urban drainage systems, the time of concentration at any point within the drainage area is given by:

   $T_c = T_i + T_t$ where

   T_i is the inlet time or the time required for the storm water to flow to the first inlet in the system. It is the sum of time in overland flow across lots and in the street gutter.

   T_t is the travel time or the time required for the storm water to flow in the storm drain from the most upstream inlet to the point in question.

   Travel Time, T_t is computed by dividing the length of storm drain by the computed flow velocity. Since the velocity normally changes at each inlet because of changes in flow rate or slope, total travel time must be computed as the sum of the travel times for each section of the storm drain.

   The overland flow component of inlet time, T_i, may be estimated by the use of the chart shown in Figure A-4. Use Figure A-5 to estimate time of travel for street gutter flow.

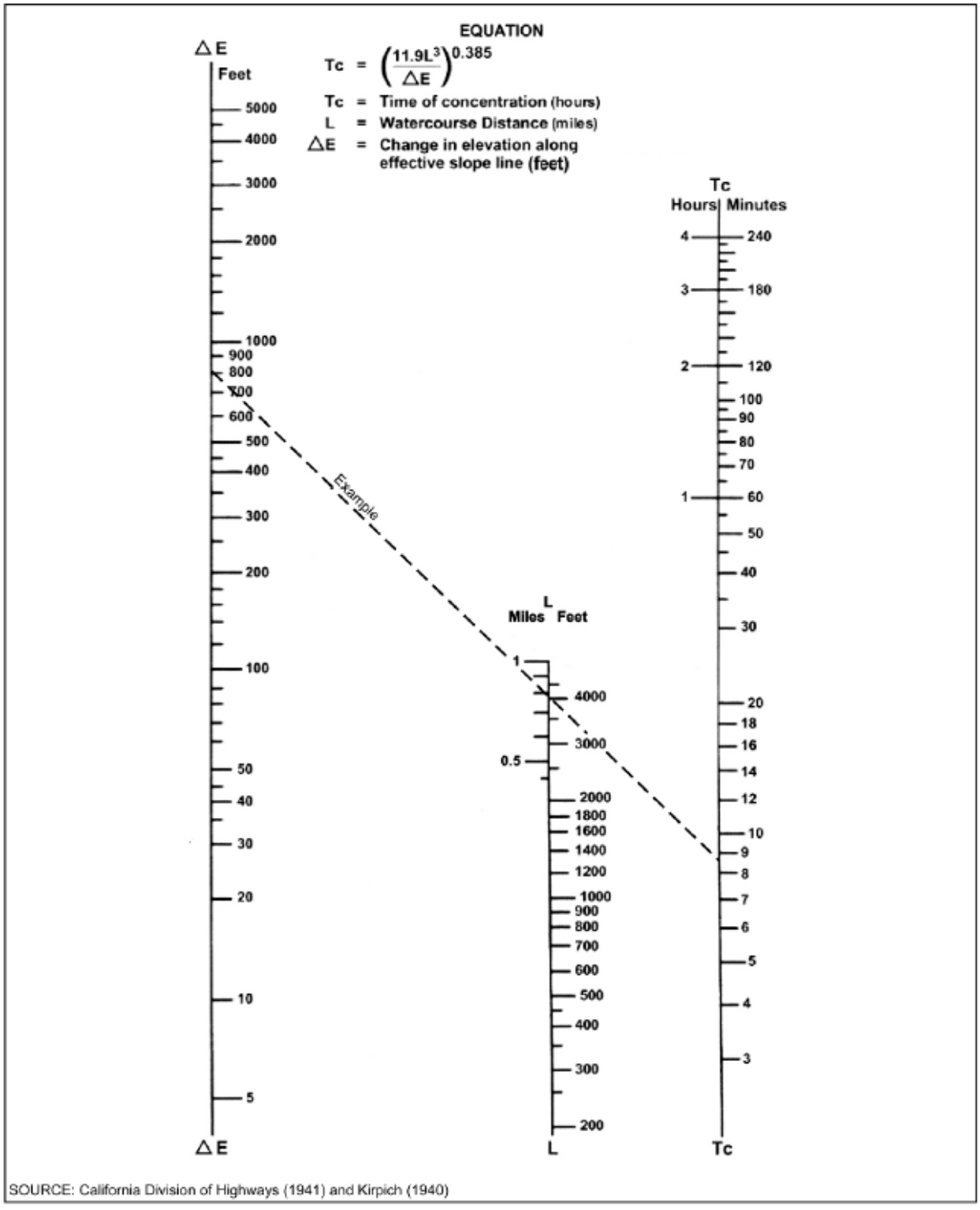


Figure A-2. Nomograph for Determination of T_c for Natural Watersheds

Note: Add ten minutes to the computed time of concentration from Figure A-2.

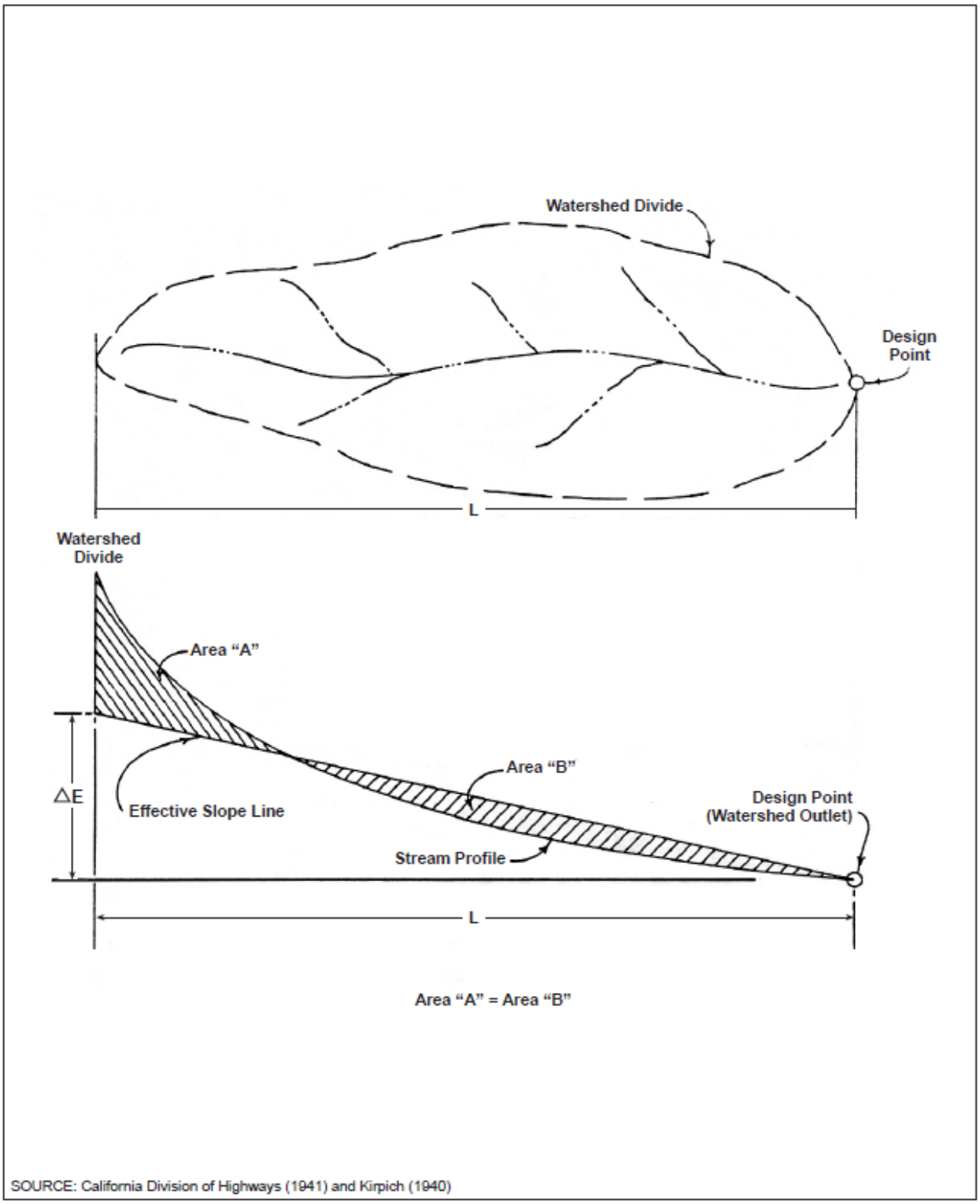


Figure A-3. Computation of Effective Slope for Natural Watersheds

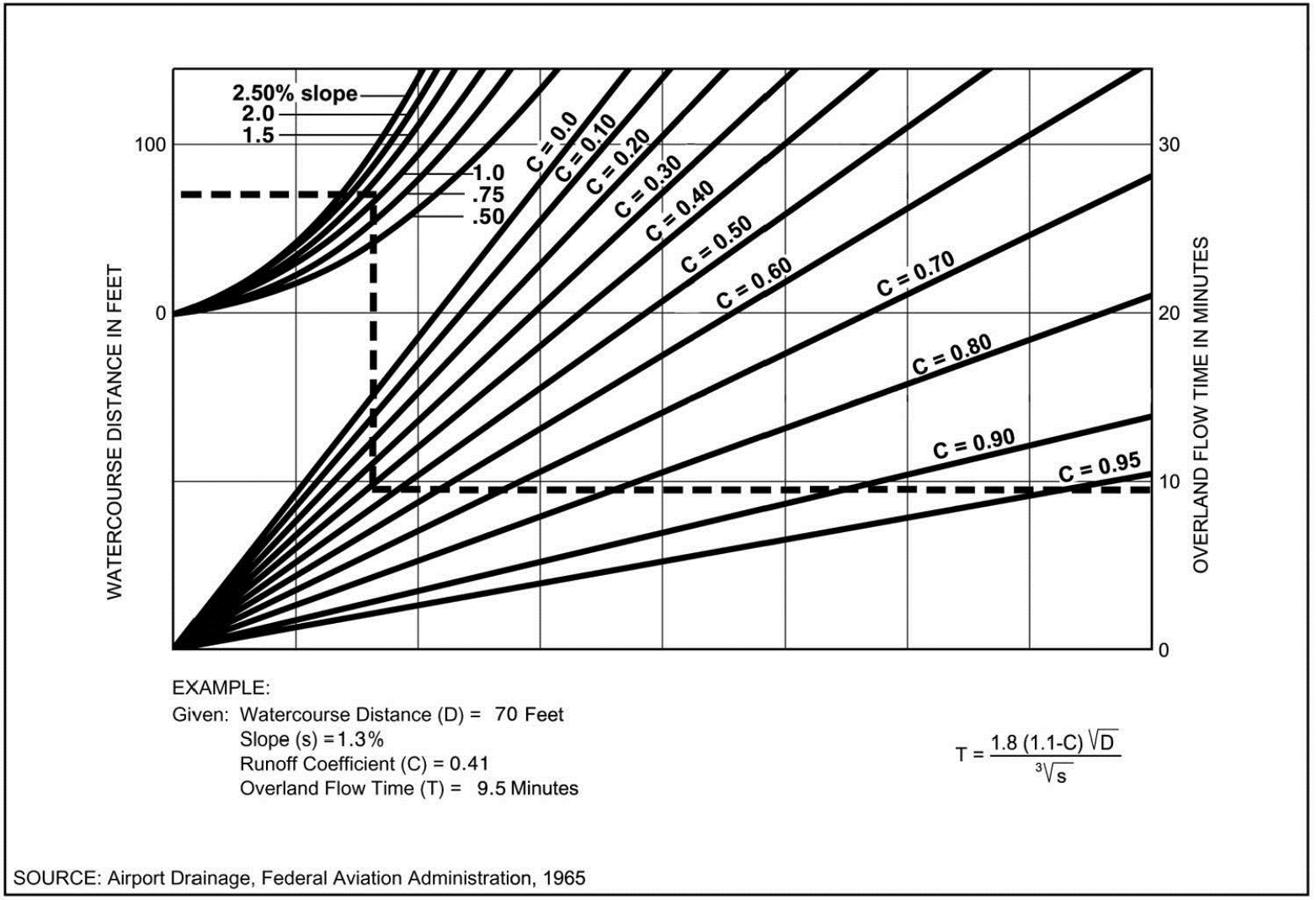
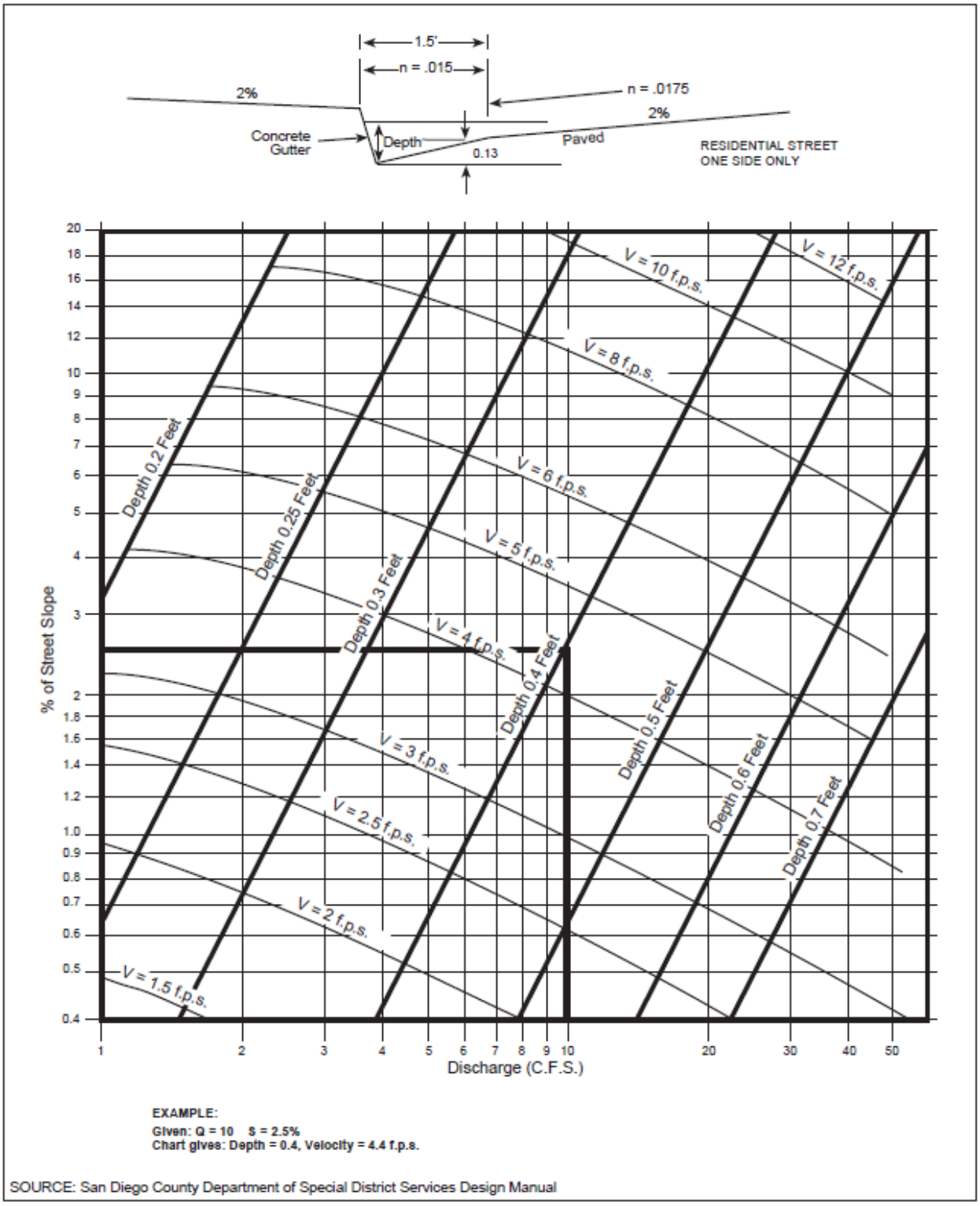


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.



SOURCE: San Diego County Department of Special District Services Design Manual

Figure A-5. Gutter and Roadway Discharge – Velocity Chart

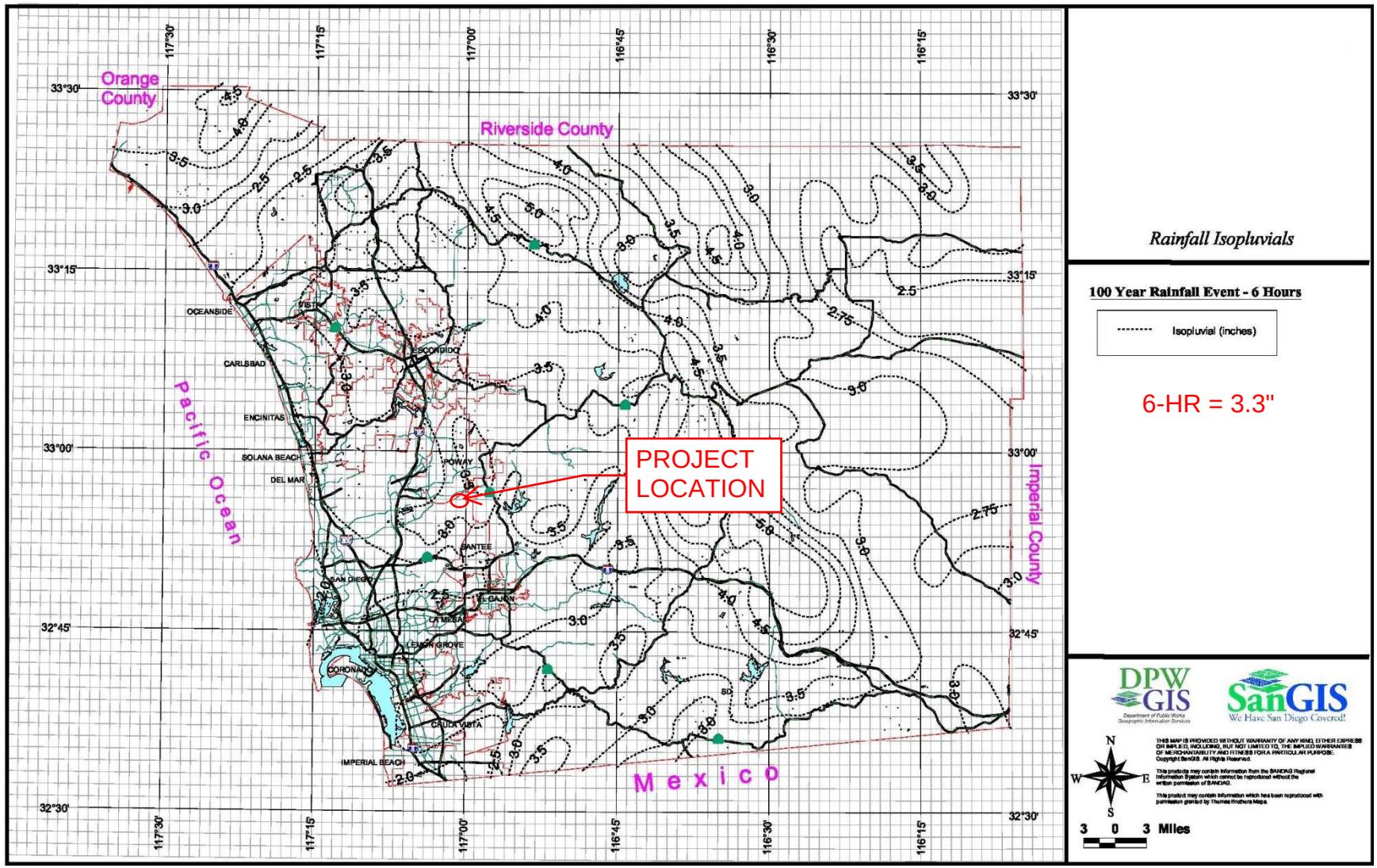


Figure B-2. 100-Year 6-Hour Isopluvials.

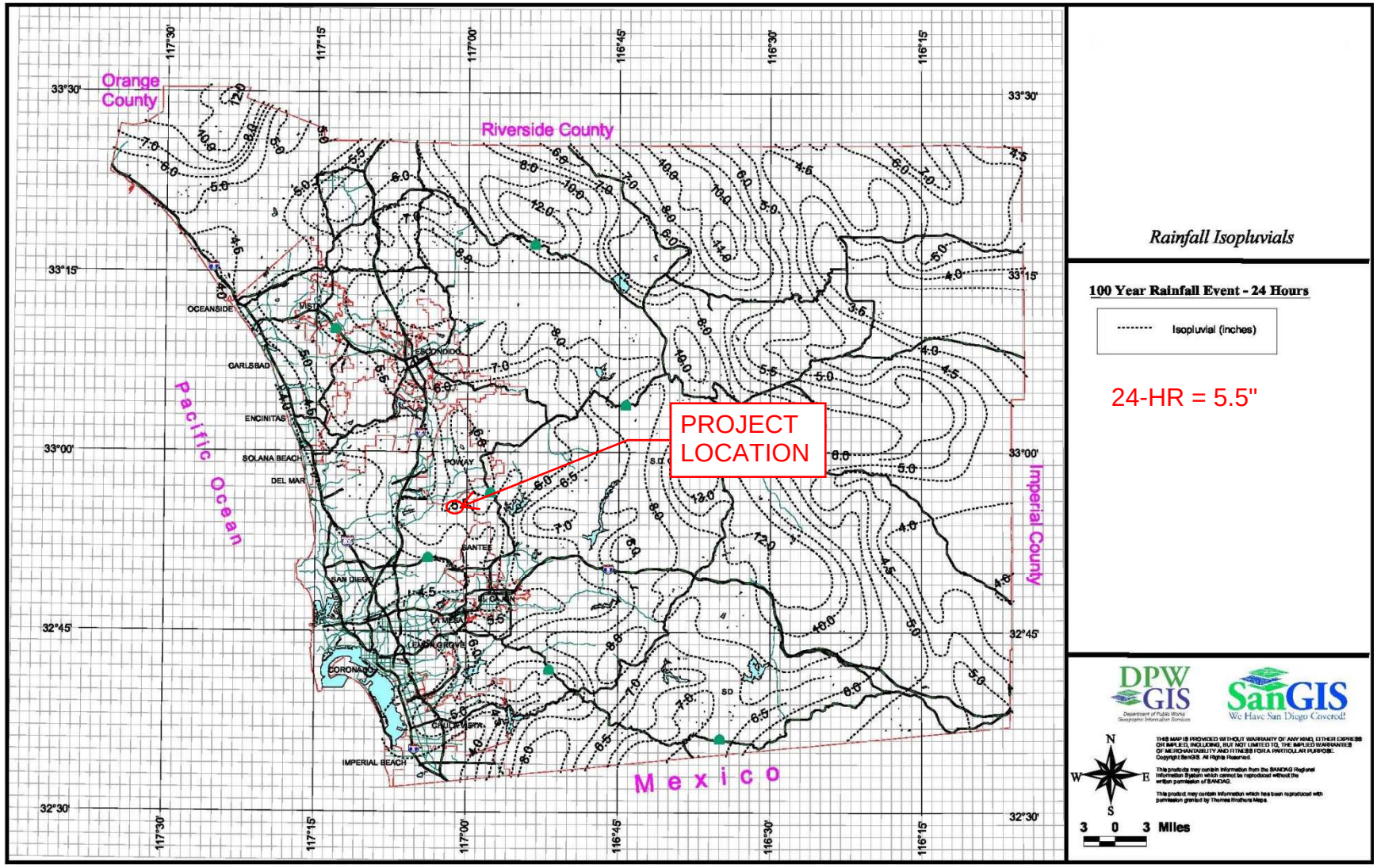
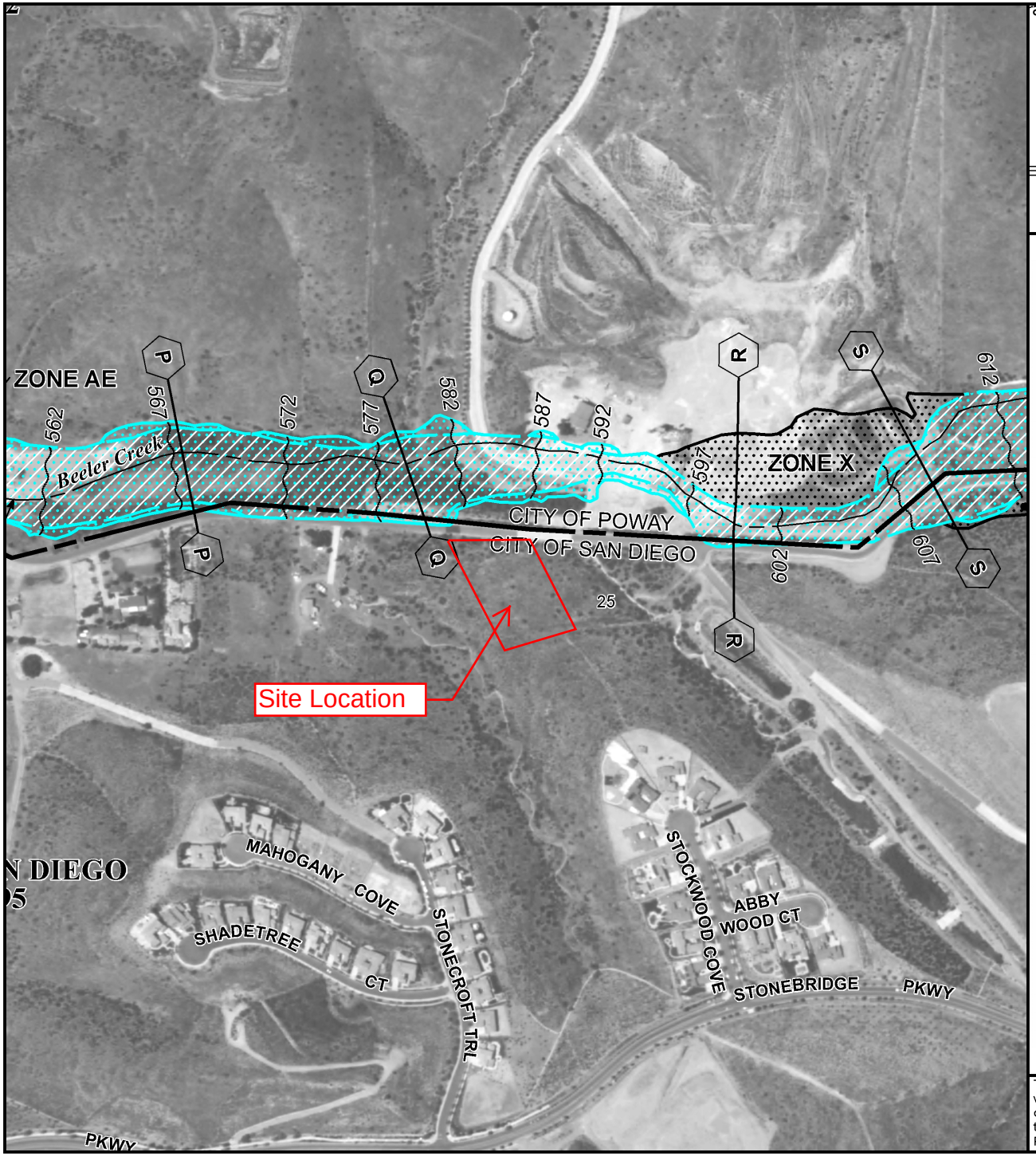


Figure B-3. 100-Year 24-Hour Isopluvials

Attachment F

FEMA Flood Plain Map



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1366G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1366 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
POWAY, CITY OF	060702	1366	G
SAN DIEGO, CITY OF	060295	1366	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C1366G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

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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