The City of San Diego

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

Facility Expansion EDCO Recovery and Transfer
Project No. 515674
Drawing Number (If Applicable) & Internal Order Number (

REGISTERED PROFESSIONAL ENGINEER
PAUL J. HACUNDA
No. 41627
CIVIL
STATE OF CALIFORNIA

ENGINEER OF WORK:

Paul J. Hacunda, P.E. Lic. No. 41627
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

EDCO Disposal Corporation
3660 Dalbergia Street
San Diego, CA 92113
760-744-7615

PREPARED BY:

Hacunda Consulting

Paul J. Hacunda, P.E.
16 Lakeridge
Trabuco Canyon, CA 92679
951-741-9783

DATE:
March 1, 2018

Approved by: City of San Diego Date

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Project Name: Facility Expansion EDCO Recovery and Transfer

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ACRONYMS

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

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CERTIFICATION PAGE

Project Name: Facility Expansion EDCO Recovery & Expansion
Permit Application Number: 515674

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.

PE Lic. No. 41627, Expires 12/31/2019
Engineer of Work's Signature, PE Number & Expiration Date

Paul J. Hacunda, P.E.
Print Name

Hacunda Consulting
Company

March 1, 2018
Date

REGISTERED PROFESSIONAL ENGINEER
PAUL J. HACUNDA
No. 41627
CIVIL
STATE OF CALIFORNIA

Engineer's Stamp

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Project Name: Facility Expansion EDCO Recovery and Transfer

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	10/4/16	● Preliminary Design/Planning/CEQA ○ Final Design	Initial Submittal
2	7/17/17	● Preliminary Design/Planning/CEQA ○ Final Design	Second Submittal
3	11/3/17	● Preliminary Design/Planning/CEQA ○ Final Design	Third Submittal
4	3/1/18	● Preliminary Design/Planning/CEQA ○ Final Design	Fourth Submittal

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
OCTOBER 2016

Project Address:	Project Number *(for City Use Only)*:

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 Water Resources Control Board.

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

PART A: Determine Construction Phase Storm Water Requirements.

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

☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

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

☐ Yes; WPCP required, skip 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 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.**

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[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

Clear Page 1

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

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

3. ☒ **Medium Priority**

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

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

4. ☐ **Low Priority**

a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

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

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

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

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

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

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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

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7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over 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 ☒

Paul Hacunda, P.E.	Civil Engineer
Name of Owner or Agent *(Please Print)*	Title
Paul Hacunda	03/01/2018
Signature	Date

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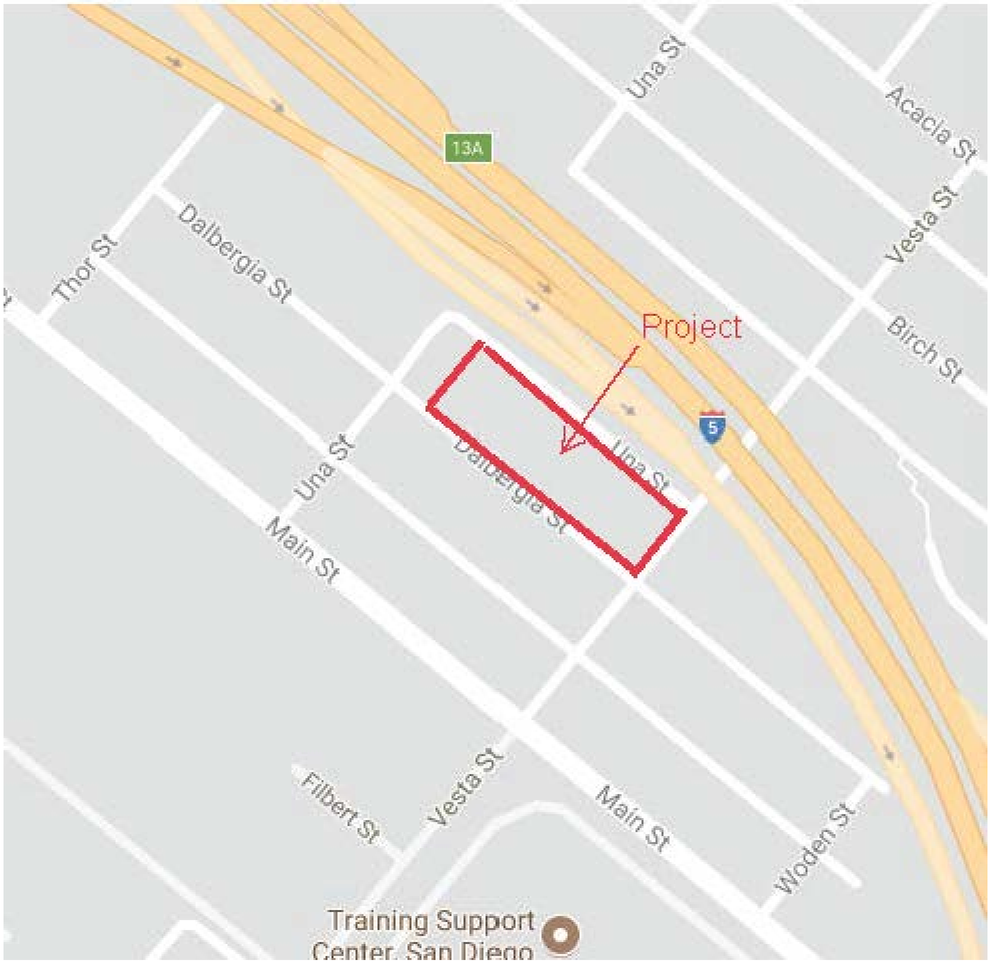
PROJECT VICINITY MAP

Project Name: Faility Expansion EDCO Recovery and Transfer
Permit Application Number: 515674



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Applicability of Permanent, Post-Construction Storm Water BMP Requirements

(Storm Water Intake Form for all Development Permit Applications)

Form I-1

Project Identification

Project Name: Facility Expansion EDCP Recovery and Expansion

Permit Application Number: 515674

Date: 7/17/17

Determination of Requirements

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

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop".
Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	● Yes	Go to Step 2.
	○ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.

Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):
Click or tap here to enter text.

Step	Answer	Progression
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist.	○ Standard Project	Stop. Standard Project requirements apply.
	● PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	○ PDP Exempt	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below.

Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:
Click or tap here to enter text.

<table>
<tr><th colspan="3">Form I-1 Page 2</th></tr>
<tr><th>Step</th><th>Answer</th><th>Progression</th></tr>
<tr><td rowspan="2">Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval?
See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>○ Yes</td><td>Consult the City Engineer to determine requirements.
Provide discussion and identify requirements below.
Go to Step 4.</td></tr>
<tr><td>● No</td><td>BMP Design Manual PDP requirements apply.
Go to Step 4.</td></tr>
<tr><td colspan="3">Discussion / justification of prior lawful approval, and identify requirements (<u>not required if prior lawful approval does not apply</u>):
Click or tap here to enter text.</td></tr>
<tr><td rowspan="2">Step 4. Do hydromodification control requirements apply?
See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>○ Yes</td><td>PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6).
Go to Step 5.</td></tr>
<tr><td>● No</td><td>Stop.
PDP structural BMPs required for pollutant control (Chapter 5) only.
Provide brief discussion of exemption to hydromodification control below.</td></tr>
<tr><td colspan="3">Discussion / justification if hydromodification control requirements do <u>not</u> apply:
Exhibit of Receiving Waters and Conveyance Systems Exempt from Hydromodification Management Requirements, dated September 8, 2014 and revised May 22, 2017 shows this reach of Chollas Creek as an Exempt Body (see Map and Snap Shot in Attachment 2). Chollas Creek is an improved channel from I-5 to San Diego Bay. It has concrete slope walls and a graded, soft bottom.</td></tr>
<tr><td rowspan="2">Step 5. Does protection of critical coarse sediment yield areas apply?
See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</td><td>○ Yes</td><td>Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2).
Stop.</td></tr>
<tr><td>● No</td><td>Management measures not required for protection of critical coarse sediment yield areas.
Provide brief discussion below.
Stop.</td></tr>
<tr><td colspan="3">Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply:
A review of the appropriate maps indicates the project is not in a coarse sediment yield area, see Exhibit of Potential Critical Coarse Sediment Yield Areas dated September 8, 2014 in Attachment 2.</td></tr>
</table>

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Facility Expansion EDCO Recovery & Transfer
Project Address	3608-3688 Dalbergia Street
Assessor's Parcel Number(s) (APN(s))	550-620-02 thru 10
Permit Application Number	515674
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 paces (9XX.XX)	Pueblo San Diego/El Toyan 908.31
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	2.02 Acres ([SQFT] Square Feet)
Area to be disturbed by the project (Project Footprint)	[AC] Acres (60,663 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	[AC] Acres (84,071 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	[AC] Acres (3,920 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.	+3.3 %

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:
Click or tap here to enter text.

Existing Land Cover Includes (select all that apply):
☒ Vegetative Cover
☐ Non-Vegetated Pervious Areas
☒ Impervious Areas
Description / Additional Information:
Click or tap here to enter text.

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

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

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒ None
Description / Additional Information:
Click or tap here to enter text.

Form I-3B Page 3 of 11

Description of Existing Site Topography and Drainage:

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

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

Description / Additional Information:

General:
Existing drainage areas consists of two urban watersheds. The majority of the site drains to the existing alley where the runoff is collected in a catch basin and is then conveyed, untreated by 15", 24" and 36" RCP pipelines under Interstate 5 to Chollas Creek and ultimately to the San Diego Bay. A small portion of the site drains out the driveway and into Dalbergia Street where the flow is directed by cross-gutters and concrete curb and gutters (untreated) to the unlined Paleta Creek and ultimately to the San Diego Bay.

Chollas Creek Watershed:
The I-5 highway slope is an off-site area that presently contributes flow to the existing alley catch basin. The existing on-site drainage consists of small drop inlets and small diameter pipes that connect local drainage areas to the existing alley catch basin.

Pre-project Drainage Area to Chollas Creek: 2.04-Ac
Pre-project Discharge to Chollas Creek: 0.36-cfs

Paleta Creek Watershed:
Paleta Creek is predominately, an unlined, earth channel. When the channel emerges from under the I-5 at Main Street, it is a concrete-lined channel, but once it reaches and traverses the Navy Recreational Facility, it is an unlined earth channel to its terminus at the San Diego Bay.

Pre-project Drainage Area to Paleta Creek: 0.45-Ac
Pre-project Discharge to Paleta Creek: 0.08-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 Project is the expansion of an existing transfer station. The expansion includes a larger storage area for baled recyclables, a new loading dock for recyclables, seven aenerobic digestion chambers to create compost from green waste and food waste, additional in-bound scales, a new load-out tunnel for the transfer of solid waste, new entrance and exit tunnel ramps and an expanded tipping floor inside the existing transfer station.

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

The site includes building area, small paved parking lot and paved operational areas, i.e driving lanes, ramps and loading areas.

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

A small amount of depressed landscaping area is provided.

Does the project include grading and changes to site topography?

● Yes

○ No

Description / Additional Information:

Click or tap here to enter text.

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:
General:
As the alley is to be vacated and incorporated into the project, it is proposed to intercept the Caltrans area with a concrete channel and direct the majority of the runoff to Vesta Street. A small amount of the I-5 slope will be directed to Una Street. In order to compensate for this diversion, areas that previously discharged to Dalbergia Street are being re-directed on-site and discharged to the Chollas Creek watershed. The hydrology study discusses and calculates the discharge flows. The off-site Caltrans slope is then re-directed around the proposed project to discharge, untreated, to Vesta Street and the Paleta Creek Watershed.

Chollas Creek Watershed:
It is proposed to intercept the runoff from the entrance and exit ramps to the tunnel with trench drains and collect that runoff in a Modular Wetland System (MWS) device. The storm event overflows will be directed to a water quality chamber consisting of an inlet gallery, inlet weir and bypass assembly, an outlet chamber with media filter cartridges, a vented, outlet hood and finally into a pump chamber where pumps will lift the flow and discharge into the existing 15-inch RCP.
Pre-project Drainage Area to Chollas Creek: 1.97-Acres
Post Project Drainage Area to Chollas Creek: 0.74-Acres
Pre-project Discharge to Chollas Creek: 0.35-cfs
Post Project Discharge to Chollas Creek: 0.13-cfs

Paleta Creek Watershed:
The untreated off-site freeway slope will be discharged onto Vesta Street and a small amount of untreated freeway slope will be discharged onto Una Street.
Pre-project Drainage Area to Paleta Creek: 0.45-Acres
Post Project Drainage Area to Paleta Creek: 0.53-Acres
Pre-project Discharge to Paleta Creek: 0.08-cfs
Post Project Discharge to Paleta Creek: 0.03-cfs

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):

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

Description / Additional Information:
Click or tap here to enter text.

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) Chollas Creek Watershed drainage will be discharged into existing 15 and 24-inch concrete pipes that flow under the I-5 and into a 36-inch concrete pipe in Birch Street then northerly in Birch Street to Chollas Creek. Paleta Creek Watershed discharged flows will flow into the curb and gutter along Una, Vesta and Dalbergia Streets, then proceeding in a southerly direction to a cross gutter across Vesta Street. The flow continues in the north curb and gutter of Dalbergia Street to Woden Street where the flow turns westerly along Woden Street to Main Street. The runoff proceeds in the north curb of Main Street in a southerly direction to the intersection of Main Street and Yama Street where the flow crosses the intersection in a diagonal fashion and proceeds west along the south curb of Yama Street, crossing the On Ramp to the I-5 and into a side over drain and into the Paleta Creek channel. Paleta Creek flows through the Naval Training Facility and empties into San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. None
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations. None
Provide distance from project outfall location to impaired or sensitive receiving waters. Chollas Creek: 1,800-ft Paleta Creek: 2,045-ft
Sumarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands NA

Form I-3B Page 8 of 11

Identification of Receiving Water Pollutants of Concern

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

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
Paleta Creek	Copper/Lead	TMDL 2021
San Diego Bay	PCBs	TMDL 2019
Chollas Creek	Copper	TMDL 2004
Chollas Creek	Diazinon	TMDL 2003
Chollas Creek	Indicator Bacteria	TMDL 2005
Chollas Creek	Lead	TMDL 2004
Chollas Creek	Phosphorous	TMDL 2019
Chollas Creek	Total Nitrogen	TMDL 2019

Identification of Project Site Pollutants*

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

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):

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

Project Name: **Facility Expansion EDCO Recovery and Transfer**

Form I-3B Page 9 of 11

Hydromodification Management Requirements

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

● Yes, hydromodification management flow control structural BMPs required.

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

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

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

Description / Additional Information (to be provided if a 'No' answer has been selected above):
Click or tap here to enter text.

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

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

○ Yes

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

Discussion / Additional Information:
See map and snap-shot of Potential Critical Coarse Seiment Yield Areas, dated September 8, 2014, located in Attachment 2.

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.

POC No.1: 15-inch RCP at north property line which ultimately discharges into Chollas Creek. POC No.2 southeast corner of the project at Dalbergia Street and Vesta Street curb and gutter which ultimately discharges into Paleta Creek..

Has a geomorphic assessment been performed for the receiving channel(s)?
● No, the low flow threshold is 0.1Q2 (default low flow threshold)
○ Yes, the result is the low flow threshold is 0.1Q2
○ Yes, the result is the low flow threshold is 0.3Q2
○ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:
Click or tap here to enter text.

Discussion / Additional Information: (optional)
Click or tap here to enter text.

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

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Project Name: **Facility Expansion EDCO Recovery and Transfer**

Source Control BMP Checklist for All Development Projects			Form I-4
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	● Yes	○ No	○ N/A
Discussion / justification if SC-1 not implemented: Click or tap here to enter text.			
SC-2 Storm Drain Stenciling or Signage	● Yes	○ No	○ N/A
Discussion / justification if SC-2 not implemented: Click or tap here to enter text.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	○ Yes	○ No	● N/A
Discussion / justification if SC-3 not implemented: There is/will be no outside storage			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	○ Yes	○ No	● N/A
Discussion / justification if SC-4 not implemented: All work areas are/will be enclosed inside a building			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	○ Yes	○ No	● N/A
Discussion / justification if SC-5 not implemented: All collected trash is removed by the end of the day. There is/will be no storage of trash outdoors.			

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

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

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

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

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

Site Design Requirement	Applied?		
SD-1 Maintain Natural Draiange Pathways and Hydrologic Features	○ Yes	○ No	● N/A

Discussion / justification if SD-1 not implemented:

There are no natural drainage pathways nor hydrological features

1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	○ Yes	● No	○ N/A
1-2 Are street trees implemented? If yes, are they shown on the site map?	○ Yes	○ No	● N/A
1-3 Implemented street trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	○ Yes	○ No	● N/A
1-4 Is street tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	○ Yes	○ No	● N/A
SD-2 Have natural areas, soils and vegetation been conserved?	○ Yes	○ No	● N/A

Discussion / justification if SD-2 not implemented:

There are no natural areas or natural vegetation on the site. The site is an existing, fully developed transfer station or muiltifamily residential lot.

Form I-5 Page 2 of 4

Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	○ Yes	● No	○ N/A

Discussion / justification if SD-3 not implemented:

The existing site is composed mostly of roof and paved operational space. The expansion of the existing building and site only exchanges the amount of paved operational areas into roof area. Approximately 0.03-acres of existing landscaping area is being eliminated from the existing transfer station site. The former multifamily residential lot had approximately 0.09-acres of pervious area. The proposed plan includes 0.09-acres of landscaping or pervious area.

SD-4 Minimize Soil Compaction	○ Yes	○ No	● N/A

Discussion / justification if SD-4 not implemented:

The existing site is completely developed, either as an existing transfer station or exisitng multifamiy residential lot.

SD-5 Impervious Area Dispersion	○ Yes	○ No	● N/A

Discussion / justification if SD-5 not implemented:

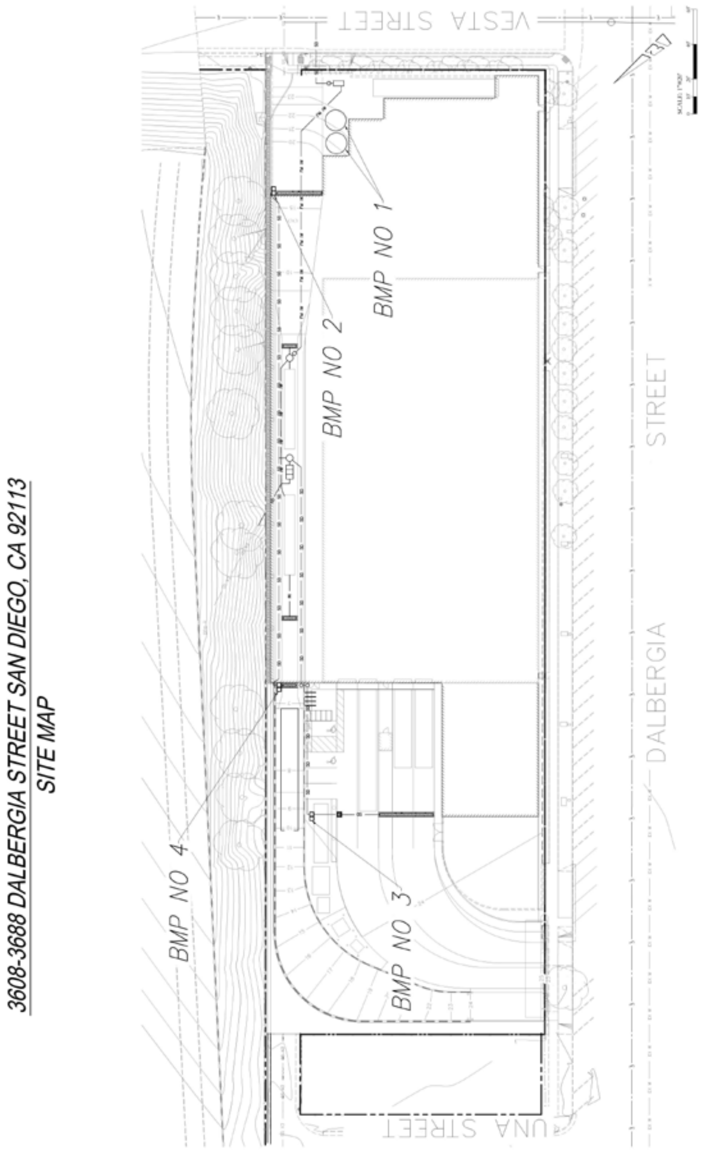
The site soils do not infiltrate.

5-1	Is the pervious area receiving runon from impervious area identified on the site map?	○ Yes	● No	
5-2	Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	○ Yes	● No	
5-3	Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	○ Yes	● No	

Form I-5 Page 3 of 4			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	○ Yes	● No	○ N/A
Discussion / justification if SD-6 not implemented: This site is an existing industrial site and the soils do not permit infiltration. The roof is an existing metal building incapable of supporting a green roof. Permeable pavement is not practical due to the amount of heavy truck traffic and dust. The project does include using a Rainwater Harvest System to intercept the Building Roof runoff.			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	○ Yes	● No	○ N/A
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	○ Yes	● No	○ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	○ Yes	● No	○ N/A
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	○ Yes	● No	○ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	● Yes	○ No	○ N/A
Discussion / justification if SD-7 not implemented: Click or tap here to enter text.			
SD-8 Harvesting and Using Precipitation	● Yes	○ No	○ N/A
Discussion / justification if SD-8 not implemented: Click or tap here to enter text.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	● Yes	○ No	○ N/A
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	● Yes	○ No	○ N/A

Project Name: **Facility Expansion EDCO Recovery and Transfer**

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:



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.

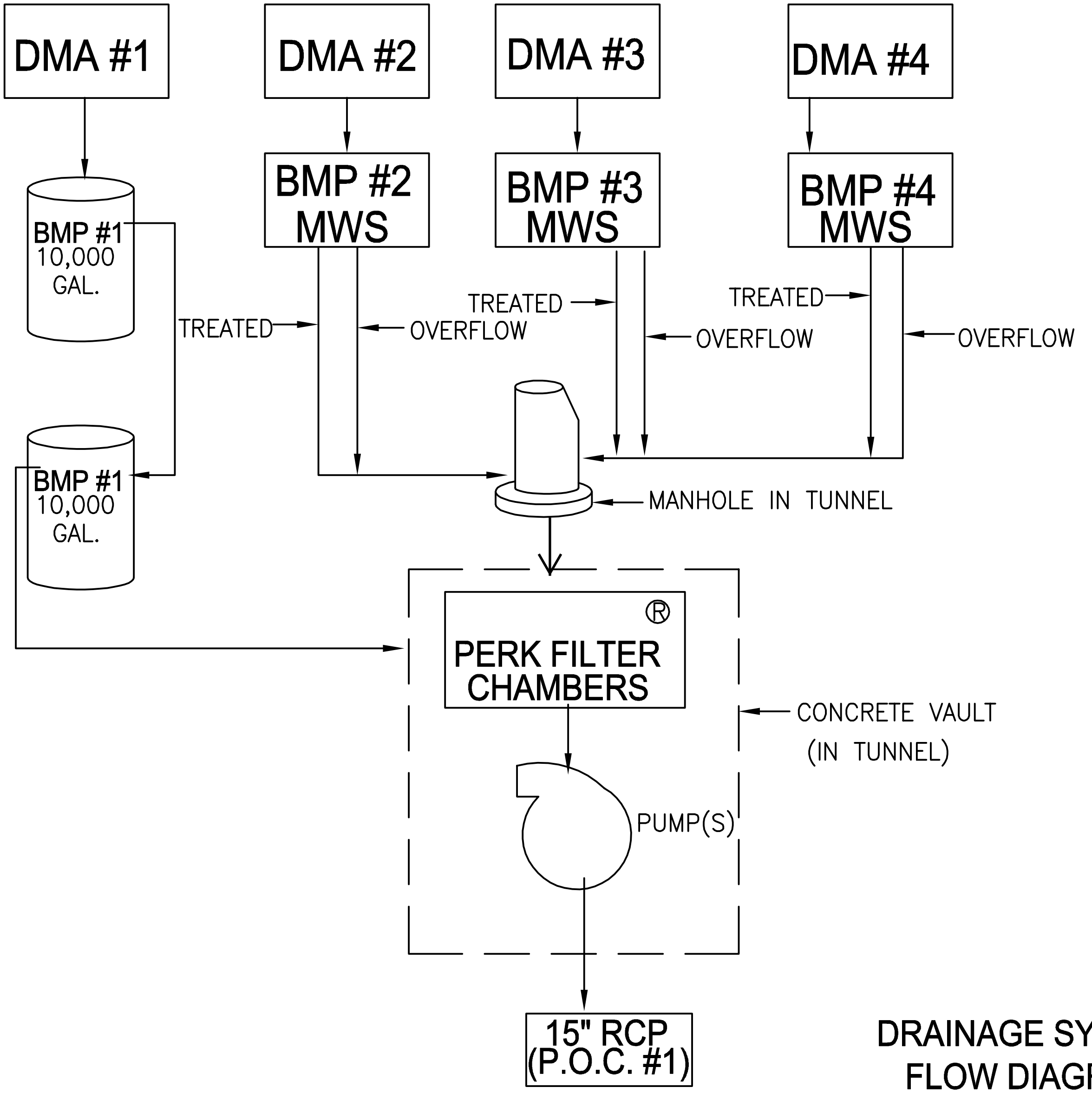
Based on in-situ infiltration tests, the soils report indicates that infiltration BMPs should be considered infeasible (Zero Infiltration).

It is proposed to collect rainwater from the roof, store the rainwater in above ground tanks and use the water for dust control inside the building, tunnel washdown, truck washdowns and irrigation. The stormwater will be filtered before reaching the storage tanks. The pumped water will then pass through a cyclone filter which includes a mircon filter.

It is proposed to install three Modular Wetland System devices on the site to provide treatment of the 85-percentile rainfall. Any overflow from these devices will be further treated in a PerkFilter® device before discharging into a 15-inch concrete pipeline.

A flow chart of the proposed drainage system is included on the following page.

(Continue on page 2 as necessary.)



DRAINAGE SYSTEM FLOW DIAGRAM

Project Name: **Facility Expansion EDCO Recovery and Transfer**

Form I-6 Page 3 of X (Copy as many as needed)

Structural BMP Summary Information

Structural BMP ID No. 1

Construction Plan Sheet No. TBD

Type of structural BMP:

● Retention by harvest and use (HU-1)

○ Retention by infiltration basin (INF-1)

○ Retention by bioretention (INF-2)

○ Retention by permeable pavement (INF-3)

○ Partial retention by biofiltration with partial retention (PR-1)

○ Biofiltration (BF-1)

○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below)

○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)

○ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion

○ Detention pond or vault for hydromodification management

○ Other (describe in discussion section below)

Purpose:

○ Pollutant control only

○ Hydromodification control only

● Combined pollutant control and hydromodification control

○ Pre-treatment/forebay for another structural BMP

○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Engineer of Record
Who will be the final owner of this BMP?	EDCO
Who will maintain this BMP into perpetuity?	EDCO
What is the funding mechanism for maintenance?	Privately Funded

Form I-6 Page 4 of 6

Structural BMP Summary Information

Structural BMP ID No. 2

Construction Plan Sheet No. TBD

Type of structural BMP:

○ Retention by harvest and use (HU-1)

○ Retention by infiltration basin (INF-1)

○ Retention by bioretention (INF-2)

○ Retention by permeable pavement (INF-3)

○ Partial retention by biofiltration with partial retention (PR-1)

● Biofiltration (BF-1)

○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below)

○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)

○ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion

○ Detention pond or vault for hydromodification management

○ Other (describe in discussion section below)

Purpose:

● Pollutant control only

○ Hydromodification control only

○ Combined pollutant control and hydromodification control

○ Pre-treatment/forebay for another structural BMP

○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	EDCO
Who will be the final owner of this BMP?	EDCO
Who will maintain this BMP into perpetuity?	EDCO
What is the funding mechanism for maintenance?	Corporate Maintenance Funds

Form I-6 Page 5 of 6

Structural BMP Summary Information

Structural BMP ID No. 3

Construction Plan Sheet No. TBD

Type of structural BMP:

○ Retention by harvest and use (HU-1)

○ Retention by infiltration basin (INF-1)

○ Retention by bioretention (INF-2)

○ Retention by permeable pavement (INF-3)

○ Partial retention by biofiltration with partial retention (PR-1)

● Biofiltration (BF-1)

○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below)

○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)

○ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion

○ Detention pond or vault for hydromodification management

○ Other (describe in discussion section below)

Purpose:

● Pollutant control only

○ Hydromodification control only

○ Combined pollutant control and hydromodification control

○ Pre-treatment/forebay for another structural BMP

○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	EDCO
Who will be the final owner of this BMP?	EDCO
Who will maintain this BMP into perpetuity?	EDCO
What is the funding mechanism for maintenance?	Corporate Maintenance Funds

Form I-6 Page 6 of 6

Structural BMP Summary Information

Structural BMP ID No. 4

Construction Plan Sheet No. TBD

Type of structural BMP:

○ Retention by harvest and use (HU-1)

○ Retention by infiltration basin (INF-1)

○ Retention by bioretention (INF-2)

○ Retention by permeable pavement (INF-3)

○ Partial retention by biofiltration with partial retention (PR-1)

● Biofiltration (BF-1)

○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below)

○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)

○ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion

○ Detention pond or vault for hydromodification management

○ Other (describe in discussion section below)

Purpose:

● Pollutant control only

○ Hydromodification control only

○ Combined pollutant control and hydromodification control

○ Pre-treatment/forebay for another structural BMP

○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	EDCO
Who will be the final owner of this BMP?	EDCO
Who will maintain this BMP into perpetuity?	EDCO
What is the funding mechanism for maintenance?	Corporate Maintenance Funds

THE CITY OF SAN DIEGO

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

Permenant BMP Construction

Self Certification Form

FORM
DS-563
January 2016

Date Prepared: Click here to enter text.

Project No.: Click here to enter text.

Project Applicant: Click here to enter text.

Phone: Click here to enter text.

Project Address: Click here to enter text.

Project Engineer: Click here to enter text.

Phone: Click here to enter text.

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

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

Signature: ______________________________

Date of Signature: _ Insert Date___

Printed Name: _Click here to enter text._

Title: _Click here to enter text._

Phone No. _Click here to enter text._

Engineer's Stamp

DS-563 (12-15)

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Project Name: **Facility Expansion EDCO Recovery and Transfer**

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	● Included on DMA Exhibit in Attachment 1a ○ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	● Included ○ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	● Included ○ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☒ Included

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

The DMA Exhibit must identify:

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

Attachment 1a

EXISTING CONDITIONS

LEGEND

▨	ROOFS	0.74 AC
░	CONCRETE DRIVES & PARKING	1.16 AC
🟩	LANDSCAPE	0.60 AC

LEGEND

—— EX SD ——	STORM DRAIN LINE
■	CATCH BASINS
P.O.C.	POINT OF COMPLIANCE

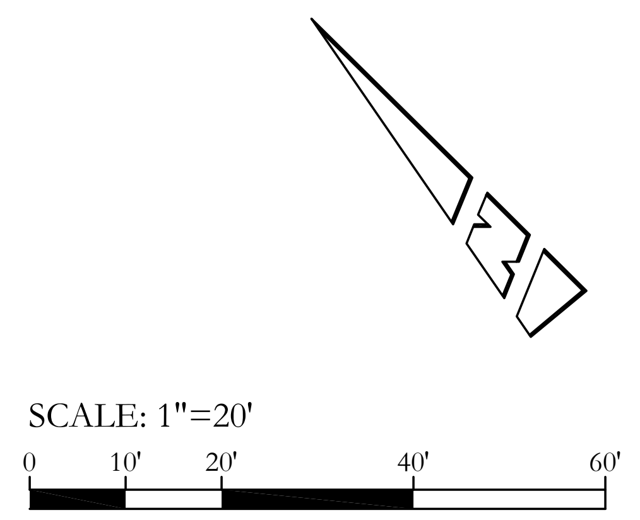


TABLE OF PERVIOUS/IMPERVIOUS

DMA	AREA (AC)	% IMPERVIOUS
1	0.34	100
2	0.11	54
3	2.50	100
4	0.45	100

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:
R.C.E. NO.
DATE Jul. 31, 16

BENCHMARK:

SCALE: AS SHOWN

DMA EXHIBIT
3608–3688 DALBERGIA STREET
SAN DIEGO, CA 92113

FOR:
W.O.
COUNTY FILE NO.

SHEET NO. 1
OF 3 SHTS

Drawing: E:\My Work\Dalbergia Street\DMA Existing Conditions SHEET 1 OF 3.dwg Layout: Layout1 Last Saved: Thu Feb 22, 2018 – 5:40pm Last Plotted: Thu Feb 22, 2018 – 5:57pm By: raymondh

POST-DEVELOPMENT CONDITIONS

	LEGEND	TOTAL
▨	GRAVEL MULCH LANDSCAPING	0.04 AC
▇	ROOFS	1.19 AC
⬚	CONCRETE DRIVES & PARKING	0.74 AC
🟩	GROUND COVER LANDSCAPE	0.53 AC
		2.50 AC TOTAL

NOTES:

UNDERLYING HYDROLOGICAL SOIL GROUP:	UNDETERMINED
APPROXIMATE DEPTH TO GROUNDWATER	27-FT
EXISTING NATURAL HYDROLOGICAL FEATURES:	NONE
CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED:	NONE
EXISTING TOPOGRAPHY:	SEE SHEET 2
POTENTIAL POLLUTANT SOURCE AREAS:	PARKING AREAS, LOADING AREA, TARPING AREA, OPERATIONAL AREAS

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

TABLE OF PERVIOUS/IMPERVIOUS

DMA	AREA (AC)	TYPE	BMP
1	1.19	DRAINS TO RWH SYSTEM.	1
2	0.10	DRAINS TO MWS.	2
3	0.47	DRAINS TO MWS	3
4	0.21	DRAINS TO MWS	4

SEAL-ENGINEER
PAUL J. HACUNDA No. 41627 CIVIL

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:
R.C.E. NO.
DATE Jul. 31, 16

BENCHMARK:

SCALE: AS SHOWN

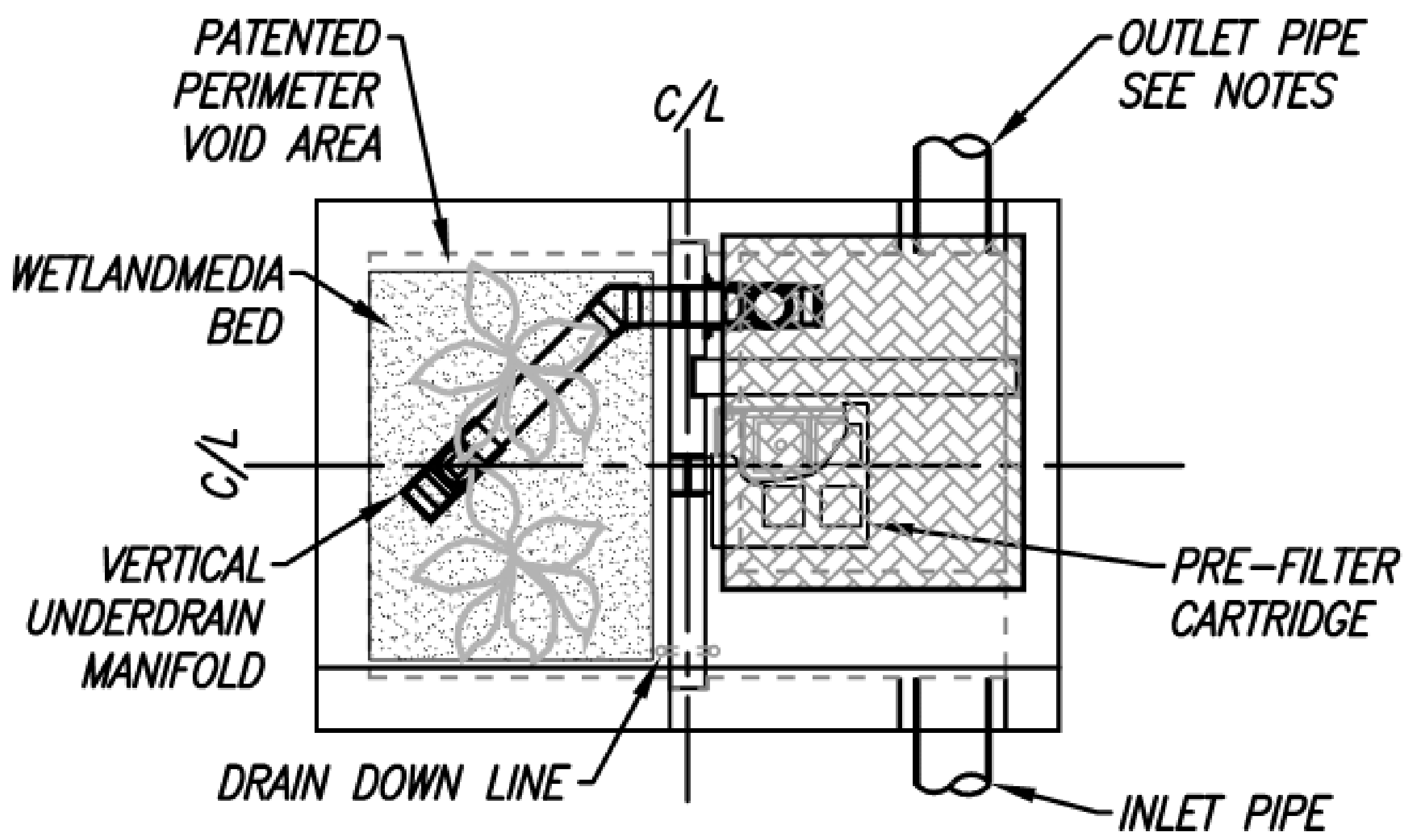
DMA EXHIBIT
3608-3688 DALBERGIA STREET
SAN DIEGO, CA 92113

FOR:
W.O.
COUNTY FILE NO.

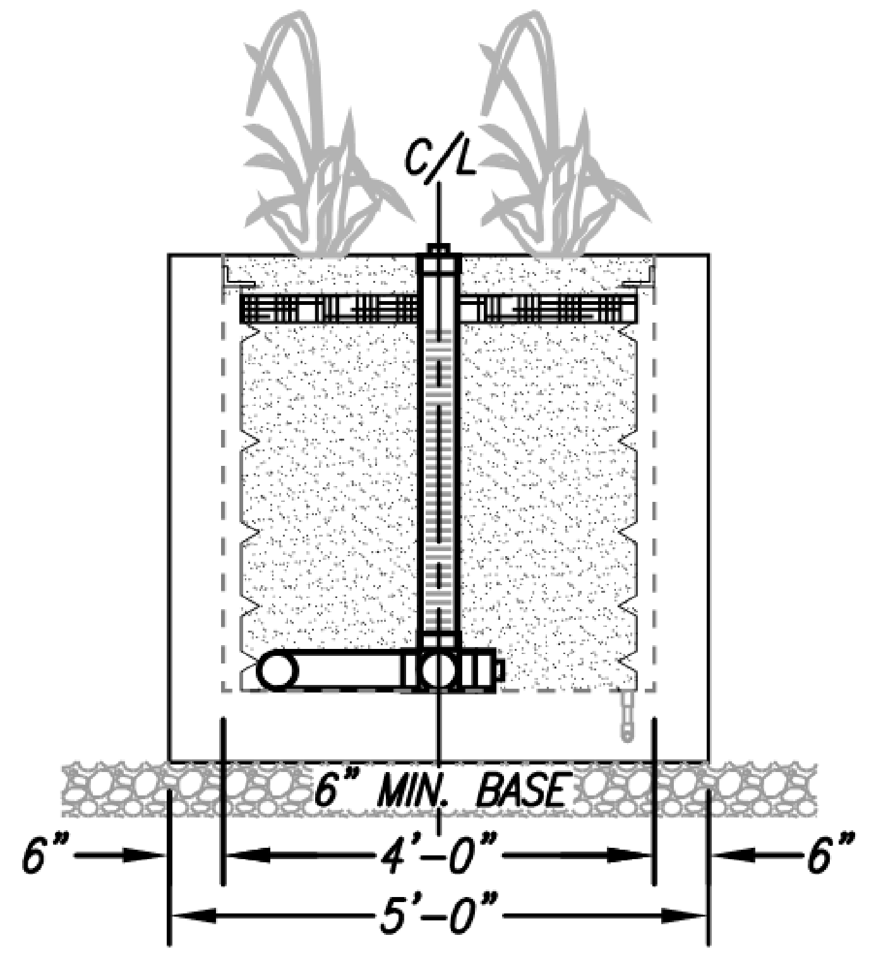
SHEET NO. 2
OF 3 SHTS

SITE SPECIFIC DATA

PROJECT NAME		EDCO DALBERGIA	
PROJECT LOCATION		SAN DIEGO	
STRUCTURE ID		2, 3, 4	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
		0.006, 0.03, 0.01	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	30" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			1.48
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø1.22"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			

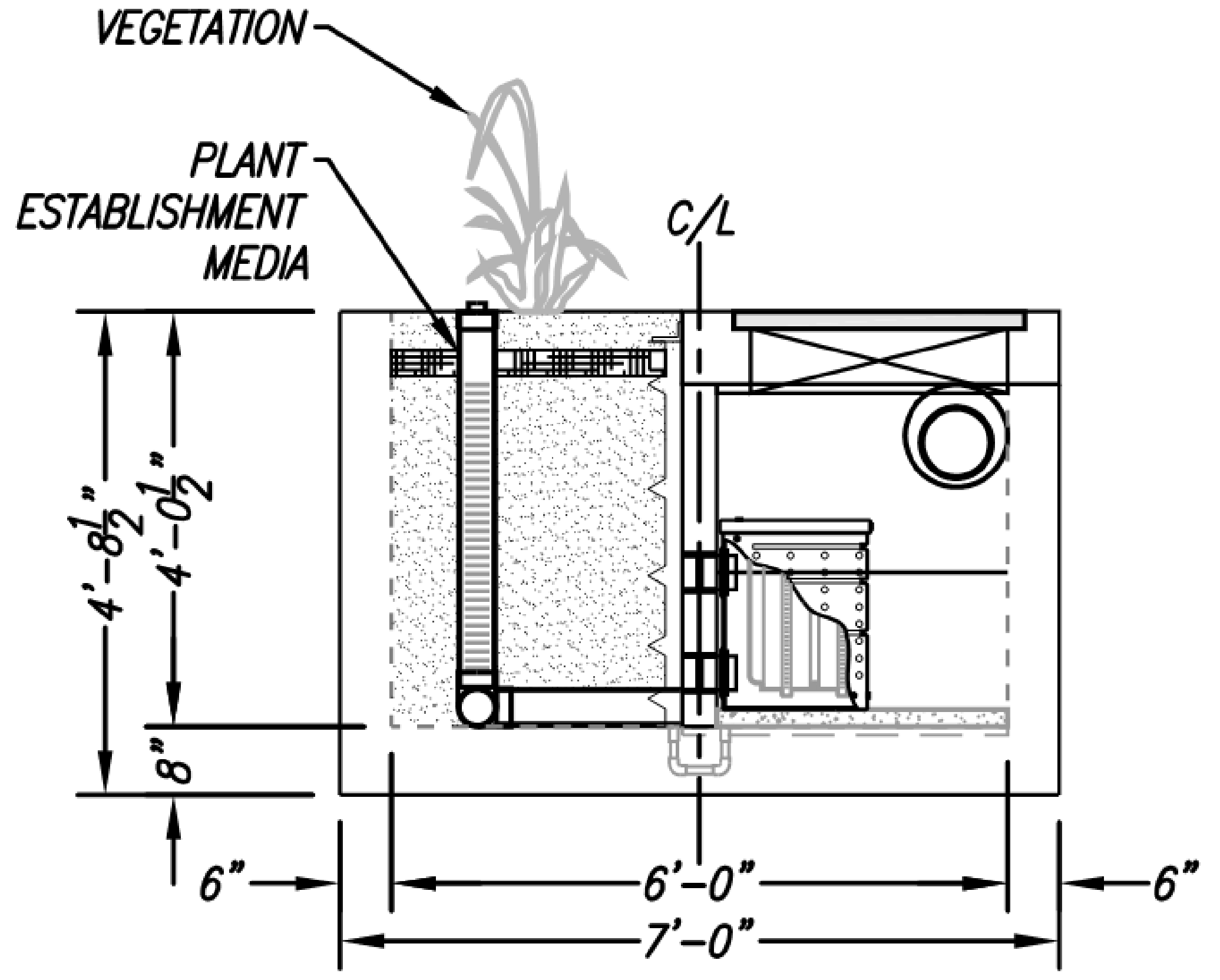


PLAN VIEW

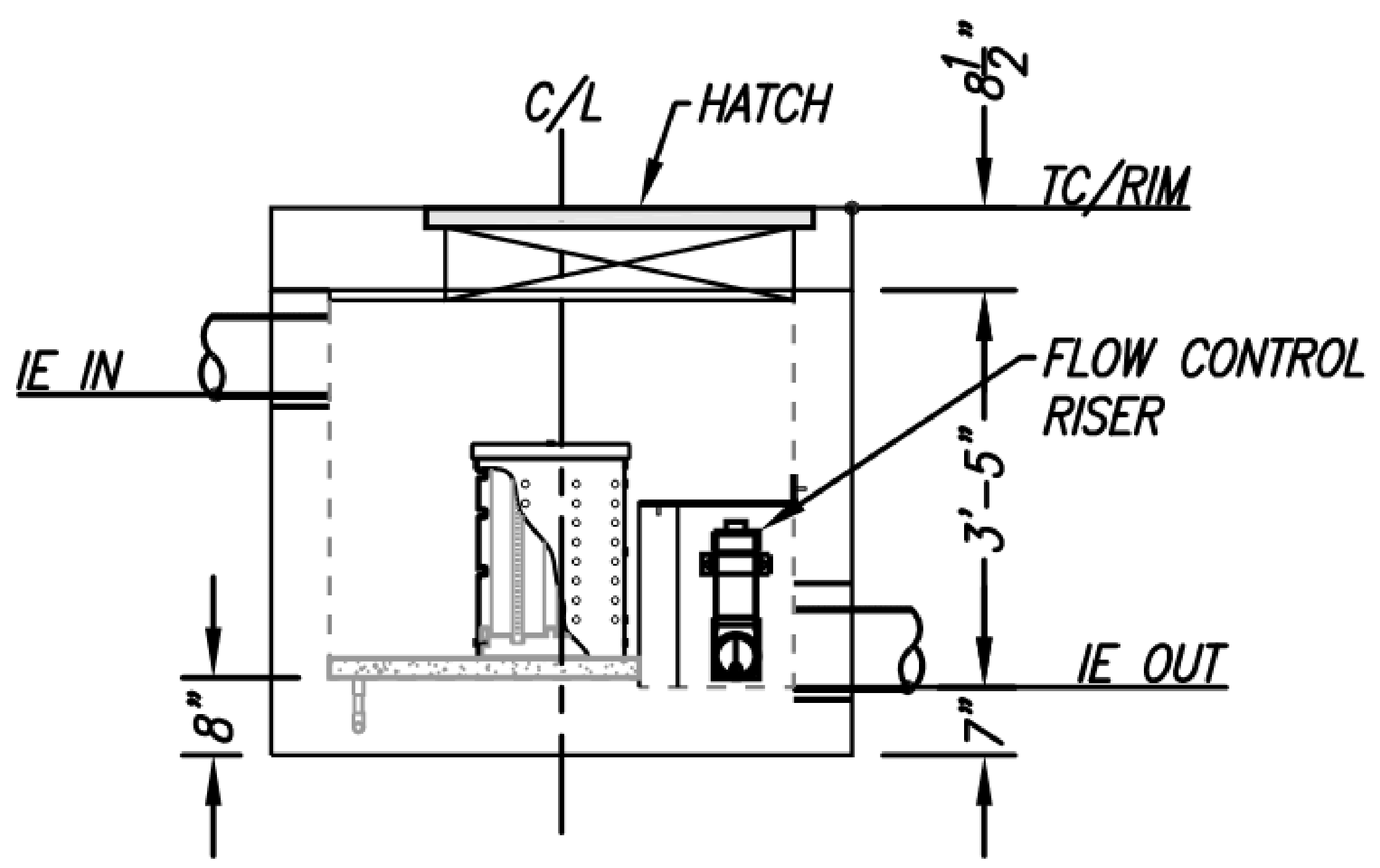


LEFT END VIEW

BIOFILTRATION



ELEVATION VIEW



RIGHT END VIEW

PRETREATMENT/DISCHARGE

INSTALLATION NOTES

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

GENERAL NOTES

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

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

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:
R.C.E. NO.
DATE Jul. 31, 16

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DMA EXHIBIT
3608–3688 DALBERGIA STREET
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FOR:
W.O.
COUNTY FILE NO.

SHEET NO. 3
OF 3 SHTS

Drawing: E:\My Work\Dalbergia Street\DMA Exhibit 3 OF 3 – Copy.dwg Layout: Layout1 Last Saved: Wed Feb 28, 2018 – 5:38pm Last Plotted: Thu Mar 01, 2018 – 6:11am By: raymondh

April 2014

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

For the

MWS-Linear Modular Wetland

Ecology's Decision:

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

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment
    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
    - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

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

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

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

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

   - Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
   - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
   - Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the

first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

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

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

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

Application Documents:

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

Applicant's Use Level Request:

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

Applicant's Performance Claims:

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

Ecology Recommendations:

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

Findings of Fact:

<u>Laboratory Testing</u>

The MWS-Linear Modular wetland has the:

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

<u>Field Testing</u>

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).

- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

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

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

Contact Information:

Applicant:	Greg Kent Modular Wetland Systems, Inc. P.O. Box 869 Oceanside, CA 92054 *gkent@biocleanenvironmental.net*

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

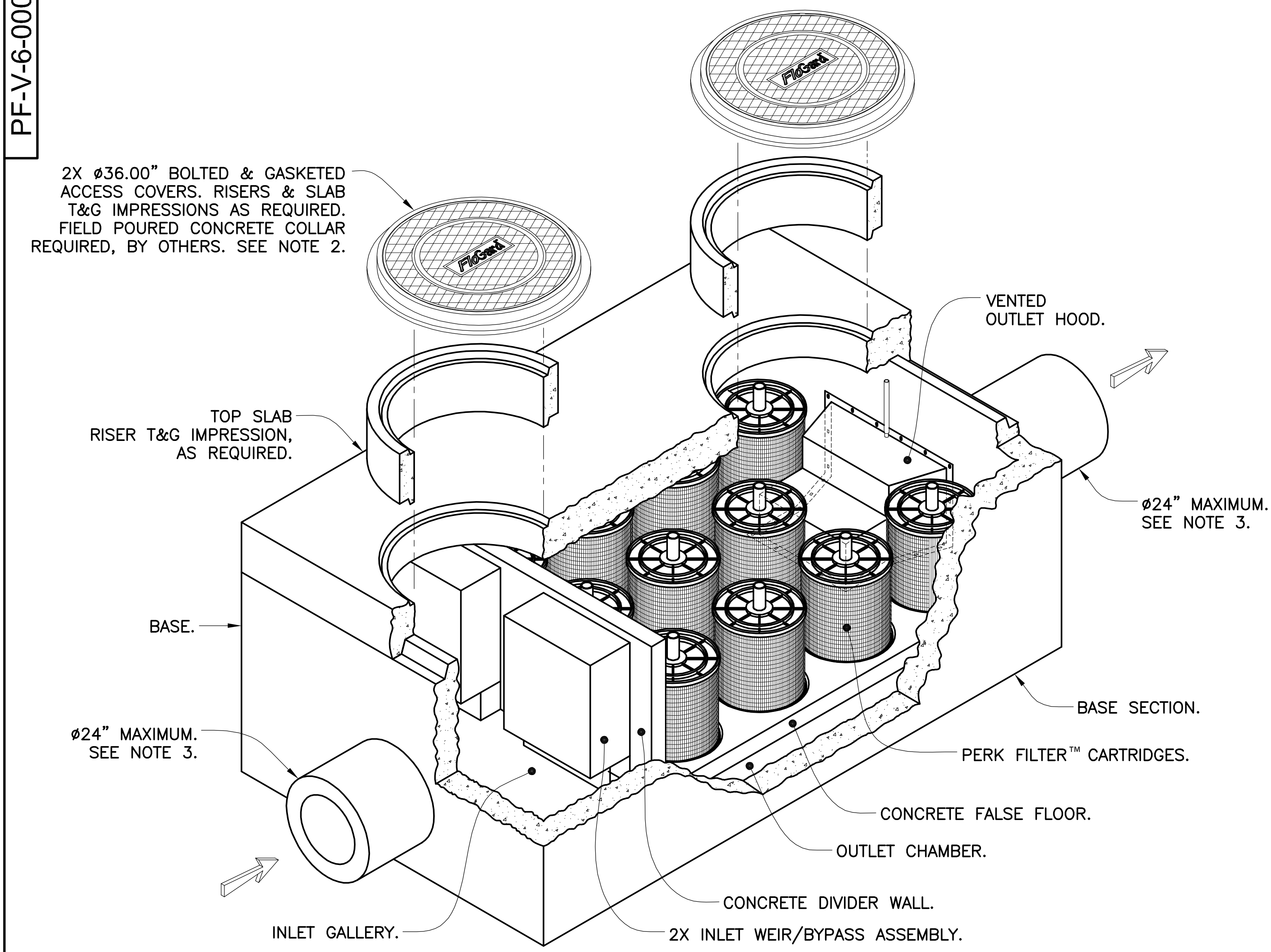
Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology:
Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	**Revision**
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment

PF-V-6-0001



Notes:

1. Precast concrete structure shall be manufactured in accordance with ASTM Designation C857 and C858.
2. Filter system shall be supplied with traffic rated (H20) bolted & gasketed Ø36" circular access covers with risers as required. Shallow applications may require configurations with (H20) bolted & gasketed square/rectangular access hatches. Field poured concrete collars required, by others.
3. Inlet & outlet pipe(s) (Ø 24" maximum) may enter device on all three sides of the inlet & outlet chambers respectively.
4. Inlet chamber shall be supplied with a drain-down device designed to remove standing water between storm events.
5. For depths less than specified minimums contact Oldcastle® Stormwater Solutions for engineering assistance.

Media
Filtration

Perk Filter™

6' Wide Concrete Vault

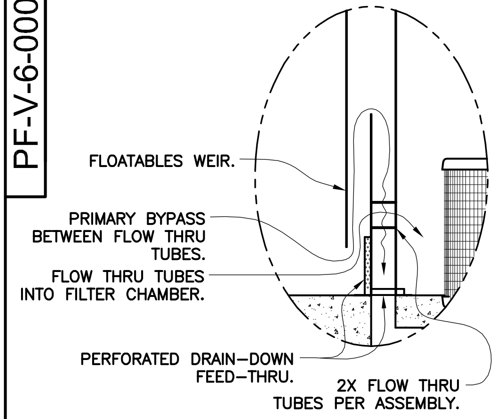
Four to Eleven Cartridges / Stacks

Oldcastle®
Stormwater Solutions

7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

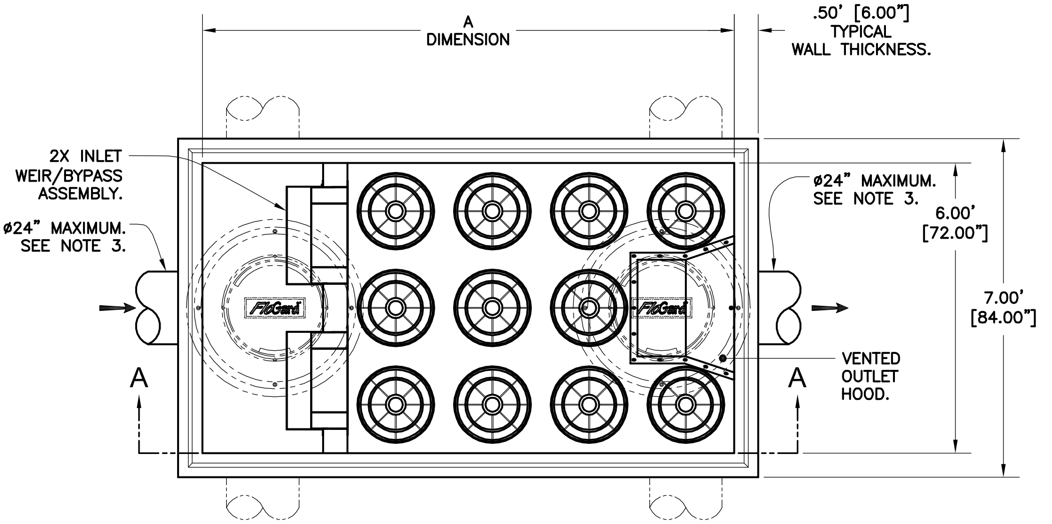
DRAWING NO.	REV	ECO	DATE	
PF-V-6-0001	F	ECO-0122 JPR 10/3/14	JPR 7/8/08	SHEET 1 OF 2

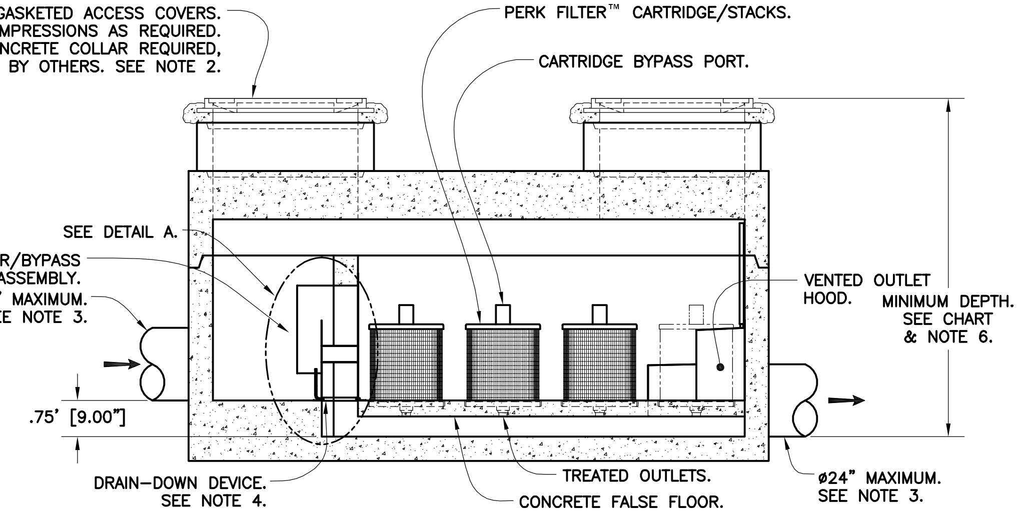
PF-V-6-0001



DETAIL A

INLET WEIR/BYPASS ASSEMBLY
& DRAIN-DOWN.
SCALE: NONE





SECTION A-A

MINIMUM DEPTH
- RIM TO OUTLET INVERT -

CARTRIDGE STACK CONFIGURATION			
12"	18"	12" + 12"	12" + 18"
4.25' [51.00"]	5.00' [60.00"]	5.92' [71.00"]	6.67' [80.00"]

6' VAULT
TREATMENT FLOW RATES, TOTAL FLOW CAPACITIES & MAXIMUM HEAD LOSS

CARTRIDGE STACK QUANTITY	A DIMENSION - LENGTH - (ID-FEET)	CARTRIDGE STACK CONFIGURATION							
		12"		18"		12" & 12"		12" & 18"	
		TREATMENT FLOW RATE (GPM / CFS)	TOTAL FLOW CAPACITY (CFS)	TREATMENT FLOW RATE (GPM / CFS)	TOTAL FLOW CAPACITY (CFS)	TREATMENT FLOW RATE (GPM / CFS)	TOTAL FLOW CAPACITY (CFS)	TREATMENT FLOW RATE (GPM / CFS)	TOTAL FLOW CAPACITY (CFS)
4	7	48 / 0.11	5.7	72 / 0.16	8.5	96 / 0.21	9.7	120 / 0.27	13.0
5	7	60 / 0.13	5.7	90 / 0.20	8.6	120 / 0.27	9.7	150 / 0.33	13.0
6	9	72 / 0.16	5.8	108 / 0.24	8.6	144 / 0.32	9.8	180 / 0.40	13.1
7	9	84 / 0.19	5.8	126 / 0.28	8.6	168 / 0.37	9.9	210 / 0.47	13.2
8	9	96 / 0.21	5.8	144 / 0.32	8.7	192 / 0.43	9.9	240 / 0.53	13.2
9	11	108 / 0.24	5.8	162 / 0.36	8.7	216 / 0.48	10.0	270 / 0.60	13.3
10	11	120 / 0.27	5.9	180 / 0.40	8.8	240 / 0.53	10.0	300 / 0.67	13.4
11	11	132 / 0.29	5.9	198 / 0.44	8.8	264 / 0.59	10.1	330 / 0.74	13.4
MAXIMUM HEAD LOSS		1.7 FEET		2.3 FEET		2.9 FEET		3.5 FEET	

Media
Filtration

Perk Filter™

6' Wide Concrete Vault

Four to Eleven Cartridges / Stacks

Oldcastle®
Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
PF-V-6-0001	F	ECO-0122 JPR 10/3/14	JPR 7/8/08	SHEET 2 OF 2

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

June 2016

GENERAL USE LEVEL DESIGNATION FOR BASIC AND PHOSPHORUS TREATMENT

for

Oldcastle Precast, Inc., PerkFilter™ (using ZPC Filter Media)

Ecology's Decision:

Based on Oldcastle's application submissions, including the Draft Technical Evaluation Report, dated April 2010, Ecology hereby issues the following use level designations:

1. **General Use Level Designation (GULD) for the PerkFilter™ for basic treatment:**
   - **Using a zeolite-perlite-carbon (ZPC) filter media as specified by Oldcastle.**
   - **Sized at hydraulic loading rate of no more than 1.5 gpm/ft^2 of media surface area, per Table 1.**

Table 1. Design Flow Rate Per Cartridge

Effective Cartridge Height (inches)	**12**	**18**
Cartridge Flow Rate (gpm/cartridge)	**6.8**	**10.2**

2. **General Use Level Designation (GULD) for the PerkFilter™ for phosphorus treatment:**
   - **Using a zeolite-perlite-carbon (ZPC) filter media as specified by Oldcastle.**
   - **Sized at hydraulic loading rate of no more than 1.5 gpm/ft^2 of media surface area, per Table 1.**

3. **Ecology approves PerkFilter™ units for treatment at the hydraulic loading rates shown in Table 1, and sized based on the water quality design flow rate for an off-line system. The internal weir in the inlet chamber functions as a bypass to route flow in excess of the water quality design flow rate around the treatment chamber. Calculate the water quality design flow rate using the following procedures:**

   - **Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.**

- **Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.**

- **Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.**

4. **These General Use Level Designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.**

<u>Ecology's Conditions of Use:</u>

PerkFilter™ units shall comply with the following conditions:

1. **Design, assemble, install, operate, and maintain PerkFilter™ units in accordance with Oldcastle's applicable manuals and documents and the Ecology Decision.**

2. **Each site plan must undergo Oldcastle review and approval before site installation. This ensures that site grading and slope are appropriate for use of a PerkFilter™ unit.**

3. **PerkFilter™media shall conform to the specifications submitted to, and approved by, Ecology.**

4. **Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.**
   - **Typically, Oldcastle designs PerkFilter systems for a target filter media replacement interval of 12 months. Maintenance includes removing accumulated sediment from the vault, and replacing spent cartridges with recharged cartridges.**
   - **Indications of the need for maintenance include effluent flow decreasing to below the design flow rate, as indicated by the scumline above the shoulder of the cartridge.**
   - **Owners/operators must inspect PerkFilter for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.**

- **Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.**
- **When inspections are performed, the following findings typically serve as maintenance triggers:**
    - **Accumulated vault sediment depths exceed an average of 2 inches, or**
    - **Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or**
    - **Standing water remains in the vault between rain events, or**
    - **Bypass occurs during storms smaller than the design storm.**
- **Note: If excessive floatables (trash and debris) are present, perform a minor maintenance consisting of gross solids removal, not cartridge replacement.**

5. **Discharges from the PerkFilter™ units shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: Oldcastle Precast, Inc.

Applicant's Address:
5885 Pruitt Avenue
Windsor, California 95492

Application Documents:

- PerkFilter™ Final Report, prepared by: Office of Water Programs, California State University, Sacramento (September 2007).
- Verification Phase of PerkFilter™ Tests with Zeolite-Perlite-Carbon Media and Zeolite-Carbon Media (August 2007).
- Quality Assurance Project Plan PerkFilter™ Stormwater Treatment Performance Monitoring Project, October 2008 Draft.
- Technical Evaluation Report Volume 1: PerkFilter™ Stormwater Treatment System Performance Monitoring, April 2010.
- Technical Evaluation Report Volume 2 - Appendices: PerkFilter™ Stormwater Treatment System Performance Monitoring, April 2010.

Applicant's Use Level Request:

- General Use Level Designation as a Basic and Phosphorus treatment device in accordance with Ecology's *Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision*.

Applicant’s Performance Claims:

- Capability to remove 80% of total suspended solids from stormwater runoff from sites with influent concentrations between 100 mg/L and 200 mg/L and provide effluent concentrations of 20 mg/L or less with influent concentrations less than 100 mg/L given a typical particle size distribution.
- Capability to remove 50% of Total Phosphorus from stormwater runoff from sites with influent concentrations between 0.1 mg/l and 0.5 mg/l.

Findings of Fact:

- Based on laboratory testing at a flow rate of 12 GPM per filter, the PerkFilter™ containing ZPC media had an average total suspended solids removal efficiency of 82% using Sil-Co-Sil 106 with an average influent concentration of 102 mg/L and zero initial sediment loading.

- Based on field-testing at a flow rate of 0.57 GPM/inch of cartridge height (17.25 inch diameter cartridge) (1.5 gpm per sq ft filter surface area), the PerkFilter™ containing ZPC media had an average total suspended solids removal efficiency of 82.4% for an influent concentration between 20 mg/L and 200 mg/l. The PerkFilter™ containing ZPC media had an average removal efficiency of 85.2% for an influent concentration between 100 mg/l and 200 mg/l. Removal rates fell over time and dropped below 80% after approximately 10 months.

- Based on field testing at a flow rate of 0.57 GPM/inch of cartridge height (17.25 inch diameter cartridge) (1.5 gpm per sq ft filter surface area), the PerkFilter™ containing ZPC media had an average total Phosphorus removal efficiency of 62.4% for an influent concentration between 0.1 mg/L and 0.5 mg/l. Removal rates tended to remain relatively constant during the 10 months of monitoring.

- Field Testing indicates that sediment accumulation in the Sediment Gallery during the 10 months of sampling was within the available volume for sediment. Thus, maintenance at a 6-month frequency (vacuuming of sediment from Inlet Gallery) as suggested by the manufacturer is sufficient.

- Filter flows during bypass events utilize the full 30-inch height of the filter. Without bypass, an unknown amount of filter is used. Comparing the flow through the filter during bypass events with the design flow rate shows that the Oldcastle system falls below the design flow rate after approximately 10 months of operation.

- Percent removal of TSS falls below 80% after approximately 10 months. There are earlier data points below 80% but these are from low influent concentration storms

Other PerkFilter™ Related Issues to be Addressed by the Company:

1. Oldcastle may perform additional monitoring to better determine the maintenance frequency for the filters with respect to design flow rate and Total Suspended Solids removal. Presentation of additional data may result in a modification to the requirements in this General Use Level Designation document.

Technology Description: Download at: www.oldcastlestormwater.com

Contact Information:

Applicant:

Jay Holtz, P.E.
Engineering Manager
Oldcastle Precast, Inc.
5885 Pruitt Avenue
Windsor, CA 95492
(800) 579-8819
jay.holtz@oldcastle.com

Applicant website: www.oldcastlestormwater.com

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

Ecology:

Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	**Revision**
March 2008	Original draft general-use-level-designation document
June 2010	Revise Use Level to General
January 2013	Modified Design Storm Description, added Revision Table, formatted document to match Ecology standard
May 2014	Revised company name and contact information
June 2016	Designated device for off-line sizing

Empty

(See DMA Exhibit)

Attachment 1b

Attachment 1c

Harvest and Use Feasibility Checklist	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: Dust Control Inside Building/Washdown

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: 5.5 gals/employee/day x 50 employees = 275 gals per day or 412 gals per 36 hours
Irrigation: 390 gals/acre x 0.18-acres + 1470 gals/acre x 0.03-acres = 114 gals
Dust Control: 96 gph x 36 hrs = 3,456 gals.
Tunnel Washdown Water: 30 gpm x 60 min = 1,800 gals per week
Truck Washdown Water: 9 trucks x 15 gpm x 30 min. = 6,075 gal per day

Total: 11,331 gals.

3. Calculate the DCV using worksheet B-2.1.
DCV = 2,210 (cubic feet)

3a. Is the 36 hour demand greater than or equal to the DCV? ☐ Yes / ☑ No ⇨ ⇩	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV? ☑ Yes / ☐ No ⇨ ⇩	3c. Is the 36 hour demand less than 0.25DCV? ☐ 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. Divert to Sanitary Sewer with Industrial Waste Discharge Permit

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Attachment 1d

<table>
<tr><th colspan="3">Categorization of Infiltration Feasibility Condition</th><th>Form I-8</th></tr>
<tr><td colspan="4">Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: Based on results of permeability testing in two locations at the property, the unfactored infiltration rates were measured to be 0.004 inches/hour and 0.014 inches/hour using a constant head borehole permeameter. If applying a feasibility factor of safety of 2.0, the infiltration rate would be 0.002 iph 0.007 iph. Information collected from the USDA website is attached. The Aardvark Permeameter test results are attached. In accordance with the Riverside County storm water procedures, which reference the United State Bureau of Reclamation Well Permeameter Method (USBR 7300), the caturated hydraulic conductivity is equal to the unfactored rate.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>2</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: No slopes greater than 25% are proposed in the vicinity of the proposed basins, a liquifaction potential is low and the landslide potential is very low to negligible. However, groundwater mounding is likely to occur, and existing utilitied would be in close proximity to the proposed BMPs. The potential for lateral water migration is high.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

<table>
<tr><th colspan="4">Form I-8 Page 2 of 4</th></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: Groundwater is not located within 10-feet of any proposed infiltration BMP, however, an active clean-up site was noted on the GeoTracker Website in the vicinity of the property. Monitoring wells are currently observing soil contamination (diesel, oil, and grease), therefore the risk of storm water infiltration BMPs adversely impacting groundwater does exist.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: We are not aware of any wells within 100-feet of the site, and given the amount of water that would infiltrate into the ground, it is our opinion that there are no adverse impacts to water balance, or impacts any downstream water rights. It should be noted that researching downstream water rights or evaluating water balance issues to stream flows is beyond the scope of the geotechnical consultant.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>No Infil.</td></tr>
</table>

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

<table>
<tr><th colspan="4">Form I-8 Page 3 of 4</th></tr>
<tr><td colspan="4">Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>5</td><td>Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: Based on results of permeability testing in two locations at the property, the unfactored infiltration rates were measured to be 0.004 inches/hour and 0.14 inches/hour using a constant head borehole permeameter. If applying a feasibility factor of safety of 2.0, thew infiltration rates would be 0.002 iph and 0.007 iph, whch are below the current thresholds for partial infiltration.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>6</td><td>Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: No slopes greater than 25% are proposed in the vicinity of the proposed basins, a liquefaction potential is very low, and the landslide potential is very low to negligible. However, groundwater mounding could occur, and existing utilities are in close proximity to the proposed BMPs. The potential for lateral water migration is high.
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
</table>

<table>
<tr><th colspan="4">Form I-8 Page 4 of 4</th></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Groundwater is not located within 10-feet from any proposed infiltration BMP, therefore the risk of storm water partial infiltration BMPs adversely impacting groundwater ir considered low due to the low volume of water expected to percolate into the ground beneath the subdrain.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Geocon is not aware of any downstream water rights that would be affected by incidental infiltration of storm water. Researching downstream water rights is beyond the scope of the geotechnical consultant.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.
If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td>No Infil.</td></tr>
</table>

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

Attachment 1e

Tabular Summary of DMAs

Worksheet B-1

DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
1	1.19	1.19	100	D	.9	2,138	1	HU-1	1
2	0.10	0.10	100	D	.9	180	2	BF-1	1
3	0.47	0.47	100	D	.9	845	3	BF-1	1
4	0.21	0.21	100	D	.9	377	4	BF-1	1

Summary of DMA Information (Must match project description and SWQMP Narrative)

No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
4	1.97	1.97	100		.9	3,540	1.97		1

<u>**Where**</u>: 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

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	1.19	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.9	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=	2,138	cubic-feet

	Flow-thru Design Flows	Worksheet B.6-1		
1	DCV	DCV	180	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	180	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	59.4	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	0.33	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.1	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.006	cfs

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.
3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

Flow-thru Design Flows		**Worksheet B.6-1**		
1	DCV	DCV	845	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	845	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	278.85	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	0.33	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.47	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.03	cfs

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.
3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

Form I-6 Page 6 of 6

Structural BMP Summary Information

Structural BMP ID No. 4

Construction Plan Sheet No. TBD

Type of structural BMP:

○ Retention by harvest and use (HU-1)

○ Retention by infiltration basin (INF-1)

○ Retention by bioretention (INF-2)

○ Retention by permeable pavement (INF-3)

○ Partial retention by biofiltration with partial retention (PR-1)

● Biofiltration (BF-1)

○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below)

○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)

○ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion

○ Detention pond or vault for hydromodification management

○ Other (describe in discussion section below)

Purpose:

● Pollutant control only

○ Hydromodification control only

○ Combined pollutant control and hydromodification control

○ Pre-treatment/forebay for another structural BMP

○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	EDCO
Who will be the final owner of this BMP?	EDCO
Who will maintain this BMP into perpetuity?	EDCO
What is the funding mechanism for maintenance?	Corporate Maintenance Funds

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

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Project Name: **Facility Expansion EDCO Recovery and Transfer**

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☒ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	● Not Performed ○ Included ○ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	● Included ○ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ● Not required because BMPs will drain in less than 96 hours

Project Name: Facility Expansion EDCO Recovery and Transfer

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

The Hydromodification Management Exhibit must identify:

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

Attachment 2a

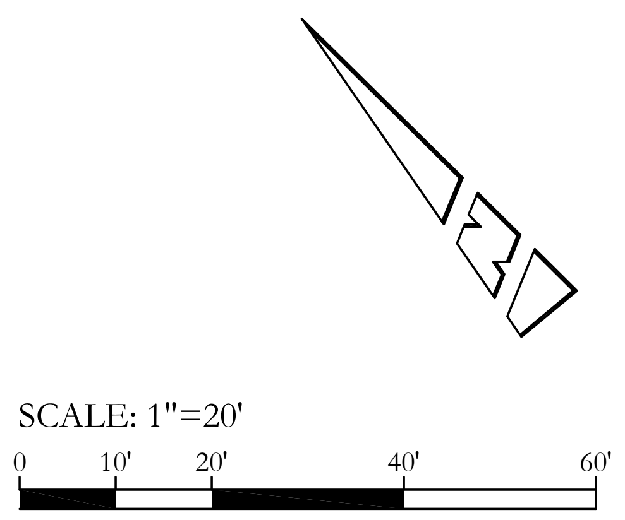
PRE-DEVELOPMENT CONDITIONS

LEGEND

▨	ROOFS	0.74 AC
▨	CONCRETE DRIVES & PARKING	1.16 AC
🟩	TURF LANDSCAPE	0.60 AC
		2.50 AC TOTAL

LEGEND

—— EX SD ——	STORM DRAIN LINE
■	CATCH BASINS
P.O.C.	POINT OF COMPLIANCE
→	RUNOFF DIRECTION
D.A.	DRAINAGE AREA
N.A.P.	NOT A PART OF PROJECT



HYDROMOD. EXHIBIT
3608–3688 DALBERGIA STREET
SAN DIEGO, CA 92113

SHEET NO.
1
OF 2 SHTS

Drawing: E:\My Work\Dalbergia Street\HYDRO MOD SHEET 1 OF 2.dwg Layout: Layout1 Last Saved: Fri Feb 09, 2018 – 5:46pm Last Plotted: Fri Feb 09, 2018 – 5:47pm By: raymondh

POST-DEVELOPMENT CONDITIONS

LEGEND	TOTAL
⁘ GRAVEL MULCH LANDSCAPING	0.04 AC
▨ ROOFS	1.19 AC
⁘ CONCRETE DRIVES & PARKING	0.74 AC
🟩 GROUND COVER LANDSCAPE	0.53 AC
	2.50 AC TOTAL

NOTES:

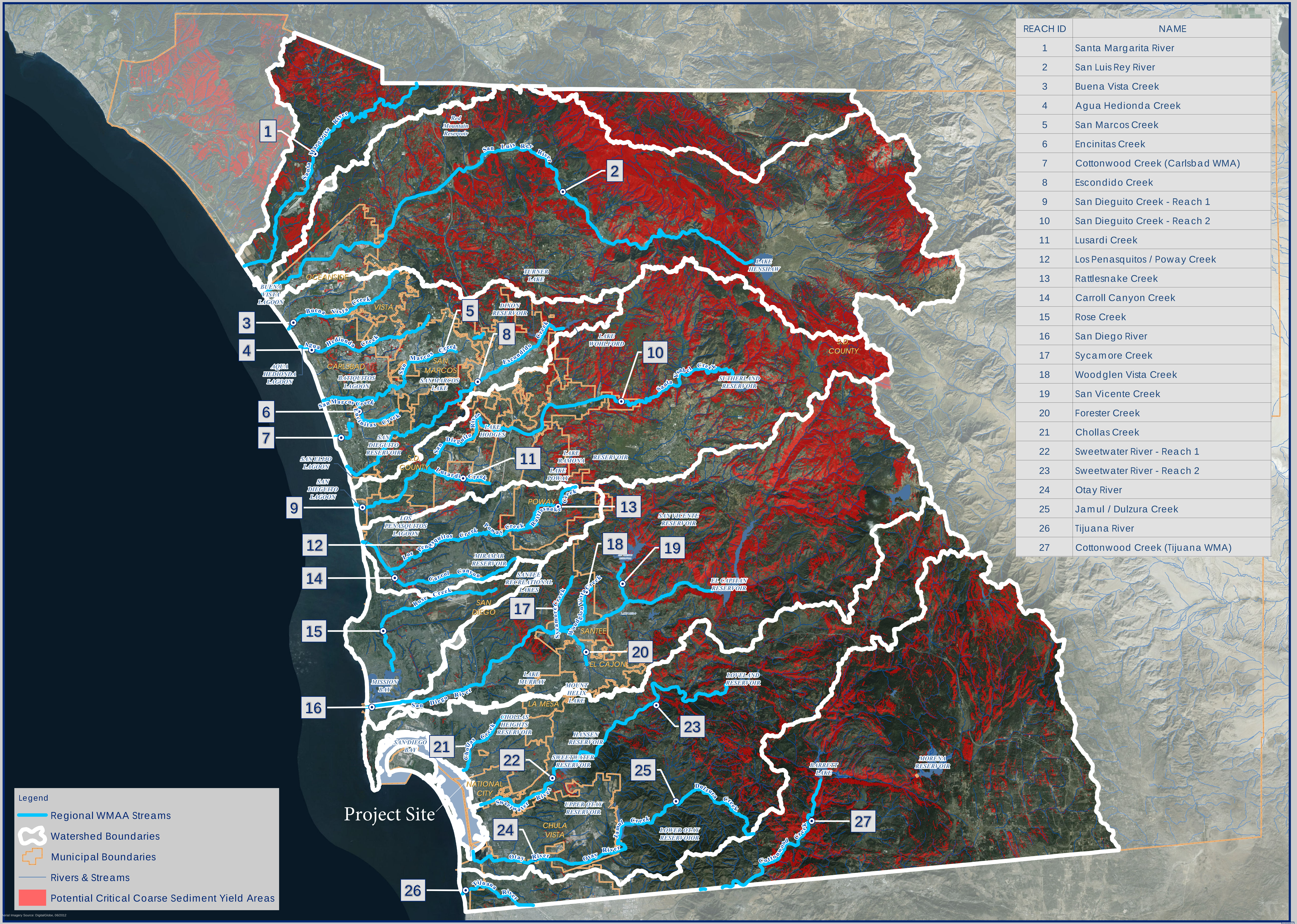
UNDERLYING HYDROLOGICAL SOIL GROUP:	D
APPROXIMATE DEPTH TO GROUNDWATER	27-FT
EXISTING NATURAL HYDROLOGICAL FEATURES:	NONE
CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED:	NONE
EXISTING TOPOGRAPHY:	SEE SHEET 1

HYDROMOD. EXHIBIT
3608-3688 DALBERGIA STREET
SAN DIEGO, CA 92113

SHEET NO. 2
OF 2 SHTS

Drawing: E:\My Work\Dalbergia Street\HYDRO MOD SHEET 2 OF 2 revised.dwg Layout: Layout1 Last Saved: Mon Mar 12, 2018 - 6:33am Last Plotted: Mon Mar 12, 2018 - 6:36am By: raymondh

Attachment 2b



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

Legend

▬	Regional WMAA Streams
▢	Watershed Boundaries
▢	Municipal Boundaries
—	Rivers & Streams
🟥	Potential Critical Coarse Sediment Yield Areas

Potential Critical Coarse Sediment Yield Areas

Regional San Diego County Watersheds

Exhibit Date: Sept. 8, 2014

Geosyntec consultants

RICK ENGINEERING COMPANY

Empty

Attachment 2c

Attachment 2d

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	EDCO Dabergia Street v2
Site Name:	EDCO Dalbergia Street
Site Address:	3608-3688 Dalbergia Streeet
City:	San Diego
Report Date:	1/16/2018
Gage:	BONITA
Data Start:	10/01/1971
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/01/05

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
D,NatVeg,Steep	0.55
Pervious Total	0.55
Impervious Land Use	acre
IMPERVIOUS-FLAT	1.49
Impervious Total	1.49
Basin Total	2.04

Element Flows To:

Surface	Interflow	Groundwater

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	0.05
Pervious Total	0.05
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.4
Impervious Total	0.4
Basin Total	0.45

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
IMPERVIOUS-FLAT	1.23
Impervious Total	1.23
Basin Total	1.23

Element Flows To:

Surface	Interflow	Groundwater
Cistern 1 with Combined H&U and Flow Control	Cistern 1 with Combined H&U and Flow Control	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Steep	0.53
D,Urban,Steep	0.04
D,Urban,Flat	0.01
Pervious Total	0.58
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.58

Element Flows To:

Surface	Interflow	Groundwater

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Urban,Flat	0.05
Pervious Total	0.05
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.74
Impervious Total	0.74
Basin Total	0.79

Element Flows To:

Surface	Interflow	Groundwater
Clarifier to Sanitary Sewer	Clarifier to Sanitary Sewer	

Routing Elements

Predeveloped Routing

Mitigated Routing

Cistern 1 with Combined H&U and Flow Control

Width: 12 ft.
Length: 12 ft.
Depth: 22 ft.
Infiltration On
Infiltration rate: 1.55
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 4.369
Total Volume Through Riser (ac-ft.): 17.822
Total Volume Through Facility (ac-ft.): 22.191
Percent Infiltrated: 19.69
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 21 ft.
Riser Diameter: 6 in.
Orifice 1 Diameter: 1 in. Elevation:1 ft.
Element Flows To:
Outlet 1 Outlet 2
Cistern 2 with Combined H&U and Flow Control

Vault Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.003	0.000	0.000	0.000
0.2444	0.003	0.000	0.000	0.005
0.4889	0.003	0.001	0.000	0.005
0.7333	0.003	0.002	0.000	0.005
0.9778	0.003	0.003	0.000	0.005
1.2222	0.003	0.004	0.012	0.005
1.4667	0.003	0.004	0.018	0.005
1.7111	0.003	0.005	0.022	0.005
1.9556	0.003	0.006	0.026	0.005
2.2000	0.003	0.007	0.029	0.005
2.4444	0.003	0.008	0.032	0.005
2.6889	0.003	0.008	0.035	0.005
2.9333	0.003	0.009	0.037	0.005
3.1778	0.003	0.010	0.040	0.005
3.4222	0.003	0.011	0.042	0.005
3.6667	0.003	0.012	0.044	0.005
3.9111	0.003	0.012	0.046	0.005
4.1556	0.003	0.013	0.048	0.005
4.4000	0.003	0.014	0.050	0.005
4.6444	0.003	0.015	0.051	0.005
4.8889	0.003	0.016	0.053	0.005
5.1333	0.003	0.017	0.055	0.005
5.3778	0.003	0.017	0.056	0.005
5.6222	0.003	0.018	0.058	0.005
5.8667	0.003	0.019	0.059	0.005
6.1111	0.003	0.020	0.061	0.005
6.3556	0.003	0.021	0.062	0.005
6.6000	0.003	0.021	0.064	0.005
6.8444	0.003	0.022	0.065	0.005
7.0889	0.003	0.023	0.067	0.005
7.3333	0.003	0.024	0.068	0.005

7.5778	0.003	0.025	0.069	0.005
7.8222	0.003	0.025	0.070	0.005
8.0667	0.003	0.026	0.072	0.005
8.3111	0.003	0.027	0.073	0.005
8.5556	0.003	0.028	0.074	0.005
8.8000	0.003	0.029	0.075	0.005
9.0444	0.003	0.029	0.077	0.005
9.2889	0.003	0.030	0.078	0.005
9.5333	0.003	0.031	0.079	0.005
9.7778	0.003	0.032	0.080	0.005
10.022	0.003	0.033	0.081	0.005
10.267	0.003	0.033	0.082	0.005
10.511	0.003	0.034	0.083	0.005
10.756	0.003	0.035	0.084	0.005
11.000	0.003	0.036	0.085	0.005
11.244	0.003	0.037	0.086	0.005
11.489	0.003	0.038	0.087	0.005
11.733	0.003	0.038	0.088	0.005
11.978	0.003	0.039	0.089	0.005
12.222	0.003	0.040	0.090	0.005
12.467	0.003	0.041	0.091	0.005
12.711	0.003	0.042	0.092	0.005
12.956	0.003	0.042	0.093	0.005
13.200	0.003	0.043	0.094	0.005
13.444	0.003	0.044	0.095	0.005
13.689	0.003	0.045	0.096	0.005
13.933	0.003	0.046	0.097	0.005
14.178	0.003	0.046	0.098	0.005
14.422	0.003	0.047	0.099	0.005
14.667	0.003	0.048	0.100	0.005
14.911	0.003	0.049	0.101	0.005
15.156	0.003	0.050	0.102	0.005
15.400	0.003	0.050	0.103	0.005
15.644	0.003	0.051	0.103	0.005
15.889	0.003	0.052	0.104	0.005
16.133	0.003	0.053	0.105	0.005
16.378	0.003	0.054	0.106	0.005
16.622	0.003	0.054	0.107	0.005
16.867	0.003	0.055	0.108	0.005
17.111	0.003	0.056	0.108	0.005
17.356	0.003	0.057	0.109	0.005
17.600	0.003	0.058	0.110	0.005
17.844	0.003	0.059	0.111	0.005
18.089	0.003	0.059	0.112	0.005
18.333	0.003	0.060	0.113	0.005
18.578	0.003	0.061	0.113	0.005
18.822	0.003	0.062	0.114	0.005
19.067	0.003	0.063	0.115	0.005
19.311	0.003	0.063	0.116	0.005
19.556	0.003	0.064	0.116	0.005
19.800	0.003	0.065	0.117	0.005
20.044	0.003	0.066	0.118	0.005
20.289	0.003	0.067	0.119	0.005
20.533	0.003	0.067	0.119	0.005
20.778	0.003	0.068	0.120	0.005
21.022	0.003	0.069	0.139	0.005
21.267	0.003	0.070	0.528	0.005
21.511	0.003	0.071	0.685	0.005

21.756	0.003	0.071	0.808	0.005
22.000	0.003	0.072	0.911	0.005
22.244	0.003	0.073	1.003	0.005
22.489	0.000	0.000	1.086	0.000

Clarifier to Sanitary Sewer

Width: 200 ft.
Length: 200 ft.
Depth: 7 ft.
Infiltration On
Infiltration rate: 3
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 13.531
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 13.531
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 24 in.
Notch Type: Rectangular
Notch Width: 2.000 ft.
Notch Height: 2.000 ft.
Orifice 1 Diameter: 3 in. Elevation:1 ft.
Element Flows To:

Outlet 1	Outlet 2
Trapezoidal Pond 1	

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.918	0.000	0.000	0.000
0.0778	0.918	0.071	0.000	2.777
0.1556	0.918	0.142	0.000	2.777
0.2333	0.918	0.214	0.000	2.777
0.3111	0.918	0.285	0.000	2.777
0.3889	0.918	0.357	0.000	2.777
0.4667	0.918	0.428	0.000	2.777
0.5444	0.918	0.499	0.000	2.777
0.6222	0.918	0.571	0.000	2.777
0.7000	0.918	0.642	0.000	2.777
0.7778	0.918	0.714	0.000	2.777
0.8556	0.918	0.785	0.000	2.777
0.9333	0.918	0.857	0.000	2.777
1.0111	0.918	0.928	0.025	2.777
1.0889	0.918	0.999	0.072	2.777
1.1667	0.918	1.071	0.099	2.777
1.2444	0.918	1.142	0.120	2.777
1.3222	0.918	1.214	0.138	2.777
1.4000	0.918	1.285	0.154	2.777
1.4778	0.918	1.357	0.168	2.777
1.5556	0.918	1.428	0.182	2.777
1.6333	0.918	1.499	0.194	2.777
1.7111	0.918	1.571	0.206	2.777
1.7889	0.918	1.642	0.216	2.777
1.8667	0.918	1.714	0.227	2.777
1.9444	0.918	1.785	0.237	2.777
2.0222	0.918	1.857	0.246	2.777
2.1000	0.918	1.928	0.256	2.777
2.1778	0.918	1.999	0.265	2.777
2.2556	0.918	2.071	0.273	2.777

2.3333	0.918	2.142	0.282	2.777
2.4111	0.918	2.214	0.290	2.777
2.4889	0.918	2.285	0.298	2.777
2.5667	0.918	2.356	0.305	2.777
2.6444	0.918	2.428	0.313	2.777
2.7222	0.918	2.499	0.320	2.777
2.8000	0.918	2.571	0.327	2.777
2.8778	0.918	2.642	0.334	2.777
2.9556	0.918	2.714	0.341	2.777
3.0333	0.918	2.785	0.348	2.777
3.1111	0.918	2.856	0.354	2.777
3.1889	0.918	2.928	0.361	2.777
3.2667	0.918	2.999	0.367	2.777
3.3444	0.918	3.071	0.374	2.777
3.4222	0.918	3.142	0.380	2.777
3.5000	0.918	3.214	0.386	2.777
3.5778	0.918	3.285	0.392	2.777
3.6556	0.918	3.356	0.398	2.777
3.7333	0.918	3.428	0.403	2.777
3.8111	0.918	3.499	0.409	2.777
3.8889	0.918	3.571	0.415	2.777
3.9667	0.918	3.642	0.420	2.777
4.0444	0.918	3.713	0.488	2.777
4.1222	0.918	3.785	0.716	2.777
4.2000	0.918	3.856	1.032	2.777
4.2778	0.918	3.928	1.417	2.777
4.3556	0.918	3.999	1.859	2.777
4.4333	0.918	4.071	2.352	2.777
4.5111	0.918	4.142	2.891	2.777
4.5889	0.918	4.213	3.472	2.777
4.6667	0.918	4.285	4.092	2.777
4.7444	0.918	4.356	4.750	2.777
4.8222	0.918	4.428	5.442	2.777
4.9000	0.918	4.499	6.168	2.777
4.9778	0.918	4.571	6.926	2.777
5.0556	0.918	4.642	7.714	2.777
5.1333	0.918	4.713	8.532	2.777
5.2111	0.918	4.785	9.377	2.777
5.2889	0.918	4.856	10.25	2.777
5.3667	0.918	4.928	11.15	2.777
5.4444	0.918	4.999	12.07	2.777
5.5222	0.918	5.070	13.02	2.777
5.6000	0.918	5.142	14.00	2.777
5.6778	0.918	5.213	15.00	2.777
5.7556	0.918	5.285	16.02	2.777
5.8333	0.918	5.356	17.06	2.777
5.9111	0.918	5.428	18.13	2.777
5.9889	0.918	5.499	19.22	2.777
6.0667	0.918	5.570	19.75	2.777
6.1444	0.918	5.642	20.55	2.777
6.2222	0.918	5.713	21.60	2.777
6.3000	0.918	5.785	22.82	2.777
6.3778	0.918	5.856	24.14	2.777
6.4556	0.918	5.928	25.52	2.777
6.5333	0.918	5.999	26.86	2.777
6.6111	0.918	6.070	28.12	2.777
6.6889	0.918	6.142	29.24	2.777
6.7667	0.918	6.213	30.17	2.777

6.8444	0.918	6.285	30.90	2.777
6.9222	0.918	6.356	31.46	2.777
7.0000	0.918	6.427	31.90	2.777
7.0778	0.918	6.499	32.51	2.777
7.1556	0.000	0.000	32.98	0.000

Cistern 2 with Combined H&U and Flow Control

Width: 12 ft.
Length: 12 ft.
Depth: 22 ft.
Infiltration On
Infiltration rate: 1.55
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 3.976
Total Volume Through Riser (ac-ft.): 13.842
Total Volume Through Facility (ac-ft.): 17.817
Percent Infiltrated: 22.32
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 21 ft.
Riser Diameter: 6 in.
Orifice 1 Diameter: 1 in. Elevation:1 ft.
Element Flows To:
Outlet 1 Outlet 2
Trapezoidal Pond 1

Vault Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.003	0.000	0.000	0.000
0.2444	0.003	0.000	0.000	0.005
0.4889	0.003	0.001	0.000	0.005
0.7333	0.003	0.002	0.000	0.005
0.9778	0.003	0.003	0.000	0.005
1.2222	0.003	0.004	0.012	0.005
1.4667	0.003	0.004	0.018	0.005
1.7111	0.003	0.005	0.022	0.005
1.9556	0.003	0.006	0.026	0.005
2.2000	0.003	0.007	0.029	0.005
2.4444	0.003	0.008	0.032	0.005
2.6889	0.003	0.008	0.035	0.005
2.9333	0.003	0.009	0.037	0.005
3.1778	0.003	0.010	0.040	0.005
3.4222	0.003	0.011	0.042	0.005
3.6667	0.003	0.012	0.044	0.005
3.9111	0.003	0.012	0.046	0.005
4.1556	0.003	0.013	0.048	0.005
4.4000	0.003	0.014	0.050	0.005
4.6444	0.003	0.015	0.051	0.005
4.8889	0.003	0.016	0.053	0.005
5.1333	0.003	0.017	0.055	0.005
5.3778	0.003	0.017	0.056	0.005
5.6222	0.003	0.018	0.058	0.005
5.8667	0.003	0.019	0.059	0.005
6.1111	0.003	0.020	0.061	0.005
6.3556	0.003	0.021	0.062	0.005
6.6000	0.003	0.021	0.064	0.005
6.8444	0.003	0.022	0.065	0.005
7.0889	0.003	0.023	0.067	0.005
7.3333	0.003	0.024	0.068	0.005
7.5778	0.003	0.025	0.069	0.005
7.8222	0.003	0.025	0.070	0.005

8.0667	0.003	0.026	0.072	0.005
8.3111	0.003	0.027	0.073	0.005
8.5556	0.003	0.028	0.074	0.005
8.8000	0.003	0.029	0.075	0.005
9.0444	0.003	0.029	0.077	0.005
9.2889	0.003	0.030	0.078	0.005
9.5333	0.003	0.031	0.079	0.005
9.7778	0.003	0.032	0.080	0.005
10.022	0.003	0.033	0.081	0.005
10.267	0.003	0.033	0.082	0.005
10.511	0.003	0.034	0.083	0.005
10.756	0.003	0.035	0.084	0.005
11.000	0.003	0.036	0.085	0.005
11.244	0.003	0.037	0.086	0.005
11.489	0.003	0.038	0.087	0.005
11.733	0.003	0.038	0.088	0.005
11.978	0.003	0.039	0.089	0.005
12.222	0.003	0.040	0.090	0.005
12.467	0.003	0.041	0.091	0.005
12.711	0.003	0.042	0.092	0.005
12.956	0.003	0.042	0.093	0.005
13.200	0.003	0.043	0.094	0.005
13.444	0.003	0.044	0.095	0.005
13.689	0.003	0.045	0.096	0.005
13.933	0.003	0.046	0.097	0.005
14.178	0.003	0.046	0.098	0.005
14.422	0.003	0.047	0.099	0.005
14.667	0.003	0.048	0.100	0.005
14.911	0.003	0.049	0.101	0.005
15.156	0.003	0.050	0.102	0.005
15.400	0.003	0.050	0.103	0.005
15.644	0.003	0.051	0.103	0.005
15.889	0.003	0.052	0.104	0.005
16.133	0.003	0.053	0.105	0.005
16.378	0.003	0.054	0.106	0.005
16.622	0.003	0.054	0.107	0.005
16.867	0.003	0.055	0.108	0.005
17.111	0.003	0.056	0.108	0.005
17.356	0.003	0.057	0.109	0.005
17.600	0.003	0.058	0.110	0.005
17.844	0.003	0.059	0.111	0.005
18.089	0.003	0.059	0.112	0.005
18.333	0.003	0.060	0.113	0.005
18.578	0.003	0.061	0.113	0.005
18.822	0.003	0.062	0.114	0.005
19.067	0.003	0.063	0.115	0.005
19.311	0.003	0.063	0.116	0.005
19.556	0.003	0.064	0.116	0.005
19.800	0.003	0.065	0.117	0.005
20.044	0.003	0.066	0.118	0.005
20.289	0.003	0.067	0.119	0.005
20.533	0.003	0.067	0.119	0.005
20.778	0.003	0.068	0.120	0.005
21.022	0.003	0.069	0.139	0.005
21.267	0.003	0.070	0.528	0.005
21.511	0.003	0.071	0.685	0.005
21.756	0.003	0.071	0.808	0.005
22.000	0.003	0.072	0.911	0.005

22.244	0.003	0.073	1.003	0.005
22.489	0.000	0.000	1.086	0.000

Trapezoidal Pond 1

Bottom Length:	1.00 ft.	
Bottom Width:	1.00 ft.	
Depth:	1 ft.	
Volume at riser head:	0.0001 acre-feet.	
Infiltration On		
Infiltration rate:	1	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		0
Total Volume Through Riser (ac-ft.):		13.842
Total Volume Through Facility (ac-ft.):		13.842
Percent Infiltrated:		0
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	1 To 1	
Side slope 2:	1 To 1	
Side slope 3:	1 To 1	
Side slope 4:	1 To 1	
Discharge Structure		
Riser Height:	1 ft.	
Riser Diameter:	24 in.	
Notch Type:	Rectangular	
Notch Width:	2.000 ft.	
Notch Height:	1.000 ft.	
Orifice 1 Diameter:	12 in.	Elevation:0 ft.

Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

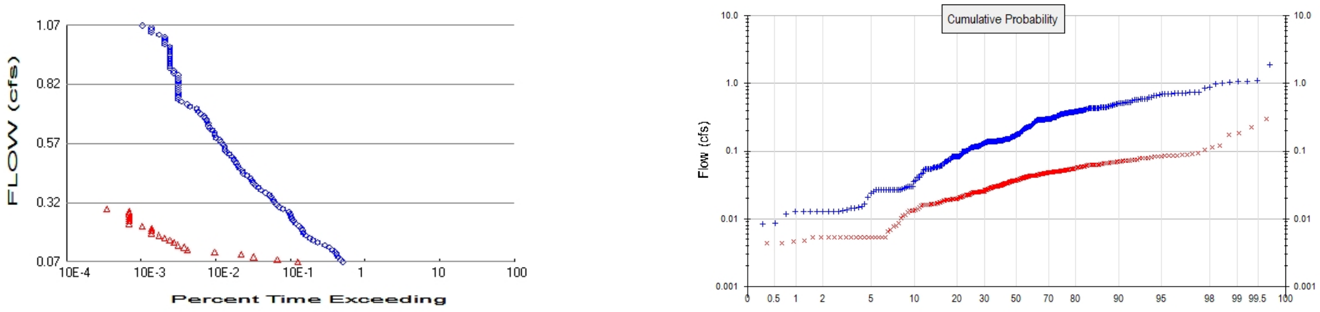
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000023	0.000000	0.000	0.000
0.0111	0.000024	0.000000	0.419	0.000
0.0222	0.000025	0.000001	0.604	0.000
0.0333	0.000026	0.000001	0.754	0.000
0.0444	0.000027	0.000001	0.886	0.000
0.0556	0.000028	0.000001	1.008	0.000
0.0667	0.000029	0.000002	1.123	0.000
0.0778	0.000031	0.000002	1.234	0.000
0.0889	0.000032	0.000002	1.341	0.000
0.1000	0.000033	0.000003	1.446	0.000
0.1111	0.000034	0.000003	1.549	0.000
0.1222	0.000036	0.000004	1.650	0.000
0.1333	0.000037	0.000004	1.751	0.000
0.1444	0.000038	0.000004	1.850	0.000
0.1556	0.000039	0.000005	1.949	0.000
0.1667	0.000041	0.000005	2.048	0.000
0.1778	0.000042	0.000006	2.146	0.000
0.1889	0.000044	0.000006	2.245	0.000
0.2000	0.000045	0.000007	2.343	0.000
0.2111	0.000046	0.000007	2.441	0.000
0.2222	0.000048	0.000008	2.539	0.000
0.2333	0.000049	0.000008	2.638	0.000
0.2444	0.000051	0.000009	2.736	0.000
0.2556	0.000052	0.000009	2.835	0.000
0.2667	0.000054	0.000010	2.935	0.000

0.2778	0.000056	0.000011	3.034	0.000
0.2889	0.000057	0.000011	3.134	0.000
0.3000	0.000059	0.000012	3.234	0.000
0.3111	0.000060	0.000013	3.335	0.000
0.3222	0.000062	0.000013	3.436	0.000
0.3333	0.000064	0.000014	3.537	0.000
0.3444	0.000065	0.000015	3.639	0.000
0.3556	0.000067	0.000015	3.742	0.000
0.3667	0.000069	0.000016	3.844	0.000
0.3778	0.000071	0.000017	3.948	0.000
0.3889	0.000073	0.000018	4.052	0.000
0.4000	0.000074	0.000018	4.156	0.000
0.4111	0.000076	0.000019	4.261	0.000
0.4222	0.000078	0.000020	4.366	0.000
0.4333	0.000080	0.000021	4.472	0.000
0.4444	0.000082	0.000022	4.578	0.000
0.4556	0.000084	0.000023	4.685	0.000
0.4667	0.000086	0.000024	4.792	0.000
0.4778	0.000088	0.000025	4.900	0.000
0.4889	0.000090	0.000026	5.008	0.000
0.5000	0.000092	0.000027	5.117	0.000
0.5111	0.000094	0.000028	5.227	0.000
0.5222	0.000096	0.000029	5.337	0.000
0.5333	0.000098	0.000030	5.447	0.000
0.5444	0.000100	0.000031	5.558	0.000
0.5556	0.000102	0.000032	5.670	0.000
0.5667	0.000104	0.000033	5.782	0.000
0.5778	0.000107	0.000034	5.895	0.000
0.5889	0.000109	0.000036	6.008	0.000
0.6000	0.000111	0.000037	6.122	0.000
0.6111	0.000113	0.000038	6.236	0.000
0.6222	0.000116	0.000039	6.351	0.000
0.6333	0.000118	0.000041	6.466	0.000
0.6444	0.000120	0.000042	6.582	0.000
0.6556	0.000123	0.000043	6.698	0.000
0.6667	0.000125	0.000045	6.815	0.000
0.6778	0.000127	0.000046	6.933	0.000
0.6889	0.000130	0.000048	7.051	0.000
0.7000	0.000132	0.000049	7.169	0.000
0.7111	0.000135	0.000051	7.289	0.000
0.7222	0.000137	0.000052	7.408	0.000
0.7333	0.000140	0.000054	7.528	0.000
0.7444	0.000142	0.000055	7.649	0.000
0.7556	0.000145	0.000057	7.770	0.000
0.7667	0.000147	0.000058	7.892	0.000
0.7778	0.000150	0.000060	8.014	0.000
0.7889	0.000153	0.000062	8.137	0.000
0.8000	0.000155	0.000063	8.260	0.000
0.8111	0.000158	0.000065	8.384	0.000
0.8222	0.000161	0.000067	8.508	0.000
0.8333	0.000163	0.000069	8.633	0.000
0.8444	0.000166	0.000071	8.759	0.000
0.8556	0.000169	0.000072	8.884	0.000
0.8667	0.000172	0.000074	9.011	0.000
0.8778	0.000174	0.000076	9.138	0.000
0.8889	0.000177	0.000078	9.265	0.000
0.9000	0.000180	0.000080	9.393	0.000
0.9111	0.000183	0.000082	9.522	0.000

0.9222	0.000186	0.000084	9.651	0.000
0.9333	0.000189	0.000086	9.780	0.000
0.9444	0.000192	0.000088	9.910	0.000
0.9556	0.000195	0.000091	10.04	0.000
0.9667	0.000198	0.000093	10.17	0.000
0.9778	0.000201	0.000095	10.30	0.000
0.9889	0.000204	0.000097	10.43	0.000
1.0000	0.000207	0.000099	10.56	0.000
1.0111	0.000210	0.000102	10.61	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.55
Total Impervious Area: 1.49

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.05
Total Impervious Area: 1.97

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.707855
5 year	0.989779
10 year	1.06717
25 year	1.471377

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.082435
5 year	0.104931
10 year	0.181072
25 year	0.25839

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0708	1463	366	25	Pass
0.0808	1356	194	14	Pass
0.0909	1267	94	7	Pass
0.1010	1212	63	5	Pass
0.1110	1151	28	2	Pass
0.1211	1054	12	1	Pass
0.1312	973	11	1	Pass
0.1412	831	9	1	Pass
0.1513	673	8	1	Pass
0.1614	584	7	1	Pass
0.1714	526	6	1	Pass
0.1815	466	5	1	Pass
0.1916	439	4	0	Pass
0.2016	422	4	0	Pass
0.2117	407	4	0	Pass
0.2218	377	3	0	Pass
0.2318	345	2	0	Pass
0.2419	319	2	0	Pass
0.2519	304	2	0	Pass
0.2620	294	2	0	Pass
0.2721	290	2	0	Pass
0.2821	275	2	0	Pass
0.2922	229	1	0	Pass
0.3023	205	0	0	Pass
0.3123	188	0	0	Pass
0.3224	174	0	0	Pass
0.3325	170	0	0	Pass
0.3425	160	0	0	Pass
0.3526	152	0	0	Pass
0.3627	135	0	0	Pass
0.3727	116	0	0	Pass
0.3828	108	0	0	Pass
0.3928	99	0	0	Pass
0.4029	92	0	0	Pass
0.4130	89	0	0	Pass
0.4230	84	0	0	Pass
0.4331	76	0	0	Pass
0.4432	68	0	0	Pass
0.4532	66	0	0	Pass
0.4633	61	0	0	Pass
0.4734	58	0	0	Pass
0.4834	55	0	0	Pass
0.4935	53	0	0	Pass
0.5036	50	0	0	Pass
0.5136	48	0	0	Pass
0.5237	44	0	0	Pass
0.5338	40	0	0	Pass
0.5438	38	0	0	Pass
0.5539	38	0	0	Pass
0.5639	37	0	0	Pass
0.5740	34	0	0	Pass
0.5841	33	0	0	Pass
0.5941	29	0	0	Pass

0.6042	28	0	0	Pass
0.6143	28	0	0	Pass
0.6243	26	0	0	Pass
0.6344	24	0	0	Pass
0.6445	23	0	0	Pass
0.6545	23	0	0	Pass
0.6646	22	0	0	Pass
0.6747	21	0	0	Pass
0.6847	20	0	0	Pass
0.6948	18	0	0	Pass
0.7048	17	0	0	Pass
0.7149	16	0	0	Pass
0.7250	13	0	0	Pass
0.7350	12	0	0	Pass
0.7451	10	0	0	Pass
0.7552	9	0	0	Pass
0.7652	9	0	0	Pass
0.7753	9	0	0	Pass
0.7854	9	0	0	Pass
0.7954	9	0	0	Pass
0.8055	9	0	0	Pass
0.8156	9	0	0	Pass
0.8256	9	0	0	Pass
0.8357	9	0	0	Pass
0.8458	9	0	0	Pass
0.8558	9	0	0	Pass
0.8659	8	0	0	Pass
0.8759	8	0	0	Pass
0.8860	7	0	0	Pass
0.8961	7	0	0	Pass
0.9061	7	0	0	Pass
0.9162	7	0	0	Pass
0.9263	7	0	0	Pass
0.9363	7	0	0	Pass
0.9464	7	0	0	Pass
0.9565	7	0	0	Pass
0.9665	7	0	0	Pass
0.9766	7	0	0	Pass
0.9867	6	0	0	Pass
0.9967	6	0	0	Pass
1.0068	6	0	0	Pass
1.0168	6	0	0	Pass
1.0269	5	0	0	Pass
1.0370	4	0	0	Pass
1.0470	4	0	0	Pass
1.0571	4	0	0	Pass
1.0672	3	0	0	Pass

Water Quality

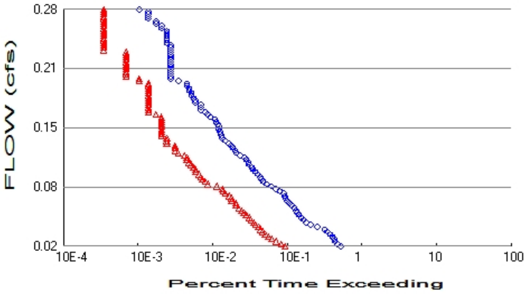
Drawdown Time Results

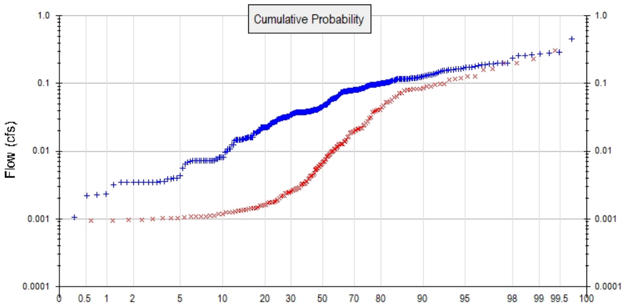
Pond: Trapezoidal Pond 1

Days	Stage(feet)	Percent of Total Run Time
1	1.000	N/A
2	1.000	N/A
3	1.000	N/A
4	1.000	N/A
5	1.000	N/A

Maximum Stage: 1.000 Drawdown Time: Less than 1 day

POC 2





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2

Total Pervious Area:	0.05
Total Impervious Area:	0.4

Mitigated Landuse Totals for POC #2

Total Pervious Area:	0.58
Total Impervious Area:	0

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.178723
5 year	0.255506
10 year	0.276369
25 year	0.367384

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.084239
5 year	0.133985
10 year	0.199777
25 year	0.264445

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0179	1500	270	18	Pass
0.0205	1366	240	17	Pass
0.0231	1279	205	16	Pass
0.0257	1236	178	14	Pass
0.0283	1165	160	13	Pass
0.0309	1093	147	13	Pass
0.0335	998	135	13	Pass
0.0361	918	127	13	Pass
0.0388	736	119	16	Pass
0.0414	594	109	18	Pass
0.0440	518	103	19	Pass
0.0466	481	95	19	Pass
0.0492	441	90	20	Pass
0.0518	413	82	19	Pass
0.0544	395	76	19	Pass
0.0570	380	70	18	Pass
0.0596	358	65	18	Pass
0.0623	330	60	18	Pass
0.0649	305	59	19	Pass
0.0675	286	52	18	Pass
0.0701	274	52	18	Pass
0.0727	271	48	17	Pass
0.0753	260	43	16	Pass
0.0779	230	40	17	Pass
0.0805	204	39	19	Pass
0.0831	176	33	18	Pass
0.0858	154	25	16	Pass
0.0884	137	23	16	Pass
0.0910	130	21	16	Pass
0.0936	127	20	15	Pass
0.0962	118	19	16	Pass
0.0988	107	17	15	Pass
0.1014	100	17	17	Pass
0.1040	97	16	16	Pass
0.1066	88	15	17	Pass
0.1093	87	14	16	Pass
0.1119	82	13	15	Pass
0.1145	78	13	16	Pass
0.1171	68	12	17	Pass
0.1197	60	10	16	Pass
0.1223	58	9	15	Pass
0.1249	54	9	16	Pass
0.1275	51	9	17	Pass
0.1301	48	7	14	Pass
0.1328	43	7	16	Pass
0.1354	39	7	17	Pass
0.1380	38	6	15	Pass
0.1406	37	6	16	Pass
0.1432	36	6	16	Pass
0.1458	35	6	17	Pass
0.1484	35	6	17	Pass
0.1510	34	6	17	Pass
0.1536	32	6	18	Pass

0.1563	31	6	19	Pass
0.1589	27	6	22	Pass
0.1615	25	5	20	Pass
0.1641	23	4	17	Pass
0.1667	20	4	20	Pass
0.1693	20	4	20	Pass
0.1719	20	4	20	Pass
0.1745	17	4	23	Pass
0.1771	17	4	23	Pass
0.1798	16	4	25	Pass
0.1824	15	4	26	Pass
0.1850	15	4	26	Pass
0.1876	14	4	28	Pass
0.1902	14	4	28	Pass
0.1928	13	4	30	Pass
0.1954	13	4	30	Pass
0.1980	10	3	30	Pass
0.2006	8	3	37	Pass
0.2033	8	2	25	Pass
0.2059	8	2	25	Pass
0.2085	8	2	25	Pass
0.2111	8	2	25	Pass
0.2137	8	2	25	Pass
0.2163	8	2	25	Pass
0.2189	8	2	25	Pass
0.2215	8	2	25	Pass
0.2241	8	2	25	Pass
0.2268	8	2	25	Pass
0.2294	8	2	25	Pass
0.2320	8	1	12	Pass
0.2346	8	1	12	Pass
0.2372	8	1	12	Pass
0.2398	7	1	14	Pass
0.2424	7	1	14	Pass
0.2450	7	1	14	Pass
0.2476	7	1	14	Pass
0.2503	7	1	14	Pass
0.2529	7	1	14	Pass
0.2555	6	1	16	Pass
0.2581	6	1	16	Pass
0.2607	5	1	20	Pass
0.2633	5	1	20	Pass
0.2659	4	1	25	Pass
0.2685	4	1	25	Pass
0.2711	4	1	25	Pass
0.2738	4	1	25	Pass
0.2764	3	1	33	Pass

Water Quality

Drawdown Time Results

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

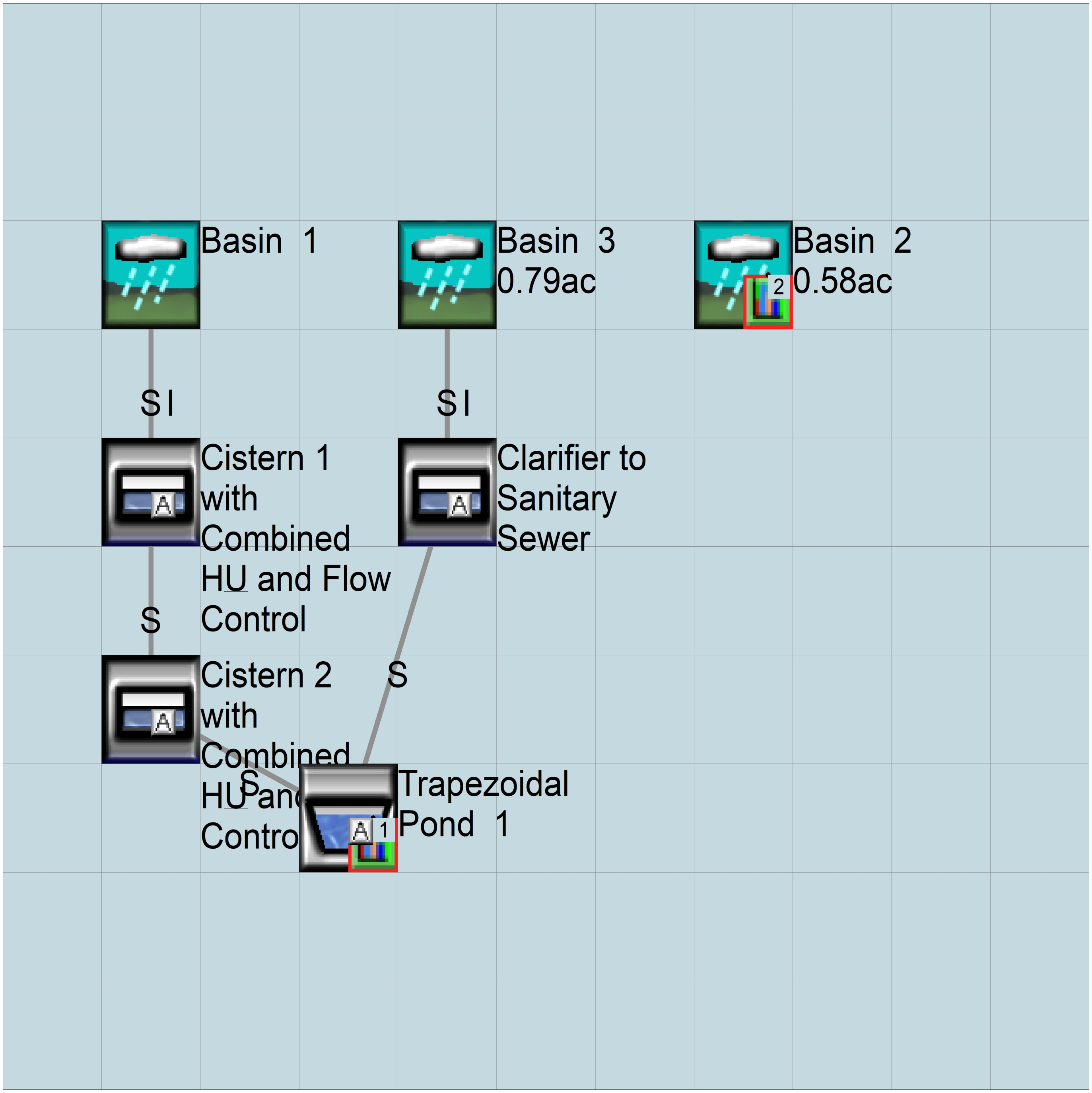
IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic

Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1971 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   EDCO Dabergia Street v2.wdm
MESSU      25   MitEDCO Dabergia Street v2.MES
           27   MitEDCO Dabergia Street v2.L61
           28   MitEDCO Dabergia Street v2.L62
           31   POCEDCO Dabergia Street v22.dat
           30   POCEDCO Dabergia Street v21.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      IMPLND       1
      PERLND      30
      PERLND      48
      PERLND      46
      RCHRES       1
      RCHRES       2
      RCHRES       3
      RCHRES       4
      COPY       502
      COPY         1
      COPY       501
      DISPLY       2
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    2        Basin  2                    MAX                      1    2   31    9
    1        Trapezoidal Pond  1         MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  502         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------>NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   30      D,NatVeg,Steep          1    1    1    1   27    0
   48      D,Urban,Steep           1    1    1    1   27    0
   46      D,Urban,Flat            1    1    1    1   27    0
```

```
END GEN-INFO
*** Section PWATER***

ACTIVITY
  <PLS > ************* Active Sections *****************************
  # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
 30         0    0    1    0    0    0    0    0    0    0    0    0
 48         0    0    1    0    0    0    0    0    0    0    0    0
 46         0    0    1    0    0    0    0    0    0    0    0    0
END ACTIVITY

PRINT-INFO
  <PLS > ***************** Print-flags ***************************** PIVL  PYR
  # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
 30         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 48         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 46         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 30         0    1    1    1    0    0    0    0    1    1    0
 48         0    1    1    1    0    0    0    0    1    1    0
 46         0    1    1    1    0    0    0    0    1    1    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >      PWATER input info: Part 2         ***
  # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
 30              0       2.7      0.02        75      0.15       2.5     0.915
 48              0       3.2      0.02        50      0.15       2.5     0.915
 46              0       3.8      0.03        50      0.05       2.5     0.915
END PWAT-PARM2

PWAT-PARM3
  <PLS >      PWATER input info: Part 3         ***
  # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 30              0         0         2         2         0      0.05      0.05
 48              0         0         2         2         0      0.05      0.05
 46              0         0         2         2         0      0.05      0.05
END PWAT-PARM3
PWAT-PARM4
  <PLS >     PWATER input info: Part 4                               ***
  # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 30              0       0.6      0.04         1       0.3         0
 48              0       0.6      0.03         1       0.3         0
 46              0       0.6      0.03         1       0.3         0
END PWAT-PARM4
MON-LZETPARM
  <PLS >      PWATER input info: Part 3         ***
  # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
 30       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
 48       0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.7  0.7  0.6  0.6  0.6
 46       0.6  0.6  0.6  0.6  0.7  0.7  0.7  0.7  0.7  0.6  0.6  0.6
END MON-LZETPARM
MON-INTERCEP
  <PLS >      PWATER input info: Part 3         ***
  # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
 30       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
 48       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 46       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
END MON-INTERCEP

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
            ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
 30              0         0      0.01         0       0.4      0.01         0
 48              0         0      0.15         0         1      0.05         0
```

```
   46              0         0      0.15         0         1      0.05         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   1                        1.23     RCHRES   1      5
Basin  3***
PERLND  46                        0.05     RCHRES   2      2
PERLND  46                        0.05     RCHRES   2      3
IMPLND   1                        0.74     RCHRES   2      5
Basin  2***
PERLND  30                        0.53     COPY   502     12
PERLND  30                        0.53     COPY   502     13
PERLND  48                        0.04     COPY   502     12
PERLND  48                        0.04     COPY   502     13
PERLND  46                        0.01     COPY   502     12
PERLND  46                        0.01     COPY   502     13

******Routing******
```

```
RCHRES   1                           1     RCHRES   3      7
RCHRES   2                           1     RCHRES   4      7
RCHRES   2                                 COPY     1     17
RCHRES   3                           1     RCHRES   4      7
RCHRES   3                                 COPY     1     17
RCHRES   4                           1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                  ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                          in  out                             ***
    1     Cistern 1 with C-005    2    1    1    1   28    0    1
    2     Clarifier to San-007    2    1    1    1   28    0    1
    3     Cistern 2 with C-008    2    1    1    1   28    0    1
    4     Trapezoidal Pond-009    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                     ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible   exit *** possible   exit     possible   exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    4        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
    2             2      0.04       0.0       0.0       0.5       0.0
    3             3      0.01       0.0       0.0       0.5       0.0
    4             4      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
```

```
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.003306  0.000000  0.000000  0.000000
  0.244444  0.003306  0.000808  0.000000  0.005167
  0.488889  0.003306  0.001616  0.000000  0.005167
  0.733333  0.003306  0.002424  0.000000  0.005167
  0.977778  0.003306  0.003232  0.000000  0.005167
  1.222222  0.003306  0.004040  0.012792  0.005167
  1.466667  0.003306  0.004848  0.018538  0.005167
  1.711111  0.003306  0.005657  0.022884  0.005167
  1.955556  0.003306  0.006465  0.026527  0.005167
  2.200000  0.003306  0.007273  0.029727  0.005167
  2.444444  0.003306  0.008081  0.032614  0.005167
  2.688889  0.003306  0.008889  0.035266  0.005167
  2.933333  0.003306  0.009697  0.037732  0.005167
  3.177778  0.003306  0.010505  0.040047  0.005167
  3.422222  0.003306  0.011313  0.042234  0.005167
  3.666667  0.003306  0.012121  0.044314  0.005167
  3.911111  0.003306  0.012929  0.046301  0.005167
  4.155556  0.003306  0.013737  0.048206  0.005167
  4.400000  0.003306  0.014545  0.050038  0.005167
  4.644444  0.003306  0.015354  0.051805  0.005167
  4.888889  0.003306  0.016162  0.053515  0.005167
  5.133333  0.003306  0.016970  0.055171  0.005167
  5.377778  0.003306  0.017778  0.056779  0.005167
  5.622222  0.003306  0.018586  0.058342  0.005167
  5.866667  0.003306  0.019394  0.059865  0.005167
  6.111111  0.003306  0.020202  0.061350  0.005167
  6.355556  0.003306  0.021010  0.062800  0.005167
  6.600000  0.003306  0.021818  0.064217  0.005167
  6.844444  0.003306  0.022626  0.065604  0.005167
  7.088889  0.003306  0.023434  0.066962  0.005167
  7.333333  0.003306  0.024242  0.068293  0.005167
  7.577778  0.003306  0.025051  0.069598  0.005167
  7.822222  0.003306  0.025859  0.070880  0.005167
  8.066667  0.003306  0.026667  0.072138  0.005167
  8.311111  0.003306  0.027475  0.073375  0.005167
  8.555556  0.003306  0.028283  0.074592  0.005167
  8.800000  0.003306  0.029091  0.075789  0.005167
  9.044444  0.003306  0.029899  0.076967  0.005167
  9.288889  0.003306  0.030707  0.078128  0.005167
  9.533333  0.003306  0.031515  0.079272  0.005167
  9.777778  0.003306  0.032323  0.080399  0.005167
  10.02222  0.003306  0.033131  0.081511  0.005167
  10.26667  0.003306  0.033939  0.082608  0.005167
  10.51111  0.003306  0.034747  0.083690  0.005167
  10.75556  0.003306  0.035556  0.084759  0.005167
  11.00000  0.003306  0.036364  0.085814  0.005167
  11.24444  0.003306  0.037172  0.086857  0.005167
  11.48889  0.003306  0.037980  0.087887  0.005167
  11.73333  0.003306  0.038788  0.088905  0.005167
  11.97778  0.003306  0.039596  0.089912  0.005167
  12.22222  0.003306  0.040404  0.090907  0.005167
  12.46667  0.003306  0.041212  0.091892  0.005167
```

```
12.71111  0.003306  0.042020  0.092866  0.005167
12.95556  0.003306  0.042828  0.093830  0.005167
13.20000  0.003306  0.043636  0.094785  0.005167
13.44444  0.003306  0.044444  0.095730  0.005167
13.68889  0.003306  0.045253  0.096665  0.005167
13.93333  0.003306  0.046061  0.097592  0.005167
14.17778  0.003306  0.046869  0.098510  0.005167
14.42222  0.003306  0.047677  0.099419  0.005167
14.66667  0.003306  0.048485  0.100321  0.005167
14.91111  0.003306  0.049293  0.101214  0.005167
15.15556  0.003306  0.050101  0.102099  0.005167
15.40000  0.003306  0.050909  0.102977  0.005167
15.64444  0.003306  0.051717  0.103847  0.005167
15.88889  0.003306  0.052525  0.104710  0.005167
16.13333  0.003306  0.053333  0.105566  0.005167
16.37778  0.003306  0.054141  0.106416  0.005167
16.62222  0.003306  0.054949  0.107258  0.005167
16.86667  0.003306  0.055758  0.108094  0.005167
17.11111  0.003306  0.056566  0.108923  0.005167
17.35556  0.003306  0.057374  0.109747  0.005167
17.60000  0.003306  0.058182  0.110564  0.005167
17.84444  0.003306  0.058990  0.111375  0.005167
18.08889  0.003306  0.059798  0.112180  0.005167
18.33333  0.003306  0.060606  0.112980  0.005167
18.57778  0.003306  0.061414  0.113773  0.005167
18.82222  0.003306  0.062222  0.114562  0.005167
19.06667  0.003306  0.063030  0.115345  0.005167
19.31111  0.003306  0.063838  0.116122  0.005167
19.55556  0.003306  0.064646  0.116895  0.005167
19.80000  0.003306  0.065455  0.117662  0.005167
20.04444  0.003306  0.066263  0.118425  0.005167
20.28889  0.003306  0.067071  0.119182  0.005167
20.53333  0.003306  0.067879  0.119935  0.005167
20.77778  0.003306  0.068687  0.120683  0.005167
21.02222  0.003306  0.069495  0.138984  0.005167
21.26667  0.003306  0.070303  0.528781  0.005167
21.51111  0.003306  0.071111  0.685834  0.005167
21.75556  0.003306  0.071919  0.808066  0.005167
22.00000  0.003306  0.072727  0.911764  0.005167
22.24444  0.003306  0.073535  1.003468  0.005167
END FTABLE  1
FTABLE      2
 92    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)     (cfs)    (ft/sec)    (Minutes)***
0.000000  0.918274  0.000000  0.000000  0.000000
0.077778  0.918274  0.071421  0.000000  2.777778
0.155556  0.918274  0.142843  0.000000  2.777778
0.233333  0.918274  0.214264  0.000000  2.777778
0.311111  0.918274  0.285685  0.000000  2.777778
0.388889  0.918274  0.357106  0.000000  2.777778
0.466667  0.918274  0.428528  0.000000  2.777778
0.544444  0.918274  0.499949  0.000000  2.777778
0.622222  0.918274  0.571370  0.000000  2.777778
0.700000  0.918274  0.642792  0.000000  2.777778
0.777778  0.918274  0.714213  0.000000  2.777778
0.855556  0.918274  0.785634  0.000000  2.777778
0.933333  0.918274  0.857055  0.000000  2.777778
1.011111  0.918274  0.928477  0.025744  2.777778
1.088889  0.918274  0.999898  0.072816  2.777778
1.166667  0.918274  1.071319  0.099707  2.777778
1.244444  0.918274  1.142741  0.120751  2.777778
1.322222  0.918274  1.214162  0.138637  2.777778
1.400000  0.918274  1.285583  0.154465  2.777778
1.477778  0.918274  1.357004  0.168816  2.777778
1.555556  0.918274  1.428426  0.182039  2.777778
1.633333  0.918274  1.499847  0.194365  2.777778
1.711111  0.918274  1.571268  0.205954  2.777778
1.788889  0.918274  1.642690  0.216925  2.777778
1.866667  0.918274  1.714111  0.227367  2.777778
```

```
 1.944444  0.918274  1.785532  0.237350  2.777778
 2.022222  0.918274  1.856953  0.246930  2.777778
 2.100000  0.918274  1.928375  0.256152  2.777778
 2.177778  0.918274  1.999796  0.265053  2.777778
 2.255556  0.918274  2.071217  0.273665  2.777778
 2.333333  0.918274  2.142639  0.282014  2.777778
 2.411111  0.918274  2.214060  0.290123  2.777778
 2.488889  0.918274  2.285481  0.298011  2.777778
 2.566667  0.918274  2.356902  0.305696  2.777778
 2.644444  0.918274  2.428324  0.313192  2.777778
 2.722222  0.918274  2.499745  0.320513  2.777778
 2.800000  0.918274  2.571166  0.327671  2.777778
 2.877778  0.918274  2.642587  0.334675  2.777778
 2.955556  0.918274  2.714009  0.341536  2.777778
 3.033333  0.918274  2.785430  0.348262  2.777778
 3.111111  0.918274  2.856851  0.354860  2.777778
 3.188889  0.918274  2.928273  0.361338  2.777778
 3.266667  0.918274  2.999694  0.367701  2.777778
 3.344444  0.918274  3.071115  0.373957  2.777778
 3.422222  0.918274  3.142536  0.380109  2.777778
 3.500000  0.918274  3.213958  0.386164  2.777778
 3.577778  0.918274  3.285379  0.392124  2.777778
 3.655556  0.918274  3.356800  0.397996  2.777778
 3.733333  0.918274  3.428222  0.403783  2.777778
 3.811111  0.918274  3.499643  0.409487  2.777778
 3.888889  0.918274  3.571064  0.415113  2.777778
 3.966667  0.918274  3.642485  0.420664  2.777778
 4.044444  0.918274  3.713907  0.488545  2.777778
 4.122222  0.918274  3.785328  0.716129  2.777778
 4.200000  0.918274  3.856749  1.032583  2.777778
 4.277778  0.918274  3.928171  1.417207  2.777778
 4.355556  0.918274  3.999592  1.859389  2.777778
 4.433333  0.918274  4.071013  2.352340  2.777778
 4.511111  0.918274  4.142434  2.891228  2.777778
 4.588889  0.918274  4.213856  3.472388  2.777778
 4.666667  0.918274  4.285277  4.092912  2.777778
 4.744444  0.918274  4.356698  4.750423  2.777778
 4.822222  0.918274  4.428120  5.442928  2.777778
 4.900000  0.918274  4.499541  6.168726  2.777778
 4.977778  0.918274  4.570962  6.926342  2.777778
 5.055556  0.918274  4.642383  7.714481  2.777778
 5.133333  0.918274  4.713805  8.531996  2.777778
 5.211111  0.918274  4.785226  9.377860  2.777778
 5.288889  0.918274  4.856647  10.25114  2.777778
 5.366667  0.918274  4.928069  11.15101  2.777778
 5.444444  0.918274  4.999490  12.07669  2.777778
 5.522222  0.918274  5.070911  13.02747  2.777778
 5.600000  0.918274  5.142332  14.00271  2.777778
 5.677778  0.918274  5.213754  15.00180  2.777778
 5.755556  0.918274  5.285175  16.02419  2.777778
 5.833333  0.918274  5.356596  17.06936  2.777778
 5.911111  0.918274  5.428018  18.13680  2.777778
 5.988889  0.918274  5.499439  19.22608  2.777778
 6.066667  0.918274  5.570860  19.75216  2.777778
 6.144444  0.918274  5.642281  20.55314  2.777778
 6.222222  0.918274  5.713703  21.60071  2.777778
 6.300000  0.918274  5.785124  22.82077  2.777778
 6.377778  0.918274  5.856545  24.14913  2.777778
 6.455556  0.918274  5.927967  25.52044  2.777778
 6.533333  0.918274  5.999388  26.86802  2.777778
 6.611111  0.918274  6.070809  28.12757  2.777778
 6.688889  0.918274  6.142230  29.24319  2.777778
 6.766667  0.918274  6.213652  30.17496  2.777778
 6.844444  0.918274  6.285073  30.90771  2.777778
 6.922222  0.918274  6.356494  31.46093  2.777778
 7.000000  0.918274  6.427916  31.89951  2.777778
 7.077778  0.918274  6.499337  32.51872  2.777778
 END FTABLE  2
 FTABLE      3
  92    5
```

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.003306	0.000000	0.000000	0.000000		
0.244444	0.003306	0.000808	0.000000	0.005167		
0.488889	0.003306	0.001616	0.000000	0.005167		
0.733333	0.003306	0.002424	0.000000	0.005167		
0.977778	0.003306	0.003232	0.000000	0.005167		
1.222222	0.003306	0.004040	0.012792	0.005167		
1.466667	0.003306	0.004848	0.018538	0.005167		
1.711111	0.003306	0.005657	0.022884	0.005167		
1.955556	0.003306	0.006465	0.026527	0.005167		
2.200000	0.003306	0.007273	0.029727	0.005167		
2.444444	0.003306	0.008081	0.032614	0.005167		
2.688889	0.003306	0.008889	0.035266	0.005167		
2.933333	0.003306	0.009697	0.037732	0.005167		
3.177778	0.003306	0.010505	0.040047	0.005167		
3.422222	0.003306	0.011313	0.042234	0.005167		
3.666667	0.003306	0.012121	0.044314	0.005167		
3.911111	0.003306	0.012929	0.046301	0.005167		
4.155556	0.003306	0.013737	0.048206	0.005167		
4.400000	0.003306	0.014545	0.050038	0.005167		
4.644444	0.003306	0.015354	0.051805	0.005167		
4.888889	0.003306	0.016162	0.053515	0.005167		
5.133333	0.003306	0.016970	0.055171	0.005167		
5.377778	0.003306	0.017778	0.056779	0.005167		
5.622222	0.003306	0.018586	0.058342	0.005167		
5.866667	0.003306	0.019394	0.059865	0.005167		
6.111111	0.003306	0.020202	0.061350	0.005167		
6.355556	0.003306	0.021010	0.062800	0.005167		
6.600000	0.003306	0.021818	0.064217	0.005167		
6.844444	0.003306	0.022626	0.065604	0.005167		
7.088889	0.003306	0.023434	0.066962	0.005167		
7.333333	0.003306	0.024242	0.068293	0.005167		
7.577778	0.003306	0.025051	0.069598	0.005167		
7.822222	0.003306	0.025859	0.070880	0.005167		
8.066667	0.003306	0.026667	0.072138	0.005167		
8.311111	0.003306	0.027475	0.073375	0.005167		
8.555556	0.003306	0.028283	0.074592	0.005167		
8.800000	0.003306	0.029091	0.075789	0.005167		
9.044444	0.003306	0.029899	0.076967	0.005167		
9.288889	0.003306	0.030707	0.078128	0.005167		
9.533333	0.003306	0.031515	0.079272	0.005167		
9.777778	0.003306	0.032323	0.080399	0.005167		
10.02222	0.003306	0.033131	0.081511	0.005167		
10.26667	0.003306	0.033939	0.082608	0.005167		
10.51111	0.003306	0.034747	0.083690	0.005167		
10.75556	0.003306	0.035556	0.084759	0.005167		
11.00000	0.003306	0.036364	0.085814	0.005167		
11.24444	0.003306	0.037172	0.086857	0.005167		
11.48889	0.003306	0.037980	0.087887	0.005167		
11.73333	0.003306	0.038788	0.088905	0.005167		
11.97778	0.003306	0.039596	0.089912	0.005167		
12.22222	0.003306	0.040404	0.090907	0.005167		
12.46667	0.003306	0.041212	0.091892	0.005167		
12.71111	0.003306	0.042020	0.092866	0.005167		
12.95556	0.003306	0.042828	0.093830	0.005167		
13.20000	0.003306	0.043636	0.094785	0.005167		
13.44444	0.003306	0.044444	0.095730	0.005167		
13.68889	0.003306	0.045253	0.096665	0.005167		
13.93333	0.003306	0.046061	0.097592	0.005167		
14.17778	0.003306	0.046869	0.098510	0.005167		
14.42222	0.003306	0.047677	0.099419	0.005167		
14.66667	0.003306	0.048485	0.100321	0.005167		
14.91111	0.003306	0.049293	0.101214	0.005167		
15.15556	0.003306	0.050101	0.102099	0.005167		
15.40000	0.003306	0.050909	0.102977	0.005167		
15.64444	0.003306	0.051717	0.103847	0.005167		
15.88889	0.003306	0.052525	0.104710	0.005167		
16.13333	0.003306	0.053333	0.105566	0.005167		
16.37778	0.003306	0.054141	0.106416	0.005167		

```
16.62222  0.003306  0.054949  0.107258  0.005167
16.86667  0.003306  0.055758  0.108094  0.005167
17.11111  0.003306  0.056566  0.108923  0.005167
17.35556  0.003306  0.057374  0.109747  0.005167
17.60000  0.003306  0.058182  0.110564  0.005167
17.84444  0.003306  0.058990  0.111375  0.005167
18.08889  0.003306  0.059798  0.112180  0.005167
18.33333  0.003306  0.060606  0.112980  0.005167
18.57778  0.003306  0.061414  0.113773  0.005167
18.82222  0.003306  0.062222  0.114562  0.005167
19.06667  0.003306  0.063030  0.115345  0.005167
19.31111  0.003306  0.063838  0.116122  0.005167
19.55556  0.003306  0.064646  0.116895  0.005167
19.80000  0.003306  0.065455  0.117662  0.005167
20.04444  0.003306  0.066263  0.118425  0.005167
20.28889  0.003306  0.067071  0.119182  0.005167
20.53333  0.003306  0.067879  0.119935  0.005167
20.77778  0.003306  0.068687  0.120683  0.005167
21.02222  0.003306  0.069495  0.138984  0.005167
21.26667  0.003306  0.070303  0.528781  0.005167
21.51111  0.003306  0.071111  0.685834  0.005167
21.75556  0.003306  0.071919  0.808066  0.005167
22.00000  0.003306  0.072727  0.911764  0.005167
22.24444  0.003306  0.073535  1.003468  0.005167
END FTABLE  3
FTABLE      4
 91    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)    (cfs)     (cfs)   (ft/sec)    (Minutes)***
0.000000  0.000023  0.000000  0.000000  0.000000
0.011111  0.000024  0.000000  0.419708  0.000023
0.022222  0.000025  0.000001  0.604588  0.000023
0.033333  0.000026  0.000001  0.753977  0.000023
0.044444  0.000027  0.000001  0.886218  0.000023
0.055556  0.000028  0.000001  1.008264  0.000023
0.066667  0.000029  0.000002  1.123604  0.000023
0.077778  0.000031  0.000002  1.234269  0.000023
0.088889  0.000032  0.000002  1.341551  0.000023
0.100000  0.000033  0.000003  1.446331  0.000023
0.111111  0.000034  0.000003  1.549233  0.000023
0.122222  0.000036  0.000004  1.650720  0.000023
0.133333  0.000037  0.000004  1.751142  0.000023
0.144444  0.000038  0.000004  1.850771  0.000023
0.155556  0.000039  0.000005  1.949822  0.000023
0.166667  0.000041  0.000005  2.048467  0.000023
0.177778  0.000042  0.000006  2.146849  0.000023
0.188889  0.000044  0.000006  2.245083  0.000023
0.200000  0.000045  0.000007  2.343265  0.000023
0.211111  0.000046  0.000007  2.441477  0.000023
0.222222  0.000048  0.000008  2.539786  0.000023
0.233333  0.000049  0.000008  2.638252  0.000023
0.244444  0.000051  0.000009  2.736923  0.000023
0.255556  0.000052  0.000009  2.835844  0.000023
0.266667  0.000054  0.000010  2.935050  0.000023
0.277778  0.000056  0.000011  3.034574  0.000023
0.288889  0.000057  0.000011  3.134445  0.000023
0.300000  0.000059  0.000012  3.234685  0.000023
0.311111  0.000060  0.000013  3.335317  0.000023
0.322222  0.000062  0.000013  3.436360  0.000023
0.333333  0.000064  0.000014  3.537829  0.000023
0.344444  0.000065  0.000015  3.639740  0.000023
0.355556  0.000067  0.000015  3.742104  0.000023
0.366667  0.000069  0.000016  3.844934  0.000023
0.377778  0.000071  0.000017  3.948239  0.000023
0.388889  0.000073  0.000018  4.052028  0.000023
0.400000  0.000074  0.000018  4.156308  0.000023
0.411111  0.000076  0.000019  4.261086  0.000023
0.422222  0.000078  0.000020  4.366369  0.000023
0.433333  0.000080  0.000021  4.472161  0.000023
0.444444  0.000082  0.000022  4.578467  0.000023
```

```
  0.455556  0.000084  0.000023  4.685290  0.000023
  0.466667  0.000086  0.000024  4.792635  0.000023
  0.477778  0.000088  0.000025  4.900505  0.000023
  0.488889  0.000090  0.000026  5.008901  0.000023
  0.500000  0.000092  0.000027  5.117827  0.000023
  0.511111  0.000094  0.000028  5.227283  0.000023
  0.522222  0.000096  0.000029  5.337272  0.000023
  0.533333  0.000098  0.000030  5.447795  0.000023
  0.544444  0.000100  0.000031  5.558852  0.000023
  0.555556  0.000102  0.000032  5.670445  0.000023
  0.566667  0.000104  0.000033  5.782574  0.000023
  0.577778  0.000107  0.000034  5.895239  0.000023
  0.588889  0.000109  0.000036  6.008441  0.000023
  0.600000  0.000111  0.000037  6.122180  0.000023
  0.611111  0.000113  0.000038  6.236455  0.000023
  0.622222  0.000116  0.000039  6.351267  0.000023
  0.633333  0.000118  0.000041  6.466614  0.000023
  0.644444  0.000120  0.000042  6.582498  0.000023
  0.655556  0.000123  0.000043  6.698916  0.000023
  0.666667  0.000125  0.000045  6.815869  0.000023
  0.677778  0.000127  0.000046  6.933355  0.000023
  0.688889  0.000130  0.000048  7.051374  0.000023
  0.700000  0.000132  0.000049  7.169925  0.000023
  0.711111  0.000135  0.000051  7.289008  0.000023
  0.722222  0.000137  0.000052  7.408620  0.000023
  0.733333  0.000140  0.000054  7.528762  0.000023
  0.744444  0.000142  0.000055  7.649432  0.000023
  0.755556  0.000145  0.000057  7.770628  0.000023
  0.766667  0.000147  0.000058  7.892351  0.000023
  0.777778  0.000150  0.000060  8.014598  0.000023
  0.788889  0.000153  0.000062  8.137369  0.000023
  0.800000  0.000155  0.000063  8.260661  0.000023
  0.811111  0.000158  0.000065  8.384475  0.000023
  0.822222  0.000161  0.000067  8.508808  0.000023
  0.833333  0.000163  0.000069  8.633659  0.000023
  0.844444  0.000166  0.000071  8.759028  0.000023
  0.855556  0.000169  0.000072  8.884912  0.000023
  0.866667  0.000172  0.000074  9.011310  0.000023
  0.877778  0.000174  0.000076  9.138222  0.000023
  0.888889  0.000177  0.000078  9.265644  0.000023
  0.900000  0.000180  0.000080  9.393577  0.000023
  0.911111  0.000183  0.000082  9.522019  0.000023
  0.922222  0.000186  0.000084  9.650968  0.000023
  0.933333  0.000189  0.000086  9.780423  0.000023
  0.944444  0.000192  0.000088  9.910383  0.000023
  0.955556  0.000195  0.000091  10.04085  0.000023
  0.966667  0.000198  0.000093  10.17181  0.000023
  0.977778  0.000201  0.000095  10.30328  0.000023
  0.988889  0.000204  0.000097  10.43524  0.000023
  1.000000  0.000207  0.000099  10.56770  0.000023
  END FTABLE  4
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1               PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1               IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1               PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1               IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  48      EXTNL  SURLI
WDM     22 IRRG     ENGL    0.7       SAME PERLND  46      EXTNL  SURLI
WDM      2 PREC     ENGL    1               RCHRES   4     EXTNL  PREC

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     2 OUTPUT MEAN   1 1     12.1      WDM    702 FLOW     ENGL      REPL
```

```
COPY   502 OUTPUT MEAN   1 1     12.1          WDM    802 FLOW     ENGL      REPL
RCHRES   1 HYDR   RO     1 1        1          WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1          WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1          WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1          WDM   1003 STAG     ENGL      REPL
RCHRES   2 HYDR   RO     1 1        1          WDM   1004 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1          WDM   1005 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1          WDM   1006 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1          WDM   1007 STAG     ENGL      REPL
RCHRES   3 HYDR   RO     1 1        1          WDM   1008 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1          WDM   1009 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      2 1        1          WDM   1010 FLOW     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1          WDM   1011 STAG     ENGL      REPL
RCHRES   4 HYDR   RO     1 1        1          WDM   1012 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      1 1        1          WDM   1013 FLOW     ENGL      REPL
RCHRES   4 HYDR   O      2 1        1          WDM   1014 FLOW     ENGL      REPL
RCHRES   4 HYDR   STAGE  1 1        1          WDM   1015 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1          WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1          WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

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

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

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

  MASS-LINK        7
RCHRES     OFLOW  OVOL   1                 RCHRES         INFLOW IVOL
  END MASS-LINK    7

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

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

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1998/ 4/30 24: 0

RCHRES :    2

RELERR       STORS        STOR       MATIN      MATDIF
-0.00512     0.00000  0.0000E+00     0.00000  5.9861E-12

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

Disclaimer

Legal Notice

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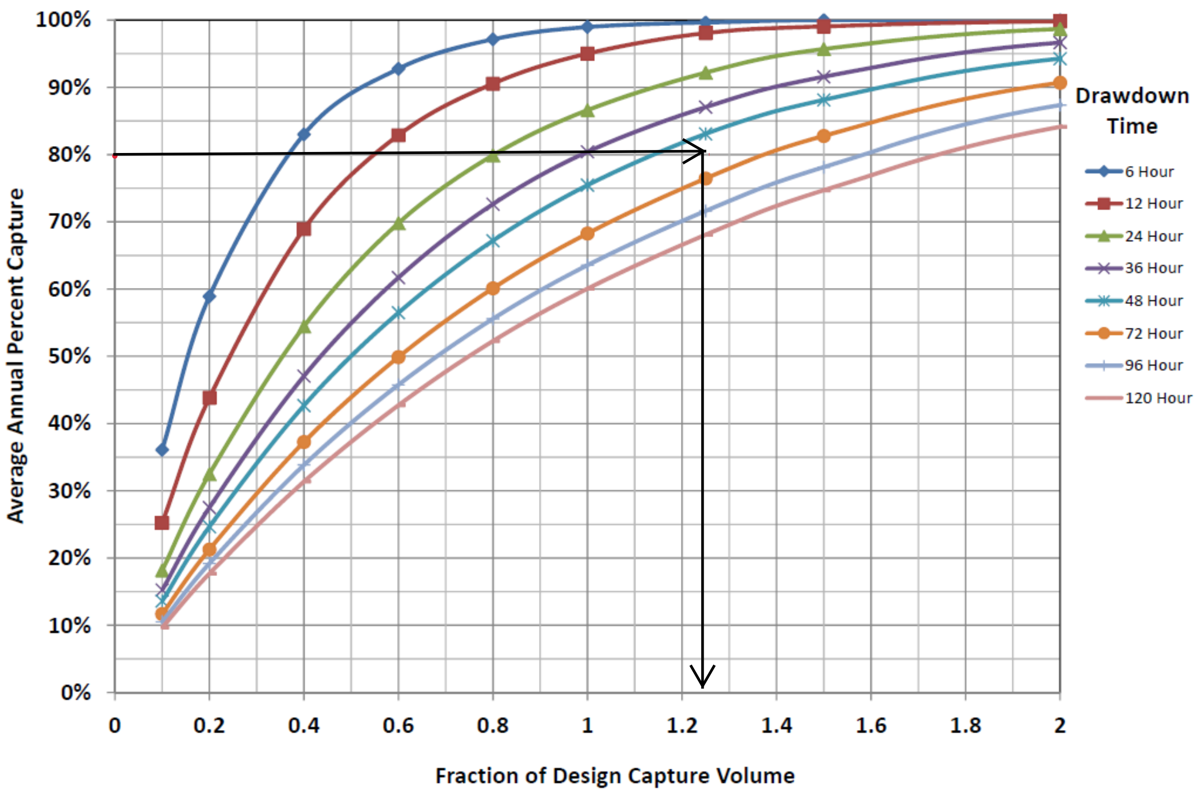
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

RAINWATER HARVEST DRAWDOWN:

(SEE DRAWDOWN CALCULATIONS)

$$21,090\ \frac{\text{gal}}{72\ \text{hrs.}} \times \frac{1\ \text{ft}^3}{7.48\ \text{gal}} \times \frac{1}{144\ \text{ft}^2} \times \frac{12\ \text{in.}}{\text{ft}} = 3.26\ \text{in./hr.}$$


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Average Annual Percent Capture
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Fraction of Design Capture Volume
Drawdown Time
6 Hour
12 Hour
24 Hour
36 Hour
48 Hour
72 Hour
96 Hour
120 Hour

Drawdown Calculations Dalbergia Street Rainwater Harvest System

	gpm	gph	gpd	gals/36-hours	gals/60-hours	gals/72-hours	gals/75-hours	Remarks	Duration
Toilet/Urinal Fushing			0	0	0	0	0		
Irrigation Watering				114	190	228	238	Daily	
Dust Control		96		3,456	5,760	6,912	7,200	Continous	
Tunnel Washdown	30			1,800	1,800	1,800	1,800	Once a week	60 min.
Transfer Truck Washing	15			4,050	8,100	12,150	12,150	9 trucks daily	30 min.
Totals				**9,420**	**15,850**	**21,090**	**21,388**		

Per Figure B.4-1 Percent Capture at 60-hours requires 1.25 times 16,000 gals. or 20,000 gals.

Drawdown is no more than 25% greater than initial calculated drawdown (60 hrs.+ 15 hrs. = 75-hours)

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Project Name: **Facility Expansion EDCO Recovery and Transfer**

Indicate which Items are Included:

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

Project Name: Facility Expansion EDCO Recovery and Transfer

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

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:
  - ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

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

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

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

THE CITY OF SAN DIEGO

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

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

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

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

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

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

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

(PROPERTY ADDRESS)

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

(LEGAL DESCRIPTION OF PROPERTY)

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

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

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

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

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

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

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

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

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

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

(Owner Signature)

Click or tap here to enter text.
(Print Name and Title)

Click or tap here to enter text.
(Company/Organization Name)

Click or tap to enter a date.
(Date)

THE CITY OF SAN DIEGO

APPROVED:

(City Control engineer Signature

(Print Name)

(Date)

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

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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

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ATTACHMENT 5
DRAINAGE REPORT

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

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HYDROLOGY REPORT

Preliminary Drainage Study
For The
Enhancement of EDCO Facility

Prepared for:
EDCO Disposal Corporation
3660 Dalbergia Street
San Diego, CA 92113

Paul J Hacunda

No. 41627

Prepared by
Paul J. Hacunda, PE Lic. No.41627
16 Lakeridge
Trabuco Canyon, CA 92679

September 30, 2016
Revised July 11, 2017
Revised October 21, 2017
Revised December 19, 2017

TABLE OF CONTENTS

SECTION 1 INTRODUCTION/PROJECT DESCRIPTION

Introduction:

The project consists of expanding an existing recycling and transfer station located on the site. The Owner, EDCO Disposal Corporation has acquired additional adjoining land and has also proposed vacating the existing alley. The City agrees to vacate the alley.

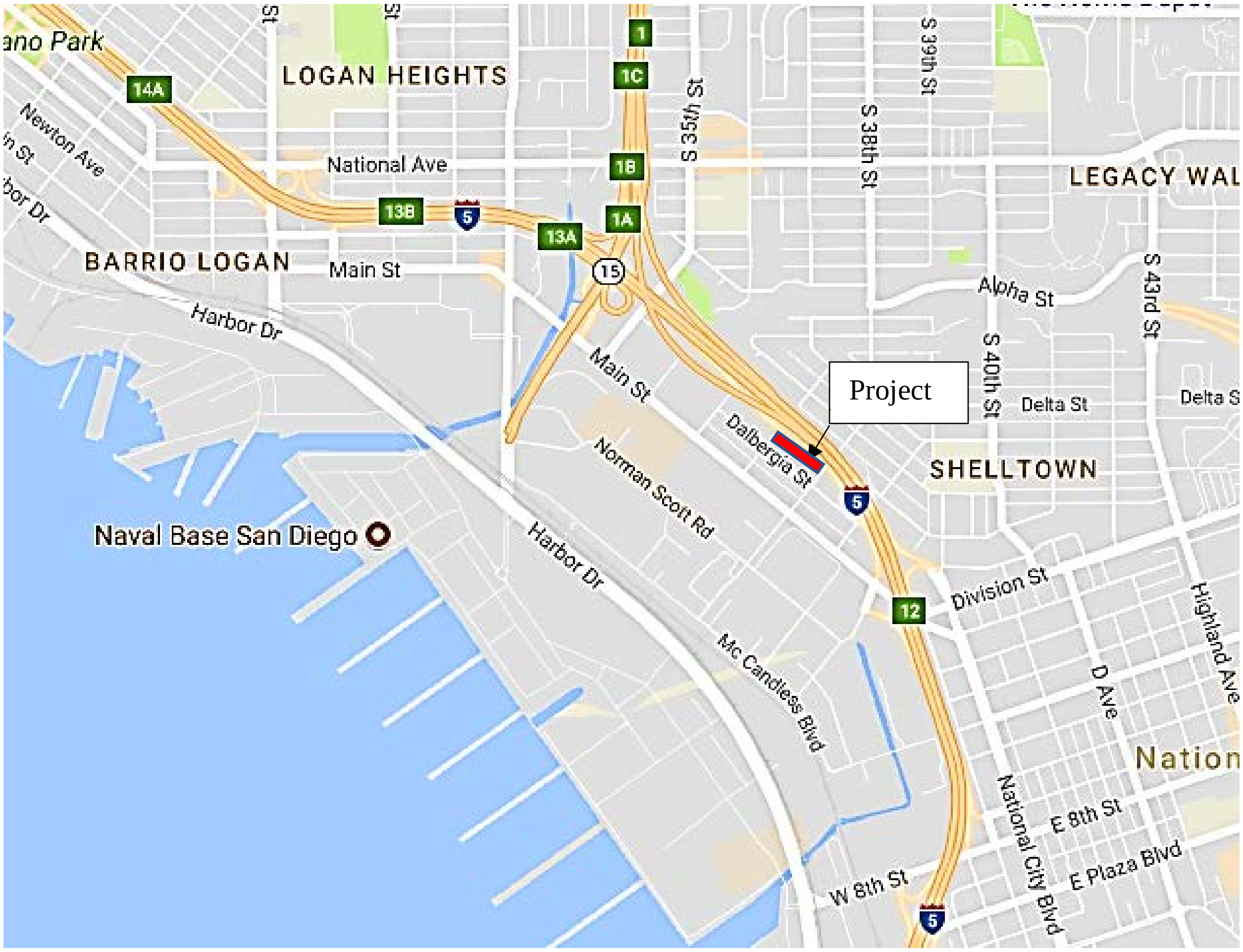


Figure 1 Regional Map

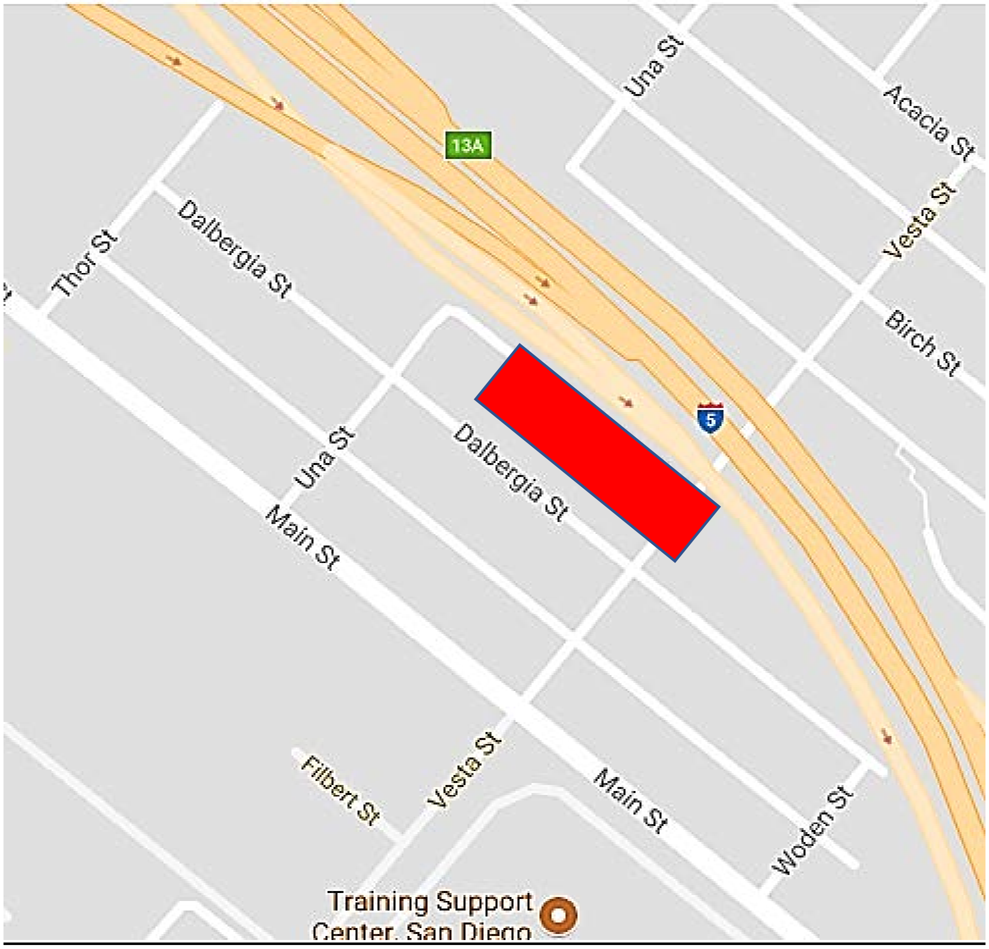


Figure 2 Vicinity Map

Existing Conditions:

Most of the site surface drains to an existing catch basin located midway in the existing alley. The catch basin is drained by an existing 15-inch concrete pipe that flows under the I-5 Freeway in a northerly direction until it reaches an existing 36-inch concrete pipe in Birch Street. That line proceeds in a northerly direction discharging into Chollas Creek and eventually into the San Diego Bay. The off-site Caltrans slope to the east of the project also drains to the alley and into the existing catch basin. The total drainage basin area including off-site contribution is 2.04-acres.

A small amount of the site (0.45-acres) drains to the west, discharging over the surface onto Dalbergia Street. The drainage then proceeds in curb and gutters and cross-gutters, southerly and westerly on Woden Street and Main Street before sheet flowing across the intersection of Main Street and Yama Street and into Paleta Creek. Paleta Creek is an unlined, earth channel that traverses the Navy Facility eventually reaching the San Diego Bay.

Proposed Conditions:

It is proposed to intercept most of the off-site Caltrans slope (Existing Drainage Areas E-8 & E-9, 0.48-acres) with a concrete v-ditch along the project's easterly boundary and divert most of the flow south to Vesta Street. A small amount of the Caltrans slope (0.05-acres) will be intercepted by a concrete v-ditch and diverted north to Una Street. To compensate for this minor diversion to the Paleta Creek watershed, it is proposed to divert some of the existing roof area (a portion of Drainage Area E-6, 0.34-acres) that currently drains to Dalbergia Street and redirect those flows into the Chollas Creek Basin.

SECTION 2 CRITERIA

The site hydrology for both the existing site condition and the re-developed condition are evaluated to assure that there is no increase in the peak storm water discharge rate due to the site improvements and the intended minor diversion of drainage area.

The City of San Diego Drainage Manual has been used as a guide in the preparation of this report.

HydroCAD® was used for the hydrology analysis of existing and proposed conditions. This program performs both the Rational, Modified Rational and SCS methods of hydrologic evaluation. As this project area is only a few acres in size the Rational Method was used. The program also calculates hydrographs and routes the hydrographs as necessary.

Precipitation: Design storms and intensities were imported from the NOAA Atlas 14 "Precipitation Frequency Data Server". An inspection of the rainfall amounts created in the software match the Rainfall Isopluvial Maps contained in the San Diego County Hydrology Manual.

Runoff Coefficient: Runoff coefficients were derived from Table 2 of the City of San Diego Drainage Manual except for the existing Caltrans slopes where a weighted c-factor was calculated. A c-factor of 0.35 was used for the slopes and a c-factor of 0.95 for the impervious area. The weighted c-factor was calculated to be 0.50.

Time of Concentration: HydroCAD® utilizes several methods to calculate Tc, including TR-55 Sheet Flow, TR-55 Shallow Concentrated Flow, Channel Flow (based on velocity) and Upland Method. As the site is so small in area, a minimum Tc of 5-minutes was used. If the time calculated is longer, it will appear in the calculations.

Intensity-Duration-Frequency: HydroCAD® calculates the IDF curves from the rainfall data downloaded from NOAA. As this project is so small in area, the 2-yr 1-hr, 10-yr 1-h, and 100-yr 1- hr. storm events were selected for design.

Tributary Areas: The contributing areas for the existing and proposed conditions are shown on the relevant maps contained in pockets in the relevant sections.

SECTION 3 PEAK RUNOFF ANALYSIS

3.1 EXISTING CONDITION PEAK RUNOFF

The existing site is made up of nine local drainage basins. The results of the hydrology analysis for the existing site conditions is summarized below:

Basin	Area (acres)	Runoff Coefficient	Time of Concentration (minutes)	2-yr 1-hr Discharge (cfs)	10-yr 1hr Discharge (cfs)	100-yr 1-h Discharge (cfs)
	A	C	Tc	Q_2	Q_{10}	Q_{100}
E-1	0.07	0.70	5	0.03	0.05	0.07
E-2	0.11	0.70	25	0.04	0.07	0.11
E-3	0.41	0.95	5	0.22	0.37	0.56
E-4	0.21	0.95	5	0.11	0.19	0.29
E-5	0.39	0.95	5	0.21	0.35	0.53
E-6	0.34	0.95	5	0.18	0.30	0.46
E-7	0.19	0.95	0	0.10	0.17	0.26
E-8	0.44	0.50	5	0.12	0.21	0.32
E-9	0.33	0.50	0	0.09	0.15	0.24

E-8 and E-9 “C”-factors were weighted (see Appendix E). All other areas were not weighted as the entire sub-area is described with one run-off factor.

The flows at the discharge points from the project are as follows:

Point of Compliance No. 1: Discharge into Existing 15-inch Concrete Pipe Under I-5 Freeway
(Includes Areas designated as E-1, E-3, E-4, E-5, E-7, E-8 and E-9)

Q_2 1-hr = 0.62 cfs
Q_{10} 1-hr = 1.48 cfs
Q_{100} 1-hr = 2.25 cfs

Point of Compliance No.2: Discharge into Dalbergia Street (at Vesta Street)
(Includes Areas designated as E-2 and E-6)

Q_2 1-hr = 0.16 cfs
Q_{10} 1-hr = 0.37 cfs
Q_{100} 1-hr = 0.57 cfs

3.2 PROPOSED CONDITION PEAK RUNOFF

The proposed site is made up of ten local drainage basins. The results of the hydrology analysis for the proposed condition is summarized as follows:

Basin	Area (acres)	Runoff Coefficient	Time of Concentration (minutes)	2-yr 1-hr Discharge (cfs)	10-yr 1hr Discharge (cfs)	100-yr 1-h Discharge (cfs)
	A	C	Tc	Q_2	Q_{10}	Q_{100}
P-1	0.21	0.95	12.0	0.11	0.19	0.29
P-2	0.19	0.95	17.1	0.10	0.17	0.26
P-3	0.28	0.95	18.7	0.15	0.25	0.38
P-4	0.10	0.95	5.0	0.05	0.09	0.14
P-5	0.65	0.95	5.0	0..35	0.58	0.88
P-6	0.34	0.95	5.0	0.18	0.30	0.46
P-7	0.10	0.95	5.0	0.05	0.09	0.14
P-8	0.10	0.95	5.1	0.05	0.09	0.14
O-1	0.05	0.35	13.5	0.01	0.02	0.03
O-2	0.48	0.35	17.1	0.09	0.16	0.24

The two areas Labeled as X-1 and X-2 are intended to be constructed as catchment areas with no discharge. The landscape architect has proposed crushed rock in these areas.

The flows at the discharge points from the proposed project are as follows:

Point of Compliance No. 1: Discharge into Existing 15-inch Concrete Pipe Under I-5 Freeway
(Includes Areas designated as P-1, P-2, P-3, P-4, P-5, P-6, P-7 and P-8)

Q_2 1-hr = 0.61-cfs
Q_{10} 1-hr = 1.22-cfs
Q_{100} 1-hr = 1.96-cfs

The above calculated flows are those flows entering the pumping station in the tunnel. The flows will be discharged via three pumps. A single pump will discharge at 0 to 275-gpm or a maximum of 0.61-cfs and then a second 275-gpm pump will begin pumping to a combined flow of 550-gpm or 1.22-cfs and finally a third pump will begin pumping for a combined flow of 880-gpm or 1.96-cfs. The discharge rates from the pumping plant will decrease due to the storage provided in the wet well and combined heads.

Point of Compliance No.2: Discharge into Dalbergia Street (at Vesta Street)
(Includes Areas designated as O-1 and O-2)

Q_2 1-hr = 0.10 cfs
Q_{10} 1-hr = 0.18 cfs
Q_{100} 1-hr = 0.27 cfs

SECTION 4 RUNOFF RATE INCREASE EVALUATION

The following table provides a comparison of the existing and proposed flows at the points of concern (POC):

	Storm Event	Existing Discharge	Proposed Discharge
POC No. 1	Q_2	0.62-cfs	0.61-cfs*
	Q_{10}	1.48-cfs	1.22-cfs*
	Q_{100}	2.25-cfs	1.96-cfs*
POC No. 2	Q_2	0.16-cfs	0.10-cfs
	Q_{10}	0.37-cfs	0.18-cfs
	Q_{100}	0.57-cfs	0.27-cfs

*Pumped Discharge

SECTION 5 401/404 PERMITS

The project does not require any modifications to existing drainage improvements nor any proposed drainage improvements located within any waters of the United States. No Permit is required.

SECTION 6 SUMMARY & CONCLUSIONS

This report concludes that the proposed re-development project which includes, vacating the existing alley and existing storm drainage, can be designed to comply with the relevant City Drainage Codes, Policies and General Permits. Although the proposed re-development project increases the size of the existing facilities, the percent of impervious surface is unchanged from the existing facility to the re-developed facility. The Caltrans right-of-way runoff can be re-directed to the City Streets (Una and Vesta) without impacting downstream facilities, i.e. the existing curb and gutter in Dalbergia Street, Woden Street, Main Street and Yama Street, nor the Paleta Creek channel. The discharge to Chollas Creek has been detained through the Rainwater Harvest System and the pump system storage facility such that the proposed discharge flows are less than the existing flows.

SECTION 7 REFERENCES

San Diego County Hydrology Manual dated June 2013
City of San Diego Drainage Manual dated 2017
Model BMP Design Manual, San Diego Region, dated February 2016

SECTION 8 APPENDICES

Appendix A	Existing Conditions Hydrology Map
Appendix B	Existing Conditions HydroCAD® Results
Appendix C	Proposed Conditions Hydrology Map
Appendix D	Proposed Conditions HydroCAD® Results
Appendix E	C-Factor Calculations

Appendix A
Existing Conditions Hydrology Map

SCALE: 1"=20'

0 10' 20' 40' 60'

DIGALERT

DIAL BEFORE YOU DIG

TWO WORKING DAYS BEFORE YOU DIG

TOLL FREE 1-800-227-2600

A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				COUNTY	

SEAL-ENGINEER

PAUL J. HACUNDA
No. 41627
CIVIL

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:

R.C.E. NO.

DATE Jul. 31, 16

BENCHMARK:

SEE ABOVE

SCALE: AS SHOWN

EXISTING DRAINAGE CONDITIONS 3608-3688 DALBERGIA STREET SAN DIEGO, CA 92113

FOR:

W.O.

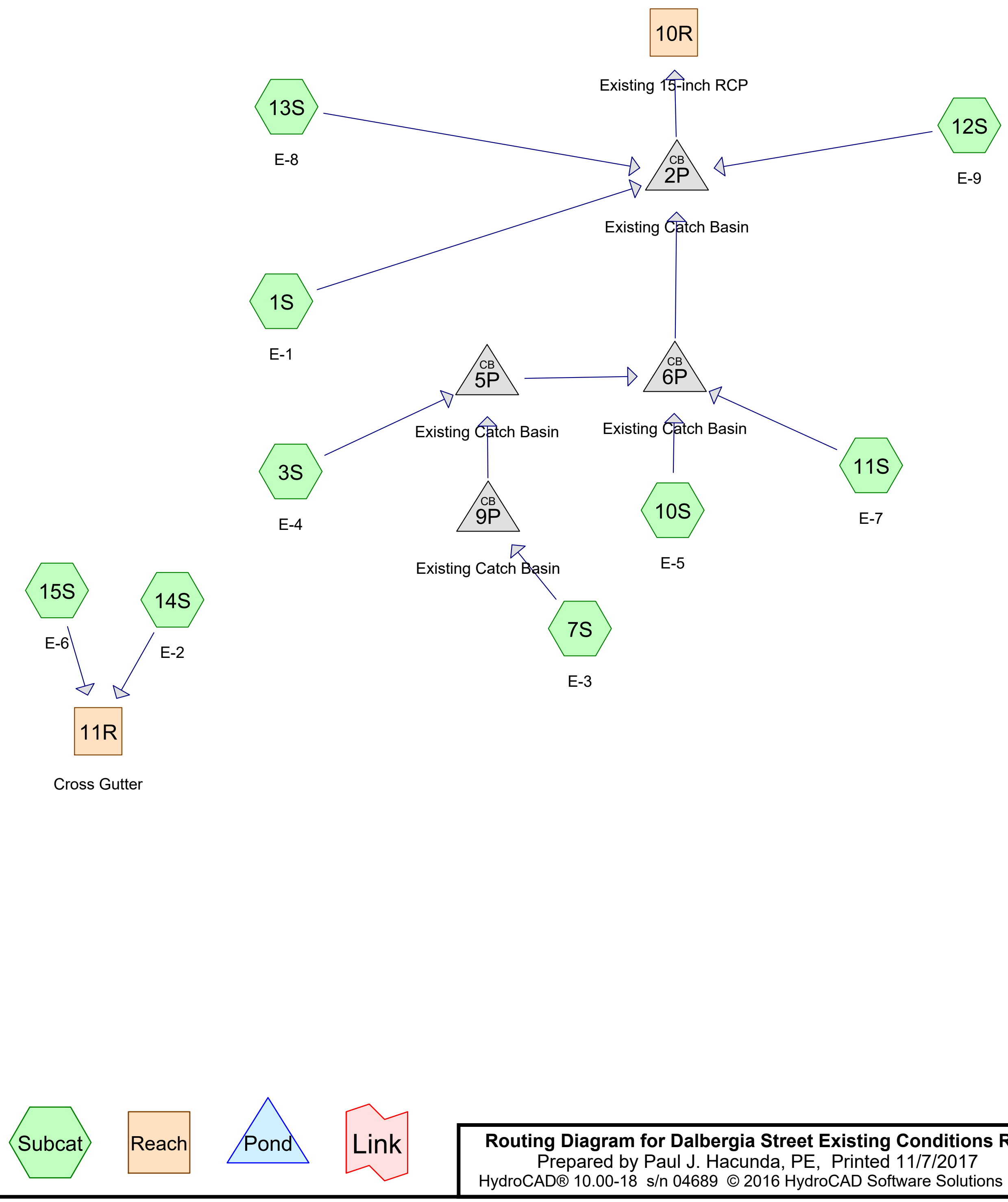
COUNTY FILE NO.

SHEET NO. 1

OF X SHTS

Drawing: C:\Users\ray\Desktop\My Work\Dalbergia Street\Existing Drainage Conditions.dwg Layout: Layout1 Last Saved: Sun Jul 31, 2016 - 10:38am Last Plotted: Sun Jul 31, 2016 - 11:35am By: ray

Appendix B
Existing Conditions
HydroCAD® Results
2-year, 1-hour
10-year, 1-hour
100-year, 1-hour



Routing Diagram for Dalbergia Street Existing Conditions Rev 1
Prepared by Paul J. Hacunda, PE, Printed 11/7/2017
HydroCAD® 10.00-18 s/n 04689 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
0.180	0.70	City of San Diego Table 2 (1S, 14S)
1.540	0.95	City of San Diego Table 2 (3S, 7S, 10S, 11S, 15S)
0.770	0.50	City of San Diego Table 2 (12S, 13S)
2.490	**0.79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.490	Other	1S, 3S, 7S, 10S, 11S, 12S, 13S, 14S, 15S
2.490		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.490	2.490	City of San Diego Table 2	1S, 3S, 7S, 10S, 11S, 12S, 13S, 14S, 15S
0.000	**0.000**	**0.000**	**0.000**	**2.490**	**2.490**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	10R	17.46	11.00	520.0	0.0124	0.013	15.0	0.0	0.0
2	2P	16.00	13.25	550.0	0.0050	0.011	15.0	0.0	0.0
3	5P	19.50	17.10	100.0	0.0240	0.010	10.0	0.0	0.0
4	6P	17.70	17.00	15.0	0.0467	0.010	10.0	0.0	0.0
5	9P	21.00	19.50	85.0	0.0176	0.010	8.0	0.0	0.0

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: E-1 Runoff Area=0.070 ac 0.00% Impervious Runoff Depth=0.39"
Flow Length=340' Tc=5.0 min C=0.70 Runoff=0.03 cfs 0.002 af

Subcatchment 3S: E-4 Runoff Area=0.210 ac 100.00% Impervious Runoff Depth=0.53"
Flow Length=155' Slope=0.0200 '/' Tc=5.0 min C=0.95 Runoff=0.11 cfs 0.009 af

Subcatchment 7S: E-3 Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=0.53"
Flow Length=240' Tc=5.0 min C=0.95 Runoff=0.22 cfs 0.018 af

Subcatchment 10S: E-5 Runoff Area=0.390 ac 100.00% Impervious Runoff Depth=0.53"
Flow Length=215' Tc=5.0 min C=0.95 Runoff=0.21 cfs 0.017 af

Subcatchment 11S: E-7 Runoff Area=0.190 ac 100.00% Impervious Runoff Depth=0.53"
Flow Length=120' Slope=0.0050 '/' Tc=5.0 min C=0.95 Runoff=0.10 cfs 0.008 af

Subcatchment 12S: E-9 Runoff Area=0.330 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=260' Tc=5.0 min C=0.50 Runoff=0.09 cfs 0.008 af

Subcatchment 13S: E-8 Runoff Area=0.440 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=335' Tc=5.0 min C=0.50 Runoff=0.12 cfs 0.010 af

Subcatchment 14S: E-2 Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=0.39"
Flow Length=105' Slope=0.0050 '/' Tc=25.1 min C=0.70 Runoff=0.04 cfs 0.004 af

Subcatchment 15S: E-6 Runoff Area=0.340 ac 100.00% Impervious Runoff Depth=0.53"
Flow Length=255' Tc=5.0 min C=0.95 Runoff=0.18 cfs 0.015 af

Reach 10R: Existing 15-inch RCP Avg. Flow Depth=0.30' Max Vel=3.99 fps Inflow=0.89 cfs 0.073 af
15.0" Round Pipe n=0.013 L=520.0' S=0.0124 '/' Capacity=7.20 cfs Outflow=0.89 cfs 0.073 af

Reach 11R: Cross Gutter Avg. Flow Depth=0.09' Max Vel=1.00 fps Inflow=0.23 cfs 0.019 af
n=0.013 L=100.0' S=0.0050 '/' Capacity=1.33 cfs Outflow=0.23 cfs 0.019 af

Pond 2P: Existing Catch Basin Peak Elev=16.46' Inflow=0.89 cfs 0.073 af
15.0" Round Culvert n=0.011 L=550.0' S=0.0050 '/' Outflow=0.89 cfs 0.073 af

Pond 5P: Existing Catch Basin Peak Elev=19.80' Inflow=0.33 cfs 0.027 af
10.0" Round Culvert n=0.010 L=100.0' S=0.0240 '/' Outflow=0.33 cfs 0.027 af

Pond 6P: Existing Catch Basin Peak Elev=18.13' Inflow=0.64 cfs 0.053 af
10.0" Round Culvert n=0.010 L=15.0' S=0.0467 '/' Outflow=0.64 cfs 0.053 af

Pond 9P: Existing Catch Basin Peak Elev=21.26' Inflow=0.22 cfs 0.018 af
8.0" Round Culvert n=0.010 L=85.0' S=0.0176 '/' Outflow=0.22 cfs 0.018 af

Total Runoff Area = 2.490 ac Runoff Volume = 0.092 af Average Runoff Depth = 0.44"
38.15% Pervious = 0.950 ac 61.85% Impervious = 1.540 ac

Summary for Subcatchment 1S: E-1

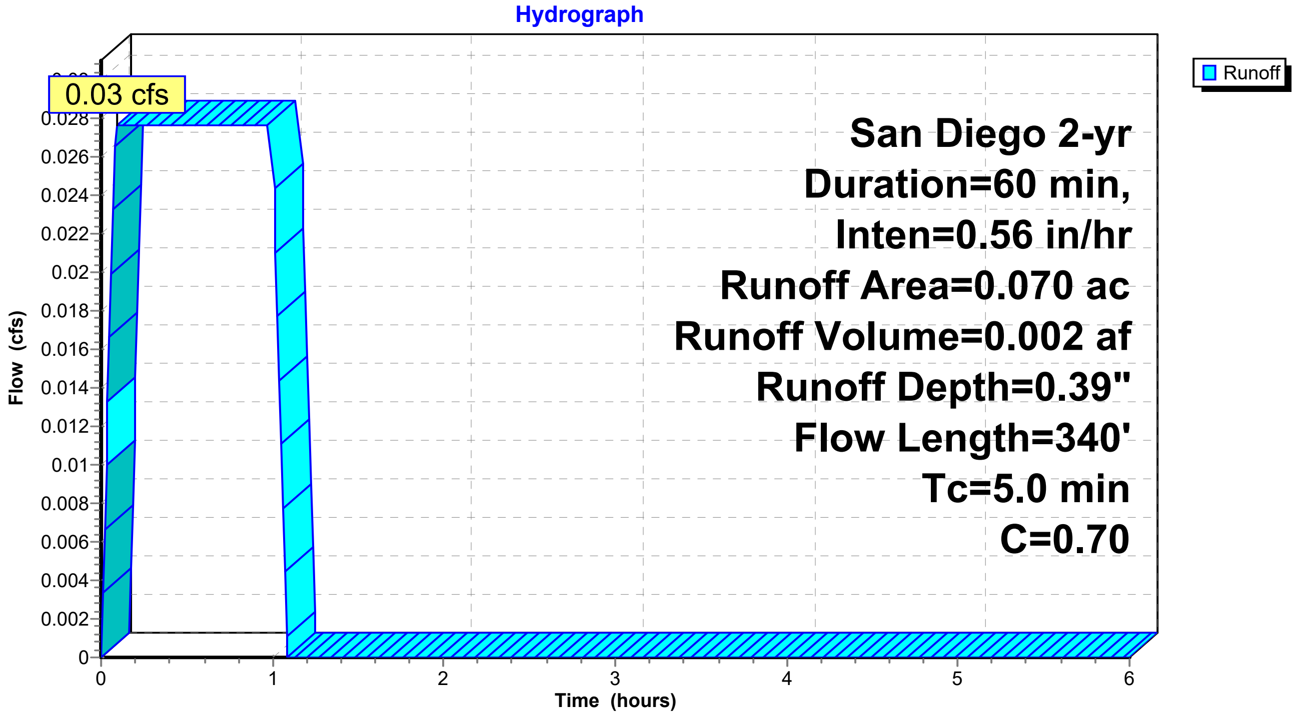
Runoff = 0.03 cfs @ 0.09 hrs, Volume= 0.002 af, Depth= 0.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.070	0.70	City of San Diego Table 2
0.070		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	90	0.0200	0.95		**Sheet Flow, Residential Lot** Smooth surfaces n= 0.011 P2= 1.60"
1.6	250	0.0160	2.57		**Shallow Concentrated Flow, Alley Flow** Paved Kv= 20.3 fps
3.2	340	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: E-1



Summary for Subcatchment 3S: E-4

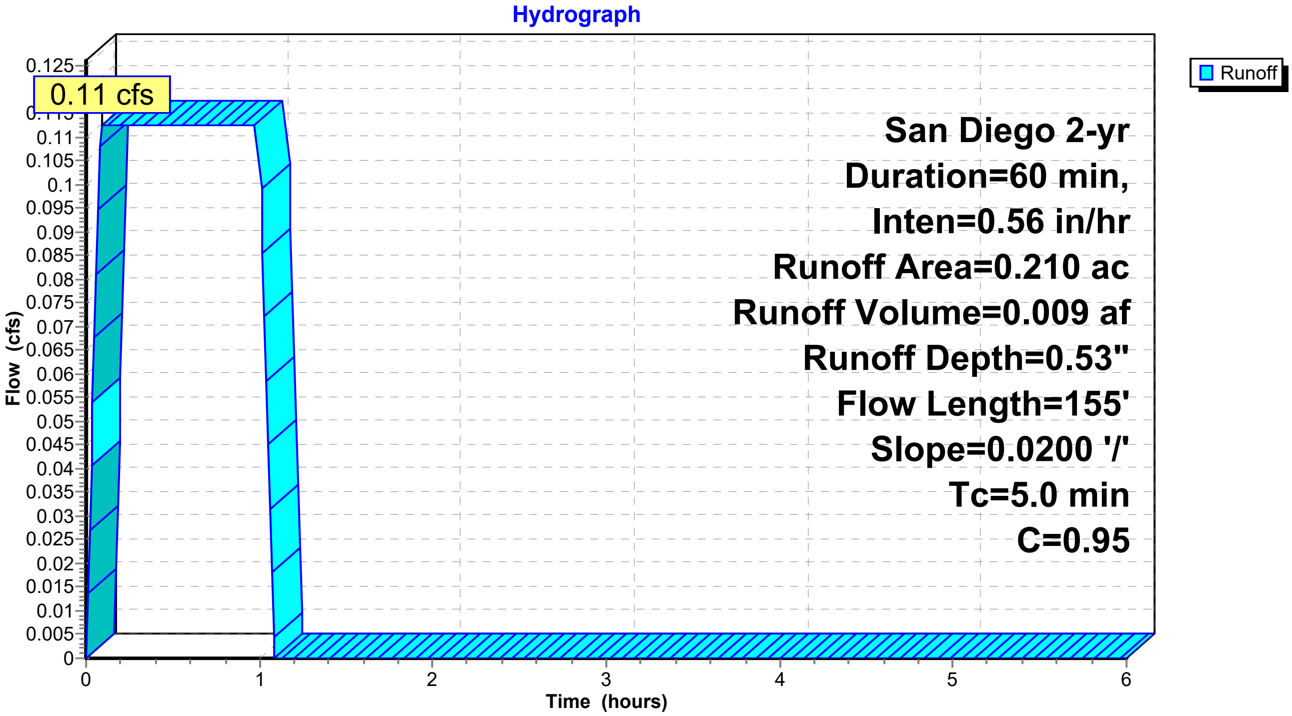
Runoff = 0.11 cfs @ 0.09 hrs, Volume= 0.009 af, Depth= 0.53"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.210	0.95	City of San Diego Table 2
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	155	0.0200	1.06		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
2.4	155	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: E-4



Summary for Subcatchment 7S: E-3

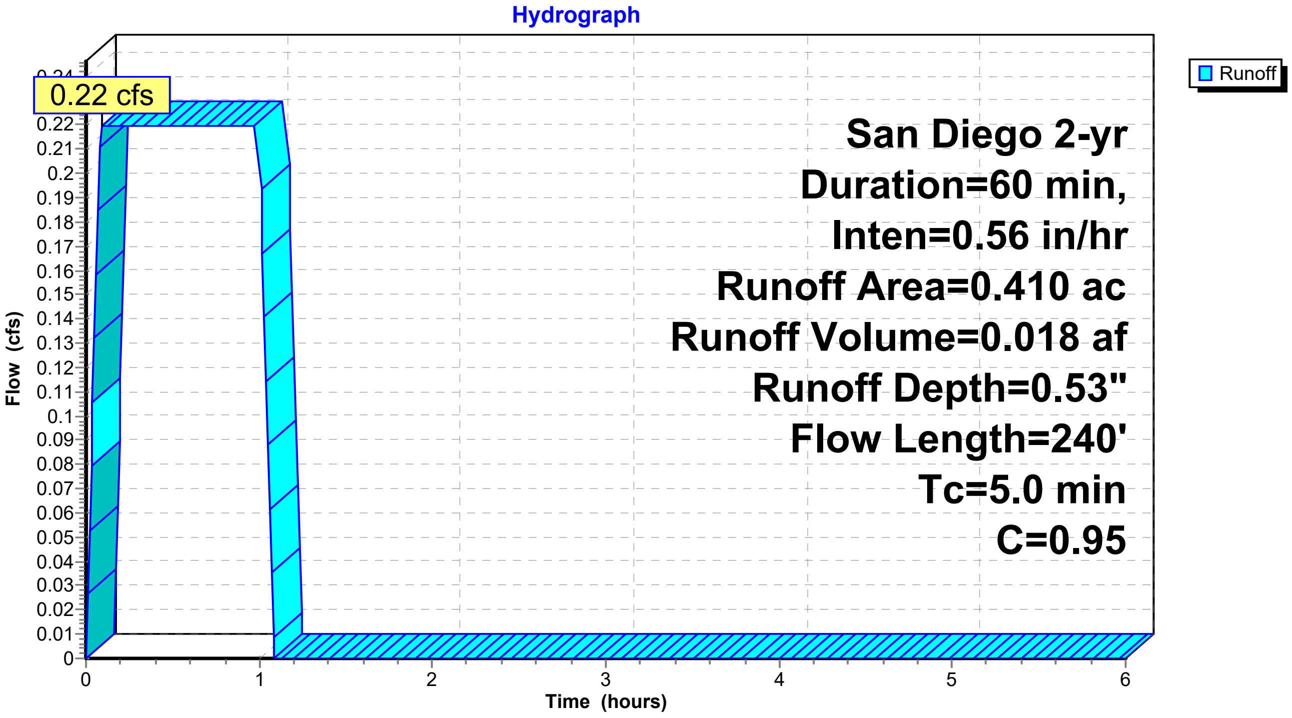
Runoff = 0.22 cfs @ 0.09 hrs, Volume= 0.018 af, Depth= 0.53"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.410	0.95	City of San Diego Table 2
0.410		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
1.4	55	0.0100	0.65		**Sheet Flow, Paved Surface** Smooth surfaces n= 0.011 P2= 1.60"
3.7	240	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 7S: E-3



Summary for Subcatchment 10S: E-5

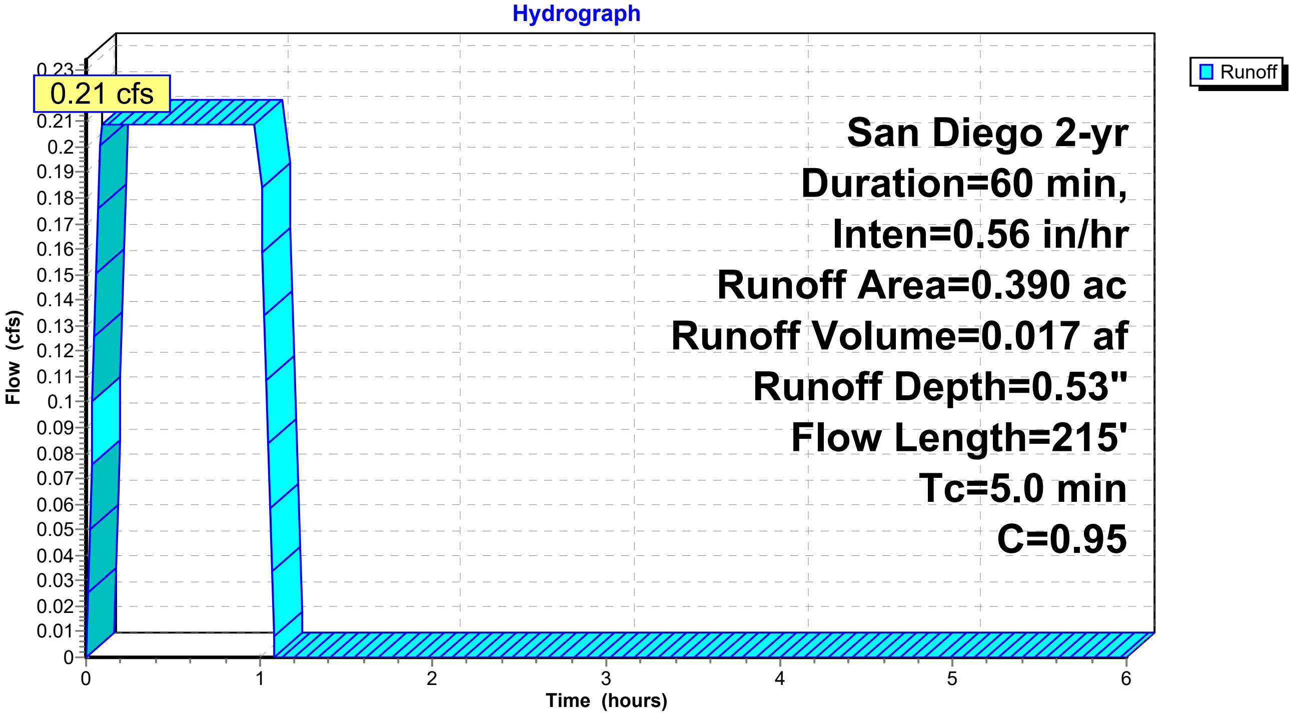
Runoff = 0.21 cfs @ 0.09 hrs, Volume= 0.017 af, Depth= 0.53"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.390	0.95	City of San Diego Table 2
0.390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	70	0.2500	2.49		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.2	145	0.0100	2.03		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
1.7	215	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 10S: E-5



Summary for Subcatchment 11S: E-7

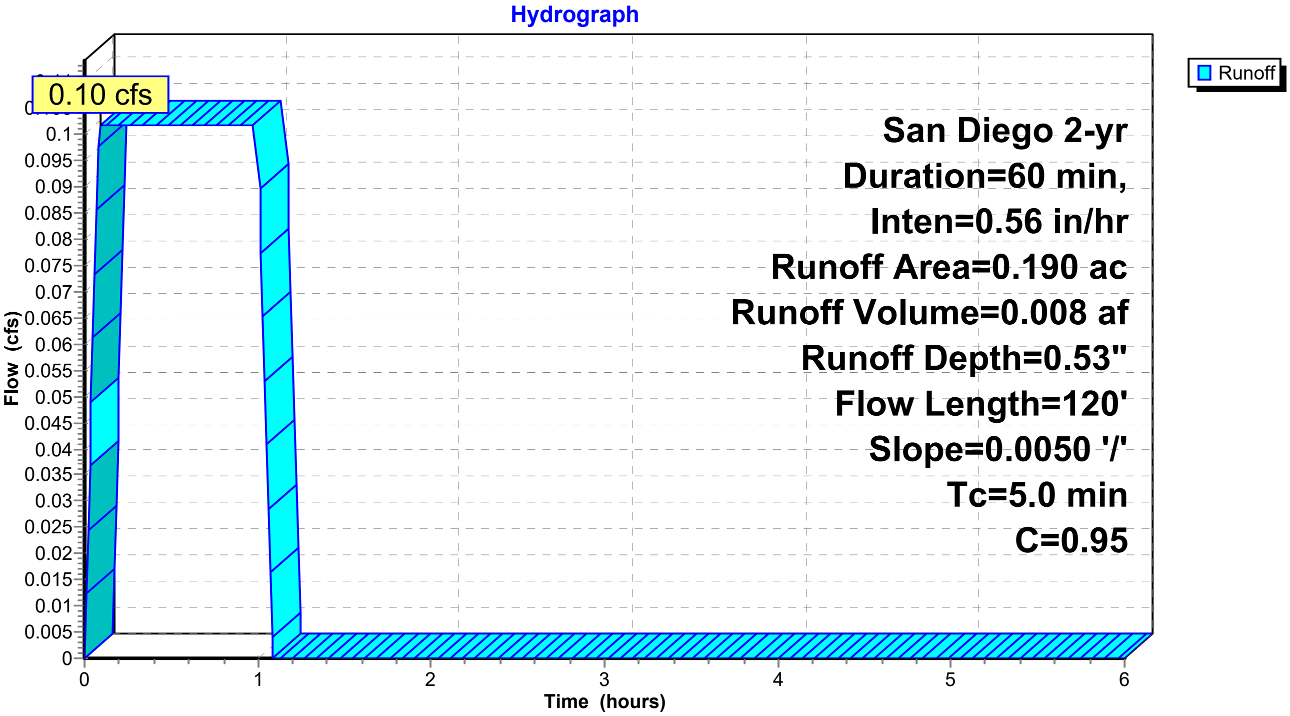
Runoff = 0.10 cfs @ 0.09 hrs, Volume= 0.008 af, Depth= 0.53"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.190	0.95	City of San Diego Table 2
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	120	0.0050	0.58		**Sheet Flow, E-7** Smooth surfaces n= 0.011 P2= 1.60"
3.5	120	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 11S: E-7



Summary for Subcatchment 12S: E-9

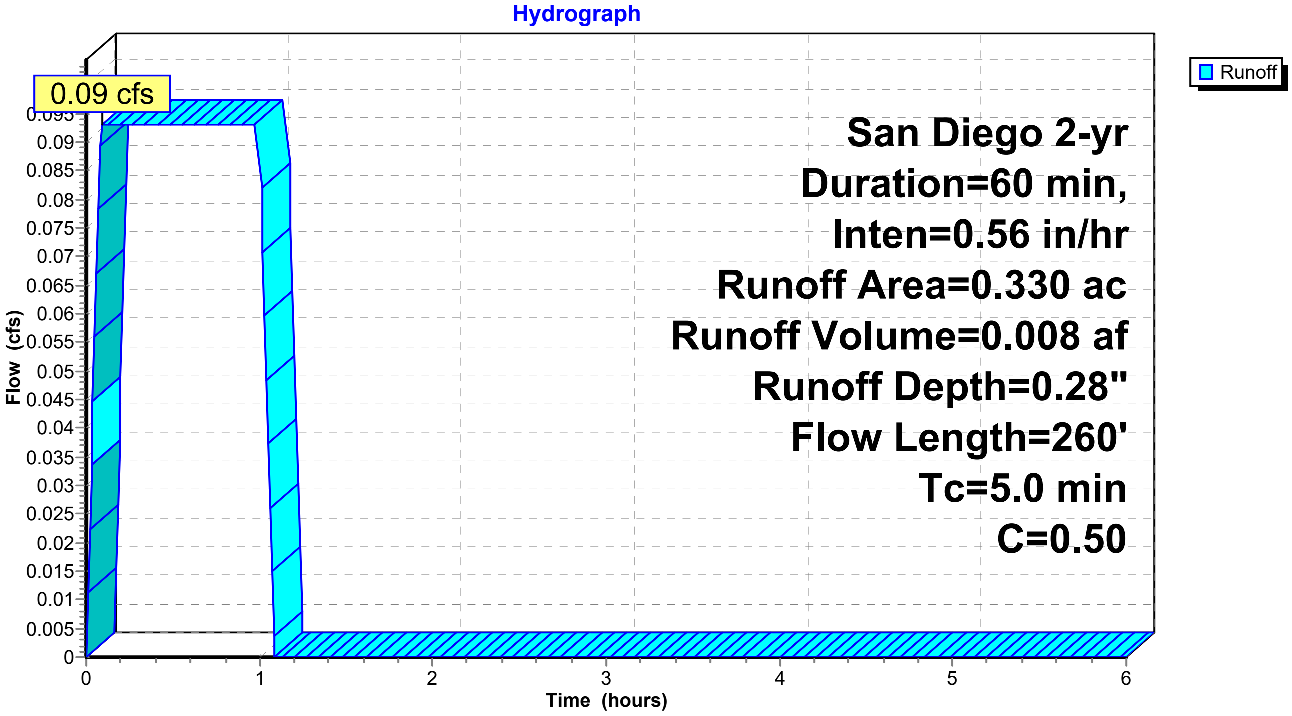
Runoff = 0.09 cfs @ 0.09 hrs, Volume= 0.008 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.330	0.50	City of San Diego Table 2
0.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	30	0.5000	0.15		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 1.60"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.6	260	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: E-9



Summary for Subcatchment 13S: E-8

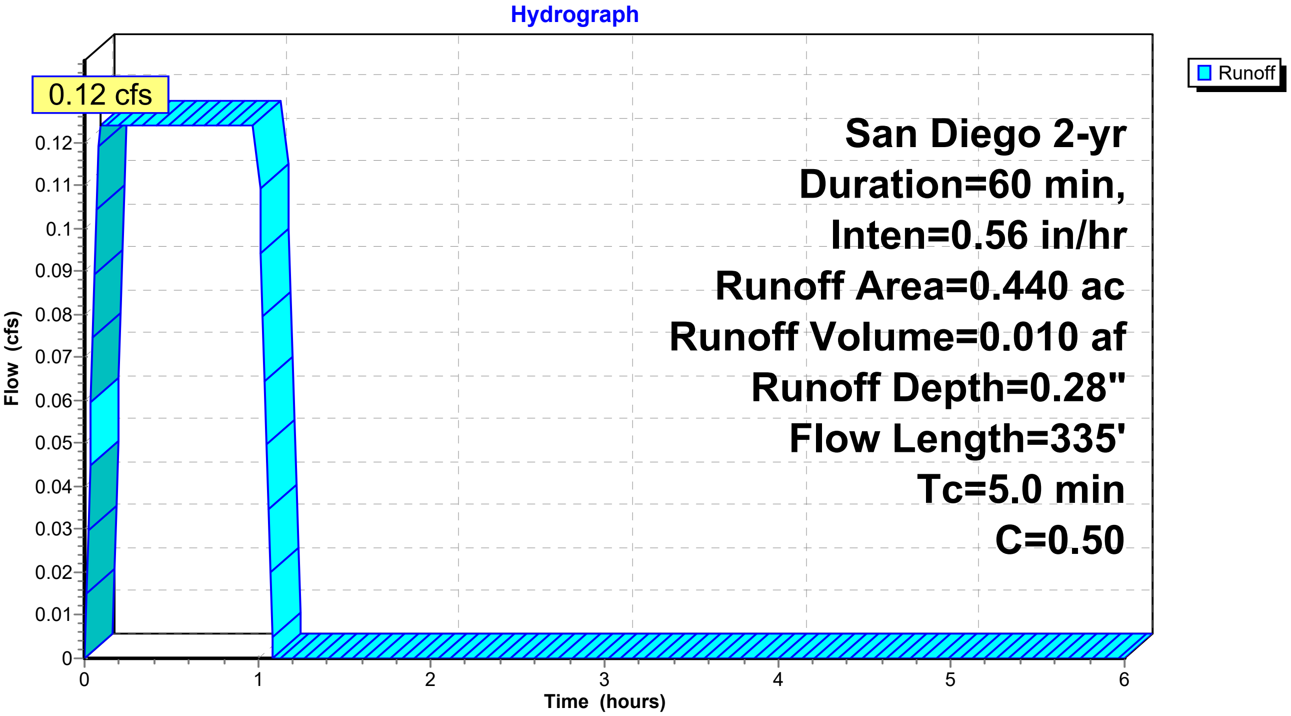
Runoff = 0.12 cfs @ 0.09 hrs, Volume= 0.010 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.440	0.50	City of San Diego Table 2
0.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.5000	0.23		**Sheet Flow, Slope** Grass: Dense n= 0.240 P2= 1.60"
1.8	310	0.0200	2.87		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
3.6	335	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 13S: E-8



Summary for Subcatchment 14S: E-2

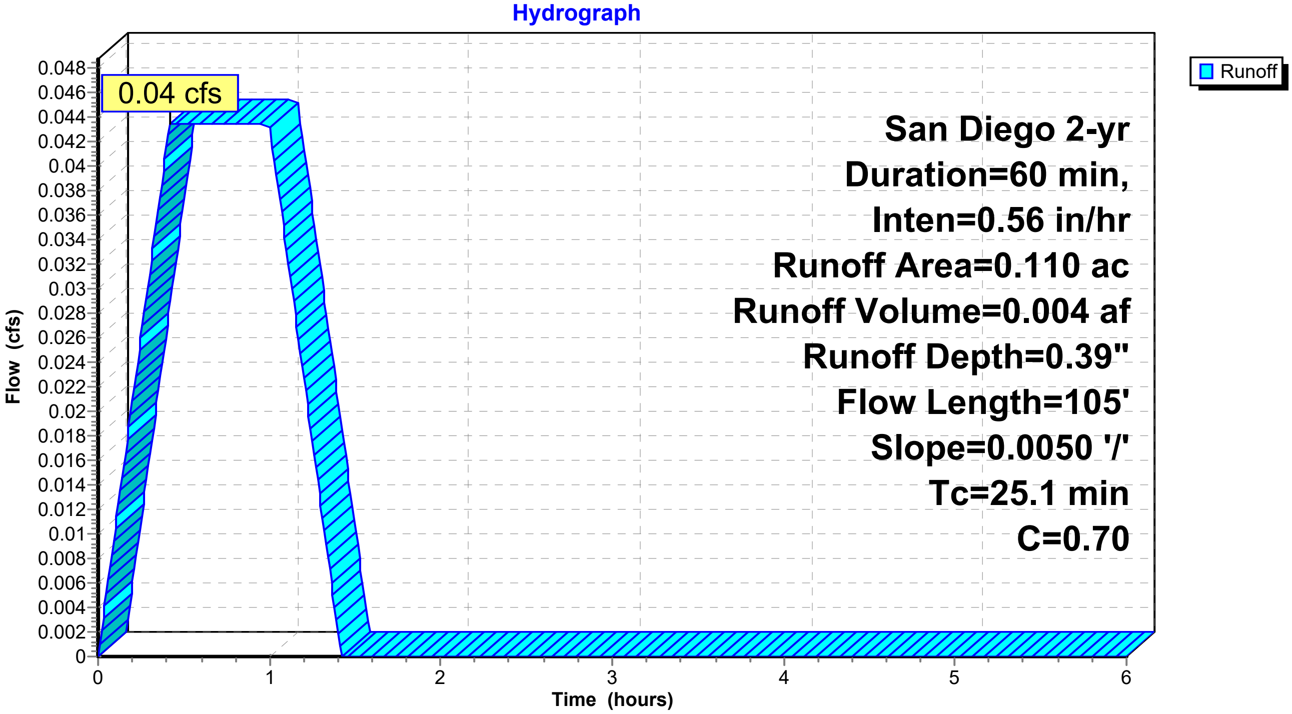
Runoff = 0.04 cfs @ 0.42 hrs, Volume= 0.004 af, Depth= 0.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.110	0.70	City of San Diego Table 2
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.1	105	0.0050	0.07		**Sheet Flow, Lawn** Grass: Short n= 0.150 P2= 1.60"

Subcatchment 14S: E-2



Summary for Subcatchment 15S: E-6

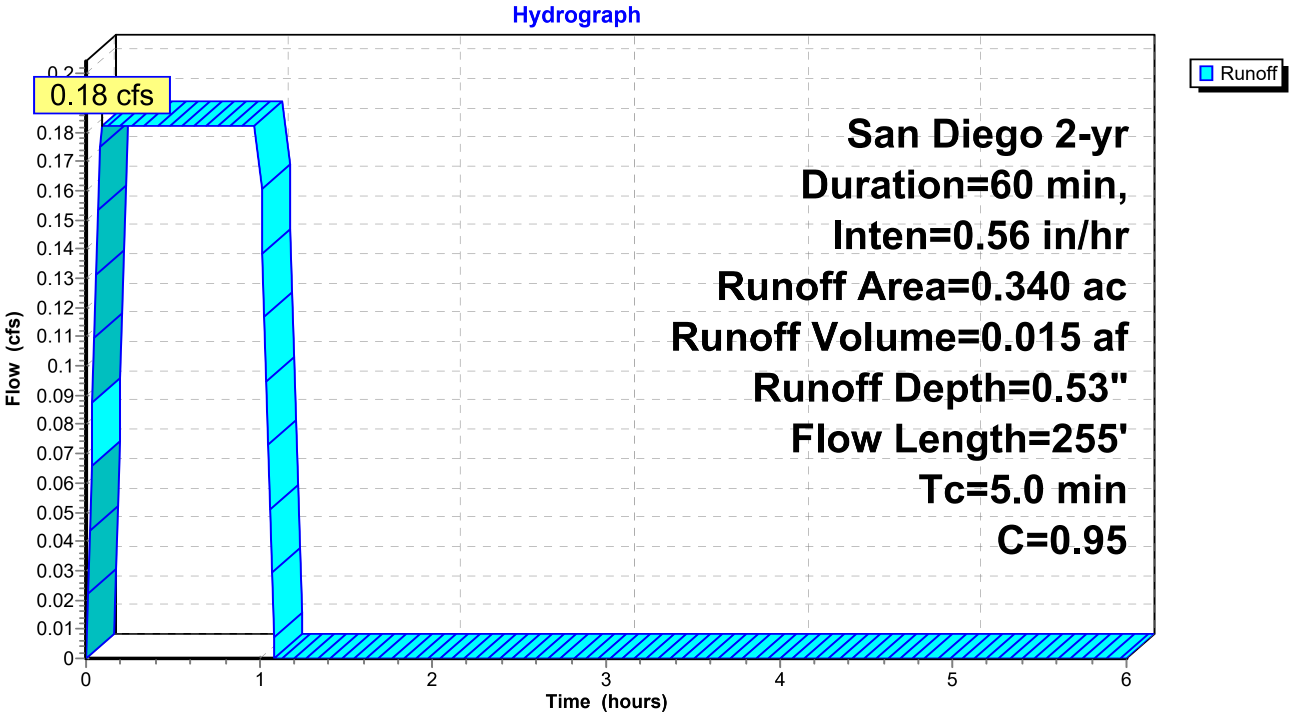
Runoff = 0.18 cfs @ 0.09 hrs, Volume= 0.015 af, Depth= 0.53"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.340	0.95	City of San Diego Table 2
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
2.2	70	0.0050	0.52		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
4.5	255	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 15S: E-6



Summary for Reach 10R: Existing 15-inch RCP

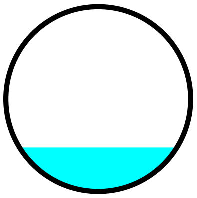
[52] Hint: Inlet/Outlet conditions not evaluated
[81] Warning: Exceeded Pond 2P by 1.62' @ 1.09 hrs

```
Inflow Area =          2.040 ac,  58.82% Impervious,  Inflow Depth =   0.43"    for  2-yr event
Inflow      =         0.89 cfs @     0.09 hrs,  Volume=            0.073 af
Outflow     =         0.89 cfs @     1.01 hrs,  Volume=            0.073 af,  Atten= 0%,  Lag= 55.2 min
```

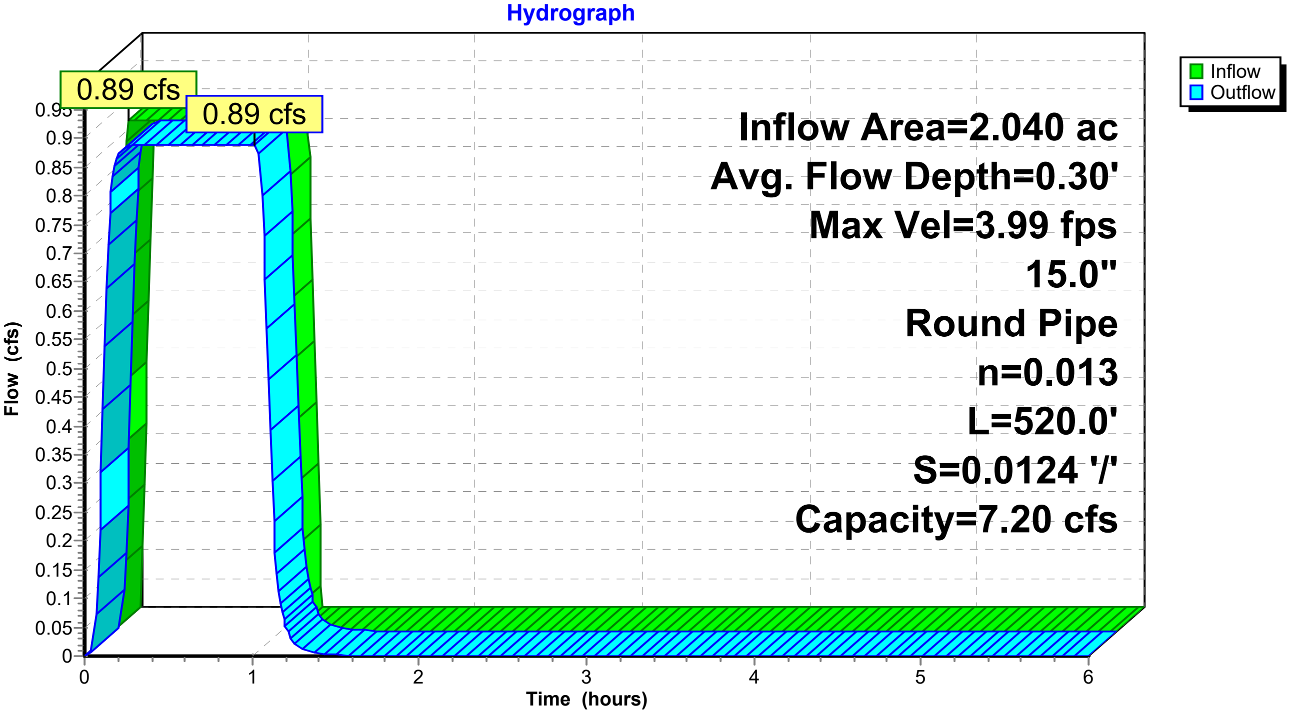
Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.99 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 2.12 fps, Avg. Travel Time= 4.1 min

Peak Storage= 116 cf @ 0.97 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 10R: Existing 15-inch RCP



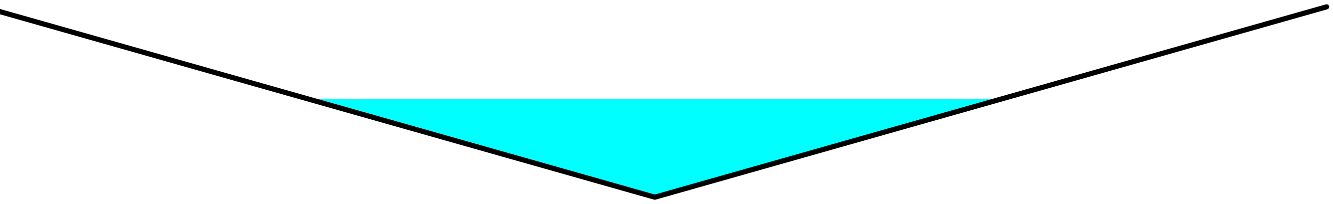
Summary for Reach 11R: Cross Gutter

Inflow Area = 0.450 ac, 75.56% Impervious, Inflow Depth = 0.50" for 2-yr event
Inflow = 0.23 cfs @ 0.42 hrs, Volume= 0.019 af
Outflow = 0.23 cfs @ 1.02 hrs, Volume= 0.019 af, Atten= 0%, Lag= 36.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 2.8 min

Peak Storage= 23 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.17' Flow Area= 0.8 sf, Capacity= 1.33 cfs

0.00' x 0.17' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 10.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 20.60', Outlet Invert= 20.10'



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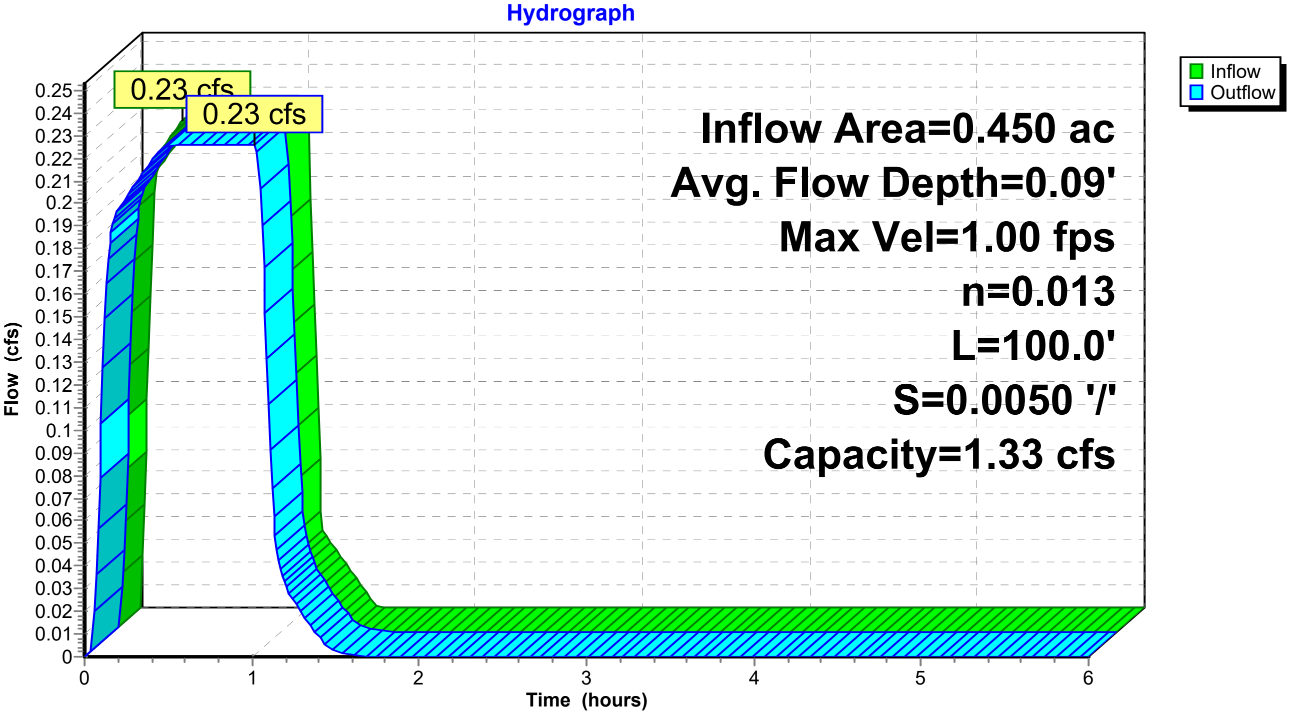
Reach 11R: Cross Gutter



Summary for Pond 2P: Existing Catch Basin

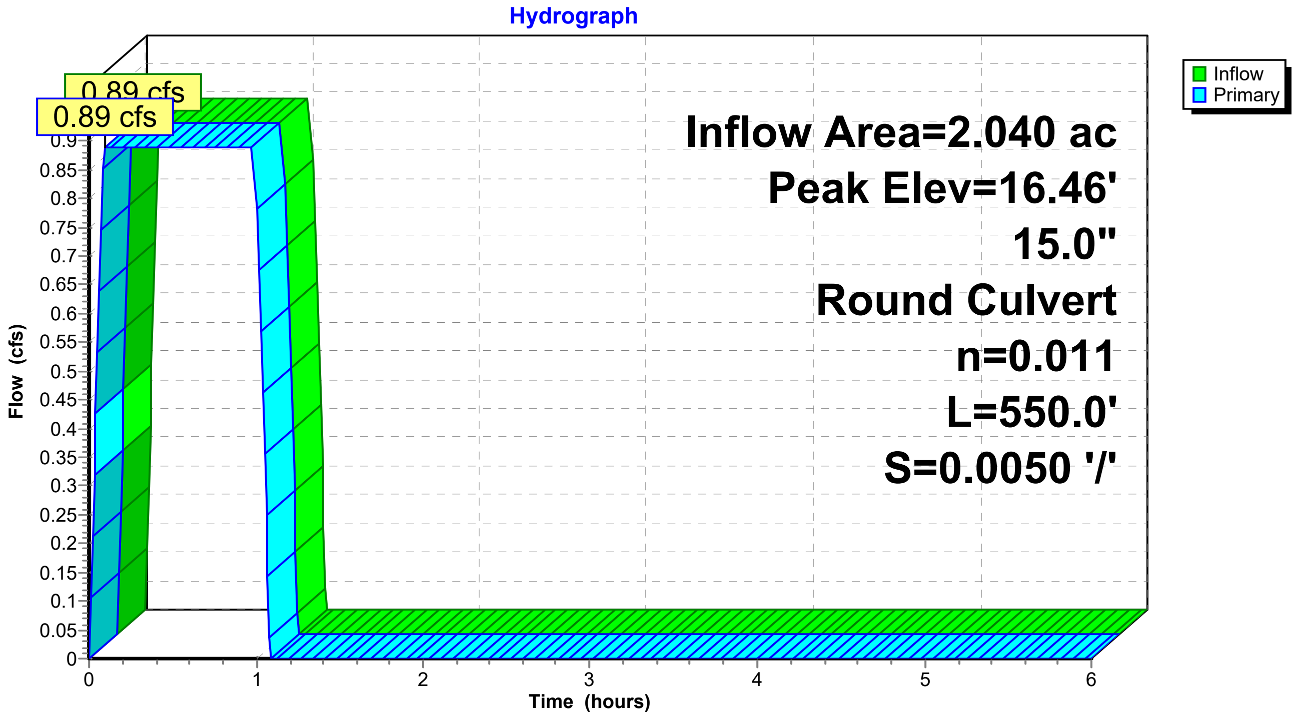
Inflow Area =	2.040 ac,	58.82% Impervious,	Inflow Depth =	0.43"	for 2-yr event
Inflow =	0.89 cfs @	0.09 hrs,	Volume=	0.073 af	
Outflow =	0.89 cfs @	0.09 hrs,	Volume=	0.073 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.89 cfs @	0.09 hrs,	Volume=	0.073 af	

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 16.46' @ 0.09 hrs
Flood Elev= 23.13'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.00'	**15.0" Round Culvert** L= 550.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 16.00' / 13.25' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=0.88 cfs @ 0.09 hrs HW=16.46' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.88 cfs @ 3.19 fps)

Pond 2P: Existing Catch Basin



Summary for Pond 5P: Existing Catch Basin

[79] Warning: Submerged Pond 9P Primary device # 1 OUTLET by 0.30'

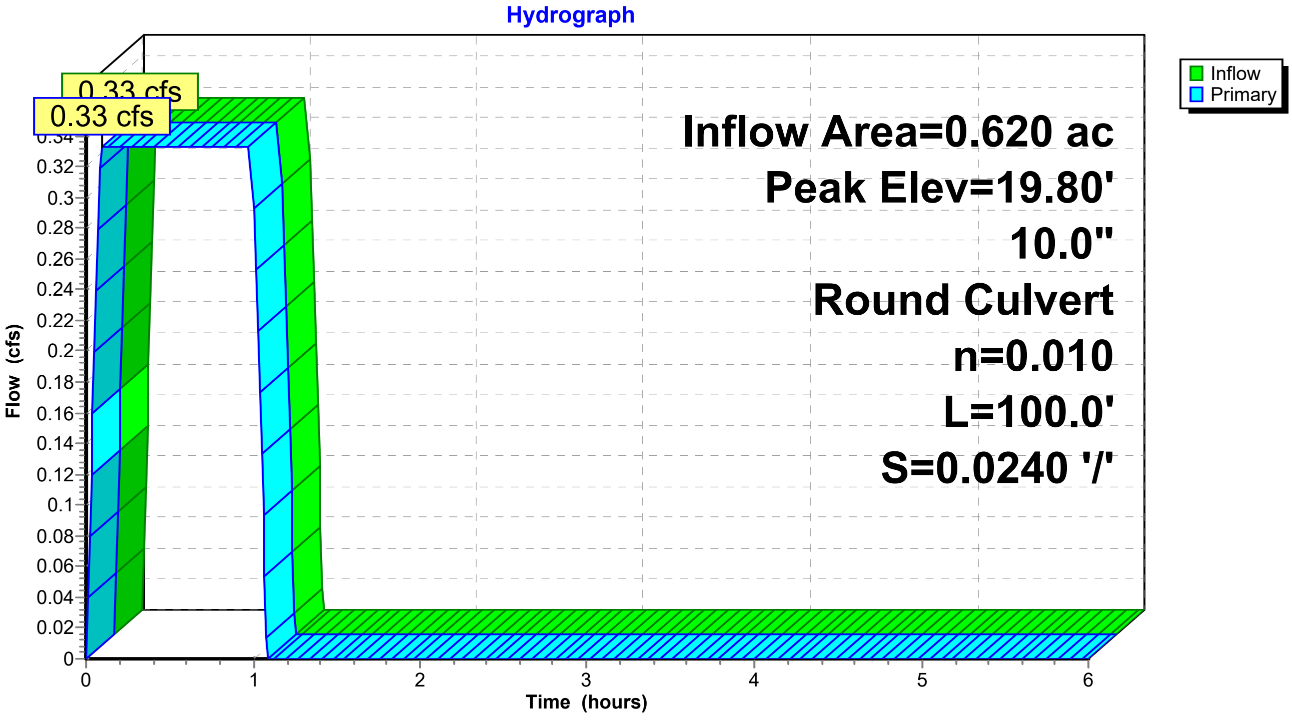
Inflow Area = 0.620 ac,100.00% Impervious, Inflow Depth = 0.53" for 2-yr event
Inflow = 0.33 cfs @ 0.09 hrs, Volume= 0.027 af
Outflow = 0.33 cfs @ 0.09 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 0.09 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 19.80' @ 0.09 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**10.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 19.50' / 17.10' S= 0.0240 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.33 cfs @ 0.09 hrs HW=19.80' (Free Discharge)
↰**1=Culvert** (Inlet Controls 0.33 cfs @ 1.87 fps)

Pond 5P: Existing Catch Basin



Summary for Pond 6P: Existing Catch Basin

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[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 1.03'

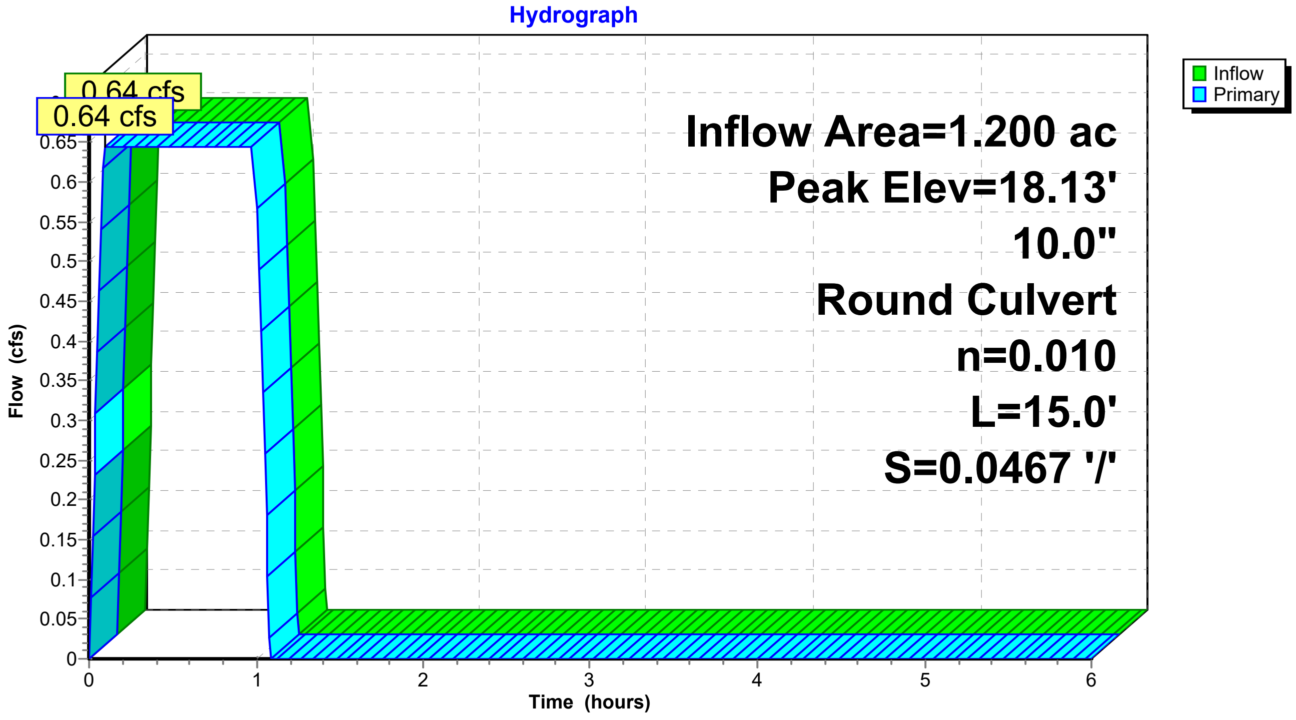
Inflow Area =       1.200 ac,100.00% Impervious,  Inflow Depth =   0.53"    for  2-yr event
Inflow      =      0.64 cfs @     0.09 hrs,  Volume=            0.053 af
Outflow     =      0.64 cfs @     0.09 hrs,  Volume=            0.053 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.64 cfs @     0.09 hrs,  Volume=            0.053 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 18.13' @ 0.09 hrs
Flood Elev= 23.24'

Device  Routing          Invert   Outlet Devices
   #1   Primary          17.70'   10.0"  Round Culvert
                                  L= 15.0'   CPP, square edge headwall,  Ke= 0.500
                                  Inlet / Outlet Invert= 17.70' / 17.00'   S= 0.0467 '/'   Cc= 0.900
                                  n= 0.010  PVC, smooth interior,  Flow Area= 0.55 sf

Primary OutFlow  Max=0.64 cfs @ 0.09 hrs  HW=18.13'   (Free Discharge)
└─1=Culvert  (Inlet Controls 0.64 cfs @ 2.24 fps)
```

Pond 6P: Existing Catch Basin



Summary for Pond 9P: Existing Catch Basin

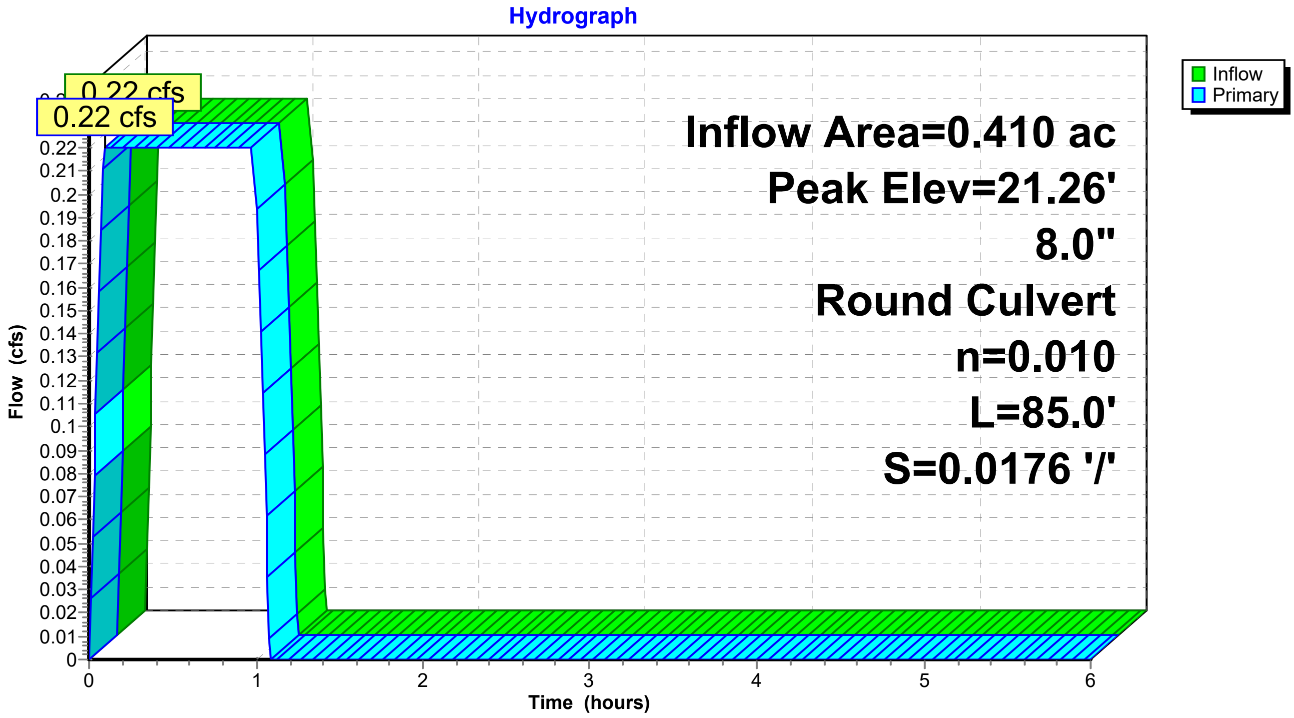
Inflow Area = 0.410 ac,100.00% Impervious, Inflow Depth = 0.53" for 2-yr event
Inflow = 0.22 cfs @ 0.09 hrs, Volume= 0.018 af
Outflow = 0.22 cfs @ 0.10 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.6 min
Primary = 0.22 cfs @ 0.10 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 21.26' @ 0.09 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**8.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 21.00' / 19.50' S= 0.0176 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.22 cfs @ 0.10 hrs HW=21.26' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.22 cfs @ 1.74 fps)

Pond 9P: Existing Catch Basin



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                          Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
                          Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
            Reach routing by Stor-Ind+Trans method  -  Pond routing by Stor-Ind method

Subcatchment 1S: E-1                      Runoff Area=0.070 ac   0.00% Impervious   Runoff Depth=0.65"
                                  Flow Length=340'   Tc=5.0 min   C=0.70   Runoff=0.05 cfs  0.004 af

Subcatchment 3S: E-4                    Runoff Area=0.210 ac   100.00% Impervious   Runoff Depth=0.88"
                   Flow Length=155'   Slope=0.0200 '/'   Tc=5.0 min   C=0.95   Runoff=0.19 cfs  0.015 af

Subcatchment 7S: E-3                    Runoff Area=0.410 ac   100.00% Impervious   Runoff Depth=0.88"
                                  Flow Length=240'   Tc=5.0 min   C=0.95   Runoff=0.37 cfs  0.030 af

Subcatchment 10S: E-5                   Runoff Area=0.390 ac   100.00% Impervious   Runoff Depth=0.88"
                                  Flow Length=215'   Tc=5.0 min   C=0.95   Runoff=0.35 cfs  0.029 af

Subcatchment 11S: E-7                   Runoff Area=0.190 ac   100.00% Impervious   Runoff Depth=0.88"
                   Flow Length=120'   Slope=0.0050 '/'   Tc=5.0 min   C=0.95   Runoff=0.17 cfs  0.014 af

Subcatchment 12S: E-9                     Runoff Area=0.330 ac   0.00% Impervious   Runoff Depth=0.47"
                                  Flow Length=260'   Tc=5.0 min   C=0.50   Runoff=0.15 cfs  0.013 af

Subcatchment 13S: E-8                     Runoff Area=0.440 ac   0.00% Impervious   Runoff Depth=0.47"
                                  Flow Length=335'   Tc=5.0 min   C=0.50   Runoff=0.21 cfs  0.017 af

Subcatchment 14S: E-2                     Runoff Area=0.110 ac   0.00% Impervious   Runoff Depth=0.65"
                  Flow Length=105'   Slope=0.0050 '/'   Tc=25.1 min   C=0.70   Runoff=0.07 cfs  0.006 af

Subcatchment 15S: E-6                   Runoff Area=0.340 ac   100.00% Impervious   Runoff Depth=0.88"
                                  Flow Length=255'   Tc=5.0 min   C=0.95   Runoff=0.30 cfs  0.025 af

Reach 10R: Existing 15-inch RCP      Avg. Flow Depth=0.38'   Max Vel=4.61 fps   Inflow=1.48 cfs  0.122 af
        15.0"  Round Pipe   n=0.013   L=520.0'   S=0.0124 '/'   Capacity=7.20 cfs   Outflow=1.48 cfs  0.122 af

Reach 11R: Cross Gutter              Avg. Flow Depth=0.11'   Max Vel=1.14 fps   Inflow=0.38 cfs  0.031 af
                     n=0.013   L=100.0'   S=0.0050 '/'   Capacity=1.33 cfs   Outflow=0.38 cfs  0.031 af

Pond 2P: Existing Catch Basin                            Peak Elev=16.61'   Inflow=1.48 cfs  0.122 af
                   15.0"  Round Culvert  n=0.011  L=550.0'  S=0.0050 '/'   Outflow=1.48 cfs  0.122 af

Pond 5P: Existing Catch Basin                            Peak Elev=19.90'   Inflow=0.55 cfs  0.046 af
                   10.0"  Round Culvert  n=0.010  L=100.0'  S=0.0240 '/'   Outflow=0.55 cfs  0.046 af

Pond 6P: Existing Catch Basin                            Peak Elev=18.29'   Inflow=1.07 cfs  0.088 af
                    10.0"  Round Culvert  n=0.010  L=15.0'  S=0.0467 '/'   Outflow=1.07 cfs  0.088 af

Pond 9P: Existing Catch Basin                            Peak Elev=21.35'   Inflow=0.37 cfs  0.030 af
                     8.0"  Round Culvert  n=0.010  L=85.0'  S=0.0176 '/'   Outflow=0.37 cfs  0.030 af

          Total Runoff Area = 2.490 ac   Runoff Volume = 0.153 af   Average Runoff Depth = 0.74"
                                     38.15% Pervious = 0.950 ac     61.85% Impervious = 1.540 ac
```

Summary for Subcatchment 1S: E-1

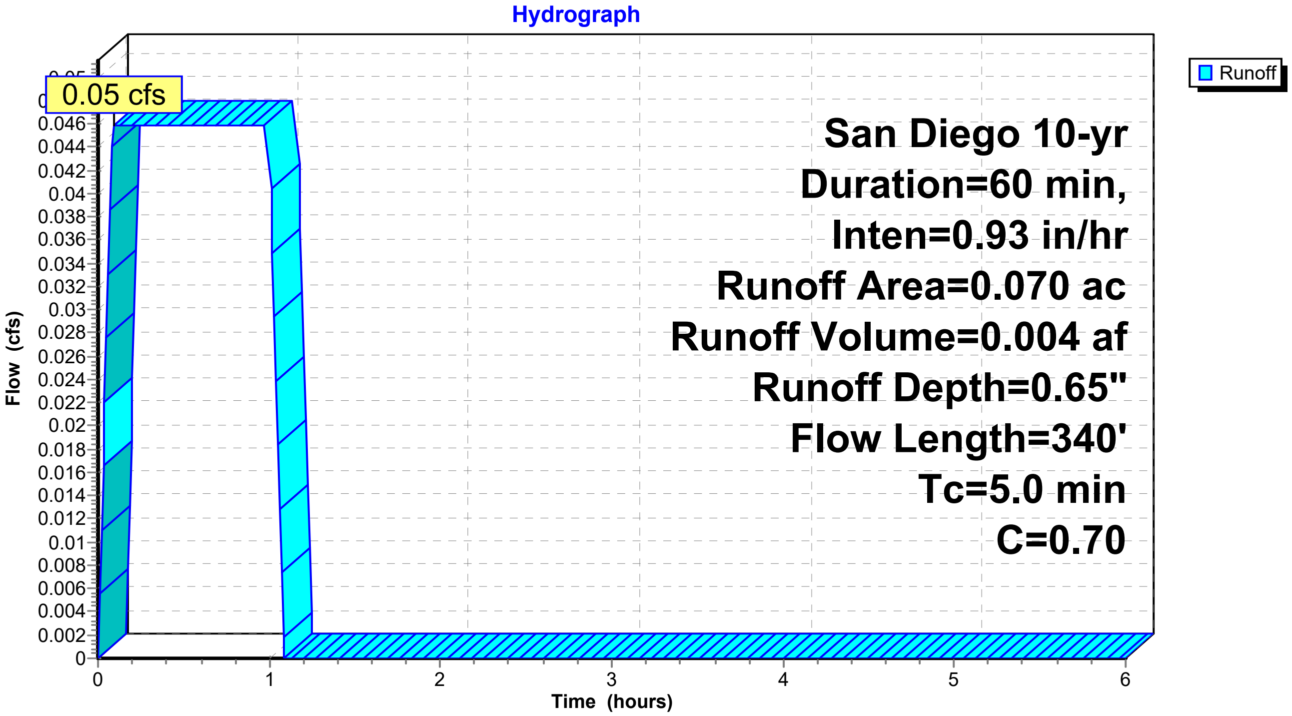
Runoff = 0.05 cfs @ 0.09 hrs, Volume= 0.004 af, Depth= 0.65"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.070	0.70	City of San Diego Table 2
0.070		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	90	0.0200	0.95		**Sheet Flow, Residential Lot** Smooth surfaces n= 0.011 P2= 1.60"
1.6	250	0.0160	2.57		**Shallow Concentrated Flow, Alley Flow** Paved Kv= 20.3 fps
3.2	340	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: E-1



Summary for Subcatchment 3S: E-4

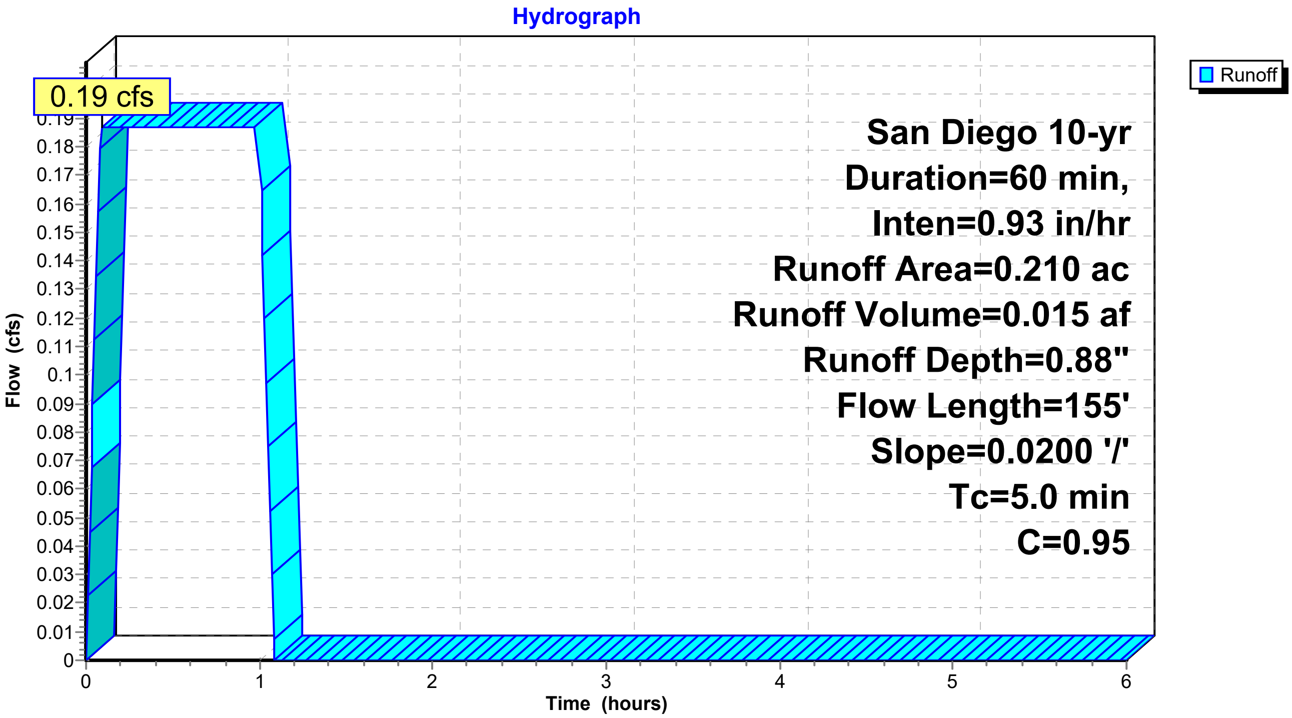
Runoff = 0.19 cfs @ 0.09 hrs, Volume= 0.015 af, Depth= 0.88"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.210	0.95	City of San Diego Table 2
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	155	0.0200	1.06		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
2.4	155	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: E-4



Summary for Subcatchment 7S: E-3

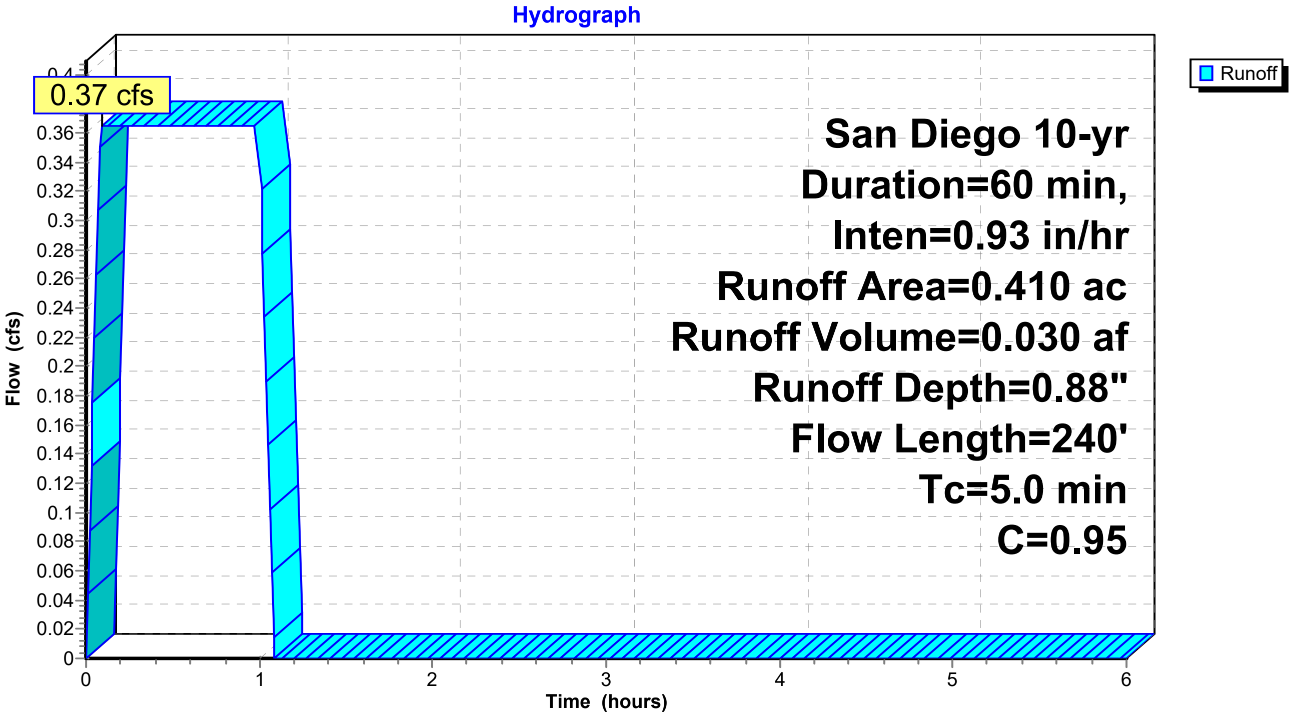
Runoff = 0.37 cfs @ 0.09 hrs, Volume= 0.030 af, Depth= 0.88"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.410	0.95	City of San Diego Table 2
0.410		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
1.4	55	0.0100	0.65		**Sheet Flow, Paved Surface** Smooth surfaces n= 0.011 P2= 1.60"
3.7	240	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 7S: E-3



Summary for Subcatchment 10S: E-5

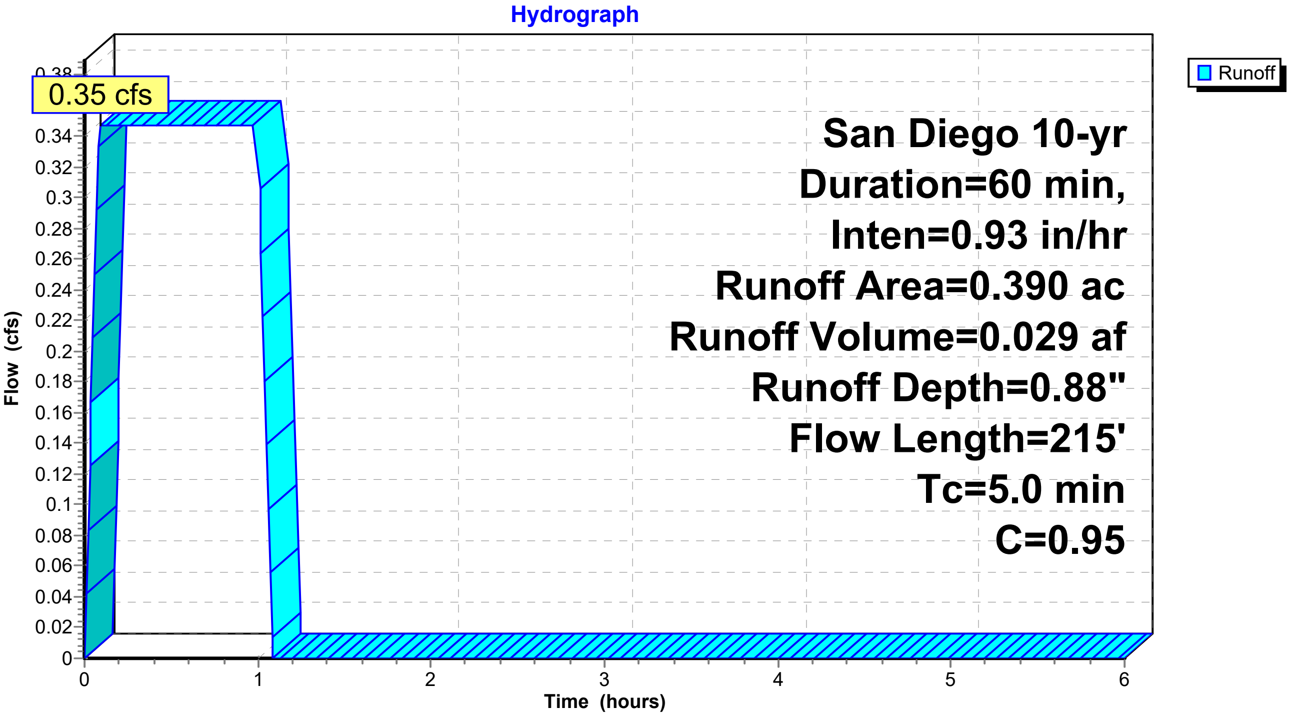
Runoff = 0.35 cfs @ 0.09 hrs, Volume= 0.029 af, Depth= 0.88"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.390	0.95	City of San Diego Table 2
0.390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	70	0.2500	2.49		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.2	145	0.0100	2.03		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
1.7	215	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 10S: E-5



Summary for Subcatchment 11S: E-7

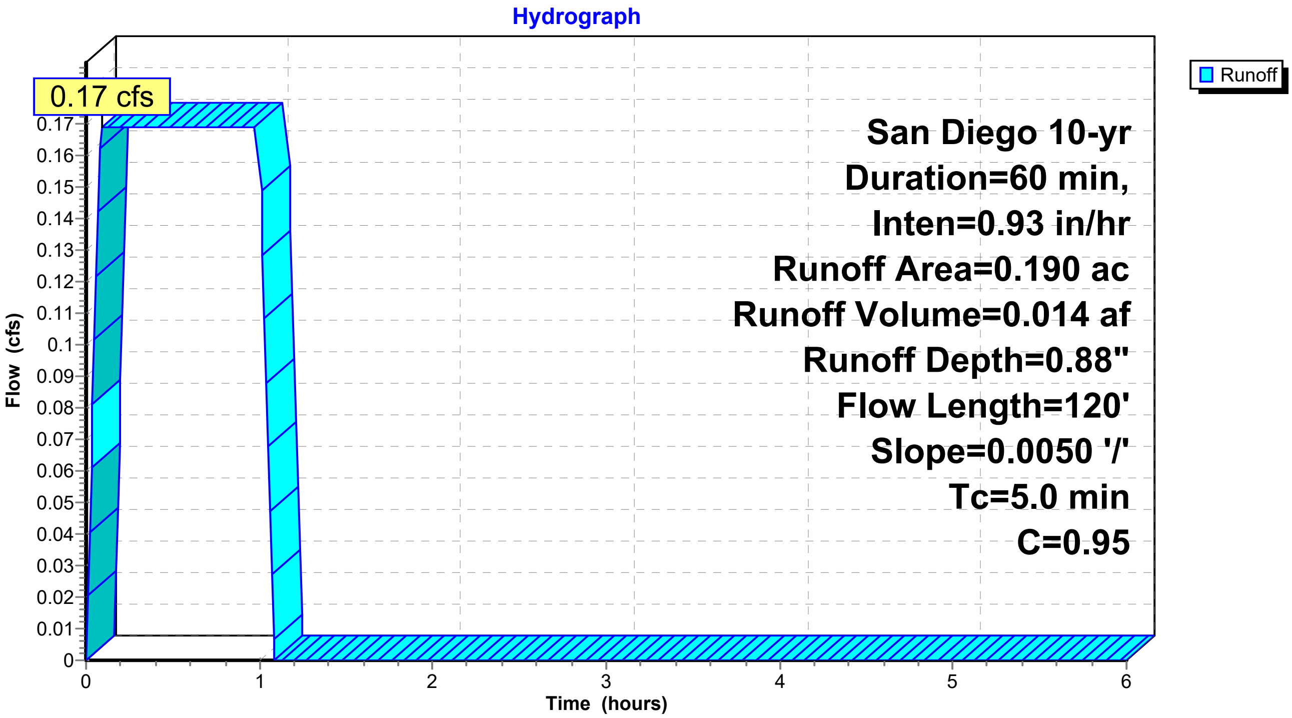
Runoff = 0.17 cfs @ 0.09 hrs, Volume= 0.014 af, Depth= 0.88"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.190	0.95	City of San Diego Table 2
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	120	0.0050	0.58		**Sheet Flow, E-7** Smooth surfaces n= 0.011 P2= 1.60"
3.5	120	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 11S: E-7



Summary for Subcatchment 12S: E-9

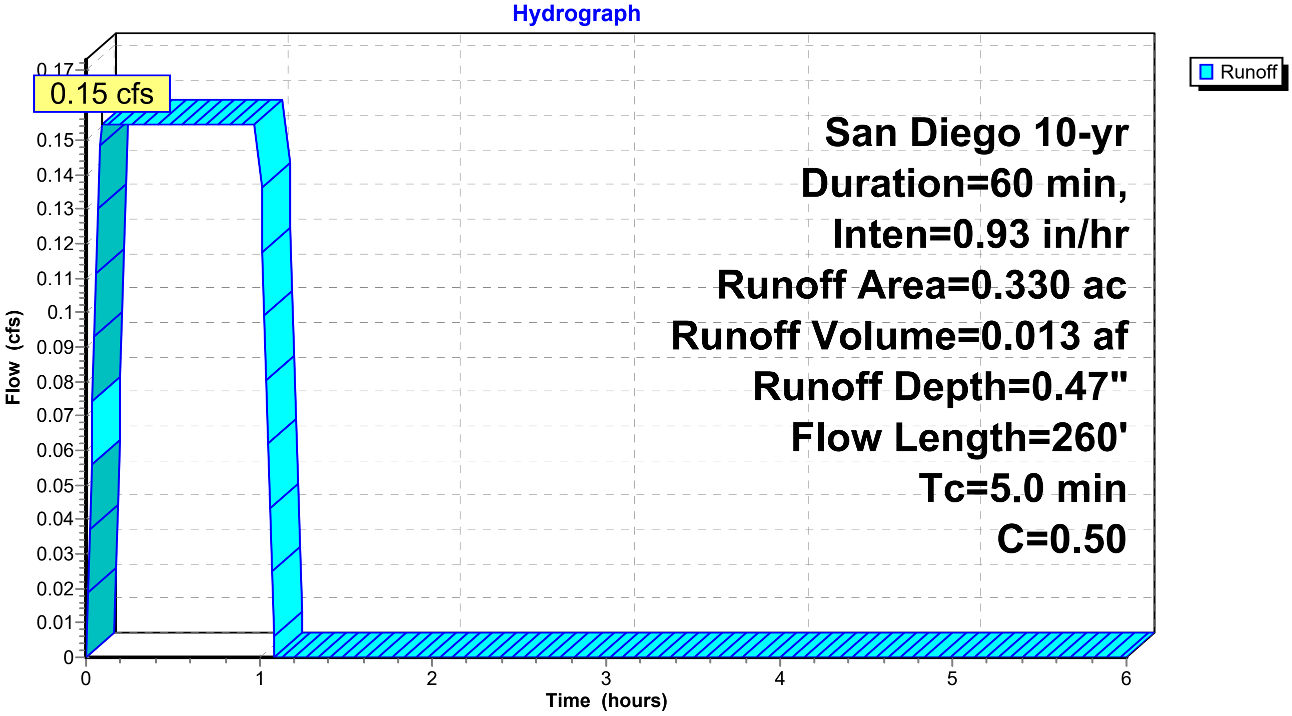
Runoff = 0.15 cfs @ 0.09 hrs, Volume= 0.013 af, Depth= 0.47"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.330	0.50	City of San Diego Table 2
0.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	30	0.5000	0.15		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 1.60"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.6	260	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: E-9



Summary for Subcatchment 13S: E-8

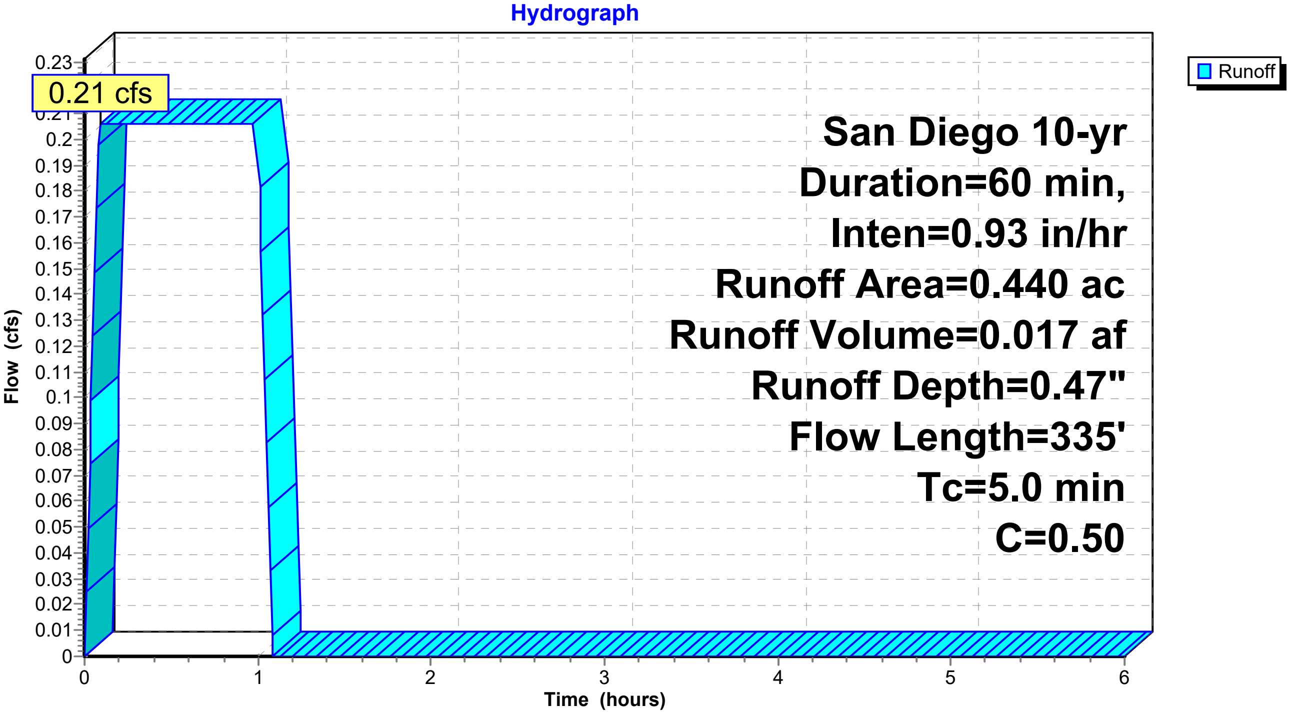
Runoff = 0.21 cfs @ 0.09 hrs, Volume= 0.017 af, Depth= 0.47"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.440	0.50	City of San Diego Table 2
0.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.5000	0.23		**Sheet Flow, Slope** Grass: Dense n= 0.240 P2= 1.60"
1.8	310	0.0200	2.87		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
3.6	335	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 13S: E-8



Summary for Subcatchment 14S: E-2

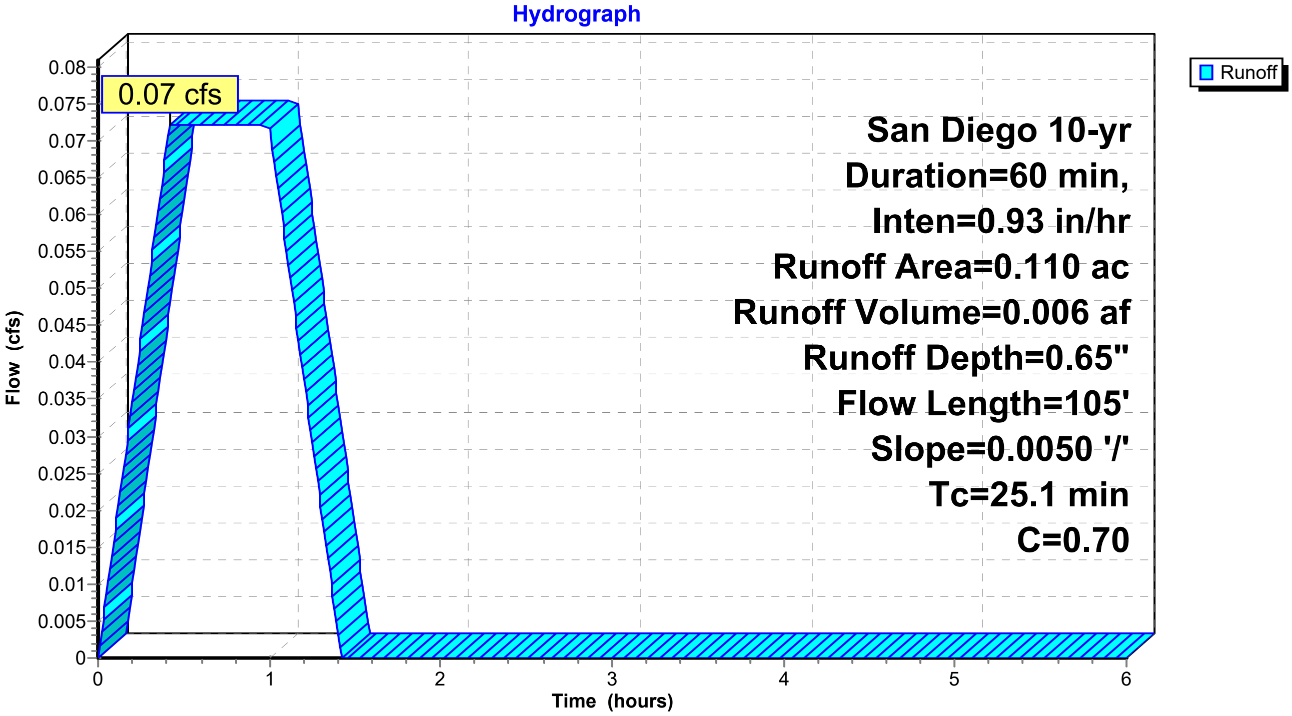
Runoff = 0.07 cfs @ 0.42 hrs, Volume= 0.006 af, Depth= 0.65"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.110	0.70	City of San Diego Table 2
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.1	105	0.0050	0.07		**Sheet Flow, Lawn** Grass: Short n= 0.150 P2= 1.60"

Subcatchment 14S: E-2



Summary for Subcatchment 15S: E-6

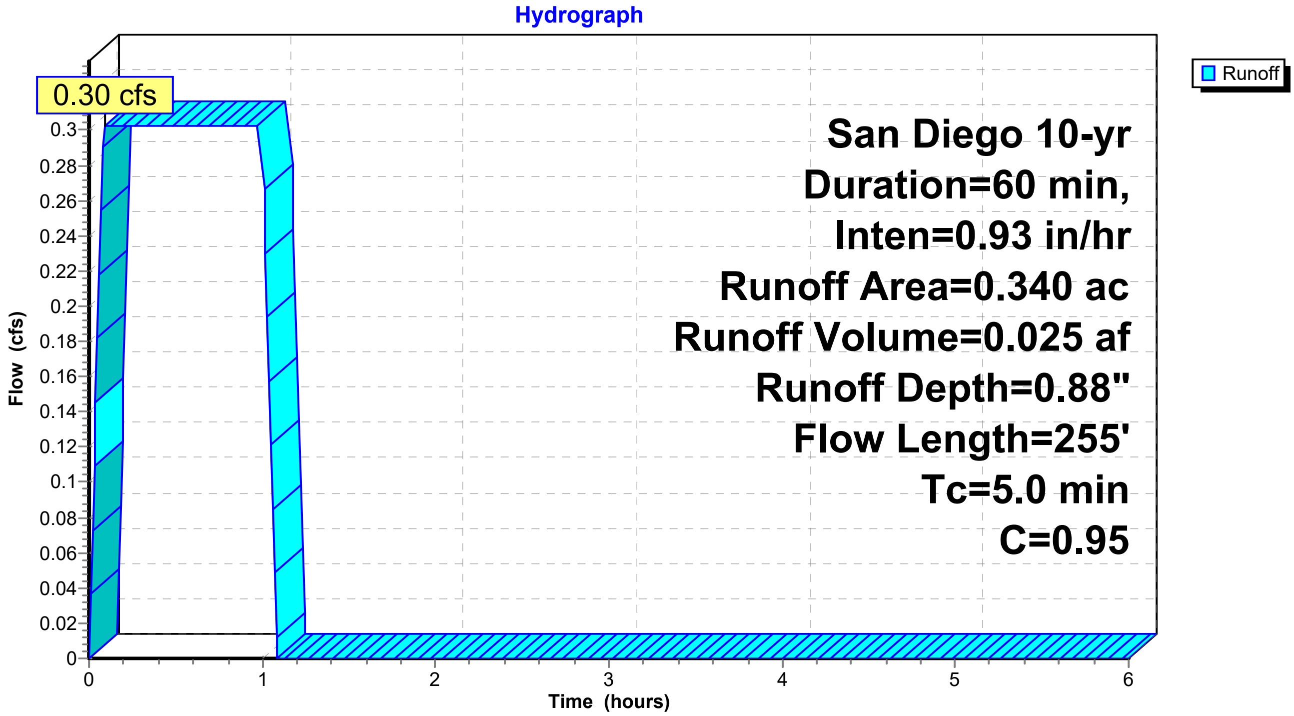
Runoff = 0.30 cfs @ 0.09 hrs, Volume= 0.025 af, Depth= 0.88"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.340	0.95	City of San Diego Table 2
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
2.2	70	0.0050	0.52		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
4.5	255	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 15S: E-6



Summary for Reach 10R: Existing 15-inch RCP

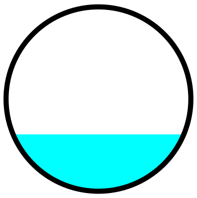
[52] Hint: Inlet/Outlet conditions not evaluated
[81] Warning: Exceeded Pond 2P by 1.65' @ 1.09 hrs

```
Inflow Area =        2.040 ac,  58.82% Impervious,  Inflow Depth =   0.72"    for  10-yr event
Inflow      =        1.48 cfs @     0.14 hrs,  Volume=          0.122 af
Outflow     =        1.48 cfs @     0.88 hrs,  Volume=          0.122 af,  Atten= 0%,  Lag= 44.4 min
```

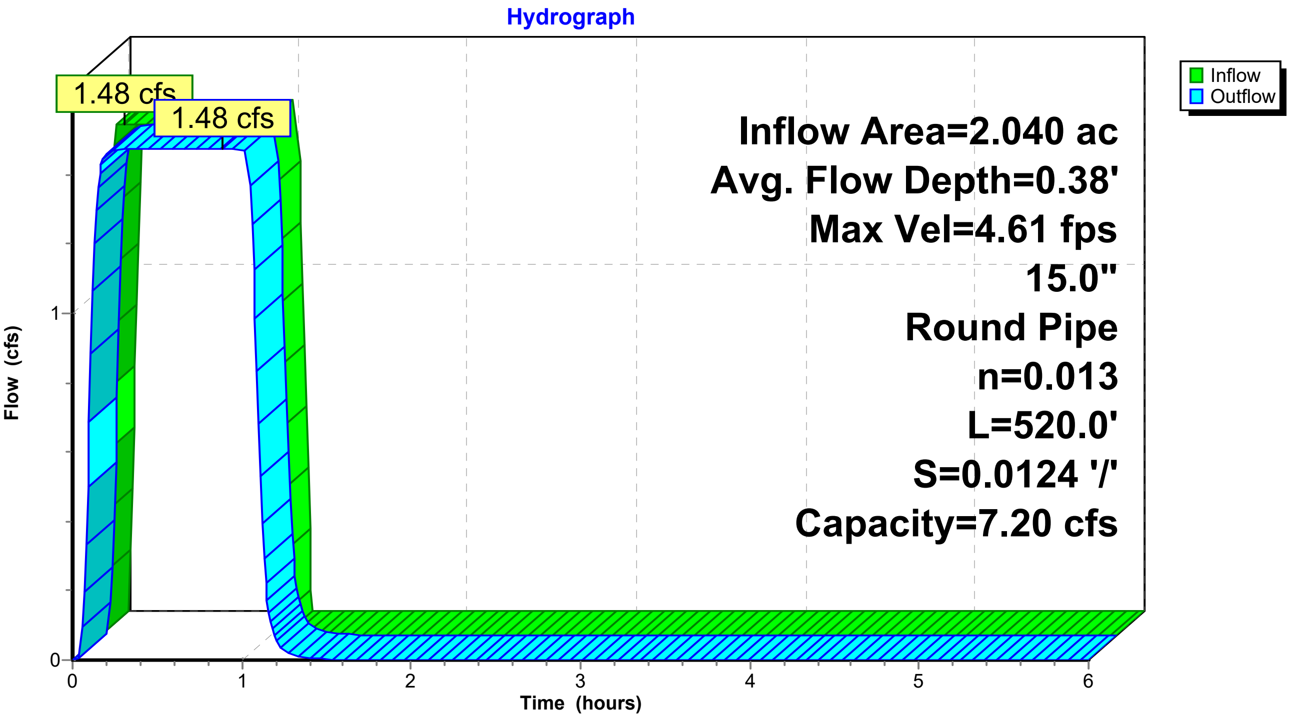
Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.61 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 2.39 fps, Avg. Travel Time= 3.6 min

Peak Storage= 166 cf @ 0.85 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 10R: Existing 15-inch RCP



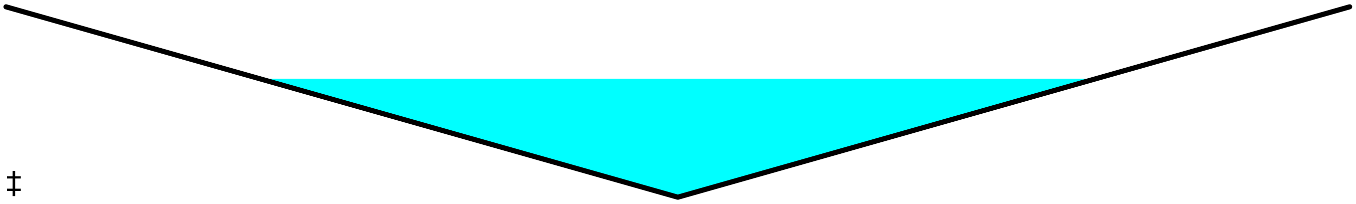
Summary for Reach 11R: Cross Gutter

Inflow Area = 0.450 ac, 75.56% Impervious, Inflow Depth = 0.83" for 10-yr event
Inflow = 0.38 cfs @ 0.42 hrs, Volume= 0.031 af
Outflow = 0.38 cfs @ 1.01 hrs, Volume= 0.031 af, Atten= 0%, Lag= 35.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.14 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 2.5 min

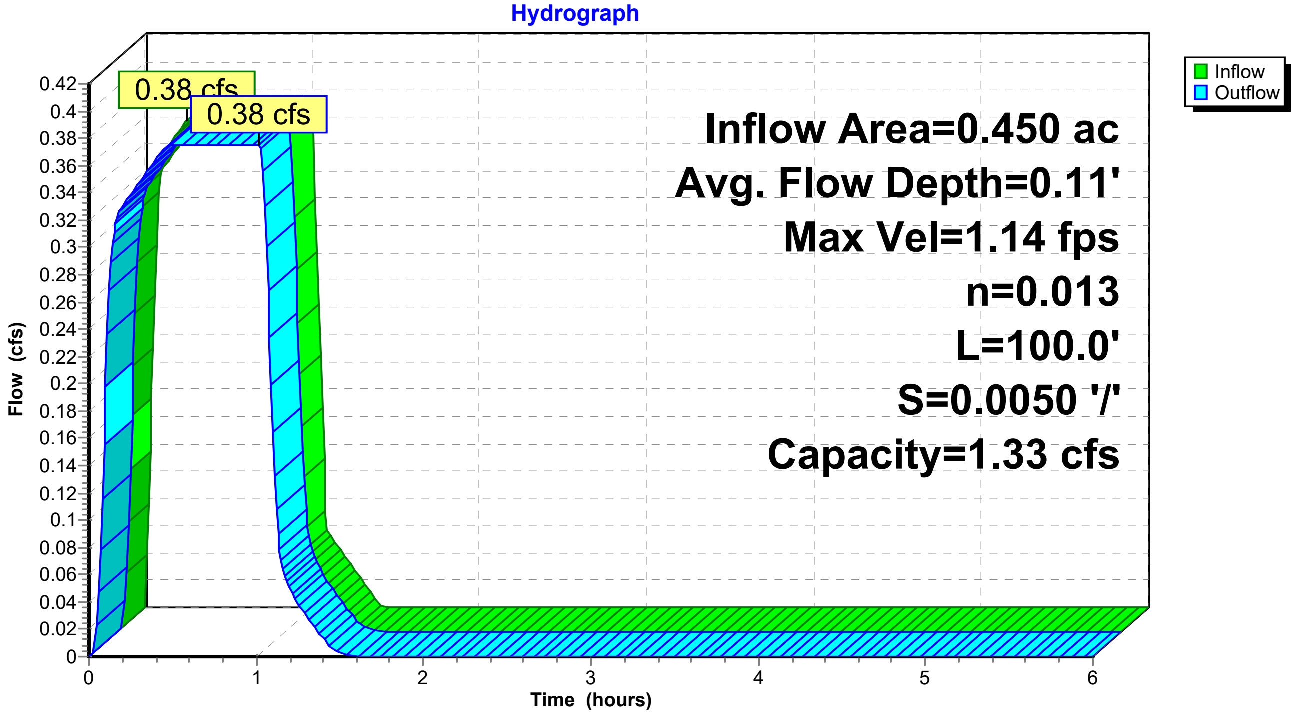
Peak Storage= 33 cf @ 0.97 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.17' Flow Area= 0.8 sf, Capacity= 1.33 cfs

0.00' x 0.17' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 10.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 20.60', Outlet Invert= 20.10'



‡

Reach 11R: Cross Gutter

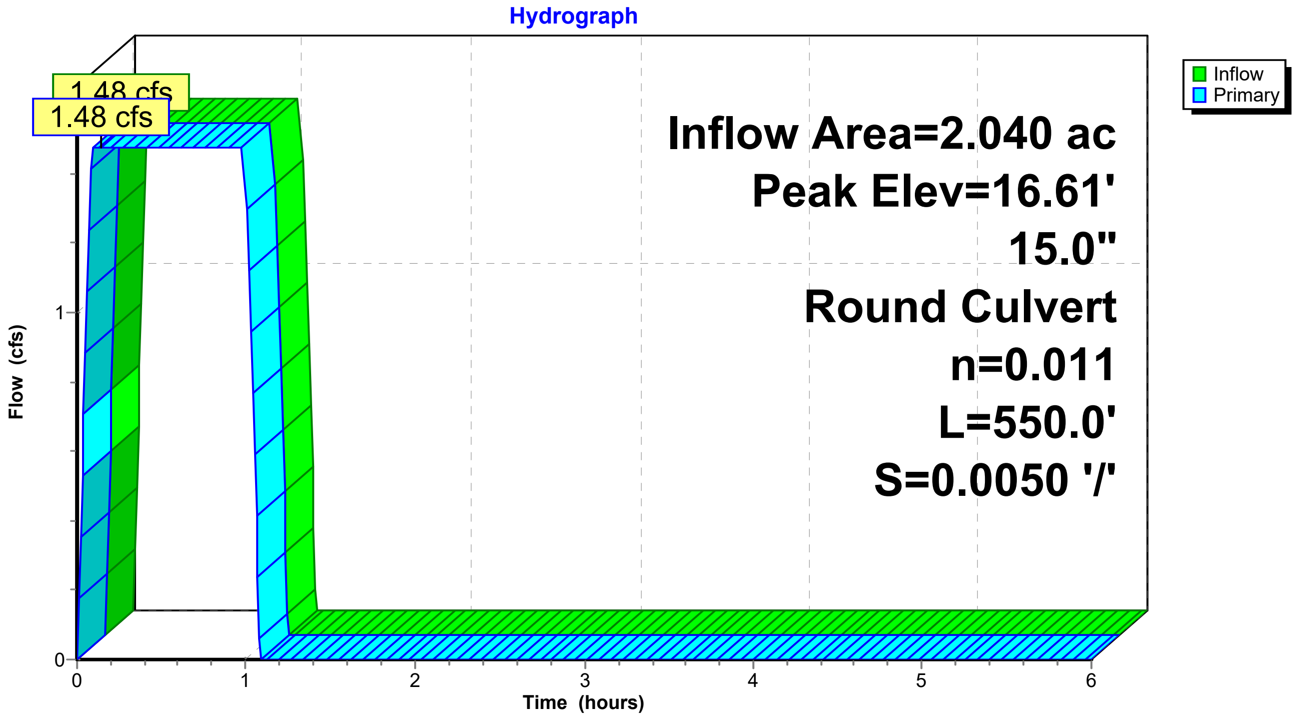


Summary for Pond 2P: Existing Catch Basin

```
Inflow Area =      2.040 ac, 58.82% Impervious, Inflow Depth =  0.72"   for 10-yr event
Inflow      =      1.48 cfs @   0.10 hrs, Volume=         0.122 af
Outflow     =      1.48 cfs @   0.14 hrs, Volume=         0.122 af, Atten= 0%, Lag= 2.4 min
Primary     =      1.48 cfs @   0.14 hrs, Volume=         0.122 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 16.61' @ 0.10 hrs
Flood Elev= 23.13'

Device  Routing         Invert  Outlet Devices
   #1   Primary         16.00'  15.0"  Round Culvert
                                L= 550.0'  RCP, square edge headwall,  Ke= 0.500
                                Inlet / Outlet Invert= 16.00' / 13.25'  S= 0.0050 '/'  Cc= 0.900
                                n= 0.011  Concrete pipe, straight & clean,  Flow Area= 1.23 sf
```

Primary OutFlow Max=1.47 cfs @ 0.14 hrs HW=16.61' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.47 cfs @ 3.66 fps)

Pond 2P: Existing Catch Basin



Summary for Pond 5P: Existing Catch Basin

[79] Warning: Submerged Pond 9P Primary device # 1 OUTLET by 0.40'

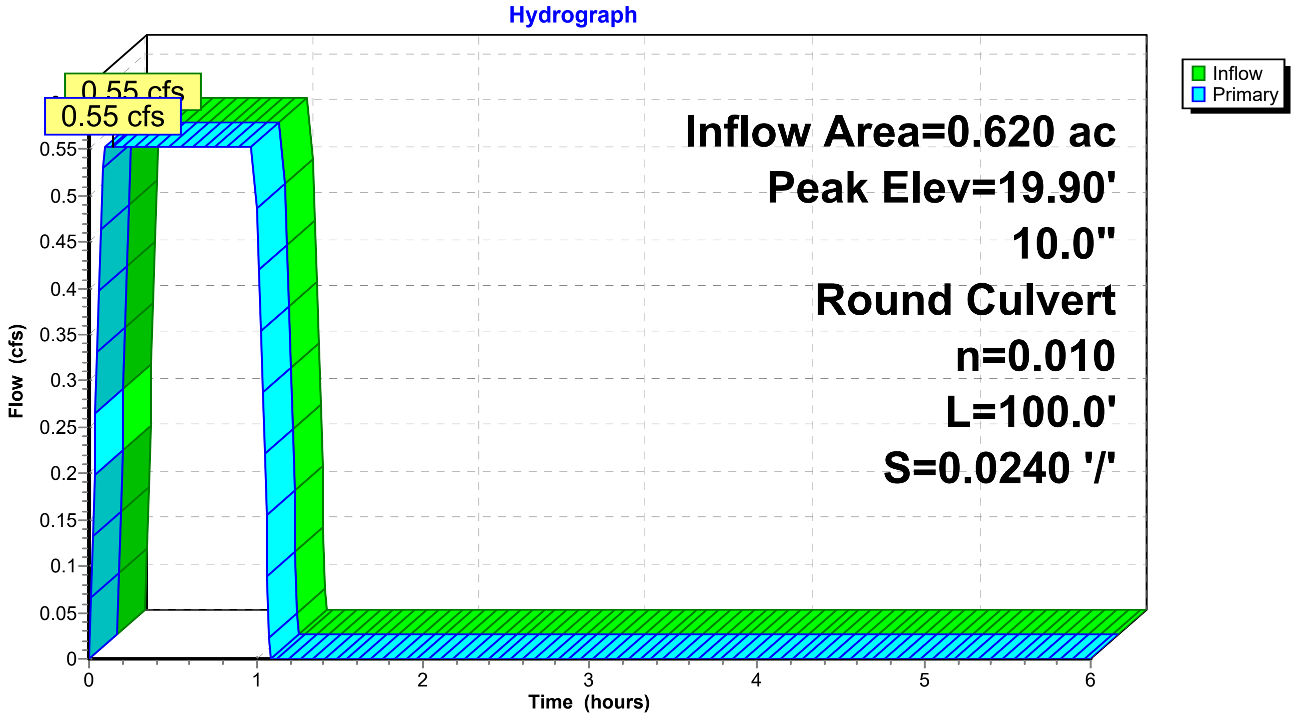
Inflow Area = 0.620 ac,100.00% Impervious, Inflow Depth = 0.88" for 10-yr event
Inflow = 0.55 cfs @ 0.10 hrs, Volume= 0.046 af
Outflow = 0.55 cfs @ 0.14 hrs, Volume= 0.046 af, Atten= 0%, Lag= 2.4 min
Primary = 0.55 cfs @ 0.14 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 19.90' @ 0.09 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**10.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 19.50' / 17.10' S= 0.0240 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.55 cfs @ 0.14 hrs HW=19.90' (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.55 cfs @ 2.15 fps)

Pond 5P: Existing Catch Basin



Summary for Pond 6P: Existing Catch Basin

[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 1.19'

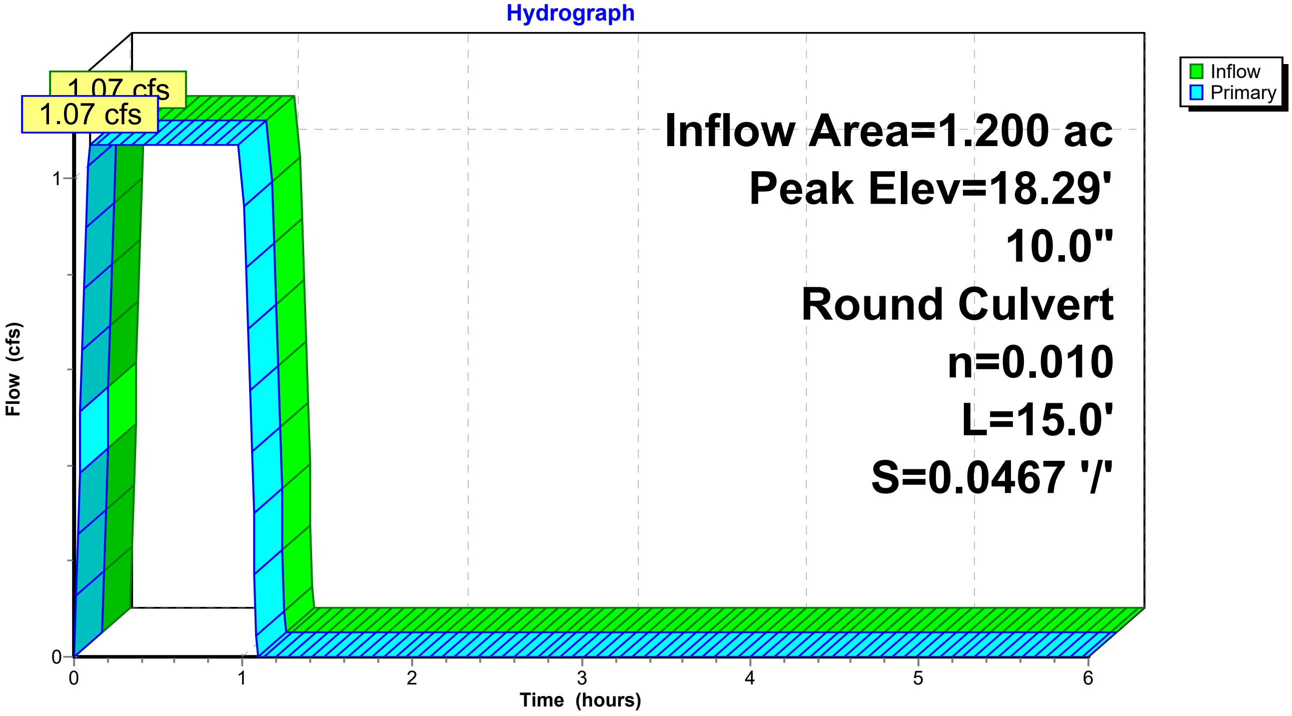
```
Inflow Area =      1.200 ac,100.00% Impervious,  Inflow Depth =  0.88"   for  10-yr event
Inflow      =      1.07 cfs @    0.10 hrs,  Volume=          0.088 af
Outflow     =      1.07 cfs @    0.10 hrs,  Volume=          0.088 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      1.07 cfs @    0.10 hrs,  Volume=          0.088 af
```

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 18.29' @ 0.09 hrs
Flood Elev= 23.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	17.70'	**10.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 17.70' / 17.00' S= 0.0467 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.07 cfs @ 0.10 hrs HW=18.29' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.07 cfs @ 2.61 fps)

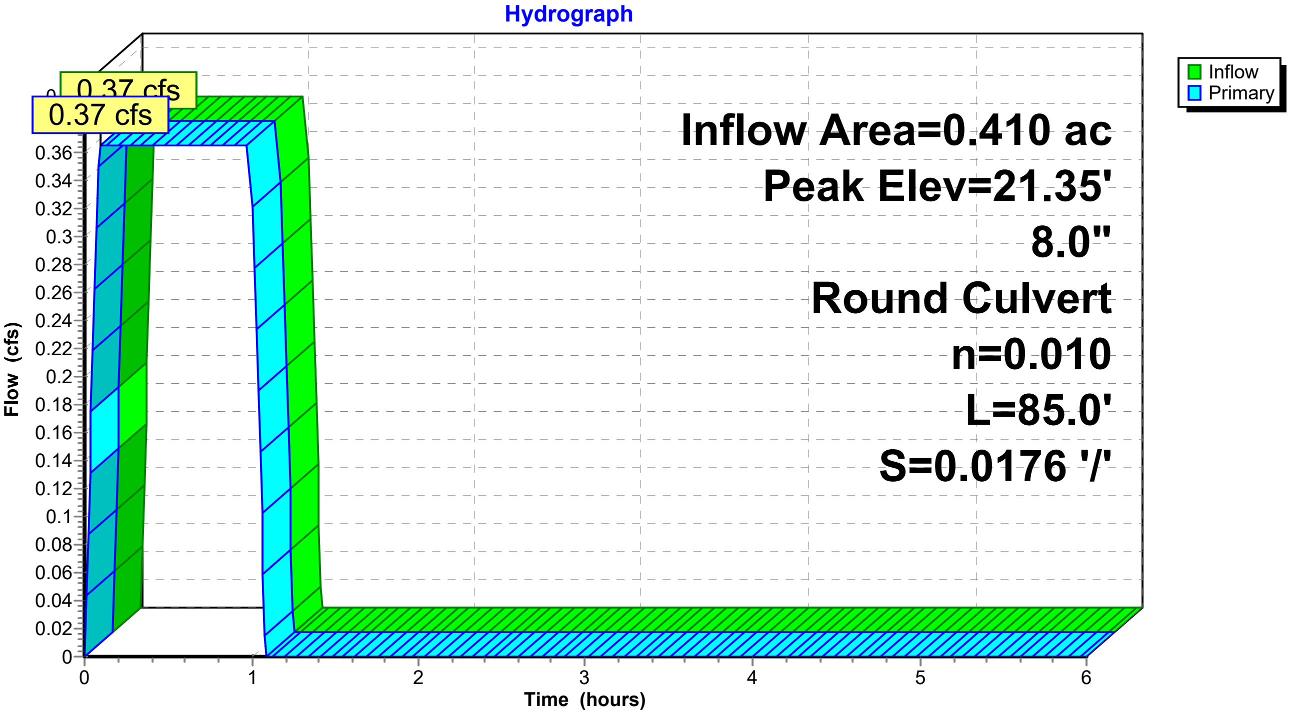
Pond 6P: Existing Catch Basin



Summary for Pond 9P: Existing Catch Basin

```
Inflow Area =        0.410 ac,100.00% Impervious,  Inflow Depth =   0.88"    for  10-yr event
Inflow      =       0.37 cfs @     0.09 hrs,  Volume=            0.030 af
Outflow     =       0.37 cfs @     0.10 hrs,  Volume=            0.030 af,  Atten= 0%,  Lag= 0.6 min
Primary     =       0.37 cfs @     0.10 hrs,  Volume=            0.030 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 21.35' @ 0.09 hrs
Flood Elev= 23.00'

Device    Routing              Invert   Outlet Devices
   #1     Primary              21.00'   8.0"  Round Culvert
                                        L= 85.0'   CPP, square edge headwall,  Ke= 0.500
                                        Inlet / Outlet Invert= 21.00' / 19.50'  S= 0.0176 '/'   Cc= 0.900
                                        n= 0.010  PVC, smooth interior,  Flow Area= 0.35 sf

Primary OutFlow  Max=0.37 cfs @ 0.10 hrs  HW=21.35'   (Free Discharge)
  └1=Culvert  (Inlet Controls 0.37 cfs @ 2.00 fps)
```

Pond 9P: Existing Catch Basin



Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: E-1 Runoff Area=0.070 ac 0.00% Impervious Runoff Depth=0.99"
Flow Length=340' Tc=5.0 min C=0.70 Runoff=0.07 cfs 0.006 af

Subcatchment 3S: E-4 Runoff Area=0.210 ac 100.00% Impervious Runoff Depth=1.35"
Flow Length=155' Slope=0.0200 '/' Tc=5.0 min C=0.95 Runoff=0.29 cfs 0.024 af

Subcatchment 7S: E-3 Runoff Area=0.410 ac 100.00% Impervious Runoff Depth=1.35"
Flow Length=240' Tc=5.0 min C=0.95 Runoff=0.56 cfs 0.046 af

Subcatchment 10S: E-5 Runoff Area=0.390 ac 100.00% Impervious Runoff Depth=1.35"
Flow Length=215' Tc=5.0 min C=0.95 Runoff=0.53 cfs 0.044 af

Subcatchment 11S: E-7 Runoff Area=0.190 ac 100.00% Impervious Runoff Depth=1.35"
Flow Length=120' Slope=0.0050 '/' Tc=5.0 min C=0.95 Runoff=0.26 cfs 0.021 af

Subcatchment 12S: E-9 Runoff Area=0.330 ac 0.00% Impervious Runoff Depth=0.71"
Flow Length=260' Tc=5.0 min C=0.50 Runoff=0.24 cfs 0.020 af

Subcatchment 13S: E-8 Runoff Area=0.440 ac 0.00% Impervious Runoff Depth=0.71"
Flow Length=335' Tc=5.0 min C=0.50 Runoff=0.32 cfs 0.026 af

Subcatchment 14S: E-2 Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=0.99"
Flow Length=105' Slope=0.0050 '/' Tc=25.1 min C=0.70 Runoff=0.11 cfs 0.009 af

Subcatchment 15S: E-6 Runoff Area=0.340 ac 100.00% Impervious Runoff Depth=1.35"
Flow Length=255' Tc=5.0 min C=0.95 Runoff=0.46 cfs 0.038 af

Reach 10R: Existing 15-inch RCP Avg. Flow Depth=0.48' Max Vel=5.19 fps Inflow=2.25 cfs 0.186 af
15.0" Round Pipe n=0.013 L=520.0' S=0.0124 '/' Capacity=7.20 cfs Outflow=2.25 cfs 0.186 af

Reach 11R: Cross Gutter Avg. Flow Depth=0.12' Max Vel=1.27 fps Inflow=0.57 cfs 0.047 af
n=0.013 L=100.0' S=0.0050 '/' Capacity=1.33 cfs Outflow=0.57 cfs 0.047 af

Pond 2P: Existing Catch Basin Peak Elev=16.77' Inflow=2.25 cfs 0.186 af
15.0" Round Culvert n=0.011 L=550.0' S=0.0050 '/' Outflow=2.25 cfs 0.186 af

Pond 5P: Existing Catch Basin Peak Elev=20.01' Inflow=0.84 cfs 0.070 af
10.0" Round Culvert n=0.010 L=100.0' S=0.0240 '/' Outflow=0.84 cfs 0.070 af

Pond 6P: Existing Catch Basin Peak Elev=18.50' Inflow=1.63 cfs 0.135 af
10.0" Round Culvert n=0.010 L=15.0' S=0.0467 '/' Outflow=1.63 cfs 0.135 af

Pond 9P: Existing Catch Basin Peak Elev=21.44' Inflow=0.56 cfs 0.046 af
8.0" Round Culvert n=0.010 L=85.0' S=0.0176 '/' Outflow=0.56 cfs 0.046 af

Total Runoff Area = 2.490 ac Runoff Volume = 0.234 af Average Runoff Depth = 1.13"
38.15% Pervious = 0.950 ac 61.85% Impervious = 1.540 ac

Summary for Subcatchment 1S: E-1

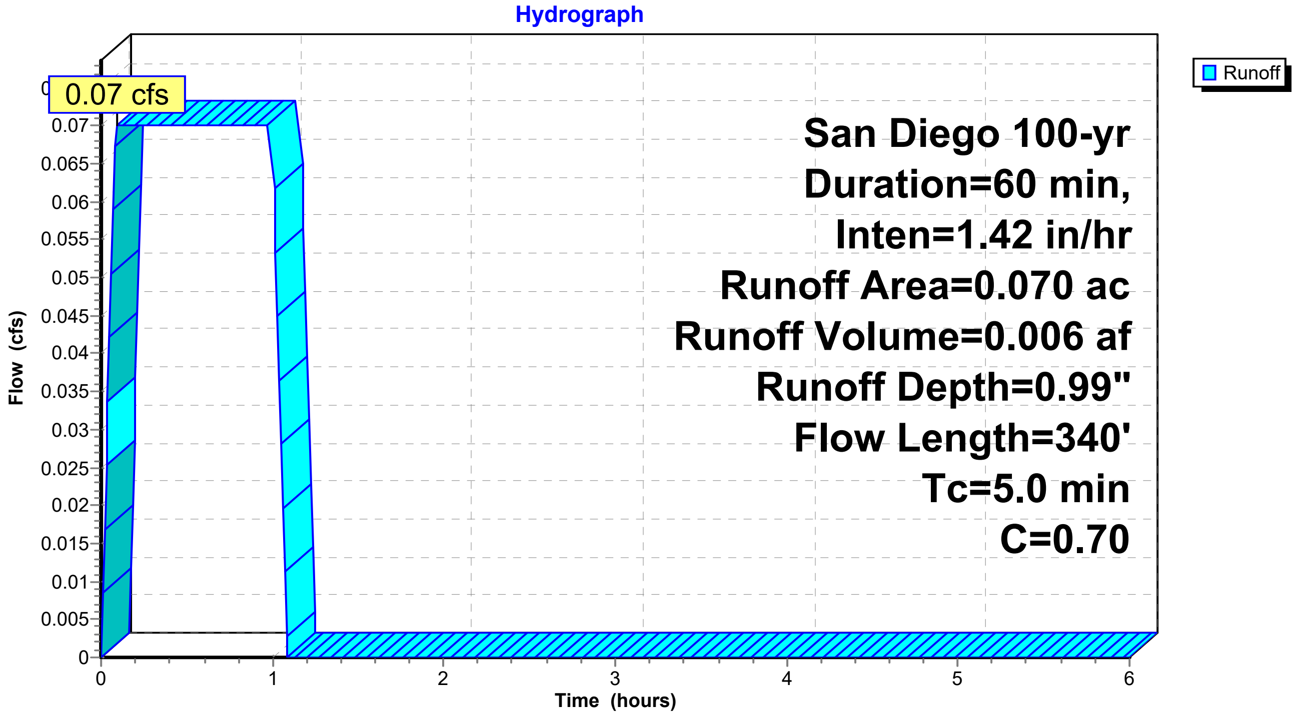
Runoff = 0.07 cfs @ 0.09 hrs, Volume= 0.006 af, Depth= 0.99"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.070	0.70	City of San Diego Table 2
0.070		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	90	0.0200	0.95		**Sheet Flow, Residential Lot** Smooth surfaces n= 0.011 P2= 1.60"
1.6	250	0.0160	2.57		**Shallow Concentrated Flow, Alley Flow** Paved Kv= 20.3 fps
3.2	340	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: E-1



Summary for Subcatchment 3S: E-4

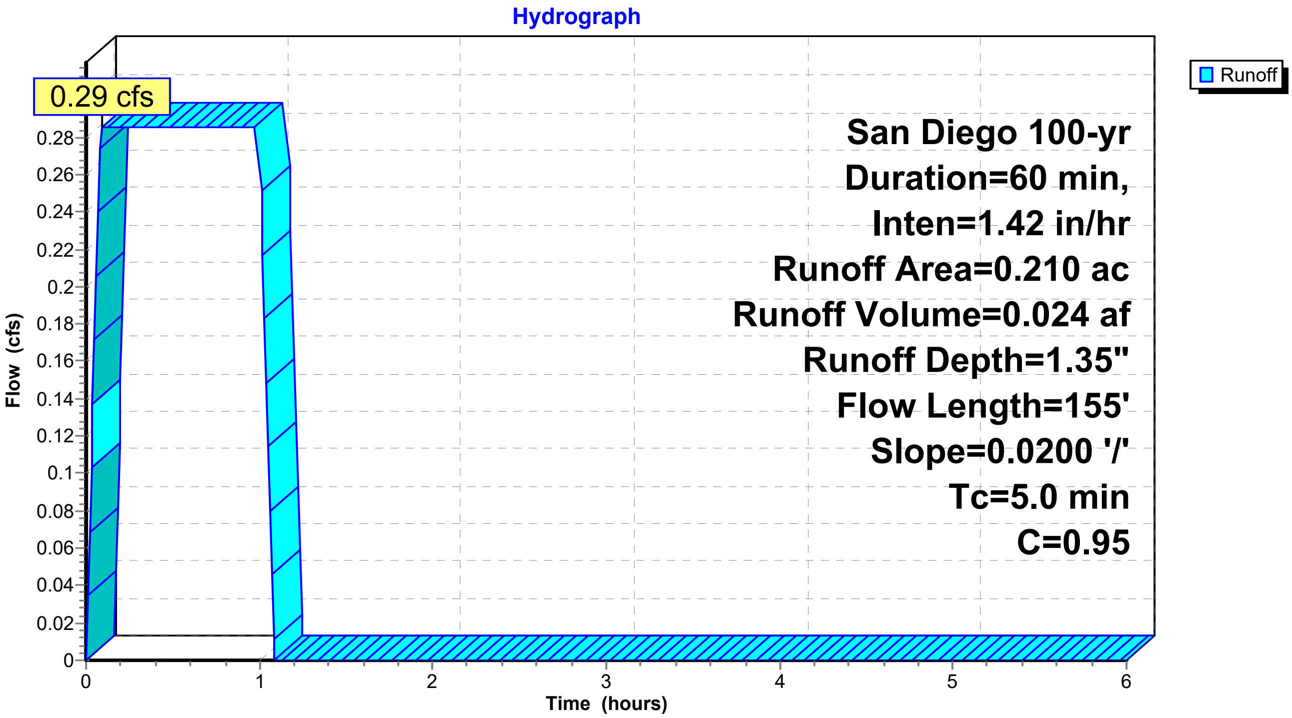
Runoff = 0.29 cfs @ 0.09 hrs, Volume= 0.024 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.210	0.95	City of San Diego Table 2
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	155	0.0200	1.06		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
2.4	155	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: E-4



Summary for Subcatchment 7S: E-3

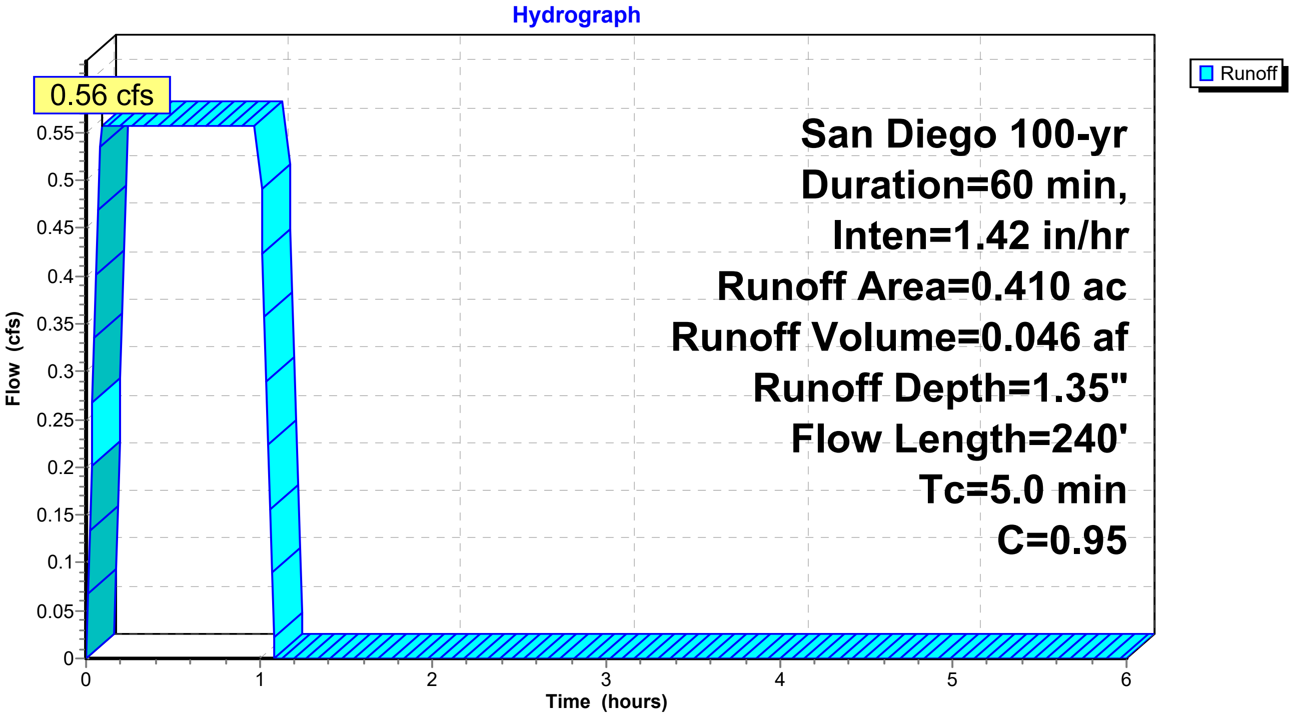
Runoff = 0.56 cfs @ 0.09 hrs, Volume= 0.046 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.410	0.95	City of San Diego Table 2
0.410		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
1.4	55	0.0100	0.65		**Sheet Flow, Paved Surface** Smooth surfaces n= 0.011 P2= 1.60"
3.7	240	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 7S: E-3



Summary for Subcatchment 10S: E-5

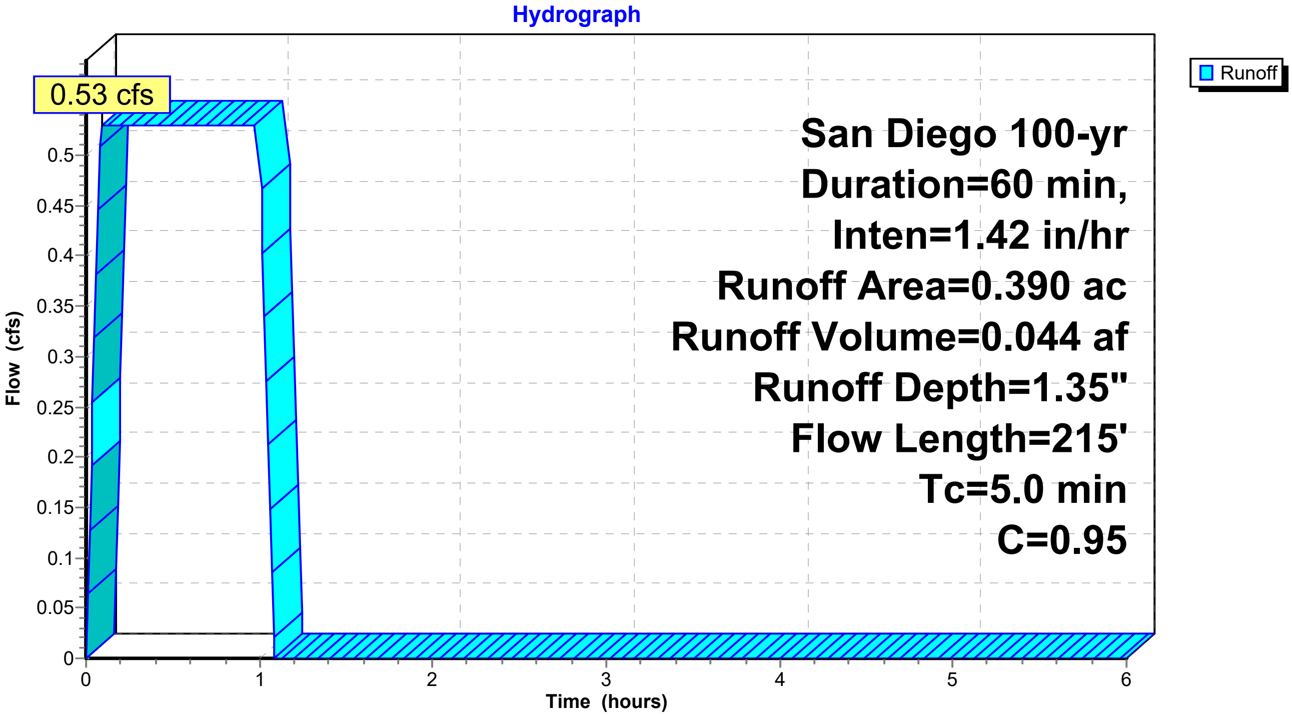
Runoff = 0.53 cfs @ 0.09 hrs, Volume= 0.044 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.390	0.95	City of San Diego Table 2
0.390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	70	0.2500	2.49		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.2	145	0.0100	2.03		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
1.7	215	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 10S: E-5



Summary for Subcatchment 11S: E-7

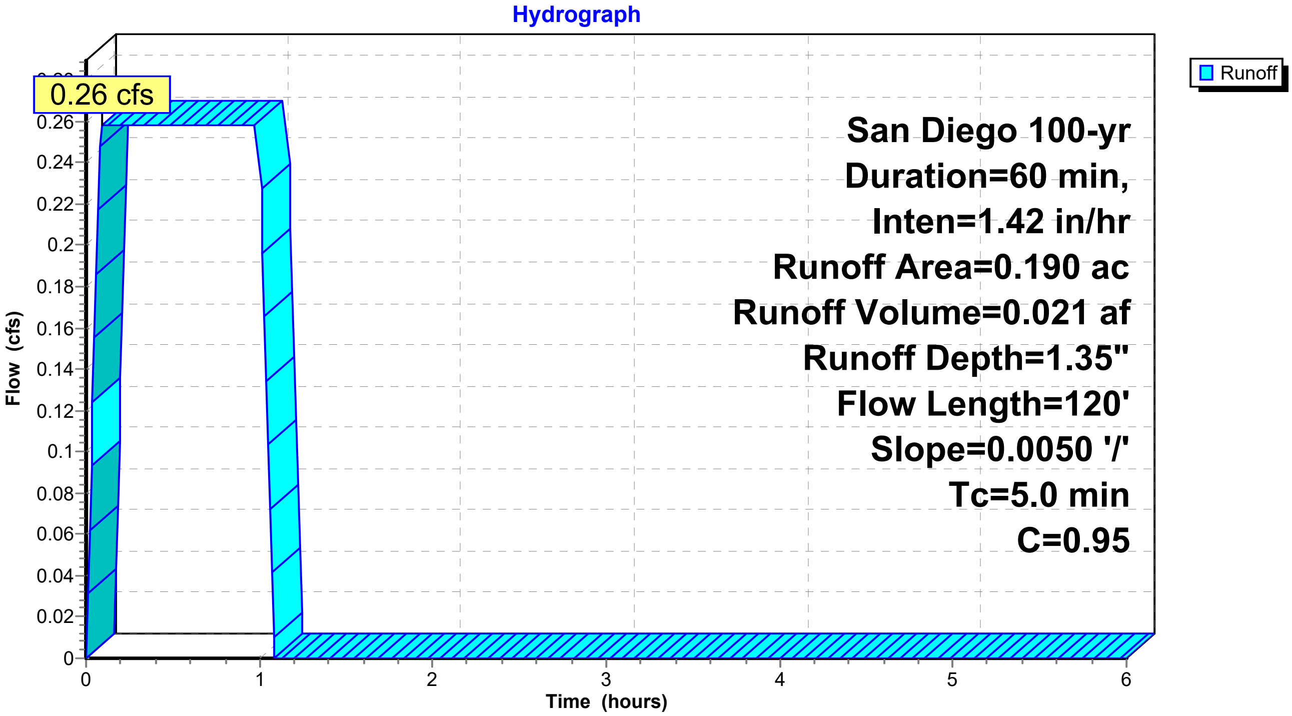
Runoff = 0.26 cfs @ 0.09 hrs, Volume= 0.021 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.190	0.95	City of San Diego Table 2
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	120	0.0050	0.58		**Sheet Flow, E-7** Smooth surfaces n= 0.011 P2= 1.60"
3.5	120	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 11S: E-7



Summary for Subcatchment 12S: E-9

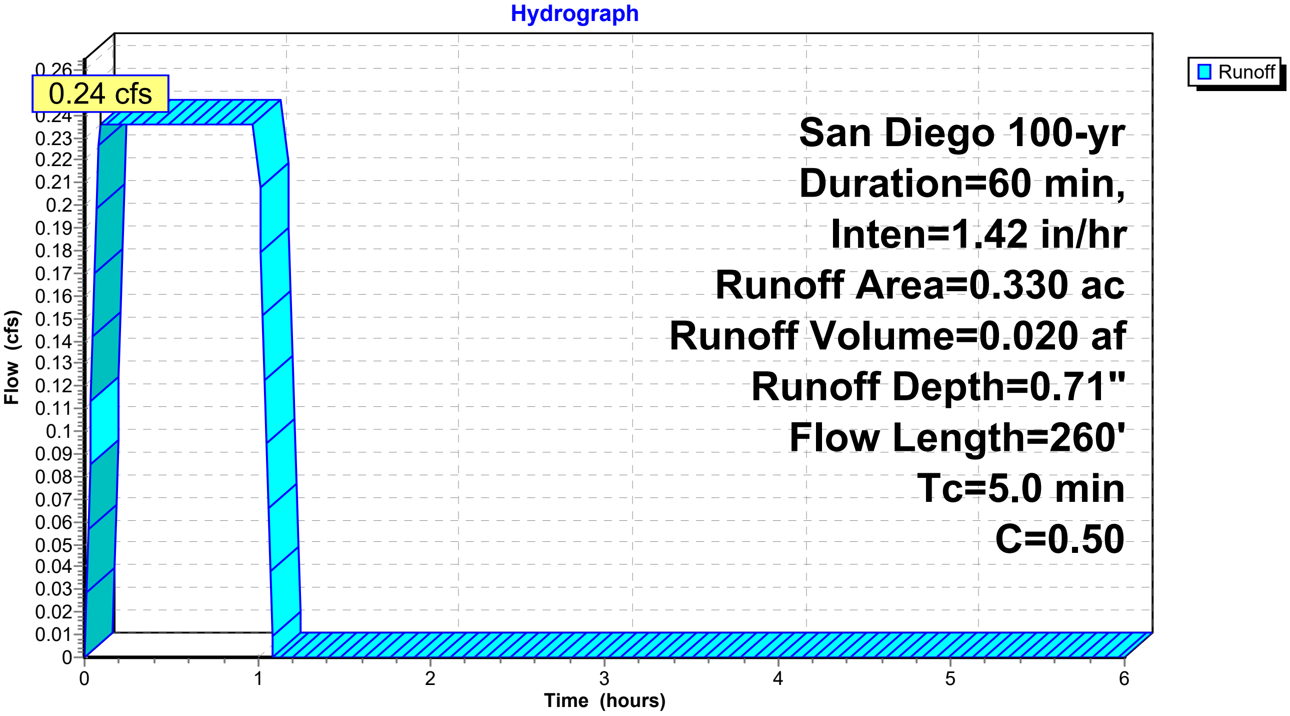
Runoff = 0.24 cfs @ 0.09 hrs, Volume= 0.020 af, Depth= 0.71"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.330	0.50	City of San Diego Table 2
0.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	30	0.5000	0.15		**Sheet Flow,** Grass: Bermuda n= 0.410 P2= 1.60"
1.3	230	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.6	260	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: E-9



Summary for Subcatchment 13S: E-8

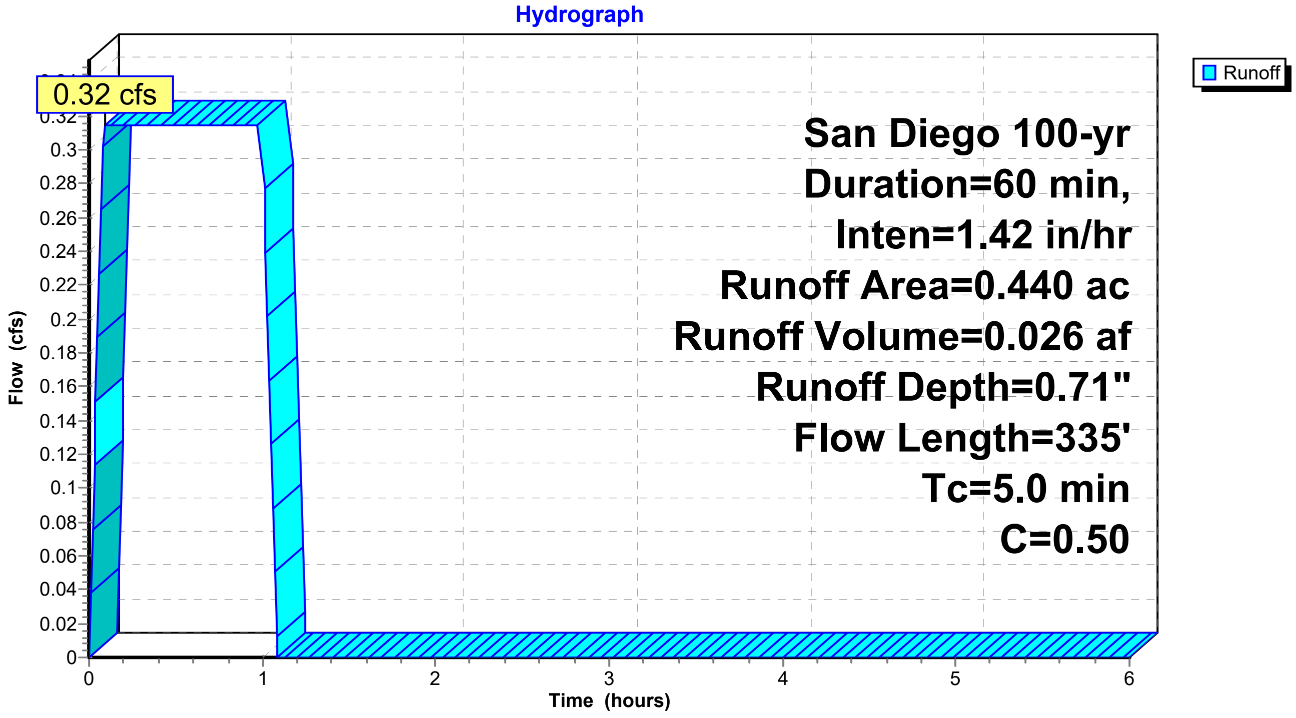
Runoff = 0.32 cfs @ 0.09 hrs, Volume= 0.026 af, Depth= 0.71"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.440	0.50	City of San Diego Table 2
0.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.5000	0.23		**Sheet Flow, Slope** Grass: Dense n= 0.240 P2= 1.60"
1.8	310	0.0200	2.87		**Shallow Concentrated Flow, Alley** Paved Kv= 20.3 fps
3.6	335	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 13S: E-8



Summary for Subcatchment 14S: E-2

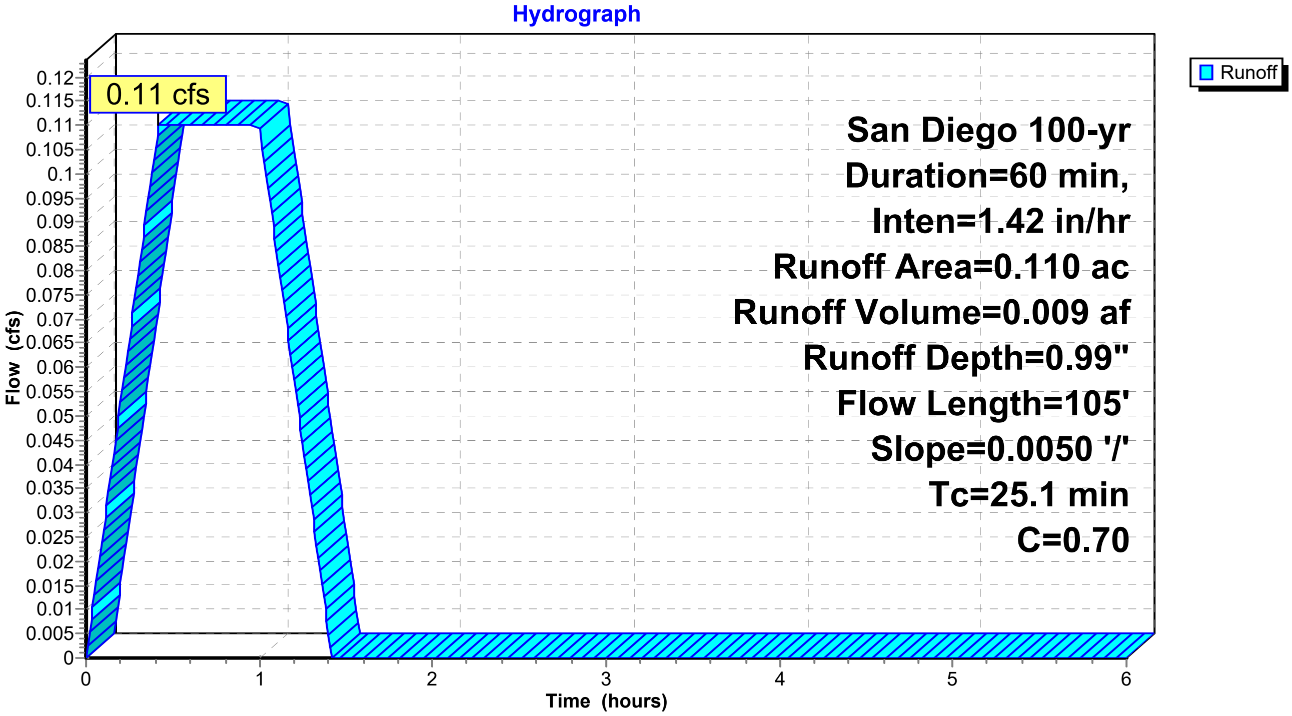
Runoff = 0.11 cfs @ 0.42 hrs, Volume= 0.009 af, Depth= 0.99"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.110	0.70	City of San Diego Table 2
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.1	105	0.0050	0.07		**Sheet Flow, Lawn** Grass: Short n= 0.150 P2= 1.60"

Subcatchment 14S: E-2



Summary for Subcatchment 15S: E-6

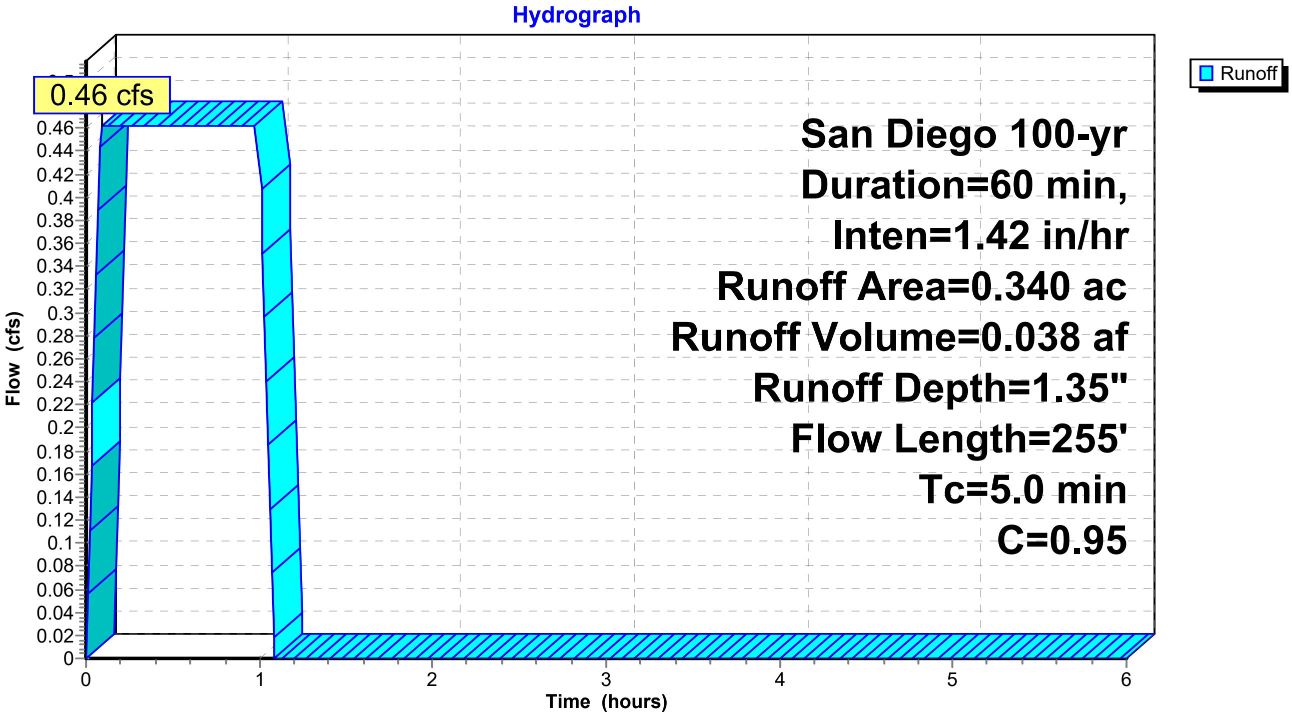
Runoff = 0.46 cfs @ 0.09 hrs, Volume= 0.038 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.340	0.95	City of San Diego Table 2
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	65	0.2500	2.45		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 1.60"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Swale along wall** Grassed Waterway Kv= 15.0 fps
2.2	70	0.0050	0.52		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 1.60"
4.5	255	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 15S: E-6



Summary for Reach 10R: Existing 15-inch RCP

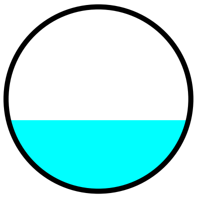
[52] Hint: Inlet/Outlet conditions not evaluated
[81] Warning: Exceeded Pond 2P by 1.69' @ 1.09 hrs

```
Inflow Area =          2.040 ac,  58.82% Impervious,  Inflow Depth =   1.10"    for  100-yr event
Inflow      =         2.25 cfs @     0.09 hrs,  Volume=            0.186 af
Outflow     =         2.25 cfs @     0.81 hrs,  Volume=            0.186 af,  Atten= 0%,  Lag= 43.2 min
```

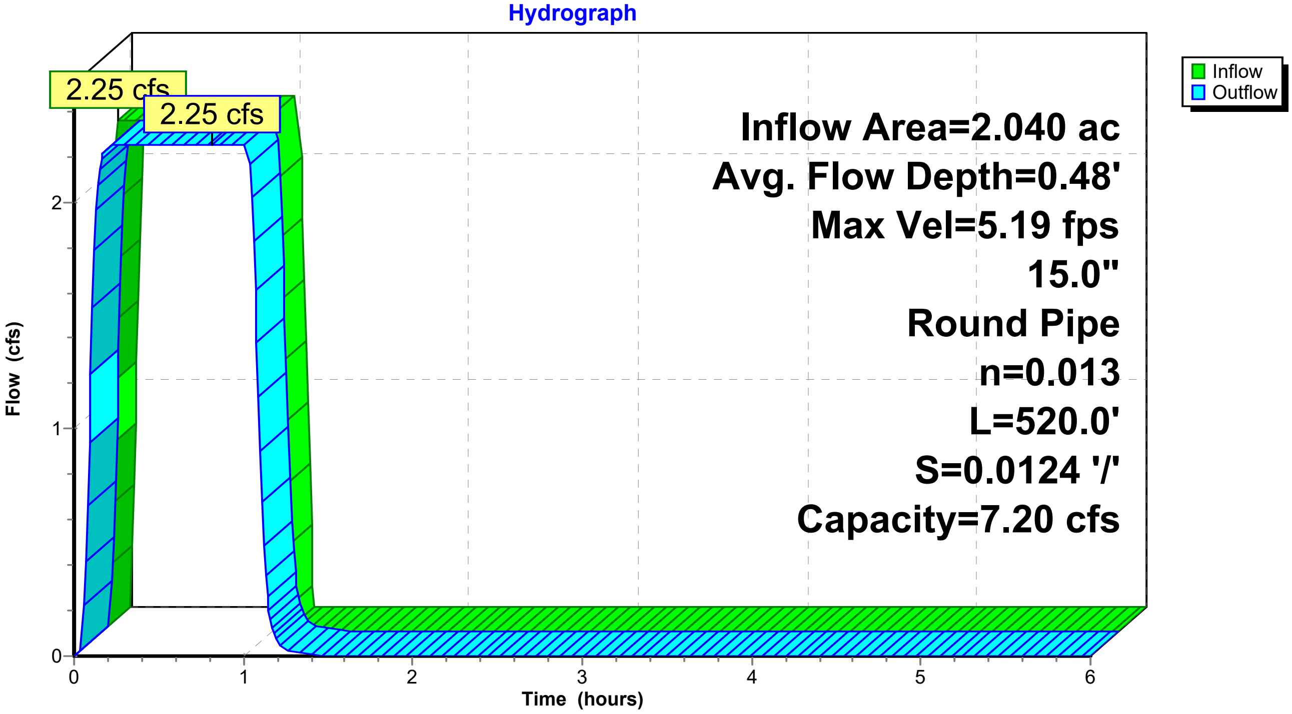
Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.19 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.65 fps, Avg. Travel Time= 3.3 min

Peak Storage= 226 cf @ 0.78 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 10R: Existing 15-inch RCP



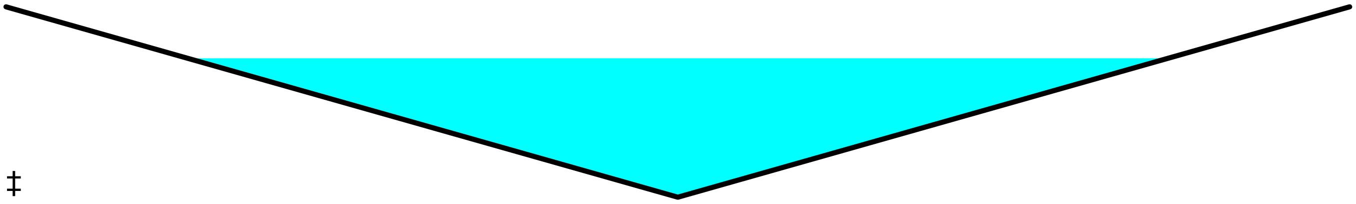
Summary for Reach 11R: Cross Gutter

Inflow Area = 0.450 ac, 75.56% Impervious, Inflow Depth = 1.26" for 100-yr event
Inflow = 0.57 cfs @ 0.42 hrs, Volume= 0.047 af
Outflow = 0.57 cfs @ 0.94 hrs, Volume= 0.047 af, Atten= 0%, Lag= 31.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.27 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 2.3 min

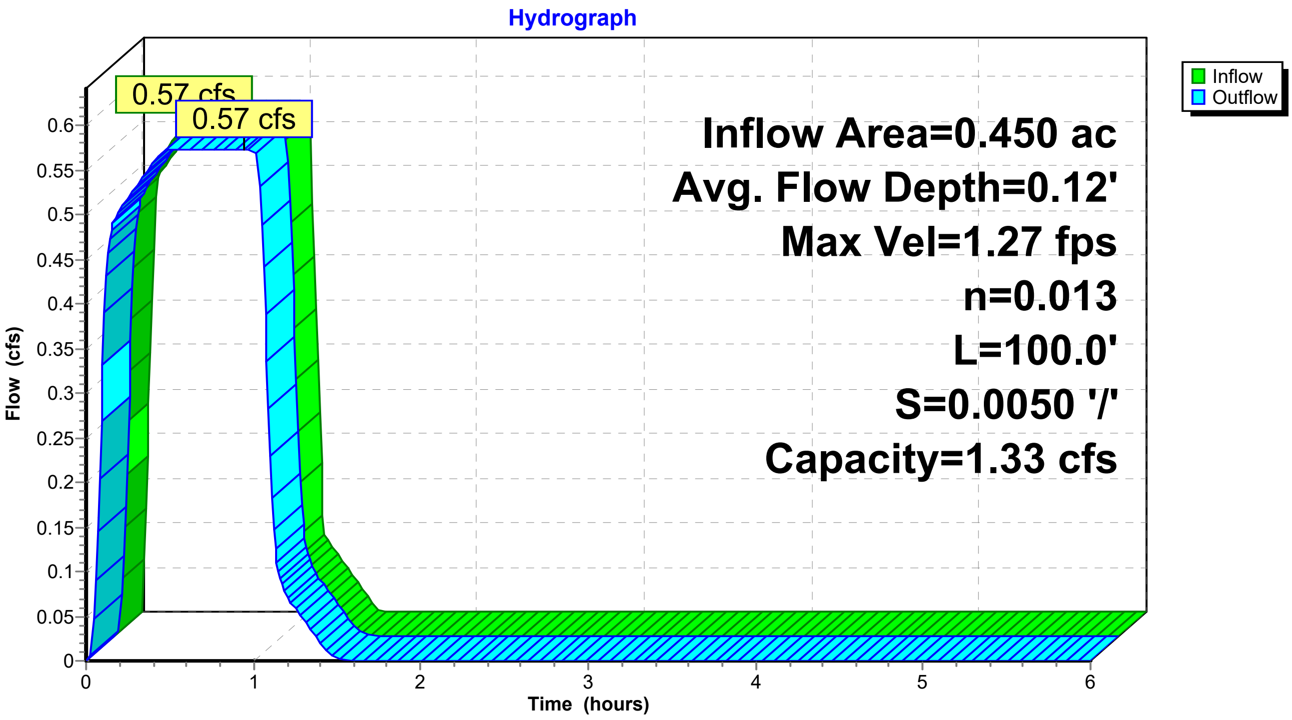
Peak Storage= 45 cf @ 0.92 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.17' Flow Area= 0.8 sf, Capacity= 1.33 cfs

0.00' x 0.17' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 10.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 20.60', Outlet Invert= 20.10'



‡

Reach 11R: Cross Gutter



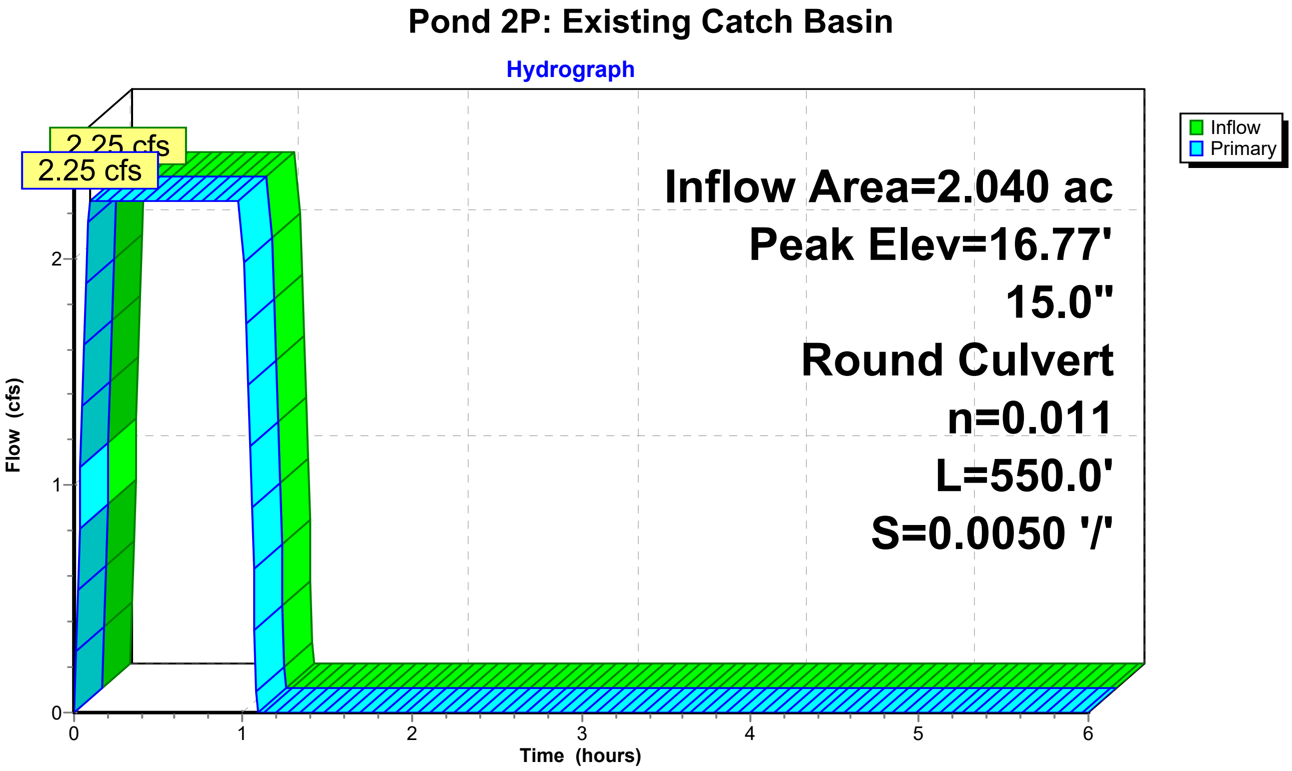
Summary for Pond 2P: Existing Catch Basin

```
Inflow Area =      2.040 ac, 58.82% Impervious, Inflow Depth =  1.10"   for 100-yr event
Inflow      =      2.25 cfs @    0.10 hrs, Volume=          0.186 af
Outflow     =      2.25 cfs @    0.09 hrs, Volume=          0.186 af, Atten= 0%, Lag= 0.0 min
Primary     =      2.25 cfs @    0.09 hrs, Volume=          0.186 af
```

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 16.77' @ 0.09 hrs
Flood Elev= 23.13'

Device	Routing	Invert	Outlet Devices
#1	Primary	16.00'	**15.0" Round Culvert** L= 550.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 16.00' / 13.25' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=2.25 cfs @ 0.09 hrs HW=16.77' (Free Discharge)
↑**1=Culvert** (Barrel Controls 2.25 cfs @ 4.08 fps)



Summary for Pond 5P: Existing Catch Basin

[79] Warning: Submerged Pond 9P Primary device # 1 OUTLET by 0.51'

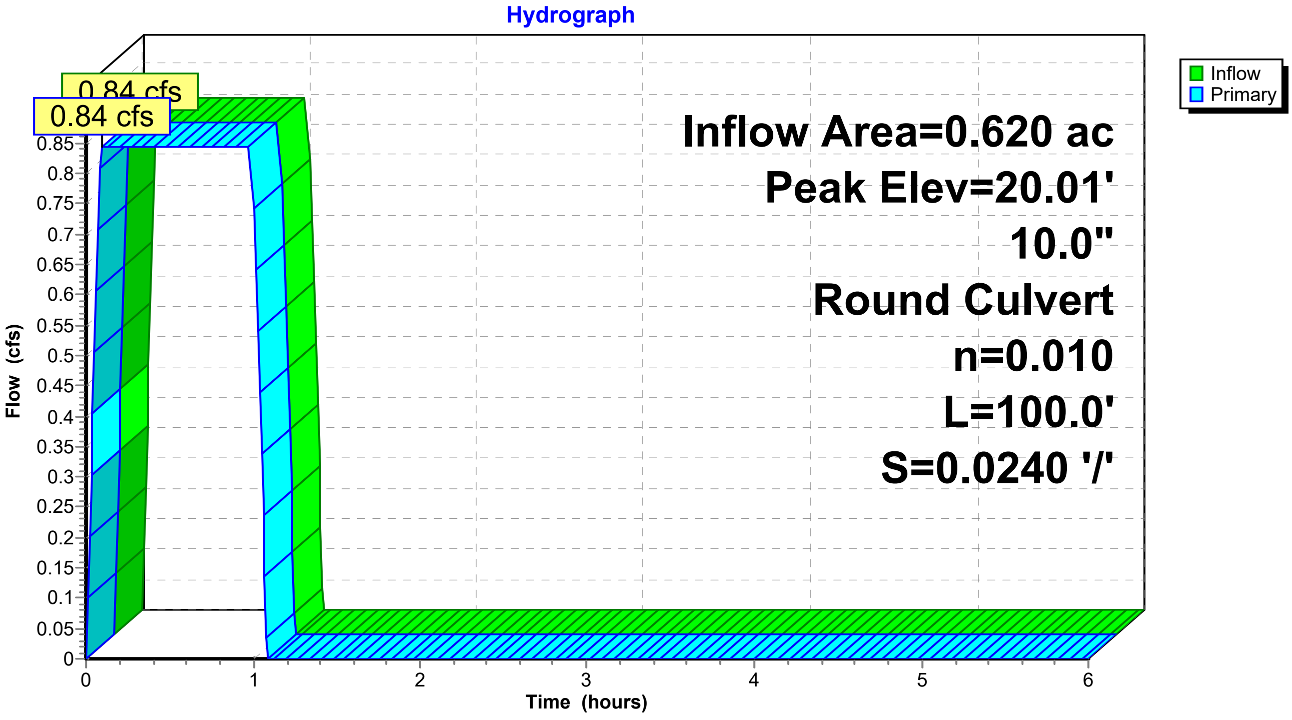
Inflow Area = 0.620 ac,100.00% Impervious, Inflow Depth = 1.35" for 100-yr event
Inflow = 0.84 cfs @ 0.09 hrs, Volume= 0.070 af
Outflow = 0.84 cfs @ 0.10 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.6 min
Primary = 0.84 cfs @ 0.10 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 20.01' @ 0.09 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	19.50'	**10.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 19.50' / 17.10' S= 0.0240 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.84 cfs @ 0.10 hrs HW=20.01' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.84 cfs @ 2.43 fps)

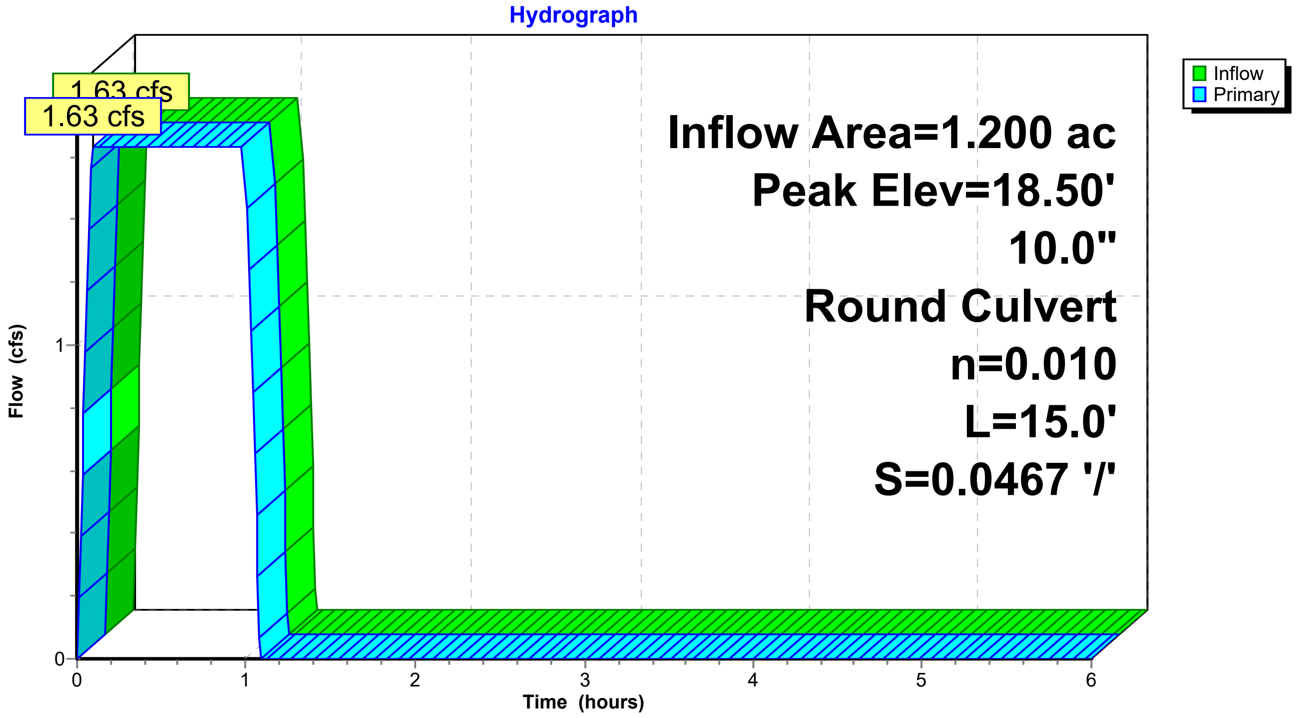
Pond 5P: Existing Catch Basin



Summary for Pond 6P: Existing Catch Basin

```
[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 1.40'

Inflow Area =      1.200 ac,100.00% Impervious,  Inflow Depth =   1.35"    for  100-yr event
Inflow      =      1.63 cfs @    0.10 hrs,  Volume=          0.135 af
Outflow     =      1.63 cfs @    0.10 hrs,  Volume=          0.135 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      1.63 cfs @    0.10 hrs,  Volume=          0.135 af

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 18.50' @ 0.09 hrs
Flood Elev= 23.24'

Device   Routing          Invert   Outlet Devices
   #1    Primary          17.70'   10.0"  Round Culvert
                                   L= 15.0'   CPP, square edge headwall,  Ke= 0.500
                                   Inlet / Outlet Invert= 17.70' / 17.00'   S= 0.0467 '/'   Cc= 0.900
                                   n= 0.010  PVC, smooth interior,  Flow Area= 0.55 sf

Primary OutFlow  Max=1.64 cfs @ 0.10 hrs  HW=18.50'   (Free Discharge)
   └─1=Culvert  (Inlet Controls 1.64 cfs @ 3.04 fps)
```

Pond 6P: Existing Catch Basin



Summary for Pond 9P: Existing Catch Basin

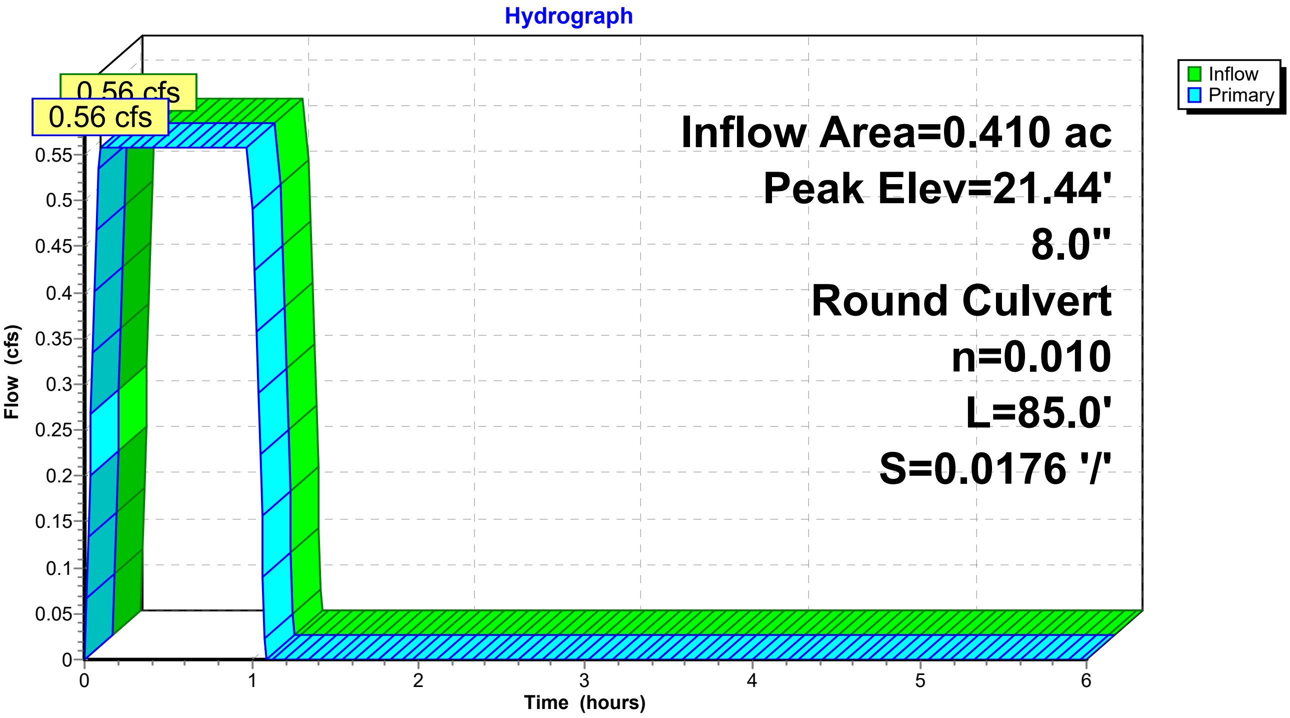
```
Inflow Area =        0.410 ac,100.00% Impervious,  Inflow Depth =   1.35"    for  100-yr event
Inflow      =       0.56 cfs @     0.09 hrs,  Volume=           0.046 af
Outflow     =       0.56 cfs @     0.09 hrs,  Volume=           0.046 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       0.56 cfs @     0.09 hrs,  Volume=           0.046 af
```

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 21.44' @ 0.09 hrs
Flood Elev= 23.00'

```
Device   Routing        Invert   Outlet Devices
   #1    Primary        21.00'   8.0"  Round Culvert
                                 L= 85.0'   CPP, square edge headwall,  Ke= 0.500
                                 Inlet / Outlet Invert= 21.00' / 19.50'   S= 0.0176 '/'   Cc= 0.900
                                 n= 0.010  PVC, smooth interior,  Flow Area= 0.35 sf
```

Primary OutFlow Max=0.56 cfs @ 0.09 hrs HW=21.44' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.56 cfs @ 2.27 fps)

Pond 9P: Existing Catch Basin



Appendix C
Proposed Hydrology Map

LEGEND

— · — · — · —	FLOW PATH OF TRAVEL
————	PROPOSED CONTOUR
P.O.C.	POINT OF COMPLIANCE
*	TO RAINWATER HARVEST SYSTEM

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

NOTE: X2 GOES INTO P3 & X1 GOES INTO O2.

BASIN NAME	C-FACTOR	AREA (AC)	Q100 (CFS)	V100 (FPS)
P1	0.95	0.21	0.29	0.33
P2	0.95	0.19	0.26	0.12
P3	0.95	0.28	0.33	0.12
P4	0.95	0.10	0.14	0.37
P5	0.95	0.65	0.88	0.41.
P6	0.95	0.34	0.46	0.38
P7	0.95	0.10	0.14	0.38
P8	0.95	0.10	0.14	0.31
O1	0.35	0.05	0.03	1.24
O2	0.35	0.48	0.24	2.12

TABLE OF PERVIOUS/IMPERVIOUS

	PERVIOUS	IMPERVIOUS
P-1 TO P-8	0%	100%
O1 AND O2	100%	0%

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:
R.C.E. NO.
DATE Jul. 31, 16

BENCHMARK:

SCALE: AS SHOWN

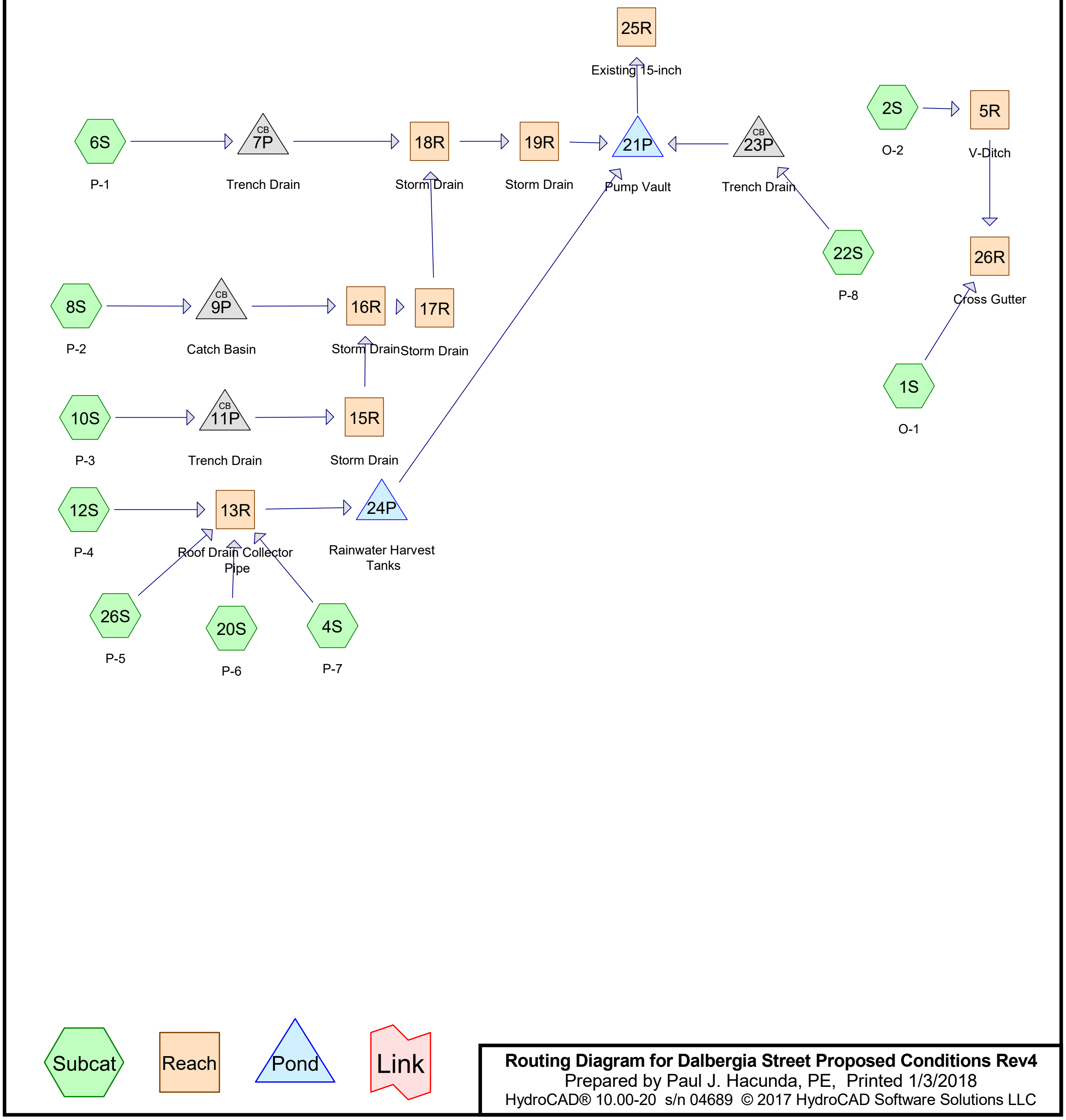
PROPOSED DRAINAGE CONDITIONS
3608-3688 DALBERGIA STREET
SAN DIEGO, CA 92113

FOR:
W.O.

SHEET NO. 1
OF 1 SHTS

Drawing: E:\My Work\Dalbergia Street\Proposed Drainage Conditions.dwg Layout: Layout1 Last Saved: Mon Mar 12, 2018 - 6:34am Last Plotted: Mon Mar 12, 2018 - 6:36am By: raymondh

Appendix D
Proposed Conditions
HydroCAD® Results
2-year, 1-hour
10-year, 1-hour
100-year, 1-hour



Routing Diagram for Dalbergia Street Proposed Conditions Rev4
Prepared by Paul J. Hacunda, PE, Printed 1/3/2018
HydroCAD® 10.00-20 s/n 04689 © 2017 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
0.530	0.35	(1S, 2S)
1.970	0.95	(4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S)
2.500	**0.82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.500	Other	1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
2.500		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.500	2.500		1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
0.000	**0.000**	**0.000**	**0.000**	**2.500**	**2.500**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	13R	53.33	36.33	195.0	0.0872	0.010	6.0	0.0	0.0
2	15R	18.13	18.00	25.0	0.0052	0.010	8.0	0.0	0.0
3	16R	18.00	17.00	98.0	0.0102	0.010	8.0	0.0	0.0
4	17R	17.00	4.00	1.0	13.0000	0.010	8.0	0.0	0.0
5	18R	4.00	3.90	12.0	0.0083	0.010	8.0	0.0	0.0
6	19R	4.40	3.75	125.0	0.0052	0.010	8.0	0.0	0.0
7	25R	17.46	11.00	520.0	0.0124	0.013	15.0	0.0	0.0
8	7P	4.50	3.85	125.0	0.0052	0.010	8.0	0.0	0.0
9	9P	18.00	16.00	100.0	0.0200	0.010	6.0	0.0	0.0
10	11P	22.00	18.13	25.0	0.1548	0.010	8.0	0.0	0.0
11	23P	14.00	13.22	155.0	0.0050	0.010	8.0	0.0	0.0

```
                         Time span=0.00-1.00 hrs, dt=0.01 hrs, 101 points x 3
                          Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
                 Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: O-1                      Runoff Area=0.050 ac   0.00% Impervious   Runoff Depth>0.17"
                                       Flow Length=107'   Tc=13.5 min   C=0.35   Runoff=0.01 cfs  0.001 af

Subcatchment 2S: O-2                      Runoff Area=0.480 ac   0.00% Impervious   Runoff Depth>0.17"
                                       Flow Length=583'   Tc=17.1 min   C=0.35   Runoff=0.09 cfs  0.007 af

Subcatchment 4S: P-7                    Runoff Area=0.100 ac   100.00% Impervious   Runoff Depth>0.51"
                    Flow Length=60'   Slope=0.2500 '/'   Tc=5.0 min   C=0.95   Runoff=0.05 cfs  0.004 af

Subcatchment 6S: P-1                    Runoff Area=0.210 ac   100.00% Impervious   Runoff Depth>0.48"
                  Flow Length=240'   Slope=0.0900 '/'   Tc=12.0 min   C=0.95   Runoff=0.11 cfs  0.008 af

Subcatchment 8S: P-2                    Runoff Area=0.190 ac   100.00% Impervious   Runoff Depth>0.46"
                  Flow Length=125'   Slope=0.0100 '/'   Tc=17.1 min   C=0.95   Runoff=0.10 cfs  0.007 af

Subcatchment 10S: P-3                   Runoff Area=0.280 ac   100.00% Impervious   Runoff Depth>0.44"
                                       Flow Length=300'   Tc=22.1 min   C=0.95   Runoff=0.15 cfs  0.010 af

Subcatchment 12S: P-4                   Runoff Area=0.100 ac   100.00% Impervious   Runoff Depth>0.51"
                    Flow Length=55'   Slope=0.2500 '/'   Tc=5.0 min   C=0.95   Runoff=0.05 cfs  0.004 af

Subcatchment 20S: P-6                   Runoff Area=0.340 ac   100.00% Impervious   Runoff Depth>0.51"
                    Flow Length=60'   Slope=0.2500 '/'   Tc=5.0 min   C=0.95   Runoff=0.18 cfs  0.015 af

Subcatchment 22S: P-8                   Runoff Area=0.100 ac   100.00% Impervious   Runoff Depth>0.51"
                                         Flow Length=150'   Tc=5.1 min   C=0.95   Runoff=0.05 cfs  0.004 af

Subcatchment 26S: P-5                   Runoff Area=0.650 ac   100.00% Impervious   Runoff Depth>0.51"
                    Flow Length=90'   Slope=0.2500 '/'   Tc=5.0 min   C=0.95   Runoff=0.35 cfs  0.028 af

Reach 5R: V-Ditch                        Avg. Flow Depth=0.04'   Max Vel=0.76 fps   Inflow=0.09 cfs  0.007 af
                       n=0.017   L=555.0'   S=0.0054 '/'   Capacity=5.03 cfs   Outflow=0.09 cfs  0.005 af

Reach 13R: Roof Drain Collector Pipe     Avg. Flow Depth=0.19'   Max Vel=9.56 fps   Inflow=0.64 cfs  0.051 af
           6.0"  Round Pipe   n=0.010   L=195.0'   S=0.0872 '/'   Capacity=2.15 cfs   Outflow=0.64 cfs  0.051 af

Reach 15R: Storm Drain                   Avg. Flow Depth=0.16'   Max Vel=2.25 fps   Inflow=0.15 cfs  0.010 af
             8.0"  Round Pipe   n=0.010   L=25.0'   S=0.0052 '/'   Capacity=1.13 cfs   Outflow=0.15 cfs  0.010 af

Reach 16R: Storm Drain                   Avg. Flow Depth=0.18'   Max Vel=3.32 fps   Inflow=0.25 cfs  0.017 af
             8.0"  Round Pipe   n=0.010   L=98.0'   S=0.0102 '/'   Capacity=1.59 cfs   Outflow=0.25 cfs  0.017 af

Reach 17R: Storm Drain                 Avg. Flow Depth=0.03'   Max Vel=40.86 fps   Inflow=0.25 cfs  0.017 af
           8.0"  Round Pipe   n=0.010   L=1.0'   S=13.0000 '/'   Capacity=56.64 cfs   Outflow=0.25 cfs  0.017 af

Reach 18R: Storm Drain                   Avg. Flow Depth=0.23'   Max Vel=3.43 fps   Inflow=0.36 cfs  0.026 af
             8.0"  Round Pipe   n=0.010   L=12.0'   S=0.0083 '/'   Capacity=1.43 cfs   Outflow=0.36 cfs  0.026 af
```

Reach 19R: Storm Drain Avg. Flow Depth=0.26' Max Vel=2.89 fps Inflow=0.36 cfs 0.026 af
8.0" Round Pipe n=0.010 L=125.0' S=0.0052 '/' Capacity=1.13 cfs Outflow=0.36 cfs 0.025 af

Reach 25R: Existing 15-inch Avg. Flow Depth=0.24' Max Vel=3.56 fps Inflow=0.61 cfs 0.035 af
15.0" Round Pipe n=0.013 L=520.0' S=0.0124 '/' Capacity=7.20 cfs Outflow=0.60 cfs 0.033 af

Reach 26R: Cross Gutter Avg. Flow Depth=0.07' Max Vel=0.83 fps Inflow=0.10 cfs 0.006 af
n=0.013 L=100.0' S=0.0050 '/' Capacity=2.05 cfs Outflow=0.10 cfs 0.006 af

Pond 7P: Trench Drain Peak Elev=4.71' Inflow=0.11 cfs 0.008 af
8.0" Round Culvert n=0.010 L=125.0' S=0.0052 '/' Outflow=0.11 cfs 0.008 af

Pond 9P: Catch Basin Peak Elev=18.31' Inflow=0.10 cfs 0.007 af
6.0" Round Culvert n=0.010 L=100.0' S=0.0200 '/' Outflow=0.10 cfs 0.007 af

Pond 11P: Trench Drain Peak Elev=22.21' Inflow=0.15 cfs 0.010 af
8.0" Round Culvert n=0.010 L=25.0' S=0.1548 '/' Outflow=0.15 cfs 0.010 af

Pond 21P: Pump Vault Peak Elev=0.17' Storage=0.002 af Inflow=0.42 cfs 0.030 af
Outflow=0.61 cfs 0.028 af

Pond 23P: Trench Drain Peak Elev=14.13' Inflow=0.05 cfs 0.004 af
8.0" Round Culvert n=0.010 L=155.0' S=0.0050 '/' Outflow=0.05 cfs 0.004 af

Pond 24P: Rainwater Harvest Tanks Peak Elev=33.01' Storage=0.050 af Inflow=0.64 cfs 0.051 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 2.500 ac Runoff Volume = 0.088 af Average Runoff Depth = 0.42"
21.20% Pervious = 0.530 ac 78.80% Impervious = 1.970 ac

Summary for Subcatchment 1S: O-1

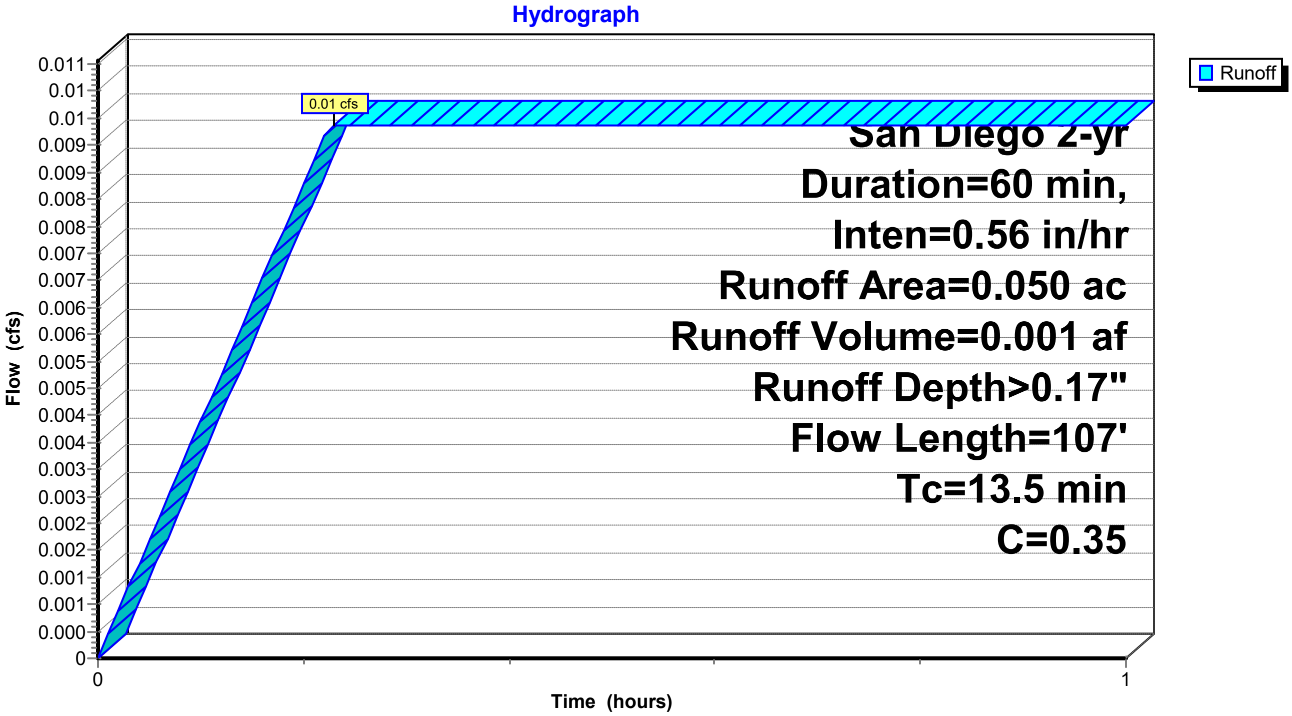
Runoff = 0.01 cfs @ 0.23 hrs, Volume= 0.001 af, Depth> 0.17"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.050	0.35	
0.050		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	27	0.5000	0.04		**Sheet Flow, Caltrans Slope** Grass: Dense n= 0.240 P2= 0.04"
1.1	80	0.0050	1.24	0.10	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.017 Concrete, unfinished
13.5	107	Total			

Subcatchment 1S: O-1



Summary for Subcatchment 2S: O-2

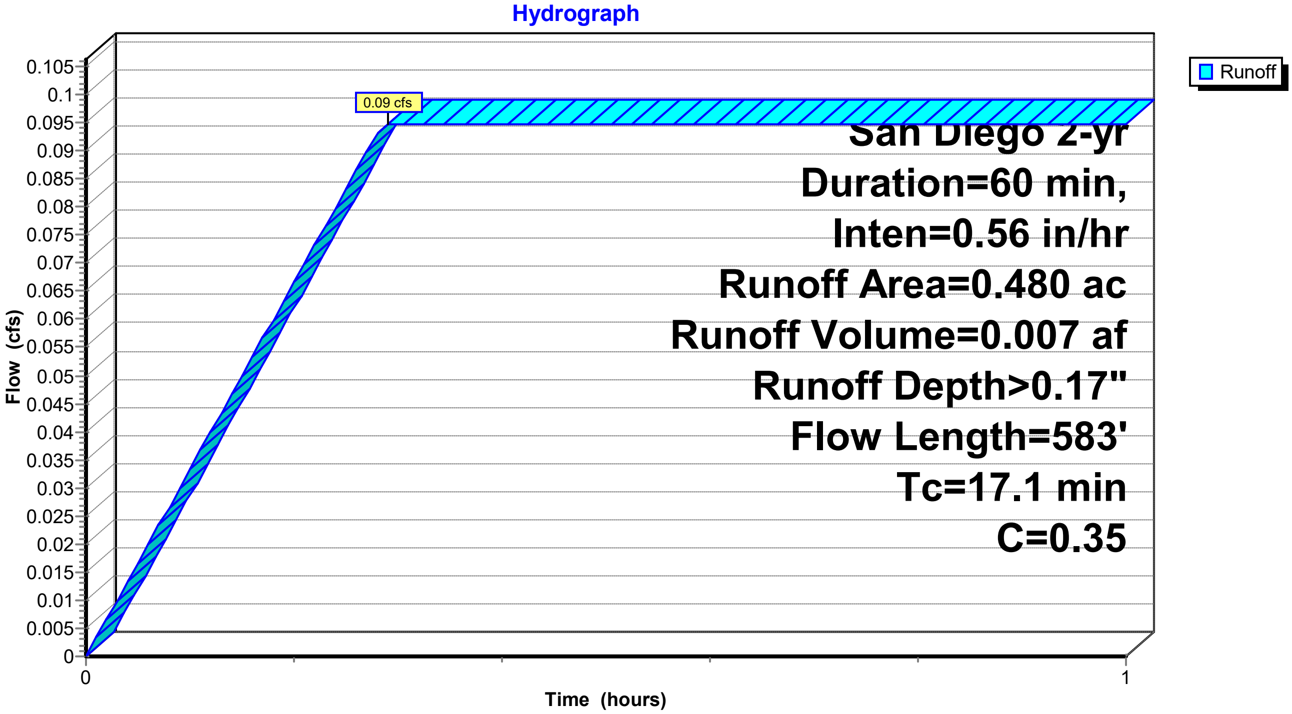
Runoff = 0.09 cfs @ 0.29 hrs, Volume= 0.007 af, Depth> 0.17"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.480	0.35	
0.480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	28	0.5000	0.04		**Sheet Flow, Caltrans R/W** Grass: Dense n= 0.240 P2= 0.04"
4.4	555	0.0050	2.12	0.38	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.30' Z= 2.0 '/' Top.W=1.20' n= 0.013 Concrete, trowel finish
17.1	583	Total			

Subcatchment 2S: O-2



Summary for Subcatchment 4S: P-7

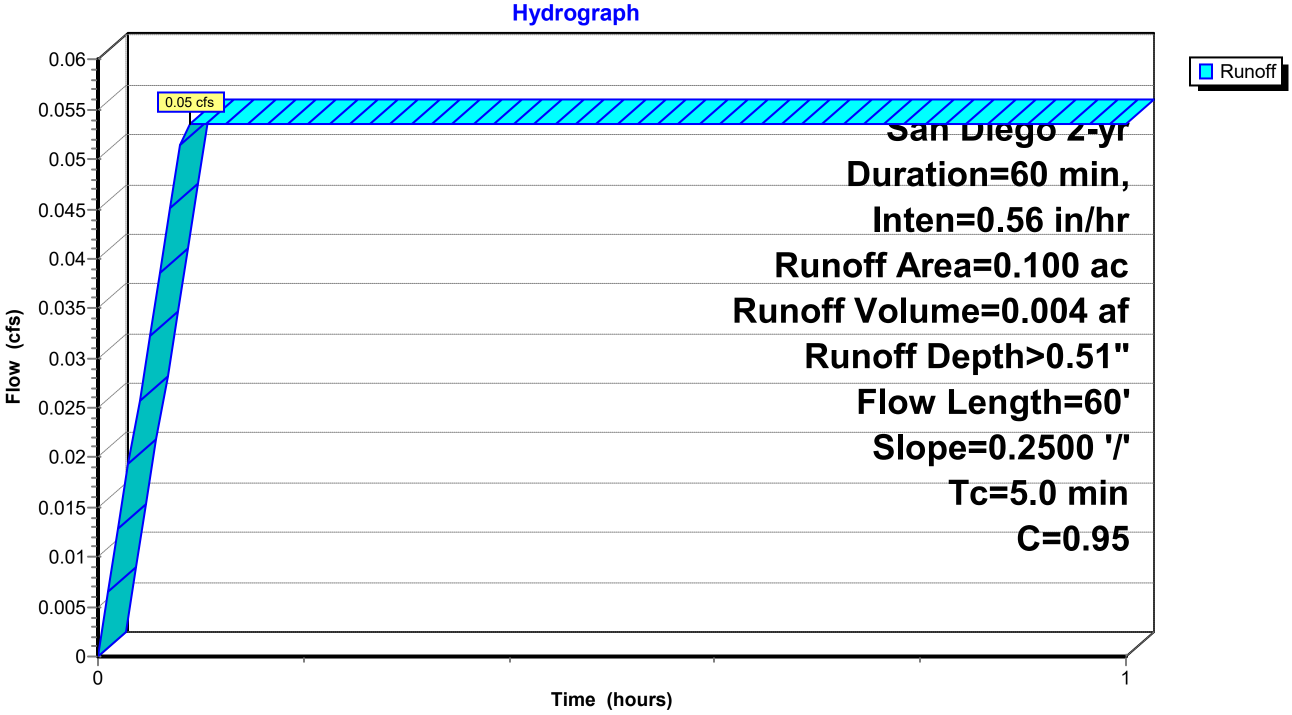
Runoff = 0.05 cfs @ 0.09 hrs, Volume= 0.004 af, Depth> 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 4S: P-7



Summary for Subcatchment 6S: P-1

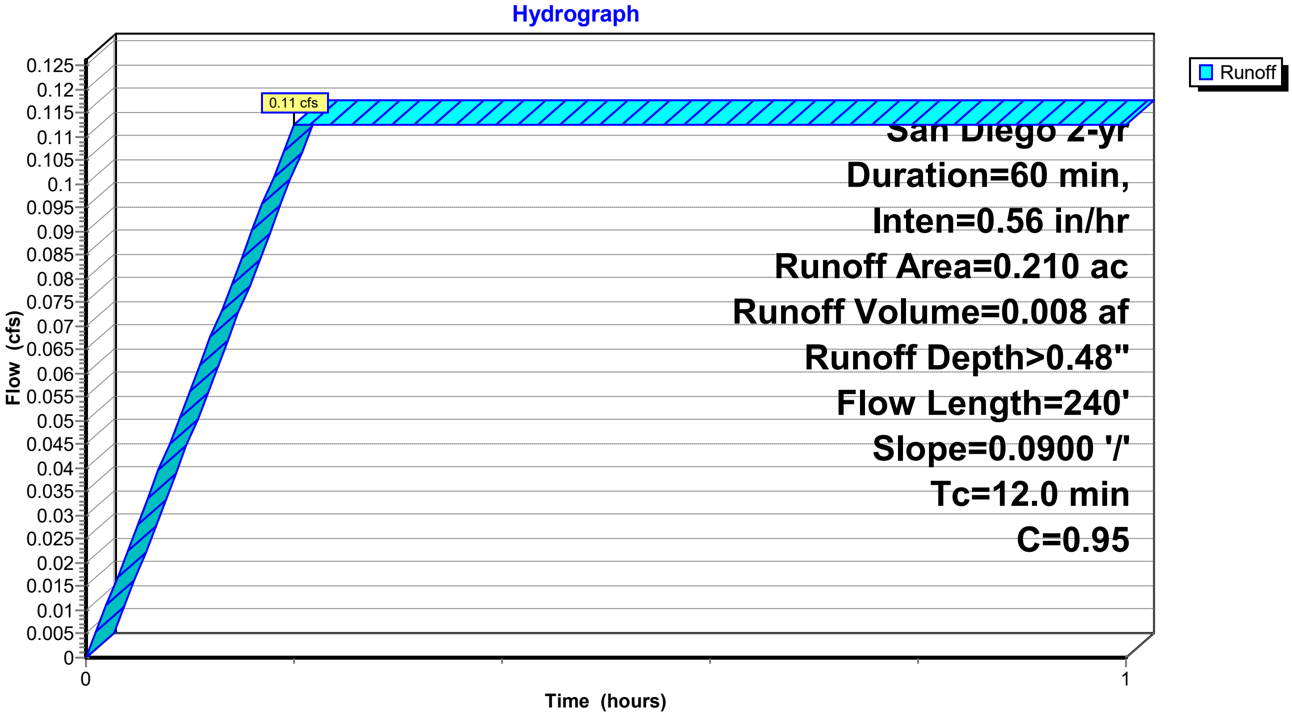
Runoff = 0.11 cfs @ 0.20 hrs, Volume= 0.008 af, Depth> 0.48"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.210	0.95	
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	240	0.0900	0.33		**Sheet Flow, Exit Ramp** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 6S: P-1



Summary for Subcatchment 8S: P-2

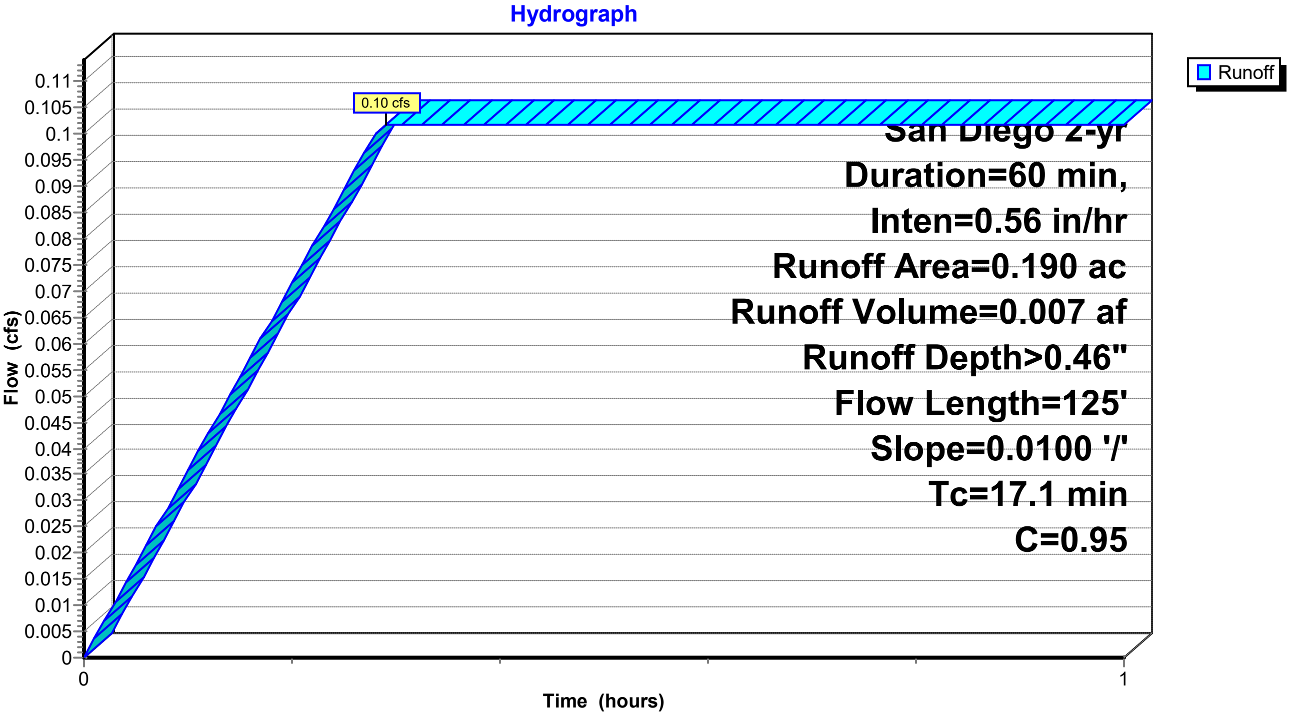
Runoff = 0.10 cfs @ 0.29 hrs, Volume= 0.007 af, Depth> 0.46"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.190	0.95	
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	125	0.0100	0.12		**Sheet Flow, Exit Area** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 8S: P-2



Summary for Subcatchment 10S: P-3

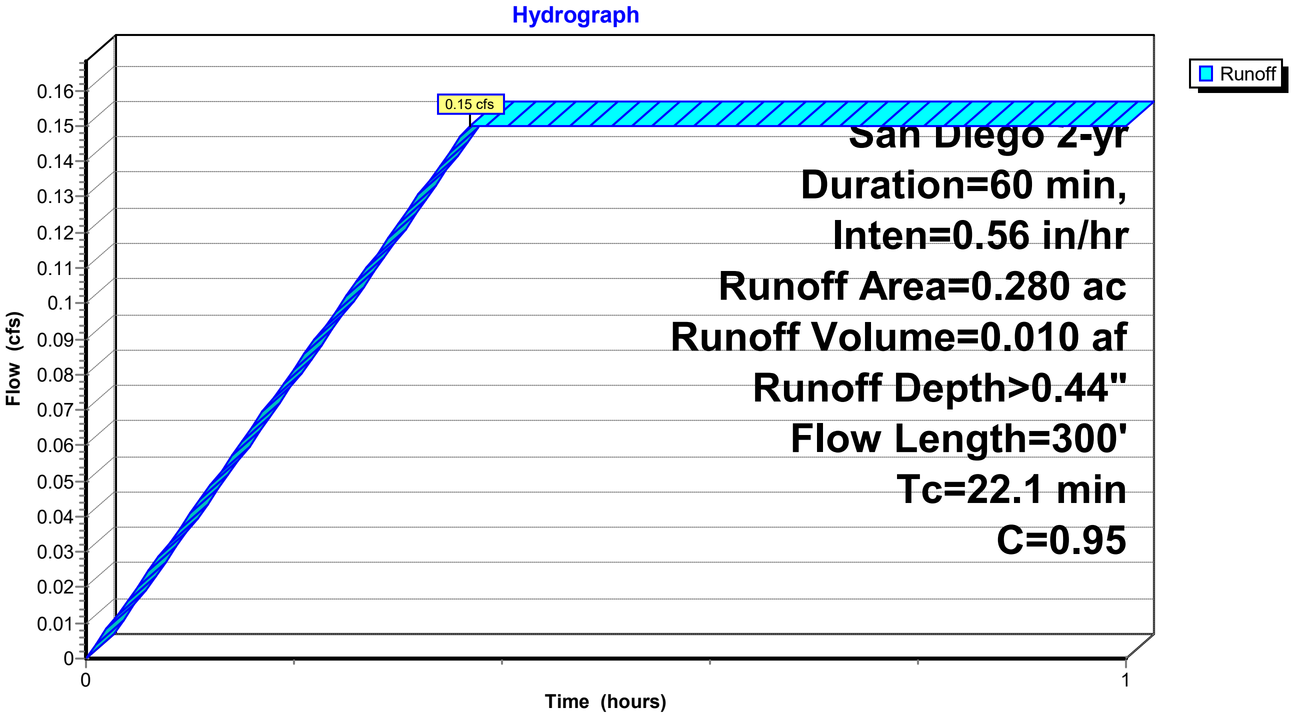
Runoff = 0.15 cfs @ 0.37 hrs, Volume= 0.010 af, Depth> 0.44"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.280	0.95	
0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	140	0.0100	0.12		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 0.04"
3.4	160	0.0060	0.77		**Shallow Concentrated Flow, Landscape Area** Nearly Bare & Untilled Kv= 10.0 fps
22.1	300	Total			

Subcatchment 10S: P-3



Summary for Subcatchment 12S: P-4

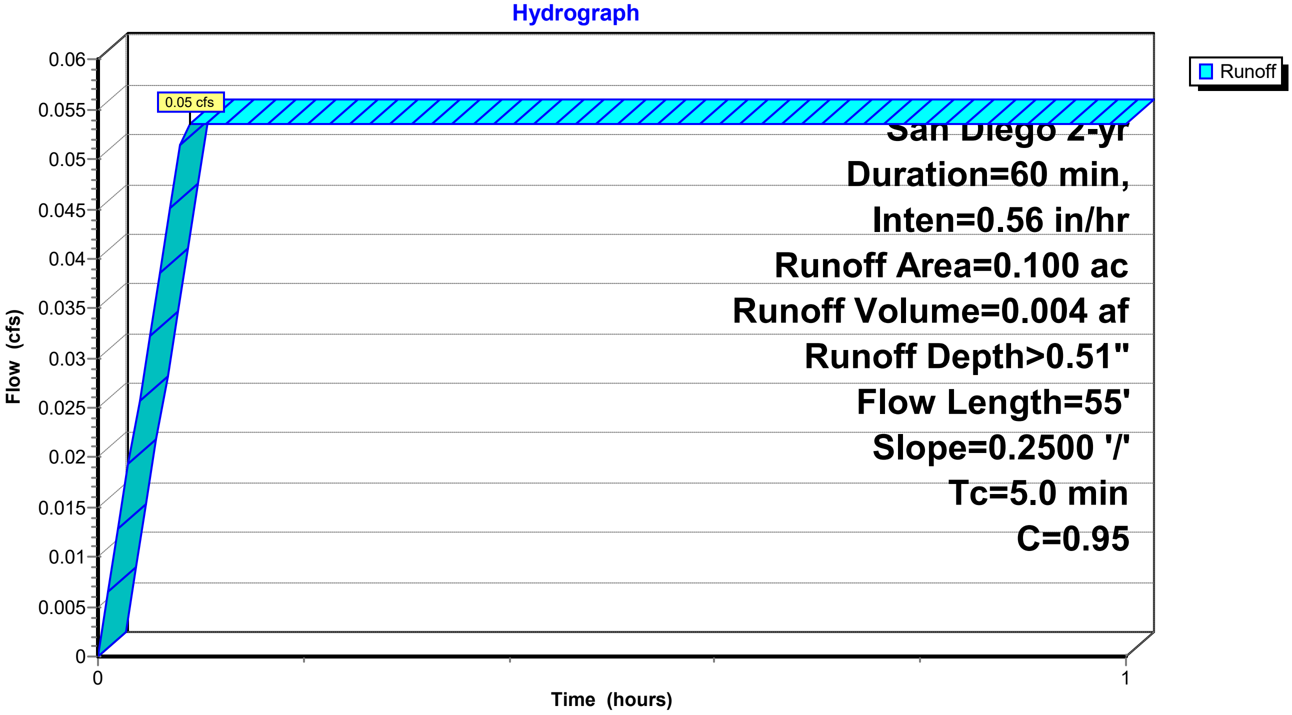
Runoff = 0.05 cfs @ 0.09 hrs, Volume= 0.004 af, Depth> 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	55	0.2500	0.37		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.4	55	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: P-4



Summary for Subcatchment 20S: P-6

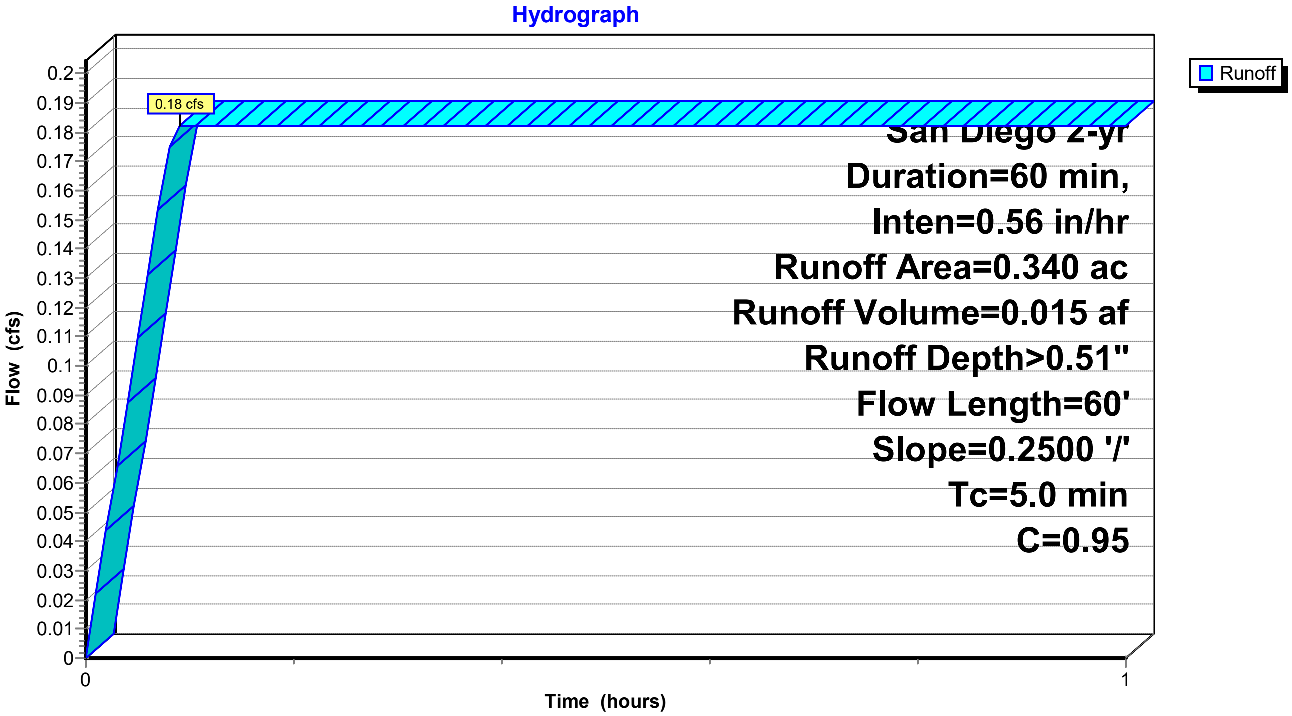
Runoff = 0.18 cfs @ 0.09 hrs, Volume= 0.015 af, Depth> 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.340	0.95	
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 20S: P-6



Summary for Subcatchment 22S: P-8

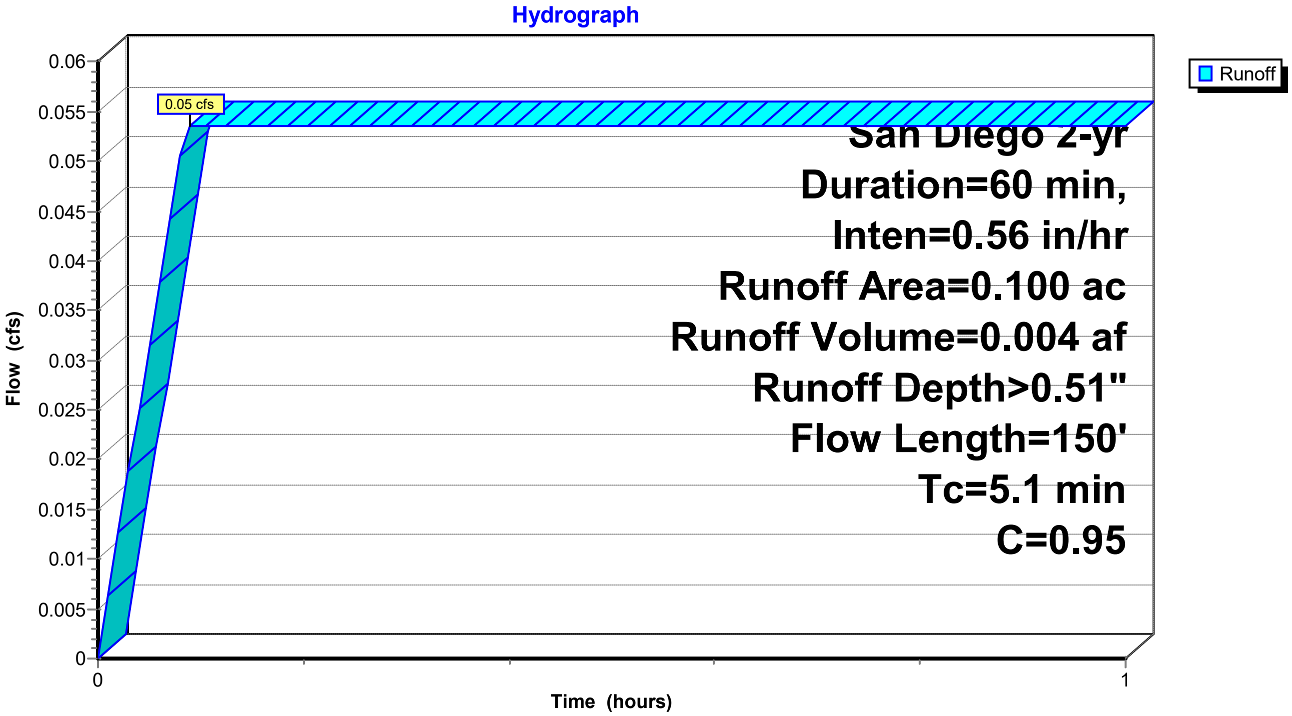
Runoff = 0.05 cfs @ 0.09 hrs, Volume= 0.004 af, Depth> 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	70	0.0050	1.44		**Shallow Concentrated Flow, Curb and Gutter** Paved Kv= 20.3 fps
4.3	80	0.1300	0.31		**Sheet Flow, Entrance Ramp** Smooth surfaces n= 0.011 P2= 0.04"
5.1	150	Total			

Subcatchment 22S: P-8



Summary for Subcatchment 26S: P-5

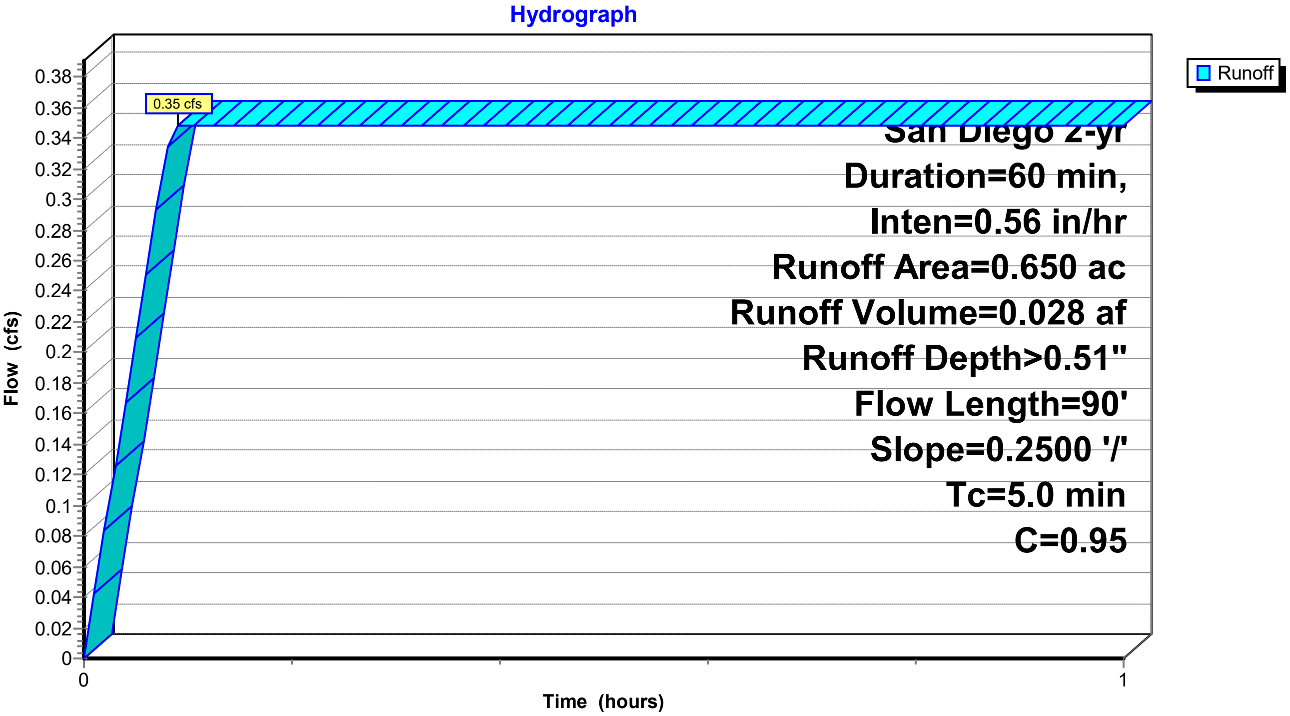
Runoff = 0.35 cfs @ 0.09 hrs, Volume= 0.028 af, Depth> 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 2-yr Duration=60 min, Inten=0.56 in/hr

Area (ac)	C	Description
0.650	0.95	
0.650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	90	0.2500	0.41		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
3.6	90	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 26S: P-5



Summary for Reach 5R: V-Ditch

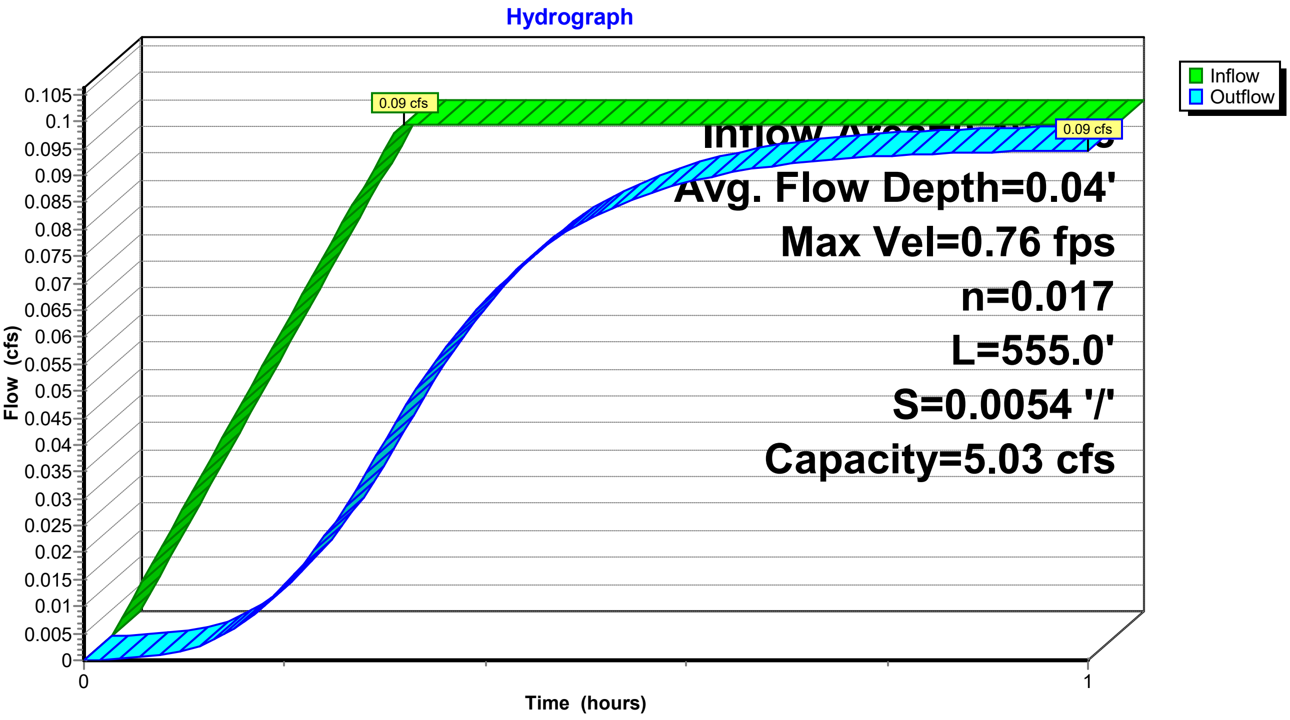
Inflow Area = 0.480 ac, 0.00% Impervious, Inflow Depth > 0.17" for 2-yr event
Inflow = 0.09 cfs @ 0.29 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 1.00 hrs, Volume= 0.005 af, Atten= 0%, Lag= 42.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.76 fps, Min. Travel Time= 12.2 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 15.4 min

Peak Storage= 69 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 5.03 cfs

3.00' x 0.50' deep channel, n= 0.017 Concrete, unfinished
Length= 555.0' Slope= 0.0054 '/'
Inlet Invert= 26.34', Outlet Invert= 23.32'

Reach 5R: V-Ditch



Summary for Reach 13R: Roof Drain Collector Pipe

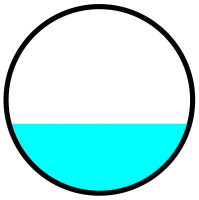
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =         1.190 ac,100.00% Impervious,  Inflow Depth >   0.51"    for  2-yr event
Inflow      =        0.64 cfs @     0.09 hrs,  Volume=            0.051 af
Outflow     =        0.64 cfs @     0.10 hrs,  Volume=            0.051 af,  Atten= 0%,  Lag= 0.6 min
```

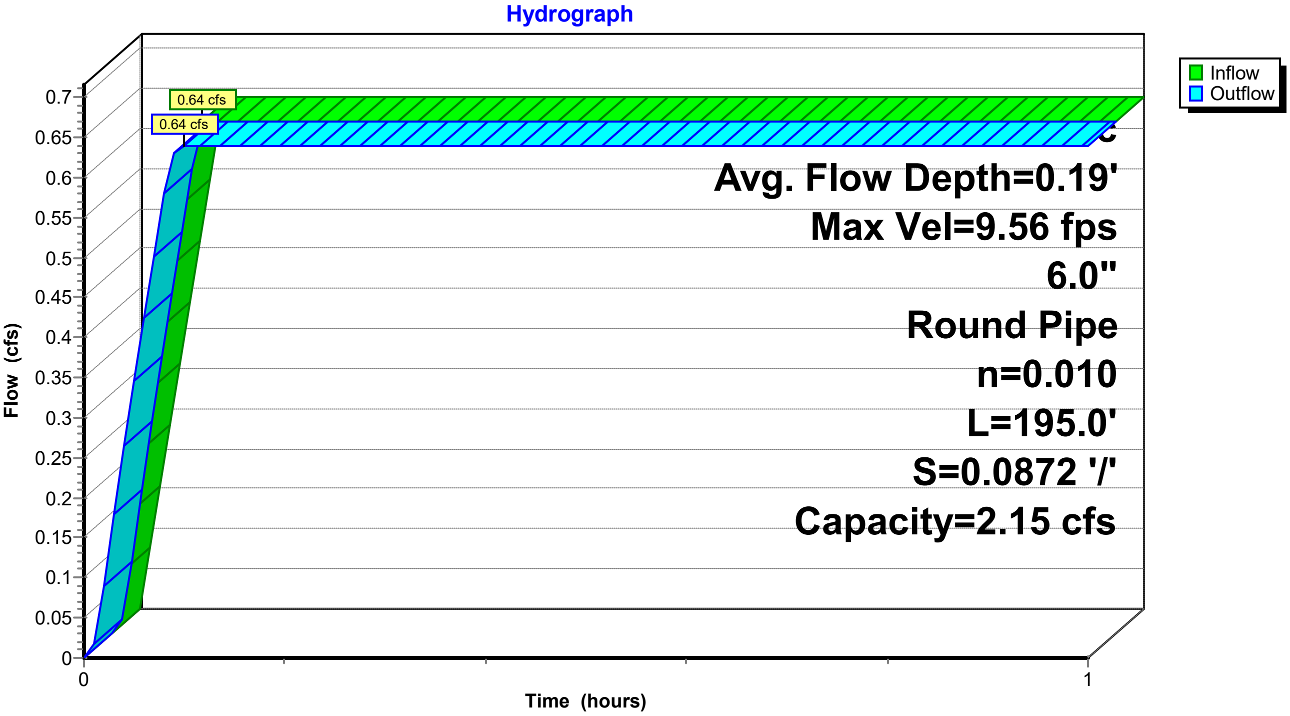
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 9.56 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.37 fps, Avg. Travel Time= 0.3 min

Peak Storage= 13 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.15 cfs

6.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 195.0' Slope= 0.0872 '/'
Inlet Invert= 53.33', Outlet Invert= 36.33'



Reach 13R: Roof Drain Collector Pipe



Summary for Reach 15R: Storm Drain

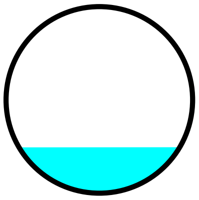
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =        0.280 ac,100.00% Impervious,  Inflow Depth >   0.44"    for  2-yr event
Inflow      =        0.15 cfs @     0.38 hrs,  Volume=            0.010 af
Outflow     =        0.15 cfs @     0.38 hrs,  Volume=            0.010 af,  Atten= 0%,  Lag= 0.0 min
```

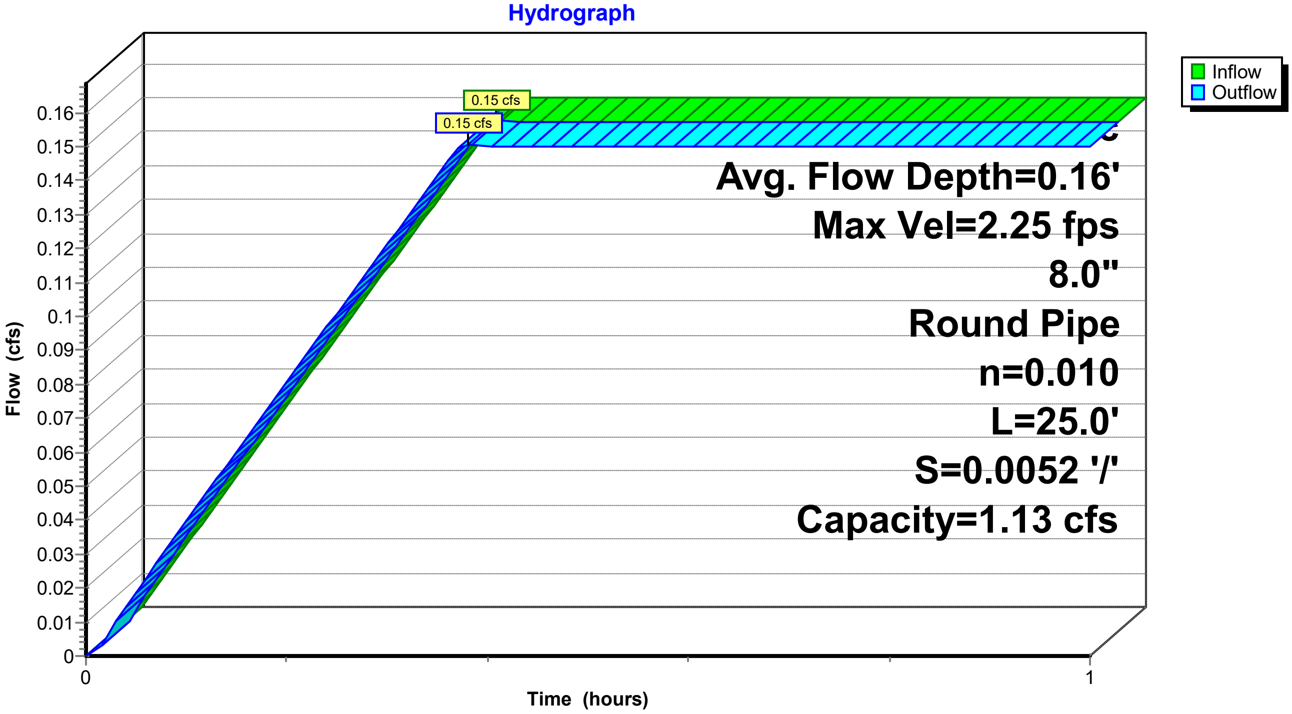
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.25 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.07 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2 cf @ 0.38 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 25.0' Slope= 0.0052 '/'
Inlet Invert= 18.13', Outlet Invert= 18.00'



Reach 15R: Storm Drain



Summary for Reach 16R: Storm Drain

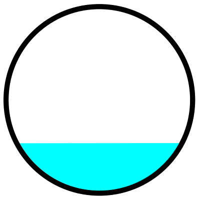
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 15R OUTLET depth by 0.02' @ 0.29 hrs

Inflow Area = 0.470 ac,100.00% Impervious, Inflow Depth > 0.44" for 2-yr event
Inflow = 0.25 cfs @ 0.38 hrs, Volume= 0.017 af
Outflow = 0.25 cfs @ 0.39 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.6 min

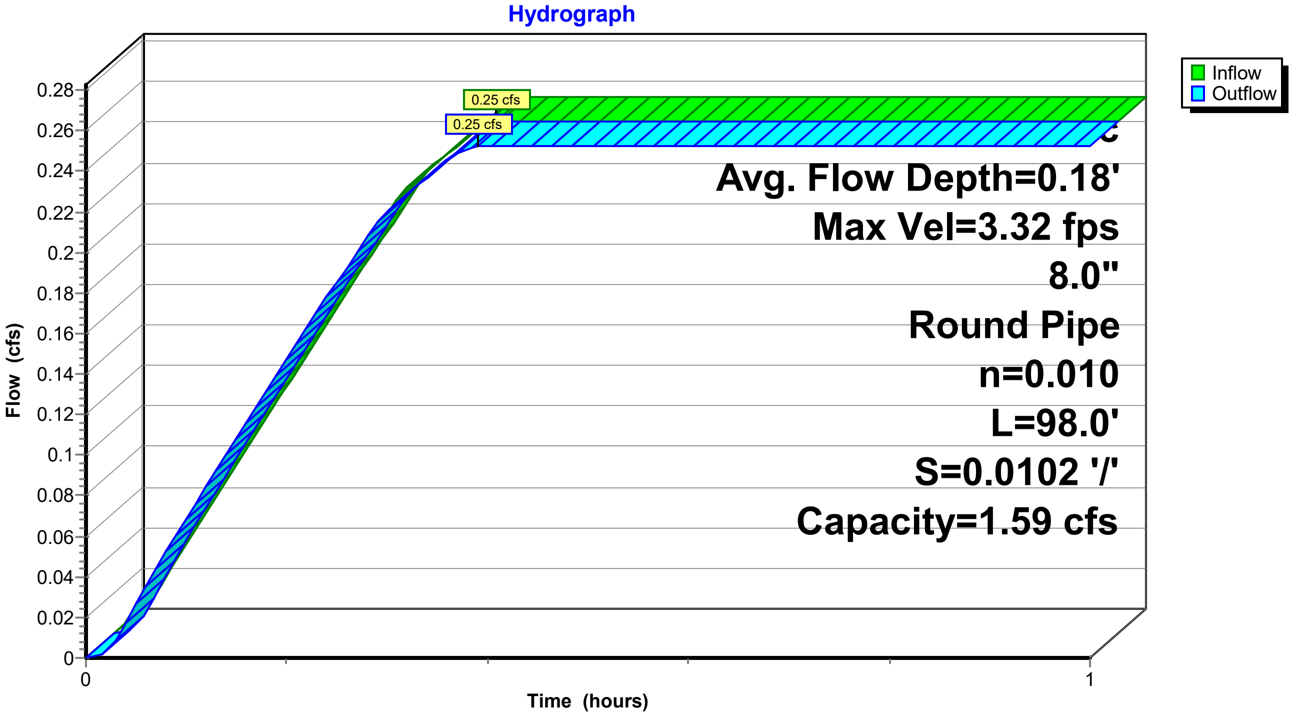
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.32 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.05 fps, Avg. Travel Time= 0.5 min

Peak Storage= 7 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.59 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 18.00', Outlet Invert= 17.00'



Reach 16R: Storm Drain



Summary for Reach 17R: Storm Drain

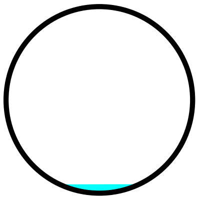
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 16R outlet invert by 0.03' @ 0.39 hrs

```
Inflow Area =          0.470 ac,100.00% Impervious,  Inflow Depth >   0.44"    for  2-yr event
Inflow       =         0.25 cfs @     0.39 hrs,  Volume=             0.017 af
Outflow      =         0.25 cfs @     0.39 hrs,  Volume=             0.017 af,  Atten= 0%,  Lag= 0.0 min
```

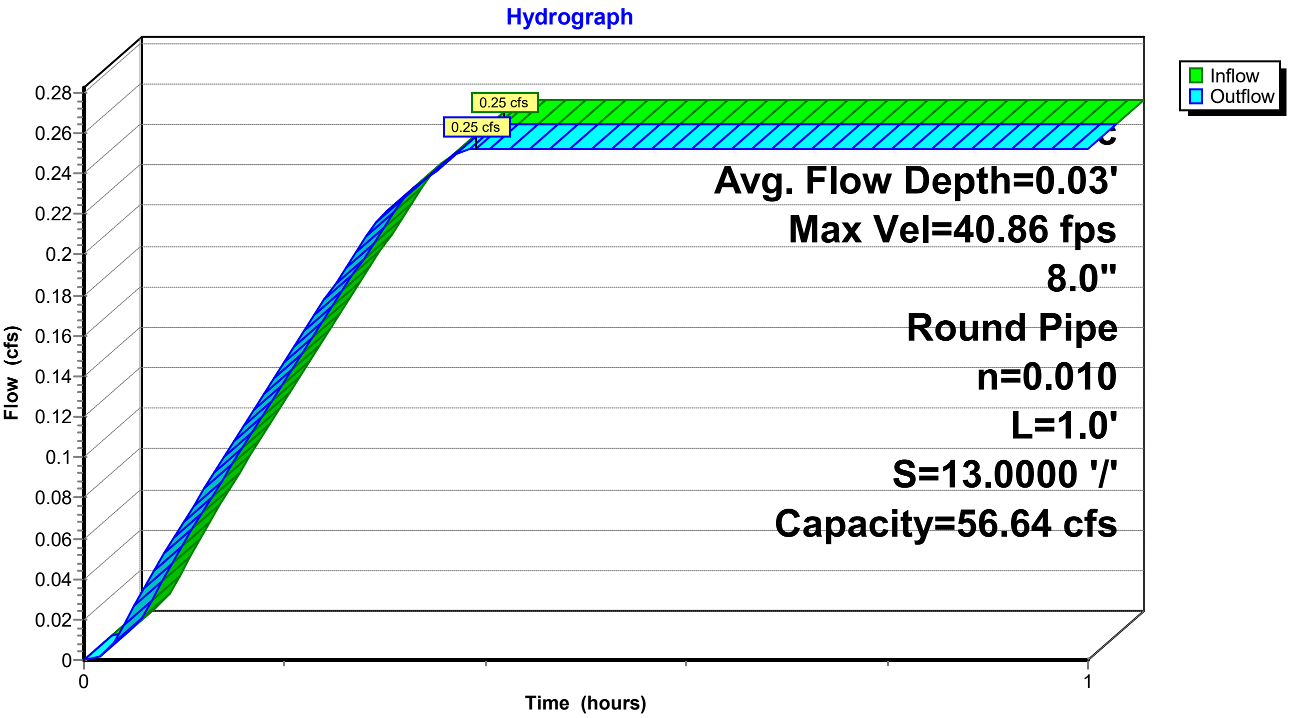
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 40.86 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 37.82 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 56.64 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 1.0' Slope= 13.0000 '/'
Inlet Invert= 17.00', Outlet Invert= 4.00'



Reach 17R: Storm Drain



Summary for Reach 18R: Storm Drain

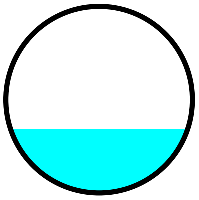
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 17R OUTLET depth by 0.20' @ 0.39 hrs

```
Inflow Area =      0.680 ac,100.00% Impervious,  Inflow Depth >   0.45"    for  2-yr event
Inflow      =      0.36 cfs @    0.39 hrs,  Volume=          0.026 af
Outflow     =      0.36 cfs @    0.39 hrs,  Volume=          0.026 af,  Atten= 0%,  Lag= 0.0 min
```

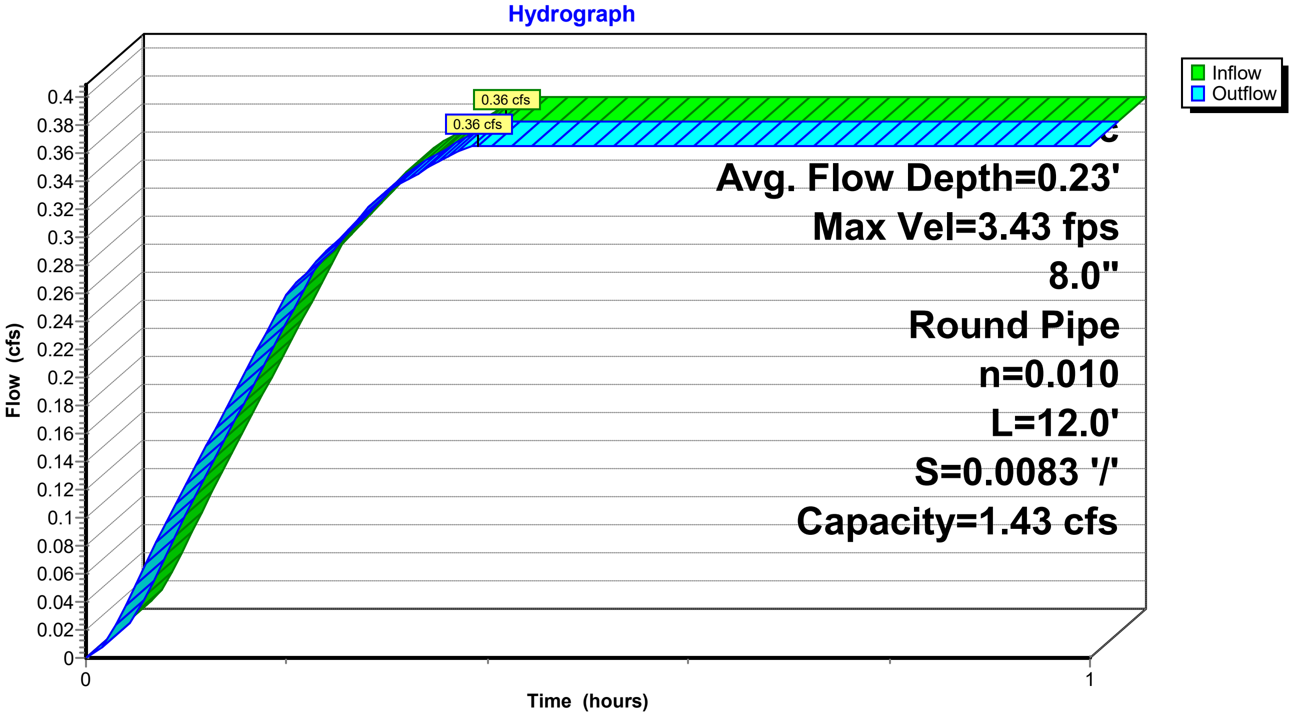
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.43 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.20 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 12.0' Slope= 0.0083 '/'
Inlet Invert= 4.00', Outlet Invert= 3.90'



Reach 18R: Storm Drain



Summary for Reach 19R: Storm Drain

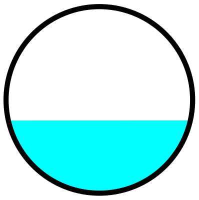
[52] Hint: Inlet/Outlet conditions not evaluated
[63] Warning: Exceeded Reach 18R INLET depth by 0.43' @ 0.47 hrs

```
Inflow Area =      0.680 ac,100.00% Impervious,  Inflow Depth >   0.45"    for  2-yr event
Inflow      =      0.36 cfs @     0.39 hrs,  Volume=          0.026 af
Outflow     =      0.36 cfs @     0.49 hrs,  Volume=          0.025 af,  Atten= 0%,  Lag= 6.1 min
```

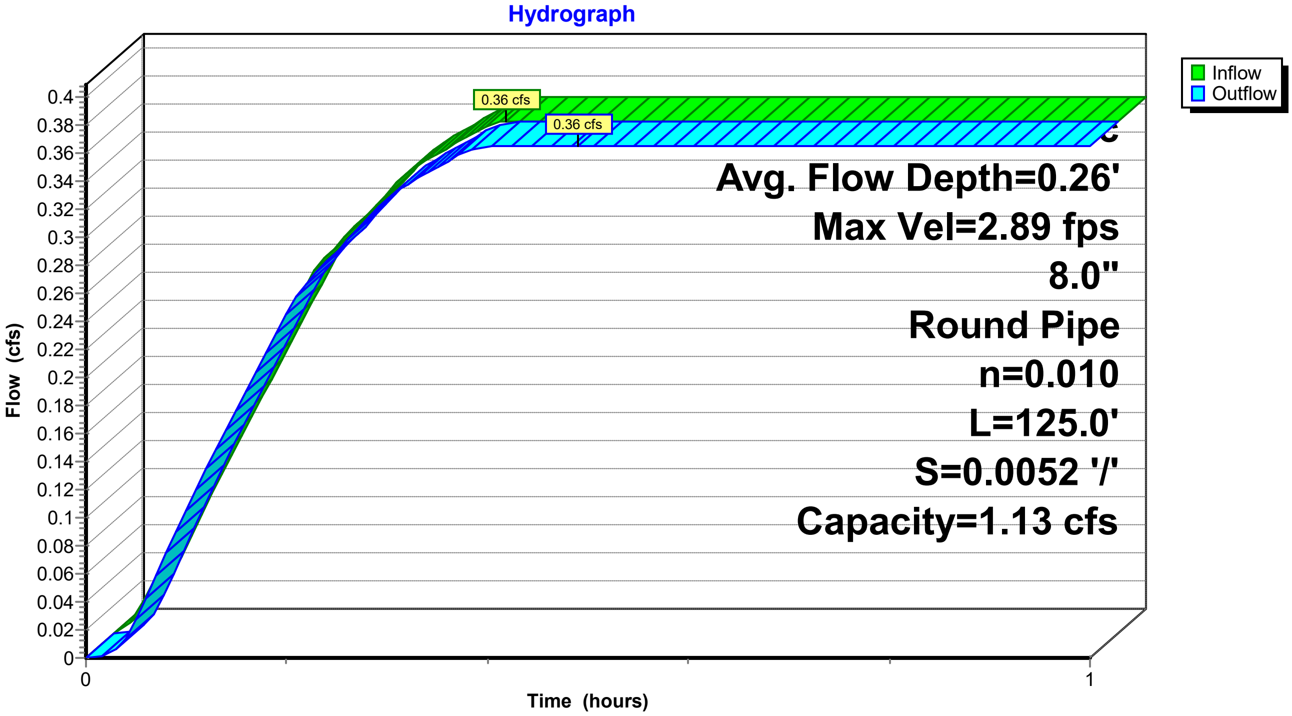
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.89 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.66 fps, Avg. Travel Time= 0.8 min

Peak Storage= 16 cf @ 0.49 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 125.0' Slope= 0.0052 '/'
Inlet Invert= 4.40', Outlet Invert= 3.75'



Reach 19R: Storm Drain



Summary for Reach 25R: Existing 15-inch

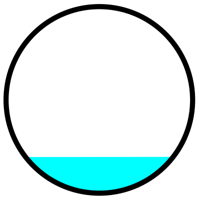
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =        1.970 ac,100.00% Impervious,  Inflow Depth >   0.21"    for  2-yr event
Inflow      =        0.61 cfs @     0.55 hrs,  Volume=            0.035 af
Outflow     =        0.60 cfs @     0.52 hrs,  Volume=            0.033 af,  Atten= 1%,  Lag= 0.0 min
```

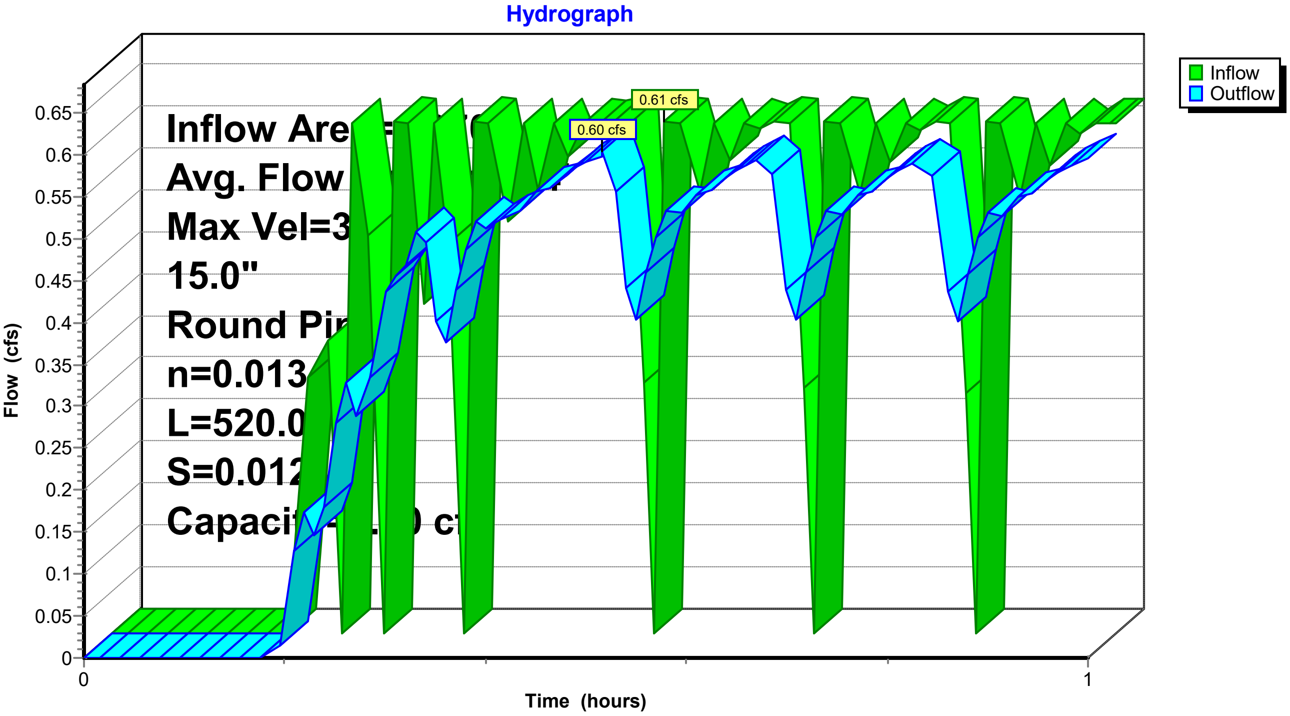
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.56 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 3.31 fps, Avg. Travel Time= 2.6 min

Peak Storage= 88 cf @ 0.52 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 25R: Existing 15-inch



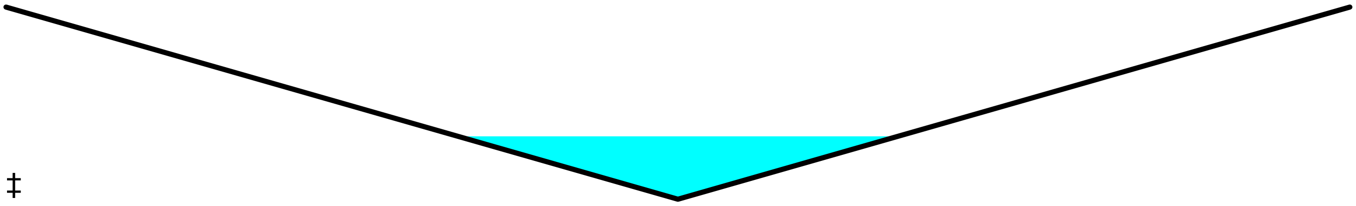
Summary for Reach 26R: Cross Gutter

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 0.13" for 2-yr event
Inflow = 0.10 cfs @ 1.00 hrs, Volume= 0.006 af
Outflow = 0.10 cfs @ 1.00 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.83 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 2.4 min

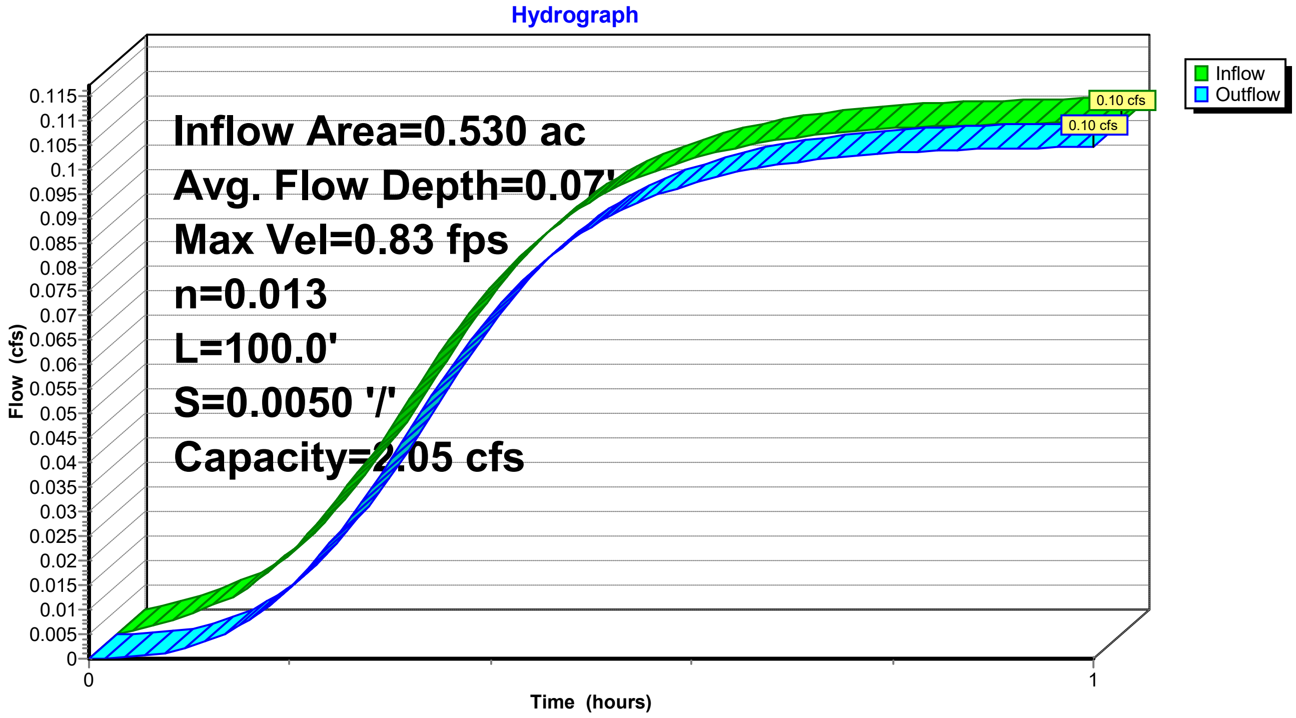
Peak Storage= 13 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 0.20' Flow Area= 1.2 sf, Capacity= 2.05 cfs

0.00' x 0.20' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 11.76'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 21.60', Outlet Invert= 21.10'



‡

Reach 26R: Cross Gutter



Summary for Pond 7P: Trench Drain

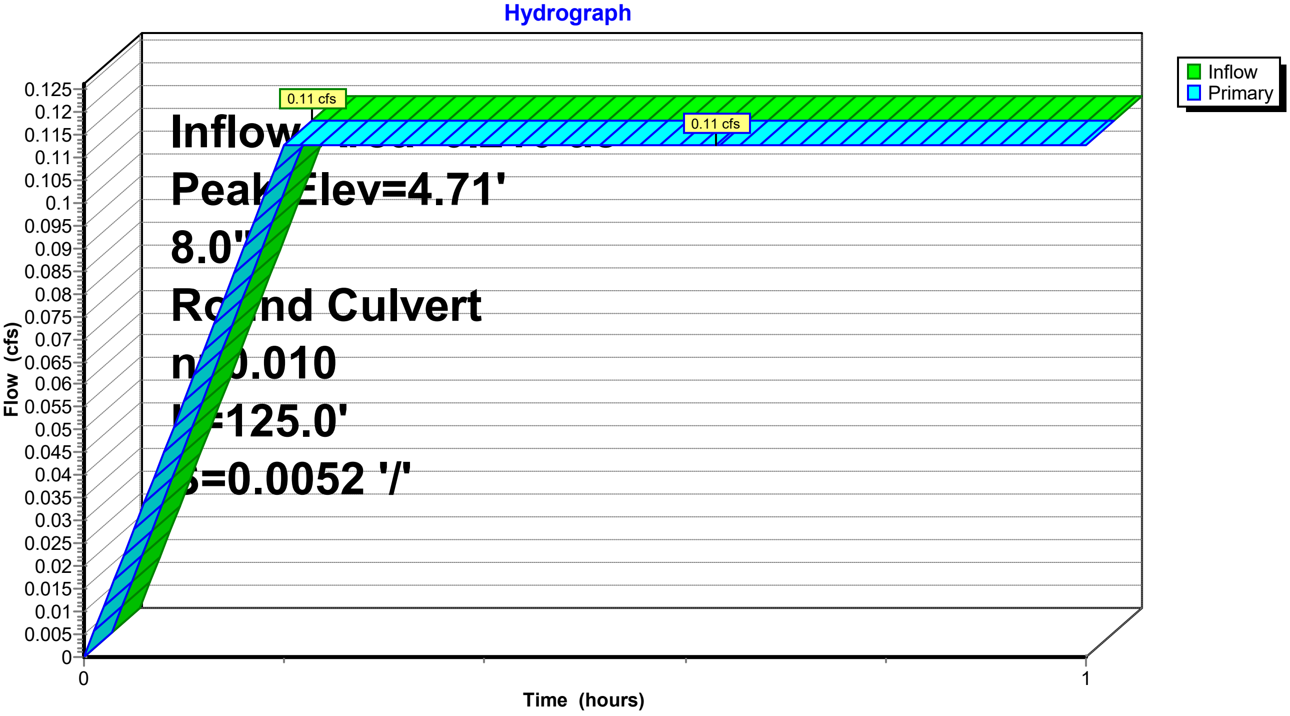
Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 0.48" for 2-yr event
Inflow = 0.11 cfs @ 0.20 hrs, Volume= 0.008 af
Outflow = 0.11 cfs @ 0.63 hrs, Volume= 0.008 af, Atten= 0%, Lag= 25.8 min
Primary = 0.11 cfs @ 0.63 hrs, Volume= 0.008 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 4.71' @ 0.39 hrs
Flood Elev= 6.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	4.50'	**8.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.50' / 3.85' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.11 cfs @ 0.63 hrs HW=4.71' TW=4.23' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.11 cfs @ 1.76 fps)

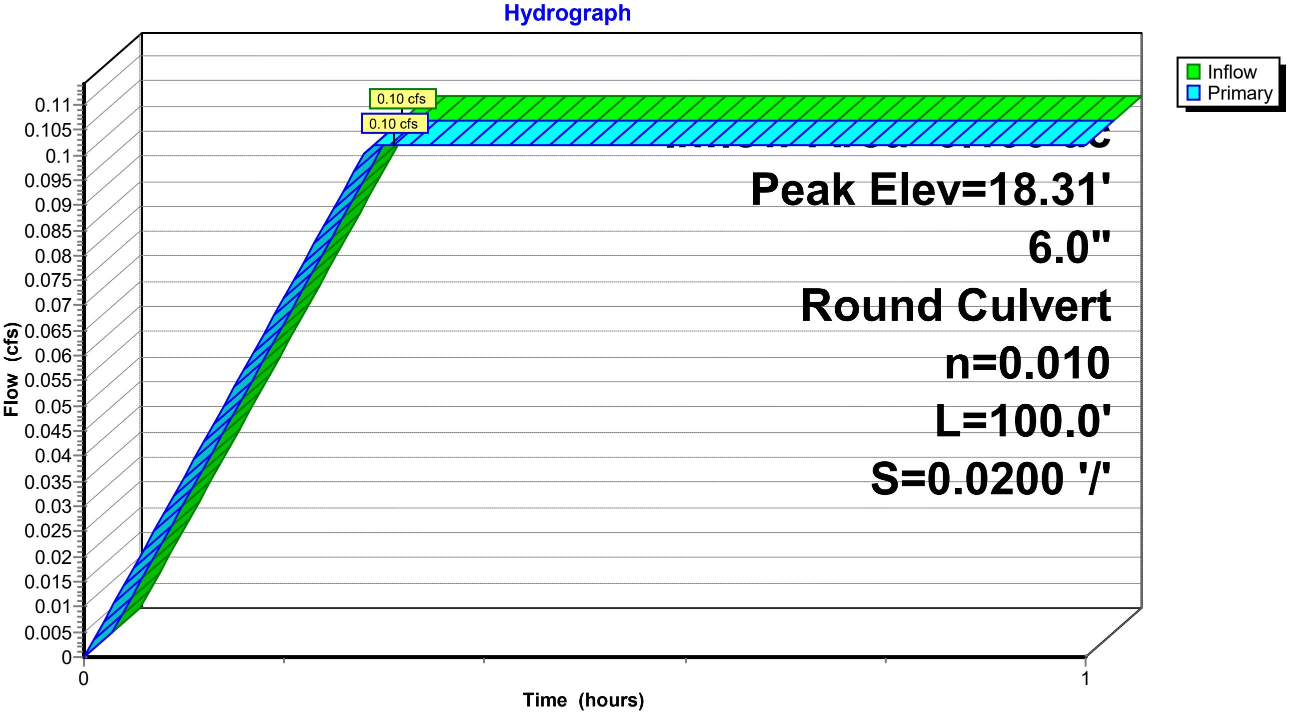
Pond 7P: Trench Drain



Summary for Pond 9P: Catch Basin

```
Inflow Area =       0.190 ac,100.00% Impervious,  Inflow Depth >   0.46"    for  2-yr event
Inflow      =      0.10 cfs @     0.29 hrs,  Volume=          0.007 af
Outflow     =      0.10 cfs @     0.31 hrs,  Volume=          0.007 af,  Atten= 0%,  Lag= 1.2 min
Primary     =      0.10 cfs @     0.31 hrs,  Volume=          0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 18.31' @ 0.39 hrs
Flood Elev= 23.00'

Device  Routing          Invert  Outlet Devices
   #1   Primary          18.00'  6.0"  Round Culvert
                                 L= 100.0'   CPP, square edge headwall,  Ke= 0.500
                                 Inlet / Outlet Invert= 18.00' / 16.00'   S= 0.0200 '/'   Cc= 0.900
                                 n= 0.010  PVC, smooth interior,  Flow Area= 0.20 sf

Primary OutFlow  Max=0.10 cfs @ 0.31 hrs  HW=18.31'  TW=18.17'   (Dynamic Tailwater)
└─1=Culvert  (Outlet Controls 0.10 cfs @ 1.16 fps)
```

Pond 9P: Catch Basin



Summary for Pond 11P: Trench Drain

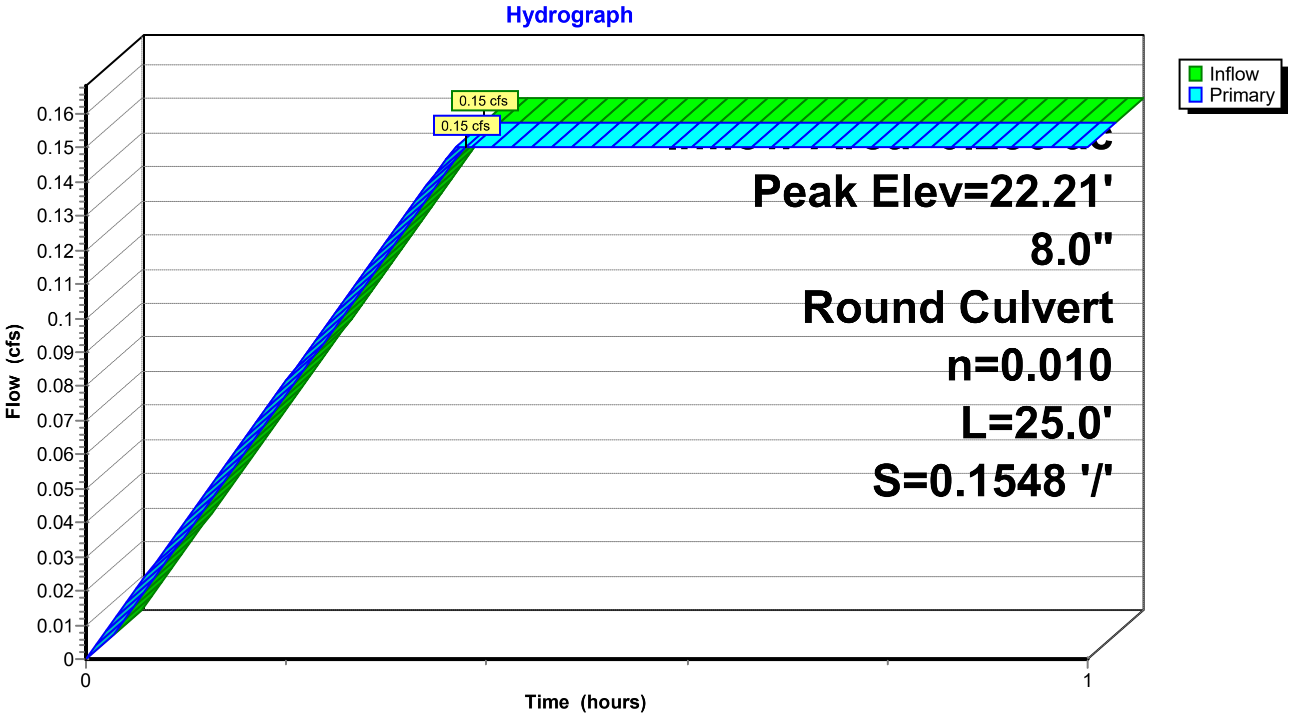
Inflow Area = 0.280 ac,100.00% Impervious, Inflow Depth > 0.44" for 2-yr event
Inflow = 0.15 cfs @ 0.37 hrs, Volume= 0.010 af
Outflow = 0.15 cfs @ 0.38 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.6 min
Primary = 0.15 cfs @ 0.38 hrs, Volume= 0.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.21' @ 0.37 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**8.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.00' / 18.13' S= 0.1548 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.15 cfs @ 0.38 hrs HW=22.21' TW=18.29' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.15 cfs @ 1.57 fps)

Pond 11P: Trench Drain



Summary for Pond 21P: Pump Vault

Inflow Area = 1.970 ac,100.00% Impervious, Inflow Depth > 0.18" for 2-yr event
Inflow = 0.42 cfs @ 0.49 hrs, Volume= 0.030 af
Outflow = 0.61 cfs @ 0.55 hrs, Volume= 0.028 af, Atten= 0%, Lag= 3.5 min
Primary = 0.61 cfs @ 0.55 hrs, Volume= 0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 0.17' @ 0.55 hrs Surf.Area= 0.002 ac Storage= 0.002 af
Flood Elev= 6.88' Surf.Area= 0.002 ac Storage= 0.015 af

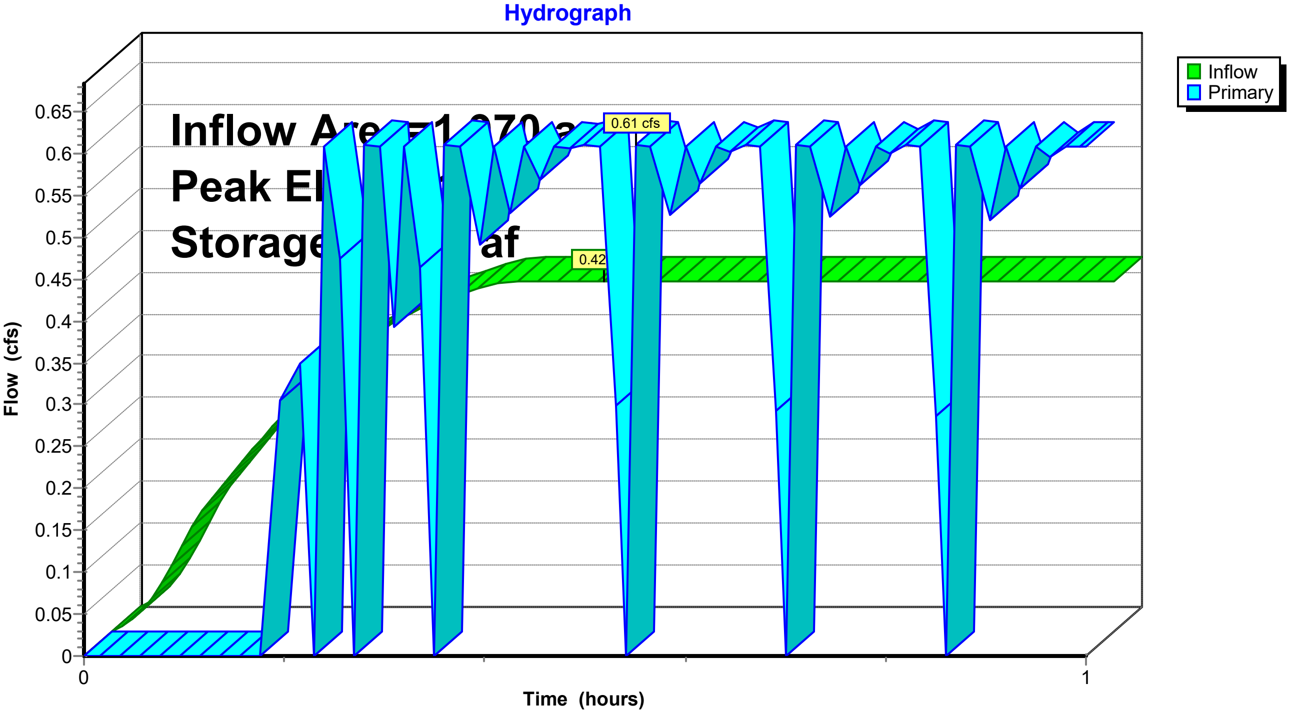
Plug-Flow detention time= 4.0 min calculated for 0.027 af (93% of inflow)
Center-of-Mass det. time= 2.4 min (36.7 - 34.3)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.12'	0.015 af	**6.00'W x 14.00'L x 8.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	0.13'	**Sample Pump 101** Discharges@19.00' Turns Off@-0.12' 6.0" Diam. x 19.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 60.0 120.0 180.0 240.0 270.0 285.0 300.0 315.0 330.0 Head (feet)= 40.00 36.00 32.00 28.00 24.00 20.00 16.00 12.00 10.00 8.00 -Loss (feet)= 0.00 0.01 0.03 0.06 0.10 0.12 0.14 0.15 0.17 0.18 =Lift (feet)= 40.00 35.99 31.97 27.94 23.90 19.88 15.86 11.85 9.83 7.82

Primary OutFlow Max=0.61 cfs @ 0.55 hrs HW=0.17' TW=17.66' (Dynamic Tailwater)
↑—**1=Sample Pump 101** (Pump Controls 0.61 cfs)

Pond 21P: Pump Vault



Summary for Pond 23P: Trench Drain

[57] Hint: Peaked at 14.13' (Flood elevation advised)

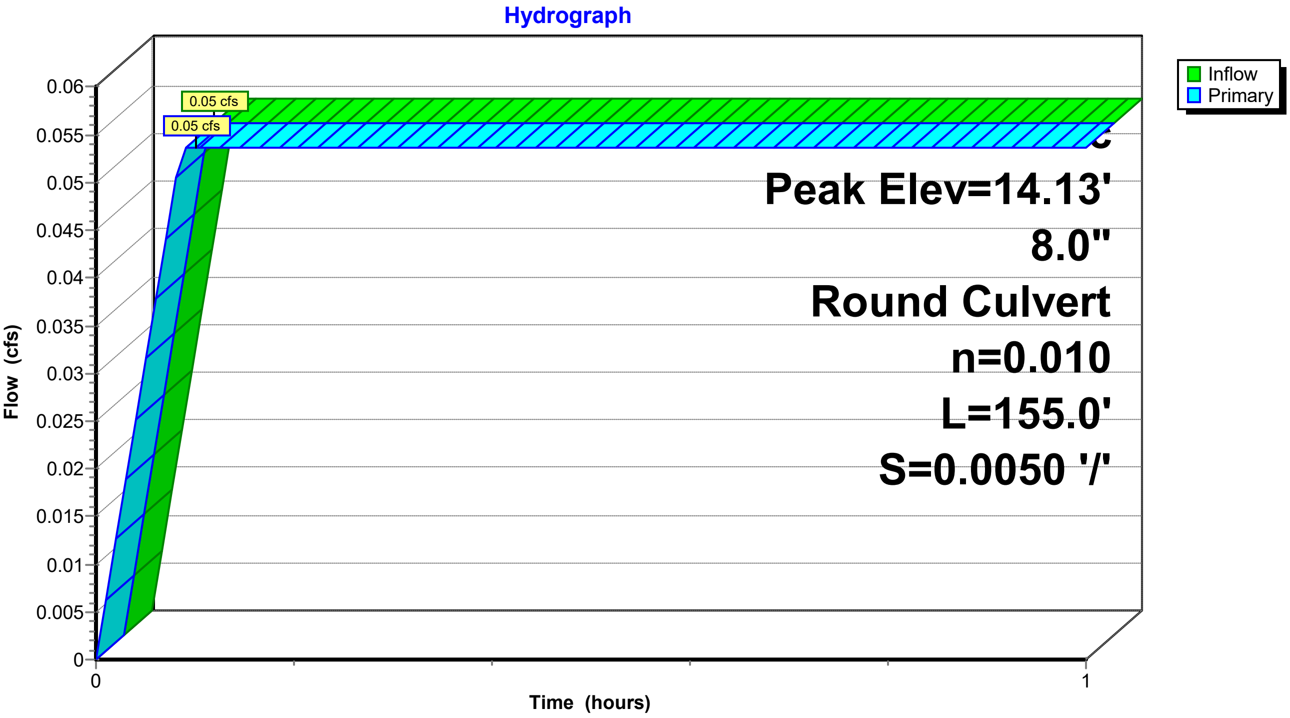
Inflow Area =	0.100 ac,100.00% Impervious,	Inflow Depth > 0.51"	for 2-yr event		
Inflow =	0.05 cfs @	0.09 hrs,	Volume=	0.004 af	
Outflow =	0.05 cfs @	0.10 hrs,	Volume=	0.004 af,	Atten= 0%, Lag= 0.6 min
Primary =	0.05 cfs @	0.10 hrs,	Volume=	0.004 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 14.13' @ 0.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**8.0" Round Culvert** L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 14.00' / 13.22' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.05 cfs @ 0.10 hrs HW=14.13' TW=-0.83' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.05 cfs @ 1.62 fps)

Pond 23P: Trench Drain



Summary for Pond 24P: Rainwater Harvest Tanks

Inflow Area =	1.190 ac,100.00% Impervious,	Inflow Depth >	0.51"	for 2-yr event	
Inflow =	0.64 cfs @	0.10 hrs, Volume=	0.051 af		
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 100%,	Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 33.01' @ 1.00 hrs Surf.Area= 0.005 ac Storage= 0.050 af

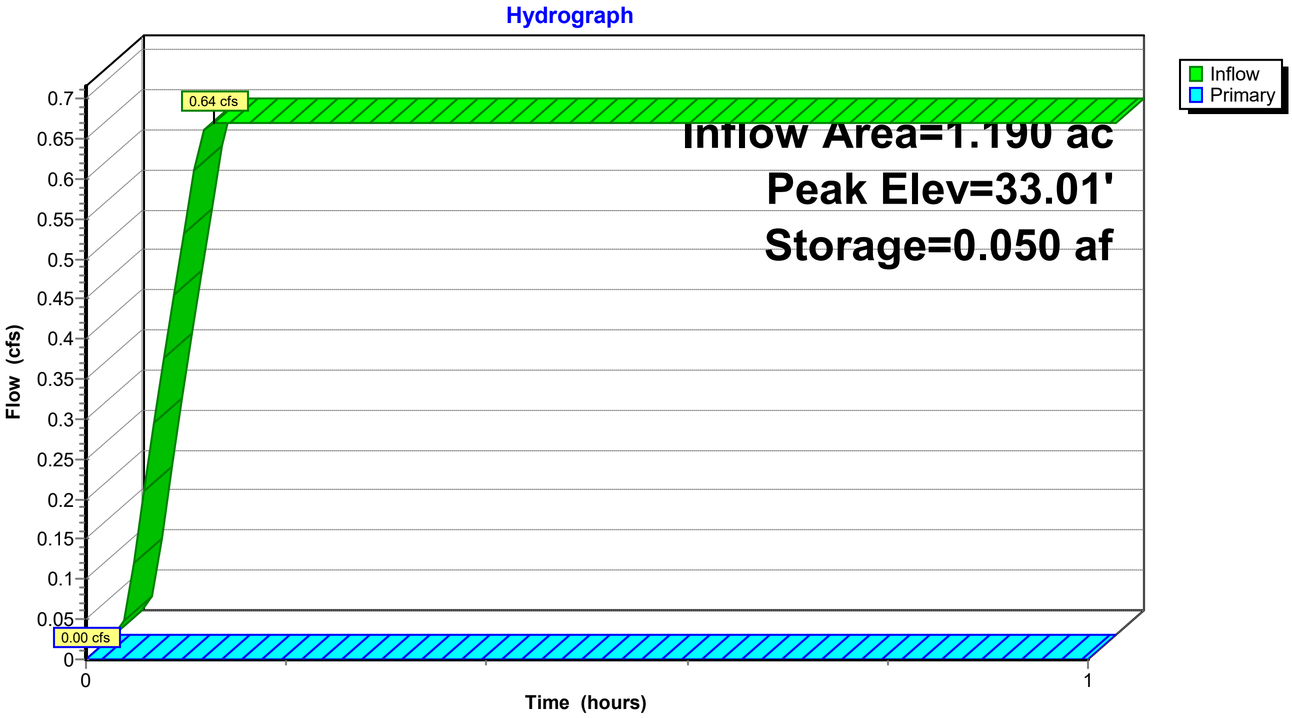
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

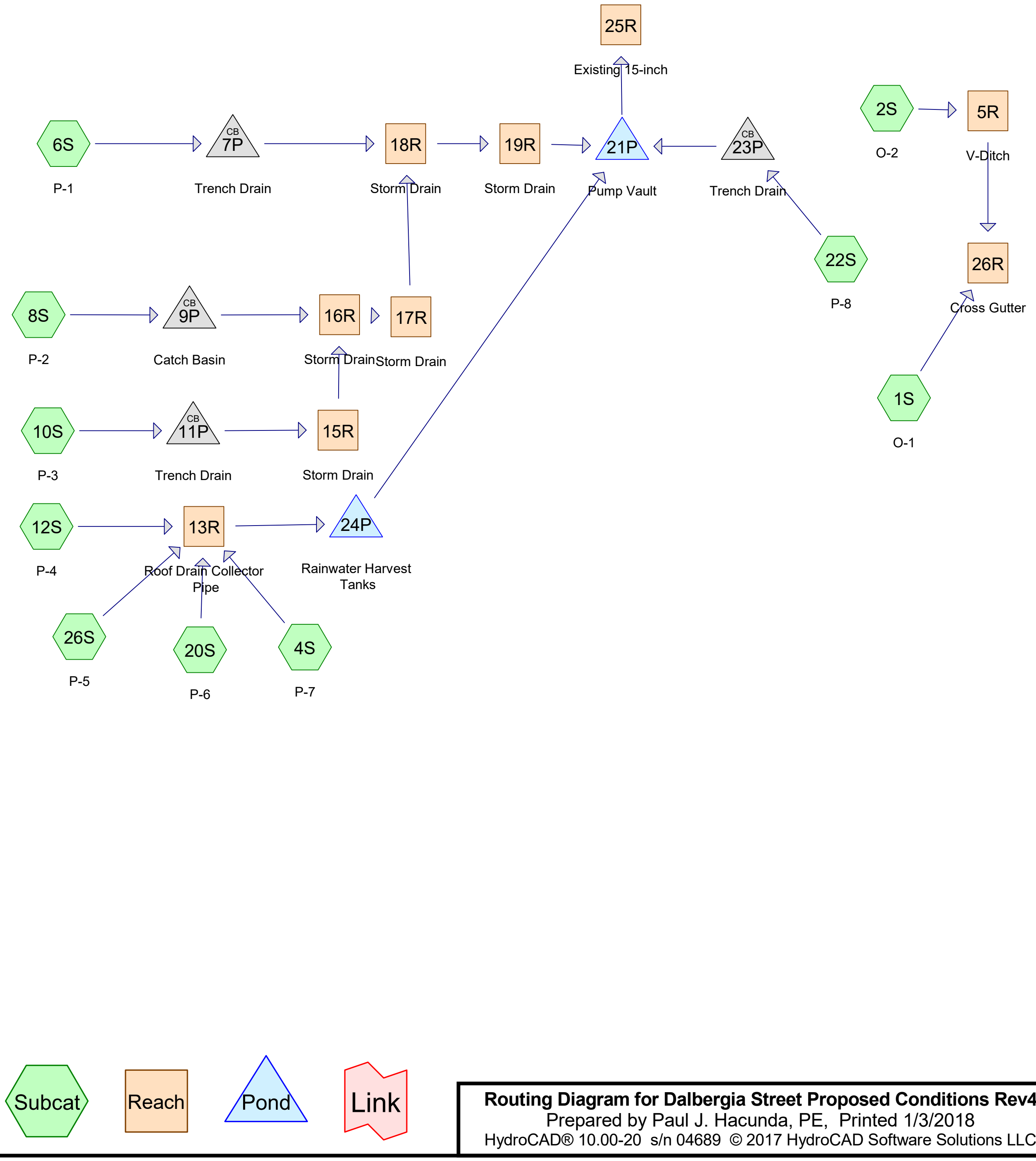
Volume	Invert	Avail.Storage	Storage Description
#1	23.33'	0.104 af	**12.00'D x 20.00'H Vertical Cone/Cylinder** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	42.33'	**6.0" Vert. Overflow** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.33' TW=-1.12' (Dynamic Tailwater)
└**1=Overflow** (Controls 0.00 cfs)

Pond 24P: Rainwater Harvest Tanks





Routing Diagram for Dalbergia Street Proposed Conditions Rev4
Prepared by Paul J. Hacunda, PE, Printed 1/3/2018
HydroCAD® 10.00-20 s/n 04689 © 2017 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
0.530	0.35	(1S, 2S)
1.970	0.95	(4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S)
2.500	**0.82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.500	Other	1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
2.500		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.500	2.500		1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
0.000	**0.000**	**0.000**	**0.000**	**2.500**	**2.500**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	13R	53.33	36.33	195.0	0.0872	0.010	6.0	0.0	0.0
2	15R	18.13	18.00	25.0	0.0052	0.010	8.0	0.0	0.0
3	16R	18.00	17.00	98.0	0.0102	0.010	8.0	0.0	0.0
4	17R	17.00	4.00	1.0	13.0000	0.010	8.0	0.0	0.0
5	18R	4.00	3.90	12.0	0.0083	0.010	8.0	0.0	0.0
6	19R	4.40	3.75	125.0	0.0052	0.010	8.0	0.0	0.0
7	25R	17.46	11.00	520.0	0.0124	0.013	15.0	0.0	0.0
8	7P	4.50	3.85	125.0	0.0052	0.010	8.0	0.0	0.0
9	9P	18.00	16.00	100.0	0.0200	0.010	6.0	0.0	0.0
10	11P	22.00	18.13	25.0	0.1548	0.010	8.0	0.0	0.0
11	23P	14.00	13.22	155.0	0.0050	0.010	8.0	0.0	0.0

Time span=0.00-1.00 hrs, dt=0.01 hrs, 101 points x 3
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: O-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth>0.29"
Flow Length=107' Tc=13.5 min C=0.35 Runoff=0.02 cfs 0.001 af

Subcatchment 2S: O-2 Runoff Area=0.480 ac 0.00% Impervious Runoff Depth>0.28"
Flow Length=583' Tc=17.1 min C=0.35 Runoff=0.16 cfs 0.011 af

Subcatchment 4S: P-7 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>0.85"
Flow Length=60' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.09 cfs 0.007 af

Subcatchment 6S: P-1 Runoff Area=0.210 ac 100.00% Impervious Runoff Depth>0.80"
Flow Length=240' Slope=0.0900 '/' Tc=12.0 min C=0.95 Runoff=0.19 cfs 0.014 af

Subcatchment 8S: P-2 Runoff Area=0.190 ac 100.00% Impervious Runoff Depth>0.76"
Flow Length=125' Slope=0.0100 '/' Tc=17.1 min C=0.95 Runoff=0.17 cfs 0.012 af

Subcatchment 10S: P-3 Runoff Area=0.280 ac 100.00% Impervious Runoff Depth>0.73"
Flow Length=300' Tc=22.1 min C=0.95 Runoff=0.25 cfs 0.017 af

Subcatchment 12S: P-4 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>0.85"
Flow Length=55' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.09 cfs 0.007 af

Subcatchment 20S: P-6 Runoff Area=0.340 ac 100.00% Impervious Runoff Depth>0.85"
Flow Length=60' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.30 cfs 0.024 af

Subcatchment 22S: P-8 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>0.85"
Flow Length=150' Tc=5.1 min C=0.95 Runoff=0.09 cfs 0.007 af

Subcatchment 26S: P-5 Runoff Area=0.650 ac 100.00% Impervious Runoff Depth>0.85"
Flow Length=90' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.58 cfs 0.046 af

Reach 5R: V-Ditch Avg. Flow Depth=0.06' Max Vel=0.93 fps Inflow=0.16 cfs 0.011 af
n=0.017 L=555.0' S=0.0054 '/' Capacity=5.03 cfs Outflow=0.16 cfs 0.009 af

Reach 13R: Roof Drain Collector Pipe Avg. Flow Depth=0.25' Max Vel=10.93 fps Inflow=1.06 cfs 0.084 af
6.0" Round Pipe n=0.010 L=195.0' S=0.0872 '/' Capacity=2.15 cfs Outflow=1.06 cfs 0.084 af

Reach 15R: Storm Drain Avg. Flow Depth=0.21' Max Vel=2.60 fps Inflow=0.25 cfs 0.017 af
8.0" Round Pipe n=0.010 L=25.0' S=0.0052 '/' Capacity=1.13 cfs Outflow=0.25 cfs 0.017 af

Reach 16R: Storm Drain Avg. Flow Depth=0.23' Max Vel=3.84 fps Inflow=0.42 cfs 0.029 af
8.0" Round Pipe n=0.010 L=98.0' S=0.0102 '/' Capacity=1.59 cfs Outflow=0.42 cfs 0.029 af

Reach 17R: Storm Drain Avg. Flow Depth=0.04' Max Vel=47.60 fps Inflow=0.42 cfs 0.029 af
8.0" Round Pipe n=0.010 L=1.0' S=13.0000 '/' Capacity=56.64 cfs Outflow=0.42 cfs 0.029 af

Reach 18R: Storm Drain Avg. Flow Depth=0.30' Max Vel=3.94 fps Inflow=0.61 cfs 0.043 af
8.0" Round Pipe n=0.010 L=12.0' S=0.0083 '/' Capacity=1.43 cfs Outflow=0.61 cfs 0.043 af

```
Reach 19R: Storm Drain                 Avg. Flow Depth=0.35'   Max Vel=3.30 fps   Inflow=0.61 cfs  0.043 af
               8.0"  Round Pipe   n=0.010   L=125.0'   S=0.0052 '/'   Capacity=1.13 cfs   Outflow=0.61 cfs  0.042 af

Reach 25R: Existing 15-inch            Avg. Flow Depth=0.34'   Max Vel=4.28 fps   Inflow=1.22 cfs  0.066 af
              15.0"  Round Pipe   n=0.013   L=520.0'   S=0.0124 '/'   Capacity=7.20 cfs   Outflow=1.14 cfs  0.063 af

Reach 26R: Cross Gutter                Avg. Flow Depth=0.08'   Max Vel=0.94 fps   Inflow=0.17 cfs  0.010 af
                                  n=0.013   L=100.0'   S=0.0050 '/'   Capacity=2.05 cfs   Outflow=0.17 cfs  0.010 af

Pond 7P: Trench Drain                                        Peak Elev=4.78'   Inflow=0.19 cfs  0.014 af
                            8.0"  Round Culvert  n=0.010  L=125.0'  S=0.0052 '/'   Outflow=0.19 cfs  0.014 af

Pond 9P: Catch Basin                                        Peak Elev=18.40'   Inflow=0.17 cfs  0.012 af
                            6.0"  Round Culvert  n=0.010  L=100.0'  S=0.0200 '/'   Outflow=0.17 cfs  0.012 af

Pond 11P: Trench Drain                                      Peak Elev=22.28'   Inflow=0.25 cfs  0.017 af
                             8.0"  Round Culvert  n=0.010  L=25.0'  S=0.1548 '/'   Outflow=0.25 cfs  0.017 af

Pond 21P: Pump Vault                          Peak Elev=0.16'  Storage=0.002 af   Inflow=0.69 cfs  0.049 af
                                                                                   Outflow=1.22 cfs  0.047 af

Pond 23P: Trench Drain                                      Peak Elev=14.17'   Inflow=0.09 cfs  0.007 af
                            8.0"  Round Culvert  n=0.010  L=155.0'  S=0.0050 '/'   Outflow=0.09 cfs  0.007 af

Pond 24P: Rainwater Harvest Tanks            Peak Elev=39.41'  Storage=0.084 af   Inflow=1.06 cfs  0.084 af
                                                                                   Outflow=0.00 cfs  0.000 af

             Total Runoff Area = 2.500 ac   Runoff Volume = 0.147 af   Average Runoff Depth = 0.71"
                                          21.20% Pervious = 0.530 ac     78.80% Impervious = 1.970 ac
```

Summary for Subcatchment 1S: O-1

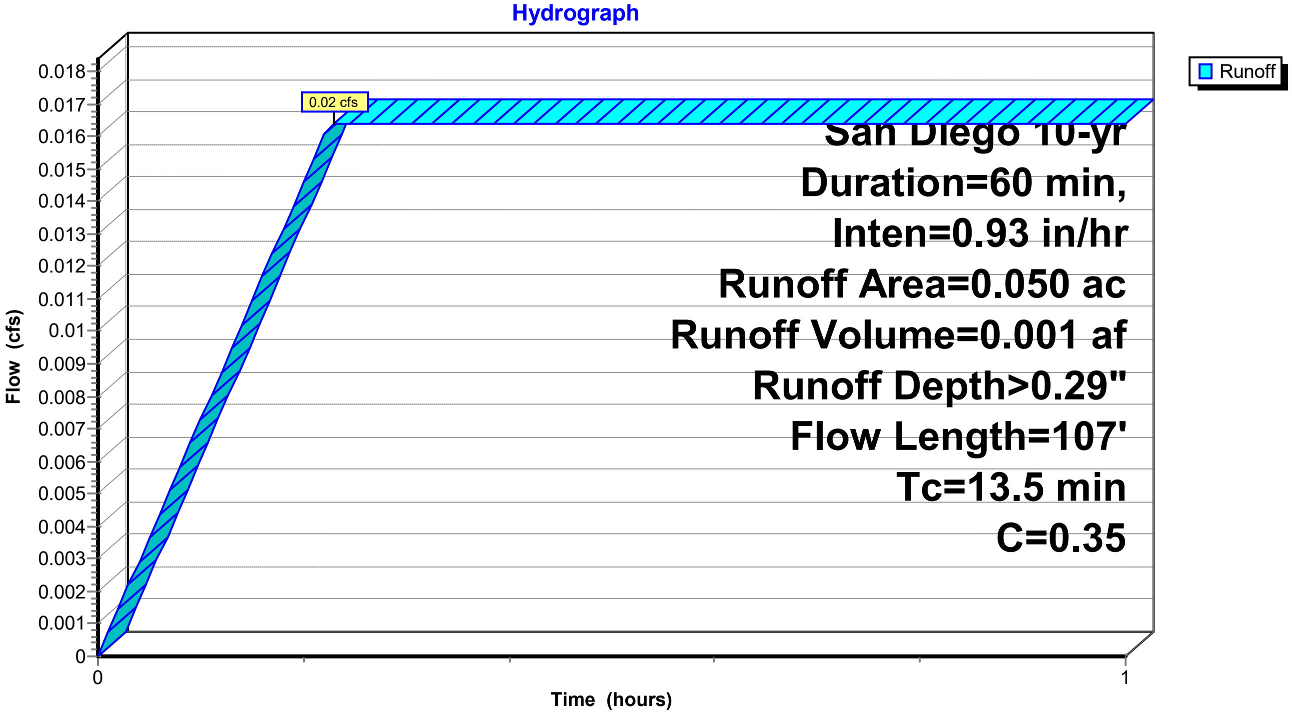
Runoff = 0.02 cfs @ 0.23 hrs, Volume= 0.001 af, Depth> 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.050	0.35	
0.050		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	27	0.5000	0.04		**Sheet Flow, Caltrans Slope** Grass: Dense n= 0.240 P2= 0.04"
1.1	80	0.0050	1.24	0.10	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.017 Concrete, unfinished
13.5	107	Total			

Subcatchment 1S: O-1



Summary for Subcatchment 2S: O-2

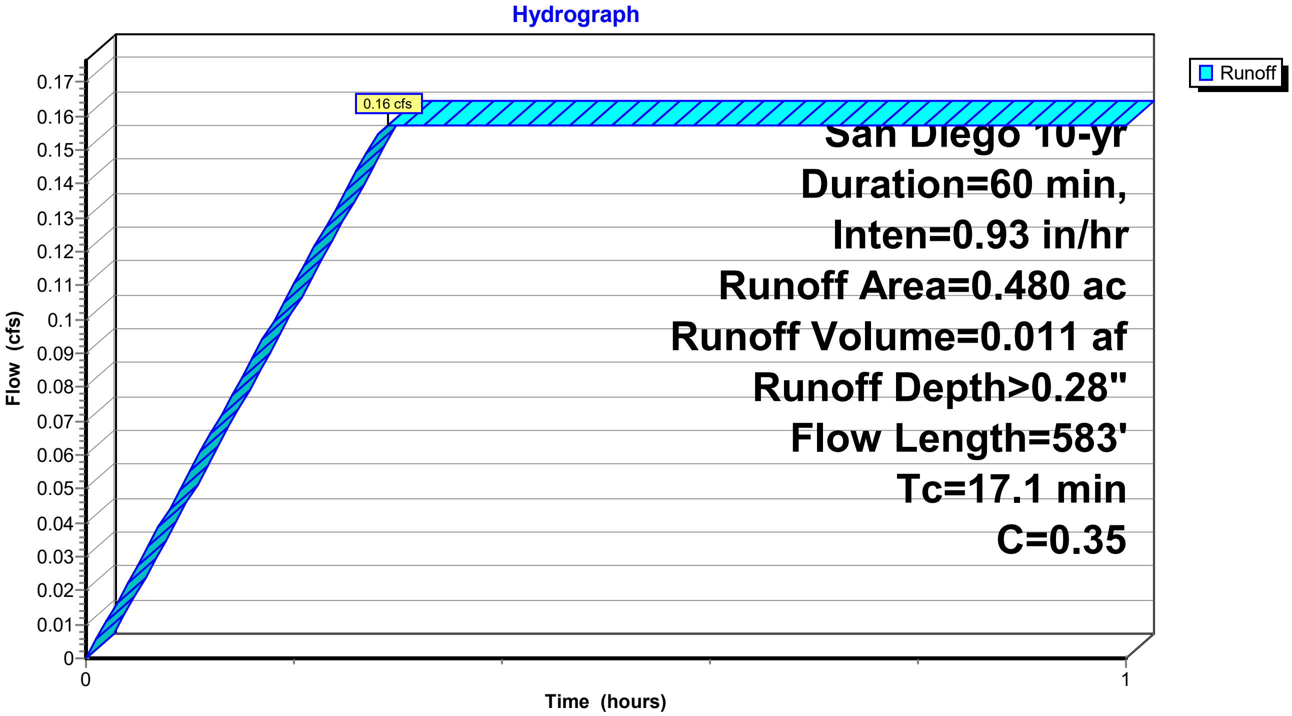
Runoff = 0.16 cfs @ 0.29 hrs, Volume= 0.011 af, Depth> 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.480	0.35	
0.480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	28	0.5000	0.04		**Sheet Flow, Caltrans R/W** Grass: Dense n= 0.240 P2= 0.04"
4.4	555	0.0050	2.12	0.38	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.30' Z= 2.0 '/' Top.W=1.20' n= 0.013 Concrete, trowel finish
17.1	583	Total			

Subcatchment 2S: O-2



Summary for Subcatchment 4S: P-7

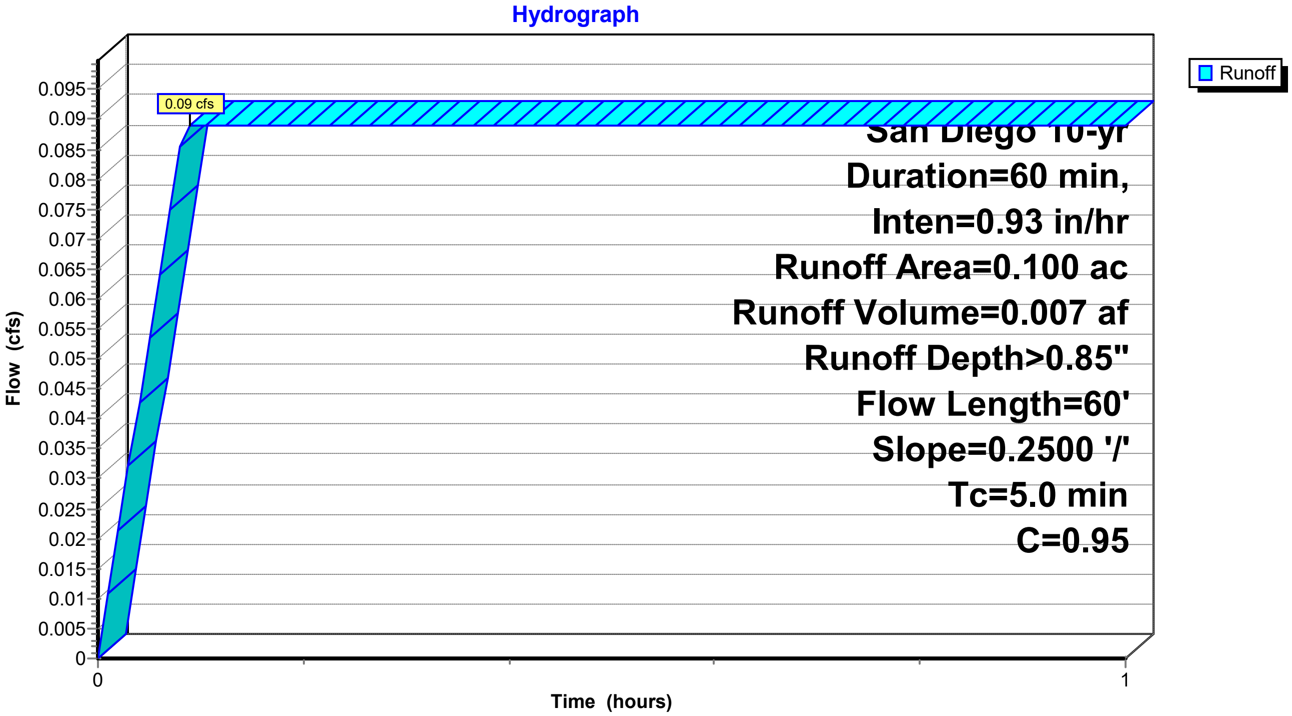
Runoff = 0.09 cfs @ 0.09 hrs, Volume= 0.007 af, Depth> 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 4S: P-7



Summary for Subcatchment 6S: P-1

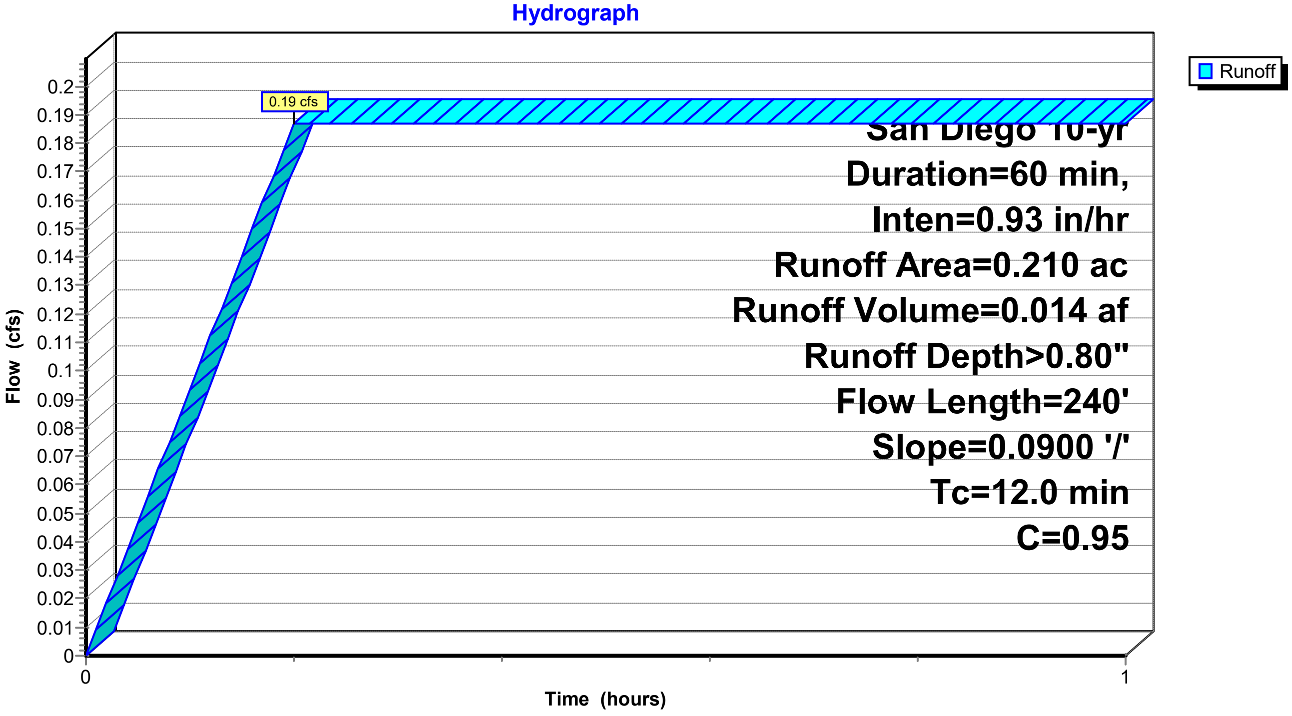
Runoff = 0.19 cfs @ 0.20 hrs, Volume= 0.014 af, Depth> 0.80"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.210	0.95	
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	240	0.0900	0.33		**Sheet Flow, Exit Ramp** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 6S: P-1



Summary for Subcatchment 8S: P-2

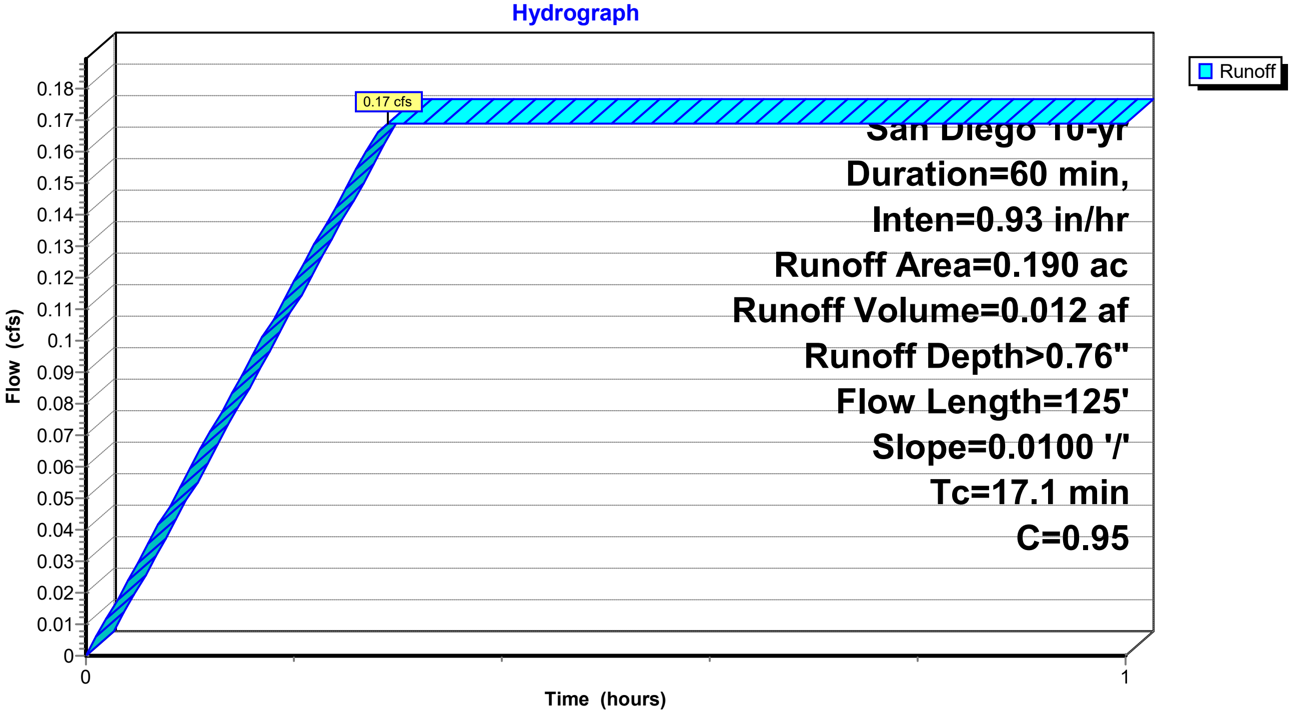
Runoff = 0.17 cfs @ 0.29 hrs, Volume= 0.012 af, Depth> 0.76"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.190	0.95	
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	125	0.0100	0.12		**Sheet Flow, Exit Area** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 8S: P-2



Summary for Subcatchment 10S: P-3

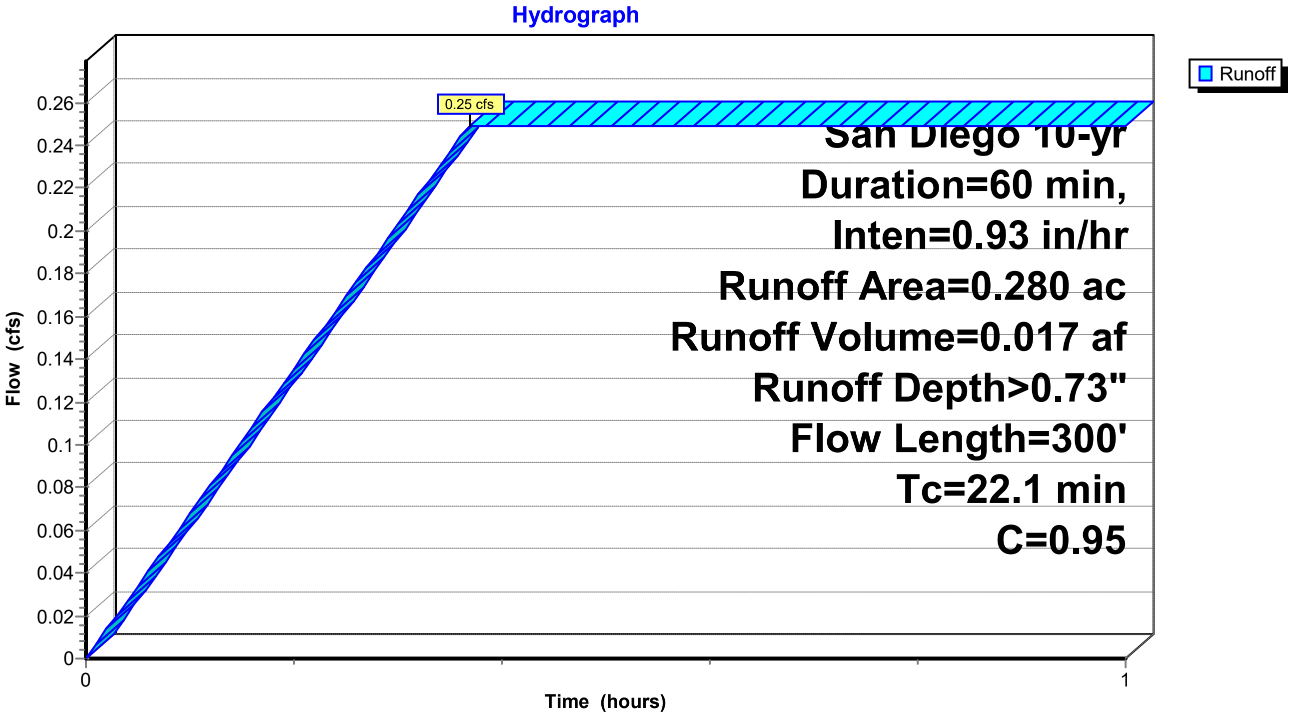
Runoff = 0.25 cfs @ 0.37 hrs, Volume= 0.017 af, Depth> 0.73"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.280	0.95	
0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	140	0.0100	0.12		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 0.04"
3.4	160	0.0060	0.77		**Shallow Concentrated Flow, Landscape Area** Nearly Bare & Untilled Kv= 10.0 fps
22.1	300	Total			

Subcatchment 10S: P-3



Summary for Subcatchment 12S: P-4

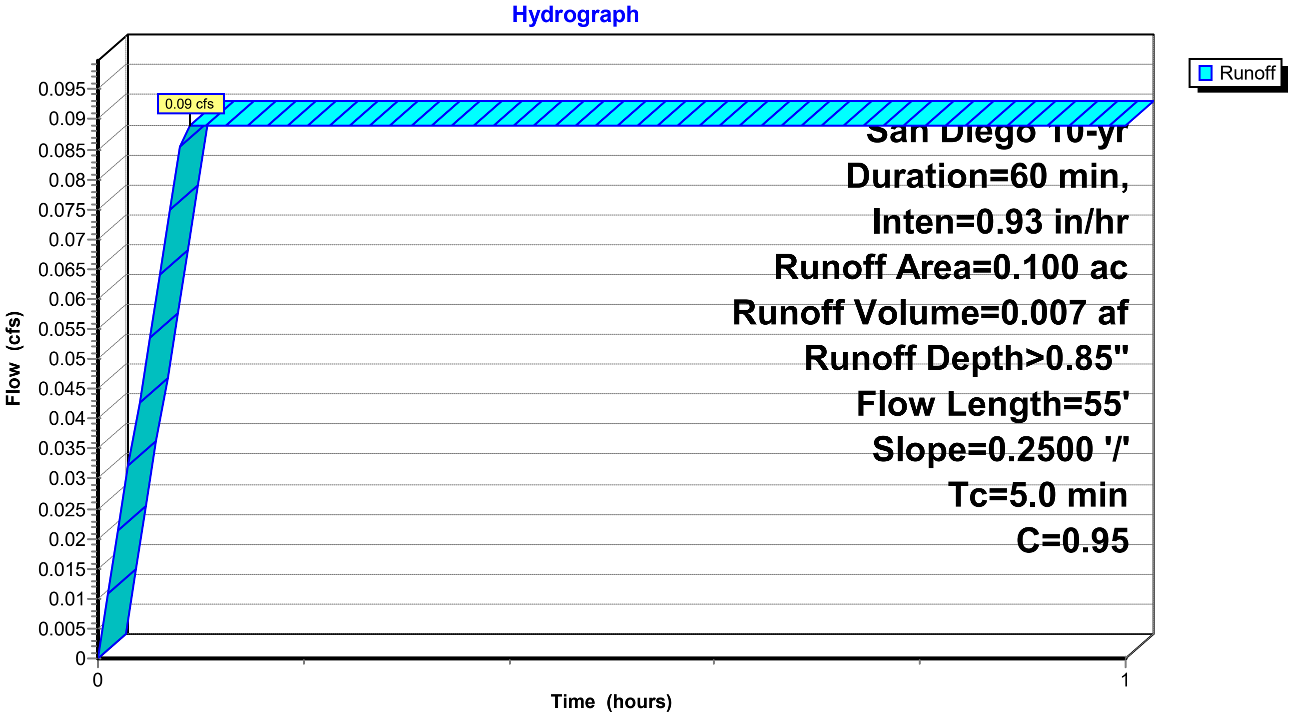
Runoff = 0.09 cfs @ 0.09 hrs, Volume= 0.007 af, Depth> 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	55	0.2500	0.37		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.4	55	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: P-4



Summary for Subcatchment 20S: P-6

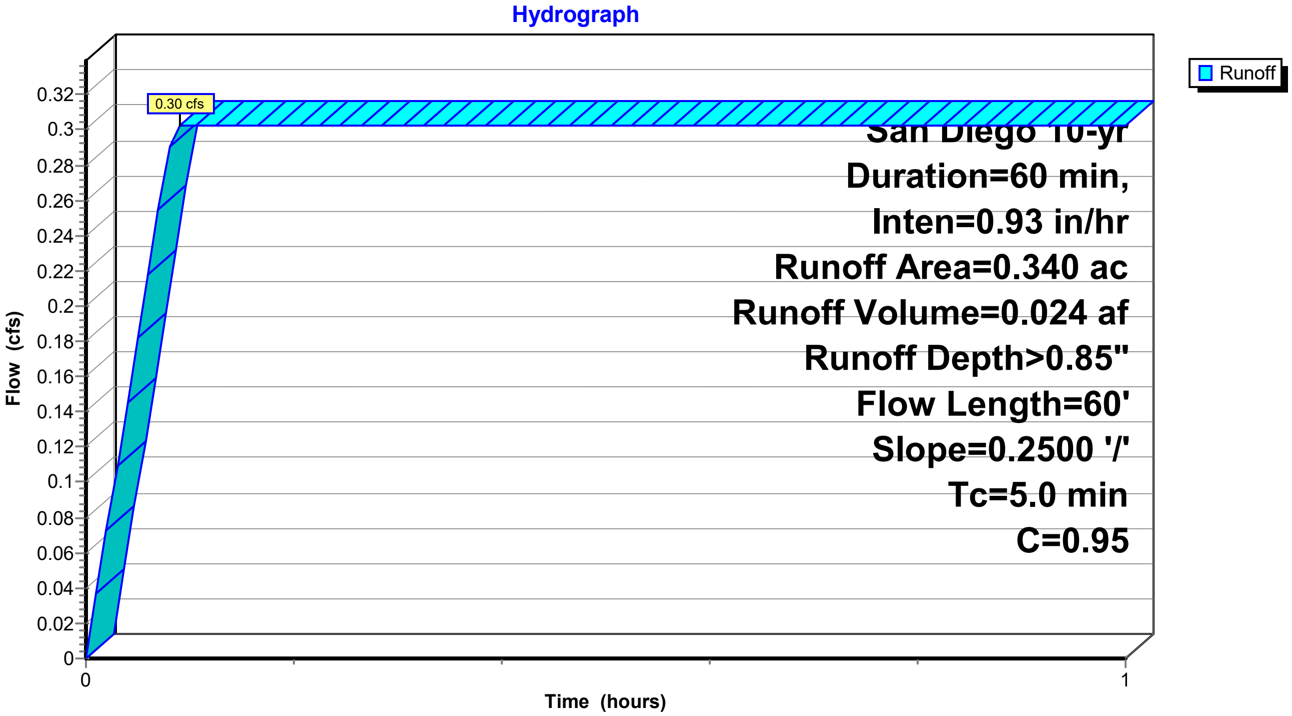
Runoff = 0.30 cfs @ 0.09 hrs, Volume= 0.024 af, Depth> 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.340	0.95	
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 20S: P-6



Summary for Subcatchment 22S: P-8

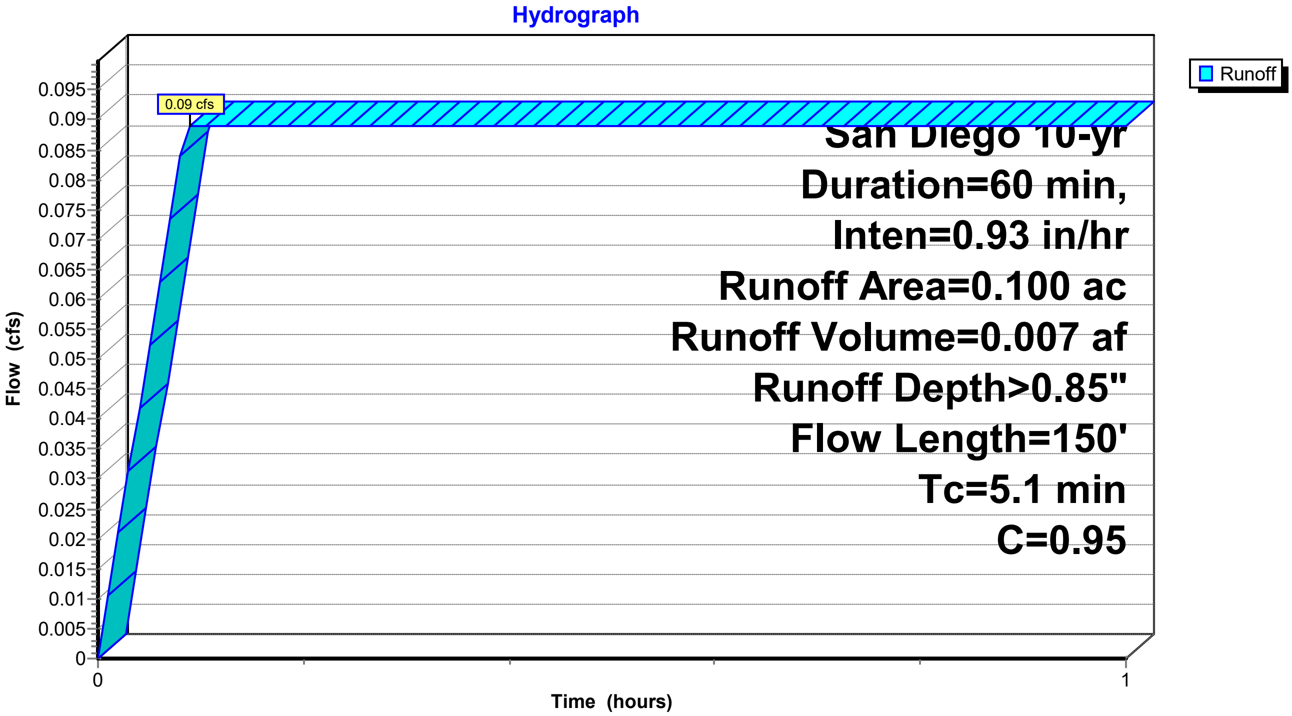
Runoff = 0.09 cfs @ 0.09 hrs, Volume= 0.007 af, Depth> 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	70	0.0050	1.44		**Shallow Concentrated Flow, Curb and Gutter** Paved Kv= 20.3 fps
4.3	80	0.1300	0.31		**Sheet Flow, Entrance Ramp** Smooth surfaces n= 0.011 P2= 0.04"
5.1	150	Total			

Subcatchment 22S: P-8



Summary for Subcatchment 26S: P-5

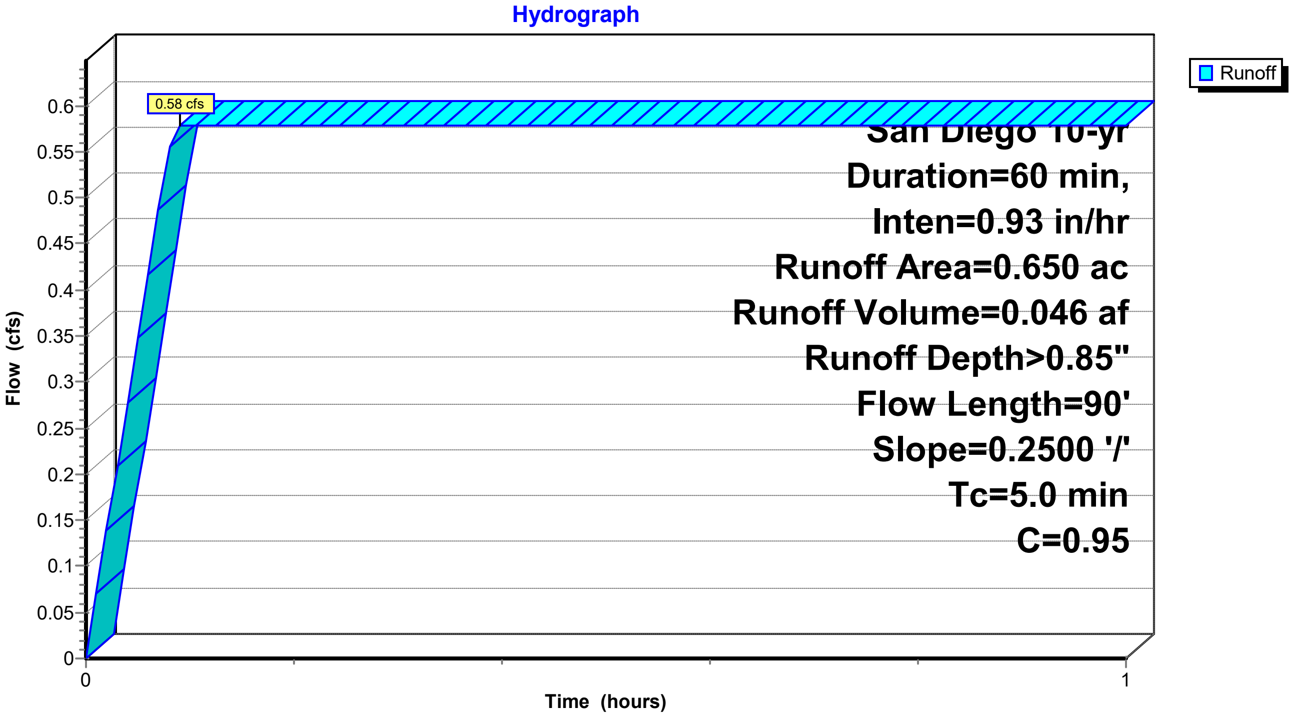
Runoff = 0.58 cfs @ 0.09 hrs, Volume= 0.046 af, Depth> 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 10-yr Duration=60 min, Inten=0.93 in/hr

Area (ac)	C	Description
0.650	0.95	
0.650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	90	0.2500	0.41		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
3.6	90	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 26S: P-5



Summary for Reach 5R: V-Ditch

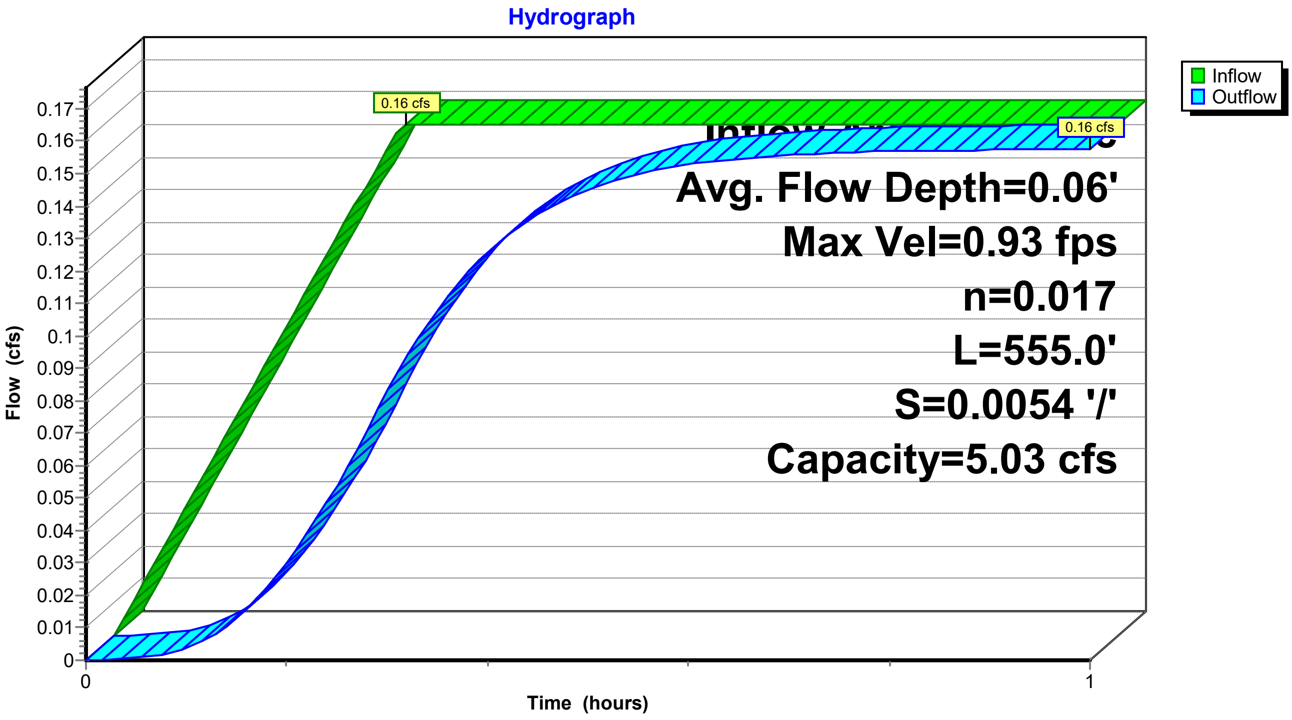
Inflow Area = 0.480 ac, 0.00% Impervious, Inflow Depth > 0.28" for 10-yr event
Inflow = 0.16 cfs @ 0.29 hrs, Volume= 0.011 af
Outflow = 0.16 cfs @ 1.00 hrs, Volume= 0.009 af, Atten= 0%, Lag= 42.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.93 fps, Min. Travel Time= 10.0 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 12.4 min

Peak Storage= 94 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 5.03 cfs

3.00' x 0.50' deep channel, n= 0.017 Concrete, unfinished
Length= 555.0' Slope= 0.0054 '/'
Inlet Invert= 26.34', Outlet Invert= 23.32'

Reach 5R: V-Ditch



Summary for Reach 13R: Roof Drain Collector Pipe

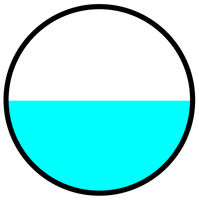
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =         1.190 ac,100.00% Impervious,  Inflow Depth >   0.85"    for  10-yr event
Inflow      =         1.06 cfs @     0.09 hrs,  Volume=            0.084 af
Outflow     =         1.06 cfs @     0.10 hrs,  Volume=            0.084 af,  Atten= 0%,  Lag= 0.6 min
```

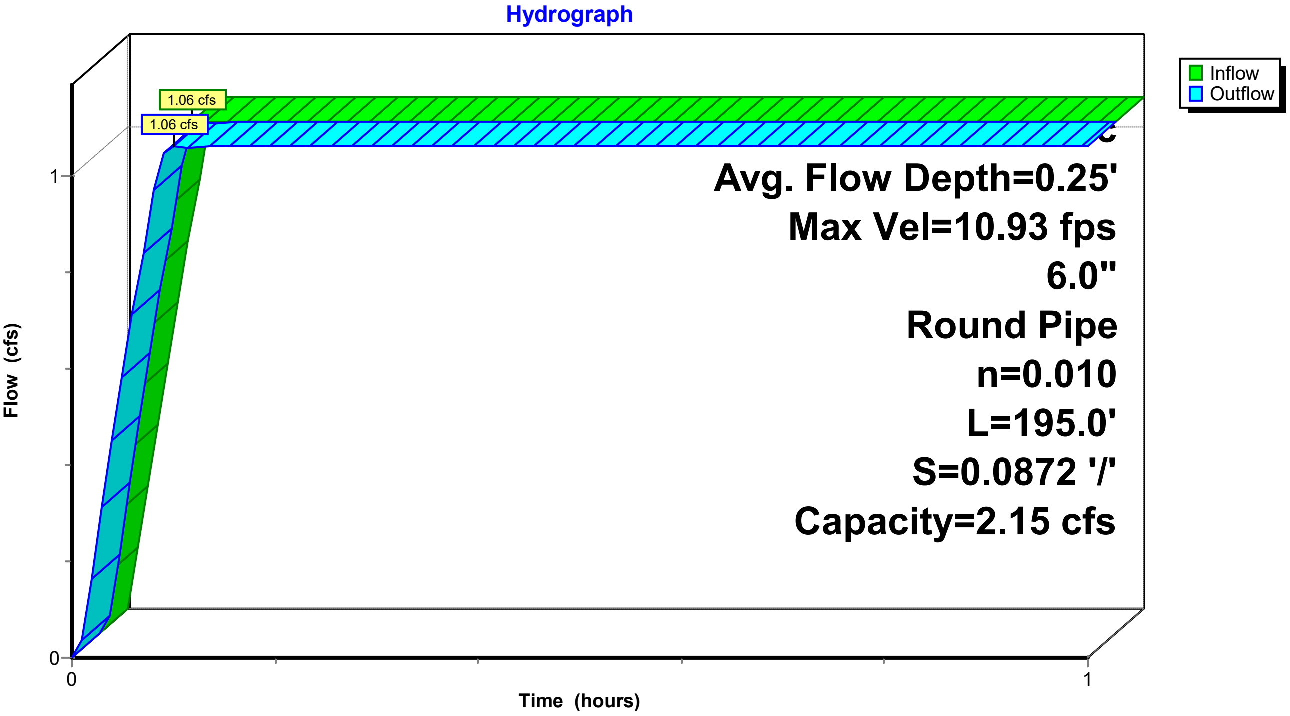
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 10.93 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 10.72 fps, Avg. Travel Time= 0.3 min

Peak Storage= 19 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.15 cfs

6.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 195.0' Slope= 0.0872 '/'
Inlet Invert= 53.33', Outlet Invert= 36.33'



Reach 13R: Roof Drain Collector Pipe



Summary for Reach 15R: Storm Drain

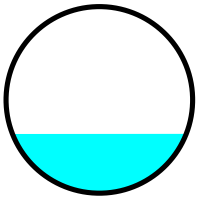
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =      0.280 ac,100.00% Impervious,  Inflow Depth >   0.73"    for  10-yr event
Inflow      =      0.25 cfs @    0.37 hrs,  Volume=          0.017 af
Outflow     =      0.25 cfs @    0.38 hrs,  Volume=          0.017 af,  Atten= 0%,  Lag= 0.6 min
```

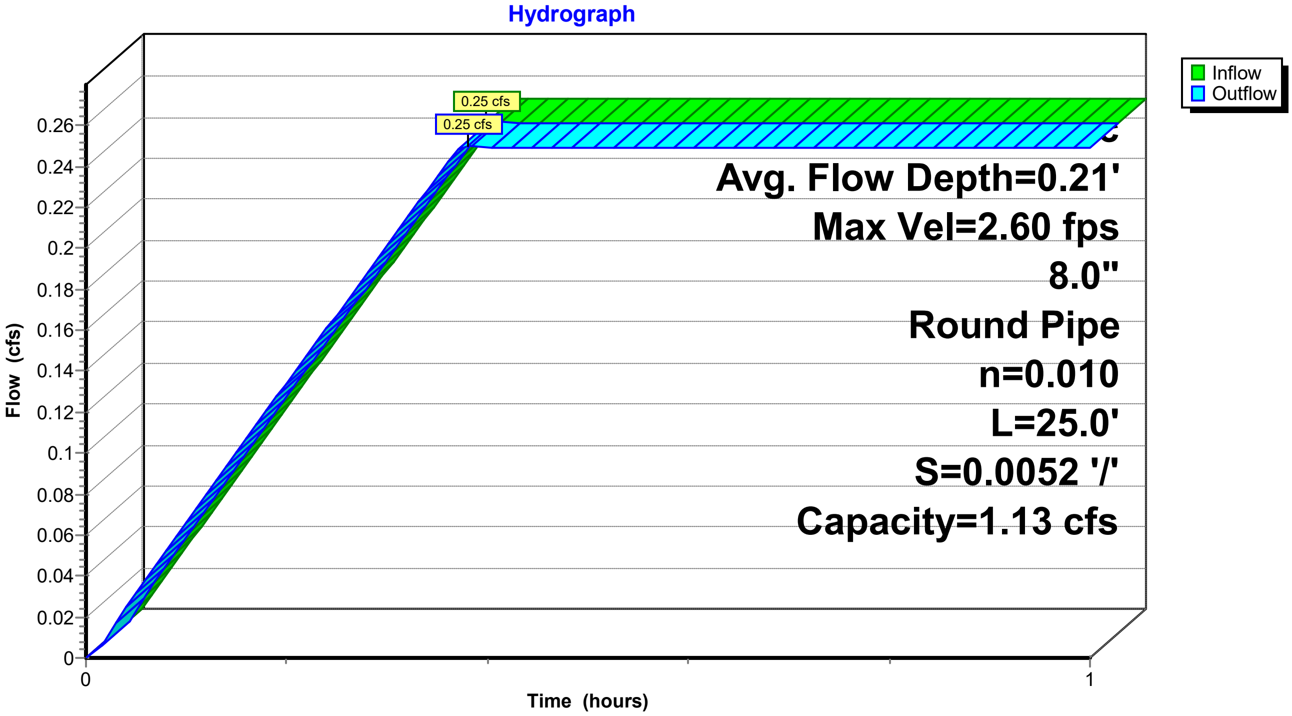
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.60 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.39 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2 cf @ 0.38 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 25.0' Slope= 0.0052 '/'
Inlet Invert= 18.13', Outlet Invert= 18.00'



Reach 15R: Storm Drain



Summary for Reach 16R: Storm Drain

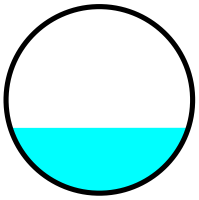
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 15R OUTLET depth by 0.03' @ 0.29 hrs

```
Inflow Area =       0.470 ac,100.00% Impervious,  Inflow Depth >   0.74"    for  10-yr event
Inflow      =       0.42 cfs @    0.38 hrs,  Volume=          0.029 af
Outflow     =       0.42 cfs @    0.39 hrs,  Volume=          0.029 af,  Atten= 0%,  Lag= 0.6 min
```

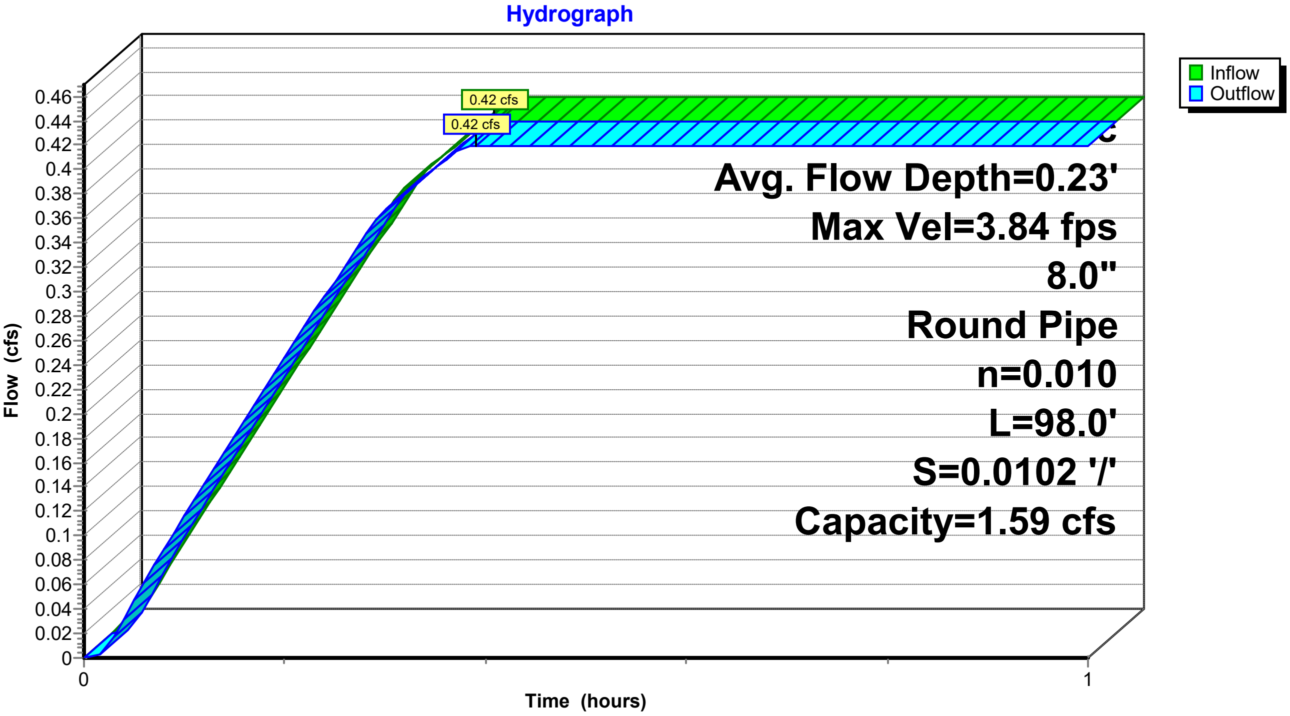
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.84 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.53 fps, Avg. Travel Time= 0.5 min

Peak Storage= 11 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.59 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 98.0'   Slope= 0.0102 '/'
Inlet Invert= 18.00', Outlet Invert= 17.00'



Reach 16R: Storm Drain



Summary for Reach 17R: Storm Drain

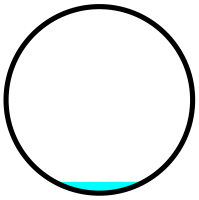
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 16R outlet invert by 0.04' @ 0.39 hrs

```
Inflow Area =      0.470 ac,100.00% Impervious,  Inflow Depth >   0.73"    for  10-yr event
Inflow      =      0.42 cfs @    0.39 hrs,  Volume=          0.029 af
Outflow     =      0.42 cfs @    0.39 hrs,  Volume=          0.029 af,  Atten= 0%,  Lag= 0.0 min
```

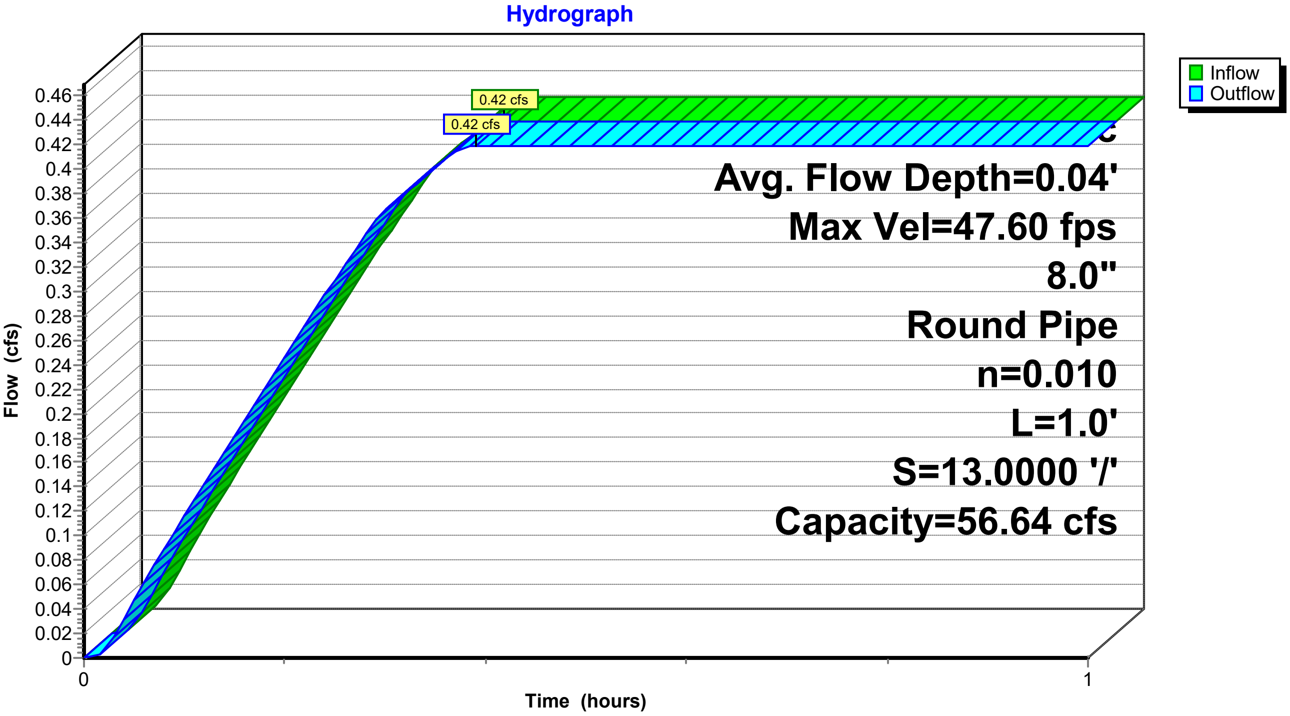
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 47.60 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 44.08 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 56.64 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 1.0' Slope= 13.0000 '/'
Inlet Invert= 17.00', Outlet Invert= 4.00'

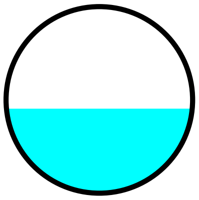


Reach 17R: Storm Drain

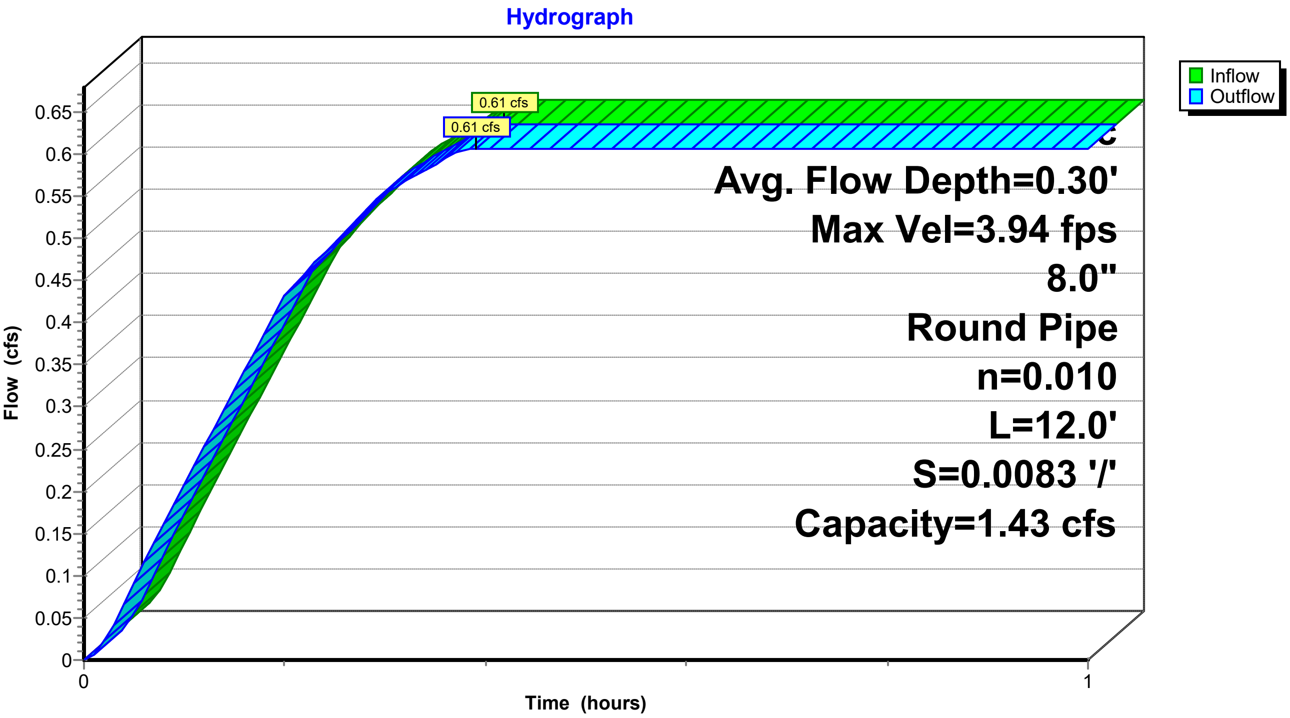


Summary for Reach 18R: Storm Drain

```
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 17R OUTLET depth by 0.26' @ 0.39 hrs

Inflow Area =      0.680 ac,100.00% Impervious,  Inflow Depth >   0.75"    for  10-yr event
Inflow      =      0.61 cfs @    0.39 hrs,  Volume=          0.043 af
Outflow     =      0.61 cfs @    0.39 hrs,  Volume=          0.043 af,  Atten= 0%,  Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.94 fps,  Min. Travel Time= 0.1 min
Avg. Velocity = 3.68 fps,  Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 0.67'  Flow Area= 0.3 sf,  Capacity= 1.43 cfs

8.0"  Round Pipe
n= 0.010  PVC, smooth interior
Length= 12.0'   Slope= 0.0083 '/'
Inlet Invert= 4.00',  Outlet Invert= 3.90'
```



Reach 18R: Storm Drain



Summary for Reach 19R: Storm Drain

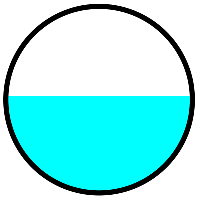
[52] Hint: Inlet/Outlet conditions not evaluated
[63] Warning: Exceeded Reach 18R INLET depth by 0.44' @ 0.42 hrs

```
Inflow Area =         0.680 ac,100.00% Impervious,  Inflow Depth >   0.75"    for  10-yr event
Inflow       =        0.61 cfs @     0.39 hrs,  Volume=            0.043 af
Outflow      =        0.61 cfs @     0.44 hrs,  Volume=            0.042 af,  Atten= 0%,  Lag= 3.0 min
```

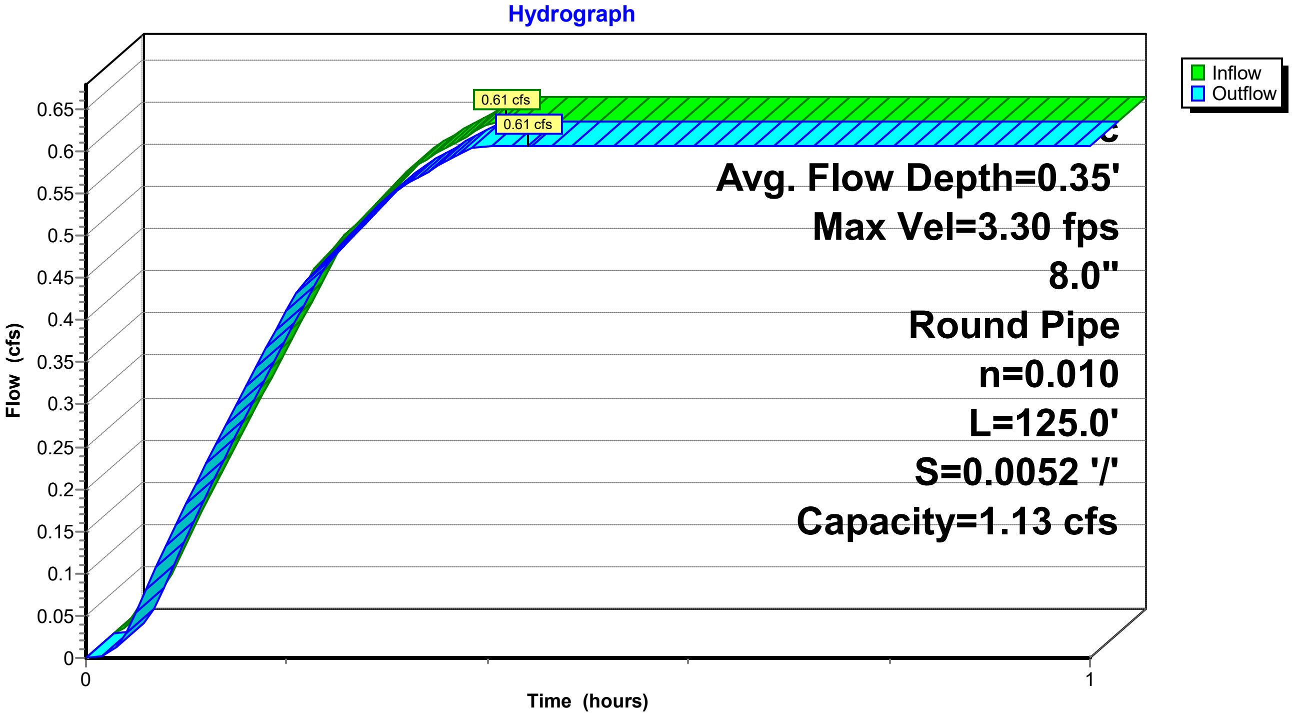
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.30 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.05 fps, Avg. Travel Time= 0.7 min

Peak Storage= 23 cf @ 0.44 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 125.0' Slope= 0.0052 '/'
Inlet Invert= 4.40', Outlet Invert= 3.75'



Reach 19R: Storm Drain



Summary for Reach 25R: Existing 15-inch

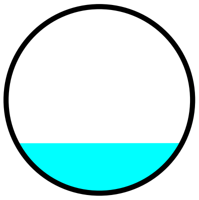
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =      1.970 ac,100.00% Impervious,  Inflow Depth >   0.40"    for  10-yr event
Inflow      =      1.22 cfs @    0.41 hrs,  Volume=          0.066 af
Outflow     =      1.14 cfs @    0.33 hrs,  Volume=          0.063 af,  Atten= 7%,  Lag= 0.0 min
```

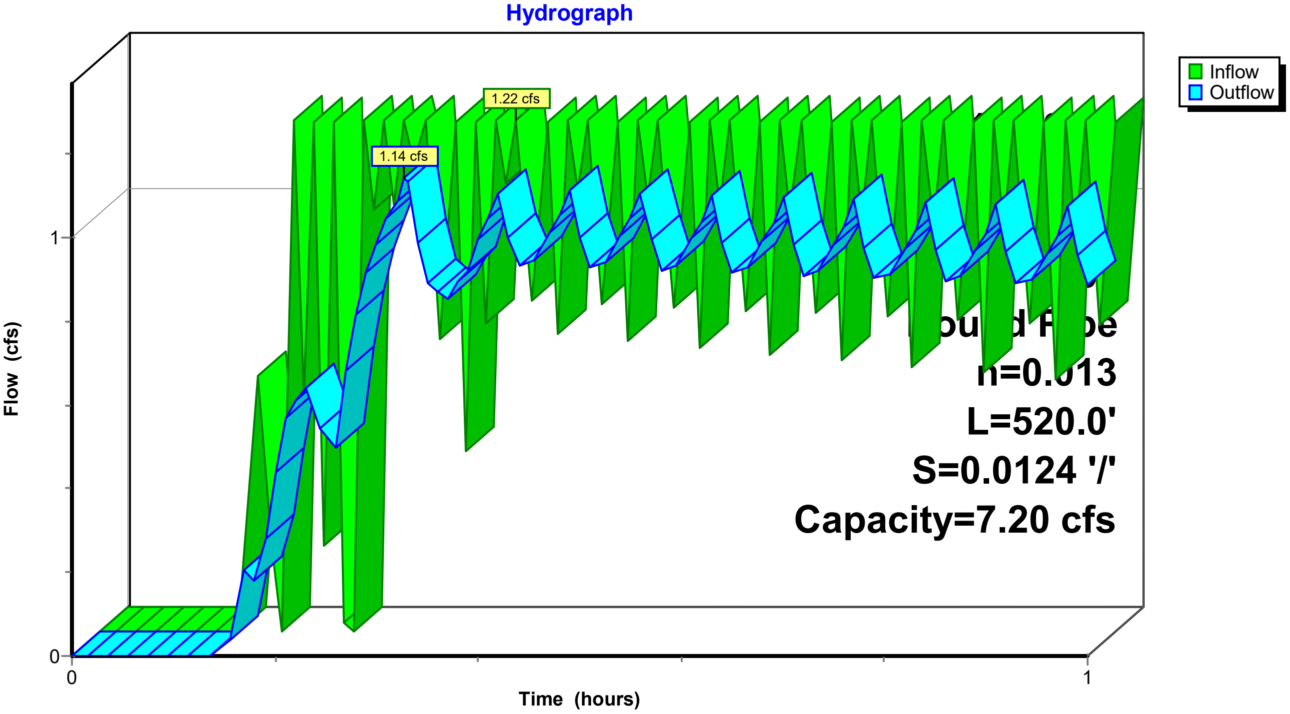
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.28 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 3.96 fps, Avg. Travel Time= 2.2 min

Peak Storage= 138 cf @ 0.33 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 25R: Existing 15-inch



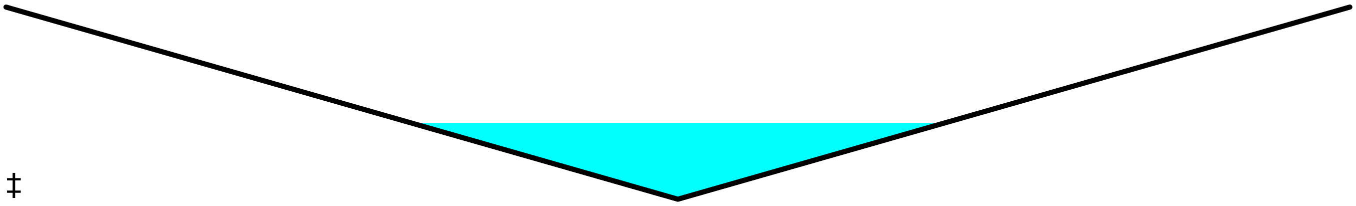
Summary for Reach 26R: Cross Gutter

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth > 0.23" for 10-yr event
Inflow = 0.17 cfs @ 1.00 hrs, Volume= 0.010 af
Outflow = 0.17 cfs @ 1.00 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

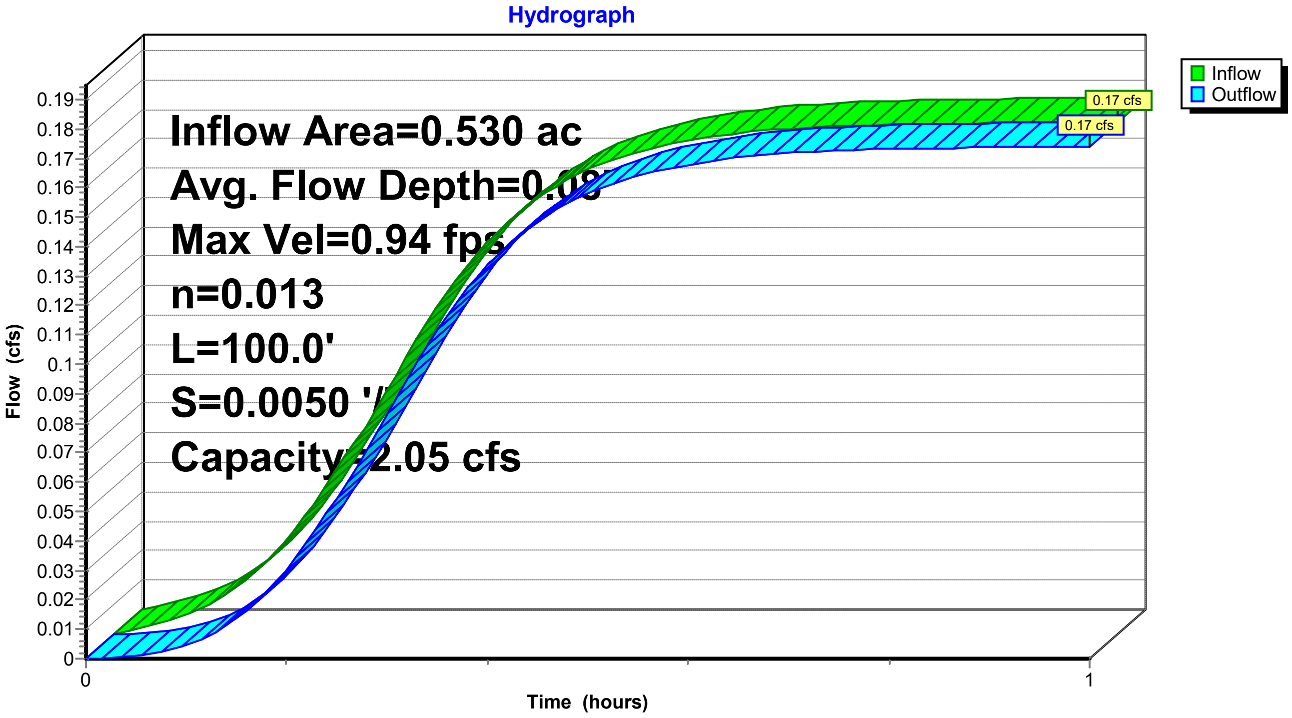
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.94 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 2.1 min

Peak Storage= 18 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.20' Flow Area= 1.2 sf, Capacity= 2.05 cfs

0.00' x 0.20' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 11.76'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 21.60', Outlet Invert= 21.10'



Reach 26R: Cross Gutter



Summary for Pond 7P: Trench Drain

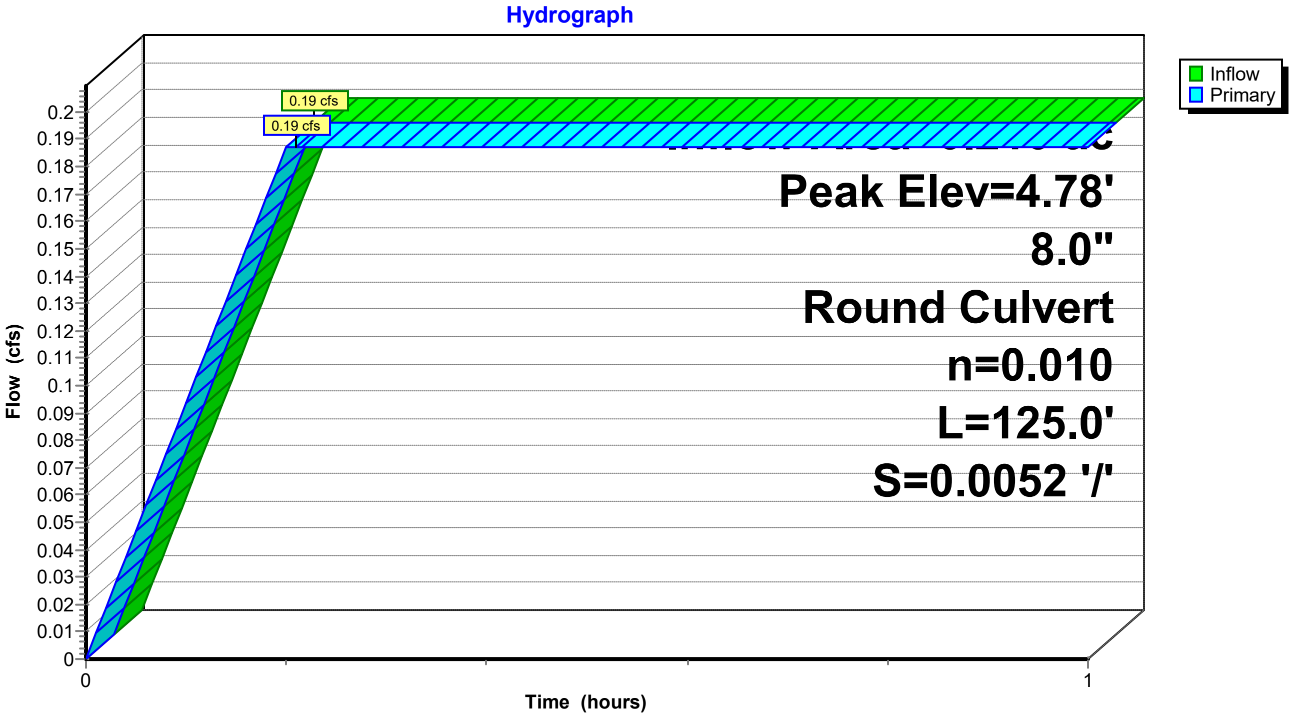
Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 0.80" for 10-yr event
Inflow = 0.19 cfs @ 0.20 hrs, Volume= 0.014 af
Outflow = 0.19 cfs @ 0.21 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.6 min
Primary = 0.19 cfs @ 0.21 hrs, Volume= 0.014 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 4.78' @ 0.39 hrs
Flood Elev= 6.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	4.50'	**8.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.50' / 3.85' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 0.21 hrs HW=4.77' TW=4.25' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.19 cfs @ 2.05 fps)

Pond 7P: Trench Drain



Summary for Pond 9P: Catch Basin

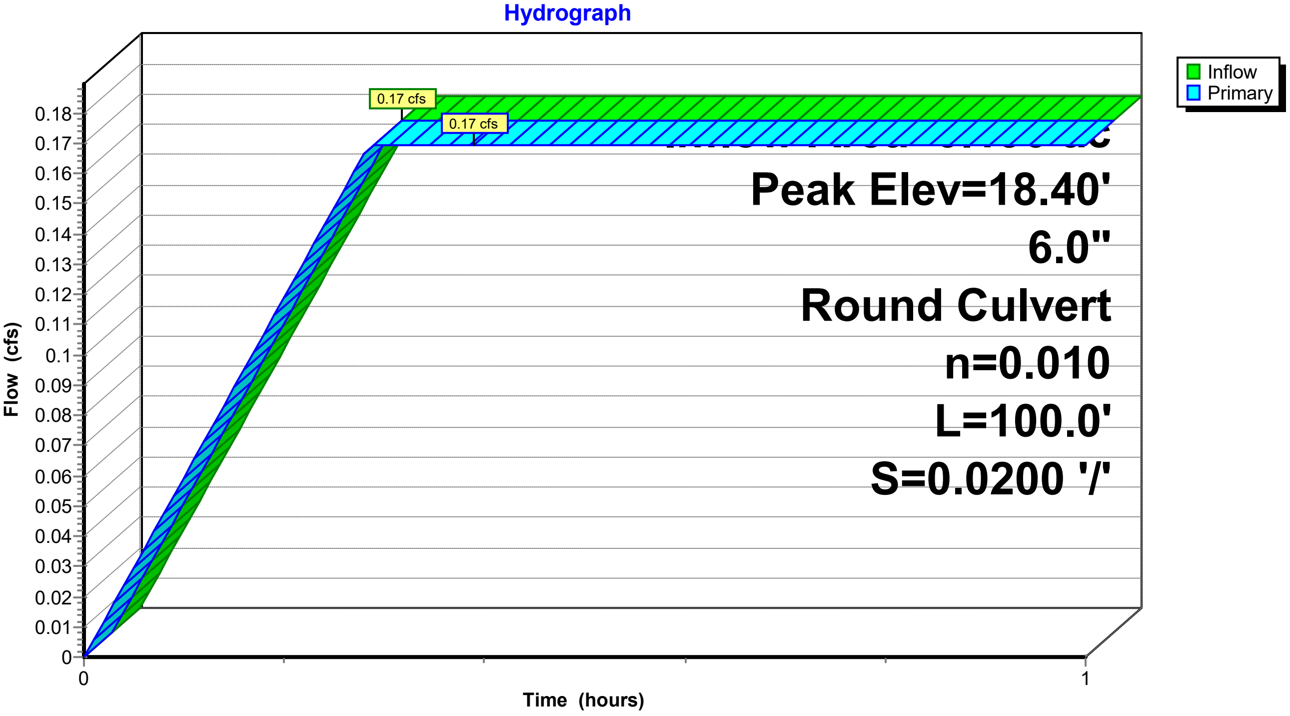
Inflow Area =	0.190 ac,100.00% Impervious,	Inflow Depth >	0.76"	for 10-yr event	
Inflow =	0.17 cfs @	0.29 hrs, Volume=	0.012 af		
Outflow =	0.17 cfs @	0.39 hrs, Volume=	0.012 af,	Atten= 0%,	Lag= 6.0 min
Primary =	0.17 cfs @	0.39 hrs, Volume=	0.012 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 18.40' @ 0.39 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.00'	**6.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 18.00' / 16.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.17 cfs @ 0.39 hrs HW=18.40' TW=18.23' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.17 cfs @ 1.38 fps)

Pond 9P: Catch Basin



Summary for Pond 11P: Trench Drain

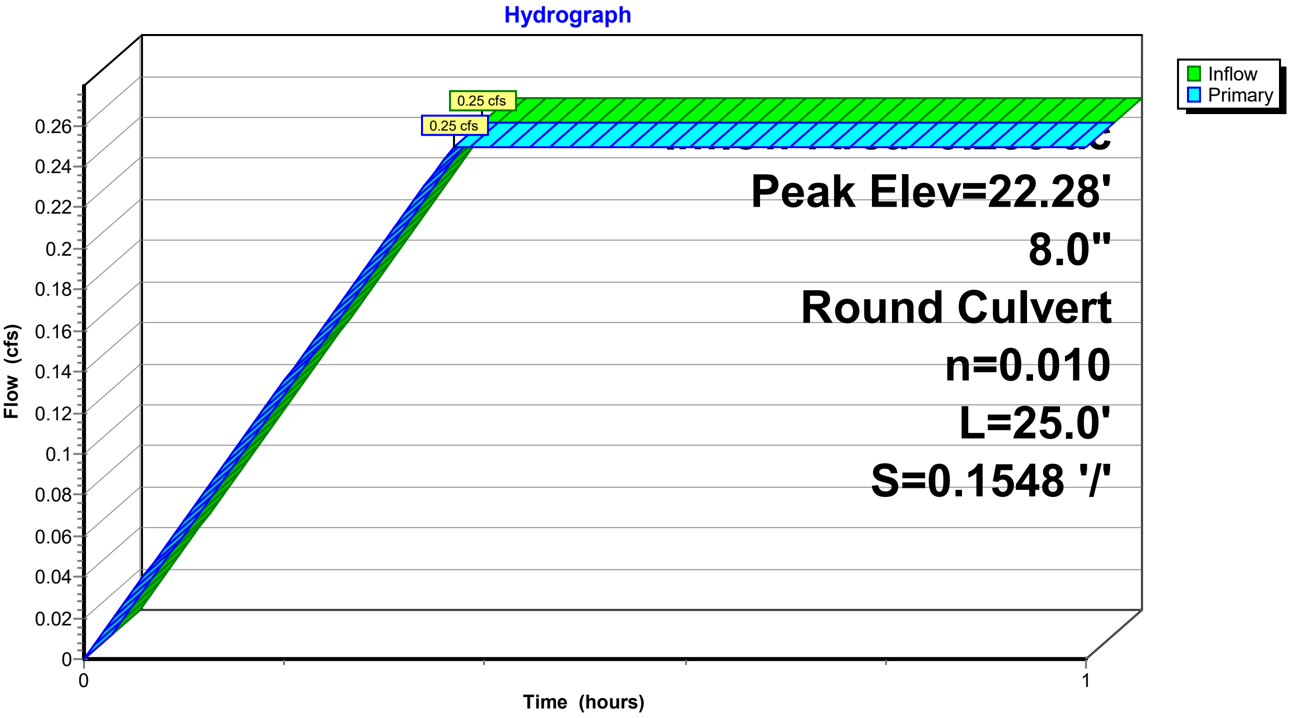
Inflow Area =	0.280 ac,100.00% Impervious,	Inflow Depth > 0.73"	for 10-yr event		
Inflow =	0.25 cfs @	0.37 hrs,	Volume=	0.017 af	
Outflow =	0.25 cfs @	0.37 hrs,	Volume=	0.017 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.25 cfs @	0.37 hrs,	Volume=	0.017 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.28' @ 0.37 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**8.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.00' / 18.13' S= 0.1548 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.25 cfs @ 0.37 hrs HW=22.28' TW=18.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.25 cfs @ 1.80 fps)

Pond 11P: Trench Drain



Summary for Pond 21P: Pump Vault

Inflow Area = 1.970 ac,100.00% Impervious, Inflow Depth > 0.30" for 10-yr event
Inflow = 0.69 cfs @ 0.44 hrs, Volume= 0.049 af
Outflow = 1.22 cfs @ 0.41 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 1.22 cfs @ 0.41 hrs, Volume= 0.066 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 0.16' @ 0.41 hrs Surf.Area= 0.002 ac Storage= 0.002 af
Flood Elev= 6.88' Surf.Area= 0.002 ac Storage= 0.015 af

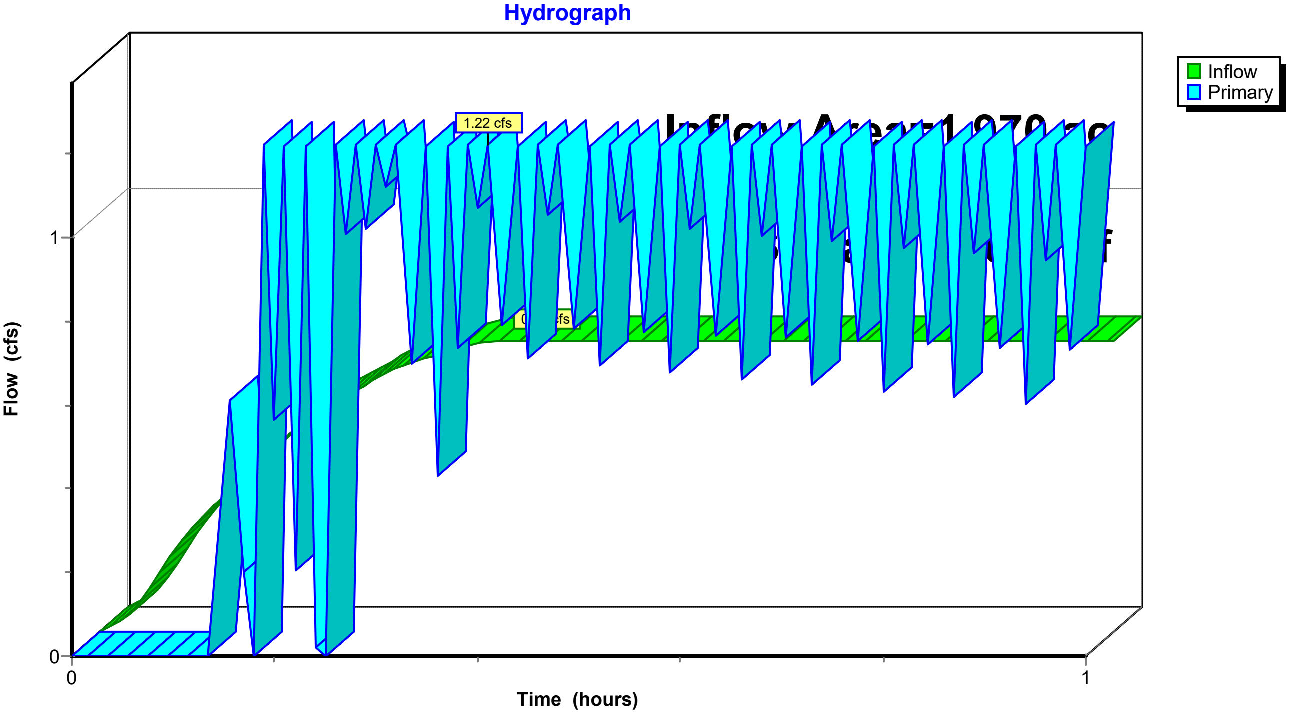
Plug-Flow detention time= 2.4 min calculated for 0.047 af (96% of inflow)
Center-of-Mass det. time= 1.5 min (35.8 - 34.3)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.12'	0.015 af	**6.00'W x 14.00'L x 8.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	0.13'	**Sample Pump 101 X 2.00** Discharges@19.00' Turns Off@-0.12' 6.0" Diam. x 19.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 60.0 120.0 180.0 240.0 270.0 285.0 300.0 315.0 330.0 Head (feet)= 40.00 36.00 32.00 28.00 24.00 20.00 16.00 12.00 10.00 8.00 -Loss (feet)= 0.00 0.01 0.03 0.06 0.10 0.12 0.14 0.15 0.17 0.18 =Lift (feet)= 40.00 35.99 31.97 27.94 23.90 19.88 15.86 11.85 9.83 7.82

Primary OutFlow Max=1.22 cfs @ 0.41 hrs HW=0.15' TW=17.78' (Dynamic Tailwater)
└─**1=Sample Pump 101** (Pump Controls 1.22 cfs)

Pond 21P: Pump Vault



Summary for Pond 23P: Trench Drain

[57] Hint: Peaked at 14.17' (Flood elevation advised)

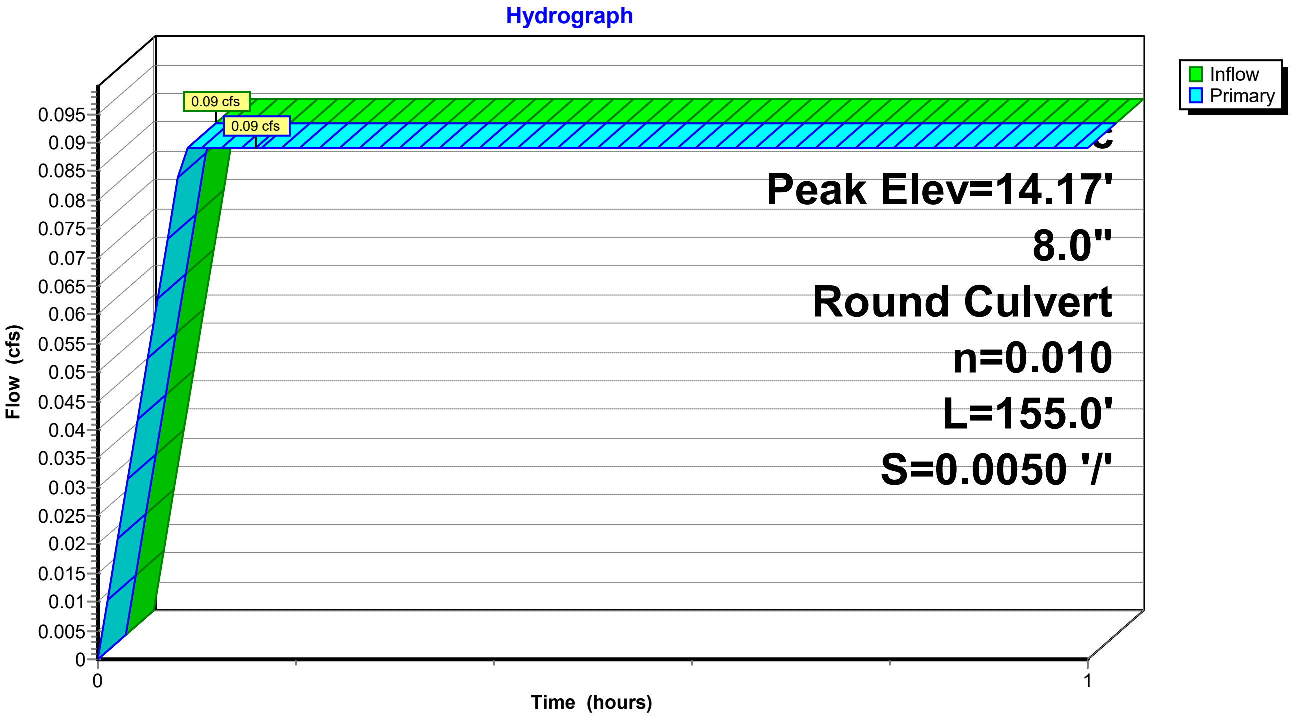
Inflow Area =	0.100 ac,100.00% Impervious,	Inflow Depth > 0.85"	for 10-yr event		
Inflow =	0.09 cfs @	0.09 hrs,	Volume=	0.007 af	
Outflow =	0.09 cfs @	0.16 hrs,	Volume=	0.007 af,	Atten= 0%, Lag= 4.2 min
Primary =	0.09 cfs @	0.16 hrs,	Volume=	0.007 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 14.17' @ 0.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**8.0" Round Culvert** L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 14.00' / 13.22' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.09 cfs @ 0.16 hrs HW=14.17' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.09 cfs @ 1.88 fps)

Pond 23P: Trench Drain



Summary for Pond 24P: Rainwater Harvest Tanks

[62] Hint: Exceeded Reach 13R OUTLET depth by 2.67' @ 0.99 hrs

```
Inflow Area =        1.190 ac,100.00% Impervious,  Inflow Depth >   0.85"    for  10-yr event
Inflow      =       1.06 cfs @     0.10 hrs,  Volume=           0.084 af
Outflow     =       0.00 cfs @     0.00 hrs,  Volume=           0.000 af,  Atten= 100%,  Lag= 0.0 min
Primary     =       0.00 cfs @     0.00 hrs,  Volume=           0.000 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 39.41' @ 1.00 hrs Surf.Area= 0.005 ac Storage= 0.084 af

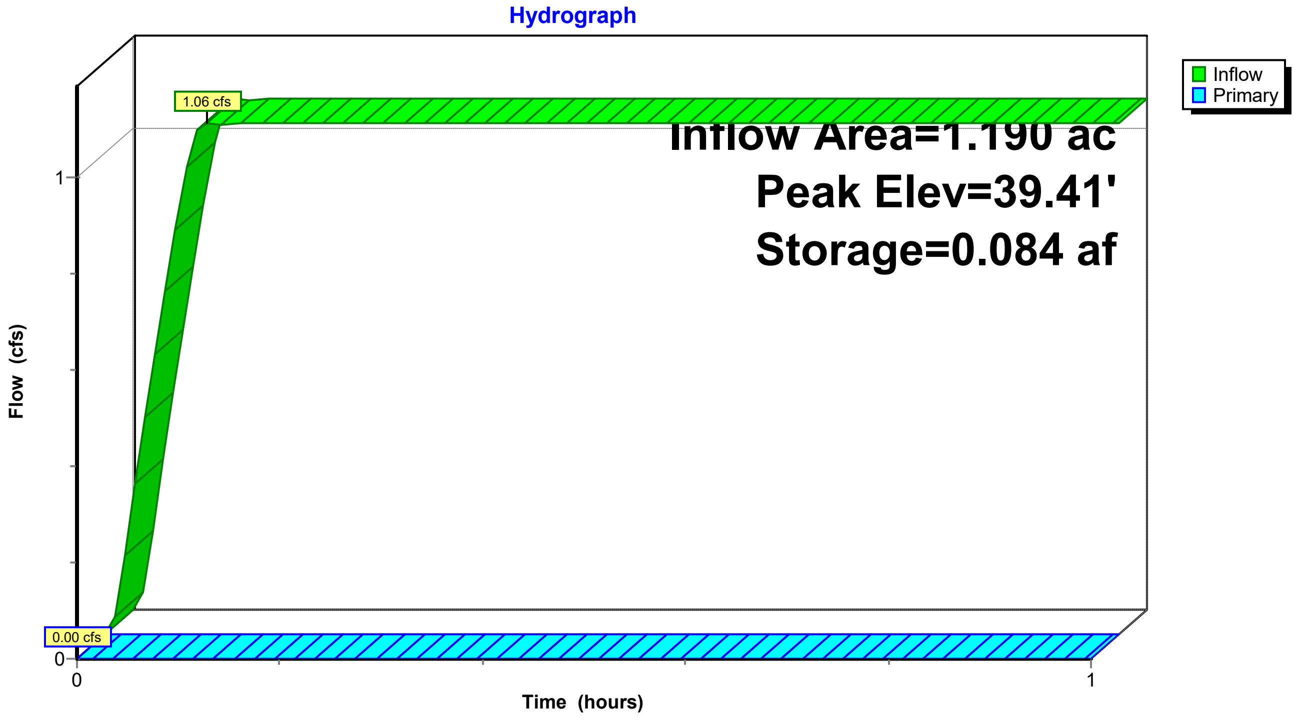
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

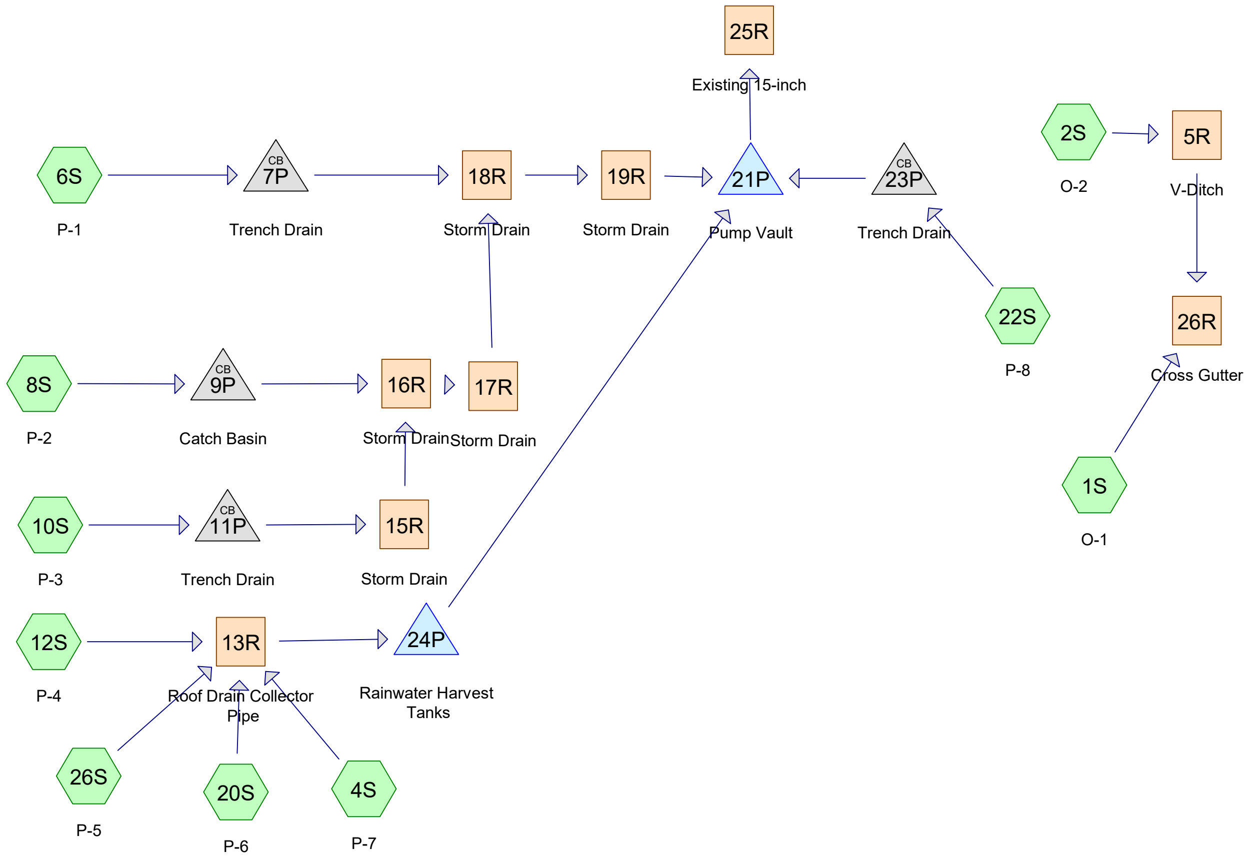
Volume	Invert	Avail.Storage	Storage Description
#1	23.33'	0.104 af	**12.00'D x 20.00'H Vertical Cone/Cylinder** x 2

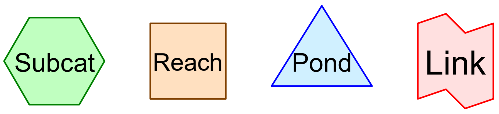
Device	Routing	Invert	Outlet Devices
#1	Primary	42.33'	**6.0" Vert. Overflow** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.33' TW=-1.12' (Dynamic Tailwater)
↑**1=Overflow** (Controls 0.00 cfs)

Pond 24P: Rainwater Harvest Tanks







Routing Diagram for Dalbergia Street Proposed Conditions Rev4
Prepared by Paul J. Hacunda, PE, Printed 1/3/2018
HydroCAD® 10.00-20 s/n 04689 © 2017 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
0.530	0.35	(1S, 2S)
1.970	0.95	(4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S)
2.500	**0.82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.500	Other	1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
2.500		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	2.500	2.500		1S, 2S, 4S, 6S, 8S, 10S, 12S, 20S, 22S, 26S
0.000	**0.000**	**0.000**	**0.000**	**2.500**	**2.500**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	13R	53.33	36.33	195.0	0.0872	0.010	6.0	0.0	0.0
2	15R	18.13	18.00	25.0	0.0052	0.010	8.0	0.0	0.0
3	16R	18.00	17.00	98.0	0.0102	0.010	8.0	0.0	0.0
4	17R	17.00	4.00	1.0	13.0000	0.010	8.0	0.0	0.0
5	18R	4.00	3.90	12.0	0.0083	0.010	8.0	0.0	0.0
6	19R	4.40	3.75	125.0	0.0052	0.010	8.0	0.0	0.0
7	25R	17.46	11.00	520.0	0.0124	0.013	15.0	0.0	0.0
8	7P	4.50	3.85	125.0	0.0052	0.010	8.0	0.0	0.0
9	9P	18.00	16.00	100.0	0.0200	0.010	6.0	0.0	0.0
10	11P	22.00	18.13	25.0	0.1548	0.010	8.0	0.0	0.0
11	23P	14.00	13.22	155.0	0.0050	0.010	8.0	0.0	0.0

Time span=0.00-1.00 hrs, dt=0.01 hrs, 101 points x 3
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: O-1 Runoff Area=0.050 ac 0.00% Impervious Runoff Depth>0.44"
Flow Length=107' Tc=13.5 min C=0.35 Runoff=0.03 cfs 0.002 af

Subcatchment 2S: O-2 Runoff Area=0.480 ac 0.00% Impervious Runoff Depth>0.43"
Flow Length=583' Tc=17.1 min C=0.35 Runoff=0.24 cfs 0.017 af

Subcatchment 4S: P-7 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>1.30"
Flow Length=60' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.14 cfs 0.011 af

Subcatchment 6S: P-1 Runoff Area=0.210 ac 100.00% Impervious Runoff Depth>1.22"
Flow Length=240' Slope=0.0900 '/' Tc=12.0 min C=0.95 Runoff=0.29 cfs 0.021 af

Subcatchment 8S: P-2 Runoff Area=0.190 ac 100.00% Impervious Runoff Depth>1.16"
Flow Length=125' Slope=0.0100 '/' Tc=17.1 min C=0.95 Runoff=0.26 cfs 0.018 af

Subcatchment 10S: P-3 Runoff Area=0.280 ac 100.00% Impervious Runoff Depth>1.11"
Flow Length=300' Tc=22.1 min C=0.95 Runoff=0.38 cfs 0.026 af

Subcatchment 12S: P-4 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>1.30"
Flow Length=55' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.14 cfs 0.011 af

Subcatchment 20S: P-6 Runoff Area=0.340 ac 100.00% Impervious Runoff Depth>1.30"
Flow Length=60' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.46 cfs 0.037 af

Subcatchment 22S: P-8 Runoff Area=0.100 ac 100.00% Impervious Runoff Depth>1.30"
Flow Length=150' Tc=5.1 min C=0.95 Runoff=0.14 cfs 0.011 af

Subcatchment 26S: P-5 Runoff Area=0.650 ac 100.00% Impervious Runoff Depth>1.30"
Flow Length=90' Slope=0.2500 '/' Tc=5.0 min C=0.95 Runoff=0.88 cfs 0.070 af

Reach 5R: V-Ditch Avg. Flow Depth=0.07' Max Vel=1.09 fps Inflow=0.24 cfs 0.017 af
n=0.017 L=555.0' S=0.0054 '/' Capacity=5.03 cfs Outflow=0.24 cfs 0.014 af

Reach 13R: Roof Drain Collector Pipe Avg. Flow Depth=0.32' Max Vel=12.05 fps Inflow=1.62 cfs 0.129 af
6.0" Round Pipe n=0.010 L=195.0' S=0.0872 '/' Capacity=2.15 cfs Outflow=1.62 cfs 0.128 af

Reach 15R: Storm Drain Avg. Flow Depth=0.27' Max Vel=2.93 fps Inflow=0.38 cfs 0.026 af
8.0" Round Pipe n=0.010 L=25.0' S=0.0052 '/' Capacity=1.13 cfs Outflow=0.38 cfs 0.026 af

Reach 16R: Storm Drain Avg. Flow Depth=0.29' Max Vel=4.30 fps Inflow=0.64 cfs 0.044 af
8.0" Round Pipe n=0.010 L=98.0' S=0.0102 '/' Capacity=1.59 cfs Outflow=0.64 cfs 0.044 af

Reach 17R: Storm Drain Avg. Flow Depth=0.05' Max Vel=54.17 fps Inflow=0.64 cfs 0.044 af
8.0" Round Pipe n=0.010 L=1.0' S=13.0000 '/' Capacity=56.64 cfs Outflow=0.64 cfs 0.044 af

Reach 18R: Storm Drain Avg. Flow Depth=0.39' Max Vel=4.37 fps Inflow=0.93 cfs 0.065 af
8.0" Round Pipe n=0.010 L=12.0' S=0.0083 '/' Capacity=1.43 cfs Outflow=0.93 cfs 0.065 af

Reach 19R: Storm Drain Avg. Flow Depth=0.46' Max Vel=3.62 fps Inflow=0.93 cfs 0.065 af
8.0" Round Pipe n=0.010 L=125.0' S=0.0052 '/' Capacity=1.13 cfs Outflow=0.92 cfs 0.064 af

Reach 25R: Existing 15-inch Avg. Flow Depth=0.44' Max Vel=4.99 fps Inflow=1.97 cfs 0.089 af
15.0" Round Pipe n=0.013 L=520.0' S=0.0124 '/' Capacity=7.20 cfs Outflow=1.95 cfs 0.084 af

Reach 26R: Cross Gutter Avg. Flow Depth=0.09' Max Vel=1.04 fps Inflow=0.27 cfs 0.016 af
n=0.013 L=100.0' S=0.0050 '/' Capacity=2.05 cfs Outflow=0.27 cfs 0.016 af

Pond 7P: Trench Drain Peak Elev=4.86' Inflow=0.29 cfs 0.021 af
8.0" Round Culvert n=0.010 L=125.0' S=0.0052 '/' Outflow=0.29 cfs 0.021 af

Pond 9P: Catch Basin Peak Elev=18.50' Inflow=0.26 cfs 0.018 af
6.0" Round Culvert n=0.010 L=100.0' S=0.0200 '/' Outflow=0.26 cfs 0.018 af

Pond 11P: Trench Drain Peak Elev=22.35' Inflow=0.38 cfs 0.026 af
8.0" Round Culvert n=0.010 L=25.0' S=0.1548 '/' Outflow=0.38 cfs 0.026 af

Pond 21P: Pump Vault Peak Elev=5.63' Storage=0.013 af Inflow=3.36 cfs 0.099 af
Outflow=1.97 cfs 0.086 af

Pond 23P: Trench Drain Peak Elev=14.21' Inflow=0.14 cfs 0.011 af
8.0" Round Culvert n=0.010 L=155.0' S=0.0050 '/' Outflow=0.14 cfs 0.011 af

Pond 24P: Rainwater Harvest Tanks Peak Elev=48.48' Storage=0.104 af Inflow=1.62 cfs 0.128 af
Outflow=2.30 cfs 0.024 af

Total Runoff Area = 2.500 ac Runoff Volume = 0.224 af Average Runoff Depth = 1.08"
21.20% Pervious = 0.530 ac 78.80% Impervious = 1.970 ac

Summary for Subcatchment 1S: O-1

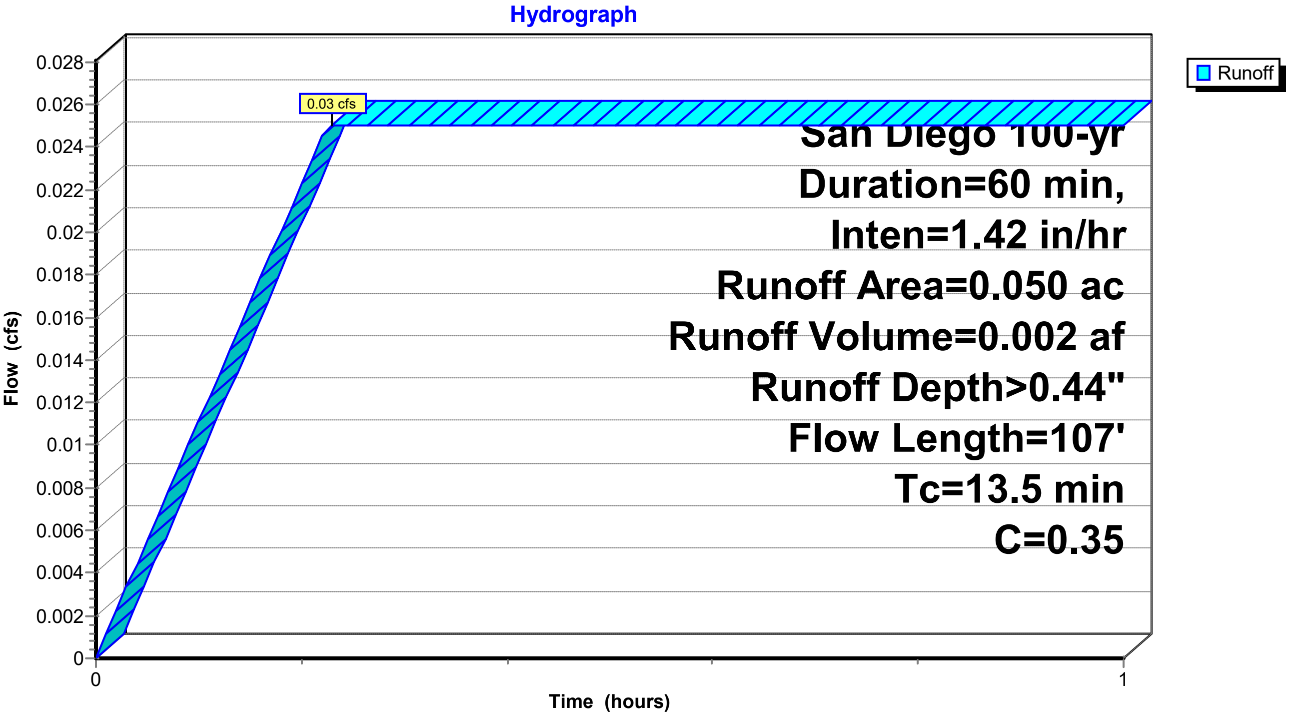
Runoff = 0.03 cfs @ 0.23 hrs, Volume= 0.002 af, Depth> 0.44"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.050	0.35	
0.050		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	27	0.5000	0.04		**Sheet Flow, Caltrans Slope** Grass: Dense n= 0.240 P2= 0.04"
1.1	80	0.0050	1.24	0.10	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.017 Concrete, unfinished
13.5	107	Total			

Subcatchment 1S: O-1



Summary for Subcatchment 2S: O-2

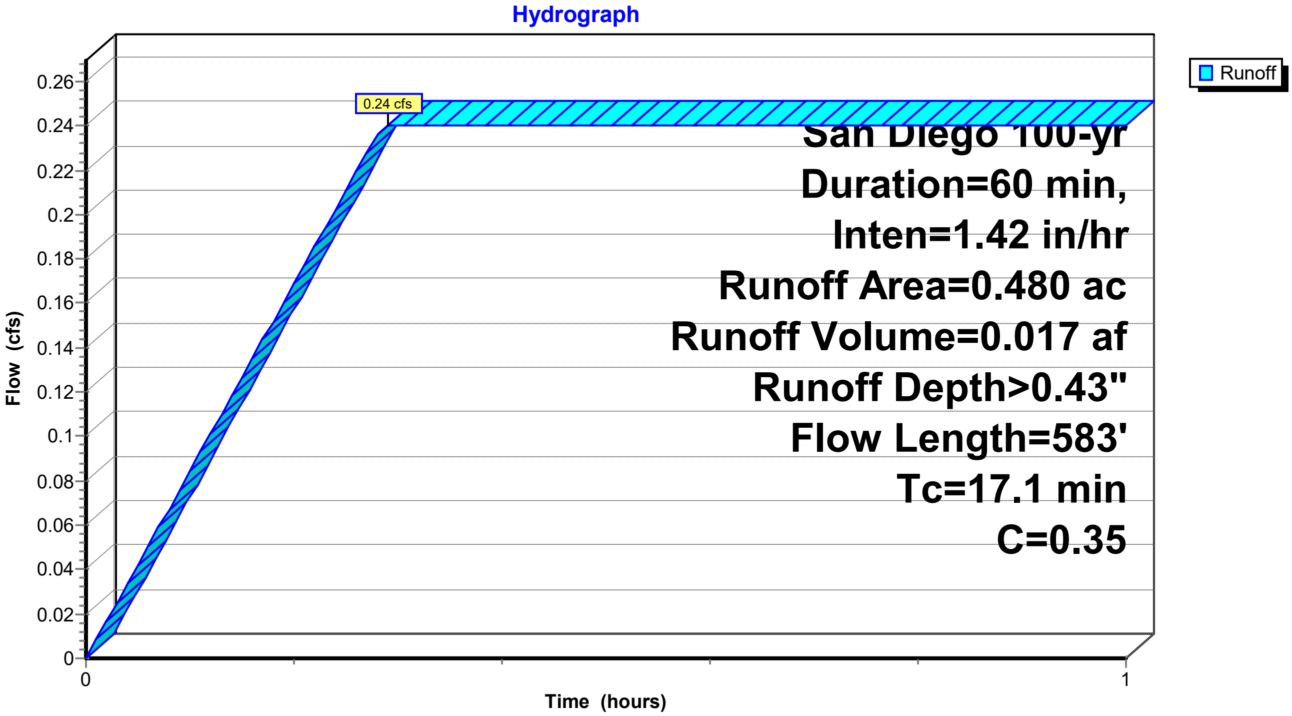
Runoff = 0.24 cfs @ 0.29 hrs, Volume= 0.017 af, Depth> 0.43"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.480	0.35	
0.480		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	28	0.5000	0.04		**Sheet Flow, Caltrans R/W** Grass: Dense n= 0.240 P2= 0.04"
4.4	555	0.0050	2.12	0.38	**Trap/Vee/Rect Channel Flow, V-Ditch** Bot.W=0.00' D=0.30' Z= 2.0 '/' Top.W=1.20' n= 0.013 Concrete, trowel finish
17.1	583	Total			

Subcatchment 2S: O-2



Summary for Subcatchment 4S: P-7

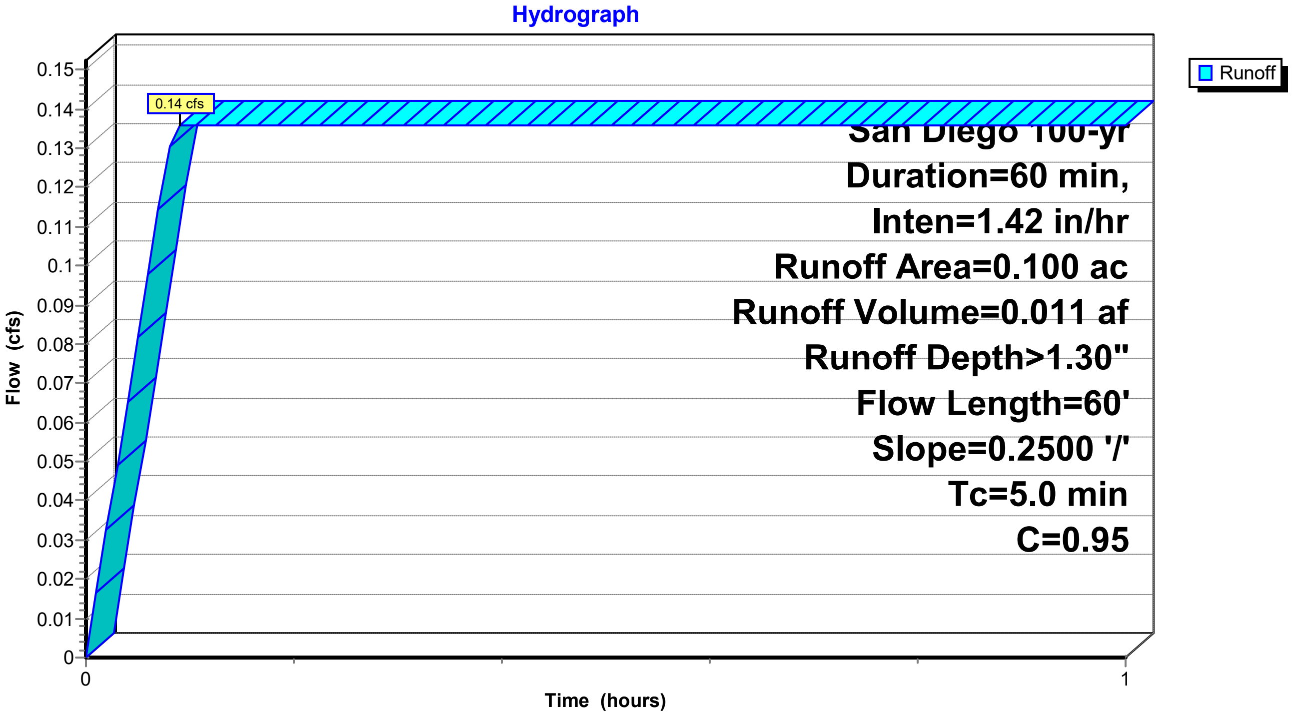
Runoff = 0.14 cfs @ 0.09 hrs, Volume= 0.011 af, Depth> 1.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 4S: P-7



Summary for Subcatchment 6S: P-1

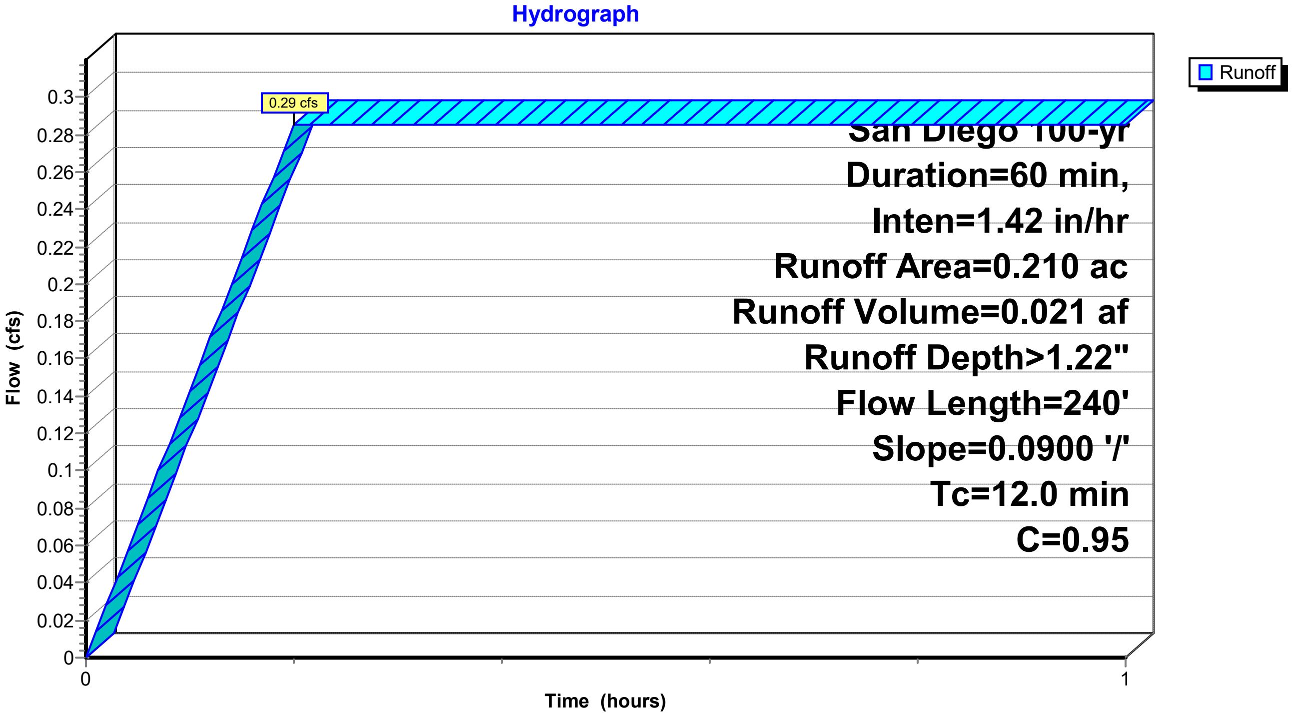
Runoff = 0.29 cfs @ 0.20 hrs, Volume= 0.021 af, Depth> 1.22"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.210	0.95	
0.210		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	240	0.0900	0.33		**Sheet Flow, Exit Ramp** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 6S: P-1



Summary for Subcatchment 8S: P-2

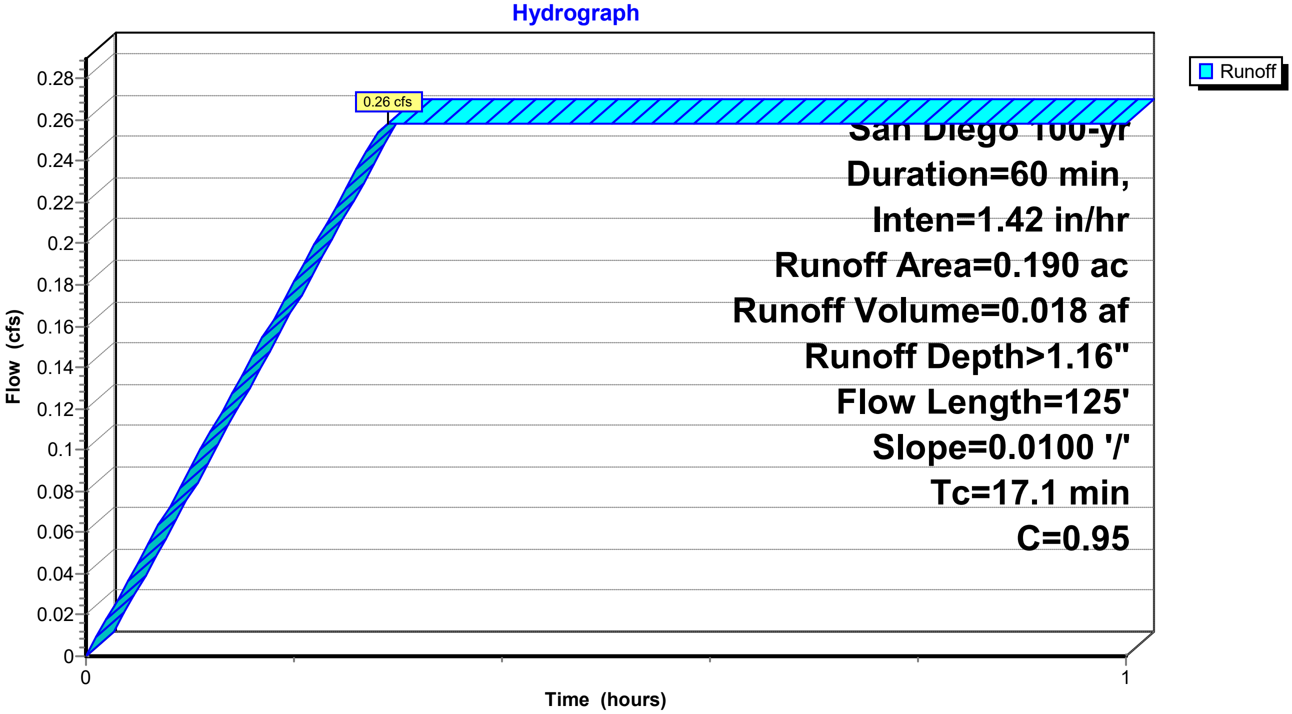
Runoff = 0.26 cfs @ 0.29 hrs, Volume= 0.018 af, Depth> 1.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.190	0.95	
0.190		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	125	0.0100	0.12		**Sheet Flow, Exit Area** Smooth surfaces n= 0.011 P2= 0.04"

Subcatchment 8S: P-2



Summary for Subcatchment 10S: P-3

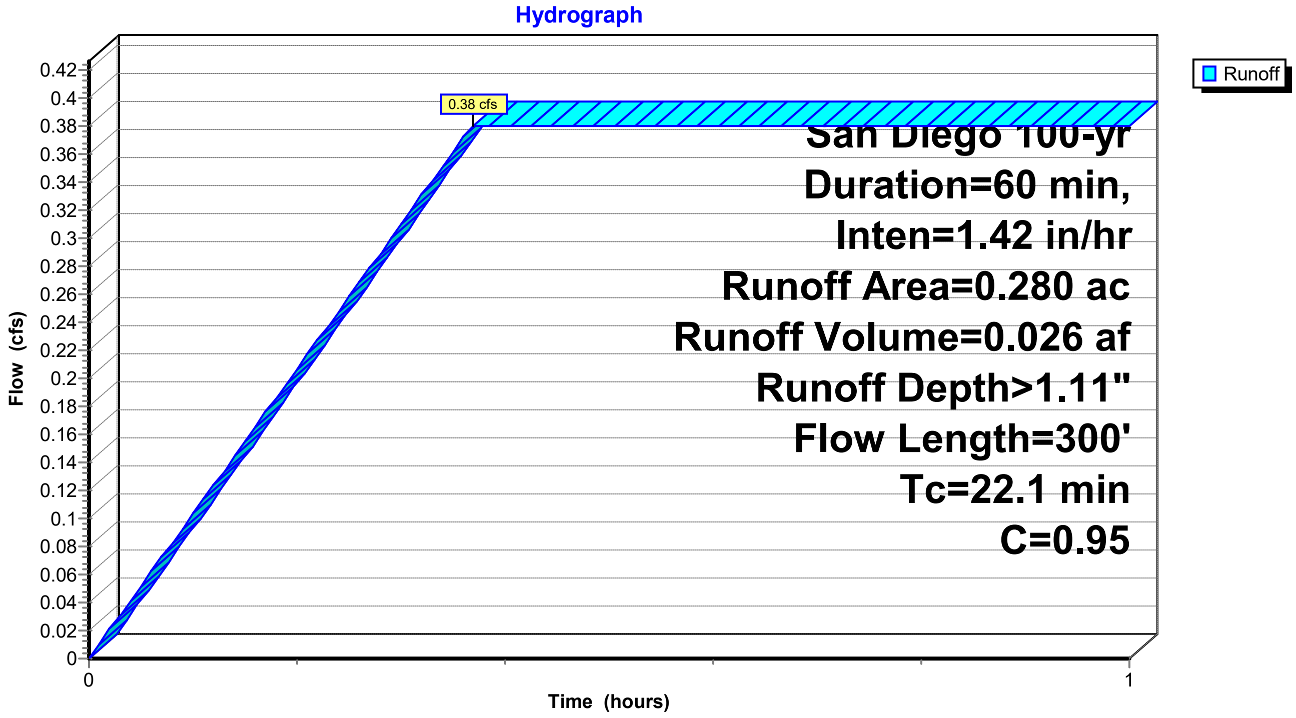
Runoff = 0.38 cfs @ 0.37 hrs, Volume= 0.026 af, Depth> 1.11"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.280	0.95	
0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	140	0.0100	0.12		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 0.04"
3.4	160	0.0060	0.77		**Shallow Concentrated Flow, Landscape Area** Nearly Bare & Untilled Kv= 10.0 fps
22.1	300	Total			

Subcatchment 10S: P-3



Summary for Subcatchment 12S: P-4

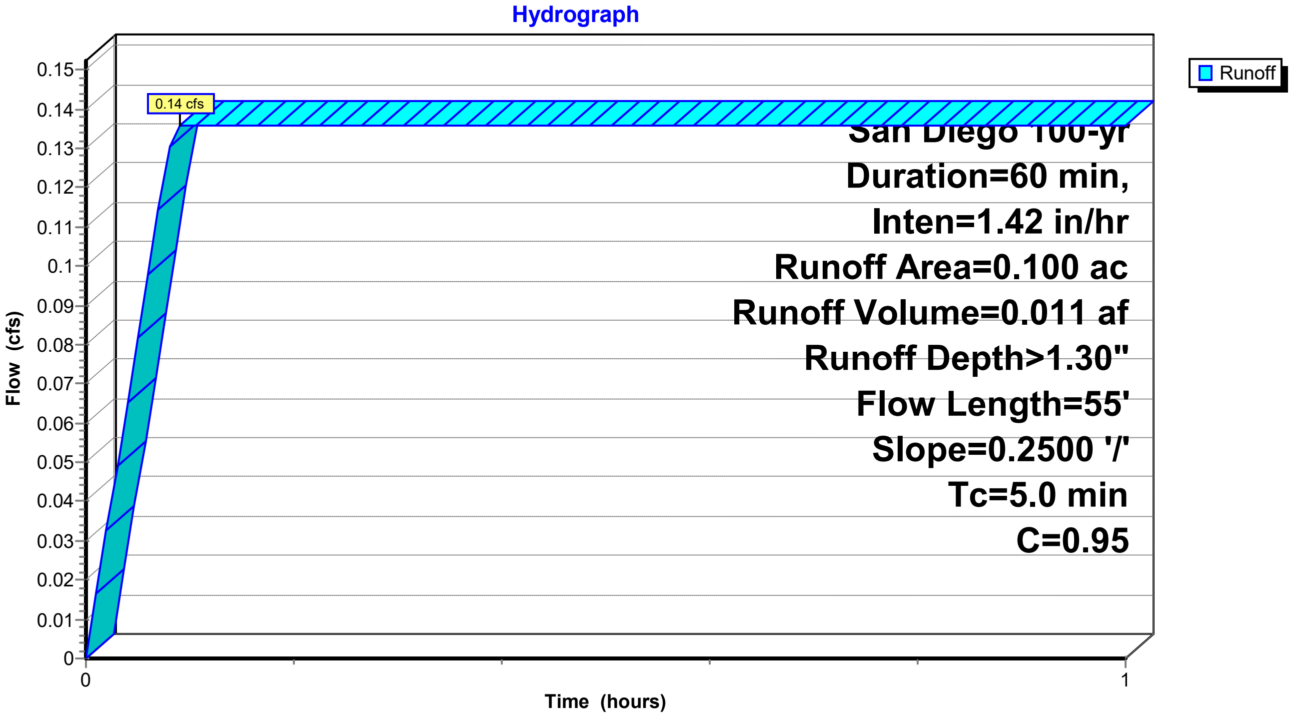
Runoff = 0.14 cfs @ 0.09 hrs, Volume= 0.011 af, Depth> 1.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	55	0.2500	0.37		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.4	55	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 12S: P-4



Summary for Subcatchment 20S: P-6

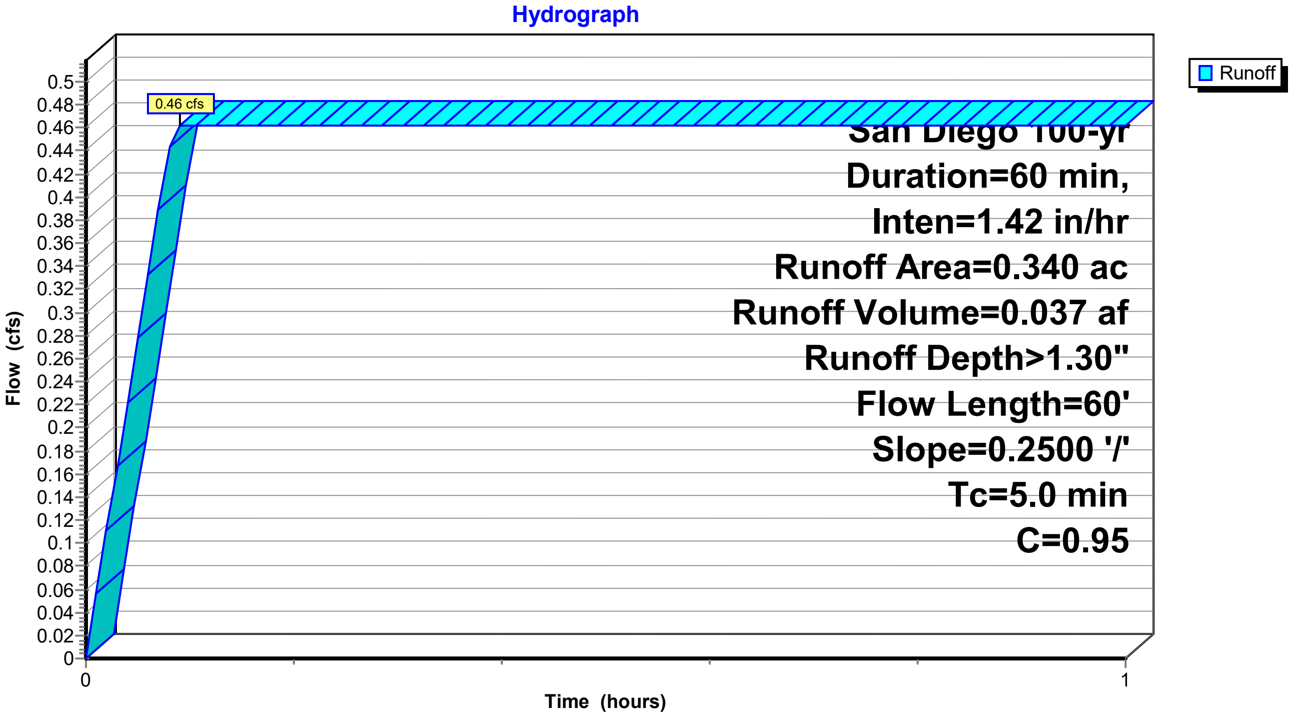
Runoff = 0.46 cfs @ 0.09 hrs, Volume= 0.037 af, Depth> 1.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.340	0.95	
0.340		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	60	0.2500	0.38		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
2.6	60	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 20S: P-6



Summary for Subcatchment 22S: P-8

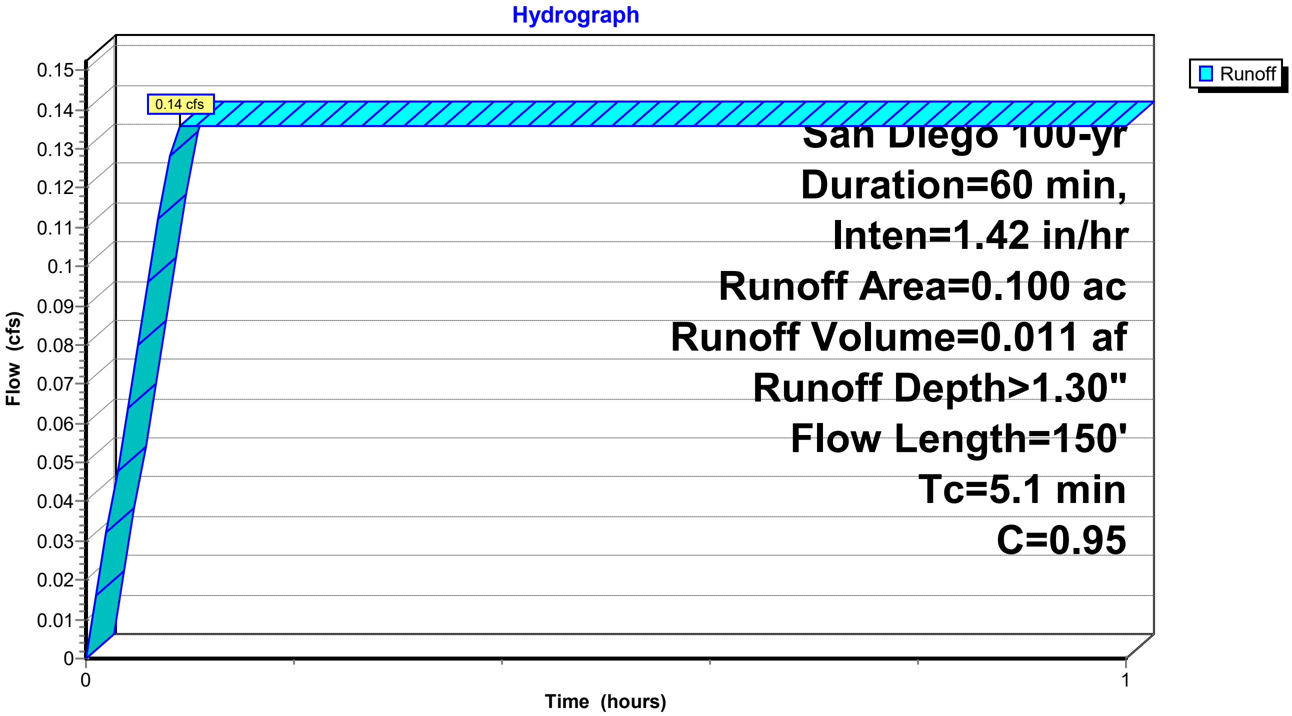
Runoff = 0.14 cfs @ 0.09 hrs, Volume= 0.011 af, Depth> 1.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.100	0.95	
0.100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	70	0.0050	1.44		**Shallow Concentrated Flow, Curb and Gutter** Paved Kv= 20.3 fps
4.3	80	0.1300	0.31		**Sheet Flow, Entrance Ramp** Smooth surfaces n= 0.011 P2= 0.04"
5.1	150	Total			

Subcatchment 22S: P-8



Summary for Subcatchment 26S: P-5

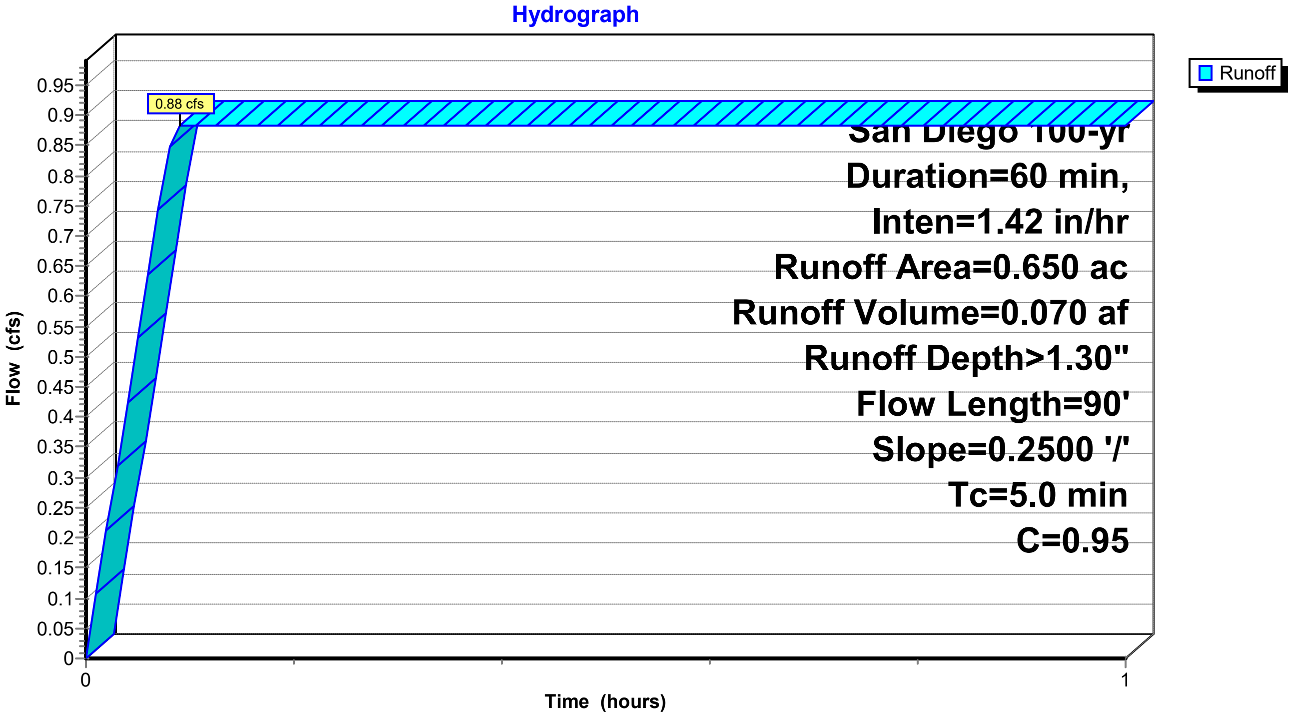
Runoff = 0.88 cfs @ 0.09 hrs, Volume= 0.070 af, Depth> 1.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs
San Diego 100-yr Duration=60 min, Inten=1.42 in/hr

Area (ac)	C	Description
0.650	0.95	
0.650		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	90	0.2500	0.41		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 0.04"
3.6	90	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 26S: P-5



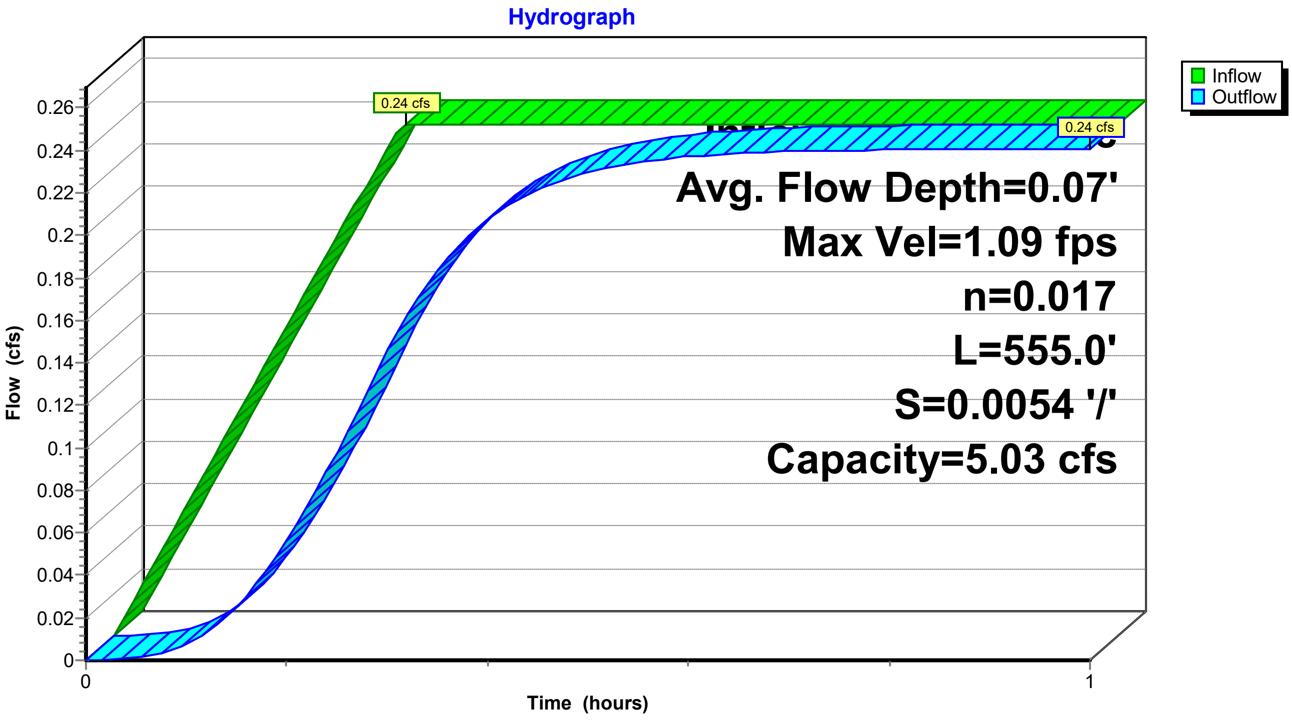
Summary for Reach 5R: V-Ditch

Inflow Area =	0.480 ac,	0.00% Impervious,	Inflow Depth >	0.43"	for 100-yr event
Inflow =	0.24 cfs @	0.29 hrs,	Volume=	0.017 af	
Outflow =	0.24 cfs @	1.00 hrs,	Volume=	0.014 af,	Atten= 0%, Lag= 42.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.09 fps, Min. Travel Time= 8.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 10.3 min

Peak Storage= 122 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 0.50' Flow Area= 1.5 sf, Capacity= 5.03 cfs

3.00' x 0.50' deep channel, n= 0.017 Concrete, unfinished
Length= 555.0' Slope= 0.0054 '/'
Inlet Invert= 26.34', Outlet Invert= 23.32'



Reach 5R: V-Ditch

Summary for Reach 13R: Roof Drain Collector Pipe

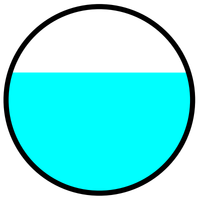
[52] Hint: Inlet/Outlet conditions not evaluated
[90] Warning: Qout>Qin may require smaller dt or Finer Routing

```
Inflow Area =          1.190 ac,100.00% Impervious,  Inflow Depth >   1.30"    for  100-yr event
Inflow       =         1.62 cfs @     0.09 hrs,  Volume=             0.129 af
Outflow      =         1.62 cfs @     0.10 hrs,  Volume=             0.128 af,  Atten= 0%,  Lag= 0.6 min
```

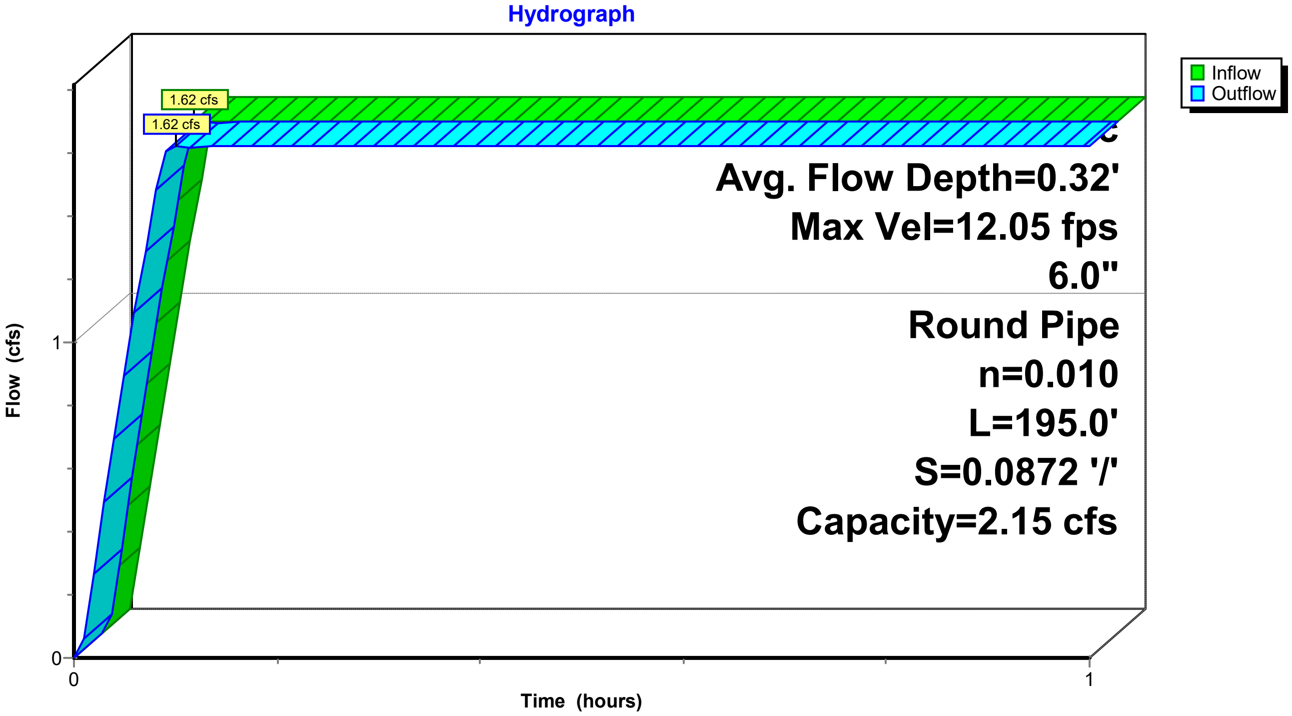
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 12.05 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 11.84 fps, Avg. Travel Time= 0.3 min

Peak Storage= 26 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.15 cfs

6.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 195.0' Slope= 0.0872 '/'
Inlet Invert= 53.33', Outlet Invert= 36.33'



Reach 13R: Roof Drain Collector Pipe



Summary for Reach 15R: Storm Drain

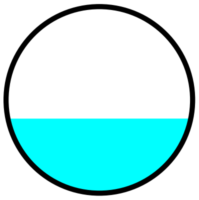
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =          0.280 ac,100.00% Impervious,  Inflow Depth >   1.11"    for  100-yr event
Inflow       =         0.38 cfs @     0.37 hrs,  Volume=             0.026 af
Outflow      =         0.38 cfs @     0.38 hrs,  Volume=             0.026 af,  Atten= 0%,  Lag= 0.6 min
```

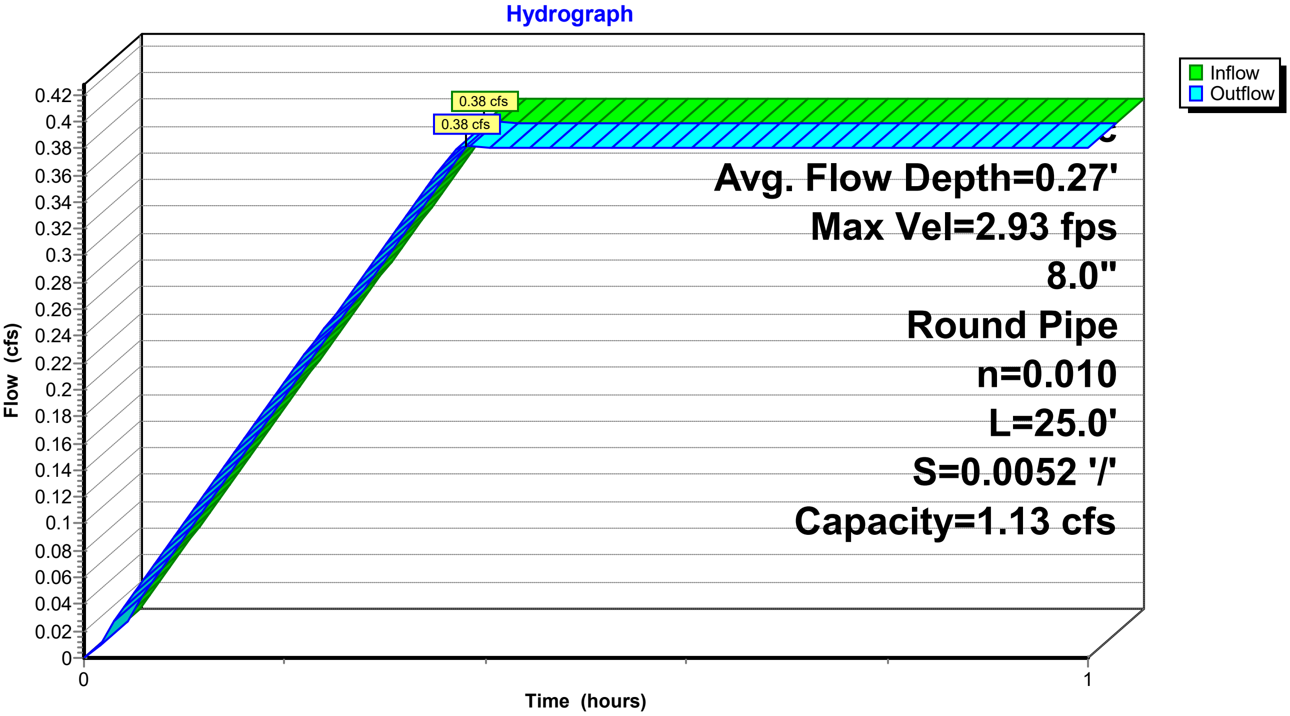
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.93 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.69 fps, Avg. Travel Time= 0.2 min

Peak Storage= 3 cf @ 0.38 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 25.0' Slope= 0.0052 '/'
Inlet Invert= 18.13', Outlet Invert= 18.00'



Reach 15R: Storm Drain



Summary for Reach 16R: Storm Drain

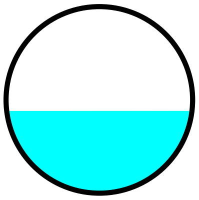
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 15R OUTLET depth by 0.04' @ 0.29 hrs

```
Inflow Area =        0.470 ac,100.00% Impervious,  Inflow Depth >   1.13"    for  100-yr event
Inflow      =        0.64 cfs @     0.38 hrs,  Volume=            0.044 af
Outflow     =        0.64 cfs @     0.39 hrs,  Volume=            0.044 af,  Atten= 0%,  Lag= 0.6 min
```

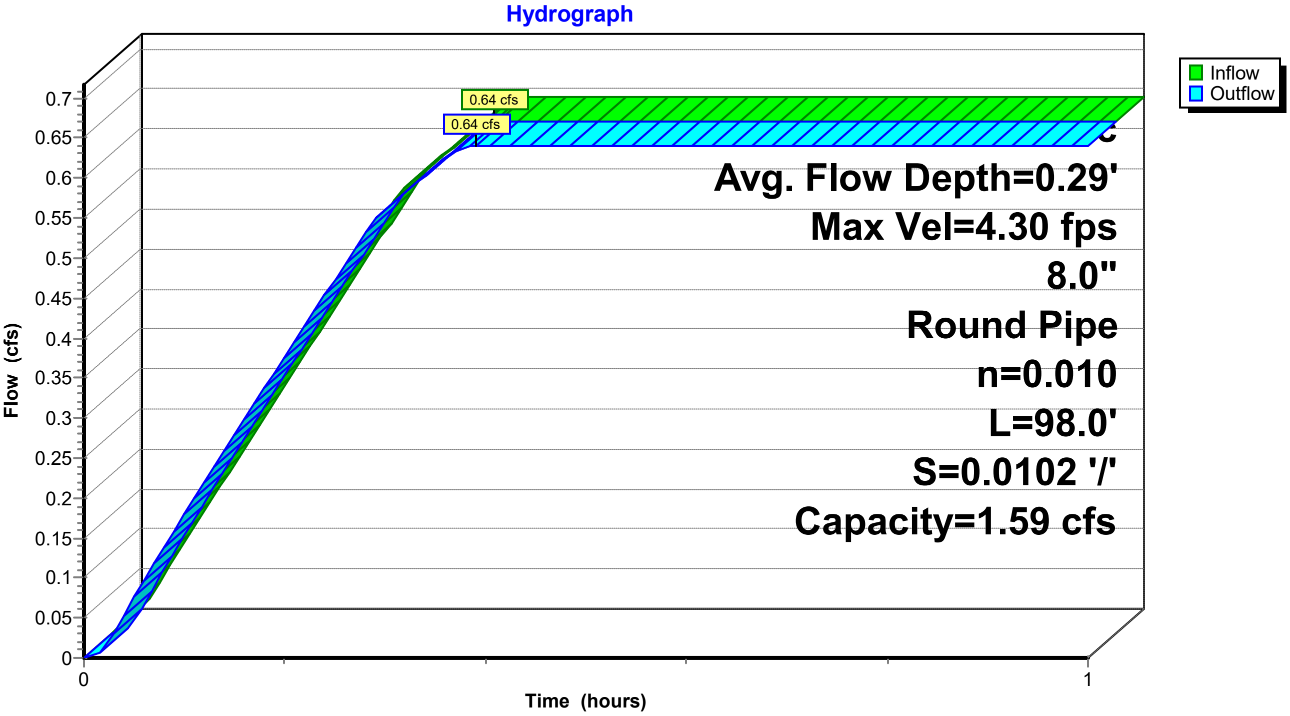
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.30 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.97 fps, Avg. Travel Time= 0.4 min

Peak Storage= 15 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.59 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 98.0' Slope= 0.0102 '/'
Inlet Invert= 18.00', Outlet Invert= 17.00'



Reach 16R: Storm Drain



Summary for Reach 17R: Storm Drain

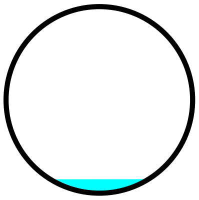
[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 16R outlet invert by 0.05' @ 0.39 hrs

```
Inflow Area =       0.470 ac,100.00% Impervious,  Inflow Depth >   1.12"    for  100-yr event
Inflow      =      0.64 cfs @    0.39 hrs,  Volume=          0.044 af
Outflow     =      0.64 cfs @    0.39 hrs,  Volume=          0.044 af,  Atten= 0%,  Lag= 0.0 min
```

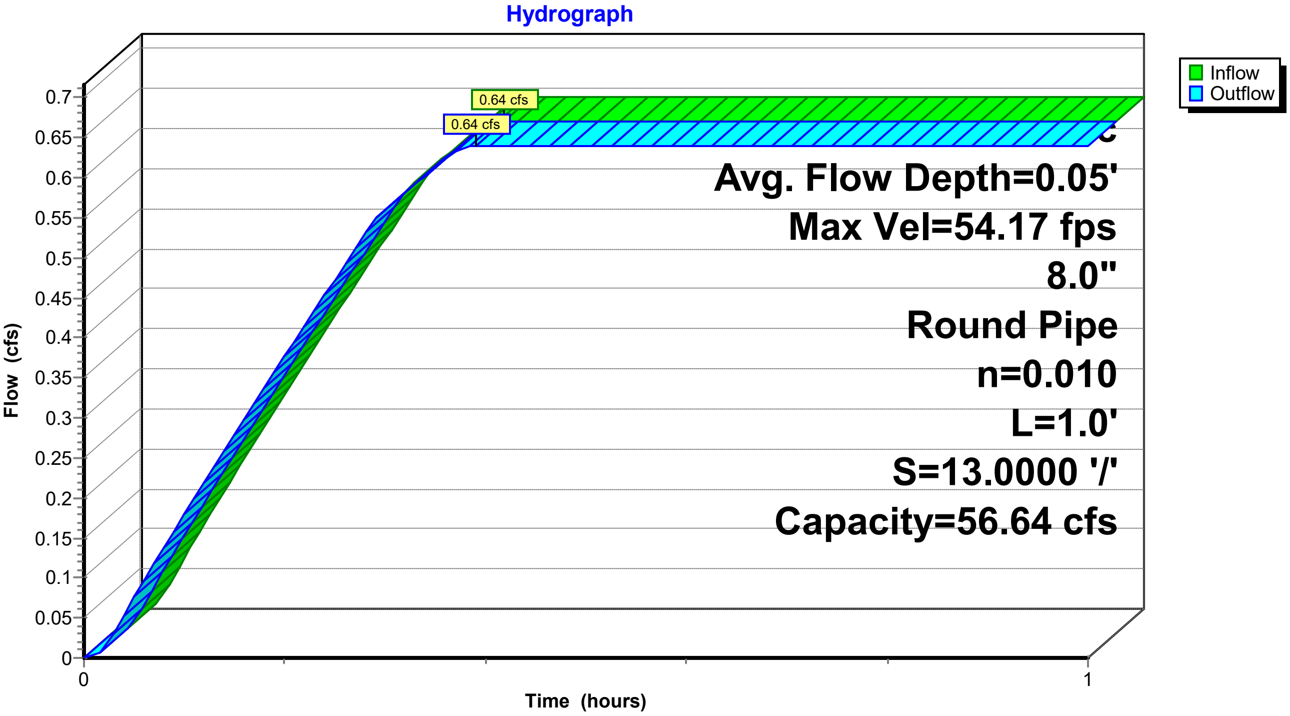
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 54.17 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 49.81 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 56.64 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 1.0' Slope= 13.0000 '/'
Inlet Invert= 17.00', Outlet Invert= 4.00'



Reach 17R: Storm Drain



Summary for Reach 18R: Storm Drain

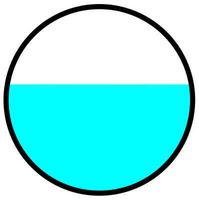
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 17R OUTLET depth by 0.34' @ 0.39 hrs

```
Inflow Area =         0.680 ac,100.00% Impervious,  Inflow Depth >   1.15"    for  100-yr event
Inflow      =         0.93 cfs @     0.39 hrs,  Volume=           0.065 af
Outflow     =         0.93 cfs @     0.39 hrs,  Volume=           0.065 af,  Atten= 0%,  Lag= 0.0 min
```

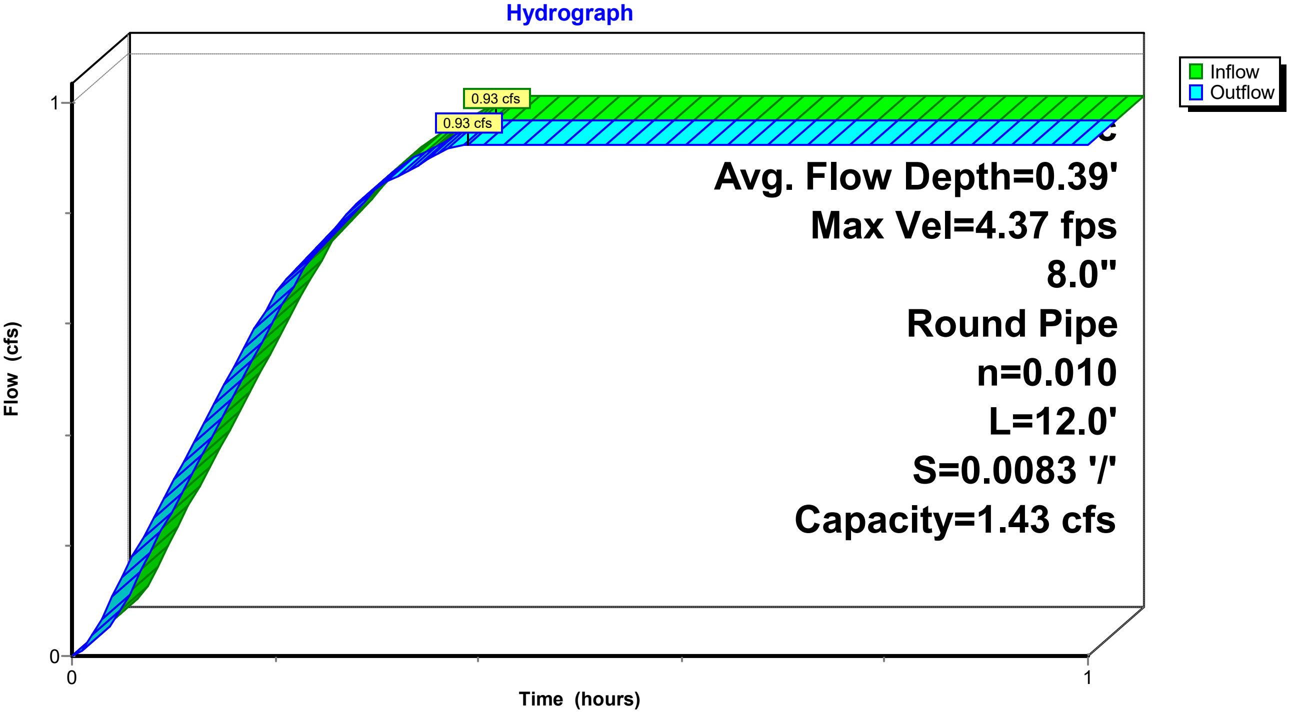
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.37 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.10 fps, Avg. Travel Time= 0.0 min

Peak Storage= 3 cf @ 0.39 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 12.0' Slope= 0.0083 '/'
Inlet Invert= 4.00', Outlet Invert= 3.90'



Reach 18R: Storm Drain



Summary for Reach 19R: Storm Drain

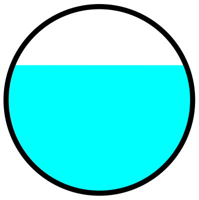
[52] Hint: Inlet/Outlet conditions not evaluated
[63] Warning: Exceeded Reach 18R INLET depth by 0.47' @ 0.42 hrs

```
Inflow Area =       0.680 ac,100.00% Impervious,  Inflow Depth >   1.15"    for  100-yr event
Inflow      =       0.93 cfs @     0.39 hrs,  Volume=            0.065 af
Outflow     =       0.92 cfs @     0.44 hrs,  Volume=            0.064 af,  Atten= 0%,  Lag= 3.2 min
```

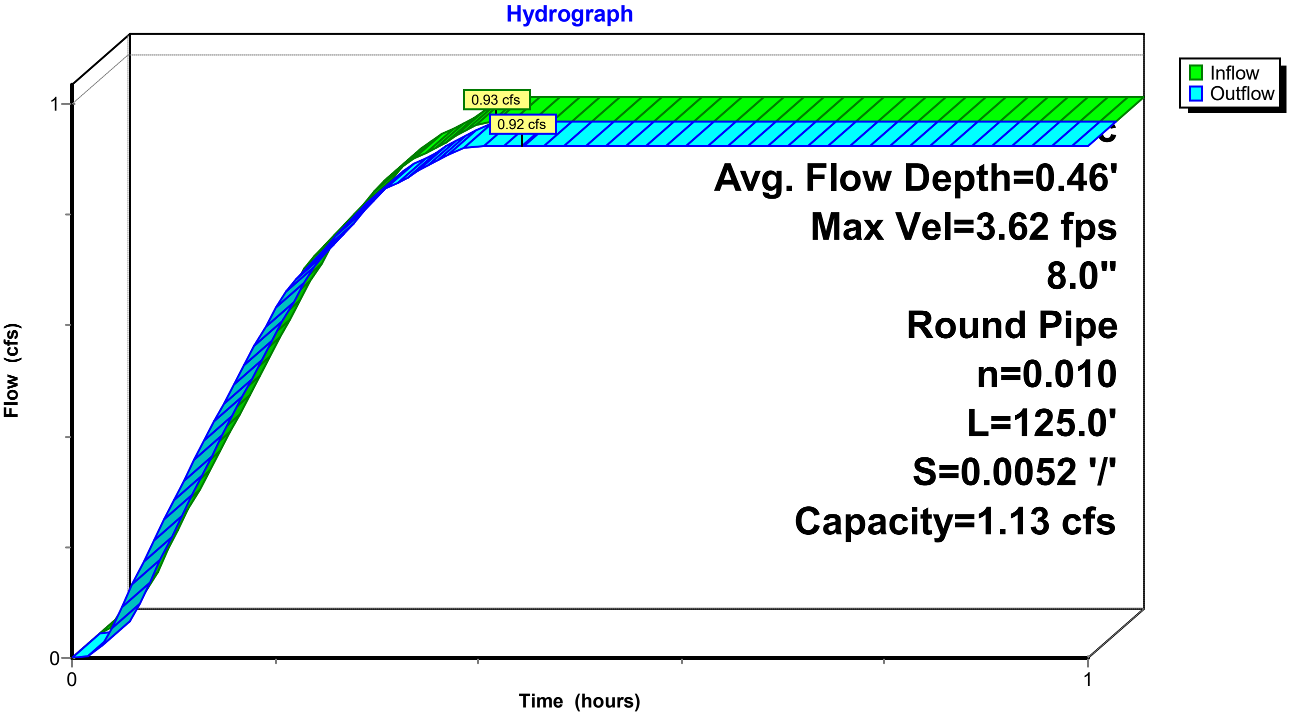
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.62 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.37 fps, Avg. Travel Time= 0.6 min

Peak Storage= 32 cf @ 0.44 hrs
Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.13 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 125.0' Slope= 0.0052 '/'
Inlet Invert= 4.40', Outlet Invert= 3.75'



Reach 19R: Storm Drain



Summary for Reach 25R: Existing 15-inch

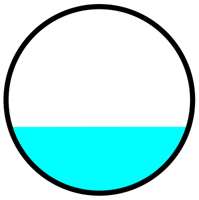
[52] Hint: Inlet/Outlet conditions not evaluated

```
Inflow Area =       1.970 ac,100.00% Impervious,  Inflow Depth >   0.54"    for  100-yr event
Inflow      =       1.97 cfs @     1.00 hrs,  Volume=            0.089 af
Outflow     =       1.95 cfs @     1.00 hrs,  Volume=            0.084 af,  Atten= 1%,  Lag= 0.0 min
```

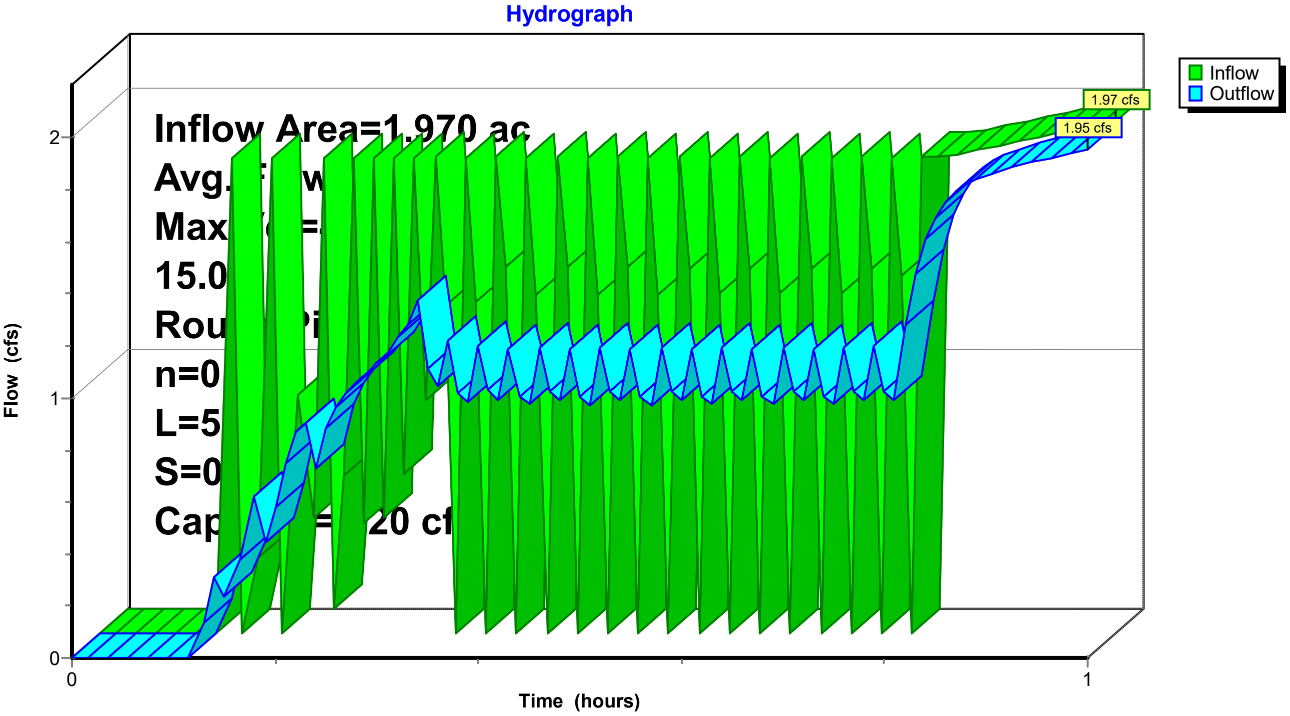
Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.99 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 4.23 fps, Avg. Travel Time= 2.0 min

Peak Storage= 203 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.20 cfs

15.0" Round Pipe
n= 0.013 Concrete pipe, bends & connections
Length= 520.0' Slope= 0.0124 '/'
Inlet Invert= 17.46', Outlet Invert= 11.00'



Reach 25R: Existing 15-inch



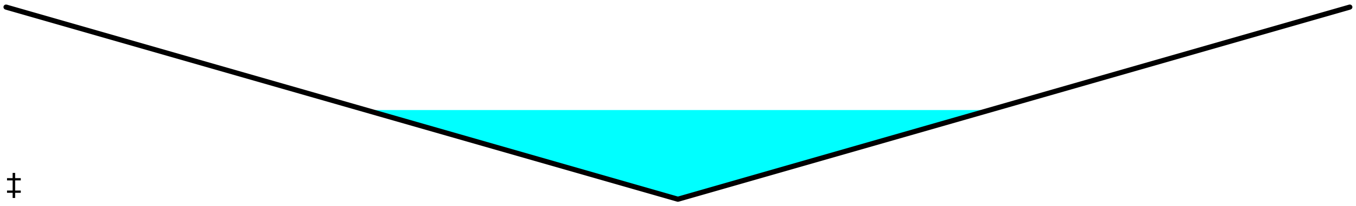
Summary for Reach 26R: Cross Gutter

Inflow Area =	0.530 ac,	0.00% Impervious, Inflow Depth >	0.37"	for 100-yr event
Inflow =	0.27 cfs @	1.00 hrs, Volume=	0.016 af	
Outflow =	0.27 cfs @	1.00 hrs, Volume=	0.016 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.04 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.89 fps, Avg. Travel Time= 1.9 min

Peak Storage= 25 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.20' Flow Area= 1.2 sf, Capacity= 2.05 cfs

0.00' x 0.20' deep channel, n= 0.013
Side Slope Z-value= 29.4 '/' Top Width= 11.76'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 21.60', Outlet Invert= 21.10'



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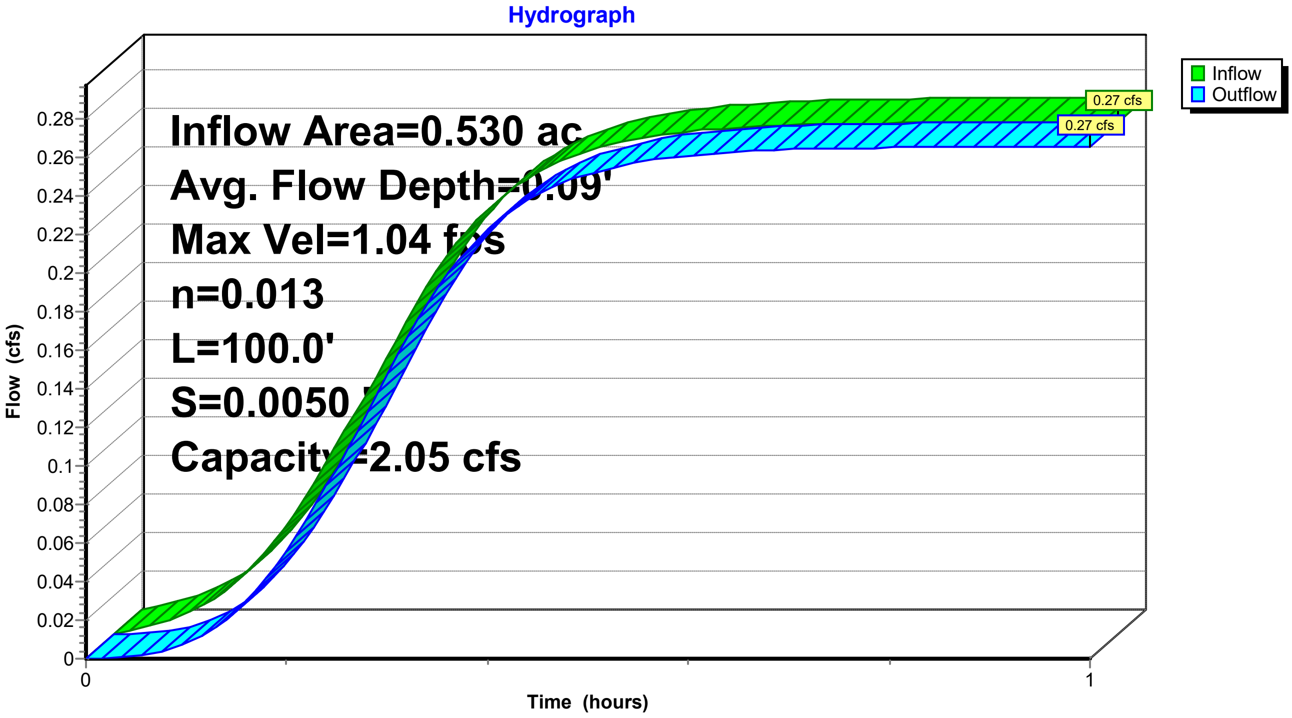
Reach 26R: Cross Gutter



Summary for Pond 7P: Trench Drain

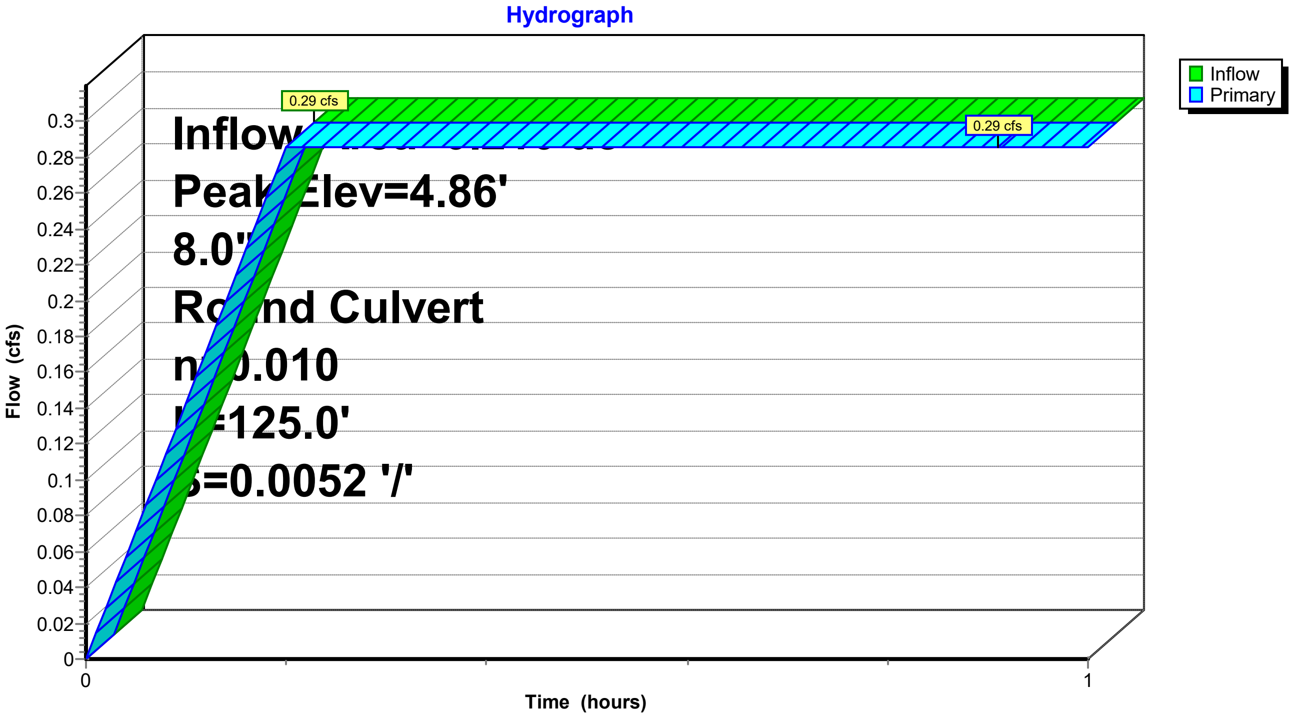
Inflow Area = 0.210 ac,100.00% Impervious, Inflow Depth > 1.22" for 100-yr event
Inflow = 0.29 cfs @ 0.20 hrs, Volume= 0.021 af
Outflow = 0.29 cfs @ 0.91 hrs, Volume= 0.021 af, Atten= 0%, Lag= 42.6 min
Primary = 0.29 cfs @ 0.91 hrs, Volume= 0.021 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 4.86' @ 0.39 hrs
Flood Elev= 6.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	4.50'	**8.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.50' / 3.85' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.29 cfs @ 0.91 hrs HW=4.86' TW=4.39' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.29 cfs @ 2.17 fps)

Pond 7P: Trench Drain



Summary for Pond 9P: Catch Basin

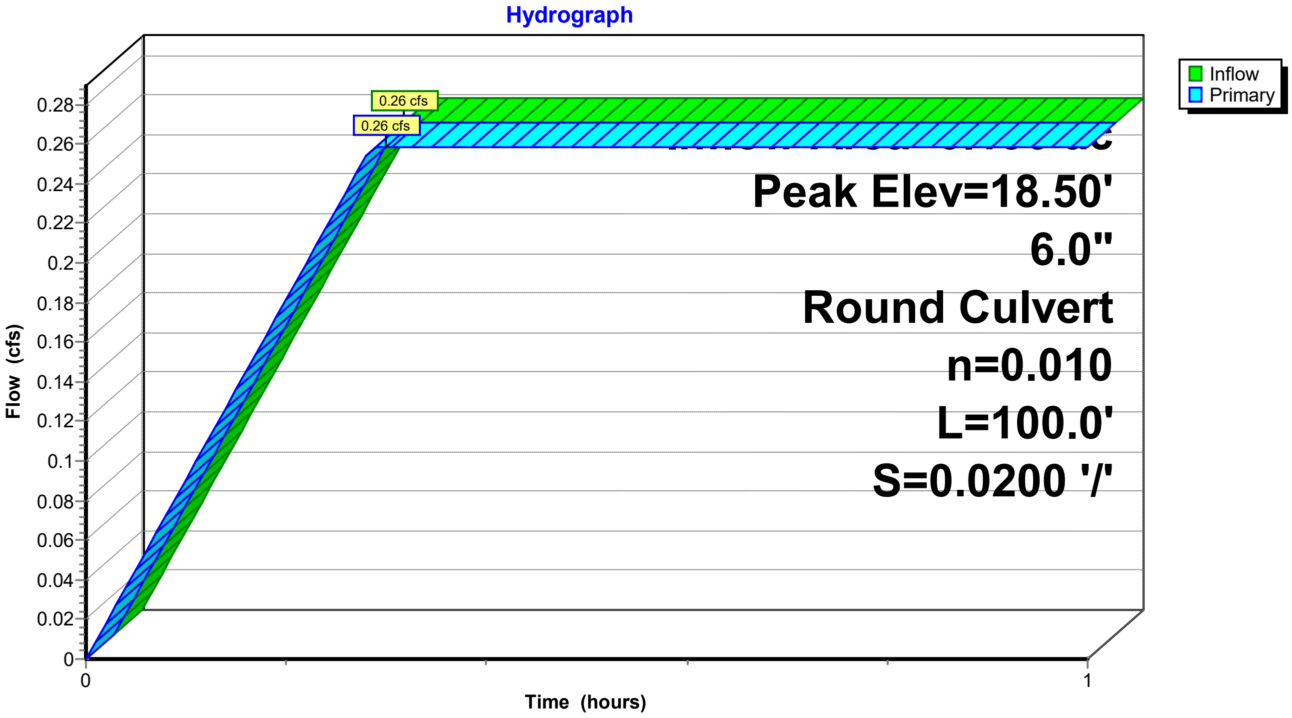
Inflow Area = 0.190 ac,100.00% Impervious, Inflow Depth > 1.16" for 100-yr event
Inflow = 0.26 cfs @ 0.29 hrs, Volume= 0.018 af
Outflow = 0.26 cfs @ 0.30 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.6 min
Primary = 0.26 cfs @ 0.30 hrs, Volume= 0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 18.50' @ 0.39 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	18.00'	**6.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 18.00' / 16.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.26 cfs @ 0.30 hrs HW=18.49' TW=18.27' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.26 cfs @ 1.66 fps)

Pond 9P: Catch Basin



Summary for Pond 11P: Trench Drain

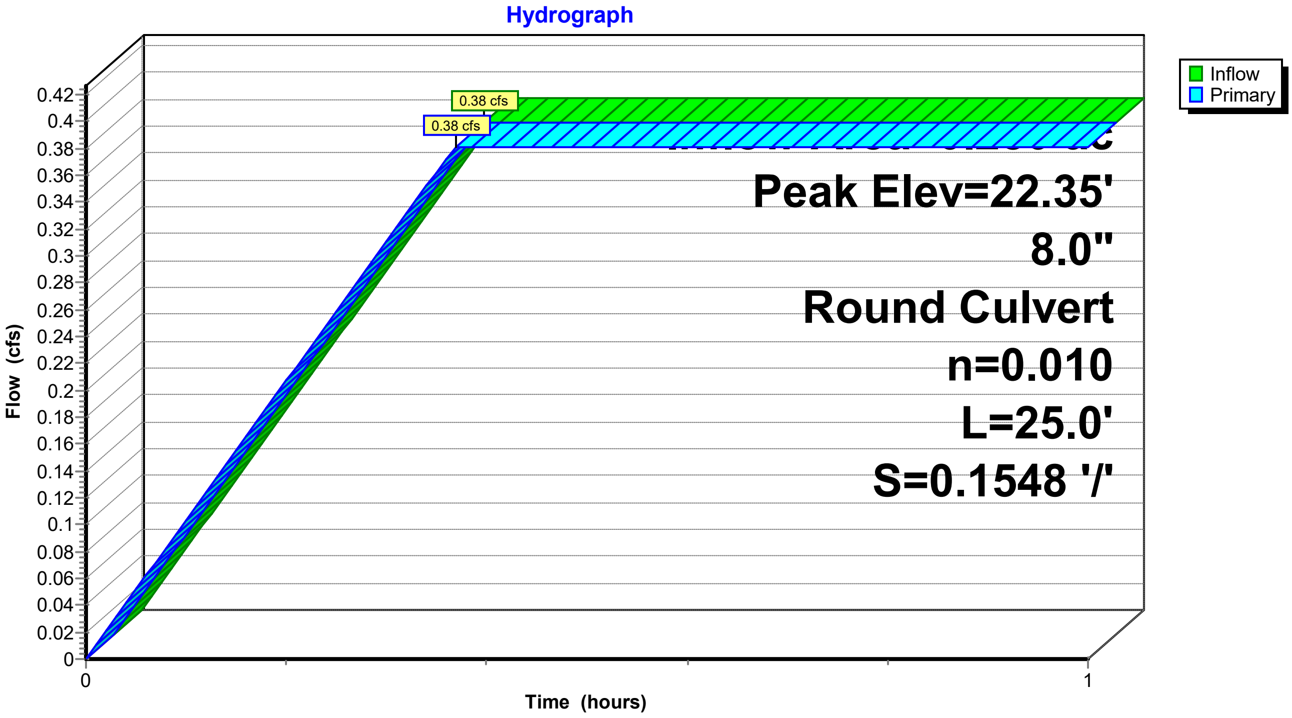
Inflow Area =	0.280 ac,100.00% Impervious,	Inflow Depth > 1.11"	for 100-yr event		
Inflow =	0.38 cfs @	0.37 hrs,	Volume=	0.026 af	
Outflow =	0.38 cfs @	0.37 hrs,	Volume=	0.026 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.38 cfs @	0.37 hrs,	Volume=	0.026 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.35' @ 0.37 hrs
Flood Elev= 23.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**8.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.00' / 18.13' S= 0.1548 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.38 cfs @ 0.37 hrs HW=22.35' TW=18.40' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.38 cfs @ 2.02 fps)

Pond 11P: Trench Drain



Summary for Pond 21P: Pump Vault

[63] Warning: Exceeded Reach 19R INLET depth by 0.46' @ 0.99 hrs

Inflow Area = 1.970 ac,100.00% Impervious, Inflow Depth > 0.61" for 100-yr event
Inflow = 3.36 cfs @ 0.85 hrs, Volume= 0.099 af
Outflow = 1.97 cfs @ 1.00 hrs, Volume= 0.086 af, Atten= 41%, Lag= 9.0 min
Primary = 1.97 cfs @ 1.00 hrs, Volume= 0.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 5.63' @ 1.00 hrs Surf.Area= 0.002 ac Storage= 0.013 af
Flood Elev= 6.88' Surf.Area= 0.002 ac Storage= 0.015 af

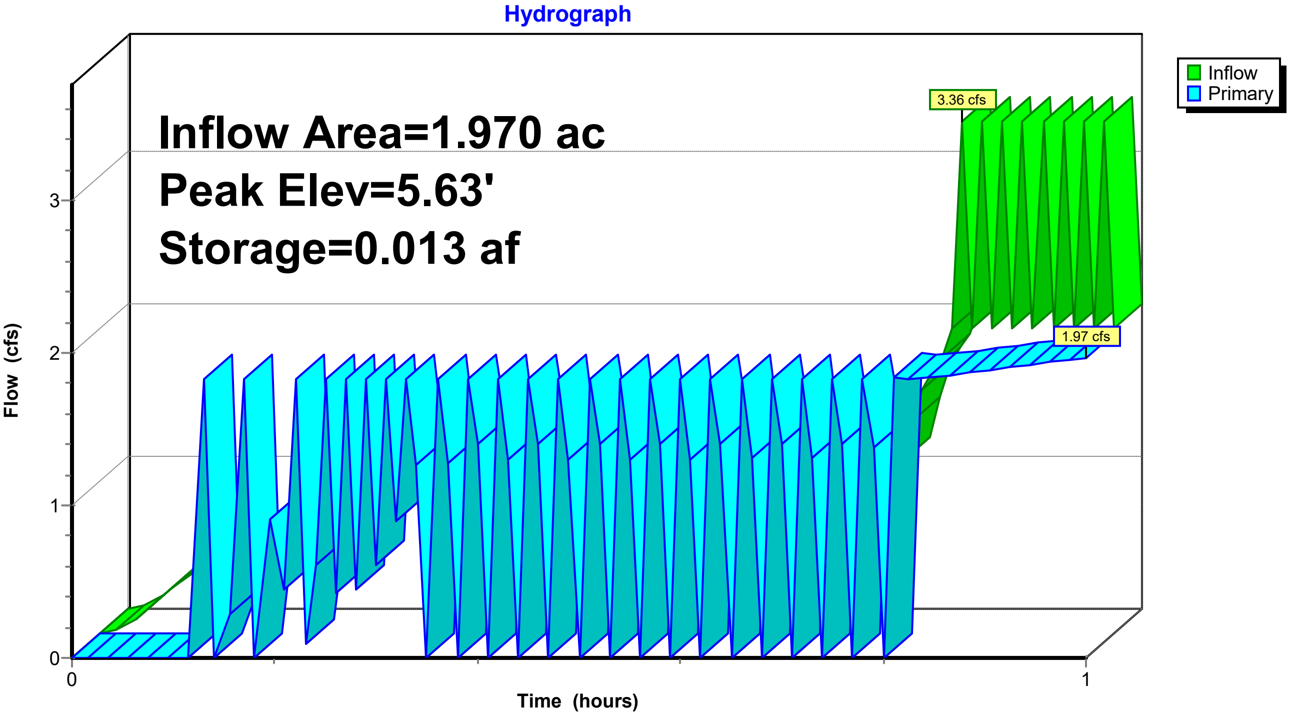
Plug-Flow detention time= 1.8 min calculated for 0.085 af (86% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	-1.12'	0.015 af	**6.00'W x 14.00'L x 8.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	0.13'	**Sample Pump 101 X 3.00** Discharges@19.00' Turns Off@-0.12' 6.0" Diam. x 19.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 60.0 120.0 180.0 240.0 270.0 285.0 300.0 315.0 330.0 Head (feet)= 40.00 36.00 32.00 28.00 24.00 20.00 16.00 12.00 10.00 8.00 -Loss (feet)= 0.00 0.01 0.03 0.06 0.10 0.12 0.14 0.15 0.17 0.18 =Lift (feet)= 40.00 35.99 31.97 27.94 23.90 19.88 15.86 11.85 9.83 7.82

Primary OutFlow Max=1.97 cfs @ 1.00 hrs HW=5.63' TW=17.90' (Dynamic Tailwater)
↑—**1=Sample Pump 101** (Pump Controls 1.97 cfs)

Pond 21P: Pump Vault



Summary for Pond 23P: Trench Drain

[57] Hint: Peaked at 14.21' (Flood elevation advised)

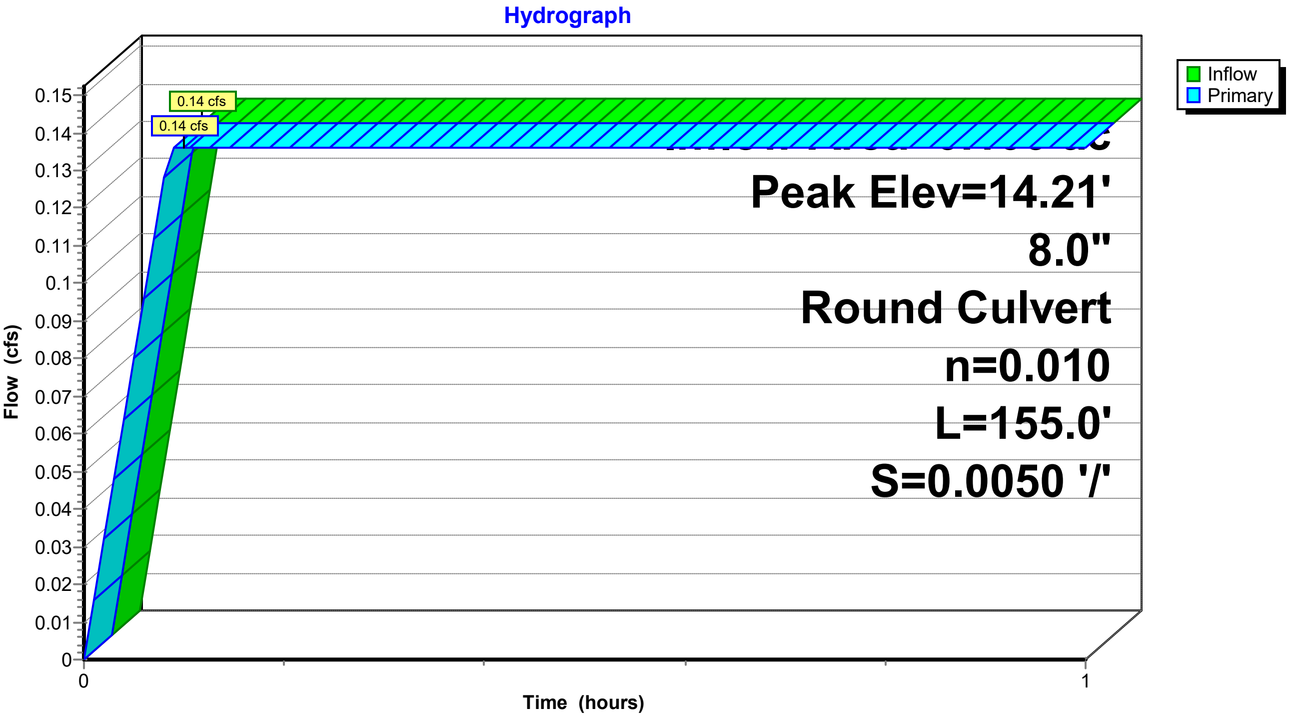
Inflow Area = 0.100 ac,100.00% Impervious, Inflow Depth > 1.30" for 100-yr event
Inflow = 0.14 cfs @ 0.09 hrs, Volume= 0.011 af
Outflow = 0.14 cfs @ 0.10 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.6 min
Primary = 0.14 cfs @ 0.10 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 14.21' @ 0.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	14.00'	**8.0" Round Culvert** L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 14.00' / 13.22' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.14 cfs @ 0.10 hrs HW=14.21' TW=-0.32' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.14 cfs @ 2.11 fps)

Pond 23P: Trench Drain



Summary for Pond 24P: Rainwater Harvest Tanks

[93] Warning: Storage range exceeded by 5.15'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=6)
[62] Hint: Exceeded Reach 13R OUTLET depth by 11.82' @ 0.85 hrs

Inflow Area = 1.190 ac,100.00% Impervious, Inflow Depth > 1.29" for 100-yr event
Inflow = 1.62 cfs @ 0.10 hrs, Volume= 0.128 af
Outflow = 2.30 cfs @ 0.85 hrs, Volume= 0.024 af, Atten= 0%, Lag= 45.0 min
Primary = 2.30 cfs @ 0.85 hrs, Volume= 0.024 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-1.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 48.48' @ 0.85 hrs Surf.Area= 0.005 ac Storage= 0.104 af

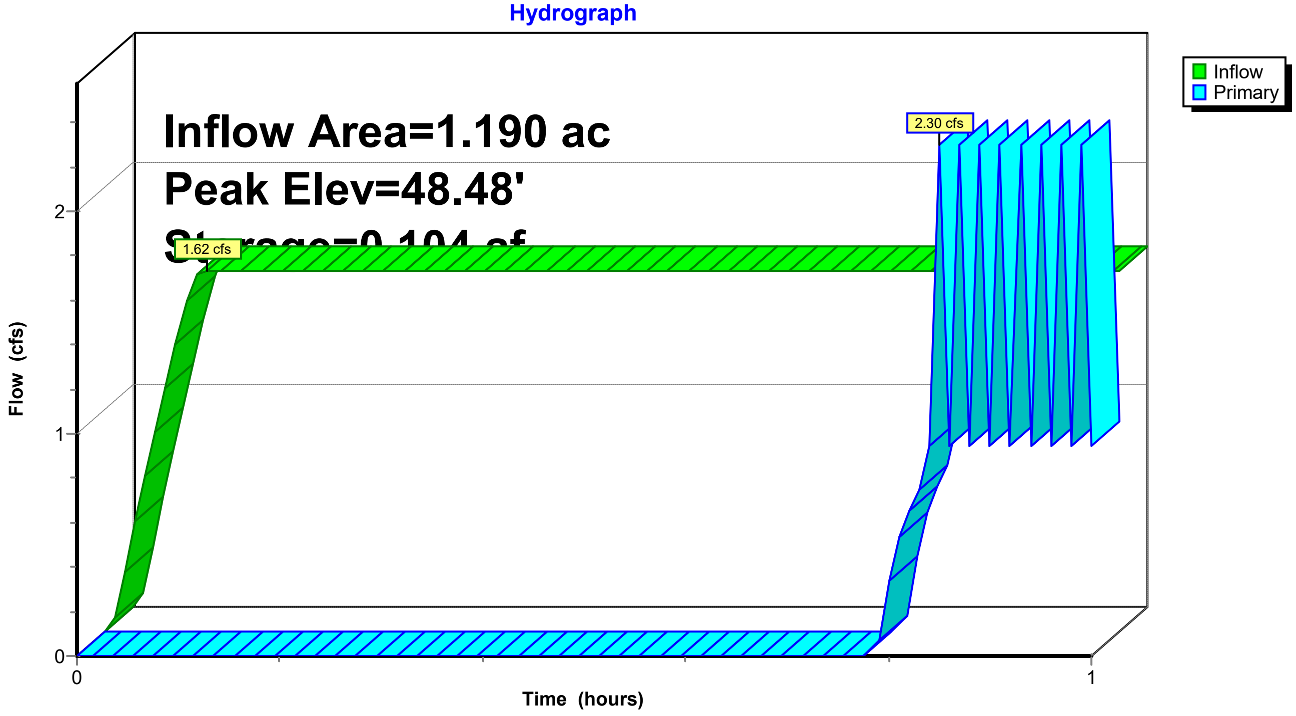
Plug-Flow detention time= 46.4 min calculated for 0.024 af (19% of inflow)
Center-of-Mass det. time= 23.2 min (54.7 - 31.5)

Volume	Invert	Avail.Storage	Storage Description
#1	23.33'	0.104 af	**12.00'D x 20.00'H Vertical Cone/Cylinder** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	42.33'	**6.0" Vert. Overflow** C= 0.600

Primary OutFlow Max=2.30 cfs @ 0.85 hrs HW=48.48' TW=0.66' (Dynamic Tailwater)
└─**1=Overflow** (Orifice Controls 2.30 cfs @ 11.69 fps)

Pond 24P: Rainwater Harvest Tanks



Appendix E
Weighted "C-factor" Calculations

E-8

0.12-ACRES IMPERVIOUS (0.95)
0.32-ACRES PERVIOUS (0.35)
0.44-ACRES TOTAL

$$C = \frac{0.12 \times 0.95 + 0.32 \times 0.35}{0.44} = 0.50$$

E-9

0.10-ACRES IMPERVIOUS (0.95)
0.23-ACRES PERVIOUS (0.35)
0.33-ACRES

$$C = \frac{0.10 \times .95 + 0.23 \times 0.35}{0.33} = 0.53 \quad \text{SAY} \quad 0.50$$

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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GEOTECHNICAL INVESTIGATION

EDCO MATERIAL RECOVERY FACILITY AND TRANSFER STATION EXPANSION
3660 DALBERGIA STREET
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

EDCO
SAN MARCOS, CALIFORNIA

SEPTEMBER 7, 2016
PROJECT NO. G2010-32-01

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G2010-32-01
September 7, 2016

EDCO
224 Las Posas Road
San Marcos, California 92078

Attention: Mr. Steve South

Subject: GEOTECHNICAL INVESTIGATION
EDCO MATERIAL RECOVERY FACILITY AND
TRANSFER STATION EXPANSION
3660 DALBERGIA STREET
SAN DIEGO, CALIFORNIA

Dear Mr. South:

In accordance with your request, and our Proposal No. LG-16217 dated June 17, 2016, we have performed a geotechnical investigation for the proposed expansion to the existing facility on Dalbergia Street in San Diego, California. The accompanying report presents our conclusions and recommendations pertaining to the geotechnical aspects of expanding the proposed facility. The results of our study indicate that the site can be developed as planned, provided the recommendations of this report are followed.

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

Very truly yours,

GEOCON INCORPORATED

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JPP:TEM:DBE:dmc

(3) Addressee
(e-mail) JRM&A
Attention: Mr. Don Amerson

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the findings of a geotechnical investigation for a proposed expansion of the EDCO Material Recovery Facility and Transfer Station located in the City of San Diego, California (see Vicinity Map, Figure 1). The purpose of the study was to investigate the soil and geologic conditions at the site, as well as geotechnical constraints (if any) that may impact construction of the proposed improvements. This report provides recommendations pertinent to the geotechnical engineering aspects of constructing the expansion to the existing facility as proposed.

The scope of our study consisted of the following:

- Reviewing satellite imagery, and readily available published and unpublished geologic literature.
- Reviewing the conceptual site plan prepared by JRM&A.
- Drilling four exploratory borings using a truck mounted hollow-stem auger drill rig to evaluate the underlying geologic conditions across the site (see Appendix A for boring logs). Two infiltration tests were also performed to evaluate storm water BMP feasibility.
- Performing laboratory tests on selected soil samples collected to evaluate their physical properties (see Appendix B).
- Providing storm water BMP design information (see Appendix C).
- Preparing this report presenting our exploratory information and our conclusions and recommendations regarding the geotechnical aspects of expanding the site as presently proposed. The approximate locations of the subsurface excavations are shown on the *Geologic Map*, Figure 2.

2. SITE AND PROJECT DESCRIPTION

The existing facility and expansion area consists of two parcels encompassing approximately 2-acres of developed land located on Dalbergia Street in San Diego, California. The property is bounded by Dalbergia Street to the southwest, Vesta Street to the southeast, Interstate 5 to the northeast, and a commercial/light industrial business occupying a parcel to the northwest. The majority of the property is developed and currently used as a waste disposal and material transfer facility, with the exception of the parcel to the northwest, which is relatively vacant. This adjacent parcel was previously a residential development with several structures and a driveway. The structures have been removed but the driveway remains. This vacant parcel is part of the expansion area. The existing building is approximately 28,750 square feet with concrete pavement to the north, east, and south.

Topographically, the site is relatively flat. Elevations range between approximately 28 feet above Mean Sea Level (MSL) to the north to approximately 22 feet (MSL) to the south. An existing slope ascends to the northeast as part of the on-ramp to Interstate 5.

It is our understanding that the proposed expansion will consist of upgrading and expanding the existing waste disposal and transfer facility from approximately 200 to 750 tons per day. The main warehouse will be expanded approximately 12,250 square feet and the overall site increased by 21,000 square feet. In addition, the structures located at 3628 and 3636 Dalbergia Street will be removed, fully enclosing the main facility, relocating the scale and scale house, and adding an additional restroom and lunchroom. Landscaping improvements will be performed to accommodate proposed bioretention basins for storm water management. Concrete and asphalt concrete paving is shown surrounding the new building and expansion areas.

The locations and descriptions of the site and proposed development are based on a reconnaissance and our general understanding of the project as presently proposed. Once final grading plans are developed, Geocon Incorporated should be notified to review the plans and evaluate the need for possible revisions to this report.

3. SOIL AND GEOLOGIC CONDITIONS

Three surficial soil types and one geologic formation was encountered during the field investigation. The surficial deposits consist of undocumented fill, previously placed compacted fill, and alluvium. The formational unit consists of old paralic deposits, formerly identified as terrace deposits. Each of the geologic units is described below in order of increasing age. The approximate extent of the deposits is shown on the *Geologic Map*.

3.1 Undocumented Fill (Qudf)

Undocumented fill associated with the previous residential development underlies the adjacent parcel to the northwest that was added to the expansion area. Undocumented fill is generally considered unsuitable for the support of the proposed structures in its present condition. Remedial grading in the form of complete removal and recompaction will be required. We expect the undocumented fill to be approximately 2 to 3 feet thick across this parcel.

3.2 Previously-Placed Compacted Fill (Qpf)

Previously placed compacted fill was observed in all the borings beneath the PCC pavement within the existing facility. The fill was approximately 5 feet thick in all four borings and generally consisted of medium dense to dense, reddish-brown, clayey sand. Based on our test results, the fill is generally considered suitable for the support of the proposed improvements in its present condition.

However, this will require verification during grading and if loose and/or unsuitable soils are exposed, these soils will require removal and compaction.

3.3 Alluvium (Qal)

Alluvial soils were encountered beneath the fill materials. The alluvium generally consists of stiff to very stiff, brown, sandy clay. Based on our laboratory testing, the alluvial soils are considered suitable for the support of the proposed improvements.

3.4 Old Paralic Deposits (Qop_6)

The Quaternary-age Old Paralic Deposits, previously identified as Bay Point Formation, were encountered underlying the alluvial deposits across the site. This deposit generally consists of medium dense to very dense, light brown, silty, fine to coarse sand and is considered suitable for the support of the proposed improvements.

4. GROUNDWATER

Groundwater was encountered within the exploratory borings at depths ranging between approximately 24 to 27 feet below the ground surface. Groundwater is not expected to be encountered during site development.

5. GEOLOGIC HAZARDS

5.1 Faulting

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

The Rose Canyon Fault zone and the Newport-Inglewood Fault, located approximately 3 miles west of the site, are the closest known active faults. The CGS considers a fault seismically active when evidence suggests seismic activity within roughly the last 11,000 years. The CGS has included portions of the Rose Canyon Fault zone within an Alquist-Priolo Earthquake Fault Zone.

5.2 Seismicity-Deterministic Analysis

According to the computer program *EZ-FRISK (Version 7.65),* 6 known active faults are located within a search radius of 50 miles from the property. We used the 2008 USGS fault database that provides several models and combinations of fault data to evaluate the fault information. The nearest active faults are the Newport-Inglewood and Rose Canyon Fault Zones, located approximately 3 miles west of the site and are the dominant sources of potential ground motion. Earthquakes that might occur on the Newport-Inglewood and Rose Canyon Fault Zones or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated maximum earthquake magnitude and peak ground acceleration for the Newport-Inglewood Fault are 7.5 and 0.47g, respectively. Table 5.2 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We used Boore-Atkinson (2008) NGA USGS 2008, Campbell-Bozorgnia (2008) NGA USGS 2008, and Chiou-Youngs (2007) NGA USGS 2008 acceleration-attenuation relationships in the calculation of the peak ground accelerations (PGA).

TABLE 5.2
DETERMINISTIC SPECTRA SITE PARAMETERS

Fault Name	**Distance from Site (miles)**	**Maximum Earthquake Magnitude (Mw)**	**Peak Ground Acceleration**		
			Boore-Atkinson 2008 (g)	**Campbell-Bozorgnia 2008 (g)**	**Chiou-Youngs 2008 (g)**
Newport-Inglewood	3	7.5	0.39	0.37	0.47
Rose Canyon	3	6.9	0.35	0.36	0.42
Coronado Bank	13	7.4	0.23	0.18	0.22
Palos Verdes Connected	13	7.7	0.25	0.19	0.25
Elsinore	41	7.85	0.14	0.09	0.11
Earthquake Valley	46	6.8	0.08	0.06	0.05

5.3 Seismicity-Probabilistic Analysis

We used the computer program *EZ-FRISK* (version 7.65) to perform a probablilistic seismic hazard analysis. *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mapped Quaternary fault is proportional to the fault slip rate. The program accounts for earthquake magnitude as a function of rupture length. Site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore-Atkinson (2008) NGA USGS 2008, Campbell-Bozorgnia (2008) NGA USGS 2008, and Chiou-Youngs (2008) NGA USGS 2008 in the analysis. Table 5.3 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence for Site Class D.

TABLE 5.3
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson, 2008 (g)	Campbell-Bozorgnia, 2008 (g)	Chiou-Youngs, 2008 (g)
2% in a 50 Year Period	0.52	0.46	0.55
5% in a 50 Year Period	0.36	0.33	0.37
10% in a 50 Year Period	0.26	0.23	0.25

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

5.4 Landslides

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

5.5 Liquefaction and Seismically Induced Settlement

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soils are cohesionless, groundwater is encountered within 50 feet of the surface, and soil relative densities are less than about 70 percent. If all four previous criteria are met, a seismic event could result in a rapid pore-water pressure increase from the earthquake-generated ground accelerations. Seismically induced settlement is settlement that may occur whether the potential for liquefaction exists or not. The potential for liquefaction and seismically induced settlement occurring within the site soils is considered to be “low” due to the geologic conditions encountered. Specifically, the alluvial materials exposed between approximately 5 to 25 feet below the ground surface consist of stiff clay and the Old Paralic Deposits exposed beneath the clay exhibited relative densities that are not conducive to liquefaction. In addition, even if the old paralic deposits exhibited liquefaction, the 25 feet of clay and compacted fill above the groundwater table would prevent any surface manifestation from occurring.

5.6 Geologic Hazard Category

Based on our review of the 2008 City of San Diego Seismic Safety Study Map, Sheet No. 13, the site is located within Geologic Hazard Category 52. Category 52 indicates *Other Terrain: Other level areas, gently sloping to steep terrain, favorable geologic structure, low risk.*

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 In our opinion, no soil or geologic conditions exist at the site that would preclude the development of the proposed building expansion and parking lot improvements as presently planned, provided the recommendations presented herein are implemented in design and construction of the project.

6.1.2 The site is underlain by undocumented fill, previously placed fill, alluvium, and old paralic deposits. The undocumented fill located beneath the parcel to the northwest is considered unsuitable in its present condition to support fill or structural loads and will require removal and compaction. The previously placed compacted fill, alluvium, and old paralic deposits are generally considered suitable in their present condition for support of fill or structural loads.

6.1.3 With the exception of possible strong seismic shaking, no geologic hazards were observed or are known to exist based on our study that would adversely affect the proposed project. No special seismic design considerations, other than those recommended herein, are required.

6.1.4 The proposed structure modifications can be supported by conventional continuous and isolated spread foundations supported entirely in compacted fill.

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

6.2 Excavation and Soil Characteristics

6.2.1 Excavation of the undocumented fill, compacted fill, and underlying alluvium should be possible with light to moderate effort using conventional heavy-duty equipment.

6.2.2 The soils encountered in the field investigation are considered to be “expansive” (expansion index [EI] of 20 or more) as defined by 2013 California Building Code (CBC) Section 1803.5.3 based on laboratory testing. Table 6.2 presents soil classifications based on the expansion index. The soil materials collected and tested for expansion index indicate a “medium” expansion potential (expansion index of 90 or less).

TABLE 6.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

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

6.3 Corrosion

6.3.1 We performed laboratory tests on two samples of the site materials to evaluate the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate content tests are presented in Appendix B and indicate that the on-site materials at the locations tested possess "Not Applicable" and "S0" sulfate exposure to concrete structures as defined by 2013 CBC Section 1904 and ACI 318-11 Sections 4.2 and 4.3. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration. Table 6.3 presents a summary of concrete requirements set forth by 2013 CBC Section 1904 and ACI 318.

TABLE 6.3
REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

Sulfate Severity	Exposure Class	Water-Soluble Sulfate (SO_4) Percent by Weight	Cement Type (ASTM C 150)	Maximum Water to Cement Ratio by Weight	Minimum Compressive Strength (psi)
Not Applicable	S0	$SO_4<0.10$	--	--	2,500
Moderate	S1	$0.10\leq SO_4<0.20$	II	0.50	4,000
Severe	S2	$0.20\leq SO_4\leq 2.00$	V	0.45	4,500
Very Severe	S3	$SO_4>2.00$	V+Pozzolan or Slag	0.45	4,500

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

6.4 Grading Recommendations

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

6.4.2 A pre-construction conference with the city inspector, owner, contractor, civil engineer, and soil engineer in attendance should be held at the site prior to the beginning of grading operations. Special soil handling requirements can be discussed at that time.

6.4.3 Grading of the site, where planned, should commence with the removal of all existing improvements from the areas to be graded. Deleterious debris such as wood, asphalt, brick, and concrete should be exported from the site and should not be mixed with the fill soils, if present. All existing underground improvements within proposed structural areas should be removed and the resulting depressions properly backfilled in accordance with the procedures described herein. If existing improvements are abandoned in-place, the suitability of the trench backfill should be evaluated or removed and re-compacted to at least 90 percent of the maximum dry density near to slightly over optimum moisture content as determined by ASTM Test Designation D1557.

6.4.4 Prior to placing fill or structural loads on previously-placed compacted fill within the existing property, the ground surface should be scarified, moisture conditioned, and compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content, as determined by ASTM Test Method D 1557. Deeper processing and/or removal may be necessary in areas where loose, wet or dry soils are encountered.

6.4.5 Prior to placing fill or structural loads on undocumented fill (i.e. expansion parcel to the northwest), the fill materials should be removed and replaced as compacted fill. Prior to placing compacted fill, the ground surface should be scarified, moisture conditioned, and compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content, as determined by ASTM Test Method D 1557.

6.4.6 If proposed foundations and/or slabs-on-grade are deeper than approximately 3 feet below existing grades (extending through the fill and bearing on alluvium), remedial grading is recommended so that the structure is supported on at least 2 feet of compacted fill. Excavations should extend 2 feet below deepest footing and at least five feet beyond the widest foundation element, except in the areas adjacent to the existing buildings.

Excavations in these areas should be performed in slots so as not to expose or undermine the existing building foundations across the entire length of the proposed additions at one time. Slot dimensions should be determined by the contractor so as to not impact the existing building. Backfill of any given slot should be completed before excavation of an adjacent slot begins.

6.4.7 Excavated soils generated from the cut operations free of deleterious debris and/or contaminants can be placed and compacted in layers to the design finish grade elevations. All fill and backfill soils should be placed in horizontal loose layers with a maximum thickness of 8 inches, moisture conditioned to near optimum moisture content and compacted to a dry density of at least 90 percent of the laboratory maximum dry density as determined by ASTM Test Method D 1557. Soils supporting slabs-on-grade and similar improvements should be compacted once subgrade elevations are achieved.

6.4.8 Any import fill soil, if needed, should consist of granular materials with a “low” expansion potential (EI less than 50) free of deleterious material or stones larger than 3 inches and compacted as recommended above. Geocon Incorporated should be notified of the import soil source so that laboratory testing can be performed to determine its suitability as fill material prior to its arrival at the site.

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

6.5 Seismic Design Criteria

6.5.1 We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. Table 6.5.1 summarizes site-specific design criteria obtained from the 2013 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 seconds. The values presented in Table 6.5.1 are for the risk-targeted maximum considered earthquake (MCE_R). Based on soil conditions and planned grading, the building should be designed using a Site Class D. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2013 CBC and Table 20.3-1 of ASCE 7-10.

TABLE 6.5.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC Reference
Site Class	D	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.097g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.419g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.061	Table 1613.3.3(1)
Site Coefficient, F_V	1.581	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.164g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.662g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.776g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.441g	Section 1613.3.4 (Eqn 16-40)

6.5.2 Table 6.5.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.5.2
2013 CBC SITE ACCELERATION PARAMETERS

Parameter	Value, Site Class D	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.474g	Figure 22-7
Site Coefficient, F_{PGA}	1.026	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.486g	Section 11.8.3 (Eqn 11.8-1)

6.5.3 Conformance to the criteria for seismic design does not constitute any guarantee or assurance that significant structural damage or ground failure will not occur in the event of a maximum level earthquake. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive.

6.6 Foundations

6.6.1 The proposed structure modifications can be supported on a shallow foundation system founded entirely in compacted fill. Foundations for the structure should consist of continuous strip footings and/or isolated spread footings. Continuous footings should be at least 12 inches wide and extend at least 18 inches below lowest adjacent pad grade. Isolated spread footings should have a minimum width of 2 feet and should extend at least 18 inches below lowest adjacent pad grade. Steel reinforcement for continuous footings should consist of at least four No. 4 steel reinforcing bars placed horizontally in the footings, two near the top and two near the bottom. Steel reinforcement for the spread footings should be designed by the project structural engineer. A footing dimension detail, depicting the depth to lowest adjacent grade, is presented in Figure 3.

6.6.2 The minimum reinforcement recommended above is based on soil characteristics only (Expansion Index of 90 or less) and is not intended to replace reinforcement required for structural considerations.

6.6.3 The recommended allowable bearing capacity for foundations with minimum dimensions described above and bearing in compacted fill is 2,000 pounds per square foot (psf). This allowable soil bearing pressure may be increased by an additional 400 psf for each additional foot of depth and 200 psf for each additional foot of width, to a maximum allowable bearing capacity of 4,000 psf. The values presented above are for dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces.

6.6.4 Settlement due to footing loads conforming to the above recommended allowable soil bearing pressures are expected to be less than 1-inch total and ½-inch differential across the building.

6.6.5 If new concrete foundations are planned adjacent to existing foundations, dowels are recommended and should be designed by the project Structural Engineer in accordance with ACI guidelines.

6.6.6 Foundation excavations should be observed by the geotechnical engineer (a representative of Geocon Incorporated) prior to the placement of reinforcing steel and concrete to verify that the exposed soil conditions are consistent with those anticipated and have been extended to appropriate bearing strata. If unanticipated soil conditions are encountered, foundation modifications may be required.

6.7 Concrete Slabs-on-Grade

6.7.1 Concrete slabs-on-grade for the structure modifications should be at least 5 inches thick and reinforced with No. 3 steel reinforcing bars at 18 inches on center in both horizontal directions.

6.7.2 Slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). In addition, the membrane should be installed in accordance with manufacturer's recommendations and ASTM requirements and installed in a manner that prevents puncture. The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

6.7.3 The bedding sand thickness should be determined by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations if the bedding sand is thicker than 6 inches. Typically, four inches of bedding sand with a vapor retarder placed at the midpoint is used. The foundation design engineer should provide appropriate concrete mix design criteria and curing measures to assure proper curing of the slab by reducing the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation design engineer present the concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

6.7.4 The concrete slab-on-grade recommendations are based on soil support characteristics only. The project structural engineer should evaluate the structural requirements of the concrete slabs for supporting vehicle, equipment and storage loads.

6.7.5 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations herein. Slab panels should be a minimum of 4 inches thick and, when in excess of 8 feet square, should be reinforced with 6 x 6 - W2.9/W2.9 (6 x 6 - 6/6) welded wire mesh or No. 3 reinforcing bars at 18 inches on center in both directions to reduce the potential for cracking. In addition, concrete flatwork should be provided with crack control joints to reduce and/or control shrinkage cracking. Crack control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing. A 4-inch-thick slab should have a maximum joint spacing of 10 feet. Subgrade soil for exterior slabs not subjected to vehicle loads should be compacted in accordance with criteria presented in the grading section prior to concrete placement. Subgrade soil should be properly compacted and the moisture content of subgrade soil should be checked prior to placing concrete.

6.7.6 The recommendations presented herein are intended to reduce the potential for cracking of slabs and foundations as a result of differential movement. However, even with the incorporation of the recommendations presented herein, foundations and slabs-on-grade will still exhibit some cracking. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack-control joints and proper concrete placement and curing. Literature provided by the Portland Concrete Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction and curing practices, and should be incorporated into project construction.

6.8 Preliminary Pavement Recommendations

6.8.1 We calculated the preliminary flexible pavement sections in general conformance with the *Caltrans Method of Flexible Pavement Design* (Highway Design Manual, Section 608.4) using estimated Traffic Indices (TI) of 4.5, 5.0, 6.0, and 7.0 for light-duty parking stalls, light-duty driveways, medium-duty, and heavy-duty traffic areas, respectively. The project civil engineer, architect, and owner should review the pavement designations to determine appropriate locations for pavement thickness. It is our opinion that a TI of 6.0 is appropriate to evaluate trash truck roadway areas. The final pavement sections should be based on the R-Value of the subgrade soil encountered at final subgrade elevation. For preliminary design purposes, we have utilized an assumed R-value of 5. Table 6.8.1 presents the preliminary flexible pavement sections. Public roadways, if any, should be designed in accordance with the City of San Diego Pavement Design Standards, Schedule J, Drawing No. SDG-113.

TABLE 6.8.1
PRELIMINARY FLEXIBLE PAVEMENT SECTIONS

Location	Assumed Traffic Index	Assumed Subgrade R-Value	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Parking stalls for light-duty vehicles	4.5	5	3	8
Driveways for light-duty vehicles	5.0	5	3	10
Medium-duty truck traffic areas	6.0	5	3.5	13
Heavy-duty truck traffic areas	7.0	5	4	15.5

6.8.2 Prior to placing base materials, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned as necessary, and recompacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM D 1557. Similarly, the base material should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Asphalt concrete should be compacted to a density of at least 95 percent of the laboratory Hveem density in accordance with ASTM D 2726.

6.8.3 Base materials should conform to Section 26-1.028 of the *Standard Specifications for The State of California Department of Transportation (Caltrans)* with a ¾-inch maximum size aggregate. The asphalt concrete should conform to Section 203-6 of the *Standard Specifications for Public Works Construction (Greenbook).*

6.8.4 A rigid Portland Cement concrete (PCC) pavement section should be placed in driveway entrance aprons, trash bin loading/storage areas and loading dock areas. The concrete pad for trash truck areas should be large enough such that the truck wheels will be positioned on the concrete during loading. We calculated the rigid pavement section in general conformance with the procedure recommended by the American Concrete Institute report ACI 330R-08 *Guide for Design and Construction of Concrete Parking Lots* using the parameters presented in Table 6.8.2.

TABLE 6.8.2
RIGID PAVEMENT DESIGN PARAMETERS

Design Parameter	Design Value
Modulus of subgrade reaction, k	50 pci
Modulus of rupture for concrete, M_R	500 psi
Traffic Category, TC	A and B
Average daily truck traffic, ADTT	10 and 300

6.8.5 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 6.8.3.

TABLE 6.8.3
RIGID PAVEMENT RECOMMENDATIONS

Location	Portland Cement Concrete (inches)
Light-Duty Vehicles (TC=A, ADTT = 10)	6.0
Trash Truck/Fire Lane Areas (TC=B, ADTT =300)	7.5

6.8.6 The PCC pavement should be placed over subgrade soil that is compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. This pavement section is based on a minimum concrete compressive strength of approximately 3,000 psi (pounds per square inch).

6.8.7 A thickened edge or integral curb should be constructed on the outside of concrete slabs subjected to wheel loads. The thickened edge should be 1.2 times the slab thickness or a minimum thickness of 2 inches, whichever results in a thicker edge, and taper back to the recommended slab thickness 4 feet behind the face of the slab (e.g., a 7-inch-thick slab would have a 9-inch-thick edge).

6.8.8 Reinforcing steel should consist of No. 3 rebar placed at 18-inches on center, both directions, or 6x6-6/6 welded wire mesh.

6.8.9 To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing. However, we recommend a spacing not to exceed 10 feet. The depth of the crack-control joints should be determined by the referenced ACI report.

6.8.10 The performance of pavement is highly dependent on providing positive surface drainage away from the edge of the pavement. Ponding of water on or adjacent to the pavement will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed to controlled drainage structures. Landscape areas adjacent to the edge of asphalt pavements are not recommended due to the potential for surface or irrigation water to infiltrate the underlying permeable aggregate base and cause distress. Where such a condition cannot be avoided, consideration should be given to incorporating measures that will significantly reduce the potential for subsurface water migration into the aggregate base. If planter islands are planned, the perimeter curb should extend at least six inches below the level of the base materials.

6.9 Retaining Walls and Lateral Loads

6.9.1 Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid with a density of 35 pounds per cubic foot (pcf). Where the backfill will be inclined at 2:1 (horizontal:vertical), an active soil pressure of 50 pcf is recommended. These soil pressures assume that the backfill materials within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall possess an Expansion Index ≤50. Geocon Incorporated should be consulted for additional recommendations if backfill materials have an EI >50.

6.9.2 Where walls are restrained from movement at the top, an additional uniform pressure of 8H psf (where H equals the height of the retaining wall portion of the wall in feet) should be added to the active soil pressure where the wall possesses a height of 8 feet or less and 12H where the wall is greater than 8 feet. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to two feet of fill soil should be added (total unit weight of soil should be taken as 130 pcf).

6.9.3 Soil contemplated for use as retaining wall backfill, including import materials, should be identified in the field prior to backfill. At that time Geocon Incorporated should obtain samples for laboratory testing to evaluate its suitability. Modified lateral earth pressures may be necessary if the backfill soil does not meet the required expansion index or shear strength. City or regional standard wall designs, if used, are based on a specific active lateral earth pressure and/or soil friction angle. In this regard, on-site soil to be used as backfill may or may not meet the values for standard wall designs. Geocon Incorporated should be consulted to assess the suitability of the on-site soil for use as wall backfill if standard wall designs will be used.

6.9.4 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The wall designer should provide appropriate lateral deflection quantities for planned retaining walls structures, if applicable. These lateral values should be considered when planning types of improvements above retaining wall structures.

6.9.5 Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The above recommendations assume a properly compacted granular (EI ≤50) free-draining backfill material with no hydrostatic forces or imposed surcharge load. A typical retaining wall drainage detail is presented on Figure 4. If conditions different than those described are expected, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.

6.9.6 In general, wall foundations having a minimum depth and width of one foot may be designed for an allowable soil bearing pressure of 2,000 psf, provided the soil within three feet below the base of the wall has an Expansion Index ≤ 90. The recommended allowable soil bearing pressure may be increased by 200 psf and 400 psf for each additional foot of foundation width and depth, respectively, up to a maximum allowable soil bearing pressure of 4,000 psf.

6.9.7 The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore, Geocon Incorporated should be consulted where such a condition is anticipated. As a minimum, wall footings should be deepened such that the bottom outside edge of the footing is at least seven feet from the face of slope when located adjacent and/or at the top of descending slopes.

6.9.8 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the CBC. If the project possesses a seismic design category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 18.3.5.12 of the 2013 CBC. The seismic load is dependent on the retained height where H is the height of the wall, in feet, and the calculated loads result in pounds per square foot (psf) exerted at the base of the wall and zero at the top of the wall. A seismic load of 22H should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.486g calculated from ASCE 7-10 Section 11.8.3 and applied a pseudo-static coefficient of 0.33.

6.9.9 For resistance to lateral loads, a passive earth pressure equivalent to a fluid density of 300 pcf is recommended for footings or shear keys poured neat against properly compacted granular fill soils or undisturbed formation materials. The passive pressure assumes a horizontal surface extending away from the base of the wall at least five feet or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material not protected by floor slabs or pavement should not be included in the design for lateral resistance. Where walls are planned adjacent to and/or on descending slopes, a passive pressure of 150 pcf should be used in design.

6.9.10 An ultimate friction coefficient of 0.35 may be used for resistance to sliding between soil and concrete. This friction coefficient may be combined with the passive earth pressure when determining resistance to lateral loads.

6.9.11 The recommendations presented above are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 12 feet. In the event that walls higher than 12 feet are planned, Geocon Incorporated should be consulted for additional recommendations.

6.10 Site Drainage and Moisture Protection

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

6.10.2 In the case of basement walls or building walls retaining landscaping areas, a waterproofing system should be used on the wall and joints, and a Miradrain drainage panel (or similar) should be placed over the waterproofing. The project architect or civil engineer should provide detailed specifications on the plans for all waterproofing and drainage.

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

6.11 Slope Maintenance

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

6.12 Grading and Foundation Plan Review

6.12.1 The geotechnical engineer and engineering geologist should review the grading and foundation plans prior to final City submittal to check their compliance with the recommendations of this report and to determine the need for additional comments, recommendations and/or analysis.

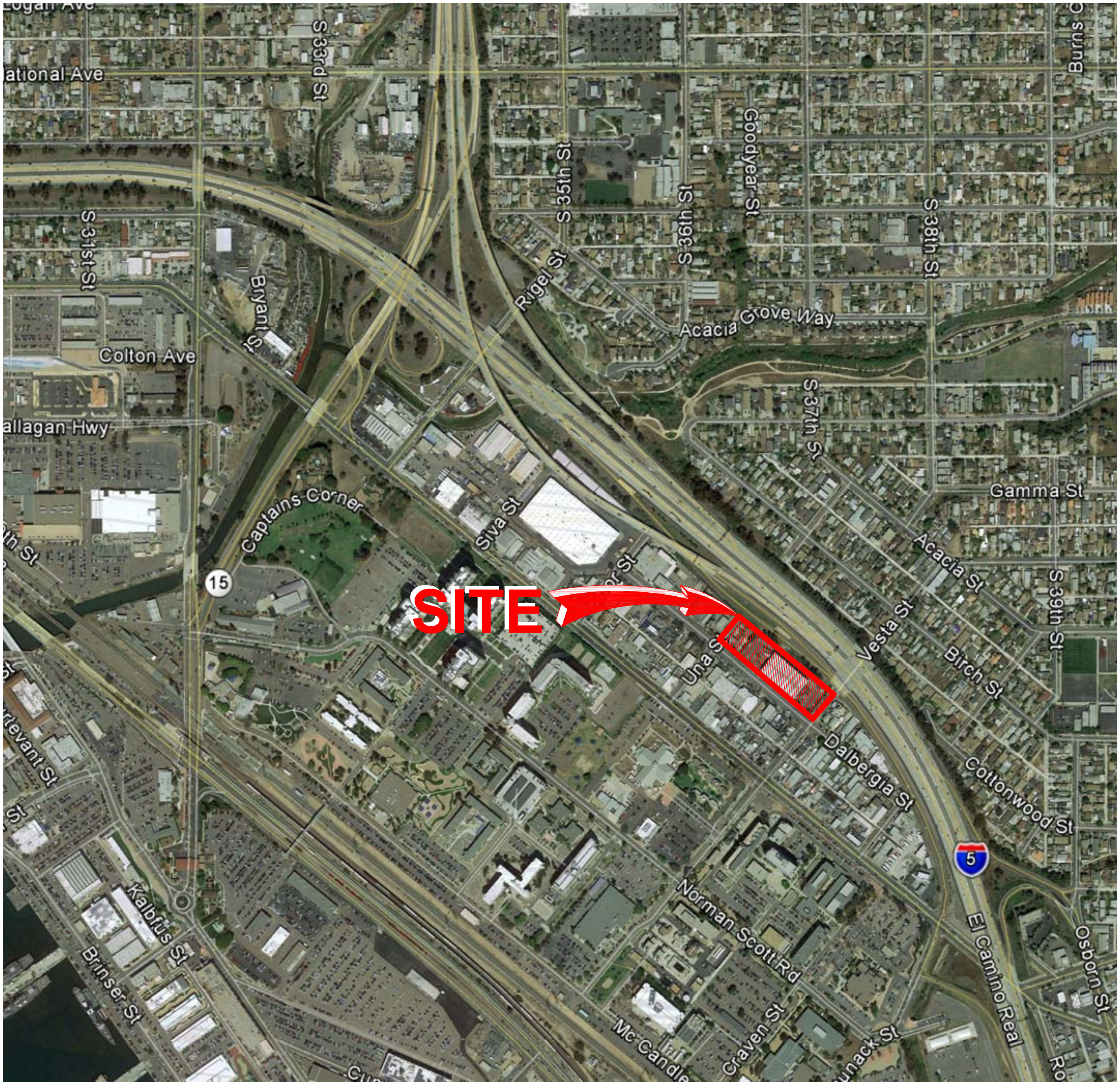
LIMITATIONS AND UNIFORMITY OF CONDITIONS

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

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

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

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



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NO SCALE

VICINITY MAP

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6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
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EDCO MATERIAL RECOVERY FACILITY
AND TRANSFER STATION EXPANSION
3660 DALBERGIA STREET
SAN DIEGO, CALIFORNIA

TM / CW		DSK/GTYPD	DATE 09 - 07 - 2016	PROJECT NO. G2010 - 32 - 01	FIG. 1

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EDCO MATERIAL RECOVERY FACILITY
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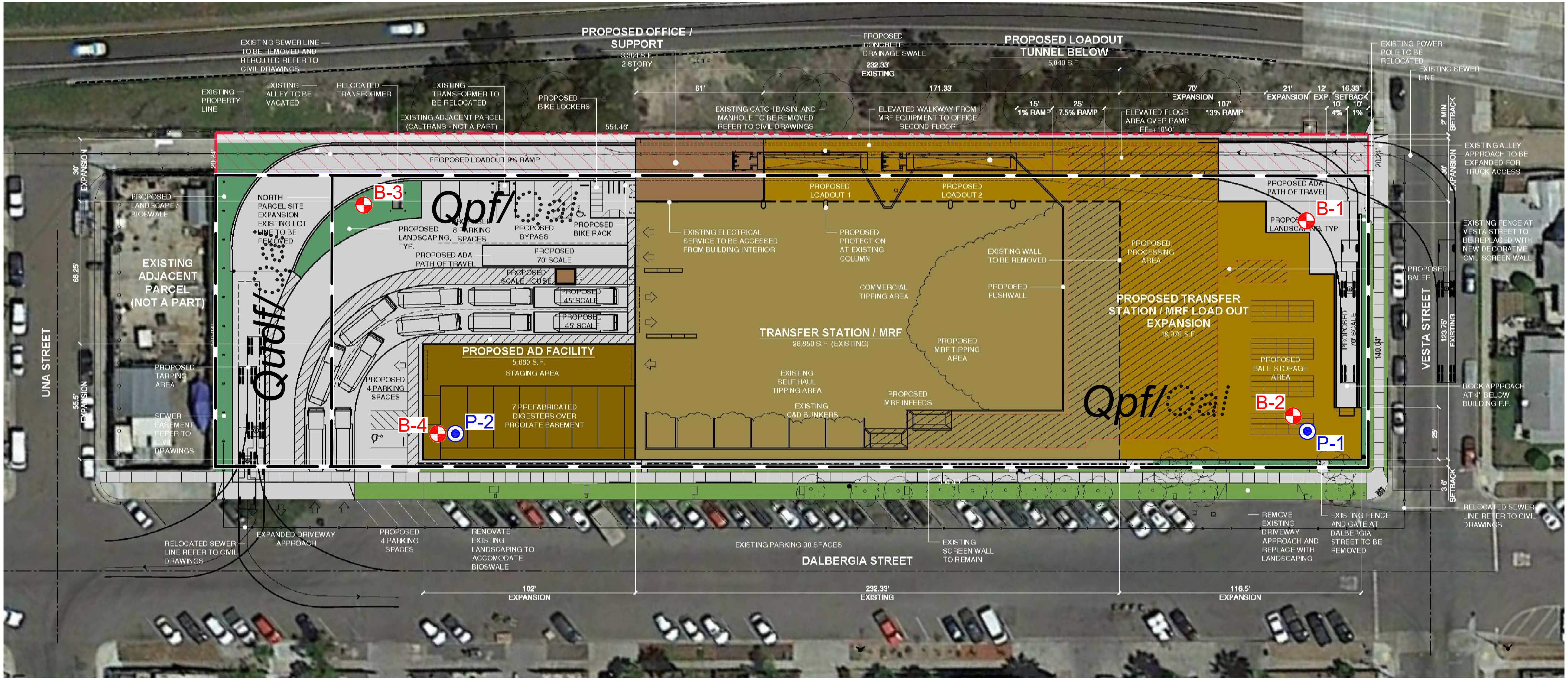

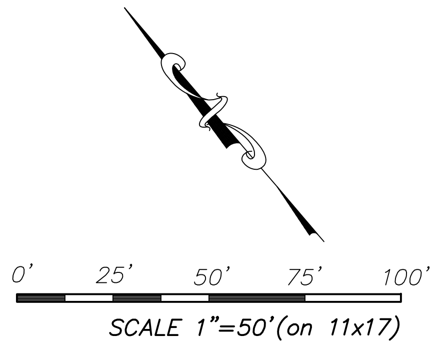

SCALE 1"=50'(on 11x17)

GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL

Qpf ....PREVIOUSLY PLACED FILL

Qal ....ALLUVIUM (Dotted Where Buried)

∼ ....APPROX. LOCATION OF GEOLOGIC CONTACT

B-4 ⊕ ....APPROX. LOCATION OF EXPLORATORY BORING

P-2 ◉ ....APPROX. LOCATION OF PERMEABILITY TEST

GEOLOGIC MAP

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PROJECT NO. G2010 - 32 - 01
FIGURE 2
DATE 09 - 07 - 2016

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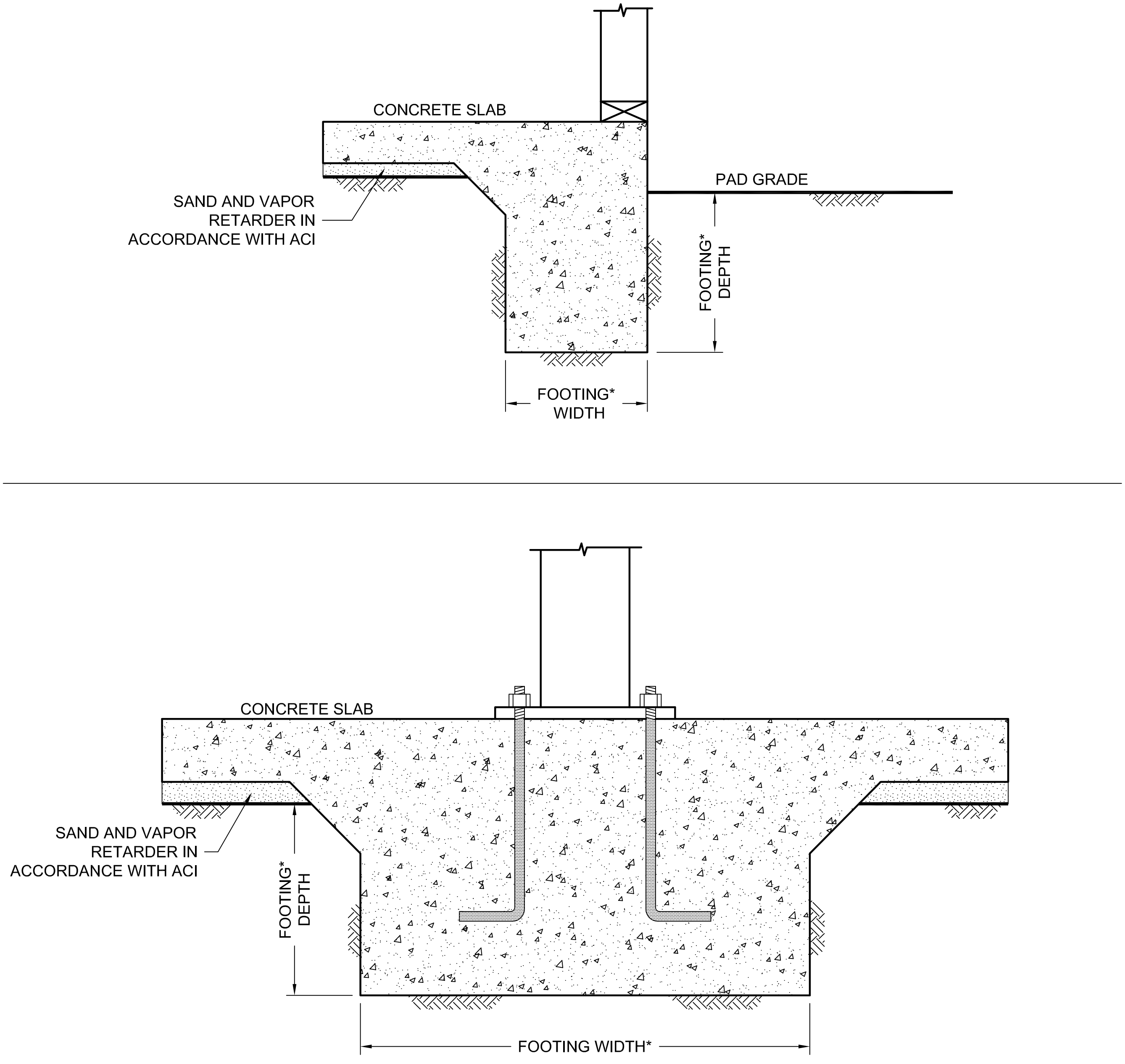

*....SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

WALL / COLUMN FOOTING DIMENSION DETAIL

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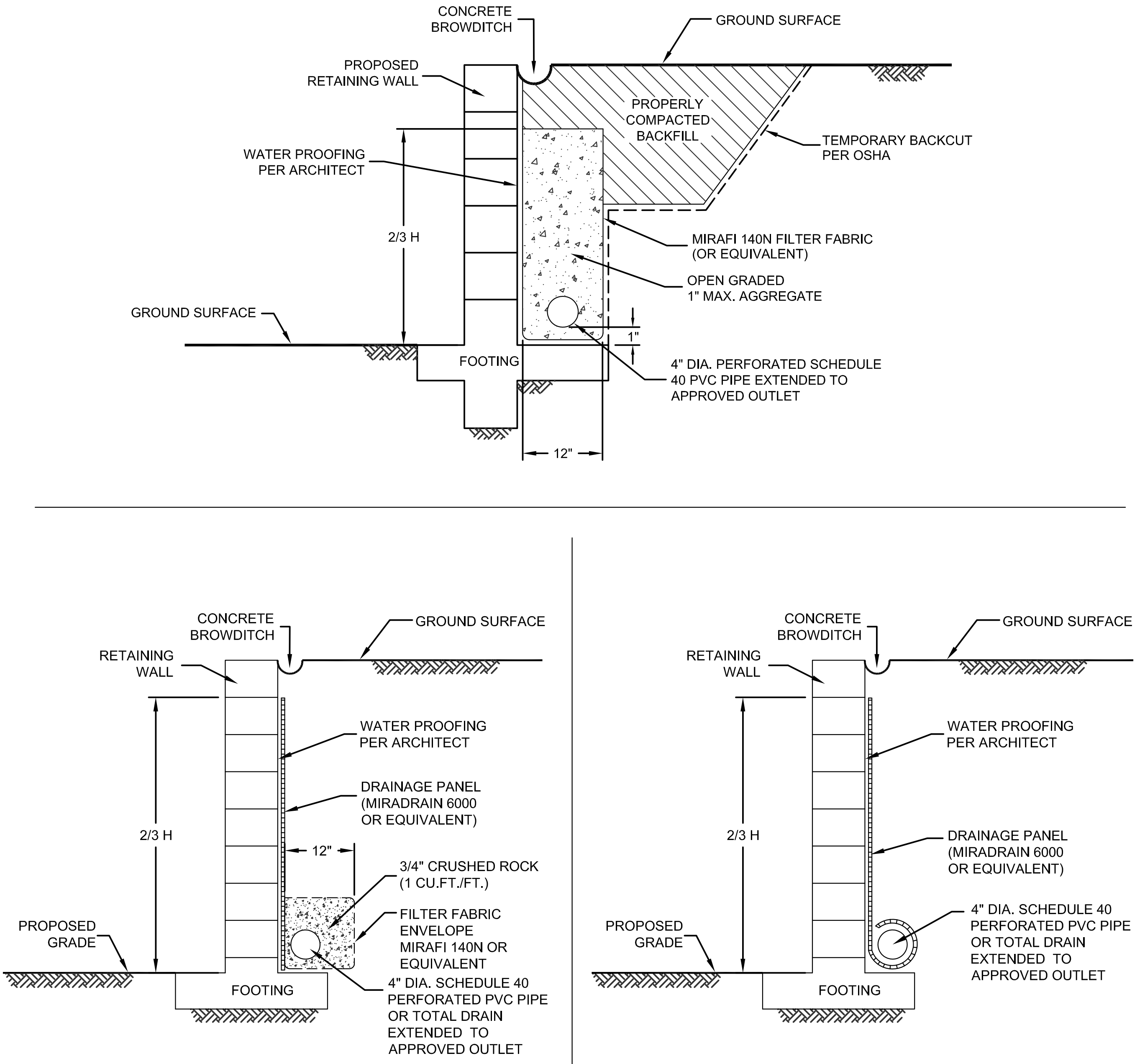
TM / CW		DSK/GTYPD	DATE 09 - 07 - 2016	PROJECT NO. G2010 - 32 - 01	FIG. 3

Plotted:09/07/2016 9:37AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2010-32-01 Dalbergia Street\DETAILS\Wall-Column Footing Dimension Detail (COLFOOT2).dwg



NOTE :

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

NO SCALE

TYPICAL RETAINING WALL DRAIN DETAIL

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TM / CW		DSK/GTYPD	DATE 09 - 07 - 2016	PROJECT NO. G2010 - 32 - 01	FIG. 4

Plotted:09/07/2016 9:37AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2010-32-01 Dalbergia Street\DETAILS\Typical Retaining Wall Drainage Detail (RWDD7A).dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The field investigation was performed on July 13, 2016, and consisted of drilling 4 hollow stem auger borings at the approximate locations shown on Figure 2. In addition, two infiltration tests (Infiltration Test Nos. P-1 and P-2) were performed to evaluate proposed storm water infiltration feasibility. The borings were excavated by Baja Drilling to depths of approximately 41.5 feet below existing grade using a CME 75 truck mounted drill rig. Relatively undisturbed and disturbed bulk samples were obtained from the borings for laboratory testing. The approximate locations of the borings and infiltration tests are shown on the *Geologic Map*, Figure 2. The results and discussion of the infiltration testing is discussed in *Appendix C* of this report.

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

PROJECT NO. G2010-32-01

BORING B 1

ELEV. (MSL.) **22'** DATE COMPLETED **07-13-2016**

EQUIPMENT **CME 75 DRILL RIG** BY: **J. PAGNILLO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**6-INCHES-PCC PAVEMENT**			
				SC	**PREVIOUSLY PLACED FILL (Qpf)** Medium dense, damp, reddish brown, Clayey, fine to medium SAND			
2								
	B1-1					52	127.7	9.4
4								
	B1-2			CL	**ALLUVIUM (Qal)** Very stiff, damp, brown, fine to medium Sandy CLAY	44	111.6	17.0
6								
	B1-3							
8								
10	B1-4				-Stiff, moist, brown, fine to medium Sandy CLAY	33	117.4	15.2
12								
14								
	B1-5				-Stiff, moist, brown to medium Sandy CLAY	32	107.3	20.2
16								
18								
20	B1-6				-Stiff, moist, brown, fine to medium Sandy CLAY	17	102.5	22.1
22								
24								
	B1-7			SM	**OLD PARALIC DEPOSITS (Qop)** Medium dense, wet, light brown, Silty, fine to medium, SAND	31	108.9	19.7
26								
			▼		-Groundwater			
28								
30	B1-8				-Medium dense, wet, light brown, Silty, fine to coarse SAND	25		
32								
34								

Figure A-1,
Log of Boring B 1, Page 1 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS			
	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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

BORING B 1

ELEV. (MSL.) **22'** DATE COMPLETED **07-13-2016**

EQUIPMENT **CME 75 DRILL RIG** BY: **J. PAGNILLO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
	B1-9			SM	-Medium dense, wet, light brown, Silty, fine to coarse SAND	30		
36								
38								
40								
	B1-10				-Medium dense, wet, light brown, Silty, fine to coarse SAND	20		
					BORING TERMINATED AT 41.5 FEET Groundwater at 27 feet Boring backfilled with approx. 10 cu. ft. of bentonite/cement slurry			

Figure A-1,
Log of Boring B 1, Page 2 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. G2010-32-01

BORING B 2

ELEV. (MSL.) 22' DATE COMPLETED 07-13-2016

EQUIPMENT CME 75 DRILL RIG BY: J. PAGNILLO

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**6-INCHES PCC PAVEMENT**			
				SC	**PREVIOUSLY PLACED FILL (Qpf)** Dense, damp, reddish brown, Clayey, fine to medium, SAND			
2								
	B2-1					70	126.4	10.1
4								
	B2-2			SC	**ALLUVIUM (Qal)** Medium dense, damp, dark brown, Clayey, fine to medium SAND	40	117.3	14.6
6								
	B2-3							
8								
				CL				
10	B2-4				-Stiff, moist, dark brown, Sandy CLAY	33	120.2	14.0
12								
14								
	B2-5				-Stiff, moist, dark brown, Sandy CLAY	27	107.1	21.1
16								
18								
20	B2-6				-Stiff, moist, dark brown, Sandy CLAY	18	115.9	19.7
22								
24			▼					
	B2-7				-Groundwater -Stiff, wet, brown, Sandy CLAY	34	108.6	22.2
26								
28								
30	B2-8				-Very stiff, wet, brown, Sandy CLAY	17		
32								
34								

Figure A-2,
Log of Boring B 2, Page 1 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS			
	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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GEOCON

BORING B 2

ELEV. (MSL.) **22'** DATE COMPLETED **07-13-2016**

EQUIPMENT **CME 75 DRILL RIG** BY: **J. PAGNILLO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
	B2-9			CL	-Very stiff, wet, brown, Sandy CLAY	53		
36								
38								
40	B2-10			SM	**OLD PARALIC DEPOSITS (Qop)** Very dense, wet, light brown, Silty, fine to coarse SAND	61		

BORING TERMINATED AT 41.5 FEET
Groundwater at 25 feet
Boring backfilled with approx. 10 cu. ft. of bentonite/cement slurry

Figure A-2,
Log of Boring B 2, Page 2 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS			
	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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PROJECT NO. G2010-32-01

BORING B 3

ELEV. (MSL.) 22' DATE COMPLETED 07-13-2016

EQUIPMENT CME 75 DRILL RIG BY: J. PAGNILLO

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**6-INCHES PCC PAVEMENT**			
				SC	**PREVIOUSLY PLACED FILL (Qpf)** Medium dense, damp, dark gray, Clayey, fine to medium SAND			
2								
	B3-1 ■					25		
4								
	B3-2 ■			CL	**ALLUVIUM (Qal)** Stiff, moist, dark brown, Sandy CLAY	35	109.6	19.8
6								
	B3-3 ▨							
8								
				SC				
10	B3-4 ■				-Very dense, moist, Clayey, fine to medium SAND	>50	118.7	11.4
12								
				SM				
14								
	B3-5 ■				-Dense, damp, light yellowish brown, Silty, fine to medium SAND	65	105.8	3.2
16								
18								
20	B3-6 ■				-Very dense, moist, light yellowish brown, Silty, fine to medium SAND	>50	107.6	12.8
22								
24			▼		-Groundwater			
	B3-7 ■			SM	**OLD PARALIC DEPOSITS (Qop)** Very dense, wet, light brown, Silty, fine to coarse SAND with gravel	>50		
26								

BORING TERMINATED AT 26.5 FEET
Groundwater at 24 feet
Boring backfilled with approx. 5 cu. ft. of bentonite/cement slurry

Figure A-3,
Log of Boring B 3, Page 1 of 1

G2010-32-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2010-32-01

BORING B 4

ELEV. (MSL.) 22' DATE COMPLETED 07-13-2016

EQUIPMENT CME 75 DRILL RIG BY: J. PAGNILLO

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**6-INCHES PCC PAVEMENT**			
				SC	**PREVIOUSLY PLACED FILL (Qpf)** Medium dense, damp, light brown, Clayey, fine to medium SAND			
2								
	B4-1					41	114.4	8.5
4								
	B4-2			SM	Dense, dry, light yellowish brown, Silty, fine to medium SAND	55	119.2	13.7
6								
	B4-3							
8								
10	B4-4			SC	**ALLUVIUM (Qal)** Dense, moist, light brown, Clayey, fine to medium SAND	58	114.3	16.3
12								
				CL	Very stiff, moist, brown, Sandy CLAY			
14								
	B4-5					62	110.7	17.5
16								
18								
20	B4-6				-Stiff, moist, brown, Sandy CLAY	35	110.2	18.1
22								
24			▼	SC	-Groundwater			
	B4-7				Medium dense, wet, brown, Clayey, fine to medium SAND	46	115.7	16.1
26								
28								
30	B4-8			SM	**OLD PARALIC DEPOSITS (Qop)** Medium dense, wet, yellowish brown, Silty, fine to coarse SAND	27		
32								
34								

Figure A-4,
Log of Boring B 4, Page 1 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ▨ ... DISTURBED OR BAG SAMPLE
- ◧ ... STANDARD PENETRATION TEST
- ◣ ... CHUNK SAMPLE
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2010-32-01

BORING B 4

ELEV. (MSL.) **22'** DATE COMPLETED **07-13-2016**

EQUIPMENT **CME 75 DRILL RIG** BY: **J. PAGNILLO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
36	B4-9			SC	-Medium dense, wet, brown, Clayey, fine to medium SAND	39		
38				SM				
40	B4-10				-Dense, wet, brown, Silty, fine to coarse SAND -No sample recovery	34		

BORING TERMINATED AT 41.5 FEET
Groundwater encountered at 24 feet
Boring backfilled with approx. 10 cu. ft. of bentonite/cement slurry

Figure A-4,
Log of Boring B 4, Page 2 of 2

G2010-32-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
▨ ... DISTURBED OR BAG SAMPLE	◣ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

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GEOCON

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for shear strength, grain size, consolidation, expansion potential, R-Value, and water-soluble sulfate content. The results of our laboratory tests are presented on Tables B-I through B-IV and Figures B-1 and B-2. The results of the dry density and moisture content tests are presented on the boring logs, Figures A-1 to A-4.

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

Sample No.	Geologic Unit (Soil Class)	Dry Density (pcf)	Moisture Content (%)	Peak [Ultimate] Cohesion (psf)	Peak [Ultimate] Angle of Shear Resistance (degrees)
B2-2	Qal (SC)	117.3	14.6	550 [140]	34 [35]
B3-2	Qal (CL)	109.6	19.8	1270 [550]	22 [27]

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

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B1-3	9.4	22.4	110.6	59
B4-3	10.0	20.7	107.6	56

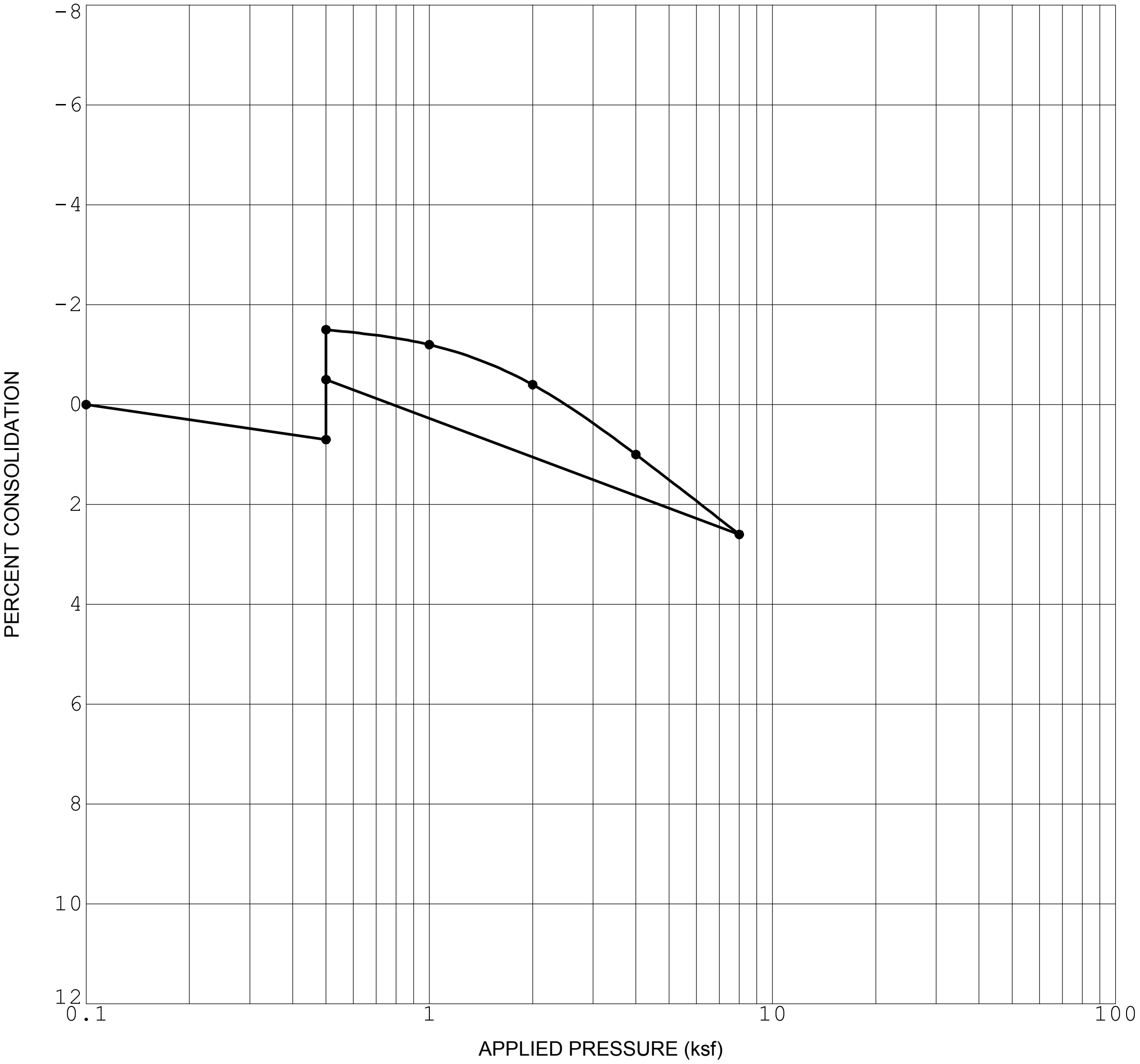
TABLE B-III
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Sulfate Severity	Sulfate Class
B1-3	0.020	Not Applicable	S0
B4-3	0.007	Not Applicable	S0

TABLE B-IV
SUMMARY OF LABORATORY RESISTANCE VALUE (R-VALUE) TEST RESULTS
ASTM D 2844

Sample No.	Description	R-Value
B1-3	Sandy Clay (Qal)	7
B4-3	Silty Sand (Qpf)	5

SAMPLE NO. B3-1



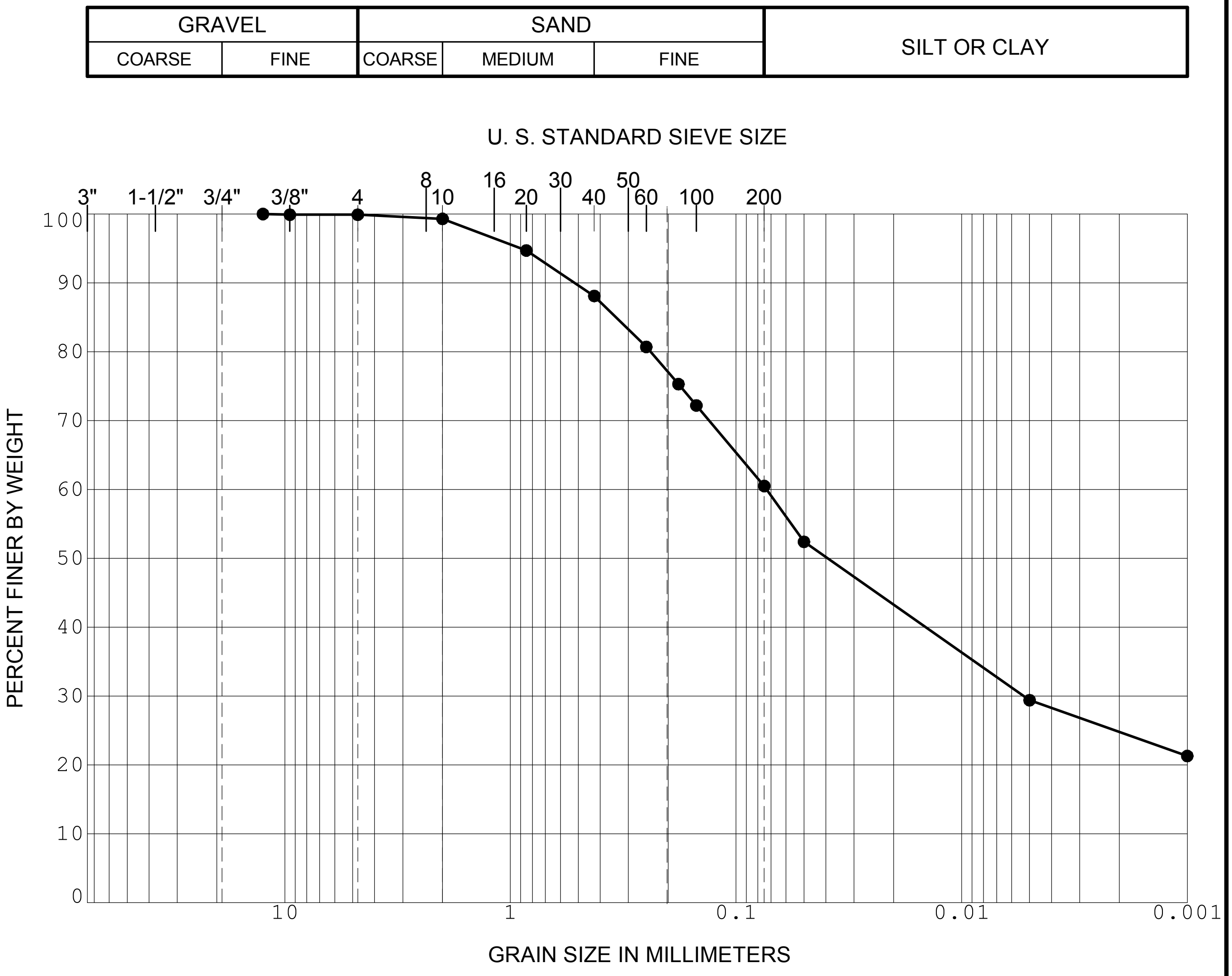
Initial Dry Density (pcf)	108.6
Initial Water Content (%)	19.8

Initial Saturation (%)	99.9
Sample Saturated at (ksf)	.5

CONSOLIDATION CURVE

DALBERGIA STREET

SAN DIEGO, CALIFORNIA



	SAMPLE	DEPTH (ft)	CLASSIFICATION	NAT WC	LL	PL	PI
●	B1-3	7.0	CL- Sandy, lean CLAY				
⧗							
▲							

GRADATION CURVE

DALBERGIA STREET

SAN DIEGO, CALIFORNIA

APPENDIX C

APPENDIX C

INFILTRATION INVESTIGATION

FOR

EDCO MATERIAL RECOVERY FACILITY
AND TRANSFER STATION EXPANSION
3660 DALBERGIA STREET
SAN DIEGO, CALIFORNIA

PROJECT NO. G2010-32-01

APPENDIX C

STORM WATER MANAGEMENT INVESTIGATION

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

Hydrologic Soil Group

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

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

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

The property is classified as urban land. No other pertinent information is provided for urban land. Table C-2 presents the information from the USDA website for the subject property.

TABLE C-2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (Inches/ Hour)
Urban Land	Ur	100	Not Available	Not Available

In-Situ Testing

The infiltration rate, percolation rates and saturated hydraulic conductivity are different and have different meanings. Percolation rates tend to overestimate infiltration rates and saturated hydraulic conductivities by a factor of 10 or more. Table C-3 describes the differences in the definitions.

TABLE C-3
SOIL PERMEABILITY DEFINITIONS

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

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

We performed 2 Aardvark Permeameter Tests, P-1 and P-2, at locations shown on the attached Geologic Map, Figure 2. The test borings were 4 inches in diameter. The results of the tests provide parameters regarding the saturated hydraulic conductivity characteristics of on-site soil and geologic units. Table C-4 presents the results of the estimated field saturated hydraulic conductivity and estimated infiltration rates obtained from the Aardvark Permeameter tests. The field sheets are also attached herein. We applied a feasibility factor of safety of 2 to the field results for use in preparation of Worksheet C.4-1. The results of the testing indicate an adjusted soil infiltration rate ranging between 0.002 and 0.007 inches per hour after applying a Factor of Safety of 2. Based on a discussion in the County of Riverside *Design Handbook for Low Impact Development Best Management Practices*, the infiltration rate should be considered equal to the saturated hydraulic conductivity rate.

TABLE C-4
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	**Geologic Unit**	**Test Depth (feet)**	**Field-Saturated Hydraulic Conductivity, k_{sat} (inch/hour)**	**Worksheet[1] Saturated Hydraulic Conductivity, k_{sat} (inch/hour)**
P-1	Qal	5.0	0.004	0.002
P-2	Qpf	4.25	0.014	0.007

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

STORM WATER MANAGEMENT CONCLUSIONS

The Geologic Map, Figure 2, depicts the existing property, proposed development, the locations of the field excavations and the in-situ infiltration test locations.

Soil Types

Compacted Fill – Compacted fill exists across the existing facility or will be placed above competent alluvial materials for proper structural support (i.e. expansion parcel). The proposed storm water BMP's will be founded in compacted fill placed above native alluvial soils. The compacted fill is comprised of clayey sand. The fill has been or will be compacted to a dry density of at least 90 percent of the laboratory maximum dry density. In our experience, compacted fill does not possess infiltration rates appropriate for infiltration BMP's, as demonstrated by the in-situ testing. Hazards that occur as a result of fill soil saturation include a potential for hydro-consolidation of the granular fill soils and/or swelling of the expansive soils, long-term fill settlement, differential fill settlement, and lateral movement associated with saturated fill relaxation. The potential for lateral water migration to adversely impact existing or proposed structures, foundations, utilities, and roadways, is high. Therefore, full and partial infiltration should be considered infeasible.

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

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

- *Where possible, infiltration BMPs on fill material should be designed such that their infiltrating surface extends into native soils.* The underlying granitic rock below the compacted fill is expected between 5 to 30 feet below proposed finish grades after remedial grading is performed. Full and partial infiltration should be considered geotechnically infeasible within the compacted fill and liners and subdrains should be used. If the infiltration BMP's extended below the compacted fill, partial infiltration may be feasible.

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

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

Infiltration Rates

The results of the infiltration rates obtained within the compacted fill and/or alluvial materials ranged between 0.002 and 0.007 inches per hour. Therefore, based on the results of the infiltration testing, full and partial infiltration should be considered infeasible.

Groundwater Elevations

Groundwater was encountered during our field exploration at depths of approximately 24 to 27 feet below existing grades, or elevations of approximately 0.0 feet above Mean Sea Level (MSL). Groundwater is not expected to be a geotechnical constraint.

Soil or Groundwater Contamination

Based on review of the Geotracker website, soil or groundwater contamination is not expected beneath this property, however, several open and/or closed case files exist in the near vicinity. The closest active cleanup site is located at 3698 Main Street where monitoring wells are currently detecting free product (diesel, oil, and grease) after removal of several underground storage tanks. Clean-up efforts and monitoring are ongoing. Therefore, it is our opinion that infiltration BMP's could increase the mobility of nearby contamination that could adversely impact the shallow groundwater. As such, infiltration BMP's should be considered infeasible.

New or Existing Utilities

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

Existing and Planned Structures

Commercial, light industrial, and residential developments exist surrounding the property. Public streets are located immediately adjacent to the property boundaries. If water is allowed to infiltrate into the soil, the water could migrate laterally and into other properties and public right of ways in the vicinity of the subject site. The water migration may negatively affect other buildings and improvements in the area.

Slopes and Other Geologic Hazards

The site is relatively flat and significant slopes do not exist adjacent to the site.

Recommendations

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

Storm Water Standard Worksheets

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

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

TABLE C-5
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

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

Based on our geotechnical investigation and the Table C-5, Table C-6 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE C-6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	2	0.50
Predominant Soil Texture	0.25	3	0.75
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \sum p$			2.00

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

Categorization of Infiltration Feasibility Condition			Worksheet C.4-1
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: Based on results of permeability testing in two locations at the property, the unfactored infiltration rates were measured to be 0.004 inches/hour and 0.014 inches/hour using a constant head borehole permeameter. If applying a feasibility factor of safety of 2.0, the infiltration rate would be 0.002 iph and 0.007 iph. Information collected from the USDA website is attached. The Aardvark Permeameter test results are attached. In accordance with the Riverside County storm water procedures, which reference the United States Bureau of Reclamation Well Permeameter Method (USBR 7300), the saturated hydraulic conductivity is equal to the unfactored infiltration rate.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: No slopes greater than 25% are proposed in the vicinity of the proposed basins, a liquefaction potential is low, and the landslide potential is very low to negligible. However, groundwater mounding is likely to occur, and existing utilities would be in close proximity to the proposed BMP's. The potential for lateral water migration is high.			

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: Groundwater is not located within 10 feet from any proposed infiltration BMP, however, an active clean-up site was noted on the Geotracker website in the vicinity of the property. Monitoring wells are currently observing soil contamination (diesel, oil, and grease), therefore, the risk of storm water infiltration BMP’s adversely impacting groundwater does exist.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: We are not aware of any wells within 100 feet of the site, and given the amount of water that would infiltrate into the ground, it is our opinion there are no adverse impacts to water balance impacts to stream flow, or impacts on any downstream water rights. It should be noted that researching downstream water rights or evaluating water balance issues to stream flows is beyond the scope of the geotechnical consultant.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>No Infiltration</td></tr>
</table>

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

Worksheet C.4-1 Page 3 of 4

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

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

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

Provide basis: Based on results of permeability testing in two locations at the property, the unfactored infiltration rates were measured to be 0.004 inches/hour and 0.014 inches/hour using a constant head borehole permeameter. If applying a feasibility factor of safety of 2.0, the infiltration rates would be 0.002 iph and 0.007 iph, which are below the current thresholds for partial infiltration.

Criteria	Screening Question	Yes	No
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis: No slopes greater than 25% are proposed in the vicinity of the proposed basins, a liquefaction potential is very low, and the landslide potential is very low to negligible. However, groundwater mounding could occur, and existing utilities are in close proximity to the proposed BMP's. The potential for lateral water migration is high.

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

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

GEOCON

Aardvark Permeameter Data Analysis

Project Name: 3660 Dalbergia
Project Number: G2010-32-01
Borehole Location: P-1
Date: 7/14/2016
By: JPP
Ref. EL (feet, MSL): 22.0
Bottom EL (feet, MSL): 17.0

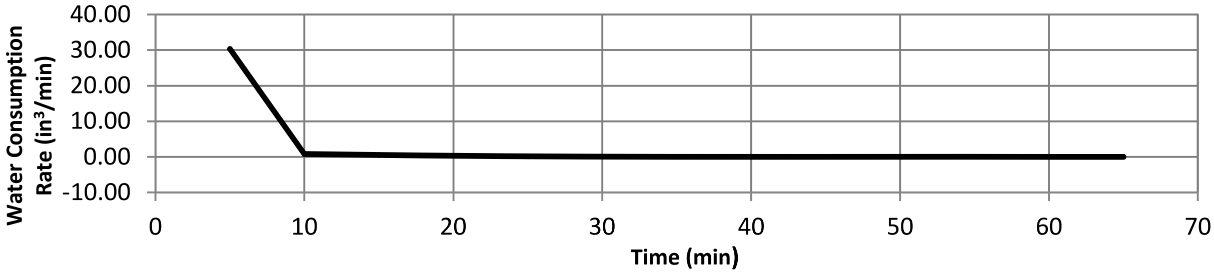
Borehole Diameter (inches): 7.00
Borehole Depth, **H** (feet): 5.00
Distance Between Reservoir & Top of Borehole (feet) 2.42
Depth to Water Table, **s** (feet): 24
Height APM Raised from Bottom (inches): 1.00

Wetted Area, **A** (in^2): 170.43

Distance Between Resevoir and APM, **D** (feet): 6.73
Head Height, **h** (inches): 6.00
Distance Between Constant Head and Water Table, **L** (inches): 234

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			20.944			
2	5.00	5.00		15.472	5.47	5.47	30.34
3	10.00	5.00		15.327	0.15	5.62	0.80
4	15.00	5.00		15.234	0.09	5.71	0.52
5	20.00	5.00		15.181	0.05	5.76	0.29
6	25.00	5.00		15.155	0.03	5.79	0.14
7	30.00	5.00		15.137	0.02	5.81	0.10
8	35.00	5.00		15.119	0.02	5.83	0.10
9	40.00	5.00		15.110	0.01	5.83	0.05
10	45.00	5.00		15.106	0.00	5.84	0.02
11	50.00	5.00		15.097	0.01	5.85	0.05
12	55.00	5.00		15.093	0.00	5.85	0.02
13	60.00	5.00		15.084	0.01	5.86	0.05
14	65.00	5.00		15.080	0.00	5.86	0.02
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

Steady Flow Rate, Q (in^3/min): 0.02



Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0001 in/min 0.004 in/hr

GEOCON

Aardvark Permeameter Data Analysis

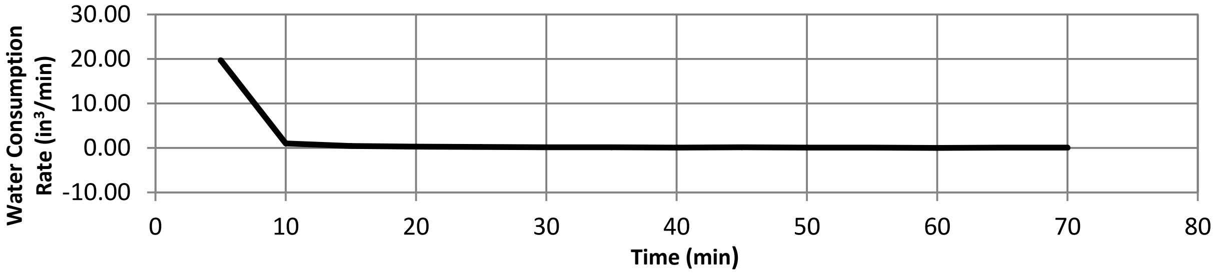
Project Name: 3660 Dalbergia
Project Number: G2010-32-01
Borehole Location: P-2
Date: 7/14/2016
By: JPP
Ref. EL (feet, MSL): 22.0
Bottom EL (feet, MSL): 17.8

Borehole Diameter (inches): 7.00
Borehole Depth, **H** (feet): 4.25
Distance Between Reservoir & Top of Borehole (feet) 2.42
Depth to Water Table, **s** (feet): 24
Height APM Raised from Bottom (inches): 1.00
Wetted Area, **A** (in^2): 170.43

Distance Between Resevoir and APM, **D** (feet): 5.98
Head Height, **h** (inches): 6.00
Distance Between Constant Head and Water Table, **L** (inches): 243

Reading	Time (min)	Time Elapsed (min)	Reservoir Water Weight (g)	Resevoir Water Weight (lbs)	Interval Water Consumption (lbs)	Total Water Consumption (lbs)	*Water Consumption Rate (in^3/min)
1	0.00			20.313			
2	5.00	5.00		16.760	3.55	3.55	19.70
3	10.00	5.00		16.570	0.19	3.74	1.05
4	15.00	5.00		16.486	0.08	3.83	0.47
5	20.00	5.00		16.424	0.06	3.89	0.34
6	25.00	5.00		16.376	0.05	3.94	0.27
7	30.00	5.00		16.345	0.03	3.97	0.17
8	35.00	5.00		16.319	0.03	3.99	0.14
9	40.00	5.00		16.297	0.02	4.02	0.12
10	45.00	5.00		16.270	0.03	4.04	0.15
11	50.00	5.00		16.252	0.02	4.06	0.10
12	55.00	5.00		16.235	0.02	4.08	0.09
13	60.00	5.00		16.226	0.01	4.09	0.05
14	65.00	5.00		16.213	0.01	4.10	0.07
15	70.00	5.00		16.200	0.01	4.11	0.07
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

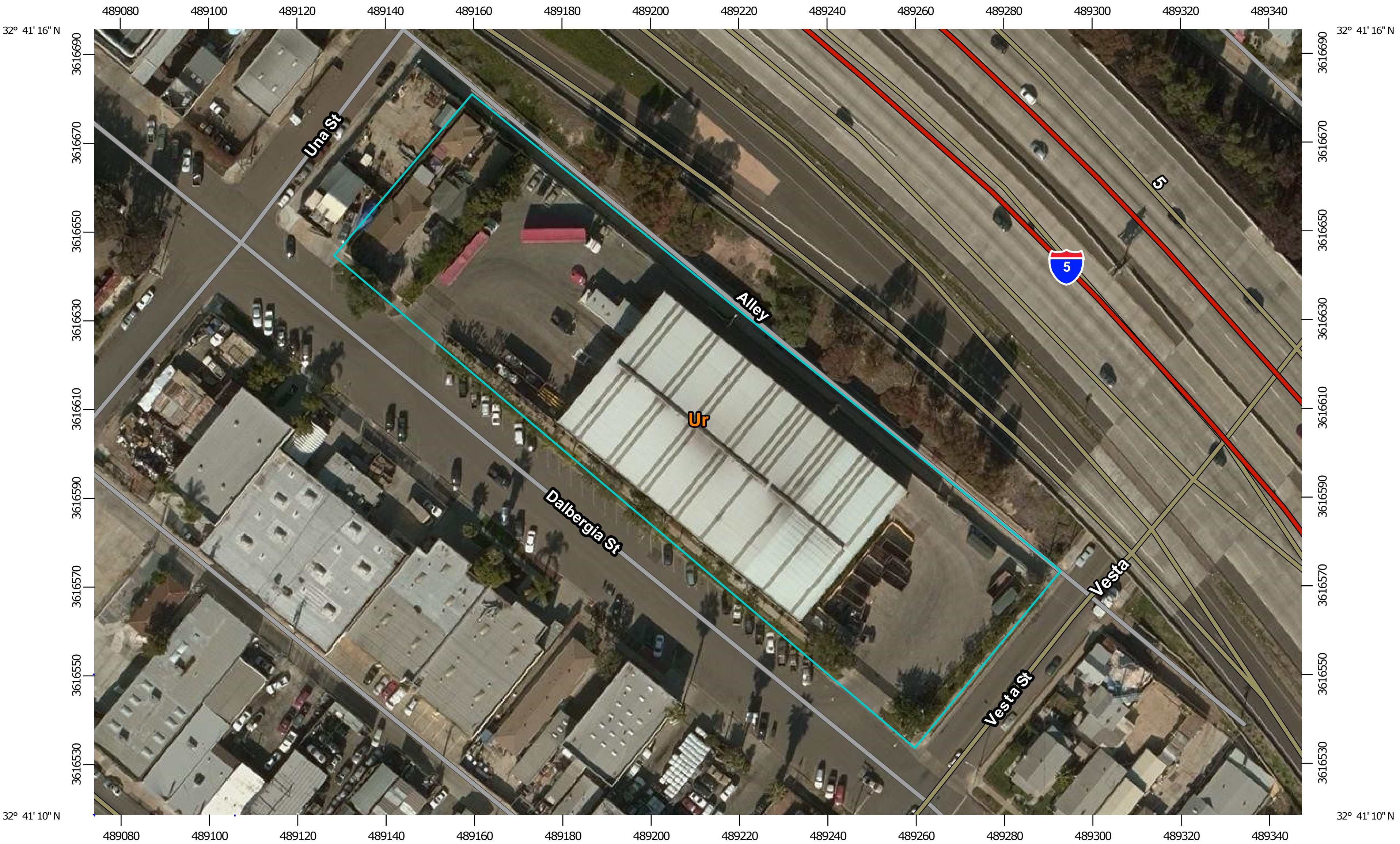
Steady Flow Rate, Q (in^3/min): 0.07



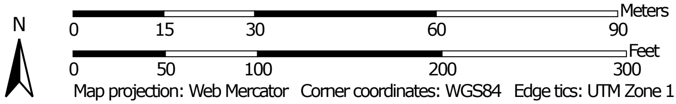
Field-Saturated Hydraulic Conductivity - Infiltration Rate

Case 1: L/h > 3 K_{sat} = 0.0002 in/min 0.014 in/hr

Soil Map—San Diego County Area, California
(3660 Dalbergia Street)



Map Scale: 1:1,250 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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 9, Sep 17, 2015

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

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

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

Map Unit Legend

San Diego County Area, California (CA638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ur	Urban land	2.1	100.0%
Totals for Area of Interest		**2.1**	**100.0%**

San Diego County Area, California

Ur—Urban land

Map Unit Composition

Urban land: 100 percent

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

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

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

Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

EDCO MATERIAL RECOVERY FACILITY AND TRANSFER STATION EXPANSION
3660 DALBERGIA STREET
SAN DIEGO, CALIFORNIA

PROJECT NO. G2010-32-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

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

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

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

2. DEFINITIONS

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

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

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

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

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

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

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

3. MATERIALS

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

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

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

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

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

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

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

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

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

4. CLEARING AND PREPARING AREAS TO BE FILLED

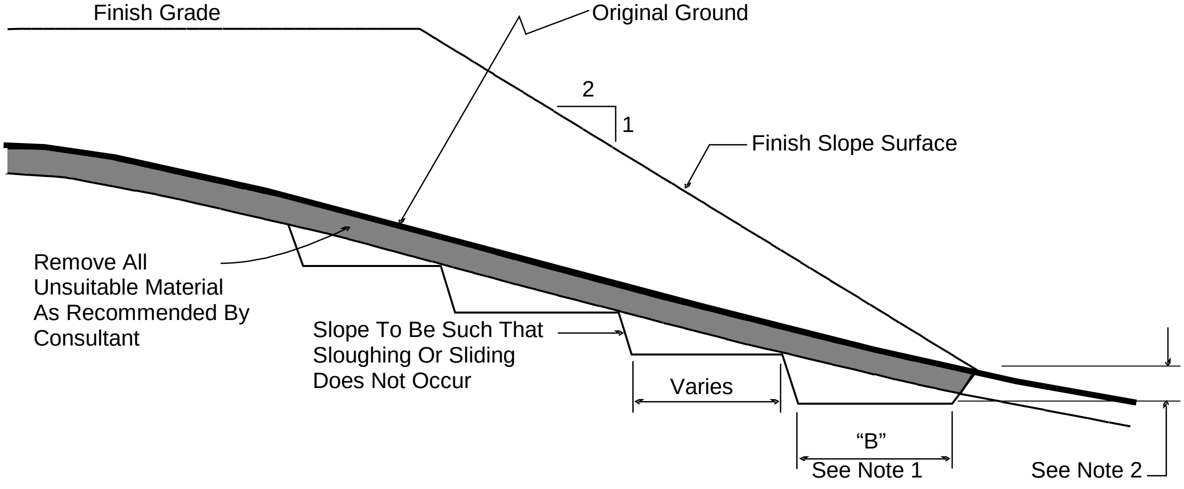
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material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

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

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

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

TYPICAL BENCHING DETAIL



No Scale

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

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

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

5. COMPACTION EQUIPMENT

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

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

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

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

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

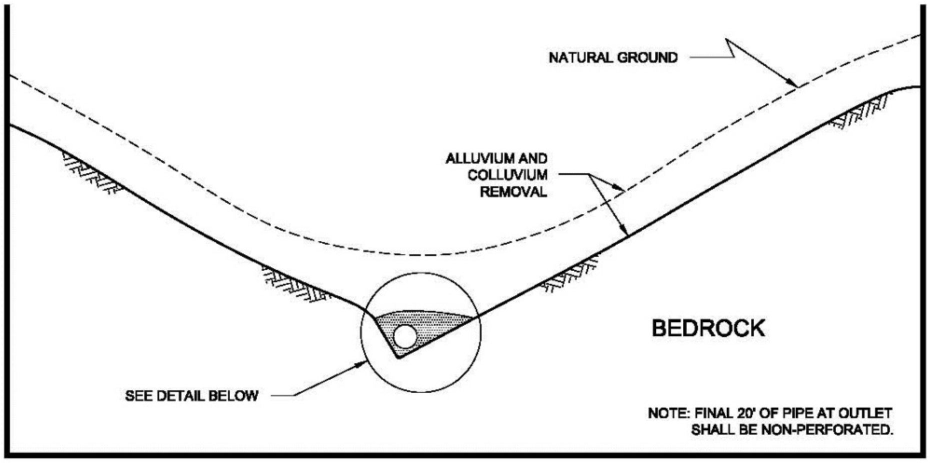
6.3.6 To reduce the potential for “piping” of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant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

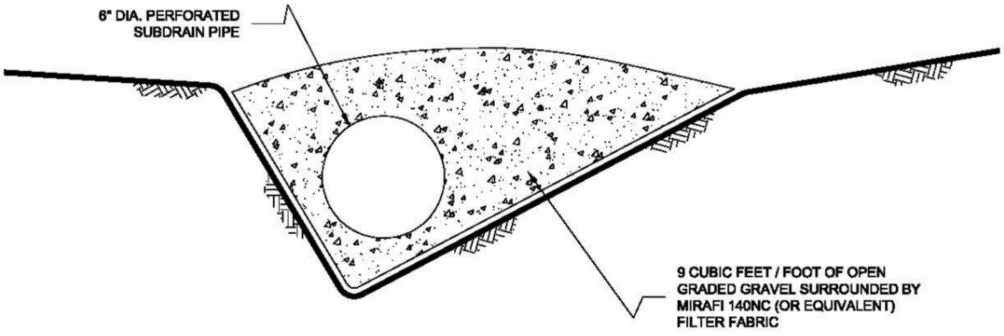
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

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

TYPICAL CANYON DRAIN DETAIL





NOTES:

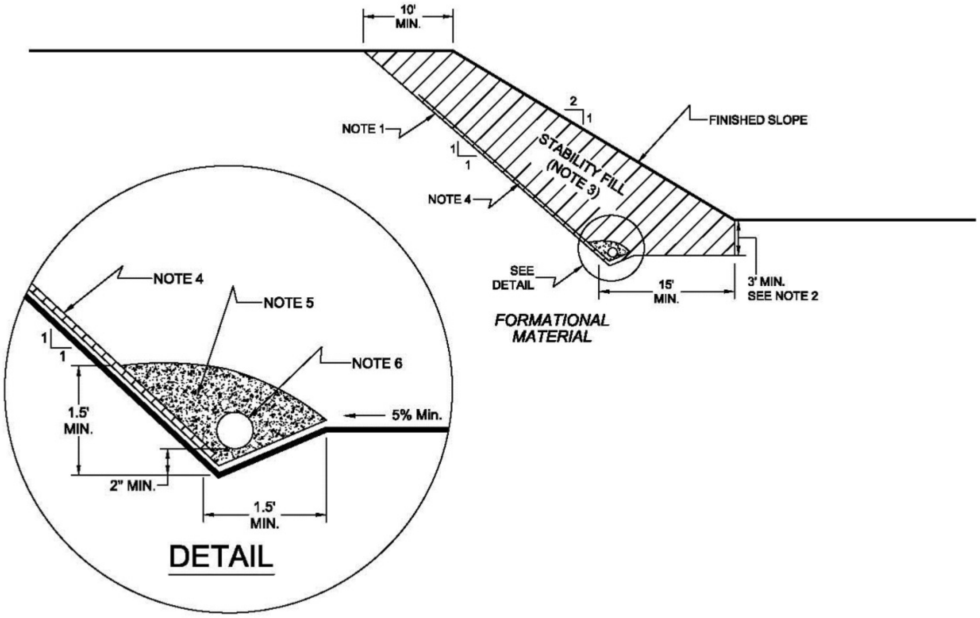
1......8-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

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

NO SCALE

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

TYPICAL STABILITY FILL DETAIL



NOTES:

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

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

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

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

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

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

NO SCALE

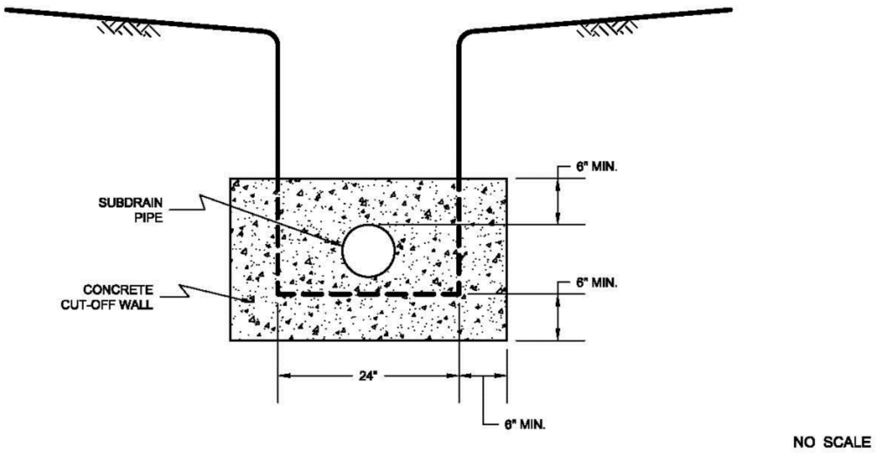
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing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

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

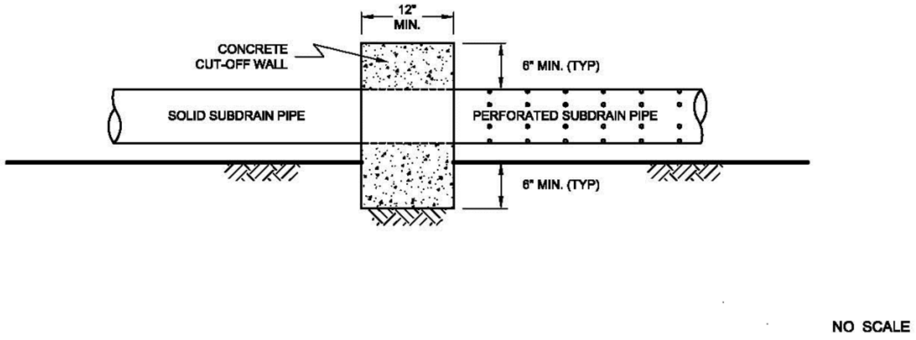
7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



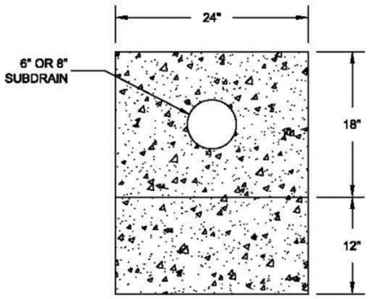
SIDE VIEW



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

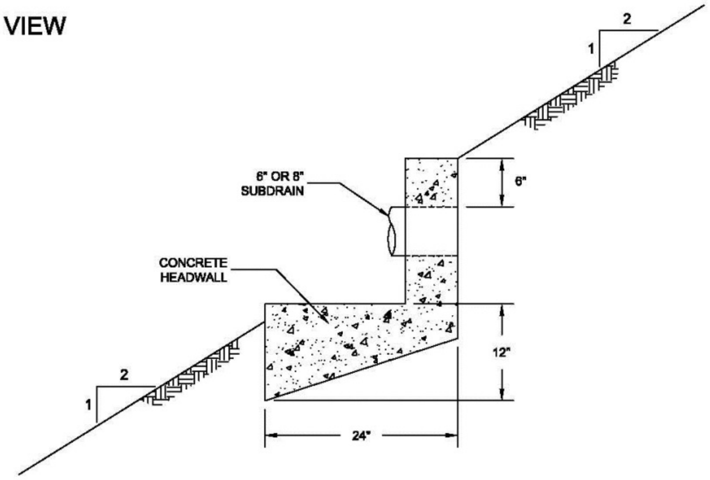
TYPICAL HEADWALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW



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

NO SCALE

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

8. OBSERVATION AND TESTING

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

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

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

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

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

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

8.6.1 Soil and Soil-Rock Fills:

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

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

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

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

9. PROTECTION OF WORK

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

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

10. CERTIFICATIONS AND FINAL REPORTS

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

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

LIST OF REFERENCES

1. Boore, D. M., and G. M. Atkinson (2007), *Boore-Atkinson NGA Ground Motion Relations for the Geometric Mean Horizontal Component of Peak and Spectral Ground Motion Parameters*, Report Number PEER 2007/01.

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

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

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

5. City of San Diego, Seismic Safety Study, Geologic Hazards and Faults, 2008 edition, Map Sheet 13.

6. *Fault Activity Map of California and Adjacent Areas*, California Division of Mines and Geology, compiled by C. W. Jennings, 1994.

7. http://www.historicaerials.com.

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

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

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

11. Kennedy, M. P., and S. S. Tan, *Geologic Map of the San Diego 30'x60' Quadrangle, California*, USGS Regional Map Series Map No. 3, Scale 1:100,000, 2008.

12. *Report of Field Density Testing, EDCO Recycling Facility, 3660 Dalbergia Street, San Diego, California*, prepared by C. W. La Monte Company, dated March 21, 2000.

13. Risk Engineering (2015), *EZ-FRISK (version 7.65).*

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

15. USGS (2011), Seismic Hazard Curves and Uniform Hazard Response Spectra (version 5.1.0, dated February 2, 2011), http://earthquake.usgs.gov/research/hazmaps/design/.

SEWER STUDY

Final
Sanitary Sewer Study
For The
Enhancement of
EDCO Recovery & Transfer Facility
At
3660 Dalbergia Street
San Diego, CA

PTS No. 515674

Prepared for
EDCO Disposal Corporation
3660 Dalbergia Street
San Diego, CA 92113

REGISTERED PROFESSIONAL ENGINEER
PAUL J. HACUNDA
No. 41627
Exp. ______
CIVIL
STATE OF CALIFORNIA

Prepared by:
Paul J. Hacunda, PE Lic. No. 41627
16 Lakeridge
Trabuco Canyon, CA 92679

October 4, 2016
Revised February 28, 2017
Revised July 10, 2017

TABLE OF CONTENTS

SECTION 1 PROJECT DESCRIPTION

The EDCO Facility is a recycling and solid waste transfer station. It is proposed to enhance the existing facility to include additional recovery of recyclables, increase the capacity of the existing tipping floor and add an aerobic digestion system for the breakdown of organic wastes. It has been proposed to vacate the existing alley to facilitate this expansion.

The vacation of the alley and the construction of a new load-out tunnel will require the existing sewer line located in the alley to be re-routed from the alley to Una, Vesta and Dalbergia Streets.

It is the intent of this study to analyze the existing hydraulic conditions and verify that the proposed relocation of the sewer line is feasible.

VICINITY MAP

LOCATION MAP

SECTION 2 CRITERIA

The City of San Diego Sewer Design Guide, dated May 2015 was used to prepare this report.
A field review was made of the existing users and a population determined from questioning employers of the number of employees at their address.

The Daily per Capita of Sewer flow used in the analysis was 80 gallons per capita per day (gpcd). The population of the existing residential units was estimated at 3.5 persons per unit per the Sewer Design Guide.

The ratio of Peak to Average Flow was determined to be 4.0 based on Figure 1-1 of the City's Sewer Design Guide.

Manning Formula value of n = 0.013 per the Sewer Design Guide.

SECTION 3 PEAK RUNOFF ANALYSIS

3.1 EXISTING CONDITION

The existing pipeline services a small area south of Vesta Street between Dalbergia Street and the I-5 Freeway. The area is fully developed and consists of a few residential units and a few commercial/industrial users. The existing 8-inch PVC sewer line flows from south to north at a slope of 0.60%.

3.2 PROPOSED CONDITION

Alternate No. 1
It is proposed to intercept the existing line at the centerline of Vesta Street by constructing a new manhole and removing the existing sewer line in the alley. A new line will be constructed in Vesta Street proceeding in a westerly direction to Dalbergia Street. A new line will be constructed in Dalbergia Street proceeding in a northerly direction to the intersection of Una Street. Then a new line will be constructed in Una Street tying back into the existing sewer main at Una Street and the I-5 Freeway. A drop of 0.20-feet will occur at each manhole. The result of which is a proposed sewer line at a slope of 0.4%. All proposed sewer mains will be public.

Alternate No. 2
It is proposed to intercept the existing sanitary sewer line at the centerline of Vesta Street by constructing a manhole and removing the existing sewer line in the alley. A new line will be constructed in Vesta Street proceeding in a westerly direction to the existing 27" PVC trunk sewer line in Dalbergia Street. A new line to collect the EDCO facility discharge will also be constructed in Dalbergia Street proceeding in an easterly direction to the proposed collection line in Vesta Street.

The load-out tunnel, including the scale pits will be washed down on a weekly basis. It is proposed to connect an industrial waste discharge line into the proposed re-aligned sewer system on Vesta Street. The wash-down water will be discharged at a rate not to exceed 30-gpm or 0.07-cfs. The industrial waste discharge will be pre-treated in a three stage, 3,000-gal clarifier prior to discharging into the sanitary sewer system. The detention time in the clarifier is 2-hrs. The volume of discharge has been estimated at 1,800-gals per week.

It is also proposed to install a rainwater diversion system in the load-out tunnel to capture the first 0.55-inches of rainfall and discharge into the sanitary sewer system via the industrial waste discharge line. A rain switch will detect the 0.55-inches of rainfall and turn the discharge pump off at which point the remainder of the stormwater runoff will be diverted into a media filter and discharged into the storm water system. The rainwater diversion system will only capture the runoff from the entrance and exit ramps of the load-out tunnel. All other areas of the project will be intercepted by a storm drainage system and treated in the media filter. The volume of the rainwater to be discharged into the sewer system has been determined to be 4,166-gals per storm based on the 85-percentile rainfall San Diego County Isopluvial Map. The rate of discharge has been calculated to be 0.055-cfs based on an intensity of 0.20-inches per hour.

SECTION 4 ANALYSIS RESULTS

The existing pipes are flowing at between 12% and 16% of capacity at a velocity of 1.21-fps to 1.77-fps.

The proposed project will reduce the amount of flow being generated from the area under design, as several residential units have been purchased and demolished. The existing facility comprises 30-persons per shift (2 shifts per day). The additional amount of EDCO employees associated with the proposed expansion is 10-persons per shift, which is less than the amount of residential population eliminated (14-persons).

Alternate No. 1:

The slope of the proposed lines is less than the existing condition (0.4%), so the velocity in the proposed lines is slightly less at between 1.20-fps and 1.30-fps.

When wash-down water is being discharged the velocity will be increased slightly, which should help in flushing the sewer lines.

Although additional elevation fall is available, that additional elevation fall has been used in providing a 0.20-ft drop at each 90° manhole. Due to the flat slopes of the sewer line, it is recommended that the available elevation fall be utilized at the manholes rather than increasing the slope of the pipe.

Alternate No. 2:

Although not a standard practice, connecting the existing and proposed collection lines directly into the 27" PVC trunk sewer line will provide collection lines whose slopes meet or exceed the 1% minimum. There will be no proposed sewer lateral connections to the existing 27" PVC trunk sewer, only a single 8-inch line which will connect into an existing manhole. As directed the proposed 8-inch PVC line will be designed to match the invert of the existing 27-inch PVC trunk sewer.

SECTION 5 SUMMARY & CONCLUSIONS

Alternate No. 1 does not meet the City Design Requirements of a minimum slope of 1% or a flow velocity of 2-fps. This alternative, although not ideal, will perform in the same manner as the existing system. The City desires to improve the existing condition.

Alternate No. 2 will provide a sewer system that is in conformance with the City Design Guidelines by providing sewer lines that are at a minimum slope of 1%. Alternate No. 2 is the preferred design and will be incorporated into the project plans.

The benefit in relocating the existing sewer is the elimination of a pubic alley and the incorporation of the alley into the expansion of a recycling and transfer station which is critical for the collection of solid waste and recyclables to the residents of San Diego.

SECTION 6 REFERENCES

City of San Diego Sewer Design Guide dated May 2015
San Diego Storm Water Standards Manual and Related Documents
2013 Municipal Separate Storm Sewer System (MS4) Permit (Order No. R-9-2013-0001)

Plans: Sewer Relocations-Intersection of Routes 5,15, Una Street to Vesta Street, Drawing Number 16511-2-D

SECTION 7 APPENDICES

APPENDIX A	Local Sewer Infrastructure Map
APPENDIX B	Existing and Proposed Calculation Summaries
APPENDIX C	Population Count
APPENDIX D	Manning Pipe Flow Calculations
POCKET	Preliminary Utility Plan

Appendix A

Local Sewer Infrastructure Map

LEGEND

—	EXISTING SEWER MAIN
—	PEOPOSED SEWER MAIN
●	EXISTING SEWER MANHOLE
●	PROPOSED SEWER MANHOLE

SEWER STUDY EXHIBIT ALT 1
3608–3688 DALBERGIA STREET
SAN DIEGO, CA 92113

LEGEND

—	EXISTING SEWER MAIN
—	PEOPOSED SEWER MAIN
●	EXISTING SEWER MANHOLE
●	PROPOSED SEWER MANHOLE

SEWER STUDY EXHIBIT ALT 2
3608–3688 DALBERGIA STREET
SAN DIEGO, CA 92113

Appendix B

Calculation Summaries

PRELIMINARY SEWER STUDY - EXISTING CONDITIONS

SHEET 1 OF 1
DATE: SEPTEMBER 16, 2016
REFER TO FIGURE

WBS NO. N/A

FOR: EDCO RECYCLING & TRANSFER
BY: PAUL HACUNDA, PE 41627

Line	From	To	Populatio n Per D.U.'s	In-Line D.U.'s	Population Served		Sewage Per Capital Per Day (gpm)	Average Dry Weather Flow	Average Dry Weather Peaking Factor (1)	Peak Dry Weather Flow	Wet Weather Peaking Factor (2)	Peak Wet Weather Flow (Design Flow)		Line Diameter (D) (in)	Design Slope (%)	dn	dn/D	Velocity (ft/s)	Remarks
					In-Line	Cumulativ e Total						gpd	cfs						
1	A	B	-	-	51	51	80	4,080	4	16,320	1	16,320	0.025	8	0.6000	0.08	0.12	1.21	1,2
2	B	C	3.5	-	16.5	67.5	80	5,400	4	21,600	1	21,600	0.033	8	0.6000	0.09	0.13	1.27	3
3	C	D	-	-	49	116.5	80	9,320	4	37,280	1	37,280	0.058	8	0.8950	0.11	0.16	1.77	3,4

REMARKS:

1. Based on a field survey with local business owners
2. Residential based on a field study with local home owners
3. Residential based on 3.5 persons per unit
4. Based on EDCO present work staff

PRELIMINARY SEWER STUDY - PROPOSED CONDITIONS ALTERNATE 1

SHEET 1 OF 1
DATE: SEPTEMBER 16, 2016
REFER TO FIGURE

WBS NO. N/A

FOR: EDCO RECYCLING & TRANSFER
BY: PAUL HACUNDA, PE 41627

Line	From	To	Population Per D.U.'s	In-Line D.U.'s	Population Served		Sewage Per Capital Per Day (gpm)	Average Dry Weather Flow	Average Dry Weather Peaking Factor (1)	Peak Dry Weather Flow	Wet Weather Peaking Factor (2)	Peak Wet Weather Flow (Design Flow)		Line Diameter (D) (in)	Design Slope (%)	dn	dn/D	Velocity (ft/s)	Remarks
					In-Line	Cumulative Total						gpd	cfs						
1	A	B	-	-	51	51	80	4,080	4	16,320	1	16,320	0.025	8	0.600	0.08	0.12	1.20	
2	B	E	-	-	16.5	67.5	80	5,400	4	21,600	1	21,600	0.033	8	0.600	0.09	0.13	1.27	
4	E	F	-	-	0	67.5	80	5,400	4	21,600	1	21,600	0.033	8	0.400*	0.09	0.13	1.27	
5	F	G	-	-	50	117.5	80	9,400	4	37,600	1	37,600	0.058	8	0.400*	0.13	0.19	1.30	
6	G	D	-	-	0	117.5	80	9,400	4	37,600	1	37,600	0.058	8	0.400*	0.13	0.19	1.30	
With Batch Loading from Industrial Waste Discharge																			
4	E	F	-	-	0	0	80	0	4	0	1	0	0.103	8	0.400*	0.17	0.25	1.53	1
5	F	G	-	-	50	50	80	4,000	4	16,000	1	16,000	0.113	8	0.400*	0.17	0.26	1.57	
6	G	D	-	-	0	50	80	4,000	4	16,000	1	16,000	0.113	8	0.400*	0.17	0.26	1.57	

1. Wash Down Water Discharge

* - Allowing 0.20' drops in the new and remodeled manholes

PRELIMINARY SEWER STUDY - PROPOSED CONDITIONS ALTERNATE 2

SHEET 1 OF 1
DATE: FEBRUARY 9, 2017
REFER TO FIGURE

WBS NO. N/A

FOR: EDCO RECYCLING & TRANSFER
BY: PAUL HACUNDA, PE 41627

Line	From	To	Population Per D.U.'s	In-Line D.U.'s	Population Served		Sewage Per Capital Per Day (gpm)	Average Dry Weather Flow	Average Dry Weather Peaking Factor (1)	Peak Dry Weather Flow	Wet Weather Peaking Factor (2)	Peak Wet Weather Flow (Design Flow)		Line Diameter (D) (in)	Design Slope (%)	dn	dn/D	Velocity (ft/s)	Remarks
					In-Line	Cumulative Total						gpd	cfs						
4	E	F	-	-	67.5	67.5	80	5,400	4	21,600	1	21,600	0.033	8	4.600	0.05	0.08	2.58	
5	G	H	-	-	50	50	80	4,000	4	16,000	1	16,000	0.025	8	1.600	0.06	0.09	1.64	
6	H	F			50	50	80	4,000	4	16,000	1	16,000	0.025	8	1.500	0.06	0.09	1.59	
7	F	Exist. MH				117.5	80	9,400	4	37,600	1	37,600	0.058	8	4.600	0.07	0.1	2.99	

With Batch Loading from Industrial Waste Discharge

4	E	F	-	-	67.5	67.5	80	5,400	4	21,600	1	21,600	0.103	8	4.600	0.09	0.14	3.68	1
7	F	Exist. MH				117.5	80	9,400	4	37,600	1	37,600	0.128	8	4.600	0.10	0.15	3.84	1

1. Plus Wash Down Water Discharge Rate at 0.07 cfs

DALBERGIA STREET | WATER QUALITY

TO SANITARY SEWER:

RAMPS (P-1 & P-8)

RATE OR Q_{BMP} = CIA

C = 0.90
I = 0.2 INCHES PER HOUR
A = 0.31-ACRES

$Q_{BMP} = 0.9 \times 0.2 \times 0.31$
= 0.056-CFS
OR
25-GPM

VOLUME OR V_{BMP} : 0.55-IN/12IN/FT × 0.31 ACRES × 43560-SF/AC × 0.9
= 557 FT^3 OR 4,166 GALS. TO SAN. SEWER

PROVIDE 3,000-GAL CLARIFIER

DETENTION TIME = 3,000 GALS/25 GPM = 2 HRS

DALBERGIA STREET | SEWER FLOWS

WEEKLY WASH-DOWN

30-GPM - DURATION = 1 HR.

30-GPM = 0,07-CFS

VOLUME = 1800-GALS

STORM FLOW (WATER QUALITY)

25-GPM PEAK = 0.055 CFS

VOLUME: 4,166-GALS

WASTE DISCHARGE

1800-GALS/WEEK × 50 WEEKS = 90,000-GALS

5 STORMS × 4166 GALS = 20,830-GALS

TOTAL = 110,830-GALS (ANNUALLY)

AVERAGE DISCHARGE = 304 GPD

Appendix C

Population Count

EDCO Dalbergia Population Count:

<u>Dalbergia Street:</u>

Address	Activity	Population
3604	Welding Shop	5
3608	Residential	4 x 3.5 = 14
3660	EDCO	45
3704	Residential	3.5
3712	Residential	6
3720	Residential	4
3724	Residential	3.5
3732	Residential	3.5
3744	Commercial	5
3750	Commercial	20
3768	Commercial	15
<u>Vesta Street:</u>		
1931	Residential	2 x 3.5 = 7

Appendix D

Manning Pipe Flow Calculations

Free Online Manning Pipe Flow Calculator

List of Calculators (index.php) Hydraulics Language

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate this calculator to your language or host this calculator at your web site? (../contact.php)

EDCO Dalbergia Street

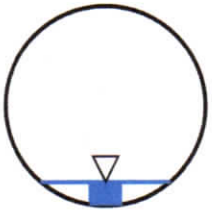
Existing Line 1

Set units: m mm ft inches

Pipe diameter, d_0	8	inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013	
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.006	rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.12	fraction

Results

Flow, q	0.0286	cfs
Velocity, v	1.2065	ft/sec
Velocity head, h_v	0.2715	inches
Flow area	3.4167	sq. in.
Wetted perimeter	5.6599	inches
Hydraulic radius	0.6037	inches
Top width, T	5.1994	inches
Froude number, F	0.91	
Shear stress (tractive force), tau	1.4347	N/m^2



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EDCO Dalbergia Street

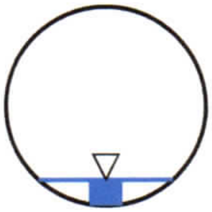
Existing Line2

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.006 rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.13 fraction

Results

Flow, q	0.0338	cfs
Velocity, v	1.2683	ft/sec
Velocity head, h_v	0.3000	inches
Flow area	3.8400	sq. in.
Wetted perimeter	5.9018	inches
Hydraulic radius	0.6506	inches
Top width, T	5.3809	inches
Froude number, F	0.92	
Shear stress (tractive force), tau	1.5542	N/m^2



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Free Online Manning Pipe Flow Calculator

List of Calculators (index.php) Hydraulics Language

Manning Formula Uniform Pipe Flow at Given Slope and Depth

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EDCO Dalbergia Street

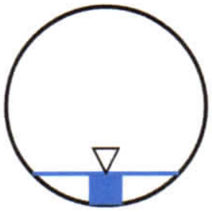
Existing Line 3

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.895 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.16 fraction

Results

Flow, q	0.0635	cfs
Velocity, v	1.7607	ft/sec
Velocity head, h_v	0.5781	inches
Flow area	5.1912	sq. in.
Wetted perimeter	6.5843	inches
Hydraulic radius	0.7884	inches
Top width, T	5.8657	inches
Froude number, F	1.14	
Shear stress (tractive force), tau	2.8534	N/m^2



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Free Online Manning Pipe Flow Calculator

List of Calculators (index.php) Hydraulics Language

Manning Formula Uniform Pipe Flow at Given Slope and Depth

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EDCO Dalbergia Street

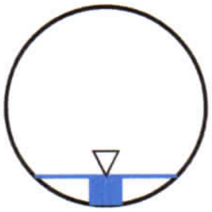
Proposed Line 4

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.4 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.15 fraction

Results

Flow, q	0.0371	cfs
Velocity, v	1.1314	ft/sec
Velocity head, h_v	0.2387	inches
Flow area	4.7280	sq. in.
Wetted perimeter	6.3632	inches
Hydraulic radius	0.7430	inches
Top width, T	5.7131	inches
Froude number, F	0.76	
Shear stress (tractive force), tau	1.1955	N/m^2



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Free Online Manning Pipe Flow Calculator

List of Calculators (index.php) Hydraulics Language

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate this calculator to your language or host this calculator at your web site? (../contact.php)

EDCO Dalbergia Street

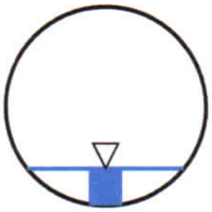
Line 5 (Proposed)

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.4 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.19 fraction

Results

Flow, q	0.0603	cfs
Velocity, v	1.3060	ft/sec
Velocity head, h_v	0.3181	inches
Flow area	6.6496	sq. in.
Wetted perimeter	7.2164	inches
Hydraulic radius	0.9215	inches
Top width, T	6.2768	inches
Froude number, F	0.77	
Shear stress (tractive force), tau	1.5144	N/m^2



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Free Online Manning Pipe Flow Calculator

List of Calculators (index.php) Hydraulics Language

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate this calculator to your language or host this calculator at your web site? (../contact.php)

EDCO Dalbergia Street

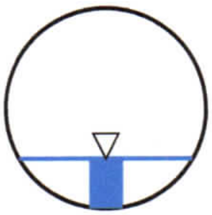
Proposed Line 4 with Batch Loading

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.4 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.25 fraction

Results

Flow, q	0.1047	cfs
Velocity, v	1.5340	ft/sec
Velocity head, h_v	0.4389	inches
Flow area	9.8270	sq. in.
Wetted perimeter	8.3776	inches
Hydraulic radius	1.1730	inches
Top width, T	6.9282	inches
Froude number, F	0.79	
Shear stress (tractive force), tau	1.9926	N/m^2



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Free Online Manning Pipe Flow Calculator

Manning Formula Uniform Pipe Flow at Given Slope and Depth

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EDCO Dalbergia Street

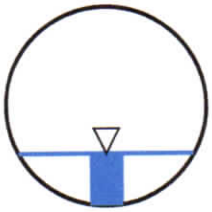
Proposed Lines 5 & 6 with Batch Loading

Set units: m mm ft inches

Pipe diameter, d_0	8 inches
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	0.4 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.26 fraction

Results

Flow, q	0.1131	cfs
Velocity, v	1.5687	ft/sec
Velocity head, h_v	0.4589	inches
Flow area	10.3849	sq. in.
Wetted perimeter	8.5611	inches
Hydraulic radius	1.2130	inches
Top width, T	7.0181	inches
Froude number, F	0.79	
Shear stress (tractive force), tau	2.0723	N/m^2



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Free Online Manning Pipe Flow Calculator

Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

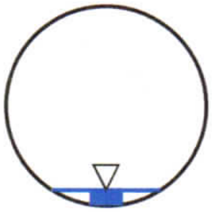
Proposed Line 4

Results

Flow, Q	0.0338	cfs
Velocity, v	2.5837	ft/sec
Velocity head, h_v	1.2450	in
Flow area	1.8839	sq. in.
Wetted perimeter	4.5881	in
Hydraulic radius	0.4106	in
Top width, T	4.3407	in
Froude number, F	2.40	
Shear stress (tractive force), tau	7.3327	N/m^2

Set units: m | mm | ft | in

Pipe diameter, d_0	8 in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	4.6 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.08 fraction



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Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

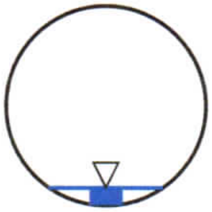
Proposed Line 5

Set units: m | mm | ft | in

Pipe diameter, d_0	8	in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013	
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	1.6	% rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.09	fraction

Results

Flow, Q	0.0256	cfs
Velocity, v	1.6428	ft/sec
Velocity head, h_v	0.5034	in
Flow area	2.2408	sq. in.
Wetted perimeter	4.8751	in
Hydraulic radius	0.4596	in
Top width, T	4.5789	in
Froude number, F	1.43	
Shear stress (tractive force), tau	2.8693	N/m^2



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Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

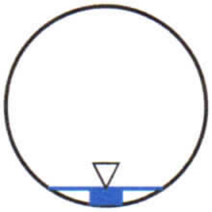
Proposed Line 6

Set units: m | mm | ft | in

Pipe diameter, d_0	8 in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	1.5 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.09 fraction

Results

Flow, Q	0.0248	cfs
Velocity, v	1.5907	ft/sec
Velocity head, h_v	0.4719	in
Flow area	2.2408	sq. in.
Wetted perimeter	4.8751	in
Hydraulic radius	0.4596	in
Top width, T	4.5789	in
Froude number, F	1.39	
Shear stress (tractive force), tau	2.6900	N/m^2



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Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

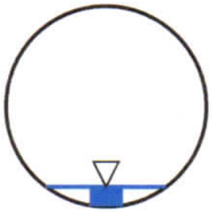
Proposed Line 7

Set units: m | mm | ft | in

Pipe diameter, d_0	8 in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	4.6 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.10 fraction

Results

Flow, Q	0.0541	cfs
Velocity, v	2.9783	ft/sec
Velocity head, h_v	1.6544	in
Flow area	2.6160	sq. in.
Wetted perimeter	5.1480	in
Hydraulic radius	0.5082	in
Top width, T	4.8000	in
Froude number, F	2.47	
Shear stress (tractive force), tau	9.1659	N/m^2



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Free Online Manning Pipe Flow Calculator

Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

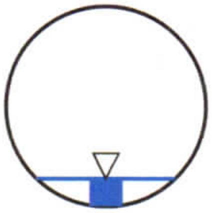
Proposed Line 4 with batch loading

Set units: m mm ft in

Pipe diameter, d_0	8 in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	4.6 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.14 fraction

Results

Flow, Q	0.1092	cfs
Velocity, v	3.6770	ft/sec
Velocity head, h_v	2.5216	in
Flow area	4.2773	sq. in.
Wetted perimeter	6.1360	in
Hydraulic radius	0.6971	in
Top width, T	5.5518	in
Froude number, F	2.56	
Shear stress (tractive force), tau	12.8322	N/m^2



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Free Online Manning Pipe Flow Calculator

Manning Formula Uniform Pipe Flow at Given Slope and Depth

EDCO Dalbergia Street Alternate 2

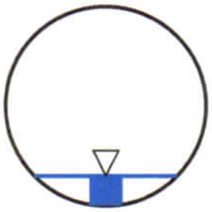
Proposed Line 7 with batch loading

Set units: m | mm | ft | in

Pipe diameter, d_0	8 in
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.013
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	4.6 % rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.15 fraction

Results

Flow, Q	0.1260	cfs
Velocity, v	3.8368	ft/sec
Velocity head, h_v	2.7455	in
Flow area	4.7280	sq. in.
Wetted perimeter	6.3632	in
Hydraulic radius	0.7430	in
Top width, T	5.7131	in
Froude number, F	2.58	
Shear stress (tractive force), tau	13.7488	N/m^2



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NOTES
1. ALL ON-SITE UTILITIES SHALL BE PRIVATE
2. ALL EXISTING SEWER LATERALS TO BE REMOVED

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

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TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			COUNTY	

SEAL-ENGINEER
No. 41627

PAUL J. HACUNDA, PE
16 LAKERIDGE TRABUCO CANYON, CA 92679
CA PE LIC No 41627

PREPARED BY:
R.C.E. NO.
DATE Jul. 31, 16

BENCHMARK:

SCALE: AS SHOWN

PRELIMINARY UTILITY PLAN
3608-3688 DALBERGIA STREET
SAN DIEGO, CA 92113

FOR:
W.O.
COUNTY FILE NO.

SHEET NO. 1
OF 1 SHTS

Drawing: B:\My Work\Dalbergia Street\Preliminary Utility Plan.dwg Layout: Layout1 Last Saved: Thu Jun 22, 2017 - 12:35pm Last Plotted: Thu Jun 29, 2017 - 6:03pm By: ray

Waste Management Plan for the EDCO Recovery & Transfer Station Facility Expansion Project San Diego, California

Project No. 515674

Prepared for
EDCO Disposal Corporation
3660 Dalbergia Street
San Diego, CA 92113
Contact: Steve South

Prepared by
RECON Environmental, Inc.
1927 Fifth Avenue
San Diego, CA 92101
P 619.308.9333

RECON Number 8649
July 30, 2018

Andrew Capobianco, Assistant Environmental Analyst

Nick Larkin, Environmental Analyst

TABLE OF CONTENTS

FIGURES

TABLES

TABLE OF CONTENTS (cont.)

ATTACHMENTS

Acronyms

AB	Assembly Bill
AD	Anaerobic Digestion
C&D	Construction and Demolition
City	City of San Diego
ERT	EDCO Recovery & Transfer
ESD	Environmental Services Department
SWMC	Solid Waste Management Coordinator
tpd	tons per day
U.S. EPA	United States Environmental Protection Act
WMP	Waste Management Plan

1.0 Introduction

This Waste Management Plan (WMP) is a requirement for the EDCO Recovery & Transfer (ERT) Station Facility Expansion Project (project). The purpose of this WMP is to identify the solid waste impacts generated by construction and operation of the project, and to identify measures to reduce those impacts.

The WMP consists of four site development phases: demolition, grading, construction, and occupancy (post-construction). Each phase addresses the amount of waste that would be generated by project activities, waste reduction goals, and the recommended techniques to achieve the waste reduction goals. For each phase, the WMP includes tons of waste anticipated to be generated; material/type and amount of waste anticipated to be diverted; project features that would reduce the amount of waste generated; project features that would divert or limit the generation of waste; source separation techniques for waste generated; how materials shall be reused on-site; and the name and location of recycling, reuse, or landfill facilities where waste shall be taken.

2.0 Background

The California State Legislature has enacted several bills intended to promote waste diversion. In 1989, Assembly Bill (AB) 939, the Integrated Waste Management Act—as modified in 2010 by Senate Bill 1016—mandated that all local governments reduce disposal waste in landfills from generators within their borders by 50 percent by the year 2000 (State of California 1989 and 2010). AB 341, approved October 2011, sets a policy goal of 75 percent waste diversion by the year 2020 (State of California 2011).

All landfills within the San Diego region are approaching capacity and are due to close within the next 3 to 20 years. In compliance with the state policies, the City of San Diego (City) Environmental Services Department (ESD) developed the Source Reduction and Recycling Element, which describes local waste management policies and programs. The City's Recycling Ordinance, adopted November 2007, requires on-site recyclable collection for residential and commercial uses (City of San Diego 2007a). The ordinance requires recycling of plastic and glass bottles and jars, paper, newspaper, metal containers, and cardboard. The focus of the ordinance is on education, with responsibility shared between the ESD, haulers, and building owners and managers. On-site technical assistance, educational materials, templates, and service provider lists are provided by the ESD. Property owners and managers provide on-site recycling services and educational materials annually and to new tenants. Strategies for compliance are discussed in Section 6.2, Waste Reduction Measures.

The City's Refuse and Recyclable Materials Storage Regulations, adopted December 2007, indicate the minimum exterior refuse and recyclable material storage areas required at residential and commercial properties (City of San Diego 2007b). These are intended to provide permanent, adequate, and convenient space for the storage and collection of refuse and recyclable materials; encourage recycling of solid waste to reduce the amount of waste material entering landfills; and meet the recycling goals established by the City Council and mandated by the state of California. These regulations are discussed further in Section 6.3, Exterior Storage.

In July 2008, the Construction and Demolition (C&D) Debris Deposit Ordinance was adopted by the City (City of San Diego 2008). The ordinance requires that the majority of construction, demolition, and remodeling projects requiring building, combination, or demolition permits pay a refundable C&D Debris Recycling Deposit and divert at least 50 percent of their waste by recycling, reusing, or donating reusable materials. The required diversion rate is currently proposed for an increase to 65 percent. The ordinance is designed to keep C&D materials out of local landfills. Requirements are discussed further in Section 5.4.2, Contractor Education and Responsibilities.

In December 2013, the City Council adopted the Zero Waste Objective, implementing the 75 percent diversion of waste target goal from landfills by the year 2020 and zero waste by 2040 (City of San Diego 2013a). An additional City target of 90 percent diversion by 2035 is proposed in the City's Climate Action Plan (City of San Diego 2015).

AB 1826, approved September 2014, requires businesses in California to arrange for recycling services for organic waste including food waste, green waste, landscape and pruning waste, non-hazardous wood waste, and food-soiled paper waste that is mixed in with food waste. The law is effective on and after January 1, 2016 for businesses that generate greater than eight cubic yards of organic waste per week; effective January 1, 2017 for businesses that generate greater than 4 cubic yards of organic waste per week; effective January 1, 2019 for businesses that generate greater than 4 cubic yards of commercial solid waste per week; and, if a 50 percent statewide reduction in organic waste from 2014 has not yet been achieved, the law will be effective January 1, 2020 for businesses that generate greater than 2 cubic yards of commercial solid waste per week (State of California 2014). Strategies for compliance are discussed in Section 6.2, Waste Reduction Measures.

3.0 Existing Conditions

The project site is located at 3660 Dalbergia Street, south of Interstate 5, between Una Street and Vesta Street, in the City of San Diego. The 2.04-acre site is currently developed with an existing 28,850-square-foot EDCO ERT facility. The property is bound by Interstate 5 to the northeast, industrial/commercial space to the west and northwest, and single-family residential to the south. Figures 1 through 3 depict the regional and project location, respectively.

✳ Project Location

FIGURE 1

Regional Location

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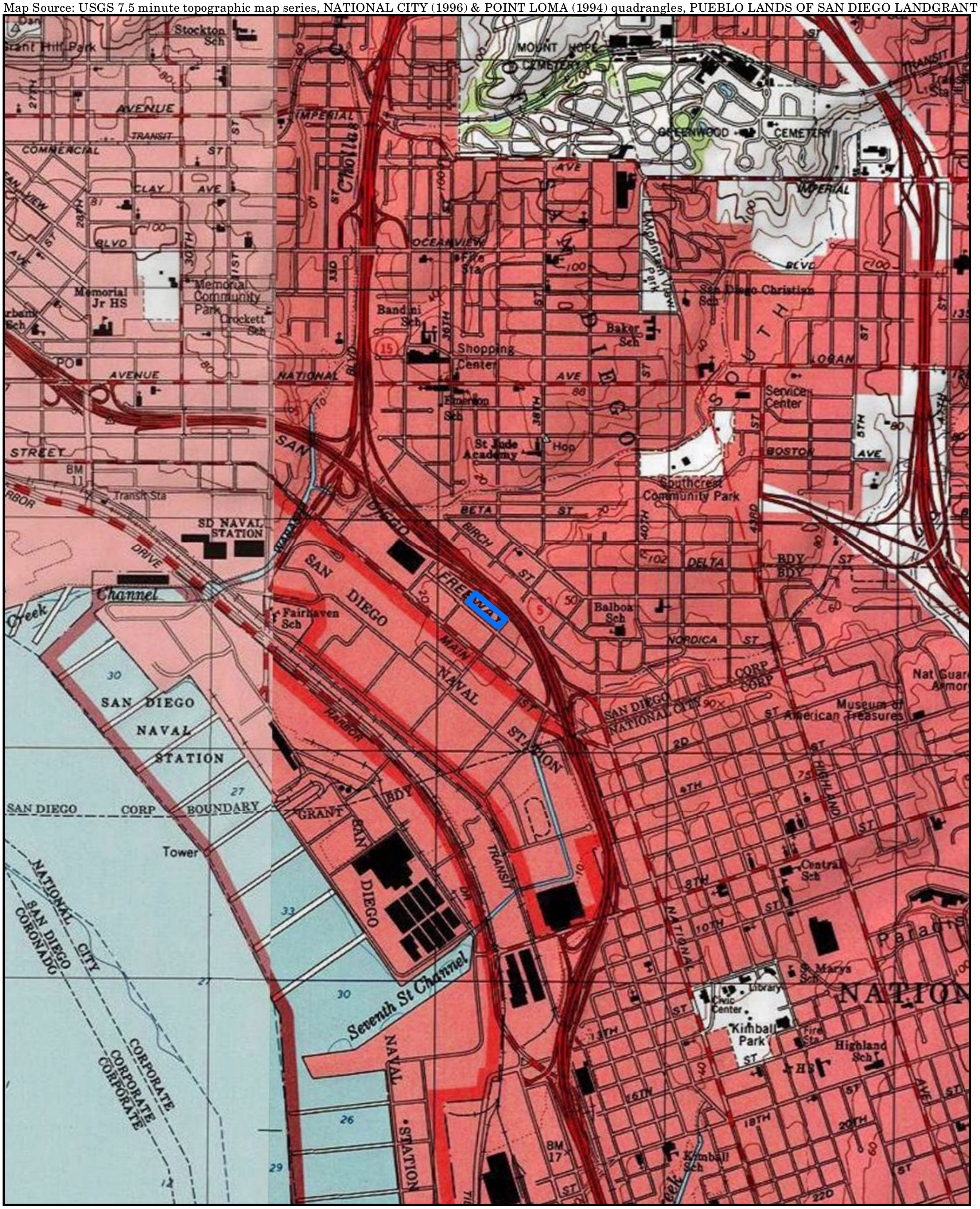
Map Source: USGS 7.5 minute topographic map series, NATIONAL CITY (1996) & POINT LOMA (1994) quadrangles, PUEBLO LANDS OF SAN DIEGO LANDGRANT



🟦 Project Boundary

FIGURE 2

Project Location on USGS Map

RECON

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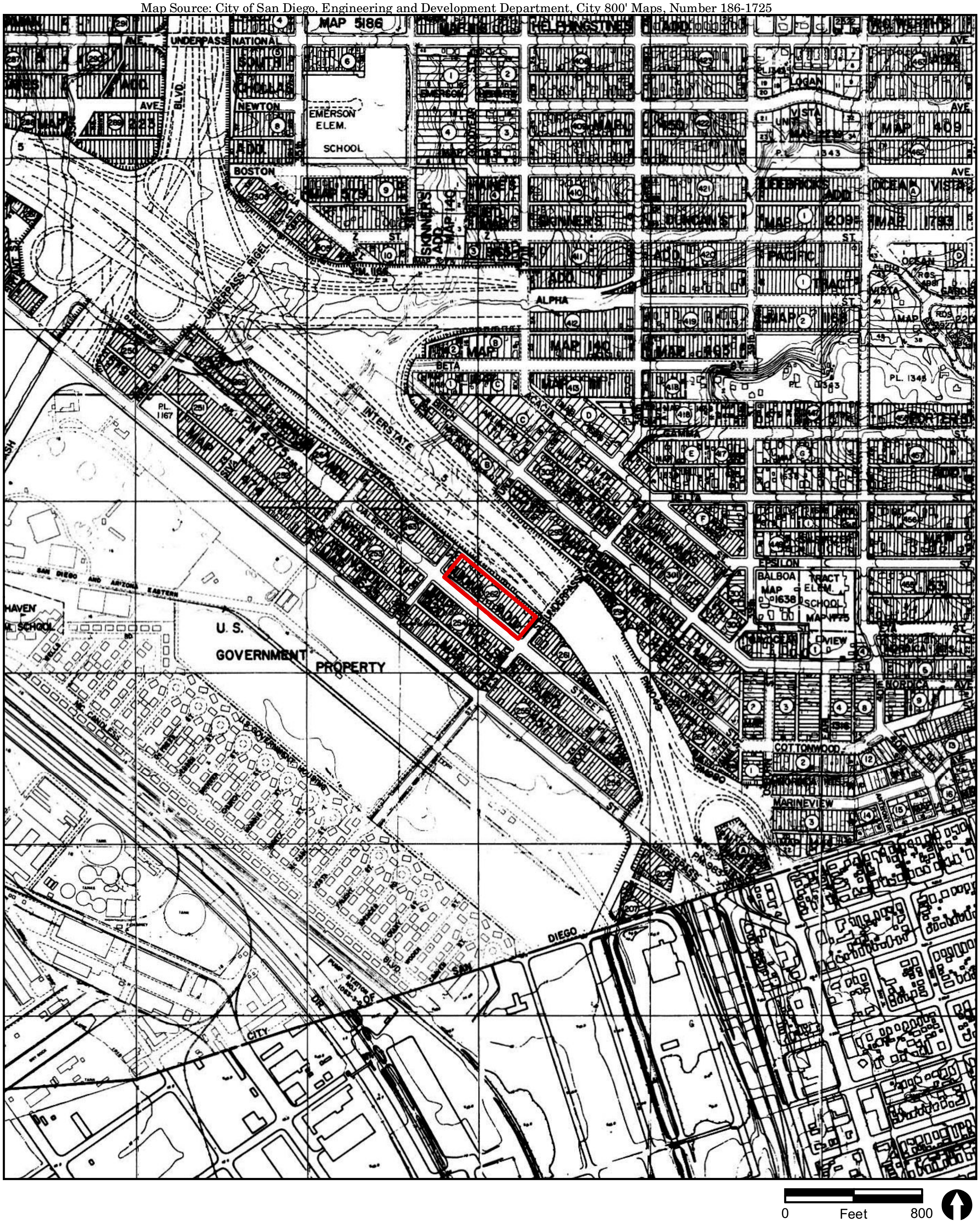
Map Source: City of San Diego, Engineering and Development Department, City 800' Maps, Number 186-1725



▭ Project Boundary

FIGURE 3

Project Location on City 800' Map

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4.0 Proposed Project

The project proposes a number of facility enhancements designed to allow the facility to help achieve the waste reduction goals of the City and state. The proposed facility enhancements include expanding the existing ERT facility to incorporate the northwest-adjacent parcel and the northeast adjacent alley; enhancing existing traffic flow patterns within the project boundary, while adding additional on-site scales; installing a mechanized processing line to recover additional commodities; installing an Anaerobic Digestion (AD) facility to create renewable natural gas; installing a loading dock for the movement of recycling commodities; installing enhanced engineering controls for storm water treatment; increasing the size of the existing ERT building; relocating the existing office structure; allowing for internal processing up to 24 hours per day; allowing for acceptance of materials from 5:00 a.m.to 7:00 p.m. Monday to Sunday; and requiring the vacation by the City of the alley at the north and east sides of the project site in order to construct improvements to the facility therein.

The project does not propose increased daily tonnage or increased daily traffic as the facility would continue to operate within the existing permitted capacity of 1,500 tons per day (tpd). The project would incorporate the adjacent parcel to the northwest, thereby increasing the overall acreage of the site to approximately 2 acres. The existing 28,850-square-foot facility would be expanded to 60,680 square feet, incorporating an additional transfer facility space, a loadout tunnel, office space, an AD facility, and scale house.

The proposed facility expansion and enhancement is anticipated to support the recovery of additional cardboard, mixed paper, mixed rigid plastics, steel, asphalt, concrete, wood, and green waste. Figure 4 shows the proposed site plan for the project.

5.0 Demolition, Grading, and Construction Waste

According to the Waste Composition Study prepared by the ESD, C&D waste constituted the largest single component of disposed waste in San Diego in 2000 (City of San Diego 2000). Of the almost 590,000 tons of waste disposed of that year, C&D waste composed 34 percent.

Map Source: JRMA Architects Engineers

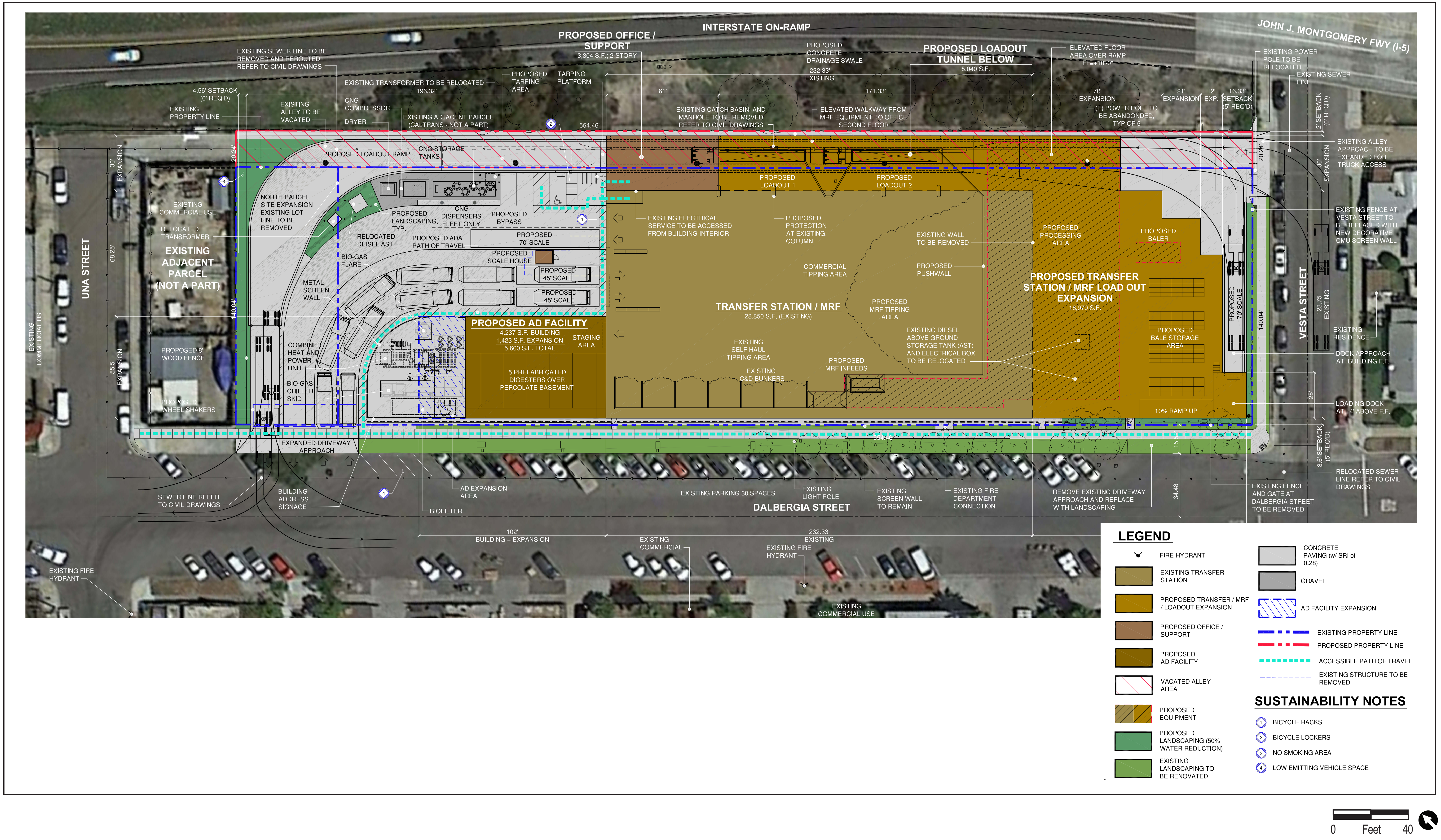

FIGURE 4
Site Plan

RECON

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5.1 Demolition

Demolition activities would remove approximately 34,000 square feet of asphalt pavement located in the northwestern and southeastern portions of the project site. Asphalt pavement depth varies by project and soil type, but is typically 0.5 feet for surface parking lots. Based on the ESD C&D Debris Conversion Rate Table (Attachment 1), estimated asphalt to be removed totals 441 tons as shown in the calculation below:

$$34{,}000 \text{ square feet} \times 0.5 \text{ foot} = 17{,}000 \text{ cubic feet}$$

$$\frac{17{,}000\ cubic\ feet}{27\ cubic\ feet} = 629.63 \text{ cubic yards} \times 0.70\ \frac{tons}{unit} = 441 \text{ tons}$$

Table 1 shows that the entirety of these materials would be diverted for reuse at the appropriate facility.

Table 1
Projected Materials Generated by Demolition Activities

Material	Tons Generated[1]	Percent Diverted	Facility[2]	Tons Diverted	Tons Disposed
Asphalt (broken)	441	100	Reclaimed Aggregates Chula Vista	441 **(100%)**	0 **(0%)**

Note: Totals may vary due to independent rounding.
[1] ESD C&D Debris Conversion Rate Table (Attachment 1).
[2] City of San Diego ESD 2017 Certified C&D Recycling Facility Directory (Attachment 2).

5.2 Grading

Following cleanup and demolition activities, implementation of the project would require a net soil export of approximately 6,000 cubic yards. Grading of the site would include 5,000 cubic yards of cut soil and 0 cubic yards of fill soil. Based on the ESD C&D Debris Conversion Rate Table, grading soil weighs approximately 1.3 tons per cubic yard (see Attachment 1). Therefore, project grading would result in an export of 6,500 tons as shown in the calculation below:

$$6{,}000 \text{ cubic yards} \times 1.3\ \frac{tons}{cubic\ yard} = 7{,}800 \text{ tons}$$

Table 2 summarizes the grading phase waste generation, diversion, and disposal calculations. All exported soil would be recycled using the City of San Diego Clean Fill Dirt Program or an approved clean fill dirt handler listed in Attachment 1 (City of San Diego 2017a).

Table 2
Grading Phase Waste Generation, Diversion, and Disposal

Amount of Export (cubic yards)	Generation Rate (tons per cubic yard)[1]	Tons Exported	Percent Diverted	Tons Diverted	Tons Disposed
6,000	1.3	7,800	100%	7,800	0

[1]ESD C&D Debris Conversion Rate Table (Attachment 1).

Any vegetation removed during grading would be taken to the Miramar Greenery facility for 100 percent composting. Diversion goals will be communicated to contractors through contract documents; the project's Mitigated Negative Declaration, and corresponding Mitigation Monitoring and Reporting Program, or permit conditions; and the Solid Waste Management Coordinator (SWMC) for the project.

5.3 Construction

According to a 1998 study by the U.S. Environmental Protection Agency (U.S. EPA), a sample of non-residential construction projects generated an average of 3.9 pounds of construction waste per square foot (U.S. EPA 1998). Based on this generation rate, the total proposed building construction area of 33,073 square feet is estimated to generate 65 tons of waste during construction (see calculation below).

$$33{,}073 \text{ square feet} \times \frac{3.9\, pounds}{square\ foot} \times \frac{1\, ton}{2{,}000\, pounds} = 64.5 \text{ tons}$$

Table 3 shows the amount of tons estimated during the construction phase.

Table 3
Construction Phase Waste Generation

Building (B7)	Amount (square feet)	Generation Rate (pounds per square foot)	Tons Generated
Transfer Station Expansion	18,979	3.9	37.0
Loadout Tunnel	5,050	3.9	9.8
Office/Support	3,304	3.9	6.4
Anaerobic Digester Facility	5,660	3.9	11.0
Scale House	80	3.9	0.2
Total	**33,073**	**3.9**	**64.5**

NOTE: Totals may vary due to independent rounding.

Estimates of material types and portions are based on similar non-residential developments and parking structures. The types of construction waste anticipated to be generated include the following:

- Asphalt and concrete
- Brick/masonry/tile
- Carpet, padding/foam
- Corrugated cardboard
- Metals
- Clean wood
- Drywall
- Trash/garbage

5.4 Waste Diversion

Waste diversion would be conducted through source separation rather than mixed-debris diversion. With mixed-debris diversion, all material waste is disposed of in a single container for transport to a mixed C&D recycling facility where 67 percent is diverted for recycling. With source-separated diversion, materials are separated on-site before transport to appropriate facilities that accept specific material types and a greater diversion rate is achieved. Recyclable waste materials would be separated on-site into material-specific containers and diverted to an approved recycler selected from ESD's directory of facilities that recycle specific waste materials from construction and demolition (see Tables 1 and 4; Attachment 2). These facilities achieve a 100 percent diversion rate for most materials and a 67 percent diversion rate for drywall. Given the waste reduction target of 75 percent, the majority of waste must be handled at facilities other than landfills.

With implementation of the diversion procedures and outlined in Table 4, it is estimated that 75 percent of the waste generated during the construction phase of the project would be diverted to appropriate facilities for reuse. Only 5 tons of drywall and 11 tons of trash/garbage, equivalent to 25 percent of the total construction waste, would be disposed of in the landfill.

Table 4
Construction Waste Diversion and Disposal by Material Type
(Aboveground Office Building)

Material Type	Estimated Waste (tons)[1]	Percent Diverted	Nearest Handling Facility[2]	Estimated Diversion (tons)	Estimated Disposal (tons)
Asphalt and Concrete	9	100	Reclaimed Aggregates Chula Vista	9	0
Metals	14	100	IMS Recycling Services	14	0
Brick/Masonry/Tile	4	100	Vulcan Carol Canyon Landfill & Recycle Site	4	0
Clean Wood	2	100	Miramar Greenery	2	0
Carpet, Padding/Foam	5	100	DFS Flooring	5	0
Drywall	14	67	EDCO Recovery & Transfer[3]	9	5
Corrugated Cardboard	4	100	IMS Recycling Services	4	0
Trash/Garbage	11	0	Miramar Landfill	0	11
Total	**65**	-	-	**49 (75%)**	**16 (25%)**

NOTE: Totals may vary due to independent rounding.

[1] Portions of material types based on demolition estimates of similar non-residential developments.

[2] City of San Diego ESD 2017 Certified C&D Recycling Facility Directory (Attachment 2).

[3] The facility would remain operational during construction, and would be available to handle the drywall material.

5.4.1 Total Diversion

Table 5 summarizes the amount of waste estimated to be generated and diverted by each phase of the project. Of the 7,006 tons estimated to be produced, 6,990 tons would be diverted, primarily through source separation. This would result in 99.8 percent of waste material diverted from the landfill for reuse.

Table 5
Total Waste Generated, Diverted, and Disposed of by Phase

Phase	Tons Generated	Tons Diverted	Tons Disposed
Demolition	441	441 (100%)	0
Grading	7,800	7,800 (100%)	0
Construction	65	49 (75%)	16 (25%)
Total	**8,306**	**8,290 (99.8%)**	**16 (0.2%)**

5.4.2 Contractor Education and Responsibilities

A SWMC for the project would be designated to ensure that all contractors and subcontractors are educated and that procedures for waste reduction and recycling efforts are implemented. Specific responsibilities of the SWMC would include the following:

- Review of the WMP at the preconstruction meeting, including the SWMC responsibilities.
- Distribute the WMP to all contractors when they first begin work on-site and when training workers, subcontractors, and suppliers on proper waste management procedures applicable to the project.
- Work with the contractors to estimate the quantities of each type of material that would be salvaged, recycled, or disposed of as waste, then assist in documentation.
- Use detailed material estimates to reduce risk of unplanned and potentially wasteful material cuts.
- Review and enforce procedures for source separated receptacles. Containers of various sizes shall:
    - Be placed in readily accessible areas that will minimize misuse or contamination.
    - Be clearly labeled with a list of acceptable and unacceptable materials, the same as the materials recycled at the receiving material recovery facility or recycling processor.
    - Contain no more than 10 percent non-recyclable materials, by volume.
    - Be inspected daily to remove contaminants and evaluate discarded material for reuse on-site.

- Review and enforce procedures for transportation of materials to appropriate recipients selected from ESD's directory of facilities that recycle demolition and construction materials (see Tables 1 and 4; Attachment 2).
- Ensure removal of demolition and construction waste materials from the project site at least once every week to ensure no over-topping of containers. The accumulation and burning of on-site construction, demolition, and land-clearing waste materials will be prohibited.
- Document the return or reuse of excess materials and packaging to enhance the diversion rate.
- Coordinate implementation of a "buy recycled" program for green construction products, including incorporating mulch and compost into the landscaping.
- Coordinate implementation of solid waste mitigation with other requirements such as storm water requirements, which may include specifications such as the placement of bins to minimize the possibility of runoff contamination.

The SWMC would ensure that the project meets the following state law and City Municipal Code requirements. Adjustments would be made as needed to maintain conformance:

- The City's C&D Debris Diversion Deposit Program, which requires a refundable deposit based on the tonnage of the expected recyclable waste materials as part of the building permit requirements (City of San Diego 2008).
- The City's Recycling Ordinance, which requires that collection of recyclable materials is provided (City of San Diego 2007a).
- The City's Storage Ordinance, which requires that areas for recyclable material collection must be provided (City of San Diego 2007b).
- The name and contact information of the waste contractor provided to ESD at least 10 days prior to the start of any work and updated within 5 days of any changes.

6.0 Occupancy – Operational Waste

6.1 Waste Generation

The estimated annual waste to be generated during occupancy of the project is based on findings from large office buildings reported by the California Environmental Protection Agency (State of California 2006). The waste generation rate for office buildings is expressed in pounds per 1,000 square feet, of which the proposed project exceeds. Table 6 summarizes the estimated occupancy phase waste generation, which amounts to a total of approximately 3.3 tons of waste per year, based on the proposed 3,304 square feet of habitable office space to be built. As discussed in Section 6.2, Waste Reduction Measures, an ongoing plan to manage waste disposal in order to meet state and City waste reduction goals would be implemented by the applicant (or applicant's successor in interest).

Table 6
Occupancy Phase Annual Waste Generation

Land Use	Amount (sf)	Annual Generation Rate[1]	Waste Generated (tons)
Office (habitable space)	3,304	1,998 pounds per thousand sf	3.3

[1]California Environmental Protection Agency (State of California 2006).
sf = square feet.

6.2 Waste Reduction Measures

According to the City Waste Management Guidelines (City of San Diego 2013b), compliance with existing ordinances is expected to achieve a 40 percent diversion rate. Therefore, waste anticipated to be diverted during the occupancy phase would be approximately 1.32 tons per year. The remaining 1.98 tons per year would not exceed the 60 tons-per-year threshold of significance for a cumulative impact on solid waste services in the City (City of San Diego 2017b).

6.3 Exterior Storage

This WMP follows the City's Municipal Code on-site refuse and recyclable material storage space requirements (City of San Diego 2007b). Table 7 shows the exterior storage area requirements for non-residential developments.

Because the project would include a total of 58,619 square feet of non-residential uses, a minimum of 144 square feet of refuse storage area and a minimum of 144 square feet of recyclable material storage area would be required. The total exterior refuse/recyclable material storage requirement for the project would be 288 square feet. Given that the project is currently, and will continue to operate as, a recycling facility, this requirement has already been met.

Table 7
Minimum Exterior Refuse and Recyclable Material Storage Areas for Non-Residential Development

Gross Floor Area per Development (square feet)	Minimum Refuse Storage Area per Development (square feet)	Minimum Recyclable Material Storage Area per Development (square feet)	Total Minimum Storage Area per Development (square feet)
0–5,000	12	12	24
5,001–10,000	24	24	48
10,001–25,000	48	48	96
25,001–50,000	96	96	192
50,001–75,000	144	144	288
75,001–100,000	192	192	384
100,000+	192 plus 48 square feet for every 25,000 square feet of building area above 100,001	192 plus 48 square feet for every 25,000 square feet of building area above 100,001	384 plus 96 square feet for every 25,000 square feet of building area above 100,001
Project Total	**144**	**144**	**288**

SOURCE: City of San Diego Municipal Code, Article 2, Division 8: Refuse and Recyclable Material Storage Regulations, §142.0830, Table 142-08C; effective, January 2000.

6.4 Organic Waste Recycling

The project would require landscaping and landscape maintenance. Drought-tolerant plants would be used in accordance with the City of San Diego Approved Plant List to reduce the amount of green waste produced. Collection of organic waste and its disposal at recycling centers that accept organic waste would further reduce the waste generated by the project during occupancy. An ongoing WMP would include a means for handling landscaping and other organic waste materials.

7.0 Conclusion

7.1 Demolition, Grading, and Construction Waste

A total of approximately 8,306 tons of waste would be generated during the demolition, grading, and construction of the project (see Table 5). Most would be recycled at source-separating facilities that achieve a 100 percent diversion rate. When necessary, mixed debris would be recycled at a lower diversion rate, leaving 16 tons to be disposed of. This amounts to a 99.8 percent reduction in solid waste, which would be diverted from the landfill.

7.2 Occupancy – Operational Waste

The project would include 3,304 square feet of habitable building space for non-residential uses, generating approximately 3.3 tons of waste per year; and would be required to provide a minimum of 144 square feet of exterior refuse area and 144 square feet recyclable material storage area (total of 288 square feet; see Table 7). The applicant (or applicant's successor in interest) would implement an ongoing WMP with measures to ensure that the waste is minimized and the operation of the project complies with City ordinances. According to the City Waste Management Guidelines (City of San Diego 2013b), compliance with existing ordinances is expected to achieve a 40 percent diversion rate. The project would not exceed the 60 tons-per-year threshold of significance for having a cumulative impact on solid waste services.

7.3 Overall Compliance

With implementation of the strategies outlined in this WMP and compliance with all applicable City ordinances, solid waste impacts would be reduced to below a level of significance regarding collection, diversion, and disposal of waste generated from C&D, grading, and occupancy. During occupancy, an ongoing waste management plan would include provisions to provide adequate exterior storage space for refuse, recyclable, and landscape/green waste materials.

This WMP outlines strategies to achieve 99.8 percent of waste being diverted from disposal during C&D and grading of the project. This would reduce the anticipated impact of waste disposal to below the direct impact threshold of significance. The occupancy phase would not exceed the 60 tons-per-year City threshold of significance for having a cumulative impact on solid waste services.

8.0 References Cited

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2006 Waste Disposal and Diversion Findings for Selected Industry Groups. California Environmental Protection Agency, Integrated Waste Management Board. June.

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2007a Recycling Ordinance. San Diego Municipal Code Chapter 6, Article 6, Division 7. November 20.

2007b Refuse and Recyclable Materials Storage Regulations. Municipal Code Chapter 14, Article 2, Division 8. December 9.

2008 Construction and Demolition Debris Diversion Deposit Program. San Diego Municipal Code Chapter 6, Article 6, Division 6.

2013a Zero Waste Objective. City of San Diego Resolution Number R-308657

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2017a Clean Fill Dirt Program. San Diego Environmental Services Department. http://www.sandiego.gov/environmental-services/miramar/cfdp.shtml. Accessed May 20, 2017.

2017b Significance Determination Thresholds. California Environmental Quality Act. July.

United States Environmental Protection Agency (U.S. EPA)
1998 Characterization of Building-Related Construction and Demolition Debris in the United States. Municipal and Industrial Solid Waste Division. Office of Solid Waste. Report No. EPA530-R-98-010. June.

ATTACHMENTS

ATTACHMENT 1

City of San Diego Environmental Services Department Construction & Demolition Debris Conversion Rate Table

CITY OF SAN DIEGO
Construction & Demolition (C&D) Debris
Conversion Rate Table

This worksheet lists materials typically generated from a constructionor demolition project and provides formulas for converting common units (i.e. cubic yards, square feet, and board feet) to tons. It is a tool that should be used for preparing your Waste Mangement Form - Part I, which requires that quantities be provided in tons.
Note: Weigh receipts are required for your refund request.

Step 1: Enter the estimated quantity for each applicable material in Column I, based on units
Step 2: Multiply by Tons/Unit figure listed in Column II. Enter the result for each material in Column III.
If using Excel version, column III will automatically calculate tons.
Step 3: Enter quantities for each separated material from Column III on this worksheet into the corresponding section of your Waste Management Form - Part I.

		Column I			**Column II**		**Column III**
Category	**Material**	**Volume**	**Unit**		**Tons/Unit**		**Tons**
Asphalt/Concrete	Asphalt (broken)		cy	**x**	0.70	=	
	Concrete (broken)		cy	**x**	1.20	=	
	Concrete (solid slab)		cy	**x**	1.30	=	
Brick/Masonry/Tile	Brick (broken)		cy	**x**	0.70	=	
	Brick (whole, palletized)		cy	**x**	1.51	=	
	Masonry Brick (broken)		cy	**x**	0.60	=	
	Tile		sq ft	**x**	0.00175	=	
Building Materials (doors, windows, cabinets, etc.)			cy	**x**	0.15	=	
Cardboard (flat)			cy	**x**	0.05	=	
Carpet	By square foot		sq ft	**x**	0.0005	=	
	By cubic yard		cy	**x**	0.30	=	
Carpet Padding/Foam			sq ft	**x**	0.000125	=	
Ceiling Tiles	Whole (palletized)		sq ft	**x**	0.0003	=	
	Loose		cy	**x**	0.09	=	
Drywall (new or used)	1/2" (by square foot)		sq ft	**x**	0.0008	=	
	5/8" (by square foot)		sq ft	**x**	0.00105	=	
	Demo/used (by cubic yd)		cy	**x**	0.25	=	
Earth	Loose/Dry		cy	**x**	1.20	**=**	
	Excavated/Wet		cy	**x**	1.30	**=**	
	Sand (loose)		cy	**x**	1.20	**=**	
Landscape Debris (brush, trees, etc)			cy	**x**	0.15	=	
Mixed Debris	Construction		cy	**x**	0.18	**=**	
	Demolition		cy	**x**	1.19	**=**	
Scrap metal			cy	**x**	0.51	=	
Shingles, asphalt			cy	**x**	0.22	=	
Stone (crushed)			cy	**x**	2.35	=	
Unpainted Wood & Pallets	By board foot		bd ft	**x**	0.001375	=	
	By cubic yard		cy	**x**	0.15	=	
Garbage/Trash			cy	**x**	0.18	=	
Other (estimated weight)			cy	**x**	estimate	=	
			cy	**x**	estimate	=	
			cy	**x**	estimate	=	
					Total All		

6/6/2016

ATTACHMENT 2

City of San Diego 2017 Certified Construction & Demolition Recycling Facility Directory

2017 Certified Construction & Demolition Recycling Facility Directory

These facilities are certified by the City of San Diego to accept materials listed in each category. Hazardous materials are not accepted. The diversion rate for these materials shall be considered 100%, except mixed C&D debris which updates quarterly. The City is not responsible for changes in facility information. Please call ahead to confirm details such as accepted materials, days and hours of operation, limitations on vehicle types, and cost. For more information visit: www.recyclingworks.com.

Please note: In order to receive recycling credit, Mixed C&D Facility and transfer station receipts must: *-be coded as construction & demolition (C&D) debris* *-have project address or permit number on receipt* **Make sure to notify weighmaster that your load is subject to the City of San Diego C&D Ordinance.* ***Note about landfills: Miramar Landfill and other landfills do not recycle mixed C&D debris.***	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
EDCO Recovery & Transfer 3660 Dalbergia St, San Diego, CA 92113 619-234-7774 | www.edcodisposal.com/public-disposal	67%											•					
EDCO Station Transfer Station & Buy Back Center 8184 Commercial St, La Mesa, CA 91942 619-466-3355 | www.edcodisposal.com/public-disposal	67%				•							•			•		
EDCO CDI Recycling & Buy Back Center 224 S. Las Posas Rd, San Marcos, CA 92078 760-744-2700 | www.edcodisposal.com/public-disposal	88%				•										•		
Escondido Resource Recovery 1044 W. Washington Ave, Escondido 760-745-3203 | www.edcodisposal.com/public-disposal	67%																
Fallbrook Transfer Station & Buy Back Center 550 W. Aviation Rd, Fallbrook, CA 92028 760-728-6114 | www.edcodisposal.com/public-disposal	67%				•										•		
Otay C&D/Inert Debris Processing Facility 1700 Maxwell Rd, Chula Vista, CA 91913 619-421-3773 | www.sd.disposal.com	69%																
Ramona Transfer Station & Buy Back Center 324 Maple St, Ramona, CA 92065 760-789-0516 | www.edcodisposal.com/public-disposal	67%				•										•		
SANCO Resource Recovery & Buy Back Center 6750 Federal Blvd, Lemon Grove, CA 91945 619-287-5696 | www.edcodisposal.com/public-disposal	67%				•										•		
All American Recycling 10805 Kenney St, Santee, CA 92071 619-508-1155 (Must call for appointment)						•											
Allan Company 6733 Consolidated Wy, San Diego, CA 92121 858-578-9300 | www.allancompany.com/facilities.htm					•										•		
Allan Company Miramar Recycling 5165 Convoy St, San Diego, CA 92111 858-268-8971 | www.allancompany.com/facilities.htm					•										•		
AMS 4674 Cardin St, San Diego, CA 92111 858-541-1977 | www.a-m-s.com								•									

	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
Armstrong World Industries, Inc. 300 S. Myrida St, Pensacola, FL 32505 877-276-7876 (Press 1, Then 8) www.armstrong.com/commceilingsna								●									
Cactus Recycling 8710 Avenida De La Fuente, San Diego, CA 92154 619-661-1283 | www.cactusrecycling.com					●								●		●		●
DFS Flooring 10178 Willow Creek Road, San Diego, CA 92131 858-630-5200 | www.dfsflooring.com						●	●										
Duco Metals 220 Bingham Drive Suite 100, San Marcos, CA 92069 760-747-6330 | www.ducometals.com															●		
Enniss Incorporated 12421 Vigilante Rd, Lakeside, CA 92040 619-443-9024 | www.ennissinc.com		●	●						●	●							
Escondido Sand and Gravel 500 N. Tulip St, Escondido, CA 92025 760-432-4690 | www.weirasphalt.com/esg		●															
Habitat for Humanity ReStore 10222 San Diego Mission Rd, San Diego, CA 92108 619-516-5267 | www.sdhfh.org/restore.php				●													
Hanson Aggregates West – Lakeside Plant 12560 Highway 67, Lakeside, CA 92040 858-547-2141		●															
Hanson Aggregates West – Miramar 9229 Harris Plant Rd, San Diego, CA 92126 858-974-3849		●								●							
HVAC Exchange 2675 Faivre St, Chula Vista, CA 91911 619-423-1855 | www.thehvacexchange.com															●		
IMS Recycling Services 2740 Boston Ave, San Diego, CA 92113 619-423-1564 | www.imsrecyclingservices.com					●								●				
IMS Recycling Services 2697 Main St, San Diego, CA 92113 619-231-2521 | www.imsrecyclingservices.com													●		●		
Inland Pacific Resource Recovery 12650 Slaughterhouse Canyon Rd, Lakeside, CA 92040 619-390-1418											●						
Lamp Disposal Solutions 1405 30th Street, San Diego, CA 92154 858-569-1807 | www.lampdisposalsolutions.com														●			
Los Angeles Fiber Company 4920 S. Boyle Ave, Vernon, CA 90058 323-589-5637 | www.lafiber.com						●	●										

	Mixed C&D Debris	Asphalt/Concrete	Brick/Block/Rock	Building Materials for Reuse	Cardboard	Carpet	Carpet Padding	Ceiling Tile	Ceramic Tile/Porcelain	Clean Fill Dirt	Clean Wood/Green Waste	Drywall	Industrial Plastics	Lamps/Light Fixtures	Metal	Mixed Inerts	Styrofoam Blocks
Miramar Greenery, City of San Diego 5180 Convoy St, San Diego, CA 92111 858-694-7000 | www.sandiego.gov/environmental-services/miramar/greenery.shtml											•						
Moody's 3210 Oceanside Blvd., Oceanside, CA 92056 760-433-3316		•								•						•	
Otay Valley Rock, LLC 2041 Heritage Rd, Chula Vista, CA 91913 619-591-4717 | www.otayrock.com		•															
Reclaimed Aggregates Chula Vista 855 Energy Wy, Chula Vista, CA 91913 619-656-1836		•														•	
Reconstruction Warehouse 3650 Hancock St., San Diego, CA 92110 619-795-7326 | www.recowarehouse.com				•													
Robertson's Ready Mix 2094 Willow Glen Dr, El Cajon, CA 92019 619-593-1856		•								•						•	
Romero General Construction Corp. 8354 Nelson Wy, Escondido, CA 92026 760-749-9312 | www.romerogc.com/crushing/nelsonway.htm		•															
SA Recycling 3055 Commercial St., San Diego, CA 92113 619-238-6740 | www.sarecycling.com															•		
SA Recycling 1211 S. 32nd St., San Diego, CA 92113 619-234-6691 | www.sarecycling.com															•		
Universal Waste Disposal 8051 Wing Avenue, El Cajon, CA 92020 619-438-1093 | www.universalwastedisposal.com														•			
Vulcan Carol Canyon Landfill and Recycle Site 10051 Black Mountain Rd, San Diego, CA 92126 858-530-9465 | www.vulcanmaterials.com		•	•							•						•	
Vulcan Otay Asphalt Recycle Center 7522 Paseo de la Fuente, San Diego, CA 92154 619-571-1945 | www.vulcanmaterials.com		•															