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

BRITANNIA AIRWAY LOGISTICS CENTER

PRJ-1048583

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

Engineer of Work:

Kamal S. Sweis

Provide Wet Signature and Stamp Above Line

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO.48592
Exp 6/30/2024
CIVIL
STATE OF CALIFORNIA

Prepared For:

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Planning Engineering Surveying

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San Diego, CA 92108
(619) 296-5565

Date:

12/20/2022

Approved by: City of San Diego Date

The City of SAN DIEGO

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- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
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- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

Acronyms

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

Certification Page

Project Name: Britannia Airway Logistics Center
Permit Application PRJ#1048583

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

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

Engineer of Work's Signature

48592
PE#

06/30/24
Expiration Date

Kamal S. Sweis
Print Name

K & S Engineering, Inc.
Company

12/20/2022
Date

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO.48592
Exp 6/30/2024
CIVIL
STATE OF CALIFORNIA

Engineer's Stamp

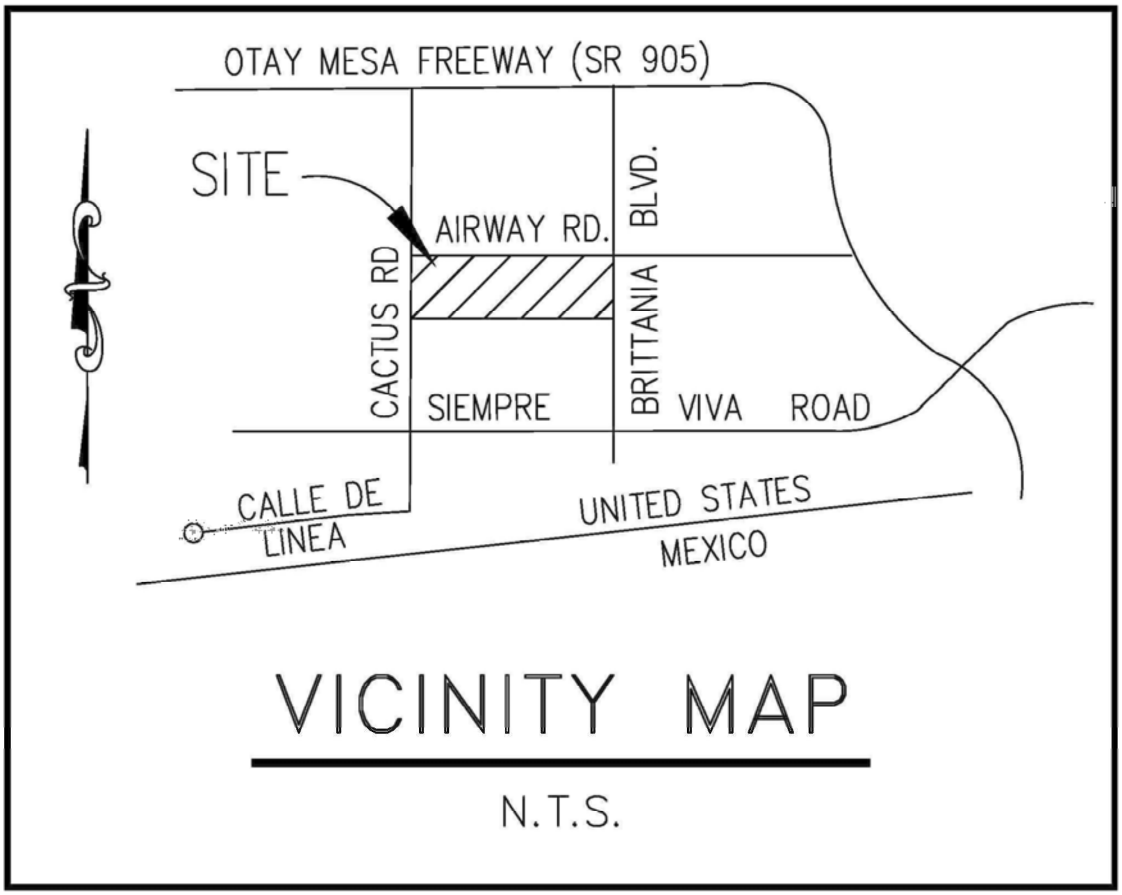
Submittal Record

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

Submittal Number	Date	Project Status	Changes
1	12/15/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	5/20/022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Resubmittal
3	9/19/2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Resubmittal
4	12/20/2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Resubmittal

Project Vicinity Map

Project Name: Britannia Airway Logistics Center
Permit Application PRJ-1048583



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

Attach DS-560 form.

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Development Services

THE CITY OF SAN DIEGO

FORM
DS-560
September 2021

Stormwater Requirements Applicability Checklist

Project Address: SW Corner of intersection of Airway Rd and Britannia Blvd. **Project Number:** PRJ-1048583

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

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

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

PART A – Determine Construction Phase Stormwater Requirements

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

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

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

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

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

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

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

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

   ☐ Yes, no document is required.

Check one of the boxes below and continue to Part B

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

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

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

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

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PART B – Determine Construction Site Priority

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

Complete Part B and continue to Section 2

☐ **1. ASBS**

A. Projects located in the ASBS watershed.

☐ **2. High Priority**

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

☑ **3. Medium Priority**

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

☐ **4. Low Priority**

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

Section 2: Construction Stormwater BMP Requirements

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

PART C – Determine if Not Subject to Permanent Stormwater Requirements

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

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

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

   ○ Yes ◉ No

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

   ○ Yes ◉ No

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

   ○ Yes ◉ No

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PART D – PDP Exempt Requirements

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

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

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

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

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

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

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

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

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

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

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ○ Yes ◉ No

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

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

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

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

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7. **New development or redevelopment discharging directly to an environmentally sensitive area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over the project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ○ Yes ◉ No

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

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

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

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

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

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

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

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

Kamal Sweis

Name of Owner or Agent

President

Title

Signature

09/19/2022

Date

CLEAR FORM

P4

Applicability of Permanent, Post-Construction Storm Water BMP Requirements			Form I-1
Project Identification			
Project Name: Britannia Logistics Center			
Permit Application Number: PRJ-1048583			Date: 09/19/2022
Determination of Requirements			
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.			
Step	**Answer**	**Progression**	
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2.**	
	☐ No	**Stop.** Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.	
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):			
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply	
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3.**	
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.	
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:			

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

HMP Exemption Exhibit

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

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

NOT APPLICABLE

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Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Britannia Logistics Center
Project Address	5761 Airway Road San Diego, CA 92154
Assessor's Parcel Number(s) (APN(s))	646-100-74-00
Permit Application Number	PRJ-1048583
Project Watershed	Select One: ☐San Dieguito River ☐Penasquitos ☐Mission Bay ☐San Diego River ☐San Diego Bay ☑Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	Water Tanks 911.12
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	37.9 Acres (1'650,924 Square Feet)
Area to be disturbed by the project (Project Footprint)	40.03 Acres (1'743,719 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	8.13 Acres (354,141 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	31.90 Acres (1'389,578 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	492 %

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: The Site is currently vacant and undeveloped
Existing Land Cover Includes (select all that apply): ☑Vegetative Cover ☐Non-Vegetated Pervious Areas ☐Impervious Areas Description / Additional Information: The existing site has poor vegetative ground cover.
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐NRCS Type A ☐NRCS Type B ☐NRCS Type C ☑NRCS Type D
Approximate Depth to Groundwater: ☐Groundwater Depth < 5 feet ☐5 feet < Groundwater Depth < 10 feet ☐10 feet < Groundwater Depth < 20 feet ☑Groundwater Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☐Watercourses ☐Seeps ☐Springs ☐Wetlands ☑None Description / Additional Information: There are no existing natural hydrologic features within project limits

Form I-3B Page 3 of 11
Description of Existing Site Topography and Drainage
How is storm water runoff conveyed from the site? At a minimum, this description should answer: 1. Whether existing drainage conveyance is natural or urban; 2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site; 3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels; 4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.
Descriptions/Additional Information
The existing site consists of one undeveloped lot with two drainage areas, one sheet flows in a Southeast direction into an existing channel located along Britannia Blvd. generating 32.06 CFS, said channel also receives off-site runoff from the development located North of the project (off-site drainage). The second drainage area is located at the Northwest corner of the site to and sheet-flows in a Northwest direction towards the Southeast corner of the intersection of Airway Road and Cactus Road generating Q50=6.46 CFS. A small portion of Cactus road drains South generating Q=0.73 CFS. The calculated flows for existing condition are based by utilizing a runoff coefficient of C=0.45 for the onsite flows and C=0.90 for the improved streets

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 consists of grading and drainage improvements for a truck parking and storage with pervious surface, nine office trailers with attached car parking, one biofiltration basin for water quality and flow control purposes; street widening improvements for Cactus Road, Airway Road and Britannia Blvd. are also part of the development.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): The project proposes impervious features such as AC paved streets, sidewalk, trailer offices, and AC parking lot.
List/describe proposed pervious features of the project (e.g., landscape areas): The proposed pervious features are landscaped areas, decomposed granite parking lot and three bioretention facilities for treatment and flow control purposes.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The project proposes grading to accommodate a proposed roadways, sidewalks, green street swales, parking area, office trailers and three bioretention facilities

Form I-3B Page 5 of 11

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

☑ Yes

☐ No

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

Description / Additional Information:

The proposed site will maintain the same discharge points and tributary areas as the existing condition, and includes installation of underground pipe system and three biofiltration facilities for storm water quality, hydromodification and detention purposes, after treatment and mitigation runoff will be discharged into the proposed public storm drain at Britannia Blvd and Airway Road.

The off-site drainage will be conveyed by means of a proposed public storm drain pipe along Britannia Blvd., said pipe will discharge into the existing channel along the West side of Britannia Blvd. by means of a proposed headwall.

The street widening improvements will drain onto proposed green street vegetated swales, before draining into the MS4.

Since the site is located in the Otay Mesa area that drains to Mexico, the project is required to provide a storm water detention facility designed to mitigate the developed runoff to be equal or less than the pre-developed condition for the 5, 10, 25 and 50 year event.

The project's drainage pattern is as follows:

The proposed site will maintain the same discharge points as the existing condition, the area draining towards the Southeast corner of the site will sheet flow into a proposed biofiltration basin along the Southerly property line where runoff will be treated and mitigated before exiting the site via storm drain pipe into the existing channel located at Britannia Blvd., at this point the confluenced undetained flow is Q50= 33.92 CFS.

The Northwest portion of the development will sheet flow towards the northwest corner of the site, runoff will be treated by means of a biofiltration basin, then flow will be conveyed via pipe into a proposed curb inlet located at the Southeast corner of the intersection of Airway Road and Britannia BLVD, the proposed confluence flow at this point is Q50= 6.45 CFS. The street portion of Cactus Road draining towards the south generates Q50= 0.36 CFS.

The proposed land use utilized for on-site proposed condition is industrial with 35% imperviousness, therefore a runoff coefficient of C=0.50 was used. For the street widening improvements a runoff coefficient of C=0.90 was utilized.

See attachment 5 for drainage and routing report. The following tables were extracted from the 5, 10, 25, 50-year Routing Analysis prepared by K & S Engineering, Inc prepared September 19, 2022.

Form I-3B Page 5 of 11

POINT 1 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 4 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 7 (cfs)	PROPOSED CONDITION AFTER DETENTION (cfs)
5-Yr	23.55	24.85	22.44
10-Yr	25.25	26.61	23.76
25-Yr	28.03	29.64	26.5
50-Yr	32.1	33.92	30.22

POINT 2 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 7 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 11 (cfs)	NO DETENTION REQUIRED FOR THIS BASIN
5-Yr	4.18	2.16	-
10-Yr	4.92	2.54	-
25-Yr	5.55	2.86	-
50-Yr	6.45	3.33	-

POINT 3 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 9 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 13 (cfs)	NO DETENTION REQUIRED FOR THIS BASIN
5-Yr	0.54	0.24	-
10-Yr	0.61	0.28	-
25-Yr	0.65	0.31	-
50-Yr	0.72	0.36	-

Form I-3B Page 6 of 11

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

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [ ] Interior parking garages
- [x] Need for future indoor & structural pest control
- [x] Landscape/outdoor pesticide use
- [ ] Pools, spas, ponds, decorative fountains, and other water features
- [ ] Food service
- [x] 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
- [x] Miscellaneous drain or wash water
- [x] Plazas, sidewalks, and parking lots

Description/Additional Information:

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) The runoff from the proposed site drains into a public storm drain system on Britannia Blvd draining south towards the Tijuana River and eventually discharges to the Tijuana Estuary and into the Pacific Ocean. The Northwest side of the project drains to a public storm drain on Cactus to the North then the runoff is conveyed onto Wruck Canyon, then into the Tijuana River and eventually discharges to the Tijuana Estuary and into the Pacific Ocean.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial service supply (IND). Coastal Water: Contact water recreation (REC1), Non-contact water recreation (REC2), Commercial and sport fishing (COMM), Preservation of biological habitats of special significance (BIOL), Estuarine habitat (EST), Wildlife habitat (WILD), Rare threatened or endangered species (RARE), Marine habitat (MAR), Migration of aquatic organisms (MIGR), Spawning (SPWN), Shellfish harvesting (SHELL)
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations Site drains to San Diego River, then into the Pacific Ocean, there are no areas of ASBS downstream project.
Provide distance from project outfall location to impaired or sensitive receiving waters The site is 0.2 miles South of Wruck Canyon which is the closest ESA
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The post-construction storm water BMP is located 0.5 miles upstream of City's Environmentally Sensitive Area.

Form I-3B Page 8 of 11		
Identification of Receiving Water Pollutants of Concern		
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:		
303(d) Impaired Water Body (Refer to Appendix K)	**Pollutant(s)/Stressor(s) (Refer to Appendix K)**	**TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)**
Pacific Ocean, Tijuana HU	Enterococcus, fecal coliform	Indicator bacteria
	total coliform	
Tijuana River	Eutrophic, indicator bacteria, low	
	dissolved oxygen, pesticides, phosphorus,	
	sedimentation/ siltation, selenium, solids,	
	surfactants, synthetic organics, total	
	nitrogen, toxicity, trace elements, trash	
Tijuana River Estuary	Eutrophic, indicator bacteria, lead, low	
	dissolved oxygen, nickel, pesticides,	
	thallium, trash, turbidity	

Identification of Project Site Pollutants*

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

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

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

Form I-3B Page 9 of 11
Hydromodification Management Requirements
Do hydromodification management requirements apply (see Section 1.6)? ☑ Yes, hydromodification management flow control structural BMPs required. ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides. Description / Additional Information (to be provided if a 'No' answer has been selected above): Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.
Critical Coarse Sediment Yield Areas* ***This Section only required if hydromodification management requirements apply**
Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint? ☐ Yes ☑ No Discussion / Additional Information: There is no CCYSA within the property limits, project is not draining into CCYSA. CCYSA does not drain into project. See Attachment 2b for project location on CCYSA map.

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. There will be two points of compliance: POC-1 located at the Southeast corner of the project and POC-2 at the Northwest corner of the site.
Has a geomorphic assessment been performed for the receiving channel(s)? ☑No, the low flow threshold is $0.1Q_2$ (default low flow threshold) ☐Yes, the result is the low flow threshold is $0.1Q_2$ ☐Yes, the result is the low flow threshold is $0.3Q_2$ ☐Yes, the result is the low flow threshold is $0.5Q_2$ If a geomorphic assessment has been performed, provide title, date, and preparer:
Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements. NOT APPLICABLE
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Source Control BMP Checklist for PDPs	Form I-4B		
Source Control BMPs			
All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented: No outdoor material storage is proposed			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented: No outdoor work area is is proposed			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

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

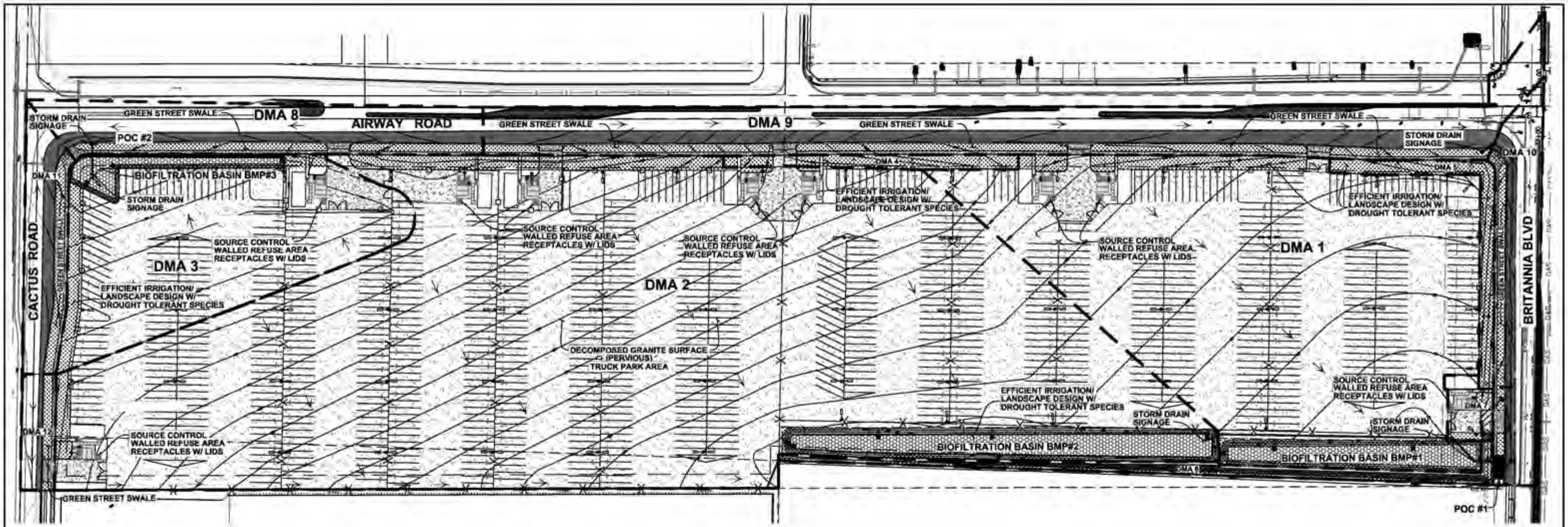
Site Design BMP Checklist for PDPs			Form I-5B
Site Design BMPs			
All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided. A site map with implemented site design BMPs must be included at the end of this checklist.			
Site Design Requirement	**Applied?**		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.1 not implemented: There are no natural drainage pathways.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☑ No	☐ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.2 not implemented: There are no natural areas on-site. Trees are proposed as part of the green street BMPs.			

Form I-5B Page 2 of 4

Site Design Requirement	Applied?		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented: By proposing decomposed granite as the surface for the truck parking.			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented: To the most extent practicable within landscape areas.			
4.3.5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: Being the project a truck parking is not feasible to add landscape areas for area dispersion per SD-5 guidelines but the site's runoff will be directed into the proposed biofiltration facilities where runoff will be treated and mitigated before connecting into the MS4.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☑ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Form I-5B Page 3 of 4			
Site Design Requirement	**Applied?**		
4.3.6 Runoff Collection	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.6 not implemented: Runoff collection is infeasible (see harvest and use feasibility screening in attachment 1c), green roof requires structural capacity that will make this project very costly and therefore unfeasible.			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvesting and reuse not feasible for project (See attachment 1c)			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

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



SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN, ALL PLANTING PER LANDSCAPE PLANS.

SD-3 MINIMIZE IMPERVIOUS AREAS

ACCOMPLISHED BY PROVING MINIMUM AISLE AND PARKING DIMENSIONS WHILE MAINTAINING SUFFICIENT SPACE FOR VEHICLE AND PEDESTRIAN MANEUVERING SAFETY.

SD-4 SOIL COMPACTION

MINIMIZE SOIL COMPACTION WHENEVER POSSIBLE BY: HAVING A MINIMUM 6" TOP SOIL LAYER AND BY SCARIFYING SUB-SOILS BELOW THE TOP SOIL LAYER WITHIN LANDSCAPE AREAS BY AT LEAST 4".

LEGEND

FEATURE	SYMBOL
SURFACE FLOW	→ →
DRAINAGE MANAGEMENT AREA (TRIBUTARY TO BIOFILTRATION)	
PROPOSED CONCRETE	
PROPOSED A.C. PAVING	
PROPOSED DECOMPOSED GRANITE	
PROPOSED LANDSCAPED AREA	
PROPOSED BIORETENTION FACILITY	

0 40 80 160 240
GRAPHIC SCALE: 1" = 80'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax (619) 296-5564

SITE DESIGN EXHIBIT FOR:

BRITANNIA AIRWAY LOGISTICS CENTER

SHEET 1 OF 1

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

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

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

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

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

The project has been divided into twelve drainage management areas 1 through 12; DMA's 1, 2 and 3 consists of about 80% of the project area and which comprises the truck parking, most of the office trailers ant attached parking will surface drain towards Biofiltration Basins BMP 1 through 3 where runoff will be treated and mitigated before leaving the site into the MS4; DMAs 4, 5 and 6 are landscaped self mitigating areas draining onto Airway Road and Britannia Blvd., DMA 7 will be conveyed into a proprietary Biofiltration BMP (Modular Wetland System BF-3) ; and DMAs 8 through 12 consist of the public street improvements which will comply with treatment by means of green street swales, refer to DMA exhibit in attachment 1. According to Geotechnical Investigation prepared by Geocon, Inc. dated April 16, 2021 and per worksheet C.4-1 (see Attachment 1d) the site's soil is not suitable for infiltration. Harvest and reuse is not feasible per Attachment 1c: Harvest and reuse Feasibility Screen.

As an effort to comply with City of San Diego StormWater Standards October, 2018 edition, the project proposes three Biofiltration basins (BF-1) and Green Street Swales as pollutant control BMP to offer treatment through filtration, sedimentation, sorption, biodegradation process o the most extend practicable. The proposed BMPs were designed in accordance with the Storm Water Standards BMP Design Manual Section 5.5.2.1 and Appendix B.5., Appendix E.18 (BF-1), Appendix E.21 (FT-1), and Appendix J.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of 20

(Continued from page 1)

The biofiltration basin will serve as pollutant control and flow control facility, since Britannia Logistics Center project is a priority development project subject to hydromodification, futhermore, the site is located in a watershed that drains into Mexico and detention is also required. The basin's outlet structure will have multi-level orifices to control the flows and comply with said flow control requirements.

The runoff generated by DMAs 1 and 2 will surface drain towards the biofiltration basins located along the southerly property line,once stormwater is treated and mitigated in the biofiltration, flows are discharged via underground pipe into the existing channel (public drainage) located at the Southeast corner of the site (POC#1).

The runoff generated by DMAs 3 will surface drain towards a biofiltration basin located at the Northwest corner of the site for treatment and flow control, then flows will be discharged via underground pipe into an existing curb inlet located at the Southeast corner of the intersection of Airway Road and Cactus Road (POC#2)

The runoff generated by DMA 7 will drain into a Modular Wetland System with curb opening, after treatment the flows will be directed into the MS4 at Britannia Blvd., flow control for DMA 7 will be addressed BMP#1.

The runoff generated by the proposed public street improvements will drain into green street swales located along Cactus Road, Airway Road and Britannia Boulevard.

This SWQMP has shown LID design, source control and treatment BMP's that should satisfy the requirements identified in the order and standards by treating and mitigating runoff to the most extend practicable, and it is anticipated that the downstream waters will not be affected by the proposed development.

Form I-6 Page 3 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 4 of 20 (Copy as many as needed)
Structural BMP ID No. 1
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): see attachment 1E for sizing calculations

Form I-6 Page 5 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 2	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 6 of 20 (Copy as many as needed)
Structural BMP ID No. 2
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): see attachment 1E for sizing calculations

Form I-6 Page 7 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 3	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 8 of 20 (Copy as many as needed)
Structural BMP ID No. 3
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): see attachment 1E for sizing calculations

Form I-6 Page 9 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 7	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☑ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 10 of 20 (Copy as many as needed)
Structural BMP ID No. 7
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Proposed BMP#7 is a Proprietary Biofiltration Modular Wetland System (BF-3), see attachment 1E for sizing calculations

Form I-6 Page 11 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 8	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☑ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 12 of 20 (Copy as many as needed)
Structural BMP ID No. 8
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):
BMP #8 consists of a green street swale to address water quality requirements for the proposed public improvements.

Form I-6 Page 13 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 9	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☑ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 14 of 20 (Copy as many as needed)
Structural BMP ID No. 9
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP #9 consists of a green street swale to address water quality requirements for the proposed public improvements.

Form I-6 Page 15 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 10	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☑ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 16 of 20 (Copy as many as needed)
Structural BMP ID No. 10
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP #10 consists of a green street swale to address water quality requirements for the proposed public improvements.

Form I-6 Page 17 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 11	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☑ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 18 of 20 (Copy as many as needed)
Structural BMP ID No. 11
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP #11 consists of a green street swale to address water quality requirements for the proposed public improvements.

Form I-6 Page 19 of 20 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 12	
Construction Plan Sheet No. -D	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☑ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☑ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	K & S Engineering, Inc. Kamal S. Sweis, RCE 48592 (619) 296-5565
Who will be the final owner of this BMP?	Badiee Development, Inc. 1261Prospect Street, Suite 9, La Jolla CA 92037 (888) 815-8886
Who will maintain this BMP into perpetuity?	Badiee Development, Inc. (Owner)
What is the funding mechanism for maintenance?	Owner's funds

Form I-6 Page 20 of 20 (Copy as many as needed)
Structural BMP ID No. 12
Construction Plan Sheet No. -D
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP #12 consists of a green street swale to address water quality requirements for the proposed public improvements.

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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: Britannia Airway Logistics Center

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs

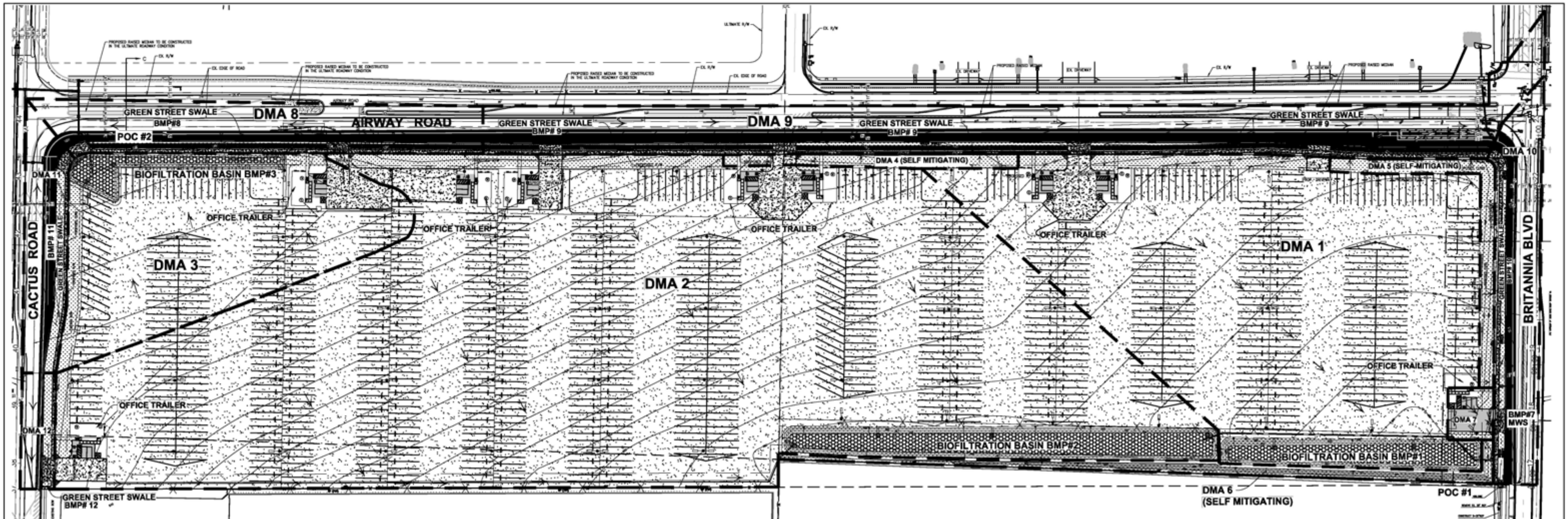
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition:
	• No Infiltration Condition:
	  ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***)
	  ○ Form I-8A (optional)
	  ○ Form I-8B (optional)
	• Partial Infiltration Condition:
	  ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***)
	  ○ Form I-8A
	  ○ Form I-8B
	• Full Infiltration Condition:
	  ○ Form I-8A
	  ○ Form I-8B
	  ○ Worksheet C.4-3
	  ○ Form I-9
	Refer to Appendices C and D of the BMP Design Manual for guidance.
		☑ Included
		☐ Not included because the entire project will use harvest and use BMPs

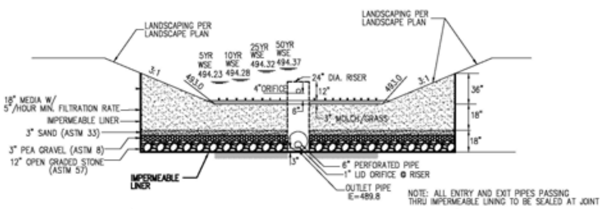
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

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

The DMA Exhibit must identify:

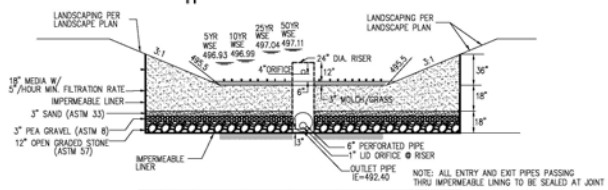
- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [ ] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [x] Existing and proposed site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





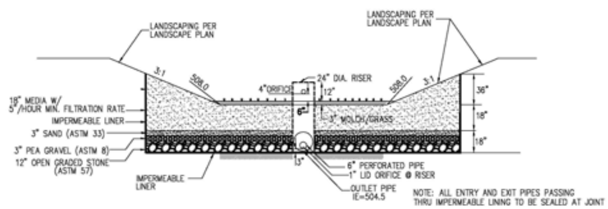
BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT^2	AREA (TOP) FT^2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	12	1	13,653	22,208	3	5,624

BMP1 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT^2	AREA (TOP) FT^2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
2	12	1	27,780	38,958	3	10,358

BMP2 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT^2	AREA (TOP) FT^2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
3	12	1	7,344	15,072	3	3,393

BMP3 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE

SAMPLE STORM DRAIN TILE INDICATED. SPECIFIC DESIGN PER CITY ENGINEER.

LEGEND

FEATURE	SYMBOL
SURFACE FLOW	→ →
DRAINAGE MANAGEMENT AREA (TRIBUTARY TO BIOFILTRATION)	
PROPOSED CONCRETE	
PROPOSED A.C. PAVING	
PROPOSED DECOMPOSED GRANITE	
PROPOSED LANDSCAPED AREA	
PROPOSED BIORETENTION FACILITY	

TABULAR SUMMARY OF DMA'S

DMA	AREA (ACRES)	IMPERVIOUS AREA (ACRES)	% IMP.	HSG	AREA WEIGHTED C FACTOR	DCV (CF)	TREATED BY BMP ID	POLLUTANT CONTROL TYPE	DRAINS TO POC ID
1	8.311	0.372	4.5	D	0.31	4,285	1	BF-1	1
2	19.438	0.896	4.6	D	0.31	10,062	2	BF-1	1
3	3.515	0.271	7.7	D	0.32	1,878	3	BF-1	2
4	0.270	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
5	0.383	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
6	0.487	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
7	0.165	0.100	60.6	D	0.57	157	7	BF-3	1
8	1.537	1.327	86.3	D	N/A	N/A	8	GREEN STREET	2
9	3.691	3.213	87.1	D	N/A	N/A	9	GREEN STREET	1
10	1.222	1.077	88.1	D	N/A	N/A	10	GREEN STREET	1
11	0.734	0.603	82.2	D	N/A	N/A	11	GREEN STREET	2
12	0.276	0.221	80.1	D	N/A	N/A	12	GREEN STREET	N/A

SUMARY OF DMA INFORMATION

No OF DMA	AREA (ACRES)	IMPERVIOUS AREA (ACRES)	% IMP.	HSG	AREA WEIGHTED C FACTOR	TOTAL DCV (CF)	TOTAL AREA TREATED		No OF POC'S
12	40.029	8.080	20.2	D	0.26	16,382	40.029		2

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.
2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.
3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.
4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.
5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK).

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax (619) 296-5564

PLANTING NOTES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN.

UNDERLAYING SOIL GROUP

ACCORDING TO THE NATIONAL COOPERATIVE SOIL SURVEY (USDA) THE UNDERLAYING SOIL CONSISTS OF SOIL TYPE D

GROUNDWATER

PER SOILS REPORT PREPARED BY GEOCON, INC. DATED APRIL 16, 2021 GROUNDWATER WAS NOT ENCOUNTERED IN INVESTIGATION.

0 80 80 160 240
GRAPHIC SCALE: 1" = 80'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

DRAINAGE MANAGEMENT AREAS ATTACHMENT 1A

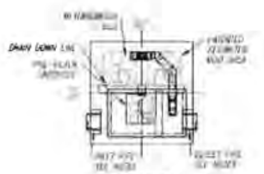
DMA EXHIBIT FOR:
BRITANNIA AIRWAY LOGISTICS CENTER

SHEET 1 OF 2

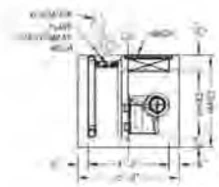
SITE SPECIFIC DATA

PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		[illegible]	
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	24" X 42"	OPEN PLANTER	N/A
NOTES:			

*PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

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.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. 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 PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
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. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

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

ELEVATION VIEW

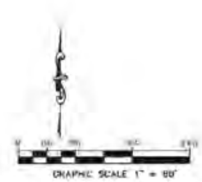
RIGHT END VIEW

TREATMENT FLOW (CFS)	[illegible]
OPERATING HEAD (FT)	14
PRETREATMENT LOADING RATE (GPM/SF)	[illegible]
WETLAND MEDIA LOADING RATE (GPM/SF)	[illegible]

Bio Clean

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

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax (619) 296-5564



IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY, SCALE PLAN ACCORDINGLY.

DRAINAGE MANAGEMENT AREAS
ATTACHMENT 1A

DMA EXHIBIT FOR:
BRITANNIA AIRWAY LOGISTICS CENTER

Project Name: Britannia Airway Logistics Center

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	8.278	0.372	4.5	D	0.31	4,285	BMP 1	BF-1	1
2	19.438	0.896	4.6	D	0.31	10,062	BMP 2	BF-1	1
3	3.515	0.271	7.7	D	0.32	1,878	BMP 3	BF-1	1
4	0.270	0	0	D	N/A	N/A	N/A	Self Mitigating	1
5	0.383	0	0	D	N/A	N/A	N/A	Self Mitigating	1
6	0.487	0	0	D	N/A	N/A	N/A	Self Mitigating	1
7	0.165	0.100	60.6	D	0.57	157	7	BF-3	1
8	1.537	1.327	86.3	D	N/A	N/A	8	Green Street	2
9	3.691	3.213	87.1	D	N/A	N/A	9	Green Street	1
10	1.222	1.077	88.1	D	N/A	N/A	10	Green Street	1
For DMA continuation see Following sheet									

SEE WORKSHEETS B.2-1 FOR WEIGHTED RUNOFF COEFFICIENT CALCULATION

Project Name: Britannia Airway Logistics Center

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)
11	0.734	0.603	82.2	D	N/A	N/A	11	Green Street	2
12	0.276	0.221	80.1	D	N/A	N/A	12	Green Street	N/A
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
12	40.029	8.08	20.3		0.26	16,382	40.029		2

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

SEE WORKSHEETS B.2-1 FOR WEIGHTED RUNOFF COEFFICIENT CALCULATION

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

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

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

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

T & U = 7Gal /day x (50 Persons x 1.5 day)/7.48 gal/ft3 = 70.19

211,364 sf (4.85AC) Landscape Area LI= (1,470 Gal x 4.85 x 1.5 Day)/7.48 gal/ft3= 1,430

Total 36hr demand= (T & U + LI) / DCV= (70.19+ 1,430)/16,225 = 0.093

3. Calculate the DCV using worksheet B-2.1.
DCV = 16,225__________ (cubic feet)
[Provide a summary of calculations here]
4,285 CF (DCV for BMP1)+10,062 CF (DCV for BMP2)+1,878 CF(DCV for BMP3)= 16,225 CF (see worksheets B.5-1)

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.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
Entire Site	Preliminary
Criteria 1: Infiltration Rate Screening	

1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☑ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☑ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☒ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.

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

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

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐Yes; continue to Step 1F. ☐No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐Yes; continue to Step 1G. ☐No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐Yes; answer "Yes" to Criteria 1 Result. ☐No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒No; full infiltration is not required. Skip to Part 1 Result.

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

Five borehole infiltration tests were performed for the project. The test results are as follows:

A1: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A2: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A3: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A4: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A5: 0.0027 in/hr (0.0014 in/hr with factor of 2.0)

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[11]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐Yes	☐No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐Full infiltration Condition ☒Complete Part 2

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
Entire Site	Preliminary
Criteria 3 : Infiltration Rate Screening	

3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☑ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☒ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☒ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

Five infiltration tests were conducted on the property. The infiltration results are as follows:

A1: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A2: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A3: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A4: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A5: 0.0027 in/hr (0.0014 in/hr with factor of 2.0)

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐Yes	☐No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☑ No Infiltration Condition

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

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	362090	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.31	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	4303	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	21	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	0.25	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	1.5	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.2	inches
15	Total Depth Treated [Line 13 + Line 14]	17.7	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	6454	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	4376	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	3227	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	2390	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	3367	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	3367	sq. ft.
23	Provided BMP Footprint	13653	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	1	

	Sizing Method for Volume Retention Criteria	Worksheet B.5-2	
1	Area draining to the BMP	362090	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.31	
3	85^{th} percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	4303	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	99	cu. ft.

The City of SAN DIEGO	Project Name	Britannia Airway Logistics center				
	BMP ID	1				

Volume Retention for No Infiltration Condition — **Worksheet B.5-6**

1	Area draining to the biofiltration BMP					362090	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.31	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					112248	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					3367	sq. ft.
5	Biofiltration BMP Footprint					13653	sq. ft.
Landscape Area (must be identified on DS-3247)							
	Identification	1	2	3	4	5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					13653	sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					4.05	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					99	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-301.95	cu. ft.
Site Design BMP							
	Identification	Site Design Type				Credit	
16	1						cu. ft.
	2						cu. ft.
	3						cu. ft.
	4						cu. ft.
	5						cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met					

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	846719	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.31	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	10062	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	21	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	0.25	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	1.5	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.2	inches
15	Total Depth Treated [Line 13 + Line 14]	17.7	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	15093	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	10232	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	7546	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	5590	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	7874	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	7874	sq. ft.
23	Provided BMP Footprint	27780	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	2	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	846719	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.31	
3	85^{th} percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	10062	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	231	cu. ft.

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center				
	BMP ID	2				
Volume Retention for No Infiltration Condition					**Worksheet B.5-6**	
1	Area draining to the biofiltration BMP				846719	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.31	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				262483	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]				7874	sq. ft.
5	Biofiltration BMP Footprint				27780	sq. ft.
Landscape Area (must be identified on DS-3247)						
	Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				27780	sq. ft.
Volume Retention Performance Standard						
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]				3.53	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]				231	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]				-584.43	cu. ft.
Site Design BMP						
	Identification	**Site Design Type**			**Credit**	
16	1					cu. ft.
	2					cu. ft.
	3					cu. ft.
	4					cu. ft.
	5					cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.				0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met				

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	3	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	153113	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.32	
3	85^{th} percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1878	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	21	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	0.25	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	1.5	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.2	inches
15	Total Depth Treated [Line 13 + Line 14]	17.7	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	2817	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	1910	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	1409	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	1043	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	1470	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	1470	sq. ft.
23	Provided BMP Footprint	7344	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center	
	BMP ID	3	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	153113	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.32	
3	85^{th} percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1878	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	43	cu. ft.

The City of SAN DIEGO	Project Name	Britannia Airway Logistics Center				
	BMP ID	3				

Volume Retention for No Infiltration Condition — **Worksheet B.5-6**

1	Area draining to the biofiltration BMP				153113	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.32	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				48996	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]				1470	sq. ft.
5	Biofiltration BMP Footprint				7344	sq. ft.
Landscape Area (must be identified on DS-3247)						
	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				7344	sq. ft.
Volume Retention Performance Standard						
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]				5	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]				43	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]				-172	cu. ft.
Site Design BMP						
	Identification	Site Design Type			Credit	
16	1					cu. ft.
	2					cu. ft.
	3					cu. ft.
	4					cu. ft.
	5					cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.				0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met				

Worksheet B.2-1: DCV

	Design Capture Volume BMP#1	Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	8.31	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.31	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=	0.00	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=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	4,303	cubic-feet

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

Worksheet B.2-1: DCV

Design Capture Volume BMP#2		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	19.44	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.31	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=	0.00	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=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	10,062	cubic-feet

Worksheet B.2-1: DCV

Design Capture Volume BMP# 3		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	3.52	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.32	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=	0.00	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=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	1,878	cubic-feet

Worksheet B.2-1: DCV

Design Capture Volume BMP# 7		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	0.165	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.57	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=	0.00	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=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	157	cubic-feet

BMP#7

	Flow-thru Design Flows	Worksheet B.6-1		
1	DCV	DCV	157	cubic-feet
2	DCV retained	$DCV_{retained}$		cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$		cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	157	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.165	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.57	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	.019	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.

Since a Proprietary BMP is proposed a Factor of 1.5 will be used
Q X 1.5 = 0.03 CFS

DMA 1

WEIGHTED RUNOFF FACTOR CALCULATION

Per Storm Water Standards Table B.1-1

Runoff factor for:

Concrete or asphalt= 0.90

Amended soils, mulched soils or landscape= 0.10

Decomposed Granite= 0.30

Weighted Runoff Factor Equation

Cw= [(C x impervious area)+ (C x pervious area)] / Total area

Where:

Total tributary area= 362,090 sf

Area impervious= 17,686 sf

Area pervious= 34,463 sf

Area DG= 309,941 sf

Wc=[(0.90)(17,686 sf)+(0.10)(34,463 ft)+(0.30)(309,941)]/362,090 sf

Wc=0.31

DMA 2

WEIGHTED RUNOFF FACTOR CALCULATION

Per Storm Water Standards Table B.1-1

Runoff factor for:

Concrete or asphalt= 0.90

Amended soils, mulched soils or landscape= 0.10

Decomposed Granite= 0.30

Weighted Runoff Factor Equation

Cw= [(C x impervious area)+ (C x pervious area)] / Total area

Where:

Total tributary area= 846,719 sf

Area impervious= 39,012 sf

Area pervious= 57,929 sf

Area DG= 749,778 sf

Wc=[(0.90)(39,012 sf)+(0.10)(57,929 ft)+(0.30)(749,778)]/846,719sf

Wc=0.31

DMA 3

WEIGHTED RUNOFF FACTOR CALCULATION

Per Storm Water Standards Table B.1-1

Runoff factor for:

Concrete or asphalt= 0.90

Amended soils, mulched soils or landscape= 0.10

Decomposed Granite= 0.30

Weighted Runoff Factor Equation

Cw= [(C x impervious area)+ (C x pervious area)] / Total area

Where:

Total tributary area= 153,113 sf

Area impervious= 11,803 sf

Area pervious= 22,815 sf

Area DG= 118,495 sf

Wc=[(0.90)(11,803 sf)+(0.10)(22,815 ft)+(0.30)(118,495)]/153,113sf

Wc=0.32

DMA 7

WEIGHTED RUNOFF FACTOR CALCULATION

Per Storm Water Standards Table B.1-1

Runoff factor for:

Concrete or asphalt= 0.90

Amended soils, mulched soils or landscape= 0.10

Permeable Pavement= 0.30

Weighted Runoff Factor Equation

Cw= [(C x impervious area)+ (C x pervious area)] / Total area

Where:

Total tributary area= 7,171 sf

Area impervious= 4,225 sf

Area pervious= 2,946 sf

Wc=[(0.90)(4,225 sf)+(0.10)(2,946 ft)]/7,171sf

Wc=0.57

DMA 7 REQUIRED WQ FLOW= 0.03 CFS
MWS-L-4-4 TREATS 0.052 CFS

BIOFILTRATION PRODUCTS

Modular Wetlands® Linear

Specifications

Flow-Based Designs

The Modular Wetlands® Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

Model #	Dimensions	Wetland Media Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
MWS-L-4-4	4'x4'	23	0.052
MWS-L-4-6	4'x6'	32	0.073
MWS-L-4-8	4'x8'	50	0.115
MWS-L-4-13	4'x13'	63	0.144
MWS-L-4-15	4'x15'	76	0.175
MWS-L-4-17	4'x17'	90	0.206
MWS-L-4-19	4'x19'	103	0.237

Model #	Dimensions	Wetland Media Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
MWS-L-4-21	4'x21'	117	0.268
MWS-L-6-8	6'x8'	64	0.147
MWS-L-8-8	8'x8'	100	0.230
MWS-L-8-12	8'x12'	151	0.346
MWS-L-8-16	8'x16'	201	0.462
MWS-L-8-20	8'x20'	252	0.577
MWS-L-8-24	8'x24'	302	0.693

Volume-Based Designs

In the example above, the Modular Wetlands Linear is installed downstream of the UrbanPond storage system. The Modular Wetlands Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements.

The Modular Wetlands Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.

UrbanPond | Single and Double Modules

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.052	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	24" X 42"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION

* PRELIMINARY NOT FOR CONSTRUCTION

PEDESTRIAN

OPEN PLANTER

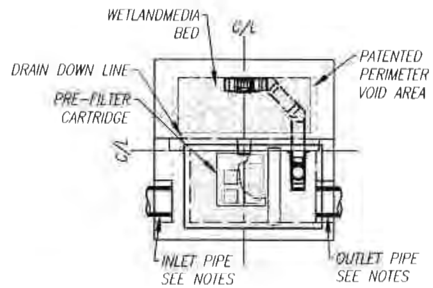
N/A

N/A

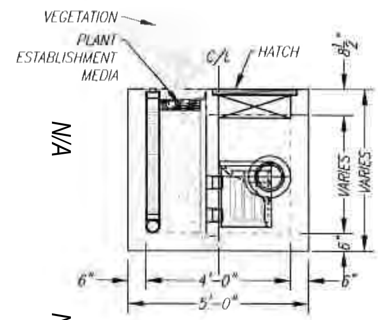
N/A

0.052

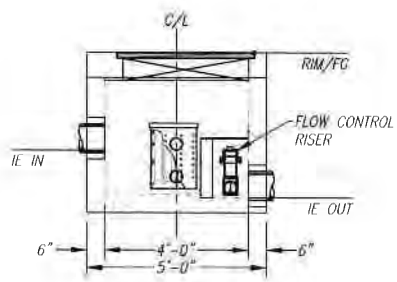
OFFLINE



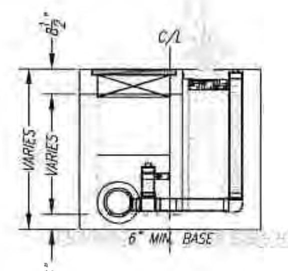
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

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.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. 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 PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
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. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

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

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

MODULAR WETLANDS

PROPRIETARY AND CONFIDENTIAL:

Bio Clean
A Forterra Company

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

E.18 BF-1 Biofiltration

Location: 43rd Street and Logan Avenue, San Diego, California

MS4 Permit Category
Biofiltration
Manual Category
Biofiltration
Applicable Performance Standard
Pollutant Control Flow Control
Primary Benefits
Treatment Volume Reduction (Incidental) Peak Flow Attenuation (Optional)

Description

Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer (aka choking layer) consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Design Adaptations for Project Goals

Biofiltration Treatment BMP for stormwater pollutant control. The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

Integrated stormwater flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Recommended Siting Criteria

	Siting Criteria	Intent/Rationale
□	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
□	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents stormwater from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
□	Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP.
□	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.

Example Schematic Design – Plan and Section View

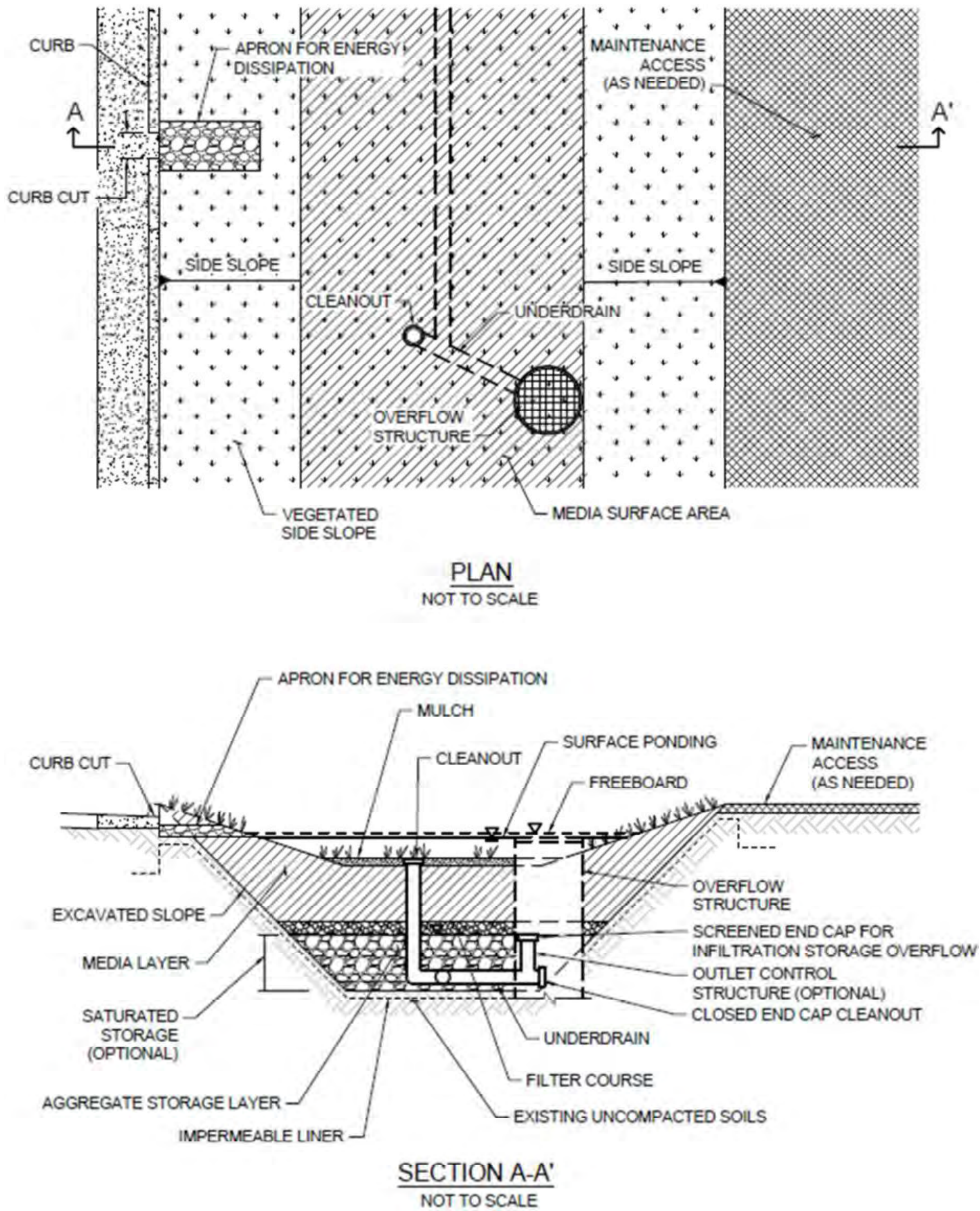


Figure E.18-1 : Typical Plan and Section View of a Biofiltration BMP

Recommended BMP Component Dimensions

BMP Component	Dimension	Intent/Rationale
Freeboard	≥ 2 inches	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
Surface Ponding	≥ 6 and ≤ 12 inches	The minimum ponding depth is required so that the runoff is uniformly spread throughout the basin (minimizes the likelihood of short circuiting). Deep surface ponding raises safety concerns. When the BMP is adjoining walkways the minimum surface ponding depth can be reduced to 4 inches. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence) and 3) potential for elevated clogging risk is evaluated (Worksheet B.5.4).
Ponding Area Side Slopes	3H:1V or shallower	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
Mulch	≥ 3 inches	Mulch will suppress weeds and maintain moisture for plant growth.
Media Layer	≥ 18 inches	A deep media layer provides additional filtration and supports plants with deeper roots. Where the minimum depth of 18 inches is used, only shallow-rooted species shall be planted. A minimum 24-inch media layer shall typically be required to support vegetation, with a minimum 36-inch media layer depth required for trees.
Filter Course	6 inches	To reduce clogging potential, a two-layer filter course (aka choking stone system) is used consisting of one 3" layer of clean and washed ASTM 33 Fine Aggregate Sand overlying a 3" layer of ASTM No 8 Stone (Appendix F.4). This specification has been developed to maintain permeability while limiting the migration of media material into the stone reservoir and underdrain system.
Underdrain Diameter	≥ 8 inches	Minimum diameter required for maintenance by City crews. For privately maintained BMPs, a minimum underdrain diameter of 6 inches is allowed.
Cleanout Diameter	≥ 8 inches	Facilitates simpler cleaning, when needed. For privately maintained BMPs, cleanout diameter of 6 inches is allowed.

Deviations to the recommended BMP component dimensions may be approved at the discretion of the City Engineer if it is determined to be appropriate.

Design Criteria and Considerations

Bioretention with underdrain must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Design Criteria	Intent/Rationale
Surface Ponding		
☐	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hour for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.
Vegetation		
☐	Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.26.	Plants suited to the climate and ponding depth are more likely to survive.
☐	An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
Mulch		
☐	A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided.	Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply.
Media Layer		
☐	Media maintains a minimum filtration rate of 5 in/hr. over lifetime of facility. Additional Criteria for media hydraulic conductivity described in the bioretention soil media model specification (Appendix F.3)	A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.

	Design Criteria	Intent/Rationale
☐	Media shall be a minimum 18 inches deep for filtration purposes, with a minimum 24-inch media layer depth typically required to support vegetation and a minimum 36-inch media layer depth required for trees. Media shall meet the following specifications. Model bioretention soil media specification provided in Appendix F.3 or County of San Diego Low Impact Development Handbook: Appendix G - Bioretention Soil Specification (June 2014, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications, the media meets the pollutant treatment performance criteria in Section F.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications shall be followed. For non-standard or proprietary designs, compliance with Appendix F.1 ensures that adequate treatment performance will be provided.
☐	Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity. Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance. Refer to Appendix B.5 for guidance to support use of smaller than 3% footprint..
☐	Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.
Filter Course Layer		
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade and can result in poor water quality performance for turbidity and suspended solids. Filter fabric is more likely to clog.
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☐	To reduce clogging potential, a two-layer filter course (aka choking stone system) is used consisting of one 3" layer of clean and washed ASTM 33 Fine Aggregate Sand overlying a 3" layer of ASTM No 8 Stone (Appendix F.4).	This specification has been developed to maintain permeability while limiting the migration of media material into the stone reservoir and underdrain system.

	Design Criteria	Intent/Rationale
Aggregate Storage Layer		
☐	ASTM #57 open graded stone is used for the storage layer and a two layer filter course (detailed above) is used above this layer	This layer provides additional storage capacity. ASTM #8 stone provides an acceptable choking/bridging interface with the particles in ASTM #57 stone.
☐	The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
Inflow, Underdrain, and Outflow Structures		
☐	Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐	Inflow velocities are limited to 3 ft./s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☐	Curb cut inlets are at least 18 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☐	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐	Minimum underdrain diameter is 8 inches.	Minimum diameter required for maintenance by City crews. For privately maintained BMPs, a minimum underdrain diameter of 6 inches is allowed.
☐	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☐	An underdrain cleanout with a minimum 8-inch diameter and lockable cap is placed every 50 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance. For privately maintained BMPs, cleanout diameter of 6 inches is allowed.
☐	Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow for on-line infiltration basins and water quality peak flow for off-line basins.	Planning for overflow lessens the risk of property damage due to flooding.

Conceptual Design and Sizing Approach for Stormwater Pollutant Control Only

To design bioretention with underdrain for stormwater pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per **Appendix B** based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in **Appendix B.5** to size biofiltration BMPs.

Conceptual Design and Sizing Approach when Stormwater Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of stormwater pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in **Chapter 6** of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If biofiltration with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After biofiltration with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if stormwater pollutant control requirements to treat the DCV have been met.

E.19 BF-2 Nutrient Sensitive Media Design

Some studies of bioretention with underdrains have observed export of nutrients, particularly inorganic nitrogen (nitrate and nitrite) and dissolved phosphorus. This has been observed to be a short-lived phenomenon in some studies or a long term issue in some studies. The composition of the soil media, including the chemistry of individual elements is believed to be an important factor in the potential for nutrient export. Organic amendments, often compost, have been identified as the most likely source of nutrient export. The quality and stability of organic amendments can vary widely.

The biofiltration media specifications contained in **Appendix F.3** and the County of San Diego Low Impact Development Handbook: Appendix G -Bioretention Soil Specification (June 2014, unless superseded by more recent edition) were developed with consideration of the potential for nutrient export. These specifications include criteria for individual component characteristics and quality in order to control the overall quality of the blended mixes.

The City and County specifications noted above were developed for general purposes to meet permeability and treatment goals. In cases where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, the biofiltration media should be designed with the specific goal of minimizing the potential for export of nutrients from the media. Therefore, in addition to adhering to the City or County media specifications, the following guidelines should be followed:

1. **Select plant palette to minimize plant nutrient needs**
   A landscape architect or agronomist should be consulted to select a plant palette that minimizes nutrient needs. Utilizing plants with low nutrient needs results in less need to enrich the biofiltration soil mix. If nutrient quantity is then tailored to plants with lower nutrient needs, these plants will generally have less competition from weeds, which typically need higher nutrient content. The following practices are recommended to minimize nutrient needs of the plant palette:
   - **Utilize native, drought-tolerant plants and grasses where possible.** Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils.
   - **Start plants from smaller starts or seed.** Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Given the lower cost of smaller plants, the project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.
2. **Minimize excess nutrients in media mix**
   Once the low-nutrient plant palette is established (item 1), the landscape architect and/or agronomist should be consulted to assist in the design of a biofiltration media to balance the interests of plant establishment, water retention capacity (irrigation demand), and the potential for nutrient export. The following guidelines should be followed:
   - **The mix should not exceed the nutrient needs of plants**. In conventional landscape design, the nutrient needs of plants are often exceeded intentionally in order to provide a factor of safety for plant survival. This practice must be avoided in biofiltration media as excess nutrients will increase the chance of export. The mix designer should keep in mind that nutrients can be added later (through mulching,

tilling of amendments into the surface), but it is not possible to remove nutrients, once added.

- **The actual nutrient content and organic content of the selected organic amendment source should be determined when specifying mix proportions.** Nutrient content (i.e., C:N ratio; plant extractable nutrients) and organic content (i.e, % organic material) are relatively inexpensive to measure via standard agronomic methods and can provide important information about mix design. If mix design relies on approximate assumption about nutrient/organic content and this is not confirmed with testing (or the results of prior representative testing), it is possible that the mix could contain much more nutrient than intended.
- **Nutrients are better retained in soils with higher cation exchange capacity.** Cation exchange capacity can be increased through selection of organic material with naturally high cation exchange capacity, such as peat or coconut coir pith, and/or selection of inorganic material with high cation exchange capacity such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc). Including higher cation exchange capacity materials would tend to reduce the net export of nutrients. Natural silty materials also provide cation exchange capacity; however potential impacts to permeability need to be considered.
- **Focus on soil structure as well as nutrient content.** Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of organic amendment, plants survivability should still be provided. While soil structure generally develops with time, biofiltration media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high humus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of organic material with a distribution of particle sizes (i.e., a more heterogeneous mix).
- **Consider alternatives to compost.** Compost, by nature, is a material that is continually evolving and decaying. It can be challenging to determine whether tests previously done on a given compost stock are still representative. It can also be challenging to determine how the properties of the compost will change once placed in the media bed. More stable materials such as aged coco coir pith, peat, biochar, shredded bark, and/or other amendments should be considered.

With these considerations, it is anticipated that less than 10 percent organic amendment by volume could be used, while still balancing plant survivability and water retention. If compost is used, designers should strongly consider utilizing less than 10 percent by volume.

3. **Design with partial retention and/or internal water storage**

An internal water storage zone, as described in Fact Sheet PR-1 is believed to improve retention of nutrients. For lined systems, an internal water storage zone worked by providing a zone that fluctuates between aerobic and anaerobic conditions, resulting in nitrification/denitrification. In soils that will allow infiltration, a partial retention design (PR-1) allows significant volume reduction and can also promote nitrification/denitrification.

Acknowledgment: This fact sheet has been adapted from the Orange County Technical Guidance Document (May 2011). It was originally developed based on input from: Deborah Deets, City of Los Angeles Bureau of Sanitation, Drew Ready, Center for Watershed Health, Rick Fisher, ASLA, City of Los Angeles Bureau of Engineering, Dr. Garn Wallace, Wallace Laboratories, Glen Dake, GDML, and Jason Schmidt, Tree People. The guidance provided herein does not reflect the individual opinions of any individual listed above and should not be cited or otherwise attributed to those listed.

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E.20 BF-3 Proprietary Biofiltration Systems

The purpose of this fact sheet is to help explain the potential role of proprietary BMPs in meeting biofiltration requirements, when full retention of the DCV is not feasible. The fact sheet does not describe design criteria like the other fact sheets in this appendix because this information varies by BMP product model.

Criteria for Use of a Proprietary BMP as a Biofiltration BMP

A proprietary BMP may be acceptable as a "biofiltration BMP" under the following conditions:

1. The BMP meets the minimum design criteria listed in **Appendix F**, including the selection criteria and pollutant treatment performance standard in **Appendix F.1**;
2. The BMP meets the performance standard for compact BMPs in **Table B.5-1** in **Appendix B.5**;
3. The BMP is designed and maintained in a manner consistent with its performance certifications (See explanation in **Appendix F.2**); and
4. The BMP is acceptable at the discretion of the City Engineer. In determining the acceptability of a BMP, the City Engineer should consider, as applicable, (a) the data submitted; (b) representativeness of the data submitted; (c) consistency of the BMP performance claims with pollutant control objectives; certainty of the BMP performance claims; (d) for projects within the public right of way and/or public projects: maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business; and (e) other relevant factors. If a proposed BMP is not accepted by the City Engineer, a written explanation/reason will be provided to the applicant.

Guidance for Sizing a Proprietary BMP as a Biofiltration BMP

Proprietary biofiltration BMPs must meet the same sizing guidance as non-proprietary BMPs. Sizing is typically based on capturing and treating 1.50 times the DCV not reliably retained. Guidance for sizing biofiltration BMPs to comply with requirements of this manual is provided in **Appendix B.5** and **Appendix F.2**.

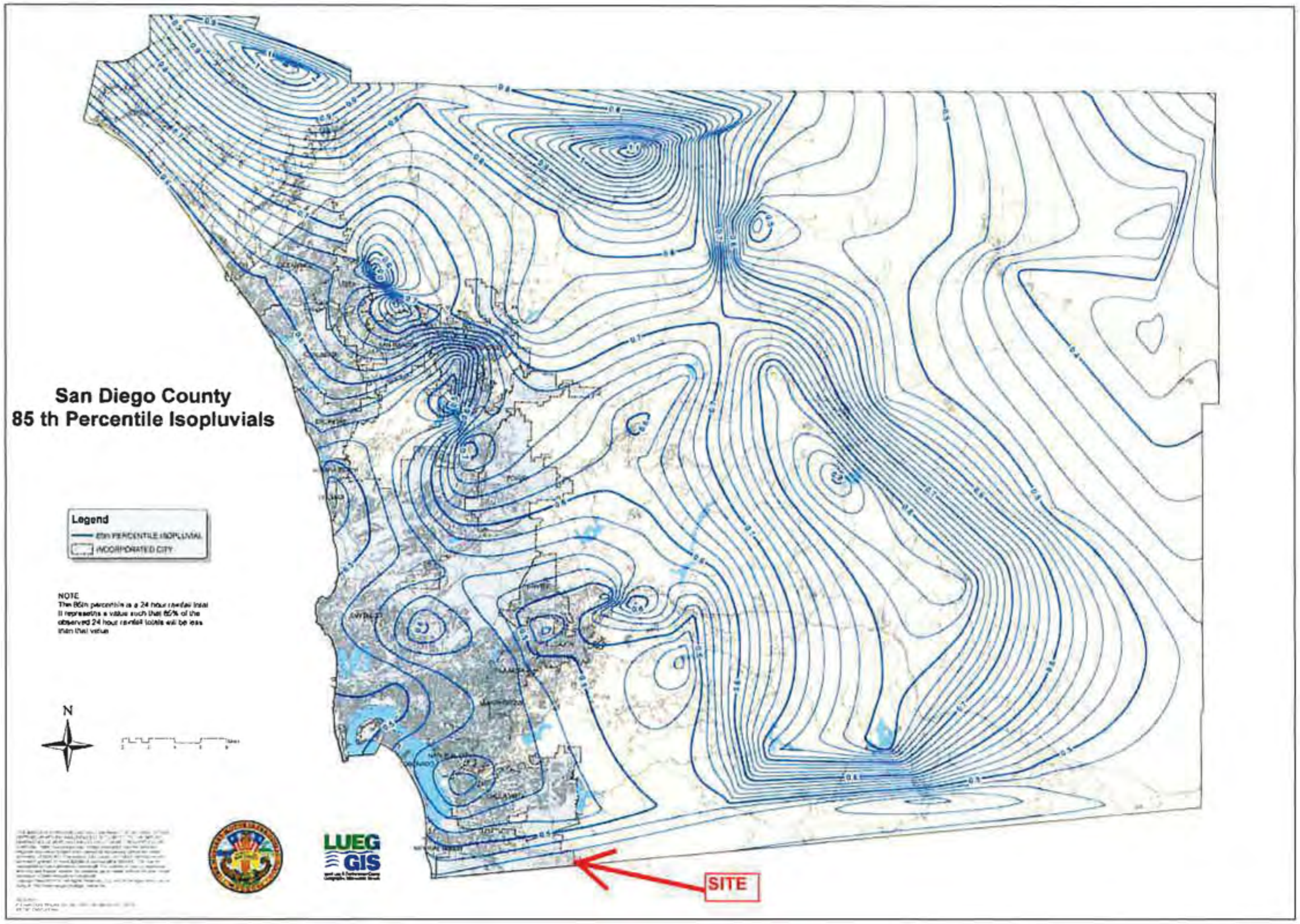

Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

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Attachment 2
Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

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

Project Name: Britannia Airway Logistics Center

Indicate which Items are Included:

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

Project Name: Britannia Airway Logistics Center

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

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [ ] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] Point(s) of Compliance (POC) for Hydromodification Management

  Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- [x] Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).

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K&S ENGINEERING, INC.
Planning Engineering Surveying

HYDROMODIFICATION REPORT

For

BRITANNIA AIRWAY LOGISTICS CENTER
5761 Airway Road
San Diego, CA 92154
APN 646-100-74-00

PTS#

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September 19, 2022
K&S JN 20-025

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

9/19/2022

Kamal S. Sweis RCE 48592 **Date**

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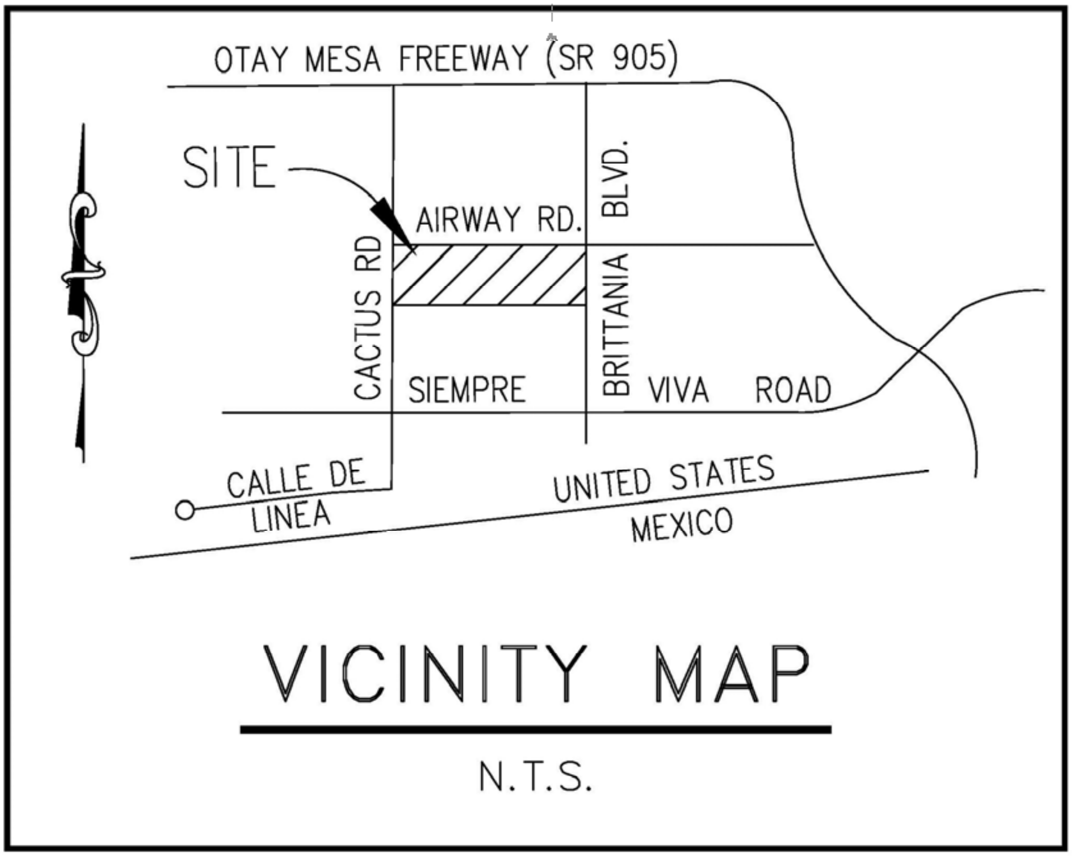


2 INTRODUCTION

The project consists of the development of the North Quarter of the Southwest Quarter of 33, Township 18 south, Range 1 West, San Bernardino base and meridian, in the county of San Diego, State of California, according to United States government survey thereof.

The project consists of grading and drainage improvements for temporary DG truck parking with landscaping, office trailers, paved office parking, storm drains and biofiltration BMP's for pollutant control and hydromodification purposes.

3 PURPOSE OF THIS MODEL

Continuous simulation hydrologic modeling was conducted on this project to demonstrate compliance with the performance standards for hydromodification management in San Diego.

The San Diego Hydrology Model (SDHM) distributed by Clear Creek Solutions, Inc. was used for hydromodification management on the subject project.

The inputs required to develop SDHM models include rainfall, watershed characteristics, and BMP configurations. The Lower Otay gauge from the Project Clean Water website was used for this study. Default SDHM 3.1 pervious and impervious soil parameters used are found in Appendix A of this report.

Per the NRCS web soil survey, the project site is situated upon Class D soils. Soils have been assumed to be compacted to represent the current existing developed condition of the site, while fully compacted in the post developed conditions

4 HMP MODELING

In current existing conditions, the existing site is undeveloped land. Table 4.1 below illustrates the pre-developed area and impervious percentage accordingly.

4.1 Summary of Predeveloped Condition

POC	DMA ID	Tributary Area, A (Ac)	Impervious Percentage, Ip
POC-1	DMA-1	8.28	0%
POC-1	DMA-2	19.44	0%
POC-2	DMA-3	3.52	0%

Runoff from the improved areas of the project site is drained to one onsite receiving LID BMPs. Once flows are routed via the proposed BMPs, onsite flows are then discharged to the existing discharge locations. Table 4.2 summarizes the post-developed area and impervious percentage accordingly.

4.2 Summary of Proposed Condition

POC	DMA ID	Tributary Area, A (Ac)	Impervious Percentage, Ip
POC-1	DMA-1	8.28	4.5%
POC-1	DMA-2	19.44	3.3%
POC-2	DMA-3	3.52	13.3%
POC-1	DMA-7	0.16	60%

DMA 7 has been accounted for in the HMP calculations for BMP 1.

Three HMP Biofiltration basins are proposed within the project site and responsible for performing hydromodification and water quality requirements for the project site. Runoff is discharged to this dual purpose water quality and HMP biofiltration basins prior to draining to the receiving POC's.

In developed conditions, the Biofiltration basin 1, 2 & 3 will have surface depth of 3 3 -inches plus 3 inches of mulch. These 3 Biofiltration basins will include a riser spillway structure set to an elevation of 12-inches from the surface invert of the basin.

Underneath the basin invert is located the proposed LID biofiltration portion of the drainage facility. This portion of the basin is comprised of an 24-inch layer of amended soil (a highly sandy, organic rich composite with an infiltration capacity of at least 5 inches/hr) and an 24-inch storage layer of gravel which includes the 6 inches of filter course layer and the 3 inches of dead storage below the LID orifice. The BMP will be lined to prevent infiltration into the underlying soil.

TABLE 3 – SUMMARY OF DEVELOPED DUAL PURPOSE BMP

BMP	Tributary Area (Ac)	DIMENSIONS					
		BMP Area, (ft^2)	LID Orifice (in)	Gravel Depth (in)	Depth to Top of Riser(ft)	Weir Perimeter Length (ft)	Total Surface Depth (ft)
1	8.28	13,653	1.0"	18"	1.0'	12.6'	3.0'
2	19.44	27,180	1.0"	18"	1.0'	12.6'	3.0'
3	3.52	7,344	1.0"	18"	1.0'	12.6'	3.0'

***Includes area under the slopes**

Water Quality BMP Sizing

The BMPs have been designed in accordance with City of San Diego Storm Water Standards Manual January 2018 Edition sizing criteria.

5. REFERENCES

1 – “Final Hydromodification Management Plan (HMP) prepared for the County of San Diego”, March 2011, Brown and Caldwell.

2 - Order R9-20013-001, California Regional Water Quality Control Board San Diego Region (SDRWQCB).

3 - City of San Diego Storm Water Standards Manual January 2018 Edition

4 – San Diego Hydrology Model 3.1 User Manual – April 2017

APPENDIX A –
SDHM 3.1 PROJECT REPORT
CALCULATIONS AND CHARTS

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	20-025
Site Name:	Badiee Truck Parking
Site Address:	Airway Road
City:	San Diego
Report Date:	9/15/2022
Gage:	LWR OTAY
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/04/19

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,Dirt,Flat	8.47
Pervious Total	8.47
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.47

Element Flows To:

Surface	Interflow	Groundwater

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Dirt,Flat	19.43
Pervious Total	19.43
Impervious Land Use	acre
Impervious Total	0
Basin Total	19.43

Element Flows To:

Surface	Interflow	Groundwater

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Dirt,Flat	3.51
Pervious Total	3.51
Impervious Land Use	acre
Impervious Total	0
Basin Total	3.51

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.79
D,Rock,Flat	7.28
Pervious Total	8.07
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.38
Impervious Total	0.38
Basin Total	8.45

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 1	Surface Biofilter 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,Rock,Flat	17.2
D,NatVeg,Flat	1.33
Pervious Total	18.53
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.9
Impervious Total	0.9
Basin Total	19.43

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 2	Surface Biofilter 2	

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	0.52
D,Rock,Flat	2.72
Pervious Total	3.24
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.27
Impervious Total	0.27
Basin Total	3.51

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 3	Surface Biofilter 3	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofilter 1

Bottom Length:	433.00 ft.
Bottom Width:	31.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	1
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	32.562
Total Outflow (ac-ft.):	42.355
Percent Through Underdrain:	76.88

Discharge Structure

Riser Height:	1 ft.	
Riser Diameter:	24 in.	
Orifice 1 Diameter:	4 in.	Elevation:0.5 ft.

Element Flows To:
Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
493.00	0.5246	0.0000	0.0000	0.0000
493.07	0.5231	0.0064	0.0000	0.0000
493.14	0.5183	0.0129	0.0000	0.0000
493.21	0.5136	0.0195	0.0000	0.0000
493.27	0.5088	0.0261	0.0000	0.0000
493.34	0.5041	0.0329	0.0000	0.0000
493.41	0.4994	0.0397	0.0000	0.0000
493.48	0.4947	0.0467	0.0000	0.0000
493.55	0.4900	0.0537	0.0000	0.0000
493.62	0.4853	0.0608	0.0000	0.0000
493.69	0.4806	0.0680	0.0000	0.0000
493.76	0.4759	0.0753	0.0000	0.0000
493.82	0.4712	0.0827	0.0000	0.0000
493.89	0.4666	0.0902	0.0000	0.0000
493.96	0.4619	0.0978	0.0000	0.0000
494.03	0.4573	0.1055	0.0000	0.0000
494.10	0.4526	0.1133	0.0000	0.0000
494.17	0.4480	0.1211	0.0000	0.0000
494.24	0.4433	0.1291	0.0000	0.0000
494.30	0.4387	0.1371	0.0000	0.0000
494.37	0.4341	0.1453	0.0000	0.0000
494.44	0.4295	0.1535	0.0000	0.0000
494.51	0.4249	0.1619	0.0000	0.0000
494.58	0.4203	0.1703	0.0000	0.0000
494.65	0.4157	0.1788	0.0000	0.0000
494.72	0.4112	0.1874	0.0000	0.0000
494.79	0.4066	0.1995	0.0000	0.0000
494.85	0.4020	0.2116	0.0000	0.0000

494.92	0.3975	0.2239	0.0000	0.0000
494.99	0.3930	0.2364	0.0000	0.0000
495.06	0.3884	0.2490	0.0000	0.0000
495.13	0.3839	0.2617	0.0000	0.0000
495.20	0.3794	0.2745	0.0000	0.0000
495.27	0.3749	0.2875	0.0000	0.0000
495.34	0.3704	0.3006	0.0000	0.0000
495.40	0.3659	0.3138	0.0000	0.0000
495.47	0.3614	0.3272	0.0000	0.0000
495.54	0.3569	0.3407	0.0000	0.0000
495.61	0.3524	0.3543	0.0000	0.0000
495.68	0.3480	0.3680	0.0000	0.0000
495.75	0.3435	0.3819	0.0000	0.0000
495.82	0.3391	0.3960	0.0000	0.0000
495.88	0.3346	0.4101	0.0000	0.0000
495.95	0.3302	0.4244	0.0000	0.0000
496.02	0.3258	0.4389	0.0000	0.0000
496.09	0.3214	0.4535	0.0000	0.0000
496.16	0.3169	0.4682	0.0000	0.0000
496.23	0.3125	0.4830	0.0000	0.0000
496.25	0.3081	0.4878	0.0000	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.2500	0.5246	0.4878	0.0000	1.5536	0.0000
3.3187	0.5294	0.5240	0.0000	1.5536	0.0000
3.3874	0.5341	0.5605	0.0000	1.9548	0.0000
3.4560	0.5389	0.5973	0.0000	2.0259	0.0000
3.5247	0.5437	0.6345	0.0000	2.0971	0.0000
3.5934	0.5485	0.6720	0.0000	2.1682	0.0000
3.6621	0.5533	0.7099	0.0000	2.2393	0.0000
3.7308	0.5581	0.7480	0.0000	2.3105	0.0000
3.7995	0.5629	0.7865	0.0000	2.3816	0.0000
3.8681	0.5677	0.8253	0.0000	2.4527	0.0000
3.9368	0.5726	0.8645	0.0000	2.5239	0.0000
4.0055	0.5774	0.9040	0.0000	2.5950	0.0000
4.0742	0.5823	0.9438	0.0000	2.6661	0.0000
4.1429	0.5871	0.9840	0.0000	2.7373	0.0000
4.2115	0.5920	1.0245	0.0000	2.8084	0.0000
4.2802	0.5968	1.0653	0.0000	2.8795	0.0000
4.3489	0.6017	1.1065	0.0000	2.9507	0.0000
4.4176	0.6066	1.1479	0.0000	3.0218	0.0000
4.4863	0.6115	1.1898	0.0000	3.0930	0.0000
4.5549	0.6164	1.2319	0.0000	3.1641	0.0000
4.6236	0.6213	1.2745	0.0020	3.2352	0.0000
4.6923	0.6262	1.3173	0.0029	3.3064	0.0000
4.7610	0.6312	1.3605	0.0047	3.3775	0.0000
4.8297	0.6361	1.4040	0.0055	3.4486	0.0000
4.8984	0.6410	1.4478	0.0068	3.5198	0.0000
4.9670	0.6460	1.4920	0.0075	3.5909	0.0000
5.0357	0.6509	1.5366	0.0086	3.6620	0.0000
5.1044	0.6559	1.5815	0.0091	3.7332	0.0000
5.1731	0.6609	1.6267	0.0100	3.8043	0.0000
5.2418	0.6659	1.6722	0.0104	3.8754	0.0000
5.3104	0.6709	1.7181	0.0112	3.9466	0.0000
5.3791	0.6759	1.7644	0.0116	4.0177	0.0000
5.4478	0.6809	1.8110	0.0123	4.0888	0.0000
5.5165	0.6859	1.8579	0.0127	4.1600	0.0000

5.5852	0.6909	1.9052	0.0138	4.2311	0.0000
5.6538	0.6959	1.9528	0.0151	4.3022	0.0000
5.7225	0.7010	2.0008	0.0166	4.3734	0.0000
5.7912	0.7060	2.0491	0.0180	4.4445	0.0000
5.8599	0.7110	2.0978	0.0193	4.5157	0.0000
5.9286	0.7161	2.1468	0.0206	4.5868	0.0000
5.9973	0.7212	2.1961	0.0218	4.6579	0.0000
6.0659	0.7262	2.2458	0.0229	4.7291	0.0000
6.1346	0.7313	2.2959	0.0240	4.8002	0.0000
6.2033	0.7364	2.3463	0.0250	4.8713	0.0000
6.2500	0.7399	2.3808	0.0261	4.9197	0.0000

Surface Biofilter 1

Element Flows To:

Outlet 1	Outlet 2
	Biofilter 1

Biofilter 2

Bottom Length:	735.00 ft.
Bottom Width:	33.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	1
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	59.377
Total Outflow (ac-ft.):	98.711
Percent Through Underdrain:	60.15

Discharge Structure

Riser Height:	1 ft.	
Riser Diameter:	24 in.	
Orifice 1 Diameter:	4 in.	Elevation:0.5 ft.

Element Flows To:

Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
495.50	0.9093	0.0000	0.0000	0.0000
495.56	0.9072	0.0097	0.0000	0.0000
495.62	0.9008	0.0195	0.0000	0.0000
495.67	0.8944	0.0294	0.0000	0.0000
495.73	0.8880	0.0394	0.0000	0.0000
495.79	0.8816	0.0495	0.0000	0.0000
495.85	0.8752	0.0597	0.0000	0.0000
495.90	0.8688	0.0701	0.0000	0.0000
495.96	0.8625	0.0805	0.0000	0.0000
496.02	0.8561	0.0910	0.0000	0.0000
496.08	0.8497	0.1017	0.0000	0.0000
496.13	0.8434	0.1124	0.0000	0.0000
496.19	0.8370	0.1233	0.0000	0.0000
496.25	0.8307	0.1342	0.0000	0.0000
496.31	0.8243	0.1453	0.0000	0.0000
496.37	0.8180	0.1565	0.0000	0.0000
496.42	0.8117	0.1678	0.0000	0.0000
496.48	0.8053	0.1792	0.0000	0.0000
496.54	0.7990	0.1907	0.0000	0.0000
496.60	0.7927	0.2023	0.0000	0.0000
496.65	0.7864	0.2140	0.0000	0.0000
496.71	0.7801	0.2258	0.0000	0.0000
496.77	0.7738	0.2378	0.0000	0.0000
496.83	0.7675	0.2498	0.0000	0.0000
496.88	0.7612	0.2619	0.0000	0.0000
496.94	0.7549	0.2742	0.0000	0.0000
497.00	0.7487	0.2865	0.0000	0.0000
497.06	0.7424	0.2990	0.0000	0.0000
497.12	0.7361	0.3116	0.0000	0.0000
497.17	0.7299	0.3243	0.0000	0.0000

497.23	0.7236	0.3371	0.0000	0.0000
497.29	0.7174	0.3549	0.0000	0.0000
497.35	0.7111	0.3729	0.0000	0.0000
497.40	0.7049	0.3911	0.0000	0.0000
497.46	0.6986	0.4094	0.0000	0.0000
497.52	0.6924	0.4278	0.0000	0.0000
497.58	0.6862	0.4464	0.0000	0.0000
497.63	0.6800	0.4652	0.0000	0.0000
497.69	0.6738	0.4841	0.0000	0.0000
497.75	0.6676	0.5031	0.0000	0.0000
497.81	0.6614	0.5223	0.0000	0.0000
497.87	0.6552	0.5417	0.0000	0.0000
497.92	0.6490	0.5612	0.0000	0.0000
497.98	0.6428	0.5809	0.0000	0.0000
498.04	0.6366	0.6007	0.0000	0.0000
498.10	0.6305	0.6207	0.0000	0.0000
498.15	0.6243	0.6408	0.0000	0.0000
498.21	0.6181	0.6610	0.0000	0.0000
498.27	0.6120	0.6815	0.0000	0.0000
498.33	0.6058	0.7020	0.0000	0.0000
498.38	0.5997	0.7228	0.0000	0.0000
498.44	0.5935	0.7436	0.0000	0.0000
498.50	0.5874	0.7647	0.0000	0.0000
498.56	0.5813	0.7859	0.0000	0.0000
498.62	0.5752	0.8072	0.0000	0.0000
498.67	0.5690	0.8287	0.0000	0.0000
498.73	0.5629	0.8503	0.0000	0.0000
498.75	0.5568	0.8576	0.0000	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.2500	0.9093	0.8576	0.0000	2.8073	0.0000
3.3077	0.9158	0.9102	0.0000	2.8073	0.0000
3.3654	0.9222	0.9632	0.0000	3.4911	0.0000
3.4231	0.9286	1.0166	0.0000	3.5991	0.0000
3.4808	0.9350	1.0704	0.0000	3.7071	0.0000
3.5385	0.9415	1.1245	0.0000	3.8150	0.0000
3.5962	0.9479	1.1790	0.0000	3.9230	0.0000
3.6538	0.9544	1.2339	0.0000	4.0310	0.0000
3.7115	0.9608	1.2891	0.0000	4.1390	0.0000
3.7692	0.9673	1.3448	0.0000	4.2469	0.0000
3.8269	0.9738	1.4007	0.0000	4.3549	0.0000
3.8846	0.9802	1.4571	0.0000	4.4629	0.0000
3.9423	0.9867	1.5139	0.0000	4.5709	0.0000
4.0000	0.9932	1.5710	0.0000	4.6788	0.0000
4.0577	0.9997	1.6284	0.0000	4.7868	0.0000
4.1154	1.0062	1.6863	0.0000	4.8948	0.0000
4.1731	1.0127	1.7445	0.0000	5.0027	0.0000
4.2308	1.0192	1.8032	0.0000	5.1107	0.0000
4.2885	1.0257	1.8621	0.0000	5.2187	0.0000
4.3462	1.0322	1.9215	0.0000	5.3267	0.0000
4.4038	1.0387	1.9812	0.0000	5.4346	0.0000
4.4615	1.0452	2.0414	0.0000	5.5426	0.0000
4.5192	1.0518	2.1018	0.0000	5.6506	0.0000
4.5769	1.0583	2.1627	0.0000	5.7586	0.0000
4.6346	1.0648	2.2240	0.0000	5.8665	0.0000
4.6923	1.0714	2.2856	0.0023	5.9745	0.0000
4.7500	1.0779	2.3476	0.0035	6.0825	0.0000

4.8077	1.0845	2.4100	0.0050	6.1904	0.0000
4.8654	1.0911	2.4727	0.0058	6.2984	0.0000
4.9231	1.0976	2.5358	0.0069	6.4064	0.0000
4.9808	1.1042	2.5994	0.0075	6.5144	0.0000
5.0385	1.1108	2.6633	0.0084	6.6223	0.0000
5.0962	1.1174	2.7275	0.0088	6.7303	0.0000
5.1538	1.1240	2.7922	0.0096	6.8383	0.0000
5.2115	1.1306	2.8572	0.0100	6.9463	0.0000
5.2500	1.1350	2.9008	0.0107	7.0182	0.0000

Surface Biofilter 2

Element Flows To:

Outlet 1	Outlet 2
	Biofilter 2

Biofilter 3

Bottom Length: 355.00 ft.
Bottom Width: 21.00 ft.
Material thickness of first layer: 0.25
Material type for first layer: Mulch
Material thickness of second layer: 1.5
Material type for second layer: ESM
Material thickness of third layer: 1.5
Material type for third layer: GRAVEL
Underdrain used
Underdrain Diameter (feet): 0.5
Orifice Diameter (in.): 1
Offset (in.): 3
Flow Through Underdrain (ac-ft.): 17.234
Total Outflow (ac-ft.): 18.522
Percent Through Underdrain: 93.05
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 4 in. Elevation:0.5 ft.
Element Flows To:
Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
508.00	0.3482	0.0000	0.0000	0.0000
508.06	0.3471	0.0030	0.0000	0.0000
508.12	0.3438	0.0060	0.0000	0.0000
508.17	0.3405	0.0091	0.0000	0.0000
508.23	0.3372	0.0123	0.0000	0.0000
508.29	0.3340	0.0155	0.0000	0.0000
508.35	0.3307	0.0187	0.0000	0.0000
508.40	0.3274	0.0220	0.0000	0.0000
508.46	0.3242	0.0254	0.0000	0.0000
508.52	0.3209	0.0288	0.0000	0.0000
508.58	0.3177	0.0322	0.0000	0.0000
508.63	0.3144	0.0357	0.0000	0.0000
508.69	0.3112	0.0393	0.0000	0.0000
508.75	0.3079	0.0429	0.0000	0.0000
508.81	0.3047	0.0466	0.0000	0.0000
508.87	0.3015	0.0503	0.0000	0.0000
508.92	0.2983	0.0541	0.0000	0.0000
508.98	0.2951	0.0579	0.0000	0.0000
509.04	0.2919	0.0618	0.0000	0.0000
509.10	0.2887	0.0657	0.0000	0.0000
509.15	0.2855	0.0697	0.0000	0.0000
509.21	0.2823	0.0738	0.0000	0.0000
509.27	0.2791	0.0779	0.0000	0.0000
509.33	0.2759	0.0820	0.0000	0.0000
509.38	0.2727	0.0862	0.0000	0.0000
509.44	0.2696	0.0905	0.0000	0.0000
509.50	0.2664	0.0948	0.0000	0.0000
509.56	0.2633	0.0991	0.0000	0.0000
509.62	0.2601	0.1036	0.0000	0.0000
509.67	0.2570	0.1080	0.0000	0.0000

509.73	0.2538	0.1126	0.0000	0.0000
509.79	0.2507	0.1189	0.0000	0.0000
509.85	0.2476	0.1253	0.0000	0.0000
509.90	0.2444	0.1318	0.0000	0.0000
509.96	0.2413	0.1384	0.0000	0.0000
510.02	0.2382	0.1450	0.0000	0.0000
510.08	0.2351	0.1517	0.0000	0.0000
510.13	0.2320	0.1585	0.0000	0.0000
510.19	0.2289	0.1654	0.0000	0.0000
510.25	0.2258	0.1724	0.0000	0.0000
510.31	0.2227	0.1794	0.0000	0.0000
510.37	0.2197	0.1865	0.0000	0.0000
510.42	0.2166	0.1937	0.0000	0.0000
510.48	0.2135	0.2009	0.0000	0.0000
510.54	0.2105	0.2083	0.0000	0.0000
510.60	0.2074	0.2157	0.0000	0.0000
510.65	0.2043	0.2232	0.0000	0.0000
510.71	0.2013	0.2307	0.0000	0.0000
510.77	0.1983	0.2384	0.0000	0.0000
510.83	0.1952	0.2461	0.0000	0.0000
510.88	0.1922	0.2539	0.0000	0.0000
510.94	0.1892	0.2618	0.0000	0.0000
511.00	0.1862	0.2697	0.0000	0.0000
511.06	0.1831	0.2778	0.0000	0.0000
511.12	0.1801	0.2859	0.0000	0.0000
511.17	0.1771	0.2941	0.0000	0.0000
511.23	0.1741	0.3023	0.0000	0.0000
511.25	0.1711	0.3051	0.0000	0.0000

Biofilter Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
3.2500	0.3482	0.3051	0.0000	0.8628	0.0000
3.3077	0.3515	0.3253	0.0000	0.8628	0.0000
3.3654	0.3548	0.3457	0.0000	1.0730	0.0000
3.4231	0.3581	0.3662	0.0000	1.1062	0.0000
3.4808	0.3614	0.3870	0.0000	1.1394	0.0000
3.5385	0.3648	0.4079	0.0000	1.1726	0.0000
3.5962	0.3681	0.4291	0.0000	1.2058	0.0000
3.6538	0.3714	0.4504	0.0000	1.2390	0.0000
3.7115	0.3748	0.4719	0.0000	1.2721	0.0000
3.7692	0.3781	0.4937	0.0000	1.3053	0.0000
3.8269	0.3814	0.5156	0.0000	1.3385	0.0000
3.8846	0.3848	0.5377	0.0000	1.3717	0.0000
3.9423	0.3882	0.5600	0.0000	1.4049	0.0000
4.0000	0.3915	0.5825	0.0000	1.4381	0.0000
4.0577	0.3949	0.6051	0.0000	1.4713	0.0000
4.1154	0.3983	0.6280	0.0000	1.5045	0.0000
4.1731	0.4017	0.6511	0.0000	1.5376	0.0000
4.2308	0.4051	0.6744	0.0000	1.5708	0.0000
4.2885	0.4084	0.6978	0.0000	1.6040	0.0000
4.3462	0.4118	0.7215	0.0000	1.6372	0.0000
4.4038	0.4152	0.7454	0.0000	1.6704	0.0000
4.4615	0.4187	0.7694	0.0000	1.7036	0.0000
4.5192	0.4221	0.7937	0.0000	1.7368	0.0000
4.5769	0.4255	0.8181	0.0000	1.7699	0.0000
4.6346	0.4289	0.8428	0.0000	1.8031	0.0000
4.6923	0.4324	0.8676	0.0023	1.8363	0.0000
4.7500	0.4358	0.8926	0.0035	1.8695	0.0000

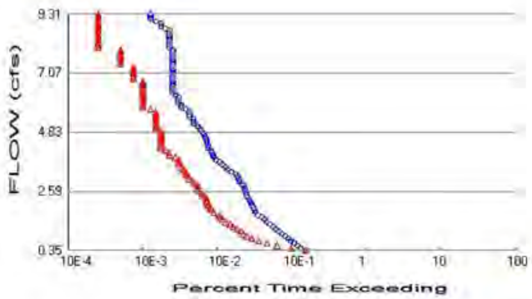
4.8077	0.4392	0.9179	0.0050	1.9027	0.0000
4.8654	0.4427	0.9433	0.0058	1.9359	0.0000
4.9231	0.4461	0.9690	0.0069	1.9691	0.0000
4.9808	0.4496	0.9948	0.0075	2.0022	0.0000
5.0385	0.4531	1.0208	0.0084	2.0354	0.0000
5.0962	0.4565	1.0471	0.0088	2.0686	0.0000
5.1538	0.4600	1.0735	0.0096	2.1018	0.0000
5.2115	0.4635	1.1002	0.0100	2.1350	0.0000
5.2500	0.4658	1.1180	0.0107	2.1571	0.0000

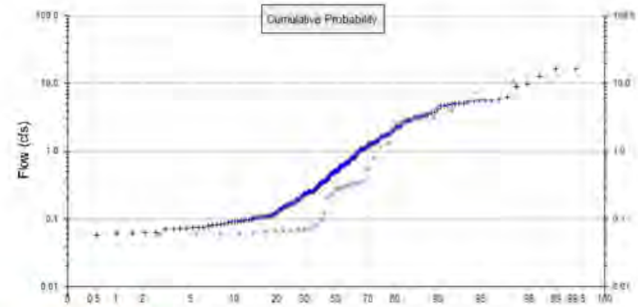
Surface Biofilter 3

Element Flows To:

Outlet 1	Outlet 2
	Biofilter 3

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 27.9
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 26.6
Total Impervious Area: 1.28

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	3.548103
5 year	5.689163
10 year	9.310252
25 year	16.251144

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.081555
5 year	1.079782
10 year	3.026122
25 year	7.652943

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3548	623	598	95	Pass
0.4453	529	392	74	Pass
0.5357	476	255	53	Pass
0.6262	429	184	42	Pass
0.7166	384	143	37	Pass
0.8071	361	116	32	Pass
0.8976	326	100	30	Pass
0.9880	297	88	29	Pass
1.0785	267	84	31	Pass
1.1689	241	73	30	Pass
1.2594	225	65	28	Pass
1.3499	204	59	28	Pass
1.4403	182	52	28	Pass
1.5308	172	47	27	Pass
1.6212	158	44	27	Pass
1.7117	138	42	30	Pass
1.8022	129	36	27	Pass
1.8926	125	33	26	Pass
1.9831	122	32	26	Pass
2.0735	116	30	25	Pass
2.1640	114	29	25	Pass
2.2544	108	29	26	Pass
2.3449	103	28	27	Pass
2.4354	99	26	26	Pass
2.5258	97	25	25	Pass
2.6163	95	23	24	Pass
2.7067	94	22	23	Pass
2.7972	89	22	24	Pass
2.8877	86	20	23	Pass
2.9781	79	19	24	Pass
3.0686	77	17	22	Pass
3.1590	75	16	21	Pass
3.2495	71	15	21	Pass
3.3400	62	15	24	Pass
3.4304	55	14	25	Pass
3.5209	52	13	25	Pass
3.6113	46	12	26	Pass
3.7018	43	12	27	Pass
3.7923	38	12	31	Pass
3.8827	36	11	30	Pass
3.9732	35	9	25	Pass
4.0636	34	9	26	Pass
4.1541	33	8	24	Pass
4.2445	30	7	23	Pass
4.3350	30	7	23	Pass
4.4255	29	7	24	Pass
4.5159	29	7	24	Pass
4.6064	28	7	25	Pass
4.6968	27	7	25	Pass
4.7873	26	7	26	Pass
4.8778	24	7	29	Pass
4.9682	23	6	26	Pass
5.0587	22	6	27	Pass

5.1491	19	6	31	Pass
5.2396	19	6	31	Pass
5.3301	19	6	31	Pass
5.4205	17	6	35	Pass
5.5110	17	6	35	Pass
5.6014	17	6	35	Pass
5.6919	15	5	33	Pass
5.7824	13	4	30	Pass
5.8728	13	4	30	Pass
5.9633	12	4	33	Pass
6.0537	12	4	33	Pass
6.1442	12	4	33	Pass
6.2346	11	4	36	Pass
6.3251	10	4	40	Pass
6.4156	10	4	40	Pass
6.5060	10	4	40	Pass
6.5965	10	4	40	Pass
6.6869	10	4	40	Pass
6.7774	10	4	40	Pass
6.8679	10	3	30	Pass
6.9583	10	3	30	Pass
7.0488	10	3	30	Pass
7.1392	10	3	30	Pass
7.2297	10	3	30	Pass
7.3202	10	3	30	Pass
7.4106	10	2	20	Pass
7.5011	10	2	20	Pass
7.5915	10	2	20	Pass
7.6820	10	2	20	Pass
7.7724	10	2	20	Pass
7.8629	10	2	20	Pass
7.9534	10	2	20	Pass
8.0438	9	1	11	Pass
8.1343	9	1	11	Pass
8.2247	9	1	11	Pass
8.3152	9	1	11	Pass
8.4057	9	1	11	Pass
8.4961	9	1	11	Pass
8.5866	9	1	11	Pass
8.6770	9	1	11	Pass
8.7675	8	1	12	Pass
8.8580	7	1	14	Pass
8.9484	7	1	14	Pass
9.0389	6	1	16	Pass
9.1293	5	1	20	Pass
9.2198	5	1	20	Pass
9.3103	5	1	20	Pass

Water Quality

Drawdown Time Results

Pond: Surface Biofilter 1

Days	Stage(feet)	Percent of Total Run Time
1	N/A	100.00
2	N/A	100.00
3	N/A	100.00
4	N/A	100.00
5	N/A	100.00

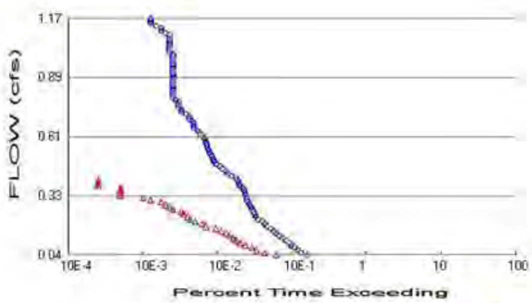
Maximum Stage: 1.000 Drawdown Time: Less than 1 day

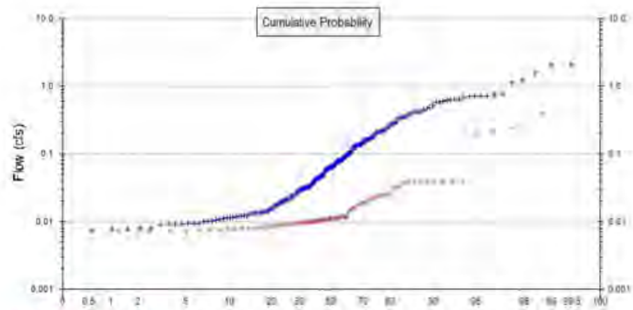
Pond: Surface Biofilter 2

Days	Stage(feet)	Percent of Total Run Time
1	N/A	100.00
2	N/A	100.00
3	N/A	100.00
4	N/A	100.00
5	N/A	100.00

Maximum Stage: 1.000 Drawdown Time: Less than 1 day

POC 2





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 3.51
Total Impervious Area: 0

Mitigated Landuse Totals for POC #2
Total Pervious Area: 3.24
Total Impervious Area: 0.27

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	0.446374
5 year	0.715733
10 year	1.17129
25 year	2.044499

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.0192
5 year	0.038446
10 year	0.094754
25 year	0.257156

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0446	629	247	39	Pass
0.0560	529	170	32	Pass
0.0674	476	134	28	Pass
0.0788	430	116	26	Pass
0.0902	385	95	24	Pass
0.1015	363	81	22	Pass
0.1129	330	71	21	Pass
0.1243	297	65	21	Pass
0.1357	268	57	21	Pass
0.1471	241	52	21	Pass
0.1584	225	45	20	Pass
0.1698	206	38	18	Pass
0.1812	183	28	15	Pass
0.1926	172	25	14	Pass
0.2040	161	20	12	Pass
0.2153	138	17	12	Pass
0.2267	129	16	12	Pass
0.2381	125	14	11	Pass
0.2495	122	13	10	Pass
0.2609	117	10	8	Pass
0.2722	114	9	7	Pass
0.2836	108	8	7	Pass
0.2950	103	7	6	Pass
0.3064	99	5	5	Pass
0.3178	97	4	4	Pass
0.3291	95	2	2	Pass
0.3405	94	2	2	Pass
0.3519	90	2	2	Pass
0.3633	86	2	2	Pass
0.3747	79	1	1	Pass
0.3860	77	1	1	Pass
0.3974	75	1	1	Pass
0.4088	71	0	0	Pass
0.4202	62	0	0	Pass
0.4316	55	0	0	Pass
0.4429	52	0	0	Pass
0.4543	46	0	0	Pass
0.4657	43	0	0	Pass
0.4771	38	0	0	Pass
0.4885	36	0	0	Pass
0.4999	35	0	0	Pass
0.5112	34	0	0	Pass
0.5226	33	0	0	Pass
0.5340	31	0	0	Pass
0.5454	30	0	0	Pass
0.5568	29	0	0	Pass
0.5681	29	0	0	Pass
0.5795	28	0	0	Pass
0.5909	27	0	0	Pass
0.6023	26	0	0	Pass
0.6137	24	0	0	Pass
0.6250	23	0	0	Pass
0.6364	22	0	0	Pass

0.6478	19	0	0	Pass
0.6592	19	0	0	Pass
0.6706	19	0	0	Pass
0.6819	18	0	0	Pass
0.6933	17	0	0	Pass
0.7047	17	0	0	Pass
0.7161	15	0	0	Pass
0.7275	13	0	0	Pass
0.7388	13	0	0	Pass
0.7502	12	0	0	Pass
0.7616	12	0	0	Pass
0.7730	12	0	0	Pass
0.7844	11	0	0	Pass
0.7957	10	0	0	Pass
0.8071	10	0	0	Pass
0.8185	10	0	0	Pass
0.8299	10	0	0	Pass
0.8413	10	0	0	Pass
0.8526	10	0	0	Pass
0.8640	10	0	0	Pass
0.8754	10	0	0	Pass
0.8868	10	0	0	Pass
0.8982	10	0	0	Pass
0.9095	10	0	0	Pass
0.9209	10	0	0	Pass
0.9323	10	0	0	Pass
0.9437	10	0	0	Pass
0.9551	10	0	0	Pass
0.9664	10	0	0	Pass
0.9778	10	0	0	Pass
0.9892	10	0	0	Pass
1.0006	10	0	0	Pass
1.0120	9	0	0	Pass
1.0233	9	0	0	Pass
1.0347	9	0	0	Pass
1.0461	9	0	0	Pass
1.0575	9	0	0	Pass
1.0689	9	0	0	Pass
1.0802	9	0	0	Pass
1.0916	9	0	0	Pass
1.1030	8	0	0	Pass
1.1144	7	0	0	Pass
1.1258	7	0	0	Pass
1.1371	6	0	0	Pass
1.1485	5	0	0	Pass
1.1599	5	0	0	Pass
1.1713	5	0	0	Pass

Water Quality

Drawdown Time Results

Pond: Biofilter 3

Days	Stage(feet)	Percent of Total Run Time
1	1.658	100.00
2	1.831	100.00
3	2.009	100.00
4	2.205	100.00
5	2.441	100.00

Maximum Stage: 3.250 Drawdown Time: 05 00:00:10

Pond: Surface Biofilter 3

Days	Stage(feet)	Percent of Total Run Time
1	N/A	100.00
2	N/A	100.00
3	N/A	100.00
4	N/A	100.00
5	N/A	100.00

Maximum Stage: 1.500 Drawdown Time: Less than 1 day

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

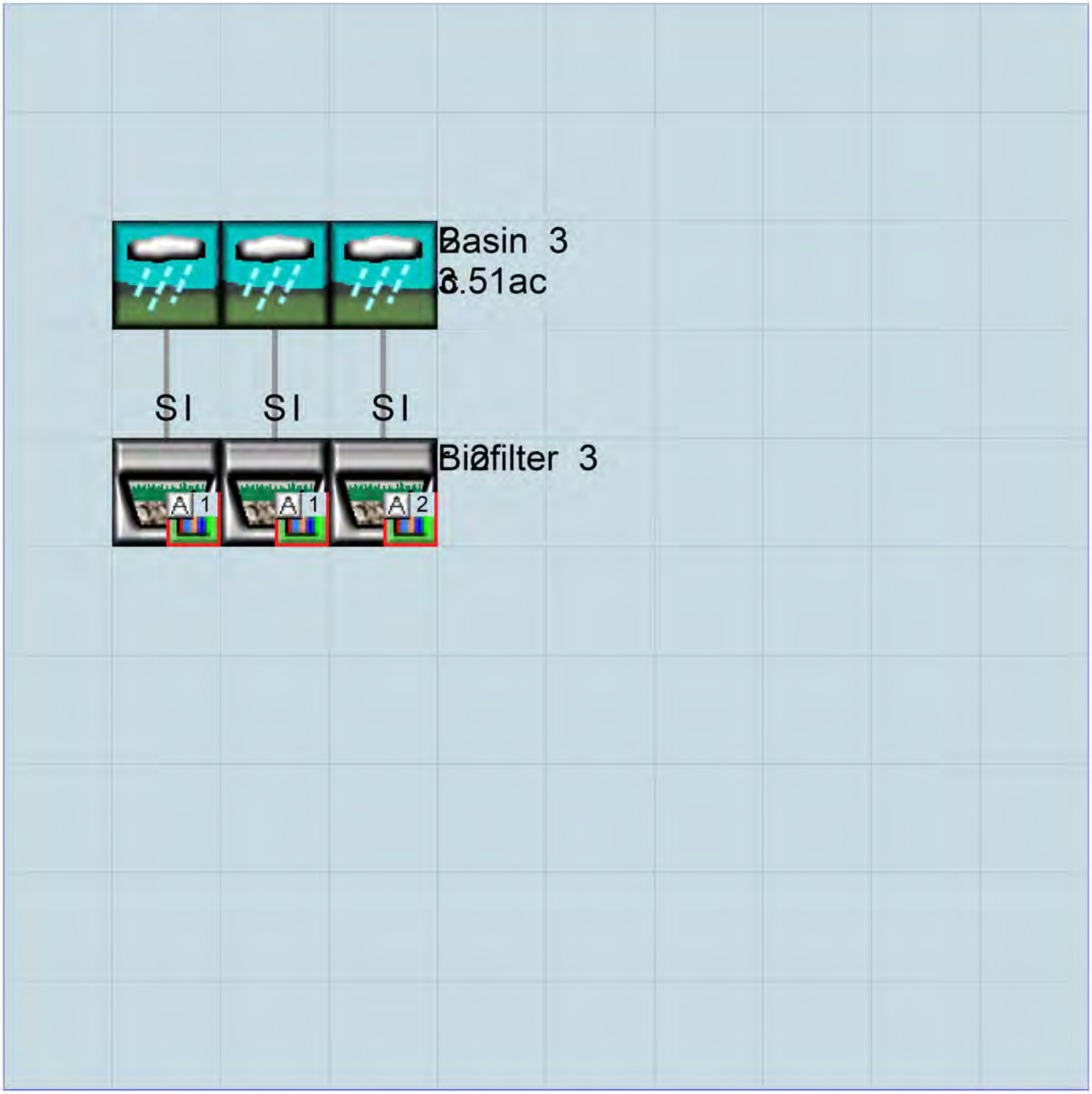
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic



Predeveloped UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   20-025.wdm
MESSU      25   Pre20-025.MES
           27   Pre20-025.L61
           28   Pre20-025.L62
           30   POC20-0251.dat
           31   POC20-0252.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      31
      COPY       501
      COPY       502
      DISPLY       1
      DISPLY       2
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                  MAX                      1    2   30    9
    2        Basin  3                  MAX                      1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1        1    1
  501        1    1
  502        1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                            User  t-series Engl Metr ***
                                            in  out          ***
   31      D,Dirt,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 ***
   31         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  *********
   31         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 ***
   31         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
   31              0       2.8     0.025       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   31              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 ***
   31              0       0.6     0.017         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  ***
   31       0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   31       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
   31              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                    <--Area-->     <-Target->   MBLK   ***
<Name>   #                    <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  31                          8.47     COPY   501     12
PERLND  31                          8.47     COPY   501     13
Basin  2***
PERLND  31                         19.43     COPY   501     12
PERLND  31                         19.43     COPY   501     13
Basin  3***
PERLND  31                          3.51     COPY   502     12
PERLND  31                          3.51     COPY   502     13

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

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


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

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

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

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

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

```
  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

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

END EXT SOURCES

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

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

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   20-025.wdm
MESSU      25   Mit20-025.MES
           27   Mit20-025.L61
           28   Mit20-025.L62
           30   POC20-0251.dat
           31   POC20-0252.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      28
      PERLND      34
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      GENER        6
      RCHRES       5
      RCHRES       6
      COPY         1
      COPY       501
      COPY         2
      COPY       502
      DISPLY       1
      DISPLY       2
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface Biofilter  1        MAX                   1    2   30    9
    2        Surface Biofilter  3        MAX                   1    2   31    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
    2         1    1
  502         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
    4        24
    6        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
```

```
    4             0.
    6             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   28      D,NatVeg,Flat          1    1    1    1   27    0
   34      D,Rock,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 ***
   28         0    0    1    0    0    0    0    0    0    0    0    0
   34         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  *********
   28         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   34         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 ***
   28         0    1    1    1    0    0    0    0    1    1    0
   34         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
   28              0       3.3      0.03       100      0.05       2.5     0.915
   34              0       2.4     0.022       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   28              0         0         2         2         0      0.05      0.05
   34              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 ***
   28              0       0.6      0.04         1       0.3         0
   34              0       0.6     0.025         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  ***
   28       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
   34       0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   28       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
   34       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
   28             0         0      0.01         0       0.4      0.01         0
   34             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

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

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

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

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

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

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  28                        0.79     RCHRES   1      2
PERLND  28                        0.79     RCHRES   1      3
PERLND  34                        7.28     RCHRES   1      2
PERLND  34                        7.28     RCHRES   1      3
IMPLND   1                        0.38     RCHRES   1      5
Basin  2***
PERLND  34                        17.2     RCHRES   3      2
PERLND  34                        17.2     RCHRES   3      3
PERLND  28                        1.33     RCHRES   3      2
PERLND  28                        1.33     RCHRES   3      3
IMPLND   1                         0.9     RCHRES   3      5
Basin  3***
```

```
PERLND  28                        0.52     RCHRES   5      2
PERLND  28                        0.52     RCHRES   5      3
PERLND  34                        2.72     RCHRES   5      2
PERLND  34                        2.72     RCHRES   5      3
IMPLND   1                        0.27     RCHRES   5      5

******Routing******
PERLND  28                        0.79     COPY     1     12
PERLND  34                        7.28     COPY     1     12
IMPLND   1                        0.38     COPY     1     15
PERLND  28                        0.79     COPY     1     13
PERLND  34                        7.28     COPY     1     13
RCHRES   1                           1     RCHRES   2      8
PERLND  34                        17.2     COPY     1     12
PERLND  28                        1.33     COPY     1     12
IMPLND   1                         0.9     COPY     1     15
PERLND  34                        17.2     COPY     1     13
PERLND  28                        1.33     COPY     1     13
RCHRES   3                           1     RCHRES   4      8
PERLND  28                        0.52     COPY     2     12
PERLND  34                        2.72     COPY     2     12
IMPLND   1                        0.27     COPY     2     15
PERLND  28                        0.52     COPY     2     13
PERLND  34                        2.72     COPY     2     13
RCHRES   5                           1     RCHRES   6      8
RCHRES   2                           1     COPY   501     16
RCHRES   1                           1     COPY   501     17
RCHRES   4                           1     COPY   501     16
RCHRES   3                           1     COPY   501     17
RCHRES   6                           1     COPY   502     16
RCHRES   5                           1     COPY   502     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   12.1        DISPLY   2     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     EXTNL  OUTDGT 1
GENER    6 OUTPUT TIMSER      .0002778     RCHRES   5     EXTNL  OUTDGT 1



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

RCHRES
  GEN-INFO
    RCHRES       Name         Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                            in  out                          ***
    1     Surface Biofilte-004    3    1    1    1   28    0    1
    2     Biofilter  1            1    1    1    1   28    0    1
    3     Surface Biofilte-008    3    1    1    1   28    0    1
    4     Biofilter  2            1    1    1    1   28    0    1
    5     Surface Biofilte-014    3    1    1    1   28    0    1
    6     Biofilter  3            1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
    5         1    0    0    0    0    0    0    0    0    0
```

```
    6         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
    5         4    0    0    0    0    0    0    0    0    0    1    9
    6         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  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    3        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    4        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    5        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    6        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50        ***
  <------><--------><--------><--------><--------><--------><-------->        ***
    1             1      0.01       0.0     493.0       0.0       0.0
    2             2      0.08       0.0     493.0       0.0       0.0
    3             3      0.01       0.0     495.5       0.0       0.0
    4             4      0.14       0.0     495.5       0.0       0.0
    5             5      0.01       0.0     508.0       0.0       0.0
    6             6      0.07       0.0     508.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  5.0  6.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    2           0         4.0  0.0  0.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    3           0         4.0  5.0  6.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    4           0         4.0  0.0  0.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    5           0         4.0  5.0  6.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
    6           0         4.0  0.0  0.0  0.0  0.0        0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL             4
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
```

```
*** User-Defined Variable Quantity Lines
***                           addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol6   RCHRES   6 VOL              4
  UVQUAN v2m6   GLOBAL     WORKSP  5        3
  UVQUAN vpo6   GLOBAL     WORKSP  6        3
  UVQUAN v2d6   GENER    6 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m6    1 WORKSP  5         1.0 QUAN
  UVNAME  vpo6    1 WORKSP  6         1.0 QUAN
  UVNAME  v2d6    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                              v2m2            =  21416.79
*** Compute remaining available pore space
  GENER   2                              vpo2            =  v2m2
  GENER   2                              vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                              vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                              v2d2            =  vpo2
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                              v2m4            =  37525.02
*** Compute remaining available pore space
  GENER   4                              vpo4            =  v2m4
  GENER   4                              vpo4           -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                              vpo4            =  0.0
END IF
*** Infiltration volume
  GENER   4                              v2d4            =  vpo4
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   6                              v2m6            =  13460.06
*** Compute remaining available pore space
  GENER   6                              vpo6            =  v2m6
  GENER   6                              vpo6           -=  vol6
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo6 < 0.0) THEN
  GENER   6                              vpo6            =  0.0
END IF
*** Infiltration volume
  GENER   6                              v2d6            =  vpo6
END SPEC-ACTIONS
```

FTABLES
FTABLE 2
49 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.524593	0.000000	0.000000		
0.068681	0.523070	0.006395	0.000000		
0.137363	0.518318	0.012880	0.000000		
0.206044	0.513574	0.019455	0.000000		
0.274725	0.508837	0.026122	0.000000		
0.343407	0.504109	0.032880	0.000000		
0.412088	0.499388	0.039729	0.000000		
0.480769	0.494675	0.046670	0.000000		
0.549451	0.489969	0.053702	0.000000		
0.618132	0.485272	0.060826	0.000000		
0.686813	0.480582	0.068041	0.000000		
0.755495	0.475900	0.075349	0.000000		
0.824176	0.471226	0.082749	0.000000		
0.892857	0.466560	0.090242	0.000000		
0.961538	0.461901	0.097827	0.000000		
1.030220	0.457250	0.105504	0.000000		
1.098901	0.452607	0.113275	0.000000		
1.167582	0.447972	0.121138	0.000000		
1.236264	0.443345	0.129095	0.000000		
1.304945	0.438725	0.137145	0.000000		
1.373626	0.434113	0.145288	0.001952		
1.442308	0.429509	0.153525	0.002928		
1.510989	0.424913	0.161856	0.004663		
1.579670	0.420325	0.170281	0.005530		
1.648352	0.415744	0.178800	0.006845		
1.717033	0.411172	0.187413	0.007503		
1.785714	0.406607	0.199459	0.008553		
1.854396	0.402049	0.211636	0.009078		
1.923077	0.397500	0.223944	0.009966		
1.991758	0.392958	0.236383	0.010411		
2.060440	0.388425	0.248954	0.011193		
2.129121	0.383899	0.261656	0.011584		
2.197802	0.379380	0.274491	0.012292		
2.266484	0.374870	0.287457	0.012666		
2.335165	0.370367	0.300556	0.013768		
2.403846	0.365873	0.313788	0.015133		
2.472527	0.361386	0.327153	0.016556		
2.541209	0.356906	0.340651	0.017952		
2.609890	0.352435	0.354282	0.019288		
2.678571	0.347971	0.368047	0.020557		
2.747253	0.343516	0.381945	0.021761		
2.815934	0.339068	0.395978	0.022907		
2.884615	0.334627	0.410145	0.023999		
2.953297	0.330195	0.424446	0.025045		
3.021978	0.325770	0.438882	0.026051		
3.090659	0.321353	0.453452	0.027020		
3.159341	0.316944	0.468158	0.027960		
3.228022	0.312543	0.483000	0.028882		
3.250000	0.308150	0.491662	0.047002		

END FTABLE 2
FTABLE 1
45 6

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Outflow3 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.308150	0.000000	0.000000	0.000000	0.000000		
0.068681	0.529355	0.036193	0.000000	1.553589	0.000000		
0.137363	0.534125	0.072714	0.000000	1.954791	0.000000		
0.206044	0.538903	0.109562	0.000000	2.025926	0.000000		
0.274725	0.543689	0.146739	0.000000	2.097061	0.000000		
0.343407	0.548482	0.184245	0.000000	2.168196	0.000000		
0.412088	0.553284	0.222081	0.000000	2.239331	0.000000		
0.480769	0.558093	0.260246	0.000000	2.310466	0.000000		
0.549451	0.562910	0.298742	0.008937	2.381601	0.000000		

0.618132	0.567735	0.337569	0.047342	2.452736	0.000000
0.686813	0.572567	0.376728	0.108229	2.523871	0.000000
0.755495	0.577408	0.416219	0.180489	2.595006	0.000000
0.824176	0.582256	0.456042	0.245295	2.666141	0.000000
0.892857	0.587112	0.496199	0.272142	2.737276	0.000000
0.961538	0.591976	0.536690	0.294973	2.808411	0.000000
1.030220	0.596847	0.577515	0.427667	2.879546	0.000000
1.098901	0.601727	0.618675	0.995255	2.950681	0.000000
1.167582	0.606614	0.660170	1.805046	3.021816	0.000000
1.236264	0.611509	0.702001	2.786461	3.092951	0.000000
1.304945	0.616411	0.744168	3.892383	3.164086	0.000000
1.373626	0.621322	0.786673	5.078900	3.235221	0.000000
1.442308	0.626240	0.829515	6.301096	3.306357	0.000000
1.510989	0.631166	0.872695	7.513064	3.377492	0.000000
1.579670	0.636100	0.916214	8.669782	3.448627	0.000000
1.648352	0.641042	0.960072	9.730134	3.519762	0.000000
1.717033	0.645992	1.004270	10.66071	3.590897	0.000000
1.785714	0.650949	1.048807	11.44026	3.662032	0.000000
1.854396	0.655914	1.093686	12.06468	3.733167	0.000000
1.923077	0.660887	1.138906	12.55244	3.804302	0.000000
1.991758	0.665868	1.184467	12.95050	3.875437	0.000000
2.060440	0.670856	1.230371	13.51604	3.946572	0.000000
2.129121	0.675852	1.276618	13.94139	4.017707	0.000000
2.197802	0.680856	1.323208	14.35409	4.088842	0.000000
2.266484	0.685868	1.370143	14.75522	4.159977	0.000000
2.335165	0.690888	1.417421	15.14569	4.231112	0.000000
2.403846	0.695916	1.465045	15.52633	4.302247	0.000000
2.472527	0.700951	1.513014	15.89782	4.373382	0.000000
2.541209	0.705994	1.561330	16.26082	4.444517	0.000000
2.609890	0.711045	1.609992	16.61586	4.515652	0.000000
2.678571	0.716104	1.659001	16.96347	4.586787	0.000000
2.747253	0.721170	1.708358	17.30407	4.657922	0.000000
2.815934	0.726244	1.758063	17.63809	4.729057	0.000000
2.884615	0.731326	1.808117	17.96589	4.800192	0.000000
2.953297	0.736416	1.858520	18.28781	4.871327	0.000000
3.000000	0.739882	1.892994	18.60415	4.919699	0.000000

END FTABLE 1
FTABLE 4
58 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.909349	0.000000	0.000000		
0.057692	0.907212	0.009690	0.000000		
0.115385	0.900804	0.019486	0.000000		
0.173077	0.894401	0.029387	0.000000		
0.230769	0.888003	0.039395	0.000000		
0.288462	0.881612	0.049509	0.000000		
0.346154	0.875225	0.059728	0.000000		
0.403846	0.868844	0.070054	0.000000		
0.461538	0.862469	0.080486	0.000000		
0.519231	0.856099	0.091025	0.000000		
0.576923	0.849735	0.101670	0.000000		
0.634615	0.843376	0.112421	0.000000		
0.692308	0.837023	0.123280	0.000000		
0.750000	0.830675	0.134245	0.000000		
0.807692	0.824333	0.145317	0.000000		
0.865385	0.817996	0.156495	0.000000		
0.923077	0.811665	0.167781	0.000000		
0.980769	0.805339	0.179174	0.000000		
1.038462	0.799019	0.190675	0.000000		
1.096154	0.792704	0.202282	0.000000		
1.153846	0.786395	0.213998	0.000000		
1.211538	0.780091	0.225820	0.000000		
1.269231	0.773792	0.237751	0.000000		
1.326923	0.767500	0.249789	0.000000		
1.384615	0.761212	0.261934	0.000000		
1.442308	0.754931	0.274188	0.002314		
1.500000	0.748654	0.286550	0.003470		
1.557692	0.742383	0.299020	0.005013		
1.615385	0.736118	0.311598	0.005785		

1.673077	0.729858	0.324284	0.006909
1.730769	0.723604	0.337079	0.007471
1.788462	0.717355	0.354928	0.008374
1.846154	0.711112	0.372928	0.008826
1.903846	0.704874	0.391078	0.009599
1.961538	0.698642	0.409378	0.009986
2.019231	0.692415	0.427829	0.010674
2.076923	0.686194	0.446431	0.011018
2.134615	0.679978	0.465184	0.011644
2.192308	0.673768	0.484087	0.011659
2.250000	0.667563	0.503142	0.012109
2.307692	0.661364	0.522348	0.013138
2.365385	0.655170	0.541705	0.014373
2.423077	0.648982	0.561214	0.015650
2.480769	0.642799	0.580875	0.016899
2.538462	0.636622	0.600687	0.018097
2.596154	0.630450	0.620652	0.019236
2.653846	0.624284	0.640768	0.020318
2.711538	0.618123	0.661036	0.021349
2.769231	0.611968	0.681457	0.022334
2.826923	0.605818	0.702030	0.023278
2.884615	0.599674	0.722756	0.024185
2.942308	0.593535	0.743635	0.025059
3.000000	0.587402	0.764666	0.025905
3.057692	0.581274	0.785851	0.026725
3.115385	0.575152	0.807188	0.027522
3.173077	0.569035	0.828679	0.028301
3.230769	0.562924	0.850323	0.029071
3.250000	0.556818	0.861456	0.047002

END FTABLE 4
FTABLE 3
36 6

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Outflow3 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.556818	0.000000	0.000000	0.000000	0.000000		
0.057692	0.915765	0.052648	0.000000	2.807294	0.000000		
0.115385	0.922186	0.105665	0.000000	3.491122	0.000000		
0.173077	0.928613	0.159054	0.000000	3.599095	0.000000		
0.230769	0.935045	0.212813	0.000000	3.707068	0.000000		
0.288462	0.941482	0.266944	0.000000	3.815040	0.000000		
0.346154	0.947926	0.321446	0.000000	3.923013	0.000000		
0.403846	0.954374	0.376320	0.000000	4.030986	0.000000		
0.461538	0.960828	0.431566	0.000000	4.138959	0.000000		
0.519231	0.967288	0.487185	0.060211	4.246932	0.000000		
0.576923	0.973753	0.543176	0.120422	4.354905	0.000000		
0.634615	0.980224	0.599541	0.159304	4.462878	0.000000		
0.692308	0.986700	0.656279	0.190404	4.570850	0.000000		
0.750000	0.993182	0.713391	0.217094	4.678823	0.000000		
0.807692	0.999669	0.770877	0.240845	4.786796	0.000000		
0.865385	1.006162	0.828738	0.262454	4.894769	0.000000		
0.923077	1.012660	0.886973	0.282415	5.002742	0.000000		
0.980769	1.019164	0.945583	0.301056	5.110715	0.000000		
1.038462	1.025673	1.004569	0.478684	5.218687	0.000000		
1.096154	1.032187	1.063930	0.967248	5.326660	0.000000		
1.153846	1.038708	1.123668	1.627680	5.434633	0.000000		
1.211538	1.045233	1.183782	2.416500	5.542606	0.000000		
1.269231	1.051764	1.244272	3.304465	5.650579	0.000000		
1.326923	1.058301	1.305139	4.265420	5.758552	0.000000		
1.384615	1.064843	1.366384	5.273241	5.866524	0.000000		
1.442308	1.071391	1.428006	6.301096	5.974497	0.000000		
1.500000	1.077944	1.490006	7.321721	6.082470	0.000000		
1.557692	1.084503	1.552384	8.308265	6.190443	0.000000		
1.615385	1.091067	1.615141	9.235534	6.298416	0.000000		
1.673077	1.097637	1.678277	10.08151	6.406389	0.000000		
1.730769	1.104212	1.741792	10.82912	6.514362	0.000000		
1.788462	1.110793	1.805686	11.46818	6.622334	0.000000		
1.846154	1.117379	1.869960	11.99757	6.730307	0.000000		
1.903846	1.123971	1.934614	12.42752	6.838280	0.000000		

```
  1.961538  1.130568  1.999649  12.78205  6.946253  0.000000
  2.000000  1.134969  2.043217  13.25425  7.018235  0.000000
  END FTABLE  3
  FTABLE      6
   58    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)    (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.348192  0.000000  0.000000
  0.057692  0.347093  0.002988  0.000000
  0.115385  0.343800  0.006028  0.000000
  0.173077  0.340512  0.009119  0.000000
  0.230769  0.337230  0.012263  0.000000
  0.288462  0.333953  0.015459  0.000000
  0.346154  0.330682  0.018707  0.000000
  0.403846  0.327416  0.022007  0.000000
  0.461538  0.324156  0.025360  0.000000
  0.519231  0.320901  0.028765  0.000000
  0.576923  0.317652  0.032223  0.000000
  0.634615  0.314408  0.035733  0.000000
  0.692308  0.311170  0.039296  0.000000
  0.750000  0.307937  0.042912  0.000000
  0.807692  0.304710  0.046581  0.000000
  0.865385  0.301488  0.050303  0.000000
  0.923077  0.298272  0.054078  0.000000
  0.980769  0.295061  0.057906  0.000000
  1.038462  0.291856  0.061788  0.000000
  1.096154  0.288656  0.065723  0.000000
  1.153846  0.285462  0.069712  0.000000
  1.211538  0.282273  0.073754  0.000000
  1.269231  0.279090  0.077850  0.000000
  1.326923  0.275912  0.082000  0.000000
  1.384615  0.272740  0.086203  0.000000
  1.442308  0.269573  0.090461  0.002314
  1.500000  0.266412  0.094773  0.003470
  1.557692  0.263257  0.099139  0.005013
  1.615385  0.260106  0.103559  0.005785
  1.673077  0.256962  0.108034  0.006909
  1.730769  0.253822  0.112563  0.007471
  1.788462  0.250689  0.118904  0.008374
  1.846154  0.247560  0.125320  0.008826
  1.903846  0.244438  0.131812  0.009599
  1.961538  0.241321  0.138380  0.009986
  2.019231  0.238209  0.145024  0.010674
  2.076923  0.235103  0.151744  0.011018
  2.134615  0.232002  0.158541  0.011644
  2.192308  0.228907  0.165414  0.011659
  2.250000  0.225817  0.172363  0.012109
  2.307692  0.222733  0.179389  0.013138
  2.365385  0.219654  0.186492  0.014373
  2.423077  0.216581  0.193672  0.015650
  2.480769  0.213513  0.200929  0.016899
  2.538462  0.210451  0.208263  0.018097
  2.596154  0.207394  0.215674  0.019236
  2.653846  0.204343  0.223163  0.020318
  2.711538  0.201298  0.230730  0.021349
  2.769231  0.198257  0.238374  0.022334
  2.826923  0.195223  0.246096  0.023278
  2.884615  0.192193  0.253896  0.024185
  2.942308  0.189170  0.261774  0.025059
  3.000000  0.186152  0.269731  0.025905
  3.057692  0.183139  0.277765  0.026725
  3.115385  0.180132  0.285879  0.027522
  3.173077  0.177130  0.294071  0.028301
  3.230769  0.174134  0.302342  0.029071
  3.250000  0.171143  0.309001  0.047002
  END FTABLE  6
  FTABLE      5
   36    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
```

```
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.171143  0.000000  0.000000  0.000000  0.000000
  0.057692  0.351493  0.020183  0.000000  0.862848  0.000000
  0.115385  0.354799  0.040557  0.000000  1.073029  0.000000
  0.173077  0.358110  0.061122  0.000000  1.106215  0.000000
  0.230769  0.361428  0.081878  0.000000  1.139402  0.000000
  0.288462  0.364750  0.102825  0.000000  1.172588  0.000000
  0.346154  0.368078  0.123964  0.000000  1.205775  0.000000
  0.403846  0.371412  0.145296  0.000000  1.238961  0.000000
  0.461538  0.374751  0.166820  0.000000  1.272148  0.000000
  0.519231  0.378096  0.188536  0.001392  1.305334  0.000000
  0.576923  0.381446  0.210446  0.021021  1.338520  0.000000
  0.634615  0.384801  0.232550  0.060264  1.371707  0.000000
  0.692308  0.388162  0.254847  0.113767  1.404893  0.000000
  0.750000  0.391529  0.277338  0.174637  1.438080  0.000000
  0.807692  0.394901  0.300023  0.232305  1.471266  0.000000
  0.865385  0.398279  0.322903  0.262454  1.504453  0.000000
  0.923077  0.401662  0.345979  0.282415  1.537639  0.000000
  0.980769  0.405050  0.369249  0.301056  1.570826  0.000000
  1.038462  0.408444  0.392715  0.478684  1.604012  0.000000
  1.096154  0.411844  0.416377  0.967248  1.637199  0.000000
  1.153846  0.415249  0.440236  1.627680  1.670385  0.000000
  1.211538  0.418660  0.464291  2.416500  1.703572  0.000000
  1.269231  0.422076  0.488543  3.304465  1.736758  0.000000
  1.326923  0.425498  0.512992  4.265420  1.769944  0.000000
  1.384615  0.428925  0.537639  5.273241  1.803131  0.000000
  1.442308  0.432357  0.562484  6.301096  1.836317  0.000000
  1.500000  0.435795  0.587527  7.321721  1.869504  0.000000
  1.557692  0.439239  0.612768  8.308265  1.902690  0.000000
  1.615385  0.442688  0.638208  9.235534  1.935877  0.000000
  1.673077  0.446143  0.663847  10.08151  1.969063  0.000000
  1.730769  0.449603  0.689686  10.82912  2.002250  0.000000
  1.788462  0.453069  0.715725  11.46818  2.035436  0.000000
  1.846154  0.456540  0.741964  11.99757  2.068623  0.000000
  1.903846  0.460016  0.768403  12.42752  2.101809  0.000000
  1.961538  0.463499  0.795043  12.78205  2.134995  0.000000
  2.000000  0.465823  0.812914  13.25425  2.157120  0.000000
  END FTABLE  5
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   3     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   5     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   4     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   5     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   6     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO      1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE   1 1        1      WDM   1001 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE   1 1        1      WDM   1002 STAG     ENGL      REPL
RCHRES   1 HYDR   O       1 1        1      WDM   1003 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN    1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN    1 1     12.1      WDM    801 FLOW     ENGL      REPL
RCHRES   4 HYDR   RO      1 1        1      WDM   1004 FLOW     ENGL      REPL
```

```
RCHRES   4 HYDR   STAGE  1 1        1       WDM   1005 STAG     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1        1       WDM   1006 STAG     ENGL      REPL
RCHRES   3 HYDR   O      1 1        1       WDM   1007 FLOW     ENGL      REPL
RCHRES   6 HYDR   RO     1 1        1       WDM   1008 FLOW     ENGL      REPL
RCHRES   6 HYDR   STAGE  1 1        1       WDM   1009 STAG     ENGL      REPL
RCHRES   5 HYDR   STAGE  1 1        1       WDM   1010 STAG     ENGL      REPL
RCHRES   5 HYDR   O      1 1        1       WDM   1011 FLOW     ENGL      REPL
COPY     2 OUTPUT MEAN   1 1     12.1       WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     12.1       WDM    802 FLOW     ENGL      REPL
END EXT TARGETS

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

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

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

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

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

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

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

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

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

END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
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: 1984/ 4/30 24: 0

RCHRES :    5

RELERR       STORS         STOR       MATIN      MATDIF
-1.000E+00     0.00000  0.0000E+00     0.00000  5.6213E-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.
```

```
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: 1985/ 6/30 24: 0

RCHRES :    5

RELERR       STORS         STOR       MATIN      MATDIF
-1.000E+00     0.00000  0.0000E+00     0.00000  6.9005E-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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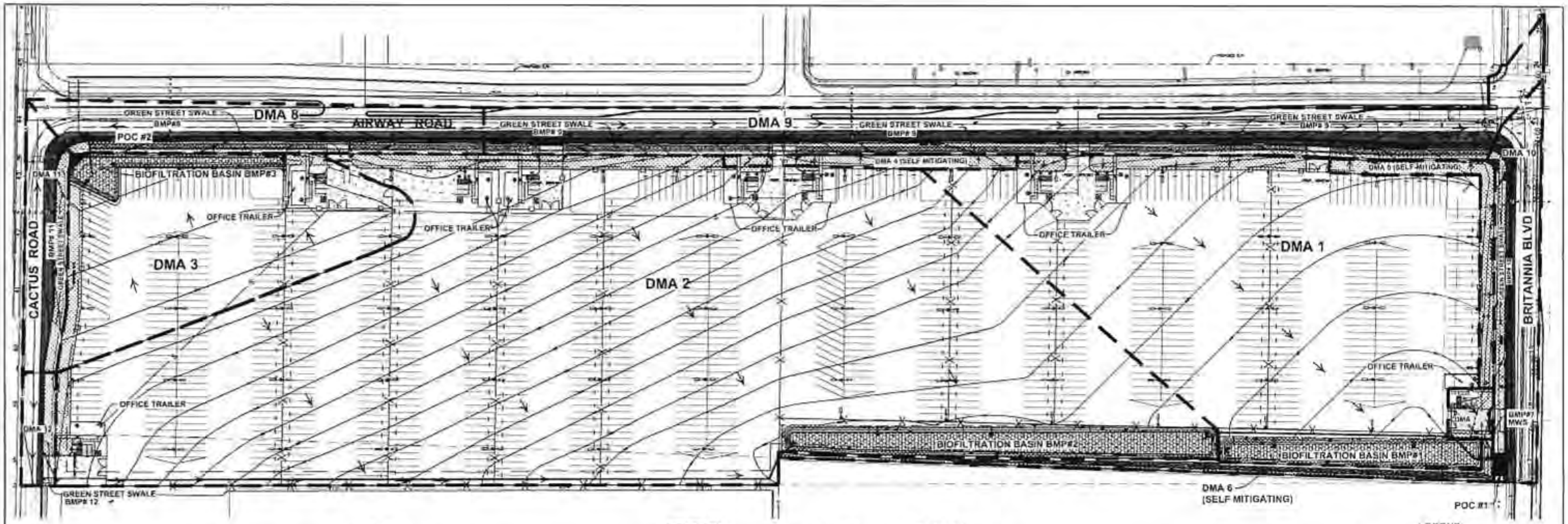
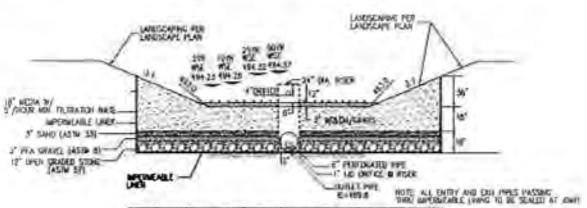
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

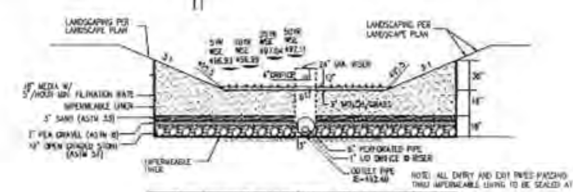
APPENDIX B –
HMP EXHIBIT





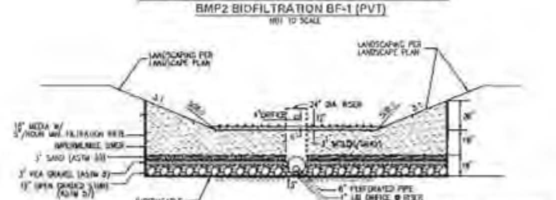
BMP	H (IN)	UD ORIFICE (IN)	AREA (BMP) FT²	AREA (TOP) FT²	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	12	1	13,853	22,208	3	3,624

BMP1 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE



BMP	H (IN)	UD ORIFICE (IN)	AREA (BMP) FT²	AREA (TOP) FT²	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
2	12	1	27,780	40,855	3	10,358

BMP2 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE



BMP	H (IN)	UD ORIFICE (IN)	AREA (BMP) FT²	AREA (TOP) FT²	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
3	12	1	2,344	15,072	3	3,281

BMP3 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE

MEASURES TO ACCESS THE STRUCTURAL BMP

1. THE BMP MUST BE ACCESSIBLE TO EQUIPMENT NEEDED FOR MAINTENANCE. ACCESS REQUIREMENTS FOR MAINTENANCE WILL VARY WITH THE TYPE OF FACILITY SELECTED.

2. INFILTRATION BMPS, BIOFILTRATION BMPS AND MOST ABOVE-GROUND DETENTION BASINS AND SAND FILTERS WILL TYPICALLY REQUIRE ROUTINE LANDSCAPE MAINTENANCE USING THE SAME EQUIPMENT THAT IS USED FOR GENERAL LANDSCAPE MAINTENANCE. AT TIMES THESE BMPS MAY REQUIRE EXCAVATION OF CLOGGED MEDIA (E.G. BIORETENTION SOIL MEDIA, OR SAND FOR THE SAND FILTER), AND SHOULD BE ACCESSIBLE TO APPROPRIATE EQUIPMENT FOR EXCAVATION AND REMOVAL/REPLACEMENT OF MEDIA.

3. ABOVE-GROUND DETENTION BASINS SHOULD INCLUDE ACCESS RAMPS FOR TRUCKS TO ENTER THE BASIN TO BRING EQUIPMENT AND TO REMOVE MATERIALS.

4. UNDERGROUND BMPS SUCH AS DETENTION VAULTS, MEDIA FILTERS, OR GROSS POLLUTANT SEPARATORS USED AS FOREBAYS TO OTHER BMPS, TYPICALLY REQUIRE ACCESS FOR A VACTOR TRUCK TO REMOVE MATERIALS. PROPRIETARY BMPS SUCH AS MEDIA FILTERS OR GROSS POLLUTANT SEPARATORS MAY REQUIRE ACCESS BY A FORKLIFT OR OTHER TRUCK FOR DELIVERY AND REMOVAL OF MEDIA CARTRIDGES OR OTHER INTERNAL COMPONENTS. ACCESS REQUIREMENTS MUST BE VERIFIED WITH THE MANUFACTURER OF PROPRIETARY BMPS.

5. VACTOR TRUCKS ARE LARGE, HEAVY, AND DIFFICULT TO MANEUVER. STRUCTURAL BMPS THAT ARE MAINTAINED BY VACTOR TRUCK MUST INCLUDE A LEVEL PAD ADJACENT TO THE STRUCTURAL BMP, PREFERABLY WITH NO VEGETATION OR IRRIGATION SYSTEM (OTHERWISE VEGETATION OR IRRIGATION SYSTEM MAY BE DESTROYED BY THE VACTOR TRUCK).

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7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax (619) 296-5564

PLANTING NOTES:

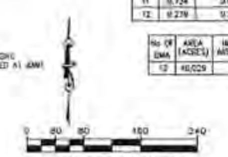
NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS, IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH. FULLY VEGETATE BOTTOM OF BASIN.

UNDERLAYING SOIL GROUP

ACCORDING TO THE NATIONAL COOPERATIVE SOIL SURVEY (USDA) THE UNDERLAYING SOIL CONSISTS OF SOIL TYPE D

GROUNDWATER

PER SOILS REPORT PREPARED BY GEOCON, INC. DATED APRIL 16 2021 GROUNDWATER WAS NOT ENCOUNTERED IN INVESTIGATION



IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY, SCALE PLAN ACCORDINGLY.

LEGEND

FEATURE	SYMBOL
SURFACE FLOW	→ →
DRAINAGE MANAGEMENT AREA (TRIBUTARY TO BIOFILTRATION)	
PROPOSED CONCRETE	
PROPOSED A.C. PAVING	
PROPOSED DECOMPOSED GRANITE	
PROPOSED LANDSCAPED AREA	
PROPOSED BIORETENTION FACILITY	

TABULAR SUMMARY OF DMA'S

DMA #	AREA (ACRES)	IMPERVIOUS AREA (ACRES)	% IMP.	HSG	AREA WEIGHTED C FACTOR	DCV (CF)	TREATED BY BMP ID	POLLUTANT CONTROL TYPE	DRAINS TO POC ID
1	8.311	0.372	4.5	D	0.31	4,289	1	BF-1	1
2	18.435	0.896	4.8	D	0.31	10,062	2	BF-1	1
3	3.505	0.271	7.7	D	0.32	1,878	3	BF-1	2
4	0.270	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
5	0.383	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
6	0.487	0	0	D	N/A	N/A	N/A	SELF MITIGATING	1
7	0.185	0.100	54.6	D	0.57	457	7	BF-2	1
8	1.537	1.327	86.3	D	N/A	N/A	8	GREEN STREET	2
9	3.691	3.213	87.1	D	N/A	N/A	9	GREEN STREET	1
10	1.223	1.073	88.1	D	N/A	N/A	10	GREEN STREET	1
11	0.724	0.602	82.2	D	N/A	N/A	11	GREEN STREET	2
12	0.279	0.221	80.1	D	N/A	N/A	12	GREEN STREET	N/A

SUMARY OF DMA INFORMATION

No. OF DMA	AREA (ACRES)	IMPERVIOUS AREA (ACRES)	% IMP.	HSG	AREA WEIGHTED C FACTOR	TOTAL DCV (CF)	TOTAL AREA TREATED		No. OF POC'S
12	40.029	8.080	20.2	D	0.29	16,382	40.029		2

ATTACHMENT 2A

HMP EXHIBIT FOR:
BRITANNIA AIRWAY LOGISTICS CENTER

SHEET 1 OF1

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Indicate which Items are Included:

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

WILL BE PROVIDED AT FINAL ENGINEERING STAGE

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

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

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

MAINTENANCE AGREEMENT WILL BE PROVIDED AT FINAL DESIGN

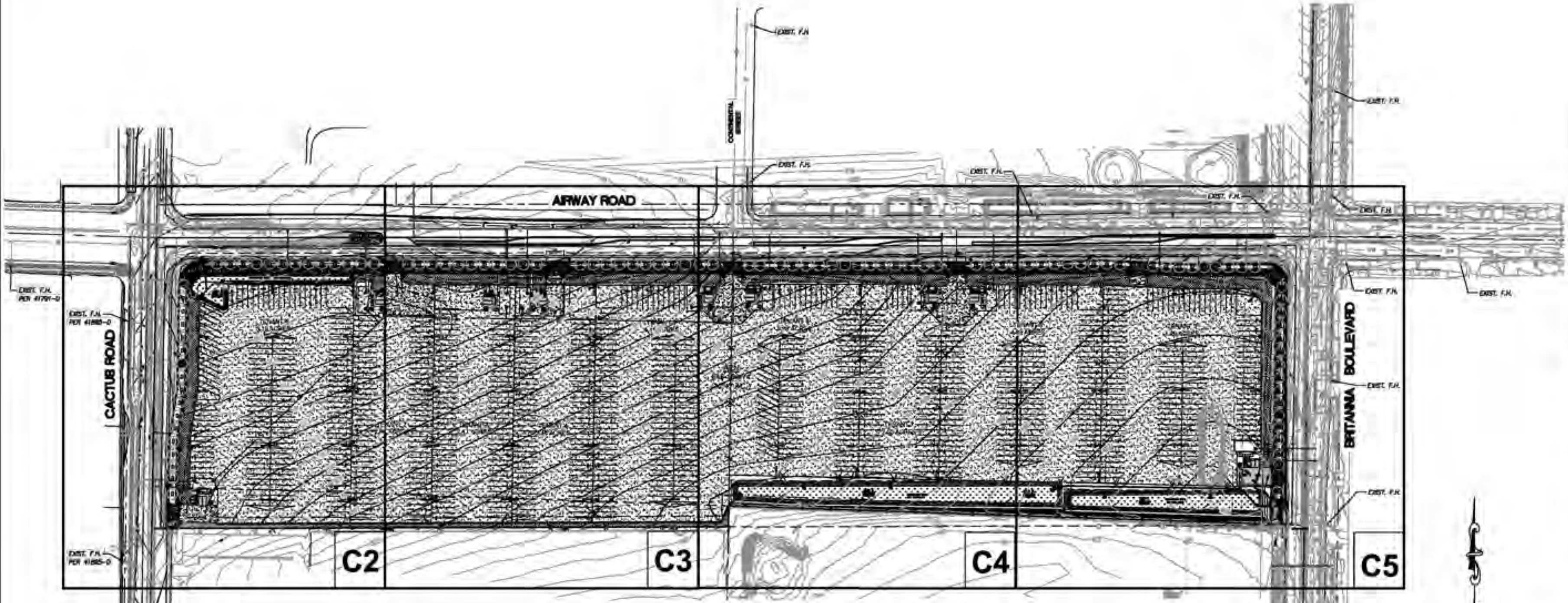
Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

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

The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] Details and specifications for construction of structural BMP(s)
- [x] Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- [x] How to access the structural BMP(s) to inspect and perform maintenance
- [x] Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- [x] Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- [x] 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)
- [x] Recommended equipment to perform maintenance
- [x] When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- [x] Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- [x] All BMPs must be fully dimensioned on the plans
- [x] When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.



KEY MAP
SCALE: 1"=100'

GRADING QUANTITIES

GRADED AREA ____ 36.36 ACRES ; % TOTAL SITE TO BE GRADED 89.7 [%]
CUT QUANTITIES ____ 10,074 CY ; MAX DEPTH OF CUT: 4.5 [FT] ; MAX HEIGHT OF CUT SLOPE: 1.5 [FT] 2:1 SLOPE RATIO
FILL QUANTITIES ____ 103,385 CY ; MAX. DEPTH OF FILL 12.7 [FT] ; MAX HEIGHT OF FILL SLOPE: 6.0 [FT] 2:1 SLOPE RATIO
IMPORT SOIL: ____ 94,201 CY ; NET IMPORT: 94,201-*43,876= 49,414 CY
*ASSUME 9" OF RECYCLED BASED FOR TRUCK PARKING AREA (1,579,543 SF=36.26 AC) =43,876 CY)

RETAINING WALLS: LENGTH 128 [FT] ; MAX HEIGHT 4 [FT]

EARTHWORK QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY DUE TO SHRINKAGE, LOSSES DUE TO CLEARING OPERATIONS, COMPACTION, SETTLEMENT, ETC. CONTRACTOR SHOULD VERIFY QUANTITIES PRIOR TO BIDDING.

NOTE

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

WATER NOTE

THE EXISTING AND PROPOSED WATER BELONG TO THE OTAY WATER DISTRICT.

LEGEND

PROPOSED IMPROVEMENTS

IMPROVEMENT	STANDARD DWGS.
STORM DRAIN PIPE-SIZE/TYPE PER PLAN (PVT)	
TYPE 'A' CLEAN OUT (PVT)	D-09
INLET BOX-SIZE PER PLAN (PVT) BROOKS PRODUCT (OR EQUAL)	
TYPE 'G' CURB AND GUTTER	SDG-151
6" CURB (PVT)	SDG-150
GRADE BREAK	
TOP/BOTTOM OF SLOPE	
DIRECTION OF FLOW	
FINISHED SURFACE ELEVATION	
FLOW LINE ELEVATION	
COMMERCIAL DRIVEWAY (PVT)	SDG-163
BIOFILTRATION BASIN (PVT)	
RETAINING WALL PER SEPARATE PERMIT (PVT)	
SIDEWALK (PUB)	SDG-155, 155, 156
CURB RAMP W/ TRUNCATED DOMES (PVT)	SDG-130, 131, 132, 135, 136, 137
FIRE HYDRANT (PUB)	SDW-104
LANDSCAPE AREA (PER LANDSCAPE PLAN)	
AC PAVEMENT PER SOIL ENGINEER RECOMMENDATIONS	
6" RECYCLED BASE	
PCC PAVEMENT PER SOIL ENGINEER RECOMMENDATIONS	

EXISTING IMPROVEMENTS

ITEM	SYMBOL
PROPERTY LIMIT	P/L
RIGHT-OF-WAY	R/W
CHAIN-LINK FENCE	
STORM DRAIN STRUCTURE & PIPE	
FIRE HYDRANT	
SEWER LATERAL	
SEWER MAIN	
SEWER MANHOLE	
WATER LATERAL	
WATER MAIN	
EXISTING CONTOUR	
EXISTING STREET LIGHT	
SIDEWALK	
CURB RAMP	
POWER POLES W/ OVERHEAD LINES	

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BADIEE DEVELOPMENT
SO THAT YOU CAN
1261 PROSPECT STREET, SUITE 5
LA JOLLA, CA 92037

PROJECT:
BRITANNIA AIRWAY LOGISTICS CENTER

APN: 646-100-74-00
5761 AIRWAY ROAD
SAN DIEGO, CA 92154

REVISION	ITEM	DATE
△	-	-
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△		

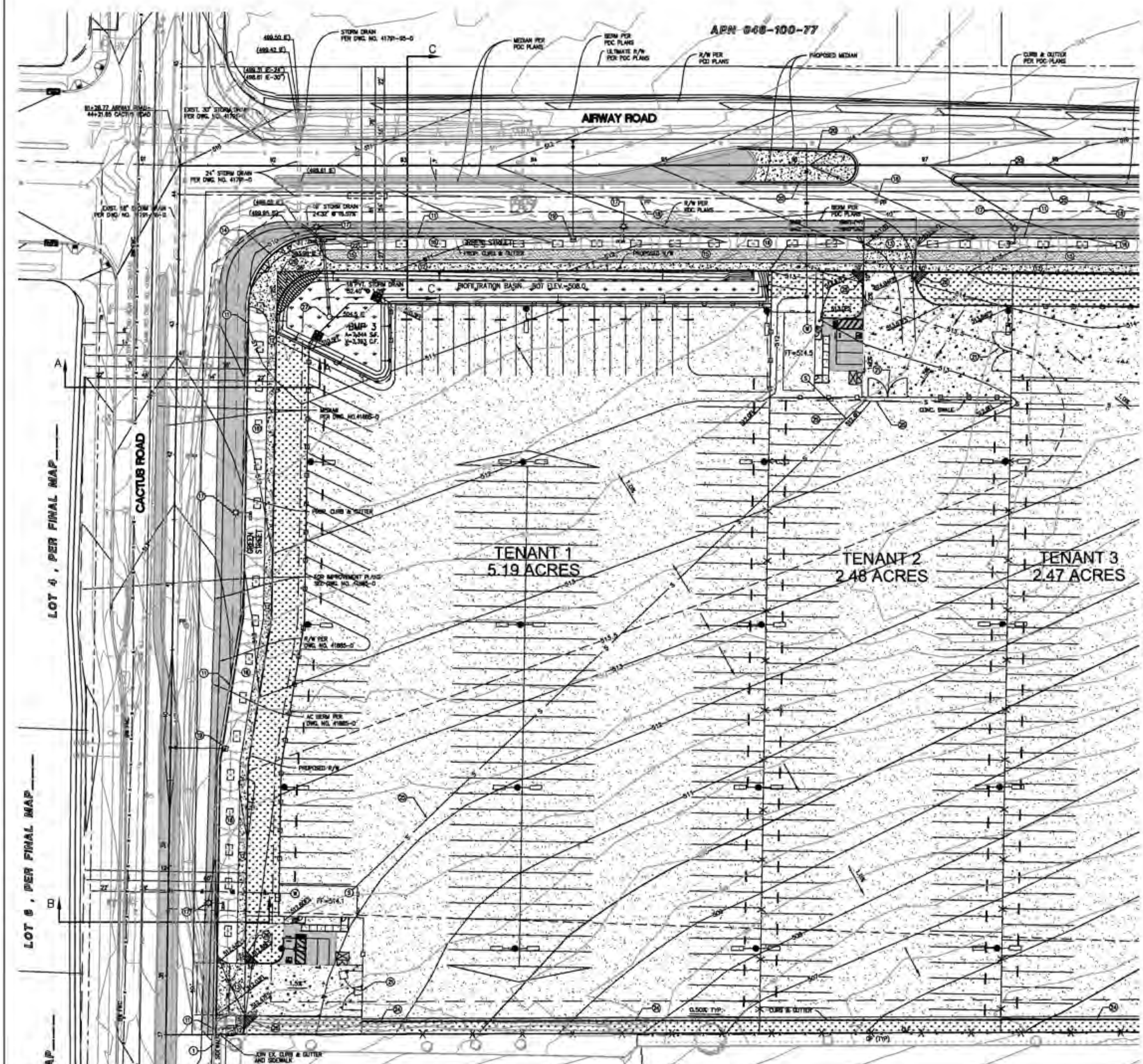
THIS SET	ISSUE DATE
☐ SCHEMATIC	8/27/2021
☐ DESIGN DEV.	10/29/2021
☐ SUBMITTAL	12/10/2021
■ PLAN CHECK 2	8/22/2022
☐ PLAN CHANGE 1	
☐ CONSTRUCTION	
☐ AS-BUILT	

SHEET TITLE / CONTENTS
GRADING PLAN

K&S PROJECT #: 20-025
SCALE: 1"=100'
DRAWN BY: DC
DATE DRAWN: 12/10/2021
CHECKED BY: KSS

SHEET: 1 OF: 5

C1

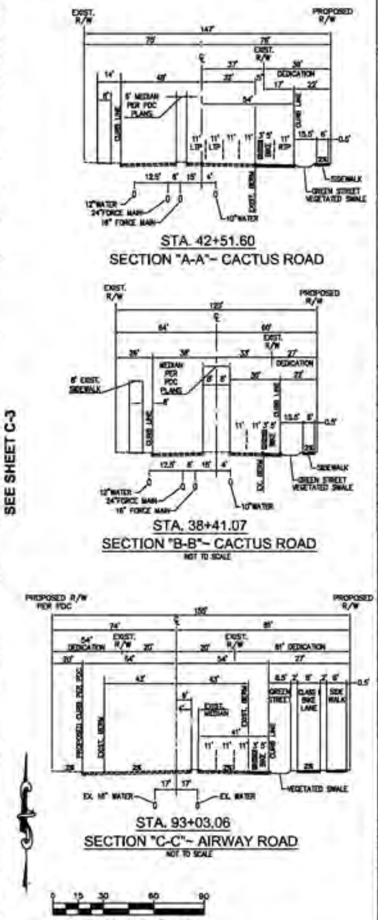


CONSTRUCTION NOTES

(1) EXISTING CURB GUTTER AND SIDEWALK TO REMAIN.
(11) PROPOSED TYPE H CURB AND GUTTER PER SDG-151
(12) PROPOSED 6' WIDE CONCRETE SIDEWALK PER SDG-155
(13) PROPOSED 40' WIDE CONCRETE DRIVEWAY PER SDG-163. A DEVIATION FORM STANDARD FORM WILL BE SUBMITTED.
(14) DUAL CURB RAMPS TYPE A PER SDG-134
(15) PROPOSED CLASS I BIKE PATH
(16) PROPOSED GREEN STREET VEGETATED SWALES.
(17) PROPOSED STEET LIGHT PER SDC-101 AND STREET DESIGN MANUAL.
(18) EXISTING POWER POLES AND OVERHEAD LINES TO BE UNDERGROUND IN COORDINATION WITH SDG&E.
(19) PROPOSED FIRE HYDRANT PER O.W.D.
(20) PROPOSED CURB MEDIAN TYPE B-2 PER SDG-154.
(21) PROPOSED GATE PER ARCHITECT PLANS.
(22) PROPOSED 12' TYPE B-1 CURB INLET PER SDG-116.
(24) PROPOSED TYPE G CURB & GUTTER PER SDG-151
(25) PROPOSED 6" SEWER LATERAL PER SDS-105. 8" PVC SEWER PRIVATE MAIN @ 1.0%
(26) VISIBILITY TRIANGLE PER SDMC DIAGRAM 113-02SS.
(27) PROPOSED 24" DIA. RISER

WATER NOTE

THE EXISTING AND PROPOSED WATER BELONG TO THE OTAY WATER DISTRICT.



STA. 42+51.60
SECTION "A-A"- CACTUS ROAD

STA. 38+41.07
SECTION "B-B"- CACTUS ROAD
NOT TO SCALE

STA. 93+03.06
SECTION "C-C"- AIRWAY ROAD
NOT TO SCALE

GRAPHIC SCALE: 1" = 30'

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PROJECT:
BRITANNIA AIRWAY LOGISTICS CENTER

APN: 646-100-74-00
5761 AIRWAY ROAD
SAN DIEGO, CA 92154

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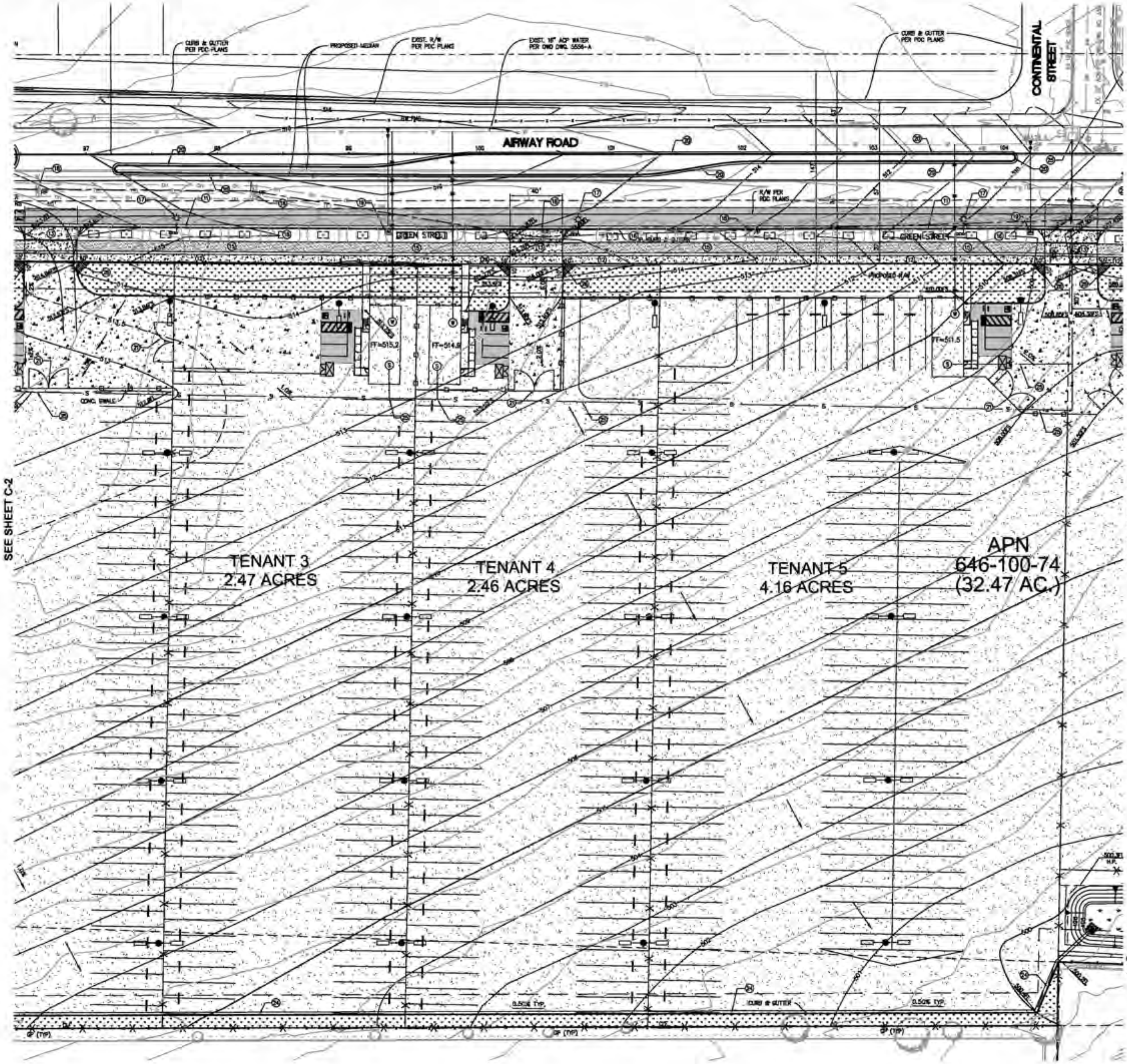
☐ CONSTRUCTION	
☐ AS-BUILT	

SHEET TITLE / CONTENTS
GRADING PLAN

K&S PROJECT #: 20-025
SCALE: 1"=30'
DRAWN BY: DC
DATE DRAWN: 12/10/2021
CHECKED BY: KSS

SHEET: C2 OF: 5



CONSTRUCTION NOTES

- (11) PROPOSED TYPE H CURB AND GUTTER PER SDG-151
- (12) PROPOSED 6' WIDE CONCRETE SIDEWALK PER SDG-155
- (13) PROPOSED 40' WIDE CONCRETE DRIVEWAY PER SDG-163. A DEVIATION FORM STANDARD FORM WILL BE SUBMITTED.
- (15) PROPOSED CLASS I BIKE PATH
- (16) PROPOSED GREEN STREET VEGETATED SWALES.
- (17) PROPOSED STEET LIGHT PER SDE-101 AND STREET DESIGN MANUAL.
- (18) EXISTING POWER POLES AND OVERHEAD LINES TO BE UNDERGROUND IN COORDINATION WITH SDG&E.
- (19) PROPOSED FIRE HYDRANT PER O.W.D.
- (20) PROPOSED CURB MEDIAN TYPE B-2 PER SDG-154.
- (21) PROPOSED GATE PER ARCHITECT PLANS.
- (24) PROPOSED TYPE G CURB & GUTTER PER SDG-151
- (25) PROPOSED 6" SEWER LATERAL PER SDS-105. 8" PVC SEWER PRIVATE MAIN @ 1.0%
- (26) VISIBILITY TRIANGLE PER SDMC DIAGRAM 113-02SS.

WATER NOTE

THE EXISTING AND PROPOSED WATER BELONG TO THE OTAY WATER DISTRICT.

K&S ENGINEERING, INC.
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(619) 296-5565 Fax (619) 296-5564

trh INC.
1300 COLUMBIA STREET
SUITE 702
SAN DIEGO, CA 92101

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SO THAT YOU CAN
1261 PROSPECT STREET, SUITE 9
LA JOLLA, CA 92037

PROJECT:
BRITANNIA AIRWAY LOGISTICS CENTER

APN: 646-100-74-00
5761 AIRWAY ROAD
SAN DIEGO, CA 92154

REVISION	ITEM	DATE
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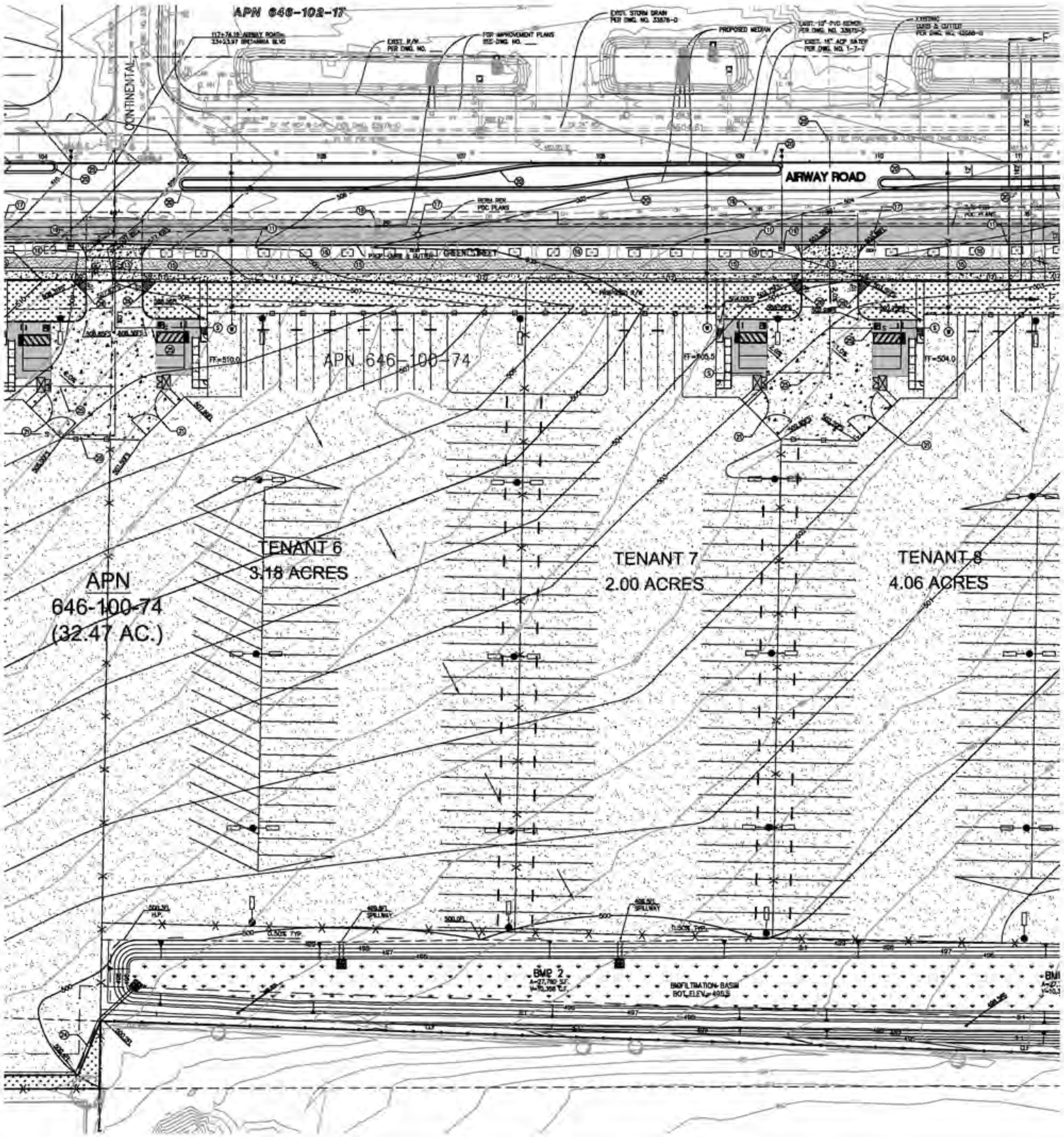
☐ PLAN CHANGE 1	
☐ CONSTRUCTION	
☐ AS-BUILT	

SHEET TITLE / CONTENTS

GRADING PLAN

K&S PROJECT #: 20-025
SCALE: 1"=30'
DRAWN BY: DC
DATE DRAWN: 12/10/2021
CHECKED BY: KSS

SHEET: C3 OF: 5



CONSTRUCTION NOTES

- (11) PROPOSED TYPE H CURB AND GUTTER PER SDG-151
- (12) PROPOSED 8' WIDE CONCRETE SIDEWALK PER SDG-150
- (13) PROPOSED 40' WIDE CONCRETE DRIVEWAY PER SDG-163. A DEVIATION FORM STANDARD FORM WILL BE SUBMITTED.
- (15) PROPOSED CLASS I BIKE PATH
- (16) PROPOSED GREEN STREET VEGETATED SWALES.
- (17) PROPOSED STEET LIGHT PER SDE-101 AND STREET DESIGN MANUAL.
- (18) EXISTING POWER POLES AND OVERHEAD LINES TO BE UNDERGROUND IN COORDINATION WITH SDG&E.
- (19) PROPOSED FIRE HYDRANT PER O.M.D.
- (20) PROPOSED CURB MEDIAN TYPE B-2 PER SDG-15A.
- (21) PROPOSED GATE PER ARCHITECT PLANS.
- (24) PROPOSED TYPE G CURB & GUTTER PER SDG-151
- (25) PROPOSED 8" SEWER LATERAL PER SDG-105. 8" PVC SEWER PRIVATE MAIN @ 1.0%
- (26) VISIBILITY TRIANGLE PER SDMC DIAGRAM 113-02SS.

WATER NOTE

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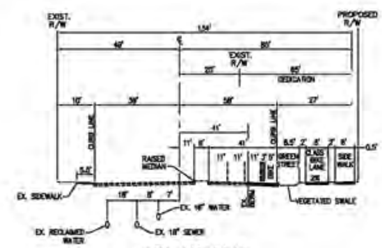

STA. 110+94.16
SECTION "F-F"~ AIRWAY ROAD
NOT TO SCALE

GRAPHIC SCALE: 1" = 30'

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trh INC.

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SO THAT YOU CAN

1261 PROSPECT STREET, SUITE 9
LA JOLLA, CA 92037

PROJECT:

BRITANNIA AIRWAY LOGISTICS CENTER

APN: 646-100-74-00
5761 AIRWAY ROAD
SAN DIEGO, CA 92154

REVISION	ITEM	DATE
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☐ CONSTRUCTION	
☐ AS-BUILT	

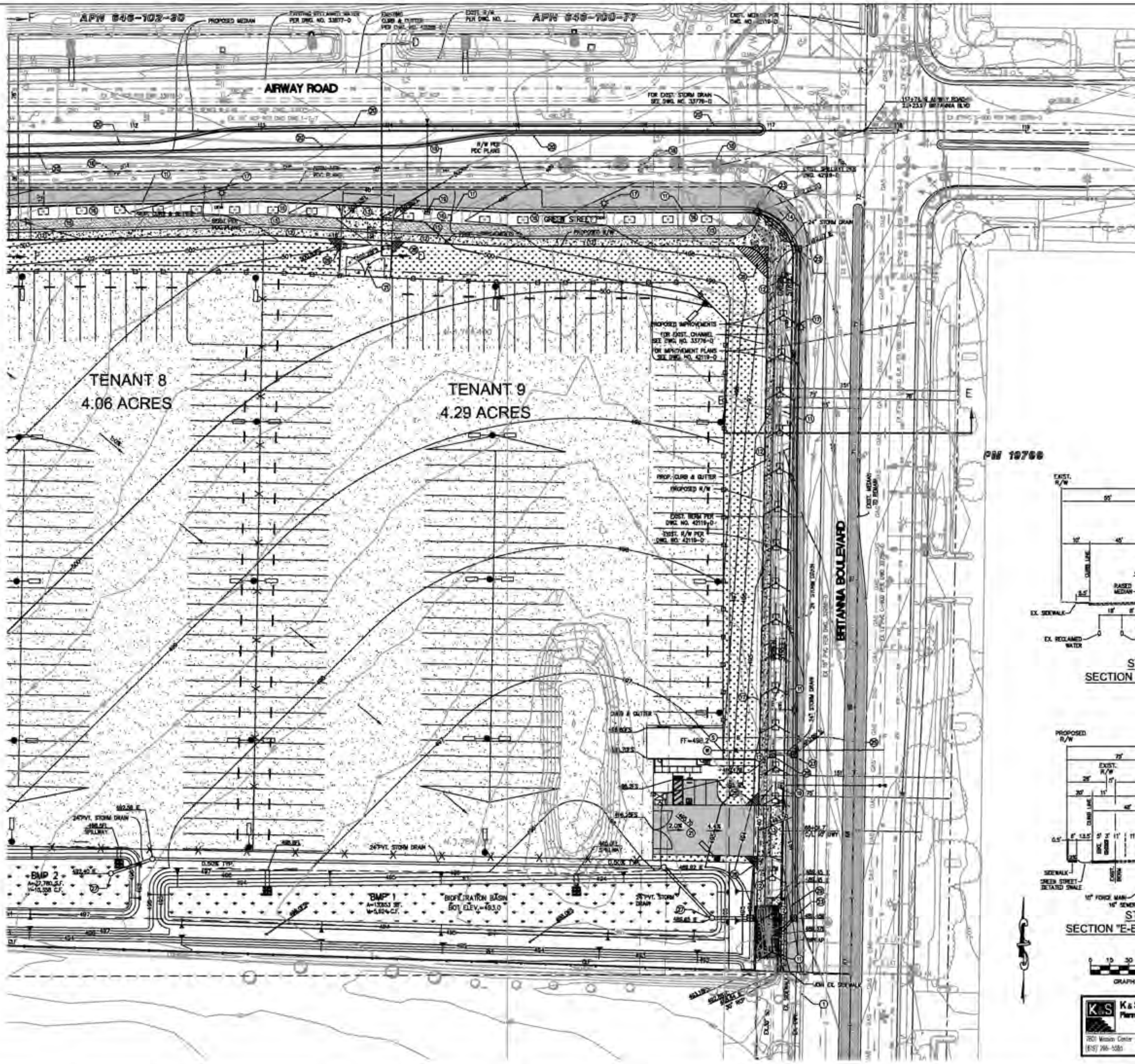
SHEET TITLE / CONTENTS

GRADING PLAN

K&S PROJECT #: 20-025
SCALE: 1"=30'
DRAWN BY: DC
DATE DRAWN: 12/10/2021
CHECKED BY: KSS

SHEET: OF: 5

C4

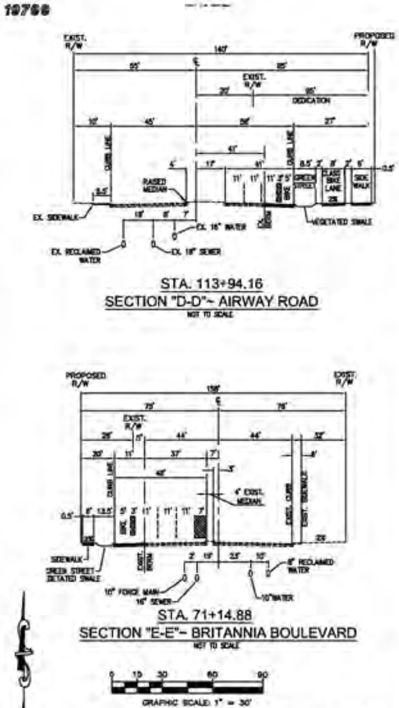


CONSTRUCTION NOTES

1. EXISTING CURB GUTTER AND SIDEWALK TO REMAIN.
11. PROPOSED TYPE H CURB AND GUTTER PER SDG-151
12. PROPOSED 6' WIDE CONCRETE SIDEWALK PER SDG-156
13. PROPOSED 40' WIDE CONCRETE DRIVEWAY PER SDG-163. A DEVIATION FORM STANDARD FORM WILL BE SUBMITTED.
14. DUAL CURB RAMPS TYPE A PER SDG-134
15. PROPOSED CLASS I BIKE PATH
16. PROPOSED GREEN STREET VEGETATED SWALES.
17. PROPOSED STEET LIGHT PER SDE-101 AND STREET DESIGN MANUAL.
18. EXISTING POWER POLES AND OVERHEAD LINES TO BE UNDERGROUND IN COORDINATION WITH SDG&E.
19. PROPOSED FIRE HYDRANT PER O.W.D.
20. PROPOSED CURB MEDIAN TYPE B-2 PER SDG-154.
21. PROPOSED GATE PER ARCHITECT PLANS.
23. PROPOSED TYPE A CLEANOUT PER D-08.
25. PROPOSED 6" SEWER LATERAL PER SDS-105. 8" PVC SEWER PRIVATE MAIN @ 1.0%.
26. VISIBILITY TRIANGLE PER SDMC DIAGRAM 113-02SS.
27. PROPOSED 24" DIA. RISER.
28. PROPOSED TYPE F CATCH BASIN PER SDG-119

WATER NOTE

THE EXISTING AND PROPOSED WATER BELONG TO THE OTAY WATER DISTRICT.



K&S ENGINEERING, INC.
Planning . Engineering . Surveying

trh INC.

CLIENT:

BADIEE DEVELOPMENT

SO THAT YOU CAN

1261 PROSPECT STREET, SUITE 9
LA JOLLA, CA 92037

PROJECT:

BRITANNIA AIRWAY LOGISTICS CENTER

APN: 646-100-74-00
5761 AIRWAY ROAD
SAN DIEGO, CA 92154

REVISION	ITEM	DATE
△	-	-
△		
△		
△		
△		
△		

THIS SET	ISSUE DATE
☐ SCHEMATIC	4/27/2021
☐ DESIGN DEV.	10/29/2021
☐ SUBMITTAL	12/20/2021
■ PLAN CHECK 2	8/22/2022
☐ PLAN CHANGE 1	
☐ CONSTRUCTION	
☐ AS-BUILT	

SHEET TITLE / CONTENTS

GRADING PLAN

K&S PROJECT #: 20-025
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SHEET: OF: 5

C5

Attachment 5
Drainage Report

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

K&S ENGINEERING, INC.
Planning Engineering Surveying

DRAINAGE STUDY

For

BRITANNIA AIRWAY LOGISTICS CENTER
5761 Airway Road
San Diego, CA 92154
APN 646-100-74-00

PRJ-1088583

Prepared for:

Badiee Development Inc.
1261 Prospect Street Suite 9
La Jolla, CA 92037
Contact: Scott Merry (888) 815-8886

Prepared by:

K&S ENGINEERING, INC.
7801 Mission Center Court, Suite 100
San Diego, CA 92108
619.296.5565

December 20, 2022
K&S JN 20-025

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
No. 48592
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

Kamal S. Sweis RCE 48592

December 20, 2022
Date

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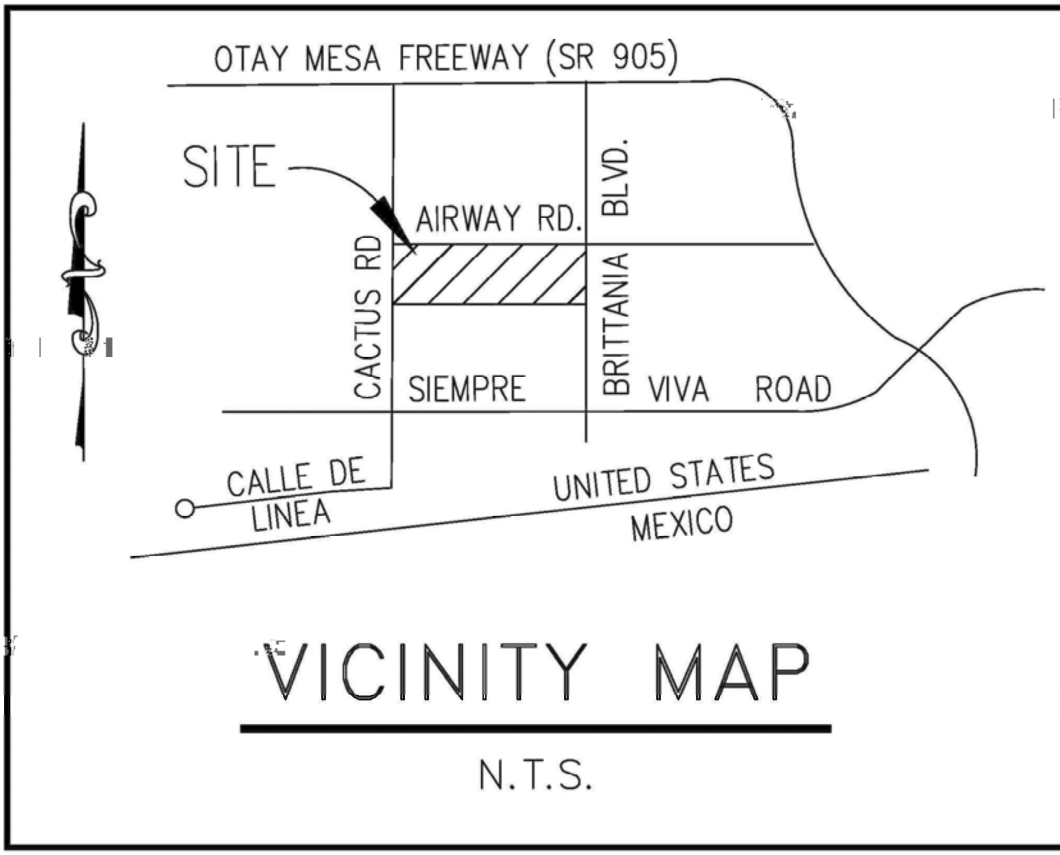
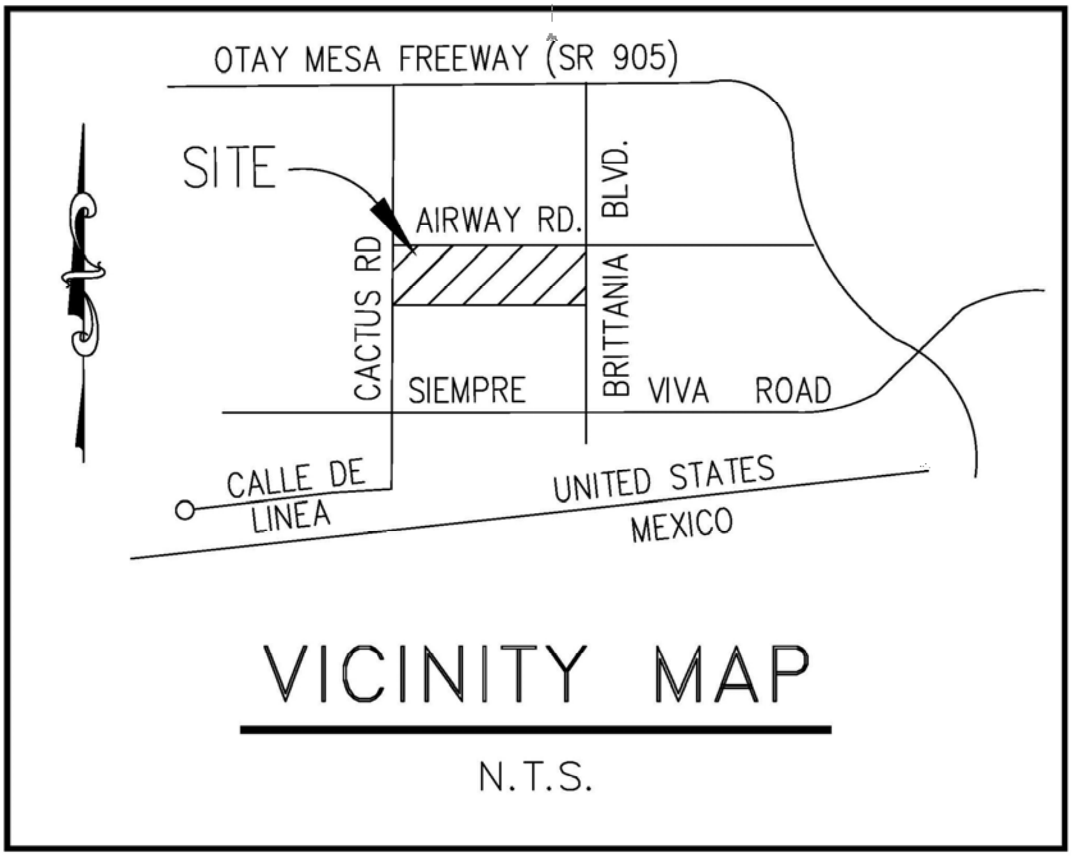
1 VICINITY MAP



1 VICINITY MAP



2 INTRODUCTION

The project is located at the Southwest corner of the intersection of Airway Road and Britannia Blvd in Otay Mesa, it is surrounded by Cactus Road to the West, Airway Road to the North, Britannia Boulevard to the East and a car auction facility to the South.

The Project consists of grading and drainage improvements for a truck parking and storage with pervious surface, nine office trailers with attached car parking, one biofiltration basin for water quality and flow control purposes; street widening improvements for Cactus Road, Airway Road and Britannia Blvd. are also part of the development.

3 PURPOSE OF THIS STUDY

The purpose of this study is to determine the proposed peak flows produced by the proposed development for the 5, 10, 25 and 50 Year storm events, as well as to determine the pipe and inlet sizes.
The proposed project is not in the close vicinity of navigable waters or wetland. The proposed construction and any associated runoff will not result into navigable waters and therefore exempt from the Regional Water Quality Control Board under Federal Clean Water Act (CWA) Section 401 or 404.

4 PROJECT INFORMATION

4.1 EXISTING CONDITION

The existing site consists of one undeveloped lot with two drainage areas, one sheet flows in a Southeast direction into an existing channel located along Britannia Blvd. generating 32.1 CFS, said channel also receives off-site runoff from the development located North of the project (off-site drainage).

The second drainage area is located at the Northwest corner of the site to and sheet-flows in a Northwest direction towards the Southeast corner of the intersection of Airway Road and Cactus Road generating Q50=6.45 CFS.

A small portion of Cactus road drains South generating Q=0.72 CFS.

The calculated flows for existing condition are based by utilizing a runoff coefficient of C=0.45 for the onsite flows and C=0.90 for the improved streets

4.2 PROPOSED CONDITION

The proposed site will maintain the same discharge points as the existing condition, the area draining towards the Southeast corner of the site will sheet flow into a proposed biofiltration basin along the Southerly property line where runoff will be treated and mitigated before exiting the site via storm drain pipe into the existing channel located at Britannia Blvd., at this point the confluenced undetained flow is Q50= 33.92 CFS.
The Northwest portion of the development will sheet flow towards the northwest corner of the site, runoff will be treated by means of a biofiltration basin, then flow will be conveyed via pipe into a proposed curb inlet located at the Southeast corner of the intersection of Airway Road and Britannia BLVD, the proposed confluence flow at this point is Q50= 6.45 CFS.
The street portion of Cactus Road draining towards the south generates Q50= 0.36 CFS.

The proposed land use utilized for on-site proposed condition is industrial with 35% imperviousness, therefore a runoff coefficient of C=0.50 was used. For the street widening improvements a runoff coefficient of C=0.90 was utilized.

4.3 DETENTION BASIN METHODOLOGY

See section 8 for detention basin calculations, one detention basin was designed for this project using the January 2017 City of San Diego Drainage Manual and Drainage Requirements in Otay Mesa Notice Dated August 7, 1997.

The purpose of this basin is to temporarily store the increased runoff and release it at a rate equal or less than the undeveloped condition. Hydrographs were determined using the rational method design storm hydrograph method. The detention basin size was determined using the single hydrograph procedure and by routing the 5, 10, 25 and 50- year storm event. The outlet structure has been sized to drain the basin within 96 hours.

The basin will also serve as a pollutant treatment and for hydromodification compliance.

4.4 SUMMARY

In order to mitigate the increased runoff from the existing to the proposed condition, A detention basin is proposed in compliance with the Otay Mesa Community Plan. Proposed flows after routing are smaller the ones generated by the undeveloped condition. Also, ultimate rational method flows were used to size the permanent drainage structures proposed by this development, therefore, the project would not create or contribute runoff water which would exceed the capacity of any existing or planned storm water drainage system, and will not expose people or structure to a significant risk or loss, injury or death involving flooding as a result of the failure of levee or dam.

The project will maintain the existing drainage pattern and will not result in any erosion or siltation; also, the project the project will not result in flooding on-site or off-site due to the installation of the peak flow detention basin. No adverse impact will occur to the downstream properties as a result of the proposed development, since the proposed flows are mitigated on-site.

The proposed condition of Northwest basin did not reflect an increase in run-off, therefore, no detention was proposed.

Also there is no peak flow detention for the widening of the public streets since Green Street Swales are being provided for treatment control only.

The following tables summarize the existing and proposed (on-site) peak flow rates for the 5, 10, 25 & 50 -Year storm events. Peak rational method flows were used to size all drainage structures.

POINT 1 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 4 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 7 (cfs)	PROPOSED CONDITION AFTER DETENTION (cfs)
5-Yr	**23.55**	**24.85**	**22.44**
10-Yr	**25.25**	**26.61**	**23.76**
25-Yr	**28.03**	**29.64**	**26.5**
50-Yr	**32.1**	**33.92**	**30.22**

POINT 2 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 7 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 11 (cfs)	NO DETENTION REQUIRED FOR THIS BASIN
5-Yr	**4.18**	**2.16**	**-**
10-Yr	**4.92**	**2.54**	**-**
25-Yr	**5.55**	**2.86**	**-**
50-Yr	**6.45**	**3.33**	**-**

POINT 3 PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION AT NODE 9 (cfs)	PROPOSED CONDITION BEFORE DETENTION AT NODE 13 (cfs)	NO DETENTION REQUIRED FOR THIS BASIN
5-Yr	**0.54**	**0.24**	**-**
10-Yr	**0.61**	**0.28**	**-**
25-Yr	**0.65**	**0.31**	**-**
50-Yr	**0.72**	**0.36**	**-**

5. DESIGN CRITERIA AND METHODOLOGY

This report was prepared using the City of San Diego Transportation and Stormwater Design Manual, January 2017 edition.

The proposed storm flows were determined using the rational method hydrology program CIVILCADD/CIVILDESIGN which is based on the City of San Diego Drainage Design Manual Dated 1984, See section 4 for Hydrology design models. The piped were sized using the 50 Year storm.

6. HYDROLOGY DESIGN MODELS

A. *DESIGN METHODS*

THE RATIONAL METHOD IS USED IN THIS HYDROLOGY STUDY; THE RATIONAL FORMULA IS AS FOLLOWS:

Q = CIA, WHERE : Q= PEAK DISCHARGE IN CUBIC FEET/SECOND *

C = RUNOFF COEFFICIENT (DIMENSIONLESS)

I = RAINFALL INTENSITY IN INCHES/HOUR

A = TRIBUTARY DRAINAGE AREA IN ACRES

*1 ACRE INCHES/HOUR = 1.008 CUBIC FEET/SEC

THE OVERLAND METHOD IS ALSO USED IN THIS HYDROLOGY STUDY;

THE URBAN AREAS OVERLAND FORMULA IS AS FOLLOWS:

$T=[1.8(1.1-C)(L)^{(.5)})]/[S(100)]^{.333}$

L = LENGTH OF WATERSHED

C = COEFFICIENT OF RUNOFF

T = TIME IN MINUTES

S = DIFFERENCE IN ELEVATION DIVIDED BY DE LENGTH OF WATERSHED

B. *DESIGN CRITERIA*

- FREQUENCY 50 YEAR STORM.
- RAIN FALL INTENSITY PER CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, JANUARY 2017.

C. *REFERENCES*

- CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, JANUARY 2017.
- COUNTY OF SAN DIEGO HYDROLOGY MANUAL, JUNE 2003
- HAND BOOK OF HYDRAULICS BY BRATER & KING, SIXTH EDITION.

7 HYDROLOGY CALCULATIONS

7.1 RATIONAL METHOD CALCULATIONS

EXISTING CONDITION HYDROLOGY
5 YEAR STORM
BADIEE TRUCK PARK AND STORAGE **J.N. 20-025**

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3
Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 12/13/21

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

Program License Serial Number 4035

Rational hydrology study storm event year is 5.0
English (in-lb) input data Units used
English (in) rainfall data used

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

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+++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 250.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 514.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(250.000^.5)/(0.800^(1/3)]= 4.60
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.149(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.748(CFS)
Total initial stream area = 0.250(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 514.000(Ft.)
Downstream point elevation = 497.000(Ft.)
Channel length thru subarea = 1500.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 0.333

Estimated mean flow rate at midpoint of channel =   3.501(CFS)
Manning's 'N'   = 0.015
Maximum depth of channel =   0.500(Ft.)
Flow(q) thru subarea =   3.501(CFS)
Depth of flow =   0.235(Ft.), Average velocity =   2.509(Ft/s)
Channel flow top width =   11.851(Ft.)
Flow Velocity =   2.51(Ft/s)
Travel time =   9.96 min.
Time of concentration =   14.96 min.
Critical depth =   0.260(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type   ]
Rainfall intensity =   1.818(In/Hr) for a   5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =   3.177(CFS) for   1.840(Ac.)
Total runoff =   3.925(CFS) Total area =   2.09(Ac.)

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+++
Process from Point/Station   2.000 to Point/Station   3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =   2.090(Ac.)
Runoff from this stream =   3.925(CFS)
Time of concentration =   14.96 min.
Rainfall intensity =   1.818(In/Hr)

++
+++
Process from Point/Station   2.000 to Point/Station   3.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type   ]
Rainfall intensity (I) =   0.502(In/Hr) for a   5.0 year storm
User specified values are as follows:
TC = 124.00 min. Rain intensity =   0.50(In/Hr)
Total area =   34.600(Ac.) Total runoff =   14.900(CFS)

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+++
Process from Point/Station   2.000 to Point/Station   3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =   34.600(Ac.)
Runoff from this stream =   14.900(CFS)
Time of concentration = 124.00 min.
Rainfall intensity =   0.502(In/Hr)
Summary of stream data:

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

1 3.925 14.96 1.818
2 14.900 124.00 0.502
Qmax(1) =
1.000 * 1.000 * 3.925) +
1.000 * 0.121 * 14.900) + = 5.723
Qmax(2) =
0.276 * 1.000 * 3.925) +
1.000 * 1.000 * 14.900) + = 15.983

Total of 2 streams to confluence:
Flow rates before confluence point:
3.925 14.900
Maximum flow rates at confluence using above data:
5.723 15.983
Area of streams before confluence:
2.090 34.600
Results of confluence:
Total flow rate = 15.983(CFS)
Time of concentration = 124.000 min.
Effective stream area after confluence = 36.690(Ac.)

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+++
Process from Point/Station 3.000 to Point/Station 4.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 492.190(Ft.)
Downstream point elevation = 489.400(Ft.)
Channel length thru subarea = 600.000(Ft.)
Channel base width = 1.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 16.231(CFS)
Manning's 'N' = 0.023
Maximum depth of channel = 4.000(Ft.)
Flow(q) thru subarea = 16.231(CFS)
Depth of flow = 1.306(Ft.), Average velocity = 3.439(Ft/s)
Channel flow top width = 6.225(Ft.)
Flow Velocity = 3.44(Ft/s)
Travel time = 2.91 min.
Time of concentration = 126.91 min.
Critical depth = 1.102(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 0.494(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.535(CFS) for 1.140(Ac.)
Total runoff = 16.518(CFS) Total area = 37.83(Ac.)

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+++
Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 37.830(Ac.)
Runoff from this stream = 16.518(CFS)
Time of concentration = 126.91 min.
Rainfall intensity = 0.494(In/Hr)

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Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 750.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 500.000(Ft.)
Elevation difference = 16.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 24.89 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(750.000^.5)/(2.133^(1/3)]= 24.89
Rainfall intensity (I) = 1.391(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 6.956(CFS)
Total initial stream area = 11.110(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 499.000(Ft.)
Downstream point/station elevation = 489.400(Ft.)
Pipe length = 1255.00(Ft.) Manning's N = 0.015
No. of pipes = 1 Required pipe flow = 6.956(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 6.956(CFS)
Normal flow depth in pipe = 10.64(In.)
Flow top width inside pipe = 23.85(In.)
Critical Depth = 11.23(In.)
Pipe flow velocity = 5.17(Ft/s)
Travel time through pipe = 4.04 min.
Time of concentration (TC) = 28.93 min.

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+++

Process from Point/Station 6.000 to Point/Station 4.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.450 given for subarea
Time of concentration = 28.93 min.
Rainfall intensity = 1.275(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 11.203(CFS) for 19.530(Ac.)
Total runoff = 18.159(CFS) Total area = 30.64(Ac.)

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+++

Process from Point/Station 6.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 30.640(Ac.)
Runoff from this stream = 18.159(CFS)
Time of concentration = 28.93 min.
Rainfall intensity = 1.275(In/Hr)
Summary of stream data:

Stream Flow rate TC Rainfall Intensity

No. (CFS) (min) (In/Hr)

1 16.518 126.91 0.494
2 18.159 28.93 1.275
Qmax(1) =
1.000 * 1.000 * 16.518) +
0.388 * 1.000 * 18.159) + = 23.556
Qmax(2) =
1.000 * 0.228 * 16.518) +
1.000 * 1.000 * 18.159) + = 21.925

Total of 2 streams to confluence:
Flow rates before confluence point:
16.518 18.159
Maximum flow rates at confluence using above data:
23.556 21.925
Area of streams before confluence:
37.830 30.640
Results of confluence:
Total flow rate = 23.556(CFS)
Time of concentration = 126.908 min.
Effective stream area after confluence = 68.470(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 615.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 510.000(Ft.)
Elevation difference = 6.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 29.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(615.000^.5)/(0.976^(1/3)]= 29.25
Rainfall intensity (I) = 1.266(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 2.638(CFS)
Total initial stream area = 4.630(Ac.)

+++
+++
Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.266(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.179(CFS) for 0.980(Ac.)
Total runoff = 3.817(CFS) Total area = 5.61(Ac.)

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+++
Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.266(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.361(CFS) for 0.300(Ac.)
Total runoff = 4.178(CFS) Total area = 5.91(Ac.)

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Process from Point/Station 8.000 to Point/Station 9.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 265.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 512.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(265.000^.5)/(0.755^(1/3)]= 4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.149(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.539(CFS)
Total initial stream area = 0.180(Ac.)
End of computations, total study area = 74.560 (Ac.)

EXISTING CONDITION HYDROLOGY
10 YEAR STORM
BADIEE TRUCK PARK AND STORAGE **J.N. 20-025**

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3
Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 12/13/21

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

Program License Serial Number 4035

Rational hydrology study storm event year is 10.0
English (in-lb) input data Units used
English (in) rainfall data used

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

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+++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 250.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 514.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(250.000^.5)/(0.800^(1/3)]= 4.60
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.592(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.853(CFS)
Total initial stream area = 0.250(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 514.000(Ft.)
Downstream point elevation = 497.000(Ft.)
Channel length thru subarea = 1500.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 0.333

Estimated mean flow rate at midpoint of channel = 3.993(CFS)
Manning's 'N' = 0.015
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 3.993(CFS)
Depth of flow = 0.247(Ft.), Average velocity = 2.593(Ft/s)
Channel flow top width = 12.451(Ft.)
Flow Velocity = 2.59(Ft/s)
Travel time = 9.64 min.
Time of concentration = 14.64 min.
Critical depth = 0.275(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 2.145(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 3.749(CFS) for 1.840(Ac.)
Total runoff = 4.602(CFS) Total area = 2.09(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.090(Ac.)
Runoff from this stream = 4.602(CFS)
Time of concentration = 14.64 min.
Rainfall intensity = 2.145(In/Hr)

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Process from Point/Station 2.000 to Point/Station 3.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity (I) = 0.592(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 124.00 min. Rain intensity = 0.59(In/Hr)
Total area = 34.600(Ac.) Total runoff = 14.900(CFS)

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Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 34.600(Ac.)
Runoff from this stream = 14.900(CFS)
Time of concentration = 124.00 min.
Rainfall intensity = 0.592(In/Hr)
Summary of stream data:

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

1 4.602 14.64 2.145
2 14.900 124.00 0.592
Qmax(1) =
1.000 * 1.000 * 4.602) +
1.000 * 0.118 * 14.900) + = 6.361
Qmax(2) =
0.276 * 1.000 * 4.602) +
1.000 * 1.000 * 14.900) + = 16.169

Total of 2 streams to confluence:
Flow rates before confluence point:
4.602 14.900
Maximum flow rates at confluence using above data:
6.361 16.169
Area of streams before confluence:
2.090 34.600
Results of confluence:
Total flow rate = 16.169(CFS)
Time of concentration = 124.000 min.
Effective stream area after confluence = 36.690(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 492.190(Ft.)
Downstream point elevation = 489.400(Ft.)
Channel length thru subarea = 600.000(Ft.)
Channel base width = 1.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 16.421(CFS)
Manning's 'N' = 0.023
Maximum depth of channel = 4.000(Ft.)
Flow(q) thru subarea = 16.421(CFS)
Depth of flow = 1.313(Ft.), Average velocity = 3.449(Ft/s)
Channel flow top width = 6.252(Ft.)
Flow Velocity = 3.45(Ft/s)
Travel time = 2.90 min.
Time of concentration = 126.90 min.
Critical depth = 1.109(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 0.583(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.631(CFS) for 1.140(Ac.)
Total runoff = 16.800(CFS) Total area = 37.83(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 37.830(Ac.)
Runoff from this stream = 16.800(CFS)
Time of concentration = 126.90 min.
Rainfall intensity = 0.583(In/Hr)

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Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 750.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 500.000(Ft.)
Elevation difference = 16.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 24.89 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(750.000^.5)/(2.133^(1/3)]= 24.89
Rainfall intensity (I) = 1.638(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 8.188(CFS)
Total initial stream area = 11.110(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 499.000(Ft.)
Downstream point/station elevation = 489.400(Ft.)
Pipe length = 1255.00(Ft.) Manning's N = 0.015
No. of pipes = 1 Required pipe flow = 8.188(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 8.188(CFS)
Normal flow depth in pipe = 11.68(In.)
Flow top width inside pipe = 23.99(In.)
Critical Depth = 12.23(In.)
Pipe flow velocity = 5.40(Ft/s)
Travel time through pipe = 3.88 min.
Time of concentration (TC) = 28.77 min.

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Process from Point/Station 6.000 to Point/Station 4.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.450 given for subarea
Time of concentration = 28.77 min.
Rainfall intensity = 1.508(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 13.249(CFS) for 19.530(Ac.)
Total runoff = 21.437(CFS) Total area = 30.64(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 30.640(Ac.)
Runoff from this stream = 21.437(CFS)
Time of concentration = 28.77 min.
Rainfall intensity = 1.508(In/Hr)
Summary of stream data:

Stream Flow rate TC Rainfall Intensity

No. (CFS) (min) (In/Hr)

1 16.800 126.90 0.583
2 21.437 28.77 1.508
Qmax(1) =
1.000 * 1.000 * 16.800) +
0.387 * 1.000 * 21.437) + = 25.088
Qmax(2) =
1.000 * 0.227 * 16.800) +
1.000 * 1.000 * 21.437) + = 25.246

Total of 2 streams to confluence:
Flow rates before confluence point:
16.800 21.437
Maximum flow rates at confluence using above data:
25.088 25.246
Area of streams before confluence:
37.830 30.640
Results of confluence:
Total flow rate = 25.246(CFS)
Time of concentration = 28.767 min.
Effective stream area after confluence = 68.470(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 615.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 510.000(Ft.)
Elevation difference = 6.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 29.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(615.000^.5)/(0.976^(1/3)]= 29.25
Rainfall intensity (I) = 1.493(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 3.110(CFS)
Total initial stream area = 4.630(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.493(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.390(CFS) for 0.980(Ac.)
Total runoff = 4.499(CFS) Total area = 5.61(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.493(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.425(CFS) for 0.300(Ac.)
Total runoff = 4.925(CFS) Total area = 5.91(Ac.)

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Process from Point/Station 8.000 to Point/Station 9.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 265.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 512.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(265.000^.5)/(0.755^(1/3)]= 4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.592(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.614(CFS)
Total initial stream area = 0.180(Ac.)
End of computations, total study area = 74.560 (Ac.)

EXISTING CONDITION HYDROLOGY
25 YEAR STORM
BADIEE TRUCK PARK AND STORAGE **J.N. 20-025**

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3
Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 12/13/21

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

Program License Serial Number 4035

Rational hydrology study storm event year is 25.0
English (in-lb) input data Units used
English (in) rainfall data used

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

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Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 250.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 514.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(250.000^.5)/(0.800^(1/3)]= 4.60
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.845(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.913(CFS)
Total initial stream area = 0.250(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 514.000(Ft.)
Downstream point elevation = 497.000(Ft.)
Channel length thru subarea = 1500.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 0.333

Estimated mean flow rate at midpoint of channel = 4.274(CFS)
Manning's 'N' = 0.015
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 4.274(CFS)
Depth of flow = 0.254(Ft.), Average velocity = 2.637(Ft/s)
Channel flow top width = 12.772(Ft.)
Flow Velocity = 2.64(Ft/s)
Travel time = 9.48 min.
Time of concentration = 14.48 min.
Critical depth = 0.281(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 2.394(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 4.184(CFS) for 1.840(Ac.)
Total runoff = 5.098(CFS) Total area = 2.09(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.090(Ac.)
Runoff from this stream = 5.098(CFS)
Time of concentration = 14.48 min.
Rainfall intensity = 2.394(In/Hr)

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Process from Point/Station 2.000 to Point/Station 3.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity (I) = 0.668(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 124.00 min. Rain intensity = 0.67(In/Hr)
Total area = 34.600(Ac.) Total runoff = 14.900(CFS)

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Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 34.600(Ac.)
Runoff from this stream = 14.900(CFS)
Time of concentration = 124.00 min.
Rainfall intensity = 0.668(In/Hr)
Summary of stream data:

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

1 5.098 14.48 2.394
2 14.900 124.00 0.668
Qmax(1) =
1.000 * 1.000 * 5.098) +
1.000 * 0.117 * 14.900) + = 6.837
Qmax(2) =
0.279 * 1.000 * 5.098) +
1.000 * 1.000 * 14.900) + = 16.322

Total of 2 streams to confluence:
Flow rates before confluence point:
5.098 14.900
Maximum flow rates at confluence using above data:
6.837 16.322
Area of streams before confluence:
2.090 34.600
Results of confluence:
Total flow rate = 16.322(CFS)
Time of concentration = 124.000 min.
Effective stream area after confluence = 36.690(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 492.190(Ft.)
Downstream point elevation = 489.400(Ft.)
Channel length thru subarea = 600.000(Ft.)
Channel base width = 1.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 16.575(CFS)
Manning's 'N' = 0.023
Maximum depth of channel = 4.000(Ft.)
Flow(q) thru subarea = 16.575(CFS)
Depth of flow = 1.318(Ft.), Average velocity = 3.458(Ft/s)
Channel flow top width = 6.273(Ft.)
Flow Velocity = 3.46(Ft/s)
Travel time = 2.89 min.
Time of concentration = 126.89 min.
Critical depth = 1.109(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 0.658(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.712(CFS) for 1.140(Ac.)
Total runoff = 17.034(CFS) Total area = 37.83(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 37.830(Ac.)
Runoff from this stream = 17.034(CFS)
Time of concentration = 126.89 min.
Rainfall intensity = 0.658(In/Hr)

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Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 750.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 500.000(Ft.)
Elevation difference = 16.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 24.89 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(750.000^.5)/(2.133^(1/3)]= 24.89
Rainfall intensity (I) = 1.843(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 9.214(CFS)
Total initial stream area = 11.110(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 499.000(Ft.)
Downstream point/station elevation = 489.400(Ft.)
Pipe length = 1255.00(Ft.) Manning's N = 0.015
No. of pipes = 1 Required pipe flow = 9.214(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 9.214(CFS)
Normal flow depth in pipe = 12.53(In.)
Flow top width inside pipe = 23.98(In.)
Critical Depth = 12.99(In.)
Pipe flow velocity = 5.56(Ft/s)
Travel time through pipe = 3.76 min.
Time of concentration (TC) = 28.65 min.

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Process from Point/Station 6.000 to Point/Station 4.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.450 given for subarea
Time of concentration = 28.65 min.
Rainfall intensity = 1.703(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 14.969(CFS) for 19.530(Ac.)
Total runoff = 24.183(CFS) Total area = 30.64(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 30.640(Ac.)
Runoff from this stream = 24.183(CFS)
Time of concentration = 28.65 min.
Rainfall intensity = 1.703(In/Hr)
Summary of stream data:

Stream Flow rate TC Rainfall Intensity

No. (CFS) (min) (In/Hr)

1 17.034 126.89 0.658
2 24.183 28.65 1.703
Qmax(1) =
1.000 * 1.000 * 17.034) +
0.386 * 1.000 * 24.183) + = 26.373
Qmax(2) =
1.000 * 0.226 * 17.034) +
1.000 * 1.000 * 24.183) + = 28.030

Total of 2 streams to confluence:
Flow rates before confluence point:
17.034 24.183
Maximum flow rates at confluence using above data:
26.373 28.030
Area of streams before confluence:
37.830 30.640
Results of confluence:
Total flow rate = 28.030(CFS)
Time of concentration = 28.654 min.
Effective stream area after confluence = 68.470(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 615.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 510.000(Ft.)
Elevation difference = 6.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 29.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(615.000^.5)/(0.976^(1/3)]= 29.25
Rainfall intensity (I) = 1.683(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 3.506(CFS)
Total initial stream area = 4.630(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.683(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.567(CFS) for 0.980(Ac.)
Total runoff = 5.073(CFS) Total area = 5.61(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.683(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.480(CFS) for 0.300(Ac.)
Total runoff = 5.552(CFS) Total area = 5.91(Ac.)

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Process from Point/Station 8.000 to Point/Station 9.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 265.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 512.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(265.000^.5)/(0.755^(1/3)]= 4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.845(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.658(CFS)
Total initial stream area = 0.180(Ac.)
End of computations, total study area = 74.560 (Ac.)

EXISTING CONDITION HYDROLOGY
50 YEAR STORM
BADIEE TRUCK PARK AND STORAGE **J.N 20-025**

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3
Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 12/10/21

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

Program License Serial Number 4035

Rational hydrology study storm event year is 50.0
English (in-lb) input data Units used
English (in) rainfall data used

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

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Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 250.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 514.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(250.000^.5)/(0.800^(1/3)]= 4.60
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.265(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.013(CFS)
Total initial stream area = 0.250(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 514.000(Ft.)
Downstream point elevation = 497.000(Ft.)
Channel length thru subarea = 1500.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 0.333

Estimated mean flow rate at midpoint of channel = 4.741(CFS)
Manning's 'N' = 0.015
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 4.741(CFS)
Depth of flow = 0.264(Ft.), Average velocity = 2.707(Ft/s)
Channel flow top width = 13.279(Ft.)
Flow Velocity = 2.71(Ft/s)
Travel time = 9.24 min.
Time of concentration = 14.24 min.
Critical depth = 0.295(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 2.766(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 4.835(CFS) for 1.840(Ac.)
Total runoff = 5.848(CFS) Total area = 2.09(Ac.)

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Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.090(Ac.)
Runoff from this stream = 5.848(CFS)
Time of concentration = 14.24 min.
Rainfall intensity = 2.766(In/Hr)

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+++
Process from Point/Station 2.000 to Point/Station 3.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity (I) = 0.777(In/Hr) for a 50.0 year storm
User specified values are as follows:
TC = 124.00 min. Rain intensity = 0.78(In/Hr)
Total area = 34.600(Ac.) Total runoff = 14.900(CFS)

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+++
Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 34.600(Ac.)
Runoff from this stream = 14.900(CFS)
Time of concentration = 124.00 min.
Rainfall intensity = 0.777(In/Hr)
Summary of stream data:

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

1 5.848 14.24 2.766
2 14.900 124.00 0.777
Qmax(1) =
1.000 * 1.000 * 5.848) +
1.000 * 0.115 * 14.900) + = 7.559
Qmax(2) =
0.281 * 1.000 * 5.848) +
1.000 * 1.000 * 14.900) + = 16.543

Total of 2 streams to confluence:
Flow rates before confluence point:
5.848 14.900
Maximum flow rates at confluence using above data:
7.559 16.543
Area of streams before confluence:
2.090 34.600
Results of confluence:
Total flow rate = 16.543(CFS)
Time of concentration = 124.000 min.
Effective stream area after confluence = 36.690(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 492.190(Ft.)
Downstream point elevation = 489.400(Ft.)
Channel length thru subarea = 600.000(Ft.)
Channel base width = 1.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 16.800(CFS)
Manning's 'N' = 0.023
Maximum depth of channel = 4.000(Ft.)
Flow(q) thru subarea = 16.800(CFS)
Depth of flow = 1.326(Ft.), Average velocity = 3.469(Ft/s)
Channel flow top width = 6.304(Ft.)
Flow Velocity = 3.47(Ft/s)
Travel time = 2.88 min.
Time of concentration = 126.88 min.
Critical depth = 1.125(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Rainfall intensity = 0.766(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.829(CFS) for 1.140(Ac.)
Total runoff = 17.372(CFS) Total area = 37.83(Ac.)

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Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 37.830(Ac.)
Runoff from this stream = 17.372(CFS)
Time of concentration = 126.88 min.
Rainfall intensity = 0.766(In/Hr)

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Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 750.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 500.000(Ft.)
Elevation difference = 16.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 24.89 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(750.000^.5)/(2.133^(1/3)]= 24.89
Rainfall intensity (I) = 2.140(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 10.699(CFS)
Total initial stream area = 11.110(Ac.)

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+++
Process from Point/Station 6.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 499.000(Ft.)
Downstream point/station elevation = 489.400(Ft.)
Pipe length = 1255.00(Ft.) Manning's N = 0.015
No. of pipes = 1 Required pipe flow = 10.699(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 10.699(CFS)
Normal flow depth in pipe = 13.73(In.)
Flow top width inside pipe = 23.75(In.)
Critical Depth = 14.06(In.)
Pipe flow velocity = 5.76(Ft/s)
Travel time through pipe = 3.63 min.
Time of concentration (TC) = 28.52 min.

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Process from Point/Station 6.000 to Point/Station 4.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.450 given for subarea
Time of concentration = 28.52 min.
Rainfall intensity = 1.986(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 17.454(CFS) for 19.530(Ac.)
Total runoff = 28.153(CFS) Total area = 30.64(Ac.)

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Process from Point/Station 6.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 30.640(Ac.)
Runoff from this stream = 28.153(CFS)
Time of concentration = 28.52 min.
Rainfall intensity = 1.986(In/Hr)
Summary of stream data:

Stream Flow rate TC Rainfall Intensity

No. (CFS) (min) (In/Hr)

1 17.372 126.88 0.766
2 28.153 28.52 1.986
Qmax(1) =
1.000 * 1.000 * 17.372) +
0.386 * 1.000 * 28.153) + = 28.228
Qmax(2) =
1.000 * 0.225 * 17.372) +
1.000 * 1.000 * 28.153) + = 32.059

Total of 2 streams to confluence:
Flow rates before confluence point:
17.372 28.153
Maximum flow rates at confluence using above data:
28.228 32.059
Area of streams before confluence:
37.830 30.640
Results of confluence:
Total flow rate = 32.059(CFS)
Time of concentration = 28.523 min.
Effective stream area after confluence = 68.470(Ac.)

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Process from Point/Station 5.000 to Point/Station 7.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 615.000(Ft.)
Highest elevation = 516.000(Ft.)
Lowest elevation = 510.000(Ft.)
Elevation difference = 6.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 29.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(615.000^.5)/(0.976^(1/3)]= 29.25
Rainfall intensity (I) = 1.957(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 4.078(CFS)
Total initial stream area = 4.630(Ac.)

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+++
Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.957(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.822(CFS) for 0.980(Ac.)
Total runoff = 5.901(CFS) Total area = 5.61(Ac.)

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+++
Process from Point/Station 5.000 to Point/Station 7.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 29.25 min.
Rainfall intensity = 1.957(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.558(CFS) for 0.300(Ac.)
Total runoff = 6.458(CFS) Total area = 5.91(Ac.)

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Process from Point/Station 8.000 to Point/Station 9.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 265.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 512.000(Ft.)
Elevation difference = 2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(265.000^.5)/(0.755^(1/3)]= 4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.265(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.729(CFS)
Total initial stream area = 0.180(Ac.)
End of computations, total study area = 74.560 (Ac.)

EXISTING CONDITION HYDROLOGY
100 YEAR STORM
BADIEE TRUCK PARK AND STORAGE **J.N 20-025**

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          San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
       Rational Hydrology Study        Date: 05/17/22
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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Program License Serial Number 4035

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

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Initial subarea flow distance  =  250.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  514.000(Ft.)
Elevation difference =    2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 250.000^.5)/(   0.800^(1/3)]=   4.60
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.042(CFS)
Total initial stream area =        0.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   514.000(Ft.)
Downstream point elevation =   497.000(Ft.)
Channel length thru subarea  =  1500.000(Ft.)
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Channel base width  =    0.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =   0.333
Estimated mean flow rate at midpoint of channel =      4.878(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      4.878(CFS)
Depth of flow =   0.267(Ft.), Average velocity =   2.726(Ft/s)
Channel flow top width =   13.422(Ft.)
Flow Velocity =    2.73(Ft/s)
Travel time  =    9.17 min.
Time of concentration =   14.17 min.
Critical depth =      0.297(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      2.969(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      5.190(CFS) for    1.840(Ac.)
Total runoff =      6.232(CFS)   Total area =        2.09(Ac.)


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Process from Point/Station       2.000 to Point/Station       3.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.090(Ac.)
Runoff from this stream =      6.232(CFS)
Time of concentration =   14.17 min.
Rainfall intensity =     2.969(In/Hr)


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Process from Point/Station       2.000 to Point/Station       3.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity (I) =      0.847(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.85(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


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Process from Point/Station       2.000 to Point/Station       3.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.847(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                 (In/Hr)


1        6.232     14.17           2.969
2       14.900    124.00           0.847
Qmax(1) =
          1.000 *    1.000 *     6.232) +
          1.000 *    0.114 *    14.900) + =       7.935
Qmax(2) =
          0.285 *    1.000 *     6.232) +
          1.000 *    1.000 *    14.900) + =      16.678

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.232      14.900
Maximum flow rates at confluence using above data:
        7.935       16.678
Area of streams before confluence:
        2.090       34.600
Results of confluence:
Total flow rate =     16.678(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     36.690(Ac.)


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Process from Point/Station       3.000 to Point/Station       4.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   492.190(Ft.)
Downstream point elevation =   489.400(Ft.)
Channel length thru subarea  =   600.000(Ft.)
Channel base width  =    1.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =     16.937(CFS)
Manning's 'N'    = 0.023
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =     16.937(CFS)
Depth of flow =   1.331(Ft.), Average velocity =   3.476(Ft/s)
Channel flow top width =    6.323(Ft.)
Flow Velocity =    3.48(Ft/s)
Travel time  =    2.88 min.
Time of concentration =  126.88 min.
Critical depth =      1.125(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Rainfall intensity =      0.835(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.904(CFS) for    1.140(Ac.)
Total runoff =     17.582(CFS)   Total area =       37.83(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     37.830(Ac.)
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Runoff from this stream =     17.582(CFS)
Time of concentration =  126.88 min.
Rainfall intensity =     0.835(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance  =  750.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   16.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    24.89 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 750.000^.5)/( 2.133^(1/3)]=  24.89
Rainfall intensity (I) =      2.325(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =     11.625(CFS)
Total initial stream area =       11.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.000(Ft.)
Downstream point/station elevation =   489.400(Ft.)
Pipe length  =  1255.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.625(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.625(CFS)
Normal flow depth in pipe =   14.48(In.)
Flow top width inside pipe =   23.48(In.)
Critical Depth =   14.68(In.)
Pipe flow velocity =      5.86(Ft/s)
Travel time through pipe =    3.57 min.
Time of concentration (TC) =    28.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       4.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Time of concentration =    28.46 min.
Rainfall intensity =      2.164(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     19.023(CFS) for   19.530(Ac.)
Total runoff =     30.648(CFS)   Total area =       30.64(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     30.640(Ac.)
Runoff from this stream =     30.648(CFS)
Time of concentration =   28.46 min.
Rainfall intensity =     2.164(In/Hr)
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```
Summary of stream data:

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


1       17.582    126.88           0.835
2       30.648     28.46           2.164
Qmax(1) =
          1.000 *    1.000 *    17.582) +
          0.386 *    1.000 *    30.648) + =      29.398
Qmax(2) =
          1.000 *    0.224 *    17.582) +
          1.000 *    1.000 *    30.648) + =      34.591

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.582      30.648
Maximum flow rates at confluence using above data:
       29.398       34.591
Area of streams before confluence:
       37.830       30.640
Results of confluence:
Total flow rate =     34.591(CFS)
Time of concentration =    28.457 min.
Effective stream area after confluence =     68.470(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       7.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance  =  615.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  510.000(Ft.)
Elevation difference =    6.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    29.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 615.000^.5)/( 0.976^(1/3)]=  29.25
Rainfall intensity (I) =      2.131(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      4.440(CFS)
Total initial stream area =        4.630(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                     ]
Time of concentration =    29.25 min.
Rainfall intensity =      2.131(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.984(CFS) for    0.980(Ac.)
Total runoff =      6.424(CFS)   Total area =        5.61(Ac.)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    29.25 min.
Rainfall intensity =      2.131(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.607(CFS) for    0.300(Ac.)
Total runoff =      7.031(CFS)   Total area =       5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Initial subarea flow distance  =  265.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  512.000(Ft.)
Elevation difference =    2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 265.000^.5)/(   0.755^(1/3)]=   4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      0.751(CFS)
Total initial stream area =       0.180(Ac.)
End of computations, total study area =         74.560 (Ac.)
```

Existing Condition @ Node 7
Channel Calculator

Given Input Data:
Shape .... Trapezoidal
Solving for .... Depth of Flow
Flowrate .... 7.3100 cfs
Slope .... 0.0100 ft/ft
Manning's n 0.0350
Height .... 12.0000 in
Bottom width .... 60.0000 in
Left slope .... 0.5000 ft/ft (V/H)
Right slope .... 0.5000 ft/ft (V/H)

Computed Results:
Depth .... 6.1104 in
Velocity .... 2.3853 fps
Full Flowrate .... 24.2931 cfs
Flow area 3.0645 ft2
Flow perimeter .... 87.3263 in
Hydraulic radius .... 5.0534 in
Top width .... 84.4414 in
Area 7.0000 ft2
Perimeter .... 113.6656 in
Percent full .... 50.9196 %

Existing Condition @ Node 9
Channel Calculator

Given Input Data:
Shape .... Trapezoidal
Solving for .... Depth of Flow
Flowrate .... 0.7500 cfs
Slope .... 0.0100 ft/ft
Manning's n 0.0300
Height .... 6.0000 in
Bottom width .... 24.0000 in
Left slope .... 0.5000 ft/ft (V/H)
Right slope .... 0.5000 ft/ft (V/H)

Computed Results:
Depth .... 2.4616 in
Velocity .... 1.5169 fps
Full Flowrate .... 3.7188 cfs
Flow area 0.4944 ft2
Flow perimeter .... 35.0085 in
Hydraulic radius .... 2.0337 in
Top width .... 33.8463 in
Area 1.5000 ft2
Perimeter .... 50.8328 in
Percent full .... 41.0262 %

PROPOSED CONDITION

PROPOSED CONDITION HYDROLOGY
5 YEAR STORM
BADIEE TRUCK PARKING AND STORAGE

```
             San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
       Rational Hydrology Study        Date: 12/22/22
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4035

------------------------------------------------------------------------
Rational hydrology study storm event year is     5.0
English (in-lb) input data Units used
English (in) rainfall data used

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                         ]
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  513.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 280.000^.5)/(   1.071^(1/3)]=   4.42
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      3.149(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.316(CFS)
Total initial stream area =       0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =     5.00 min.
Rainfall intensity =      3.149(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.748(CFS) for    0.250(Ac.)
Total runoff =      2.064(CFS)   Total area =       0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   513.000(Ft.)
End of street segment elevation =   496.750(Ft.)
Length of street segment  =  1470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  63.000(Ft.)
Distance from crown to crossfall grade break  =  61.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      6.732(CFS)
Depth of flow =   0.413(Ft.), Average velocity =   2.596(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.882(Ft.)
Flow velocity =   2.60(Ft/s)
Travel time =    9.44 min.     TC =   14.44  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      1.850(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      5.484(CFS) for    3.120(Ac.)
Total runoff =      7.548(CFS)   Total area =       3.81(Ac.)
Street flow at end of street =      7.548(CFS)
Half street flow at end of street =      7.548(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   2.668(Ft/s)
Flow width (from curb towards crown)=  16.606(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    14.44 min.
```

```
Rainfall intensity =      1.850(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.148(CFS) for    0.160(Ac.)
Total runoff =      7.696(CFS)   Total area =       3.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.420(Ft.)
Downstream point/station elevation =   492.290(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.696(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.696(CFS)
Normal flow depth in pipe =   12.47(In.)
Flow top width inside pipe =   23.98(In.)
Critical Depth =   11.83(In.)
Pipe flow velocity =      4.67(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    14.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.970(Ac.)
Runoff from this stream =      7.696(CFS)
Time of concentration =   14.52 min.
Rainfall intensity =     1.845(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity (I) =      0.502(In/Hr) for a     5.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.50(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.502(In/Hr)
Summary of stream data:

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

```
1        7.696     14.52           1.845
2       14.900    124.00           0.502
Qmax(1) =
         1.000 *    1.000 *     7.696) +
         1.000 *    0.117 *    14.900) + =       9.441
Qmax(2) =
         0.272 *    1.000 *     7.696) +
         1.000 *    1.000 *    14.900) + =      16.992

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.696      14.900
Maximum flow rates at confluence using above data:
        9.441       16.992
Area of streams before confluence:
        3.970       34.600
Results of confluence:
Total flow rate =     16.992(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     38.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.290(Ft.)
Downstream point/station elevation =   492.070(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    16.992(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    16.992(CFS)
Normal flow depth in pipe =   17.53(In.)
Flow top width inside pipe =   29.57(In.)
Critical Depth =   16.71(In.)
Pipe flow velocity =      5.71(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =   124.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.070(Ft.)
Downstream point/station elevation =   490.090(Ft.)
Pipe length  =   393.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    16.992(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    16.992(CFS)
Normal flow depth in pipe =   18.02(In.)
Flow top width inside pipe =   29.38(In.)
Critical Depth =   16.71(In.)
Pipe flow velocity =      5.51(Ft/s)
Travel time through pipe =    1.19 min.
Time of concentration (TC) =   125.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
```

```
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.30 min.
Rainfall intensity =      0.498(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.445(CFS) for    0.940(Ac.)
Total runoff =     17.437(CFS)   Total area =       39.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.30 min.
Rainfall intensity =      0.498(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.062(CFS) for    0.250(Ac.)
Total runoff =     17.500(CFS)   Total area =       39.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.30 min.
Rainfall intensity =      0.498(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.076(CFS) for    0.160(Ac.)
Total runoff =     17.575(CFS)   Total area =       39.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   490.090(Ft.)
Downstream point/station elevation =   489.450(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.575(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.575(CFS)
Normal flow depth in pipe =   18.33(In.)
Flow top width inside pipe =   29.25(In.)
Critical Depth =   17.04(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =   125.68 min.
```

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Process from Point/Station       6.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.450(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.575(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.575(CFS)
Normal flow depth in pipe =   15.54(In.)
Flow top width inside pipe =   29.98(In.)
Critical Depth =   17.04(In.)
Pipe flow velocity =      6.84(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   125.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.920(Ac.)
Runoff from this stream =     17.575(CFS)
Time of concentration =  125.79 min.
Rainfall intensity =     0.497(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  806.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   13.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    25.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 806.000^.5)/( 1.675^(1/3)]=  25.82
Rainfall intensity (I) =      1.363(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =     13.245(CFS)
Total initial stream area =      19.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station      10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.400(Ft.)
Downstream point/station elevation =   489.800(Ft.)
Pipe length  =   490.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.245(CFS)
Given pipe size =     30.00(In.)
```

```
Calculated individual pipe flow  =    13.245(CFS)
Normal flow depth in pipe =   13.99(In.)
Flow top width inside pipe =   29.93(In.)
Critical Depth =   14.70(In.)
Pipe flow velocity =      5.90(Ft/s)
Travel time through pipe =    1.38 min.
Time of concentration (TC) =    27.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.20 min.
Rainfall intensity =      1.322(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      5.487(CFS) for    8.300(Ac.)
Total runoff =     18.731(CFS)   Total area =       27.74(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.650(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.731(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.731(CFS)
Normal flow depth in pipe =   14.47(In.)
Flow top width inside pipe =   29.98(In.)
Critical Depth =   17.60(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    27.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station        7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.740(Ac.)
Runoff from this stream =     18.731(CFS)
Time of concentration =   27.30 min.
Rainfall intensity =     1.319(In/Hr)
Summary of stream data:

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


1       17.575    125.79            0.497
2       18.731     27.30            1.319
Qmax(1) =
          1.000 *    1.000 *    17.575) +
```

```
         0.377 *    1.000 *    18.731) + =      24.630
Qmax(2) =
         1.000 *    0.217 *    17.575) +
         1.000 *    1.000 *    18.731) + =      22.546

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.575      18.731
Maximum flow rates at confluence using above data:
       24.630       22.546
Area of streams before confluence:
       39.920       27.740
Results of confluence:
Total flow rate =     24.630(CFS)
Time of concentration =   125.787 min.
Effective stream area after confluence =     67.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.79 min.
Rainfall intensity =      0.497(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.109(CFS) for    0.230(Ac.)
Total runoff =     24.739(CFS)   Total area =       67.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.79 min.
Rainfall intensity =      0.497(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.119(CFS) for    0.480(Ac.)
Total runoff =     24.858(CFS)   Total area =       68.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station      20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.060(Ft.)
Downstream point/station elevation =   488.710(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 2  Required pipe flow  =    24.858(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    12.429(CFS)
Normal flow depth in pipe =   12.49(In.)
Flow top width inside pipe =   29.58(In.)
```

```
Critical Depth =   14.20(In.)
Pipe flow velocity =      6.42(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =   125.97 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  510.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  511.000(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    30.93 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 510.000^.5)/( 0.490^(1/3)]=  30.93
Rainfall intensity (I) =      1.224(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      2.155(CFS)
Total initial stream area =        3.520(Ac.)


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Process from Point/Station      11.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   504.500(Ft.)
Downstream point/station elevation =   503.980(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.155(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.155(CFS)
Normal flow depth in pipe =    5.90(In.)
Flow top width inside pipe =   16.90(In.)
Critical Depth =    6.65(In.)
Pipe flow velocity =      4.28(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    31.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    31.13 min.
Rainfall intensity =      1.220(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.865(CFS) for    1.610(Ac.)
Total runoff =      4.020(CFS)   Total area =        5.13(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    31.13 min.
Rainfall intensity =      1.220(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.904(CFS) for    0.780(Ac.)
Total runoff =      4.924(CFS)   Total area =       5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.950(Ft.)
Downstream point/station elevation =   499.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     4.924(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     4.924(CFS)
Normal flow depth in pipe =    9.88(In.)
Flow top width inside pipe =   23.62(In.)
Critical Depth =    9.38(In.)
Pipe flow velocity =      4.04(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    31.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.500
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  513.900(Ft.)
Lowest elevation =  511.830(Ft.)
Elevation difference =    2.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    19.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5278)*( 280.000^.5)/( 0.739^(1/3)]=  19.06
Rainfall intensity (I) =      1.607(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.528
Subarea runoff =      0.238(CFS)
Total initial stream area =       0.280(Ac.)
End of computations, total study area =         74.560 (Ac.)
```

PROPOSED CONDITION HYDROLOGY
10 YEAR STORM
BADIEE TRUCK PARKING AND STORAGE

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              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
       Rational Hydrology Study        Date: 12/22/22
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4035

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
English (in-lb) input data Units used
English (in) rainfall data used

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  513.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 280.000^.5)/(   1.071^(1/3)]=   4.42
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      3.592(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.502(CFS)
Total initial stream area =       0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =     5.00 min.
Rainfall intensity =      3.592(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.853(CFS) for    0.250(Ac.)
Total runoff =      2.355(CFS)   Total area =        0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   513.000(Ft.)
End of street segment elevation =   496.750(Ft.)
Length of street segment  =  1470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  63.000(Ft.)
Distance from crown to crossfall grade break  =  61.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      7.679(CFS)
Depth of flow =   0.429(Ft.), Average velocity =   2.679(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.717(Ft.)
Flow velocity =   2.68(Ft/s)
Travel time =    9.14 min.     TC =   14.14  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      2.180(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      6.462(CFS) for    3.120(Ac.)
Total runoff =      8.817(CFS)   Total area =        3.81(Ac.)
Street flow at end of street =      8.817(CFS)
Half street flow at end of street =      8.817(CFS)
Depth of flow =   0.448(Ft.), Average velocity =   2.771(Ft/s)
Flow width (from curb towards crown)=  17.638(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    14.14 min.
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```
Rainfall intensity =      2.180(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.174(CFS) for    0.160(Ac.)
Total runoff =      8.991(CFS)   Total area =       3.97(Ac.)


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Process from Point/Station       3.000 to Point/Station       3.100
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.420(Ft.)
Downstream point/station elevation =   492.290(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.991(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.991(CFS)
Normal flow depth in pipe =   13.72(In.)
Flow top width inside pipe =   23.75(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =      4.84(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.23 min.


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Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.970(Ac.)
Runoff from this stream =      8.991(CFS)
Time of concentration =   14.23 min.
Rainfall intensity =     2.174(In/Hr)


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Process from Point/Station       3.000 to Point/Station       3.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity (I) =      0.592(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.59(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


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Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.592(In/Hr)
Summary of stream data:

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

```
1        8.991     14.23           2.174
2       14.900    124.00           0.592
Qmax(1) =
         1.000 *    1.000 *     8.991) +
         1.000 *    0.115 *    14.900) + =      10.701
Qmax(2) =
         0.272 *    1.000 *     8.991) +
         1.000 *    1.000 *    14.900) + =      17.346

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.991      14.900
Maximum flow rates at confluence using above data:
       10.701       17.346
Area of streams before confluence:
        3.970       34.600
Results of confluence:
Total flow rate =     17.346(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     38.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.290(Ft.)
Downstream point/station elevation =   492.070(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.346(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.346(CFS)
Normal flow depth in pipe =   17.77(In.)
Flow top width inside pipe =   29.49(In.)
Critical Depth =   16.90(In.)
Pipe flow velocity =      5.73(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =   124.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.070(Ft.)
Downstream point/station elevation =   490.090(Ft.)
Pipe length  =   393.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.346(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.346(CFS)
Normal flow depth in pipe =   18.28(In.)
Flow top width inside pipe =   29.27(In.)
Critical Depth =   16.90(In.)
Pipe flow velocity =      5.54(Ft/s)
Travel time through pipe =    1.18 min.
Time of concentration (TC) =   125.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
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______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =   125.30 min.
Rainfall intensity =      0.588(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.525(CFS) for    0.940(Ac.)
Total runoff =     17.871(CFS)   Total area =       39.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.30 min.
Rainfall intensity =      0.588(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.073(CFS) for    0.250(Ac.)
Total runoff =     17.944(CFS)   Total area =       39.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =   125.30 min.
Rainfall intensity =      0.588(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.089(CFS) for    0.160(Ac.)
Total runoff =     18.034(CFS)   Total area =       39.92(Ac.)


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Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   490.090(Ft.)
Downstream point/station elevation =   489.450(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.034(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.034(CFS)
Normal flow depth in pipe =   18.66(In.)
Flow top width inside pipe =   29.10(In.)
Critical Depth =   17.27(In.)
Pipe flow velocity =      5.62(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =   125.67 min.
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Process from Point/Station       6.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.450(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.034(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.034(CFS)
Normal flow depth in pipe =   15.80(In.)
Flow top width inside pipe =   29.96(In.)
Critical Depth =   17.27(In.)
Pipe flow velocity =      6.89(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   125.78 min.


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Process from Point/Station       6.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.920(Ac.)
Runoff from this stream =     18.034(CFS)
Time of concentration =  125.78 min.
Rainfall intensity =     0.586(In/Hr)


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Process from Point/Station       8.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                         ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  806.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   13.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    25.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 806.000^.5)/( 1.675^(1/3)]=  25.82
Rainfall intensity (I) =      1.605(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =     15.597(CFS)
Total initial stream area =      19.440(Ac.)


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Process from Point/Station       9.000 to Point/Station      10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.400(Ft.)
Downstream point/station elevation =   489.800(Ft.)
Pipe length  =   490.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.597(CFS)
Given pipe size =     30.00(In.)
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Calculated individual pipe flow  =    15.597(CFS)
Normal flow depth in pipe =   15.39(In.)
Flow top width inside pipe =   29.99(In.)
Critical Depth =   16.01(In.)
Pipe flow velocity =      6.15(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    27.15 min.


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Process from Point/Station        9.000 to Point/Station      10.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.15 min.
Rainfall intensity =      1.559(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      6.472(CFS) for    8.300(Ac.)
Total runoff =     22.068(CFS)   Total area =       27.74(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.650(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    22.068(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    22.068(CFS)
Normal flow depth in pipe =   15.95(In.)
Flow top width inside pipe =   29.94(In.)
Critical Depth =   19.17(In.)
Pipe flow velocity =      8.32(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    27.24 min.


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Process from Point/Station       10.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.740(Ac.)
Runoff from this stream =     22.068(CFS)
Time of concentration =   27.24 min.
Rainfall intensity =     1.556(In/Hr)
Summary of stream data:

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


1       18.034    125.78            0.586
2       22.068     27.24            1.556
Qmax(1) =
         1.000 *    1.000 *    18.034) +
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```
         0.377 *    1.000 *    22.068) + =      26.345
Qmax(2) =
         1.000 *    0.217 *    18.034) +
         1.000 *    1.000 *    22.068) + =      25.974

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.034      22.068
Maximum flow rates at confluence using above data:
       26.345       25.974
Area of streams before confluence:
       39.920       27.740
Results of confluence:
Total flow rate =     26.345(CFS)
Time of concentration =   125.778 min.
Effective stream area after confluence =     67.660(Ac.)


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Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.78 min.
Rainfall intensity =      0.586(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.128(CFS) for    0.230(Ac.)
Total runoff =     26.473(CFS)   Total area =       67.89(Ac.)


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Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.78 min.
Rainfall intensity =      0.586(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.141(CFS) for    0.480(Ac.)
Total runoff =     26.614(CFS)   Total area =       68.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station      20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.060(Ft.)
Downstream point/station elevation =   488.710(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 2  Required pipe flow  =    26.614(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    13.307(CFS)
Normal flow depth in pipe =   12.97(In.)
Flow top width inside pipe =   29.72(In.)
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Critical Depth =   14.72(In.)
Pipe flow velocity =      6.54(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =   125.96 min.


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Process from Point/Station       8.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  510.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  511.000(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    30.93 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 510.000^.5)/( 0.490^(1/3)]=  30.93
Rainfall intensity (I) =      1.443(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      2.540(CFS)
Total initial stream area =        3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   504.500(Ft.)
Downstream point/station elevation =   503.980(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.540(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.540(CFS)
Normal flow depth in pipe =    6.43(In.)
Flow top width inside pipe =   17.25(In.)
Critical Depth =    7.24(In.)
Pipe flow velocity =      4.48(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    31.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    31.12 min.
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.200(CFS) for    1.610(Ac.)
Total runoff =      4.740(CFS)   Total area =        5.13(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    31.12 min.
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.066(CFS) for    0.780(Ac.)
Total runoff =      5.806(CFS)   Total area =       5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.950(Ft.)
Downstream point/station elevation =   499.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.806(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     5.806(CFS)
Normal flow depth in pipe =   10.83(In.)
Flow top width inside pipe =   23.89(In.)
Critical Depth =   10.22(In.)
Pipe flow velocity =      4.22(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    31.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.500
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  513.900(Ft.)
Lowest elevation =  511.830(Ft.)
Elevation difference =    2.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    19.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5278)*( 280.000^.5)/( 0.739^(1/3)]=  19.06
Rainfall intensity (I) =      1.886(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.528
Subarea runoff =      0.279(CFS)
Total initial stream area =       0.280(Ac.)
End of computations, total study area =         74.560 (Ac.)
```

PRPOSED CONDITION HYDROLOGY
25 YEAR STORM
BADIEE TRUCK PARKING AND STORAGE

San Diego County Rational Hydrology Program

```
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 12/22/22
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4035

------------------------------------------------------------------------
Rational hydrology study storm event year is    25.0
English (in-lb) input data Units used
English (in) rainfall data used

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  513.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 280.000^.5)/(   1.071^(1/3)]=   4.42
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      3.845(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.607(CFS)
Total initial stream area =       0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =     5.00 min.
Rainfall intensity =      3.845(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.913(CFS) for    0.250(Ac.)
Total runoff =      2.520(CFS)   Total area =       0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   513.000(Ft.)
End of street segment elevation =   496.750(Ft.)
Length of street segment  =  1470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  63.000(Ft.)
Distance from crown to crossfall grade break  =  61.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.219(CFS)
Depth of flow =   0.438(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.164(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    8.99 min.     TC =   13.99  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      2.430(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      7.203(CFS) for    3.120(Ac.)
Total runoff =      9.723(CFS)   Total area =       3.81(Ac.)
Street flow at end of street =      9.723(CFS)
Half street flow at end of street =      9.723(CFS)
Depth of flow =   0.461(Ft.), Average velocity =   2.837(Ft/s)
Flow width (from curb towards crown)=  18.318(Ft.)


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Process from Point/Station       2.000 to Point/Station       3.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    13.99 min.
Rainfall intensity =      2.430(In/Hr) for a    25.0 year storm
```

```
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.194(CFS) for    0.160(Ac.)
Total runoff =      9.918(CFS)   Total area =       3.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.420(Ft.)
Downstream point/station elevation =   492.290(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     9.918(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     9.918(CFS)
Normal flow depth in pipe =   14.63(In.)
Flow top width inside pipe =   23.42(In.)
Critical Depth =   13.52(In.)
Pipe flow velocity =      4.95(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.970(Ac.)
Runoff from this stream =      9.918(CFS)
Time of concentration =   14.08 min.
Rainfall intensity =     2.424(In/Hr)


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Process from Point/Station       3.000 to Point/Station       3.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Rainfall intensity (I) =      0.668(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.67(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.668(In/Hr)
Summary of stream data:

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

```
1        9.918     14.08           2.424
2       14.900    124.00           0.668
Qmax(1) =
          1.000 *    1.000 *     9.918) +
          1.000 *    0.114 *    14.900) + =      11.609
Qmax(2) =
          0.275 *    1.000 *     9.918) +
          1.000 *    1.000 *    14.900) + =      17.631

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.918      14.900
Maximum flow rates at confluence using above data:
       11.609       17.631
Area of streams before confluence:
        3.970       34.600
Results of confluence:
Total flow rate =     17.631(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     38.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.290(Ft.)
Downstream point/station elevation =   492.070(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.631(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.631(CFS)
Normal flow depth in pipe =   17.95(In.)
Flow top width inside pipe =   29.41(In.)
Critical Depth =   17.04(In.)
Pipe flow velocity =      5.75(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =   124.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.070(Ft.)
Downstream point/station elevation =   490.090(Ft.)
Pipe length  =   393.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    17.631(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.631(CFS)
Normal flow depth in pipe =   18.47(In.)
Flow top width inside pipe =   29.19(In.)
Critical Depth =   17.04(In.)
Pipe flow velocity =      5.56(Ft/s)
Travel time through pipe =    1.18 min.
Time of concentration (TC) =   125.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =   125.29 min.
Rainfall intensity =      0.663(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.592(CFS) for    0.940(Ac.)
Total runoff =     18.224(CFS)   Total area =       39.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.29 min.
Rainfall intensity =      0.663(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.083(CFS) for    0.250(Ac.)
Total runoff =     18.307(CFS)   Total area =       39.76(Ac.)


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Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =   125.29 min.
Rainfall intensity =      0.663(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.101(CFS) for    0.160(Ac.)
Total runoff =     18.407(CFS)   Total area =       39.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   490.090(Ft.)
Downstream point/station elevation =   489.450(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.407(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.407(CFS)
Normal flow depth in pipe =   18.91(In.)
Flow top width inside pipe =   28.96(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      5.65(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =   125.66 min.
```

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Process from Point/Station       6.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.450(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.407(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.407(CFS)
Normal flow depth in pipe =   15.98(In.)
Flow top width inside pipe =   29.94(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      6.92(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   125.77 min.


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Process from Point/Station       6.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.920(Ac.)
Runoff from this stream =     18.407(CFS)
Time of concentration =  125.77 min.
Rainfall intensity =     0.662(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  806.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   13.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    25.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 806.000^.5)/( 1.675^(1/3)]=  25.82
Rainfall intensity (I) =      1.807(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =     17.560(CFS)
Total initial stream area =      19.440(Ac.)


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Process from Point/Station       9.000 to Point/Station      10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.400(Ft.)
Downstream point/station elevation =   489.800(Ft.)
Pipe length  =   490.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.560(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    17.560(CFS)
```

```
Normal flow depth in pipe =   16.54(In.)
Flow top width inside pipe =   29.84(In.)
Critical Depth =   17.02(In.)
Pipe flow velocity =      6.33(Ft/s)
Travel time through pipe =    1.29 min.
Time of concentration (TC) =    27.11 min.


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Process from Point/Station        9.000 to Point/Station       10.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.11 min.
Rainfall intensity =      1.758(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      7.296(CFS) for    8.300(Ac.)
Total runoff =     24.856(CFS)   Total area =       27.74(Ac.)


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Process from Point/Station       10.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.650(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    24.856(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    24.856(CFS)
Normal flow depth in pipe =   17.17(In.)
Flow top width inside pipe =   29.69(In.)
Critical Depth =   20.37(In.)
Pipe flow velocity =      8.56(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    27.20 min.


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Process from Point/Station       10.000 to Point/Station        7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.740(Ac.)
Runoff from this stream =     24.856(CFS)
Time of concentration =   27.20 min.
Rainfall intensity =     1.755(In/Hr)
Summary of stream data:

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


1       18.407    125.77           0.662
2       24.856     27.20           1.755
Qmax(1) =
          1.000 *    1.000 *    18.407) +
          0.377 *    1.000 *    24.856) + =      27.777
```

```
Qmax(2) =
          1.000 *    0.216 *    18.407) +
          1.000 *    1.000 *    24.856) + =      28.837

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.407      24.856
Maximum flow rates at confluence using above data:
       27.777       28.837
Area of streams before confluence:
       39.920       27.740
Results of confluence:
Total flow rate =     28.837(CFS)
Time of concentration =    27.200 min.
Effective stream area after confluence =     67.660(Ac.)


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Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    27.20 min.
Rainfall intensity =      1.755(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.383(CFS) for    0.230(Ac.)
Total runoff =     29.220(CFS)   Total area =       67.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.20 min.
Rainfall intensity =      1.755(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.421(CFS) for    0.480(Ac.)
Total runoff =     29.642(CFS)   Total area =       68.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station      20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.060(Ft.)
Downstream point/station elevation =   488.710(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 2  Required pipe flow  =    29.642(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    14.821(CFS)
Normal flow depth in pipe =   13.79(In.)
Flow top width inside pipe =   29.90(In.)
Critical Depth =   15.59(In.)
```

```
Pipe flow velocity =      6.73(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    27.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  510.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  511.000(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    30.93 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 510.000^.5)/( 0.490^(1/3)]=  30.93
Rainfall intensity (I) =      1.628(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      2.865(CFS)
Total initial stream area =        3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   504.500(Ft.)
Downstream point/station elevation =   503.980(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     2.865(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.865(CFS)
Normal flow depth in pipe =    6.87(In.)
Flow top width inside pipe =   17.49(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      4.63(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    31.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Time of concentration =    31.11 min.
Rainfall intensity =      1.622(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.481(CFS) for    1.610(Ac.)
Total runoff =      5.347(CFS)   Total area =        5.13(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    31.11 min.
Rainfall intensity =      1.622(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.202(CFS) for    0.780(Ac.)
Total runoff =      6.549(CFS)   Total area =        5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.950(Ft.)
Downstream point/station elevation =   499.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     6.549(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     6.549(CFS)
Normal flow depth in pipe =   11.60(In.)
Flow top width inside pipe =   23.99(In.)
Critical Depth =   10.88(In.)
Pipe flow velocity =      4.35(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    31.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.500
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  513.900(Ft.)
Lowest elevation =  511.830(Ft.)
Elevation difference =    2.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    19.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5278)*( 280.000^.5)/( 0.739^(1/3)]=  19.06
Rainfall intensity (I) =      2.110(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.528
Subarea runoff =      0.312(CFS)
Total initial stream area =        0.280(Ac.)
End of computations, total study area =          74.560 (Ac.)
```

PROPOSED CONDITION HYDROLOGY
50 YEAR STORM
BADIEE TRUCK PARKING AND STORAGE

San Diego County Rational Hydrology Program

```
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 12/22/22
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4035

------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used

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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  513.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 280.000^.5)/(   1.071^(1/3)]=   4.42
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.783(CFS)
Total initial stream area =       0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =     5.00 min.
Rainfall intensity =      4.265(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.013(CFS) for    0.250(Ac.)
Total runoff =      2.796(CFS)   Total area =       0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   513.000(Ft.)
End of street segment elevation =   496.750(Ft.)
Length of street segment  =  1470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  63.000(Ft.)
Distance from crown to crossfall grade break  =  61.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.117(CFS)
Depth of flow =   0.452(Ft.), Average velocity =   2.793(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.868(Ft.)
Flow velocity =   2.79(Ft/s)
Travel time =    8.77 min.     TC =   13.77  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      2.804(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      8.312(CFS) for    3.120(Ac.)
Total runoff =     11.108(CFS)   Total area =       3.81(Ac.)
Street flow at end of street =     11.108(CFS)
Half street flow at end of street =     11.108(CFS)
Depth of flow =   0.481(Ft.), Average velocity =   2.931(Ft/s)
Flow width (from curb towards crown)=  19.284(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    13.77 min.
Rainfall intensity =      2.804(In/Hr) for a    50.0 year storm
```

```
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.224(CFS) for    0.160(Ac.)
Total runoff =     11.332(CFS)   Total area =        3.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.420(Ft.)
Downstream point/station elevation =   492.290(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    11.332(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.332(CFS)
Normal flow depth in pipe =   16.03(In.)
Flow top width inside pipe =   22.61(In.)
Critical Depth =   14.49(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.970(Ac.)
Runoff from this stream =     11.332(CFS)
Time of concentration =   13.85 min.
Rainfall intensity =     2.798(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity (I) =      0.777(In/Hr) for a    50.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.78(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.777(In/Hr)
Summary of stream data:

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

```
1       11.332     13.85           2.798
2       14.900    124.00           0.777
Qmax(1) =
          1.000 *    1.000 *    11.332) +
          1.000 *    0.112 *    14.900) + =      12.997
Qmax(2) =
          0.278 *    1.000 *    11.332) +
          1.000 *    1.000 *    14.900) + =      18.048

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.332      14.900
Maximum flow rates at confluence using above data:
       12.997       18.048
Area of streams before confluence:
        3.970       34.600
Results of confluence:
Total flow rate =     18.048(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     38.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.290(Ft.)
Downstream point/station elevation =   492.070(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.048(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.048(CFS)
Normal flow depth in pipe =   18.23(In.)
Flow top width inside pipe =   29.29(In.)
Critical Depth =   17.27(In.)
Pipe flow velocity =      5.78(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =   124.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.070(Ft.)
Downstream point/station elevation =   490.090(Ft.)
Pipe length  =   393.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.048(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.048(CFS)
Normal flow depth in pipe =   18.77(In.)
Flow top width inside pipe =   29.04(In.)
Critical Depth =   17.27(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    1.17 min.
Time of concentration (TC) =   125.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.29 min.
Rainfall intensity =      0.772(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.689(CFS) for    0.940(Ac.)
Total runoff =     18.737(CFS)   Total area =       39.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.29 min.
Rainfall intensity =      0.772(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.097(CFS) for    0.250(Ac.)
Total runoff =     18.834(CFS)   Total area =       39.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.29 min.
Rainfall intensity =      0.772(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.117(CFS) for    0.160(Ac.)
Total runoff =     18.951(CFS)   Total area =       39.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   490.090(Ft.)
Downstream point/station elevation =   489.450(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.951(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.951(CFS)
Normal flow depth in pipe =   19.29(In.)
Flow top width inside pipe =   28.75(In.)
Critical Depth =   17.70(In.)
Pipe flow velocity =      5.68(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =   125.65 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.450(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.951(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.951(CFS)
Normal flow depth in pipe =   16.27(In.)
Flow top width inside pipe =   29.89(In.)
Critical Depth =   17.70(In.)
Pipe flow velocity =      6.97(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   125.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.920(Ac.)
Runoff from this stream =     18.951(CFS)
Time of concentration =  125.76 min.
Rainfall intensity =     0.770(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  806.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   13.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    25.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 806.000^.5)/( 1.675^(1/3)]=  25.82
Rainfall intensity (I) =      2.099(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =     20.400(CFS)
Total initial stream area =      19.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.400(Ft.)
Downstream point/station elevation =   489.800(Ft.)
Pipe length  =   490.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.400(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    20.400(CFS)
```

```
Normal flow depth in pipe =   18.19(In.)
Flow top width inside pipe =   29.31(In.)
Critical Depth =   18.40(In.)
Pipe flow velocity =      6.55(Ft/s)
Travel time through pipe =    1.25 min.
Time of concentration (TC) =    27.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station      10.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.06 min.
Rainfall intensity =      2.045(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      8.489(CFS) for    8.300(Ac.)
Total runoff =     28.888(CFS)   Total area =       27.74(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.650(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    28.888(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    28.888(CFS)
Normal flow depth in pipe =   18.94(In.)
Flow top width inside pipe =   28.95(In.)
Critical Depth =   21.98(In.)
Pipe flow velocity =      8.84(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    27.15 min.


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Process from Point/Station       10.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.740(Ac.)
Runoff from this stream =     28.888(CFS)
Time of concentration =   27.15 min.
Rainfall intensity =     2.042(In/Hr)
Summary of stream data:

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


1       18.951    125.76           0.770
2       28.888     27.15           2.042
Qmax(1) =
         1.000 *    1.000 *    18.951) +
         0.377 *    1.000 *    28.888) + =      29.848
```

```
Qmax(2) =
         1.000 *    0.216 *    18.951) +
         1.000 *    1.000 *    28.888) + =      32.980

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.951      28.888
Maximum flow rates at confluence using above data:
       29.848      32.980
Area of streams before confluence:
       39.920      27.740
Results of confluence:
Total flow rate =     32.980(CFS)
Time of concentration =    27.154 min.
Effective stream area after confluence =     67.660(Ac.)


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Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    27.15 min.
Rainfall intensity =      2.042(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.446(CFS) for    0.230(Ac.)
Total runoff =     33.426(CFS)   Total area =       67.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.15 min.
Rainfall intensity =      2.042(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.490(CFS) for    0.480(Ac.)
Total runoff =     33.916(CFS)   Total area =       68.37(Ac.)


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Process from Point/Station        7.000 to Point/Station      20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.060(Ft.)
Downstream point/station elevation =   488.710(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 2  Required pipe flow  =    33.916(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    16.958(CFS)
Normal flow depth in pipe =   14.91(In.)
Flow top width inside pipe =   30.00(In.)
Critical Depth =   16.71(In.)
```

```
Pipe flow velocity =      6.96(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    27.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  510.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  511.000(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    30.93 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 510.000^.5)/( 0.490^(1/3)]=  30.93
Rainfall intensity (I) =      1.894(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      3.334(CFS)
Total initial stream area =       3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   504.500(Ft.)
Downstream point/station elevation =   503.980(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.334(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.334(CFS)
Normal flow depth in pipe =    7.45(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =    8.34(In.)
Pipe flow velocity =      4.82(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    31.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    31.11 min.
Rainfall intensity =      1.888(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.888(CFS) for    1.610(Ac.)
Total runoff =      6.222(CFS)   Total area =       5.13(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =    31.11 min.
Rainfall intensity =      1.888(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.399(CFS) for    0.780(Ac.)
Total runoff =      7.621(CFS)   Total area =        5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.950(Ft.)
Downstream point/station elevation =   499.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     7.621(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.621(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   23.96(In.)
Critical Depth =   11.78(In.)
Pipe flow velocity =      4.52(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    31.18 min.


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Process from Point/Station      12.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Note: user entry of impervious value, Ap = 0.500
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  513.900(Ft.)
Lowest elevation =  511.830(Ft.)
Elevation difference =    2.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    19.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5278)*( 280.000^.5)/( 0.739^(1/3)]=  19.06
Rainfall intensity (I) =      2.439(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.528
Subarea runoff =      0.360(CFS)
Total initial stream area =        0.280(Ac.)
End of computations, total study area =          74.560 (Ac.)
```

PROPOSED CONDITION HYDROLOGY
100 YEAR STORM
BADIEE TRUCK PARKING AND STORAGE

```
             San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
       Rational Hydrology Study        Date: 12/22/22
-------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

-------------------------------------------------------------------------


Program License Serial Number 4035

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

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


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  516.000(Ft.)
Lowest elevation =  513.000(Ft.)
Elevation difference =    3.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 280.000^.5)/(   1.071^(1/3)]=   4.42
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      1.835(CFS)
Total initial stream area =       0.440(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** SUBAREA FLOW ADDITION ****
_______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =     5.00 min.
Rainfall intensity =      4.389(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.042(CFS) for    0.250(Ac.)
Total runoff =      2.877(CFS)   Total area =       0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   513.000(Ft.)
End of street segment elevation =   496.750(Ft.)
Length of street segment  =  1470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  63.000(Ft.)
Distance from crown to crossfall grade break  =  61.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  20.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.382(CFS)
Depth of flow =   0.456(Ft.), Average velocity =   2.813(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.067(Ft.)
Flow velocity =   2.81(Ft/s)
Travel time =    8.71 min.     TC =   13.71  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity =      3.006(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      8.910(CFS) for    3.120(Ac.)
Total runoff =     11.787(CFS)   Total area =       3.81(Ac.)
Street flow at end of street =     11.787(CFS)
Half street flow at end of street =     11.787(CFS)
Depth of flow =   0.490(Ft.), Average velocity =   2.974(Ft/s)
Flow width (from curb towards crown)=  19.730(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    13.71 min.
```

```
Rainfall intensity =      3.006(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.240(CFS) for    0.160(Ac.)
Total runoff =     12.028(CFS)   Total area =       3.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.420(Ft.)
Downstream point/station elevation =   492.290(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    12.028(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    12.028(CFS)
Normal flow depth in pipe =   16.73(In.)
Flow top width inside pipe =   22.05(In.)
Critical Depth =   14.94(In.)
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.970(Ac.)
Runoff from this stream =     12.028(CFS)
Time of concentration =   13.79 min.
Rainfall intensity =     3.000(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Rainfall intensity (I) =      0.847(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC = 124.00 min.  Rain intensity =       0.85(In/Hr)
Total area =       34.600(Ac.)  Total runoff =    14.900(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       3.100
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     34.600(Ac.)
Runoff from this stream =     14.900(CFS)
Time of concentration =  124.00 min.
Rainfall intensity =     0.847(In/Hr)
Summary of stream data:

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

```
1       12.028     13.79           3.000
2       14.900    124.00           0.847
Qmax(1) =
          1.000 *    1.000 *    12.028) +
          1.000 *    0.111 *    14.900) + =      13.685
Qmax(2) =
          0.282 *    1.000 *    12.028) +
          1.000 *    1.000 *    14.900) + =      18.296

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.028      14.900
Maximum flow rates at confluence using above data:
       13.685       18.296
Area of streams before confluence:
        3.970       34.600
Results of confluence:
Total flow rate =     18.296(CFS)
Time of concentration =   124.000 min.
Effective stream area after confluence =     38.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.100 to Point/Station       4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.290(Ft.)
Downstream point/station elevation =   492.070(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.296(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.296(CFS)
Normal flow depth in pipe =   18.40(In.)
Flow top width inside pipe =   29.22(In.)
Critical Depth =   17.39(In.)
Pipe flow velocity =      5.80(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   124.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.070(Ft.)
Downstream point/station elevation =   490.090(Ft.)
Pipe length  =   393.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    18.296(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.296(CFS)
Normal flow depth in pipe =   18.94(In.)
Flow top width inside pipe =   28.95(In.)
Critical Depth =   17.39(In.)
Pipe flow velocity =      5.60(Ft/s)
Travel time through pipe =    1.17 min.
Time of concentration (TC) =   125.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
```

```
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.28 min.
Rainfall intensity =      0.841(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.751(CFS) for    0.940(Ac.)
Total runoff =     19.047(CFS)   Total area =       39.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =   125.28 min.
Rainfall intensity =      0.841(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.105(CFS) for    0.250(Ac.)
Total runoff =     19.152(CFS)   Total area =       39.76(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =   125.28 min.
Rainfall intensity =      0.841(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.128(CFS) for    0.160(Ac.)
Total runoff =     19.280(CFS)   Total area =       39.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   490.090(Ft.)
Downstream point/station elevation =   489.450(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    19.280(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    19.280(CFS)
Normal flow depth in pipe =   19.52(In.)
Flow top width inside pipe =   28.60(In.)
Critical Depth =   17.88(In.)
Pipe flow velocity =      5.70(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =   125.65 min.
```

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Process from Point/Station       6.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.450(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    19.280(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    19.280(CFS)
Normal flow depth in pipe =   16.45(In.)
Flow top width inside pipe =   29.86(In.)
Critical Depth =   17.88(In.)
Pipe flow velocity =      7.00(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =   125.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       6.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     39.920(Ac.)
Runoff from this stream =     19.280(CFS)
Time of concentration =  125.76 min.
Rainfall intensity =     0.839(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  806.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  500.000(Ft.)
Elevation difference =   13.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    25.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 806.000^.5)/( 1.675^(1/3)]=  25.82
Rainfall intensity (I) =      2.282(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =     22.178(CFS)
Total initial stream area =      19.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station      10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   492.400(Ft.)
Downstream point/station elevation =   489.800(Ft.)
Pipe length  =   490.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.178(CFS)
Given pipe size =     30.00(In.)
```

```
Calculated individual pipe flow  =    22.178(CFS)
Normal flow depth in pipe =   19.24(In.)
Flow top width inside pipe =   28.78(In.)
Critical Depth =   19.22(In.)
Pipe flow velocity =      6.67(Ft/s)
Travel time through pipe =    1.23 min.
Time of concentration (TC) =    27.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station      10.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.04 min.
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      9.238(CFS) for    8.300(Ac.)
Total runoff =     31.416(CFS)   Total area =       27.74(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.650(Ft.)
Downstream point/station elevation =   489.060(Ft.)
Pipe length  =    47.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =    31.416(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    31.416(CFS)
Normal flow depth in pipe =   20.09(In.)
Flow top width inside pipe =   28.22(In.)
Critical Depth =   22.90(In.)
Pipe flow velocity =      8.99(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    27.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.740(Ac.)
Runoff from this stream =     31.416(CFS)
Time of concentration =   27.13 min.
Rainfall intensity =     2.222(In/Hr)
Summary of stream data:

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


1       19.280    125.76            0.839
2       31.416     27.13            2.222
Qmax(1) =
          1.000 *    1.000 *    19.280) +
```

```
         0.378 *    1.000 *    31.416) + =      31.146
Qmax(2) =
         1.000 *    0.216 *    19.280) +
         1.000 *    1.000 *    31.416) + =      35.575

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.280      31.416
Maximum flow rates at confluence using above data:
       31.146       35.575
Area of streams before confluence:
       39.920       27.740
Results of confluence:
Total flow rate =     35.575(CFS)
Time of concentration =    27.130 min.
Effective stream area after confluence =     67.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    27.13 min.
Rainfall intensity =      2.222(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.486(CFS) for    0.230(Ac.)
Total runoff =     36.061(CFS)   Total area =       67.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       7.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Time of concentration =    27.13 min.
Rainfall intensity =      2.222(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.500
Subarea runoff =      0.533(CFS) for    0.480(Ac.)
Total runoff =     36.594(CFS)   Total area =       68.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station      20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   489.060(Ft.)
Downstream point/station elevation =   488.710(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 2  Required pipe flow  =    36.594(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    18.297(CFS)
Normal flow depth in pipe =   15.59(In.)
Flow top width inside pipe =   29.98(In.)
```

```
Critical Depth =   17.39(In.)
Pipe flow velocity =      7.10(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    27.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.350
Initial subarea flow distance  =  510.000(Ft.)
Highest elevation =  513.500(Ft.)
Lowest elevation =  511.000(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    30.93 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5000)*( 510.000^.5)/( 0.490^(1/3)]=  30.93
Rainfall intensity (I) =      2.063(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.500
Subarea runoff =      3.631(CFS)
Total initial stream area =        3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   504.500(Ft.)
Downstream point/station elevation =   503.980(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     3.631(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.631(CFS)
Normal flow depth in pipe =    7.82(In.)
Flow top width inside pipe =   17.84(In.)
Critical Depth =    8.73(In.)
Pipe flow velocity =      4.93(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    31.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    31.10 min.
Rainfall intensity =      2.057(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.145(CFS) for    1.610(Ac.)
Total runoff =      6.777(CFS)   Total area =        5.13(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =    31.10 min.
Rainfall intensity =      2.057(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.524(CFS) for    0.780(Ac.)
Total runoff =      8.300(CFS)   Total area =        5.91(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   499.950(Ft.)
Downstream point/station elevation =   499.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.300(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.300(CFS)
Normal flow depth in pipe =   13.38(In.)
Flow top width inside pipe =   23.84(In.)
Critical Depth =   12.32(In.)
Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    31.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Note: user entry of impervious value, Ap = 0.500
Initial subarea flow distance  =  280.000(Ft.)
Highest elevation =  513.900(Ft.)
Lowest elevation =  511.830(Ft.)
Elevation difference =    2.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    19.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.5278)*( 280.000^.5)/( 0.739^(1/3)]=  19.06
Rainfall intensity (I) =      2.635(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.528
Subarea runoff =      0.389(CFS)
Total initial stream area =        0.280(Ac.)
End of computations, total study area =         74.560 (Ac.)
```

Proposed Condition @ Node 13
Channel Calculator

Given Input Data:

Shape .... Trapezoidal
Solving for .... Depth of Flow
Flowrate .... 1.1700 cfs
Slope .... 0.0100 ft/ft
Manning's n 0.0300
Height .... 6.0000 in
Bottom width .... 36.0000 in
Left slope .... 0.5000 ft/ft (V/H)
Right slope .... 0.5000 ft/ft (V/H)

Computed Results:

Depth .... 2.5535 in
Velocity .... 1.6051 fps
Full Flowrate .... 5.2153 cfs
Flow area 0.7289 ft2
Flow perimeter .... 47.4195 in
Hydraulic radius .... 2.2135 in
Top width .... 46.2139 in
Area 2.0000 ft2
Perimeter .... 62.8328 in
Percent full .... 42.5578 %

8. DETENTION BASIN CALCULATIONS

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 1
Q5

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 27 MIN.
6 HOUR RAINFALL 1.4 INCHES
BASIN AREA 8.28 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 5.47 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 27	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0.4
TIME (MIN) = 81	DISCHARGE (CFS) = 0.4
TIME (MIN) = 108	DISCHARGE (CFS) = 0.5
TIME (MIN) = 135	DISCHARGE (CFS) = 0.5
TIME (MIN) = 162	DISCHARGE (CFS) = 0.6
TIME (MIN) = 189	DISCHARGE (CFS) = 0.7
TIME (MIN) = 216	DISCHARGE (CFS) = 1
TIME (MIN) = 243	DISCHARGE (CFS) = 1.1
TIME (MIN) = 270	DISCHARGE (CFS) = 5.47
TIME (MIN) = 297	DISCHARGE (CFS) = 0.8
TIME (MIN) = 324	DISCHARGE (CFS) = 0.5
TIME (MIN) = 351	DISCHARGE (CFS) = 0.4
TIME (MIN) = 378	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 1
Q10

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 27 MIN.
6 HOUR RAINFALL 1.6 INCHES
BASIN AREA 8.28 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 6.46 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 27	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0.4
TIME (MIN) = 81	DISCHARGE (CFS) = 0.5
TIME (MIN) = 108	DISCHARGE (CFS) = 0.5
TIME (MIN) = 135	DISCHARGE (CFS) = 0.6
TIME (MIN) = 162	DISCHARGE (CFS) = 0.7
TIME (MIN) = 189	DISCHARGE (CFS) = 0.8
TIME (MIN) = 216	DISCHARGE (CFS) = 1.2
TIME (MIN) = 243	DISCHARGE (CFS) = 1.1
TIME (MIN) = 270	DISCHARGE (CFS) = 6.46
TIME (MIN) = 297	DISCHARGE (CFS) = 0.9
TIME (MIN) = 324	DISCHARGE (CFS) = 0.6
TIME (MIN) = 351	DISCHARGE (CFS) = 0.5
TIME (MIN) = 378	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 1
Q25

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 27 MIN.
6 HOUR RAINFALL 1.8 INCHES
BASIN AREA 8.28 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 7.28 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 27	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0.5
TIME (MIN) = 81	DISCHARGE (CFS) = 0.5
TIME (MIN) = 108	DISCHARGE (CFS) = 0.6
TIME (MIN) = 135	DISCHARGE (CFS) = 0.6
TIME (MIN) = 162	DISCHARGE (CFS) = 0.8
TIME (MIN) = 189	DISCHARGE (CFS) = 0.9
TIME (MIN) = 216	DISCHARGE (CFS) = 1.3
TIME (MIN) = 243	DISCHARGE (CFS) = 1.2
TIME (MIN) = 270	DISCHARGE (CFS) = 7.28
TIME (MIN) = 297	DISCHARGE (CFS) = 1.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.7
TIME (MIN) = 351	DISCHARGE (CFS) = 0.6
TIME (MIN) = 378	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM
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BMP 1
Q50

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 27 MIN.
6 HOUR RAINFALL 2 INCHES
BASIN AREA 8.28 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 8.47 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 27	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0.5
TIME (MIN) = 81	DISCHARGE (CFS) = 0.6
TIME (MIN) = 108	DISCHARGE (CFS) = 0.7
TIME (MIN) = 135	DISCHARGE (CFS) = 0.7
TIME (MIN) = 162	DISCHARGE (CFS) = 0.9
TIME (MIN) = 189	DISCHARGE (CFS) = 1
TIME (MIN) = 216	DISCHARGE (CFS) = 1.5
TIME (MIN) = 243	DISCHARGE (CFS) = 0.9
TIME (MIN) = 270	DISCHARGE (CFS) = 8.47
TIME (MIN) = 297	DISCHARGE (CFS) = 1.2
TIME (MIN) = 324	DISCHARGE (CFS) = 0.8
TIME (MIN) = 351	DISCHARGE (CFS) = 0.6
TIME (MIN) = 378	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 2
Q5

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 26 MIN.
6 HOUR RAINFALL 1.4 INCHES
BASIN AREA 19.44 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 13.25 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 0.8
TIME (MIN) = 52	DISCHARGE (CFS) = 0.9
TIME (MIN) = 78	DISCHARGE (CFS) = 1
TIME (MIN) = 104	DISCHARGE (CFS) = 1.1
TIME (MIN) = 130	DISCHARGE (CFS) = 1.2
TIME (MIN) = 156	DISCHARGE (CFS) = 1.5
TIME (MIN) = 182	DISCHARGE (CFS) = 1.7
TIME (MIN) = 208	DISCHARGE (CFS) = 2.5
TIME (MIN) = 234	DISCHARGE (CFS) = 2.6
TIME (MIN) = 260	DISCHARGE (CFS) = 13.25
TIME (MIN) = 286	DISCHARGE (CFS) = 2
TIME (MIN) = 312	DISCHARGE (CFS) = 1.3
TIME (MIN) = 338	DISCHARGE (CFS) = 1
TIME (MIN) = 364	DISCHARGE (CFS) = 0.9
TIME (MIN) = 390	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 2
Q10

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 26 MIN.
6 HOUR RAINFALL 1.6 INCHES
BASIN AREA 19.44 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 15.6 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 0.9
TIME (MIN) = 52	DISCHARGE (CFS) = 1
TIME (MIN) = 78	DISCHARGE (CFS) = 1.1
TIME (MIN) = 104	DISCHARGE (CFS) = 1.3
TIME (MIN) = 130	DISCHARGE (CFS) = 1.4
TIME (MIN) = 156	DISCHARGE (CFS) = 1.7
TIME (MIN) = 182	DISCHARGE (CFS) = 1.9
TIME (MIN) = 208	DISCHARGE (CFS) = 2.8
TIME (MIN) = 234	DISCHARGE (CFS) = 2.5
TIME (MIN) = 260	DISCHARGE (CFS) = 15.6
TIME (MIN) = 286	DISCHARGE (CFS) = 2.2
TIME (MIN) = 312	DISCHARGE (CFS) = 1.5
TIME (MIN) = 338	DISCHARGE (CFS) = 1.2
TIME (MIN) = 364	DISCHARGE (CFS) = 1
TIME (MIN) = 390	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP2
Q25

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 26 MIN.
6 HOUR RAINFALL 1.8 INCHES
BASIN AREA 19.44 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 17.56 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 1.1
TIME (MIN) = 52	DISCHARGE (CFS) = 1.2
TIME (MIN) = 78	DISCHARGE (CFS) = 1.2
TIME (MIN) = 104	DISCHARGE (CFS) = 1.4
TIME (MIN) = 130	DISCHARGE (CFS) = 1.5
TIME (MIN) = 156	DISCHARGE (CFS) = 1.9
TIME (MIN) = 182	DISCHARGE (CFS) = 2.1
TIME (MIN) = 208	DISCHARGE (CFS) = 3.2
TIME (MIN) = 234	DISCHARGE (CFS) = 2.8
TIME (MIN) = 260	DISCHARGE (CFS) = 17.56
TIME (MIN) = 286	DISCHARGE (CFS) = 2.5
TIME (MIN) = 312	DISCHARGE (CFS) = 1.7
TIME (MIN) = 338	DISCHARGE (CFS) = 1.3
TIME (MIN) = 364	DISCHARGE (CFS) = 1.1
TIME (MIN) = 390	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

BMP 2
Q50

RUN DATE 12/15/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 26 MIN.
6 HOUR RAINFALL 2 INCHES
BASIN AREA 19.44 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 20.4 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 1.2
TIME (MIN) = 52	DISCHARGE (CFS) = 1.3
TIME (MIN) = 78	DISCHARGE (CFS) = 1.4
TIME (MIN) = 104	DISCHARGE (CFS) = 1.6
TIME (MIN) = 130	DISCHARGE (CFS) = 1.7
TIME (MIN) = 156	DISCHARGE (CFS) = 2.1
TIME (MIN) = 182	DISCHARGE (CFS) = 2.4
TIME (MIN) = 208	DISCHARGE (CFS) = 3.5
TIME (MIN) = 234	DISCHARGE (CFS) = 2.2
TIME (MIN) = 260	DISCHARGE (CFS) = 20.4
TIME (MIN) = 286	DISCHARGE (CFS) = 2.8
TIME (MIN) = 312	DISCHARGE (CFS) = 1.9
TIME (MIN) = 338	DISCHARGE (CFS) = 1.5
TIME (MIN) = 364	DISCHARGE (CFS) = 1.2
TIME (MIN) = 390	DISCHARGE (CFS) = 0

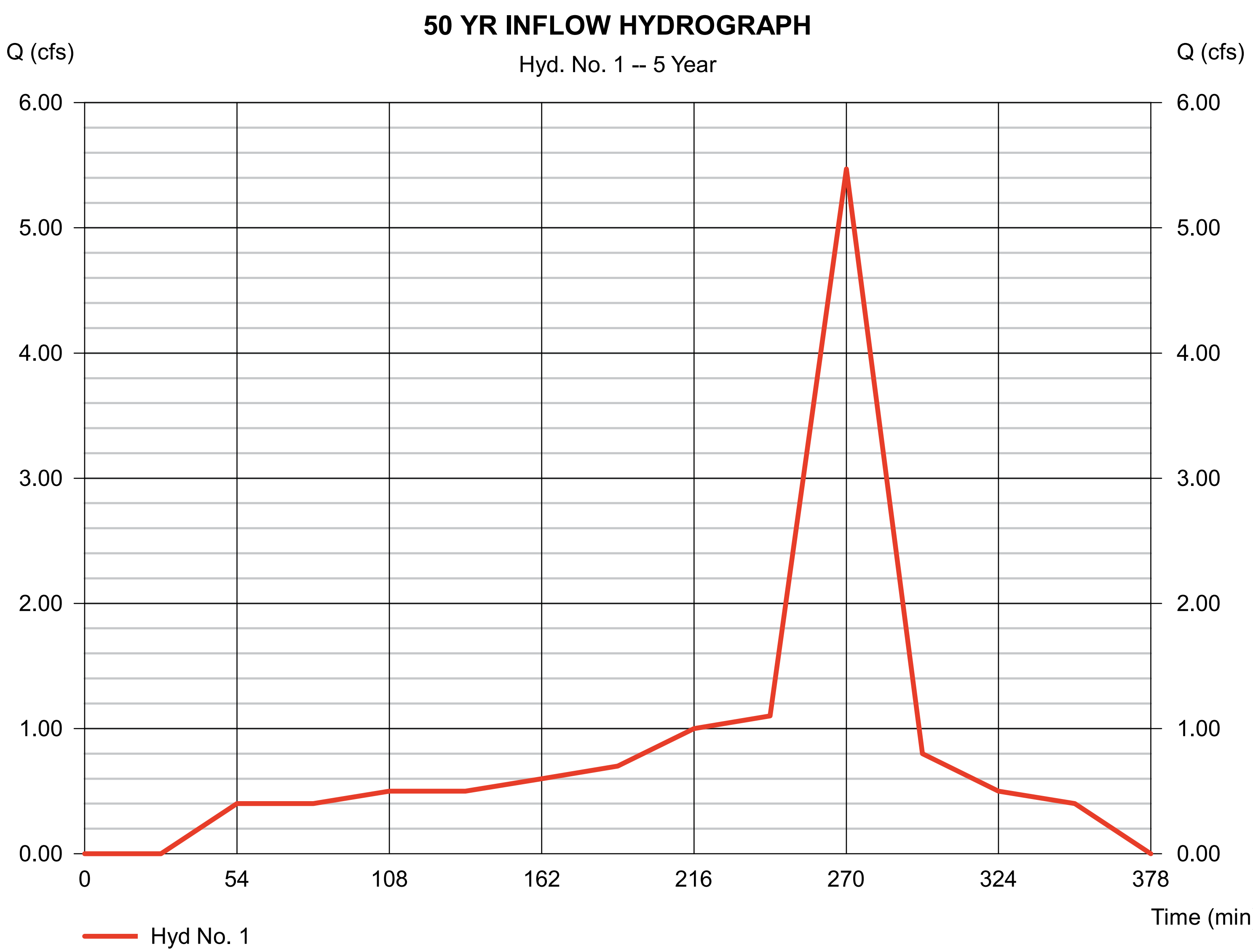
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	=	Manual	Peak discharge	=	5.470 cfs
Storm frequency	=	5 yrs	Time to peak	=	270 min
Time interval	=	27 min	Hyd. volume	=	20,039 cuft



Hydrograph Report

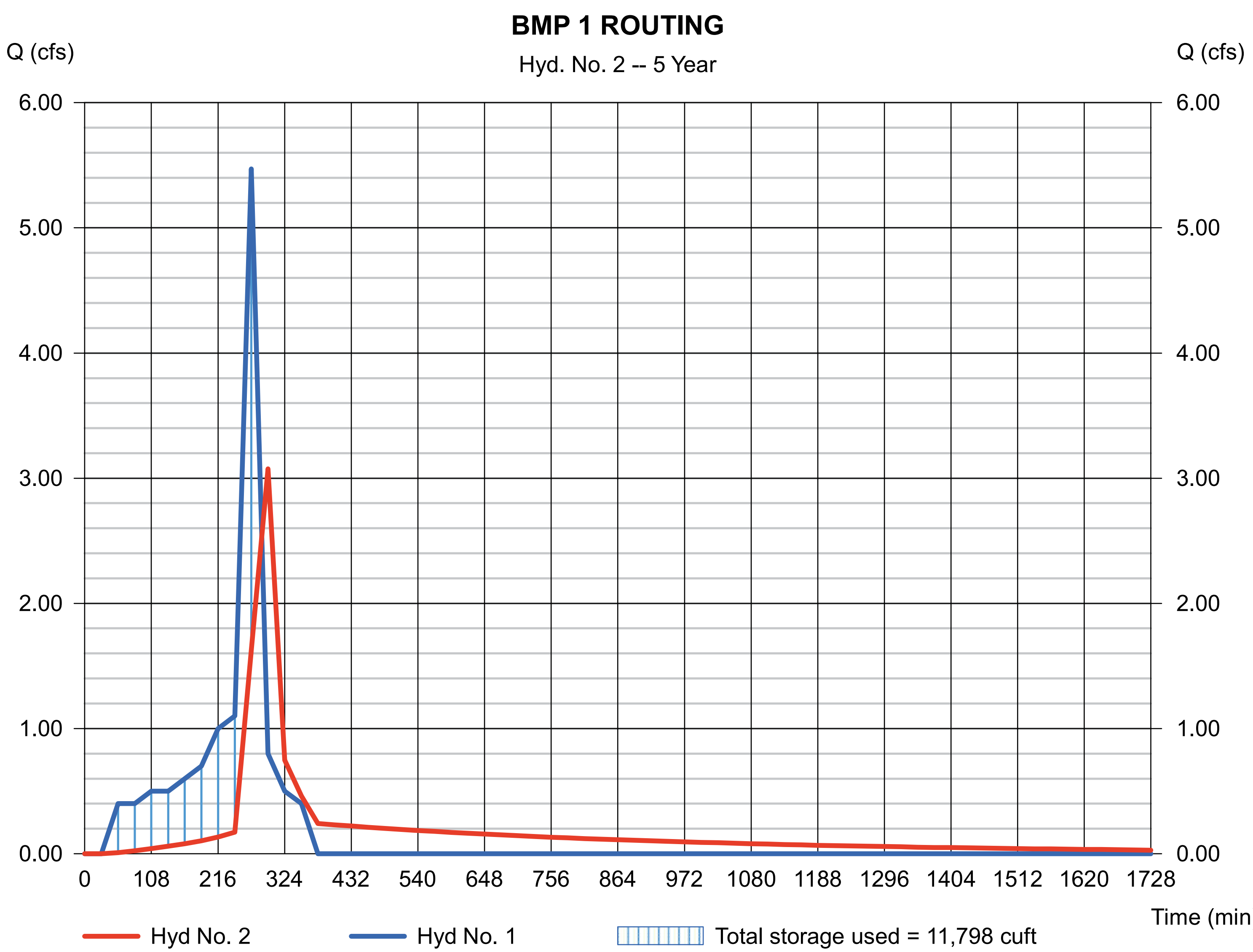
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 3.075 cfs
Storm frequency	= 5 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 20,001 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Max. Elevation	= 494.23 ft
Reservoir name	= <New Pond>	Max. Storage	= 11,798 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 493.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	493.50	15,044	0	0
2.50	496.00	22,208	46,565	46,565

Culvert / Orifice Structures

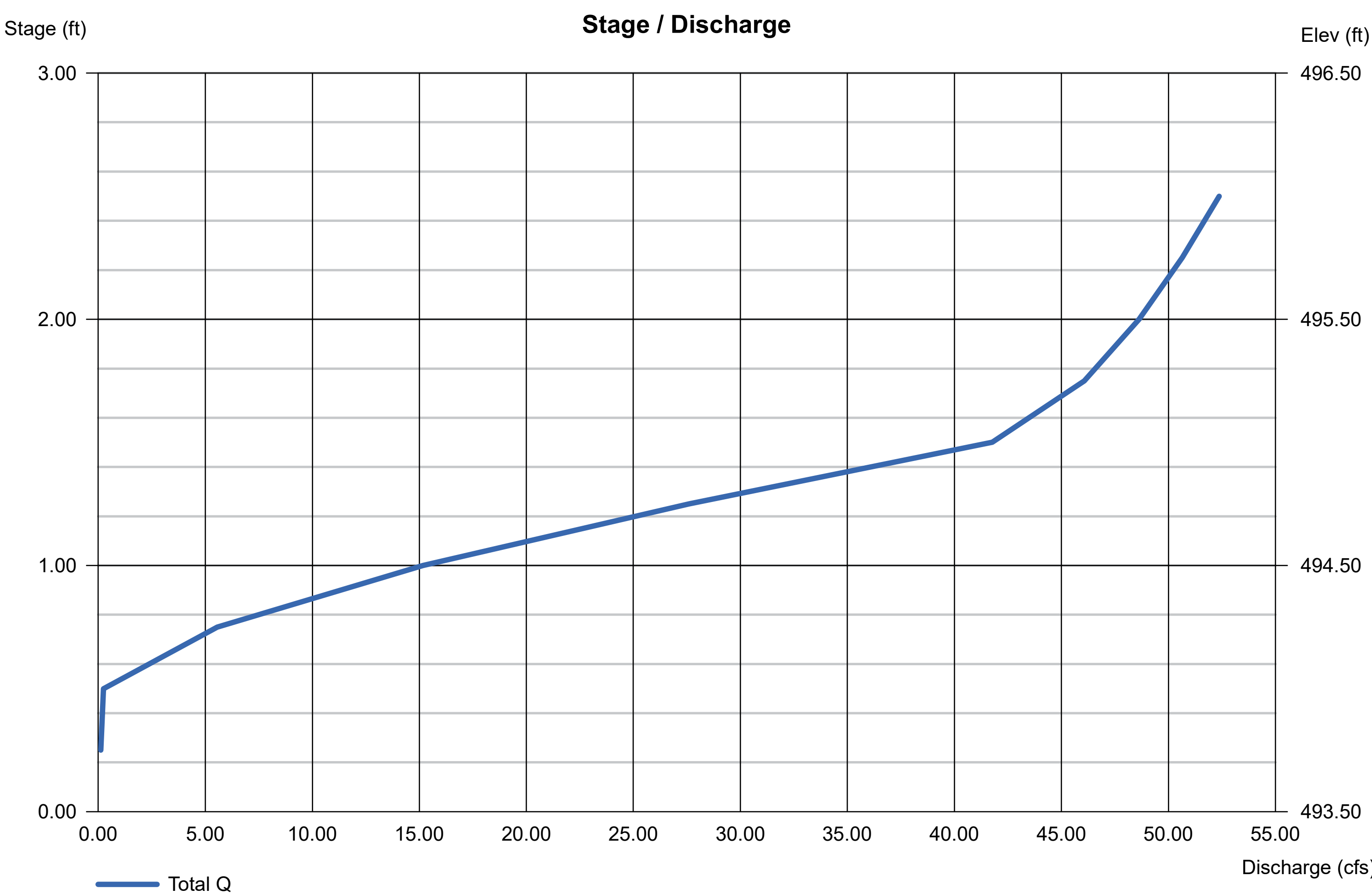
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	4.00	0.00	0.00
Span (in)	= 30.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 489.80	493.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	0.00	0.00	0.00
Crest El. (ft)	= 494.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



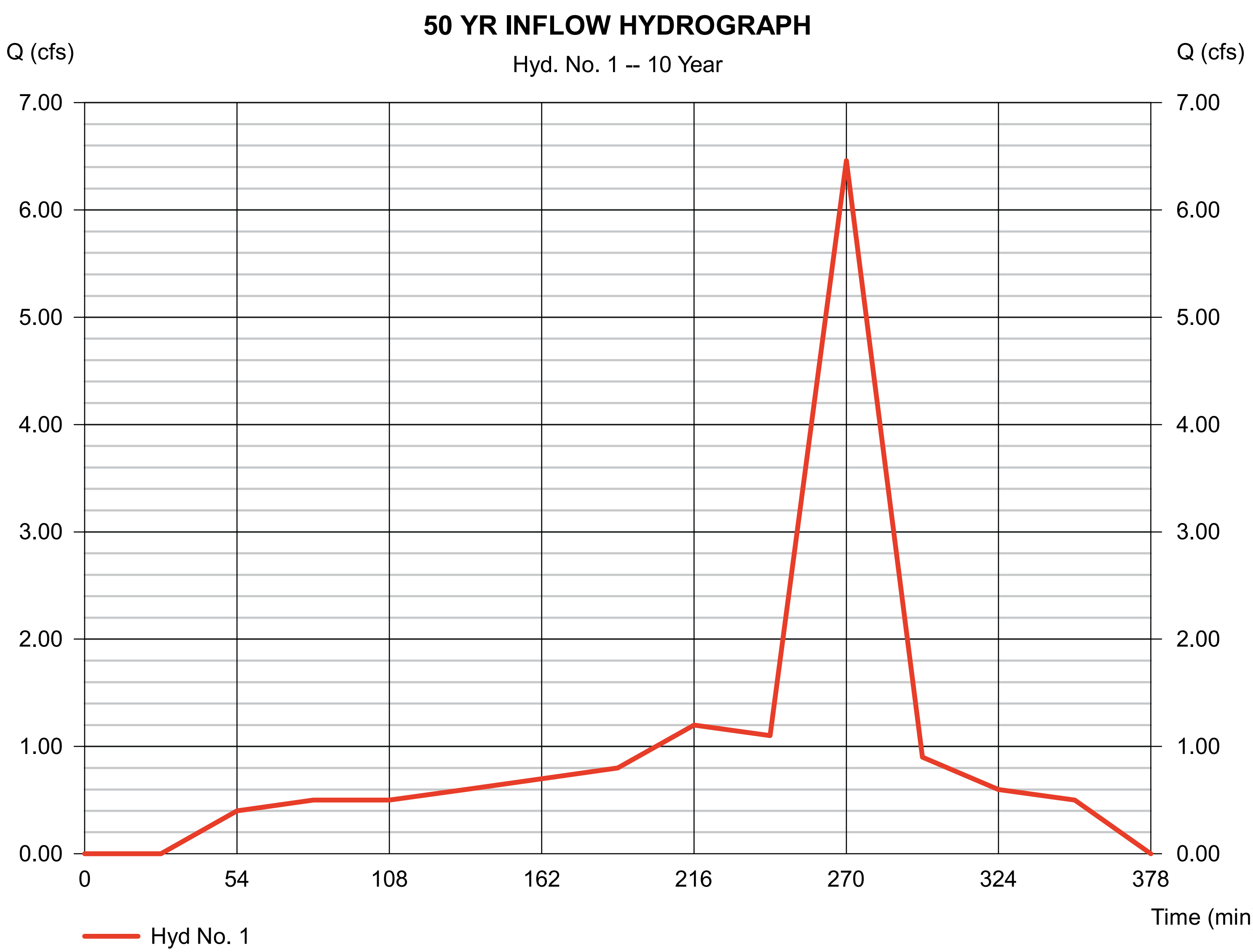
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 6.460 cfs
Storm frequency	= 10 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 23,101 cuft



Hydrograph Report

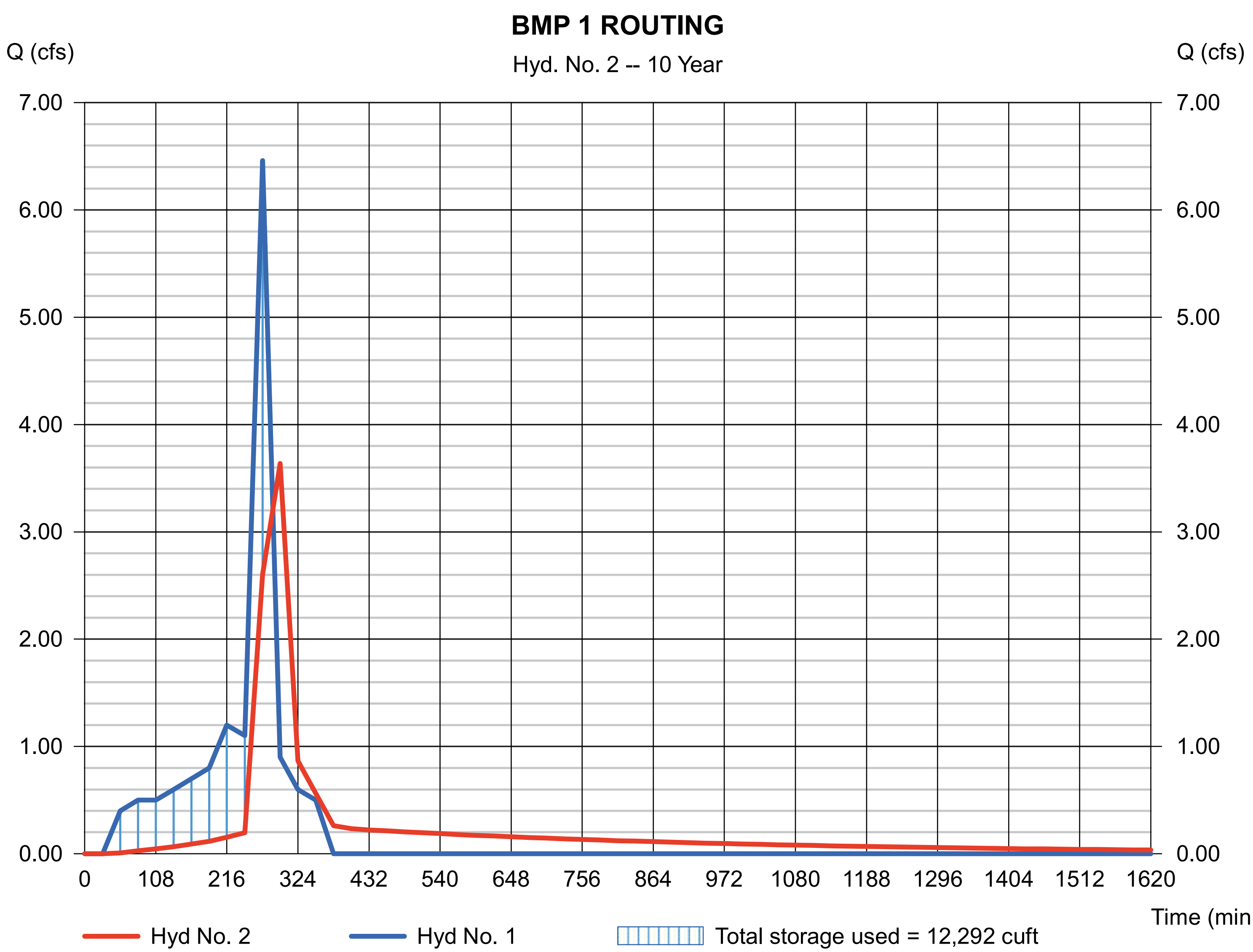
Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 3.637 cfs
Storm frequency	= 10 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 23,062 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Max. Elevation	= 494.28 ft
Reservoir name	= <New Pond>	Max. Storage	= 12,292 cuft

Storage Indication method used.



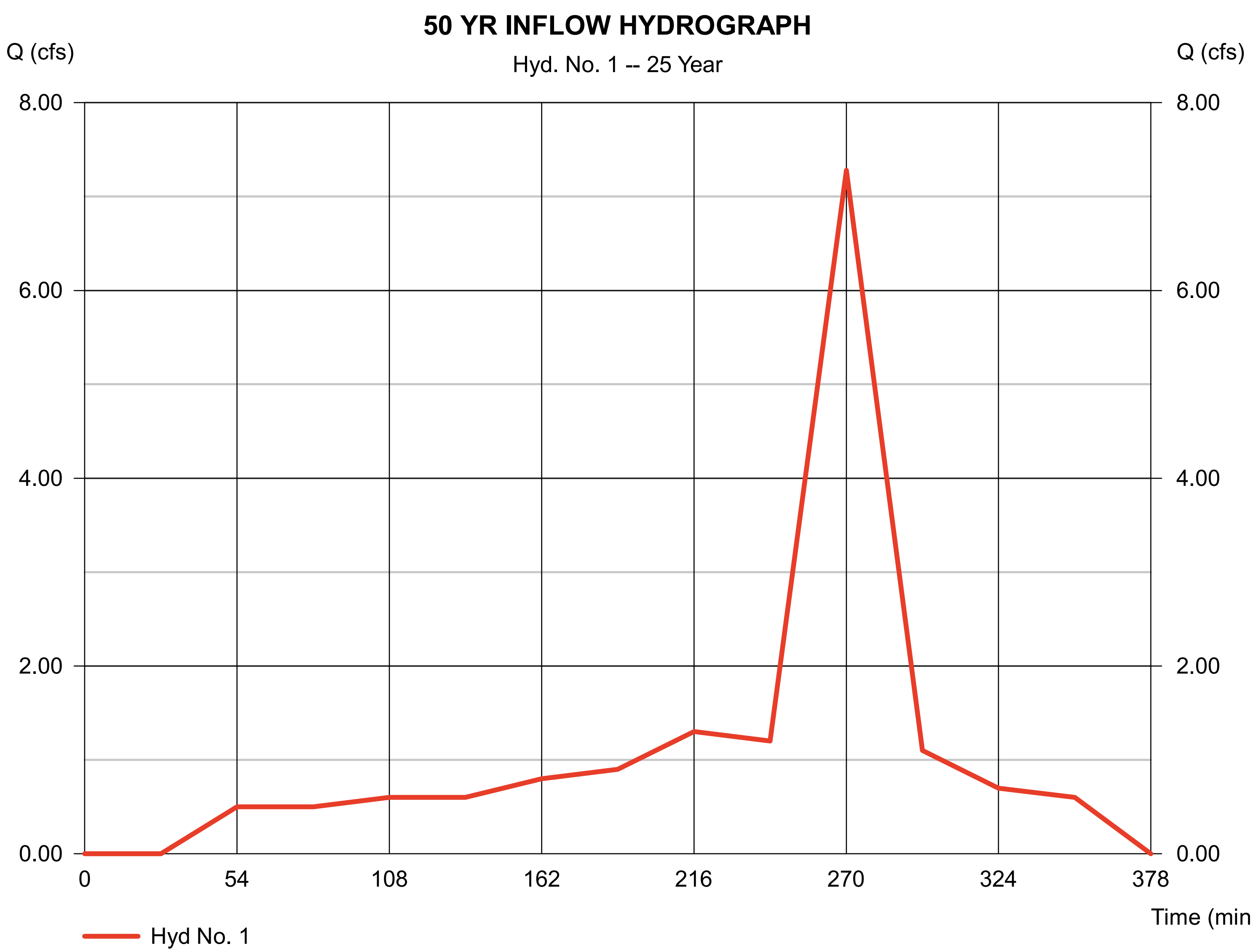
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 7.280 cfs
Storm frequency	= 25 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 26,050 cuft



Hydrograph Report

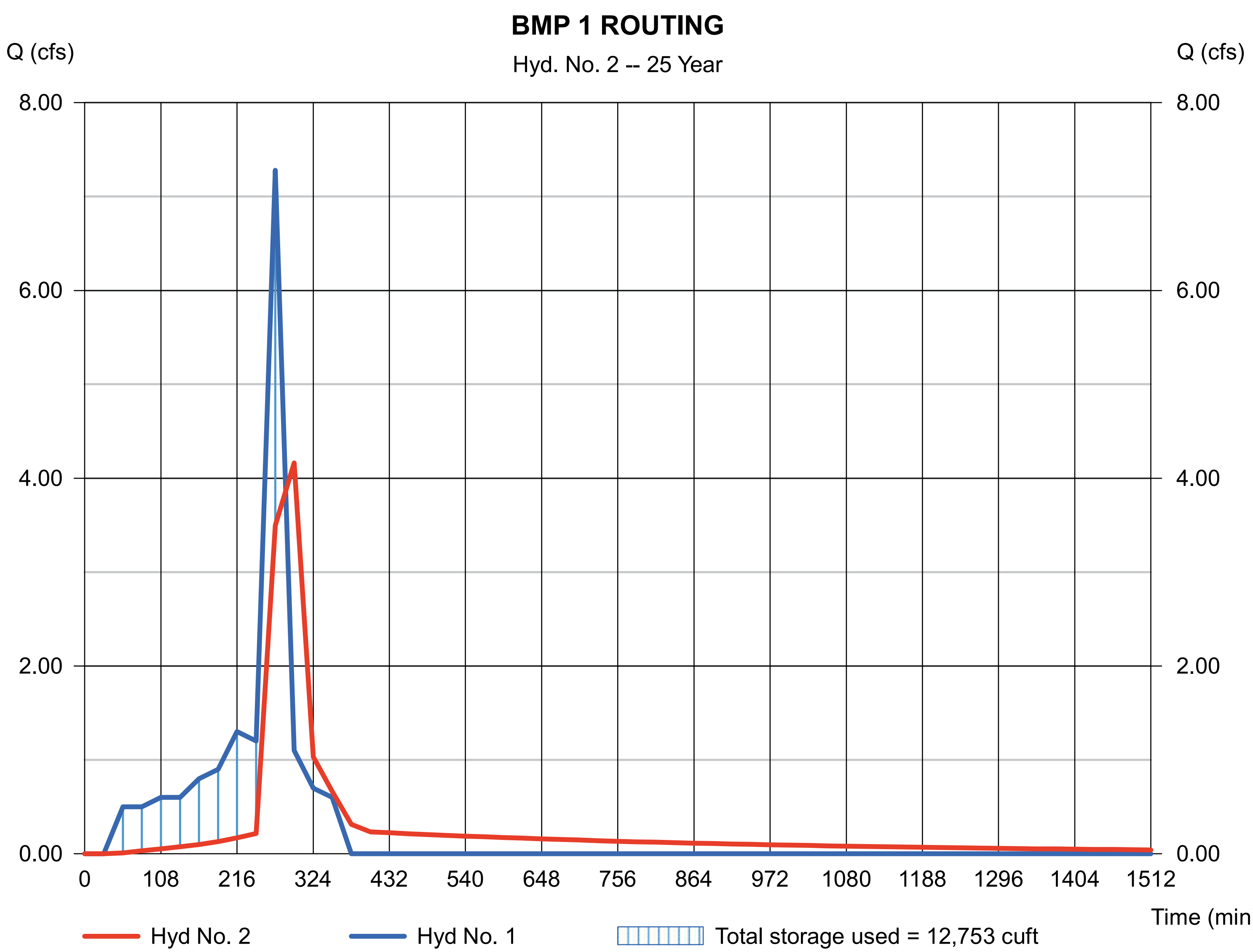
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 4.162 cfs
Storm frequency	= 25 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 26,011 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Max. Elevation	= 494.32 ft
Reservoir name	= <New Pond>	Max. Storage	= 12,753 cuft

Storage Indication method used.



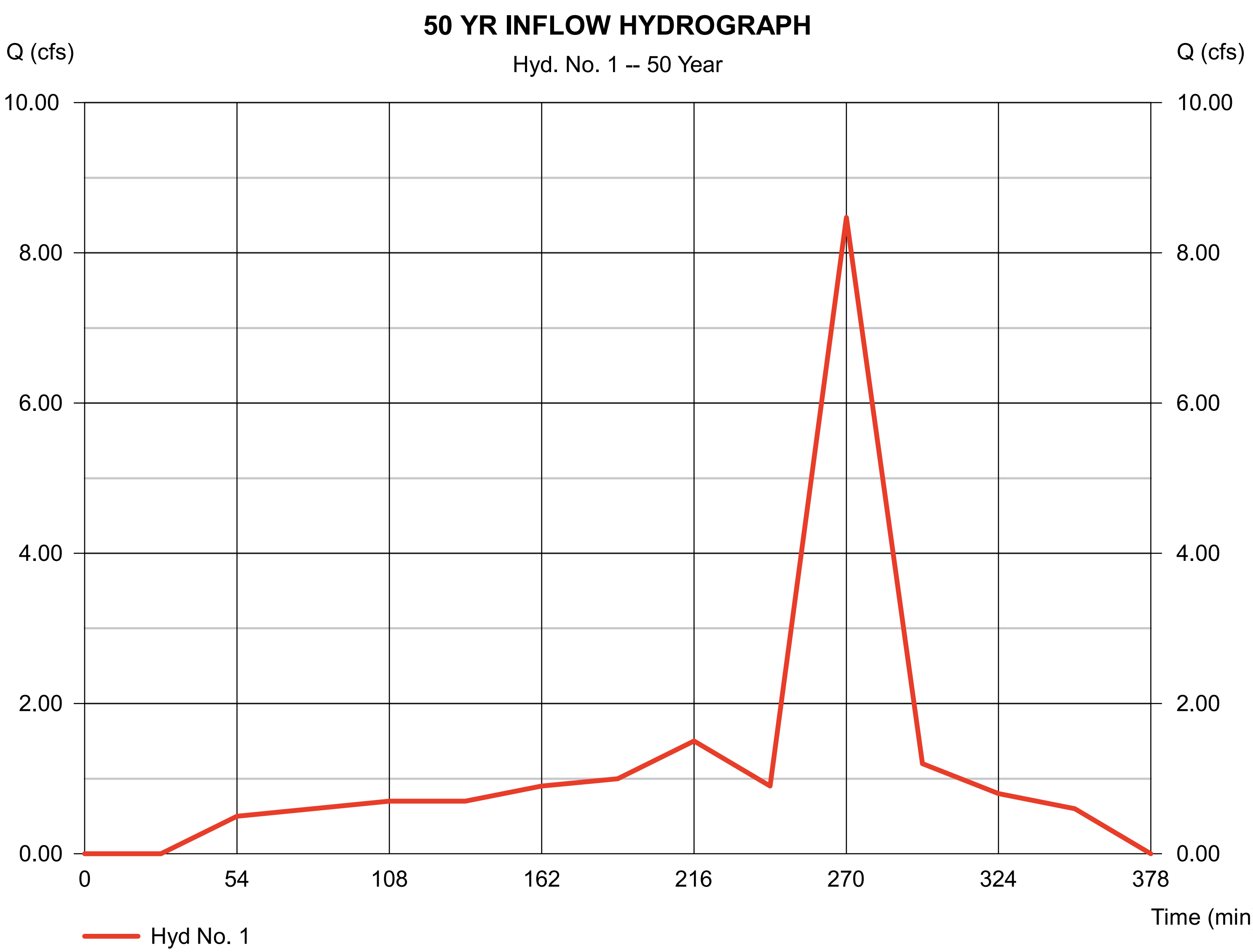
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 8.470 cfs
Storm frequency	= 50 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 28,949 cuft



Hydrograph Report

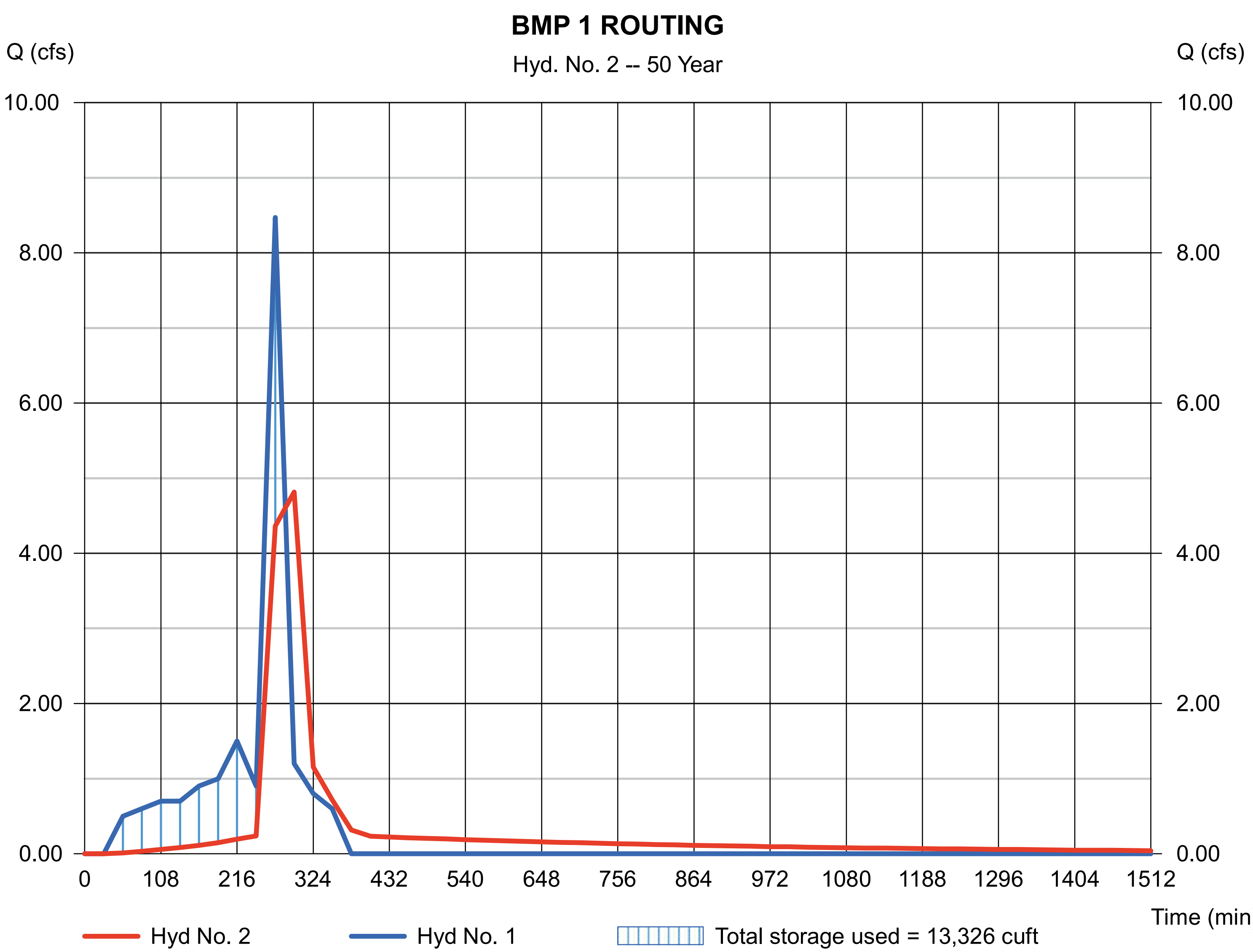
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 4.816 cfs
Storm frequency	= 50 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 28,910 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Max. Elevation	= 494.37 ft
Reservoir name	= <New Pond>	Max. Storage	= 13,326 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 5.470 cfs
Storm frequency	= 5 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 20,039 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
54	0.400
81	0.400
108	0.500
135	0.500
162	0.600
189	0.700
216	1.000
243	1.100
270	5.470 <<
297	0.800
324	0.500
351	0.400

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 3.075 cfs
Storm frequency	= 5 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 20,001 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 494.23 ft	Max. Storage	= 11,798 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
108	0.500	493.59	12.00	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
135	0.500	493.63	17.42	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
162	0.600	493.67	23.19	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
189	0.700	493.72	29.92	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
216	1.000	493.78	34.62	0.134	-----	-----	-----	-----	-----	-----	-----	0.134
243	1.100	493.86	34.62	0.173	-----	-----	-----	-----	-----	-----	-----	0.173
270	5.470 <<	494.07	34.62	0.263	-----	-----	1.363	-----	-----	-----	-----	1.626
297	0.800	494.13 <<	34.62	0.284	-----	-----	2.790	-----	-----	-----	-----	3.075 <<
324	0.500	494.02	34.62	0.250	-----	-----	0.497	-----	-----	-----	-----	0.747
351	0.400	494.01	34.62	0.246	-----	-----	0.216	-----	-----	-----	-----	0.462
378	0.000	494.00	34.62	0.241	-----	-----	-----	-----	-----	-----	-----	0.241
405	0.000	493.98	34.62	0.231	-----	-----	-----	-----	-----	-----	-----	0.231
432	0.000	493.96	34.62	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
459	0.000	493.94	34.62	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
486	0.000	493.92	34.62	0.203	-----	-----	-----	-----	-----	-----	-----	0.203
513	0.000	493.90	34.62	0.195	-----	-----	-----	-----	-----	-----	-----	0.195
540	0.000	493.89	34.62	0.187	-----	-----	-----	-----	-----	-----	-----	0.187
567	0.000	493.87	34.62	0.179	-----	-----	-----	-----	-----	-----	-----	0.179
594	0.000	493.86	34.62	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
621	0.000	493.84	34.62	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
648	0.000	493.83	34.62	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
675	0.000	493.81	34.62	0.151	-----	-----	-----	-----	-----	-----	-----	0.151
702	0.000	493.80	34.62	0.144	-----	-----	-----	-----	-----	-----	-----	0.144
729	0.000	493.79	34.62	0.138	-----	-----	-----	-----	-----	-----	-----	0.138
756	0.000	493.78	34.62	0.132	-----	-----	-----	-----	-----	-----	-----	0.132
783	0.000	493.76	34.62	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
810	0.000	493.75	34.62	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
837	0.000	493.74	33.75	0.117	-----	-----	-----	-----	-----	-----	-----	0.117
864	0.000	493.73	32.38	0.112	-----	-----	-----	-----	-----	-----	-----	0.112
891	0.000	493.72	31.05	0.107	-----	-----	-----	-----	-----	-----	-----	0.107
918	0.000	493.72	29.79	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
945	0.000	493.71	28.58	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
972	0.000	493.70	27.41	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
999	0.000	493.69	26.30	0.091	-----	-----	-----	-----	-----	-----	-----	0.091
1026	0.000	493.68	25.22	0.087	-----	-----	-----	-----	-----	-----	-----	0.087
1053	0.000	493.67	24.20	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1080	0.000	493.67	23.21	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
1107	0.000	493.66	22.26	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1134	0.000	493.65	21.36	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
1161	0.000	493.65	20.49	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
1188	0.000	493.64	19.65	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
1215	0.000	493.64	18.85	0.065	-----	-----	-----	-----	-----	-----	-----	0.065

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1242	0.000	493.63	18.08	0.062	-----	-----	-----	-----	-----	-----	-----	0.062
1269	0.000	493.63	17.34	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
1296	0.000	493.62	16.64	0.057	-----	-----	-----	-----	-----	-----	-----	0.057
1323	0.000	493.62	15.96	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
1350	0.000	493.61	15.31	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
1377	0.000	493.61	14.68	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
1404	0.000	493.60	14.08	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
1431	0.000	493.60	13.51	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
1458	0.000	493.59	12.96	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
1485	0.000	493.59	12.43	0.043	-----	-----	-----	-----	-----	-----	-----	0.043
1512	0.000	493.59	11.92	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
1539	0.000	493.58	11.44	0.040	-----	-----	-----	-----	-----	-----	-----	0.040
1566	0.000	493.58	10.97	0.038	-----	-----	-----	-----	-----	-----	-----	0.038
1593	0.000	493.58	10.53	0.036	-----	-----	-----	-----	-----	-----	-----	0.036
1620	0.000	493.57	10.10	0.035	-----	-----	-----	-----	-----	-----	-----	0.035
1647	0.000	493.57	9.685	0.033	-----	-----	-----	-----	-----	-----	-----	0.033
1674	0.000	493.57	9.292	0.032	-----	-----	-----	-----	-----	-----	-----	0.032
1701	0.000	493.56	8.912	0.031	-----	-----	-----	-----	-----	-----	-----	0.031

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.23 — Thursday, Dec 16, 2021

Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 493.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	493.50	15,044	0	0
2.50	496.00	22,208	46,565	46,565

Culvert / Orifice Structures

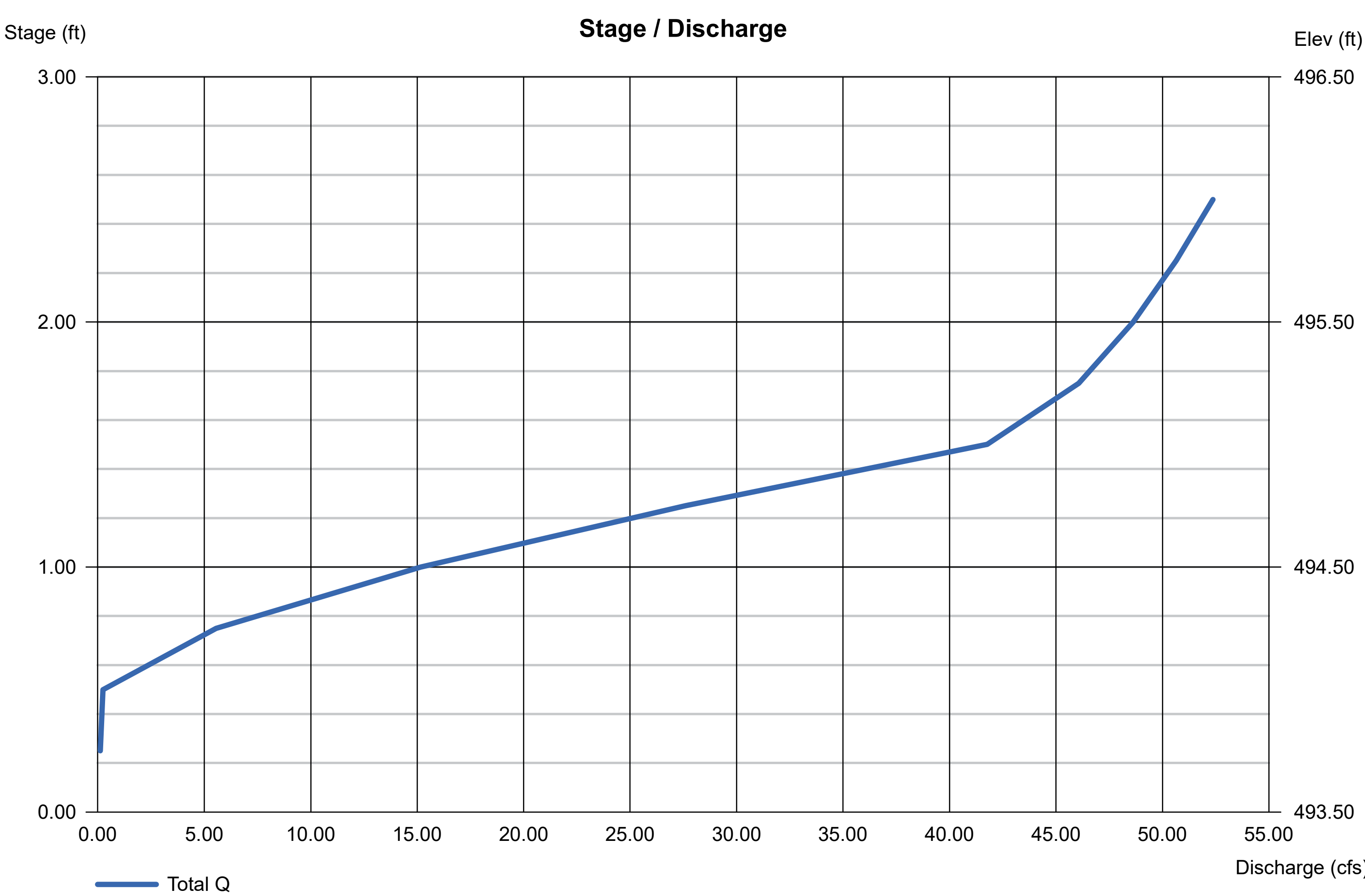
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	4.00	0.00	0.00
Span (in)	= 30.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 489.80	493.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	0.00	0.00	0.00
Crest El. (ft)	= 494.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 6.460 cfs
Storm frequency	= 10 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 23,101 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
54	0.400
81	0.500
108	0.500
135	0.600
162	0.700
189	0.800
216	1.200
243	1.100
270	6.460 <<
297	0.900
324	0.600
351	0.500

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 3.637 cfs
Storm frequency	= 10 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 23,062 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 494.28 ft	Max. Storage	= 12,292 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
108	0.500	493.60	13.16	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
135	0.600	493.64	19.12	0.066	-----	-----	-----	-----	-----	-----	-----	0.066
162	0.700	493.69	26.00	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
189	0.800	493.74	33.79	0.117	-----	-----	-----	-----	-----	-----	-----	0.117
216	1.200	493.82	34.62	0.154	-----	-----	-----	-----	-----	-----	-----	0.154
243	1.100	493.90	34.62	0.195	-----	-----	-----	-----	-----	-----	-----	0.195
270	6.460 <<	494.11	34.62	0.277	-----	-----	2.326	-----	-----	-----	-----	2.603
297	0.900	494.16 <<	34.62	0.293	-----	-----	3.344	-----	-----	-----	-----	3.637 <<
324	0.600	494.03	34.62	0.252	-----	-----	0.614	-----	-----	-----	-----	0.866
351	0.500	494.02	34.62	0.247	-----	-----	0.315	-----	-----	-----	-----	0.563
378	0.000	494.00	34.62	0.243	-----	-----	0.020	-----	-----	-----	-----	0.263
405	0.000	493.98	34.62	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
432	0.000	493.96	34.62	0.223	-----	-----	-----	-----	-----	-----	-----	0.223
459	0.000	493.94	34.62	0.213	-----	-----	-----	-----	-----	-----	-----	0.213
486	0.000	493.92	34.62	0.204	-----	-----	-----	-----	-----	-----	-----	0.204
513	0.000	493.91	34.62	0.196	-----	-----	-----	-----	-----	-----	-----	0.196
540	0.000	493.89	34.62	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
567	0.000	493.87	34.62	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
594	0.000	493.86	34.62	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
621	0.000	493.84	34.62	0.165	-----	-----	-----	-----	-----	-----	-----	0.165
648	0.000	493.83	34.62	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
675	0.000	493.81	34.62	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
702	0.000	493.80	34.62	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
729	0.000	493.79	34.62	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
756	0.000	493.78	34.62	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
783	0.000	493.77	34.62	0.128	-----	-----	-----	-----	-----	-----	-----	0.128
810	0.000	493.76	34.62	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
837	0.000	493.75	33.95	0.117	-----	-----	-----	-----	-----	-----	-----	0.117
864	0.000	493.74	32.56	0.112	-----	-----	-----	-----	-----	-----	-----	0.112
891	0.000	493.73	31.23	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
918	0.000	493.72	29.96	0.104	-----	-----	-----	-----	-----	-----	-----	0.104
945	0.000	493.71	28.74	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
972	0.000	493.70	27.57	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
999	0.000	493.69	26.45	0.091	-----	-----	-----	-----	-----	-----	-----	0.091
1026	0.000	493.68	25.37	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
1053	0.000	493.68	24.33	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1080	0.000	493.67	23.34	0.081	-----	-----	-----	-----	-----	-----	-----	0.081
1107	0.000	493.66	22.39	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1134	0.000	493.66	21.48	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
1161	0.000	493.65	20.60	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
1188	0.000	493.64	19.76	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
1215	0.000	493.64	18.96	0.065	-----	-----	-----	-----	-----	-----	-----	0.065

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1242	0.000	493.63	18.19	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
1269	0.000	493.63	17.44	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
1296	0.000	493.62	16.73	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
1323	0.000	493.62	16.05	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
1350	0.000	493.61	15.40	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
1377	0.000	493.61	14.77	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
1404	0.000	493.60	14.17	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
1431	0.000	493.60	13.59	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
1458	0.000	493.59	13.04	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
1485	0.000	493.59	12.50	0.043	-----	-----	-----	-----	-----	-----	-----	0.043
1512	0.000	493.59	12.00	0.041	-----	-----	-----	-----	-----	-----	-----	0.041
1539	0.000	493.58	11.51	0.040	-----	-----	-----	-----	-----	-----	-----	0.040
1566	0.000	493.58	11.04	0.038	-----	-----	-----	-----	-----	-----	-----	0.038
1593	0.000	493.58	10.59	0.037	-----	-----	-----	-----	-----	-----	-----	0.037

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 7.280 cfs
Storm frequency	= 25 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 26,050 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
54	0.500
81	0.500
108	0.600
135	0.600
162	0.800
189	0.900
216	1.300
243	1.200
270	7.280 <<
297	1.100
324	0.700
351	0.600

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 4.162 cfs
Storm frequency	= 25 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 26,011 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 494.32 ft	Max. Storage	= 12,753 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
108	0.600	493.61	14.86	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
135	0.600	493.65	21.33	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
162	0.800	493.71	28.72	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
189	0.900	493.77	34.62	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
216	1.300	493.85	34.62	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
243	1.200	493.95	34.62	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
270	7.280 <<	494.15	34.62	0.291	-----	-----	3.205	-----	-----	-----	-----	3.496
297	1.100	494.18 <<	34.62	0.300	-----	-----	3.862	-----	-----	-----	-----	4.162 <<
324	0.700	494.04	34.62	0.254	-----	-----	0.776	-----	-----	-----	-----	1.031
351	0.600	494.02	34.62	0.249	-----	-----	0.417	-----	-----	-----	-----	0.665
378	0.000	494.00	34.62	0.244	-----	-----	0.071	-----	-----	-----	-----	0.315
405	0.000	493.98	34.62	0.233	-----	-----	-----	-----	-----	-----	-----	0.233
432	0.000	493.96	34.62	0.223	-----	-----	-----	-----	-----	-----	-----	0.223
459	0.000	493.94	34.62	0.213	-----	-----	-----	-----	-----	-----	-----	0.213
486	0.000	493.92	34.62	0.205	-----	-----	-----	-----	-----	-----	-----	0.205
513	0.000	493.91	34.62	0.196	-----	-----	-----	-----	-----	-----	-----	0.196
540	0.000	493.89	34.62	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
567	0.000	493.87	34.62	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
594	0.000	493.86	34.62	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
621	0.000	493.84	34.62	0.165	-----	-----	-----	-----	-----	-----	-----	0.165
648	0.000	493.83	34.62	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
675	0.000	493.82	34.62	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
702	0.000	493.80	34.62	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
729	0.000	493.79	34.62	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
756	0.000	493.78	34.62	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
783	0.000	493.77	34.62	0.128	-----	-----	-----	-----	-----	-----	-----	0.128
810	0.000	493.76	34.62	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
837	0.000	493.75	33.96	0.117	-----	-----	-----	-----	-----	-----	-----	0.117
864	0.000	493.74	32.57	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
891	0.000	493.73	31.25	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
918	0.000	493.72	29.97	0.104	-----	-----	-----	-----	-----	-----	-----	0.104
945	0.000	493.71	28.75	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
972	0.000	493.70	27.58	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
999	0.000	493.69	26.46	0.091	-----	-----	-----	-----	-----	-----	-----	0.091
1026	0.000	493.68	25.38	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
1053	0.000	493.68	24.34	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1080	0.000	493.67	23.35	0.081	-----	-----	-----	-----	-----	-----	-----	0.081
1107	0.000	493.66	22.40	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1134	0.000	493.66	21.49	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
1161	0.000	493.65	20.61	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
1188	0.000	493.64	19.77	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
1215	0.000	493.64	18.96	0.066	-----	-----	-----	-----	-----	-----	-----	0.066

Continues on next page...

BMP 1 ROUTING

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1242	0.000	493.63	18.19	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
1269	0.000	493.63	17.45	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
1296	0.000	493.62	16.74	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
1323	0.000	493.62	16.06	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
1350	0.000	493.61	15.40	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
1377	0.000	493.61	14.78	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
1404	0.000	493.60	14.17	0.049	-----	-----	-----	-----	-----	-----	-----	0.049
1431	0.000	493.60	13.59	0.047	-----	-----	-----	-----	-----	-----	-----	0.047
1458	0.000	493.59	13.04	0.045	-----	-----	-----	-----	-----	-----	-----	0.045
1485	0.000	493.59	12.51	0.043	-----	-----	-----	-----	-----	-----	-----	0.043

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 8.470 cfs
Storm frequency	= 50 yrs	Time to peak	= 270 min
Time interval	= 27 min	Hyd. volume	= 28,949 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
54	0.500
81	0.600
108	0.700
135	0.700
162	0.900
189	1.000
216	1.500
243	0.900
270	8.470 <<
297	1.200
324	0.800
351	0.600

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 1 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 4.816 cfs
Storm frequency	= 50 yrs	Time to peak	= 297 min
Time interval	= 27 min	Hyd. volume	= 28,910 cuft
Inflow hyd. No.	= 1 - 50 YR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 494.37 ft	Max. Storage	= 13,326 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
108	0.700	493.62	16.61	0.057	-----	-----	-----	-----	-----	-----	-----	0.057
135	0.700	493.67	24.19	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
162	0.900	493.74	32.64	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
189	1.000	493.81	34.62	0.148	-----	-----	-----	-----	-----	-----	-----	0.148
216	1.500	493.90	34.62	0.194	-----	-----	-----	-----	-----	-----	-----	0.194
243	0.900	493.99	34.62	0.236	-----	-----	-----	-----	-----	-----	-----	0.236
270	8.470 <<	494.19	34.62	0.303	-----	-----	4.059	-----	-----	-----	-----	4.362
297	1.200	494.22 <<	34.62	0.310	-----	-----	4.506	-----	-----	-----	-----	4.816 <<
324	0.800	494.04	34.62	0.256	-----	-----	0.897	-----	-----	-----	-----	1.153
351	0.600	494.02	34.62	0.250	-----	-----	0.468	-----	-----	-----	-----	0.718
378	0.000	494.00	34.62	0.244	-----	-----	0.073	-----	-----	-----	-----	0.317
405	0.000	493.98	34.62	0.233	-----	-----	-----	-----	-----	-----	-----	0.233
432	0.000	493.96	34.62	0.223	-----	-----	-----	-----	-----	-----	-----	0.223
459	0.000	493.94	34.62	0.213	-----	-----	-----	-----	-----	-----	-----	0.213
486	0.000	493.92	34.62	0.205	-----	-----	-----	-----	-----	-----	-----	0.205
513	0.000	493.91	34.62	0.196	-----	-----	-----	-----	-----	-----	-----	0.196
540	0.000	493.89	34.62	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
567	0.000	493.87	34.62	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
594	0.000	493.86	34.62	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
621	0.000	493.84	34.62	0.165	-----	-----	-----	-----	-----	-----	-----	0.165
648	0.000	493.83	34.62	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
675	0.000	493.82	34.62	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
702	0.000	493.80	34.62	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
729	0.000	493.79	34.62	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
756	0.000	493.78	34.62	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
783	0.000	493.77	34.62	0.128	-----	-----	-----	-----	-----	-----	-----	0.128
810	0.000	493.76	34.62	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
837	0.000	493.75	33.96	0.117	-----	-----	-----	-----	-----	-----	-----	0.117
864	0.000	493.74	32.57	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
891	0.000	493.73	31.25	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
918	0.000	493.72	29.98	0.104	-----	-----	-----	-----	-----	-----	-----	0.104
945	0.000	493.71	28.75	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
972	0.000	493.70	27.58	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
999	0.000	493.69	26.46	0.091	-----	-----	-----	-----	-----	-----	-----	0.091
1026	0.000	493.68	25.38	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
1053	0.000	493.68	24.34	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1080	0.000	493.67	23.35	0.081	-----	-----	-----	-----	-----	-----	-----	0.081
1107	0.000	493.66	22.40	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1134	0.000	493.66	21.49	0.074	-----	-----	-----	-----	-----	-----	-----	0.074
1161	0.000	493.65	20.61	0.071	-----	-----	-----	-----	-----	-----	-----	0.071
1188	0.000	493.64	19.77	0.068	-----	-----	-----	-----	-----	-----	-----	0.068
1215	0.000	493.64	18.96	0.066	-----	-----	-----	-----	-----	-----	-----	0.066

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1242	0.000	493.63	18.19	0.063	-----	-----	-----	-----	-----	-----	-----	0.063
1269	0.000	493.63	17.45	0.060	-----	-----	-----	-----	-----	-----	-----	0.060
1296	0.000	493.62	16.74	0.058	-----	-----	-----	-----	-----	-----	-----	0.058
1323	0.000	493.62	16.06	0.055	-----	-----	-----	-----	-----	-----	-----	0.055
1350	0.000	493.61	15.40	0.053	-----	-----	-----	-----	-----	-----	-----	0.053
1377	0.000	493.61	14.78	0.051	-----	-----	-----	-----	-----	-----	-----	0.051
1404	0.000	493.60	14.17	0.049	-----	-----	-----	-----	-----	-----	-----	0.049

...End

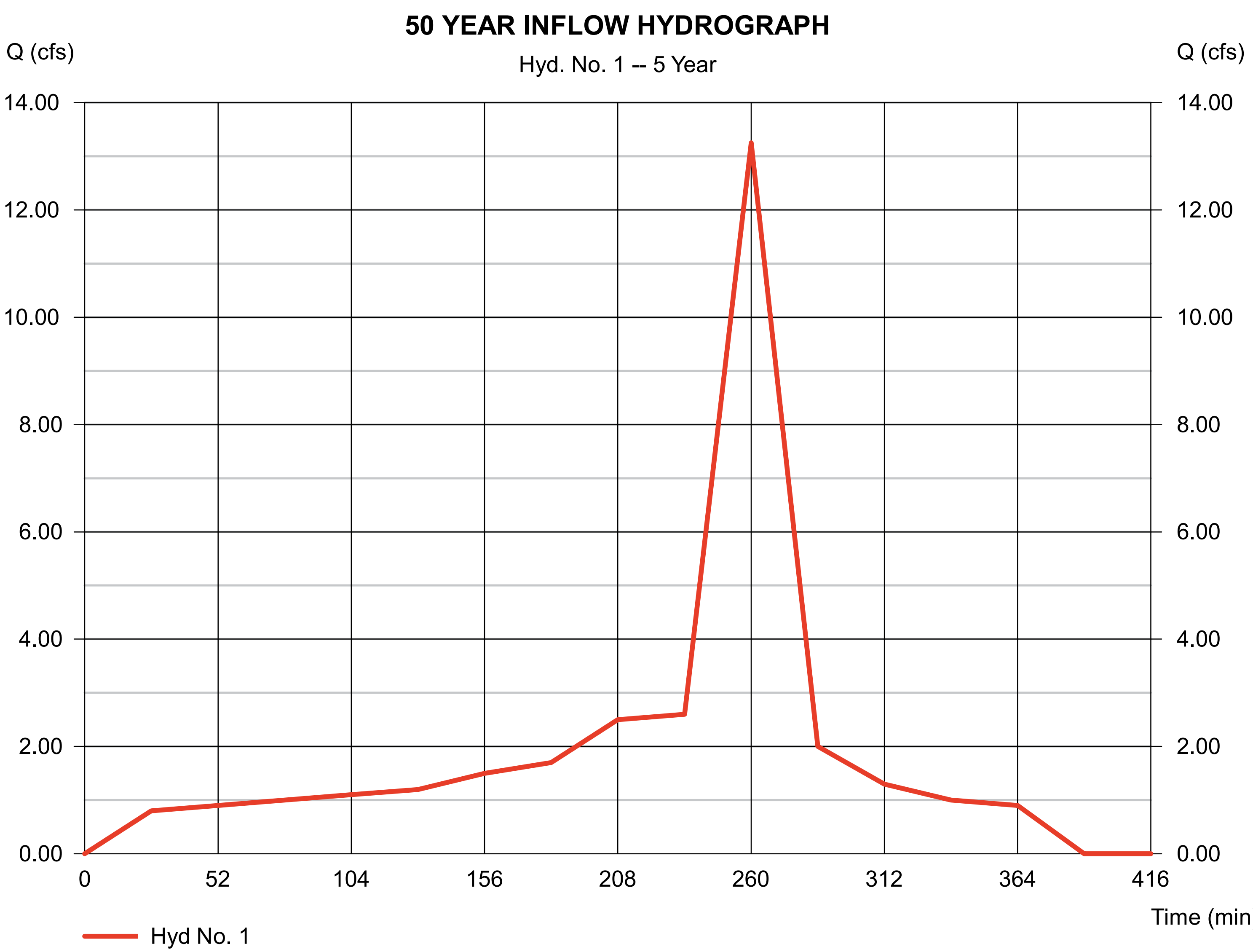
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	=	Manual	Peak discharge	=	13.25 cfs
Storm frequency	=	5 yrs	Time to peak	=	260 min
Time interval	=	26 min	Hyd. volume	=	49,530 cuft



Hydrograph Report

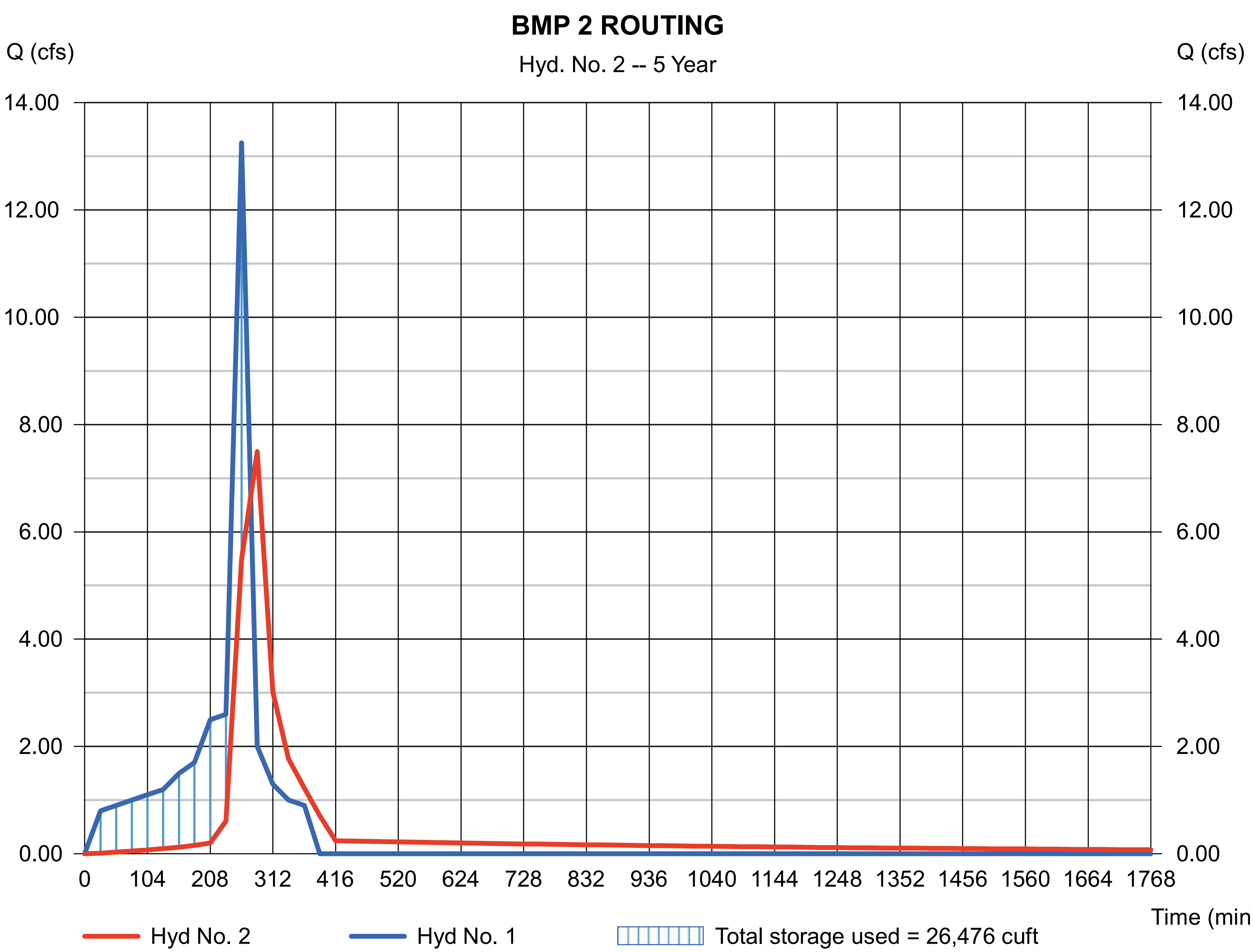
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 7.497 cfs
Storm frequency	= 5 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 49,461 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Max. Elevation	= 496.93 ft
Reservoir name	= <New Pond>	Max. Storage	= 26,476 cuft

Storage Indication method used.



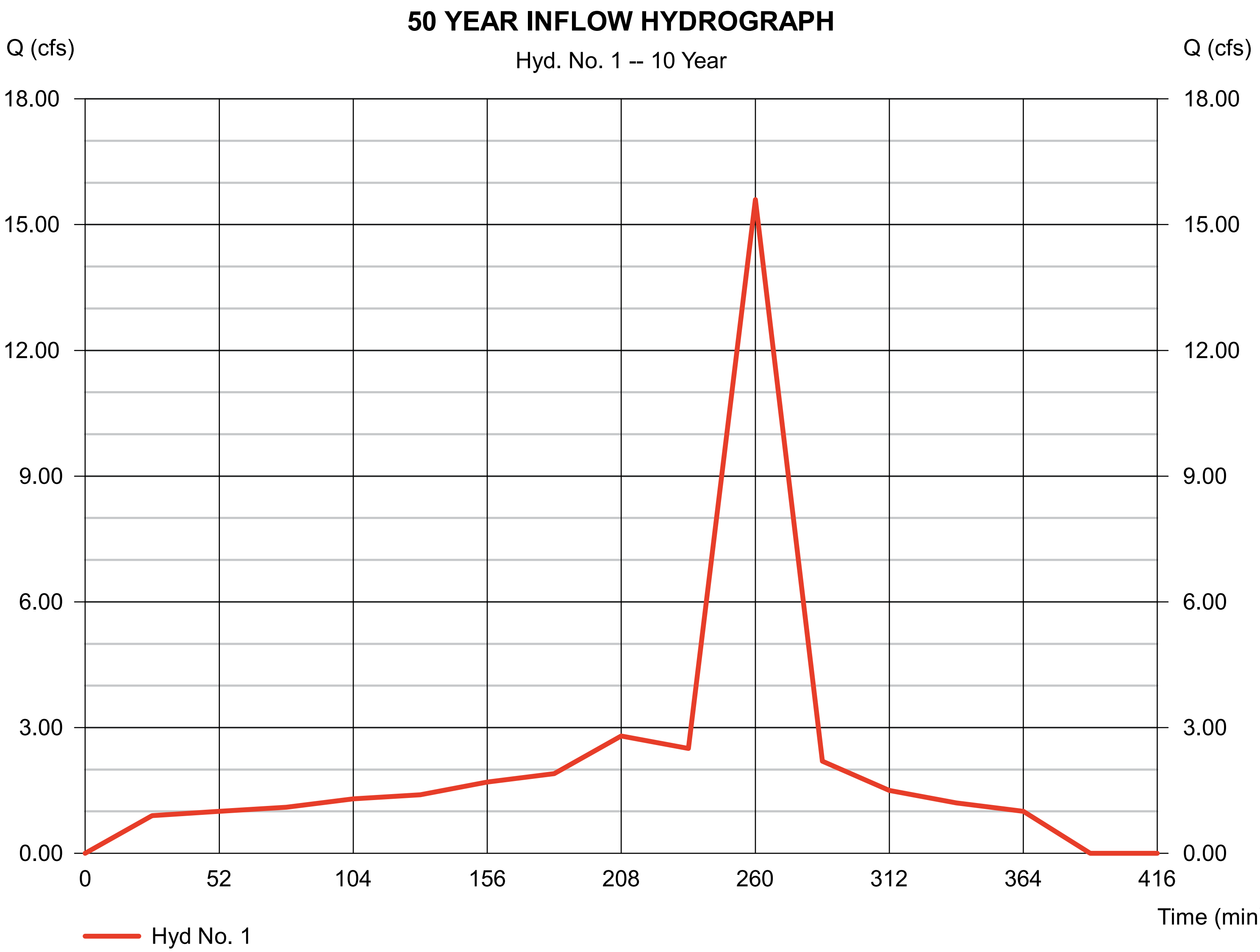
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 15.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 56,316 cuft



Hydrograph Report

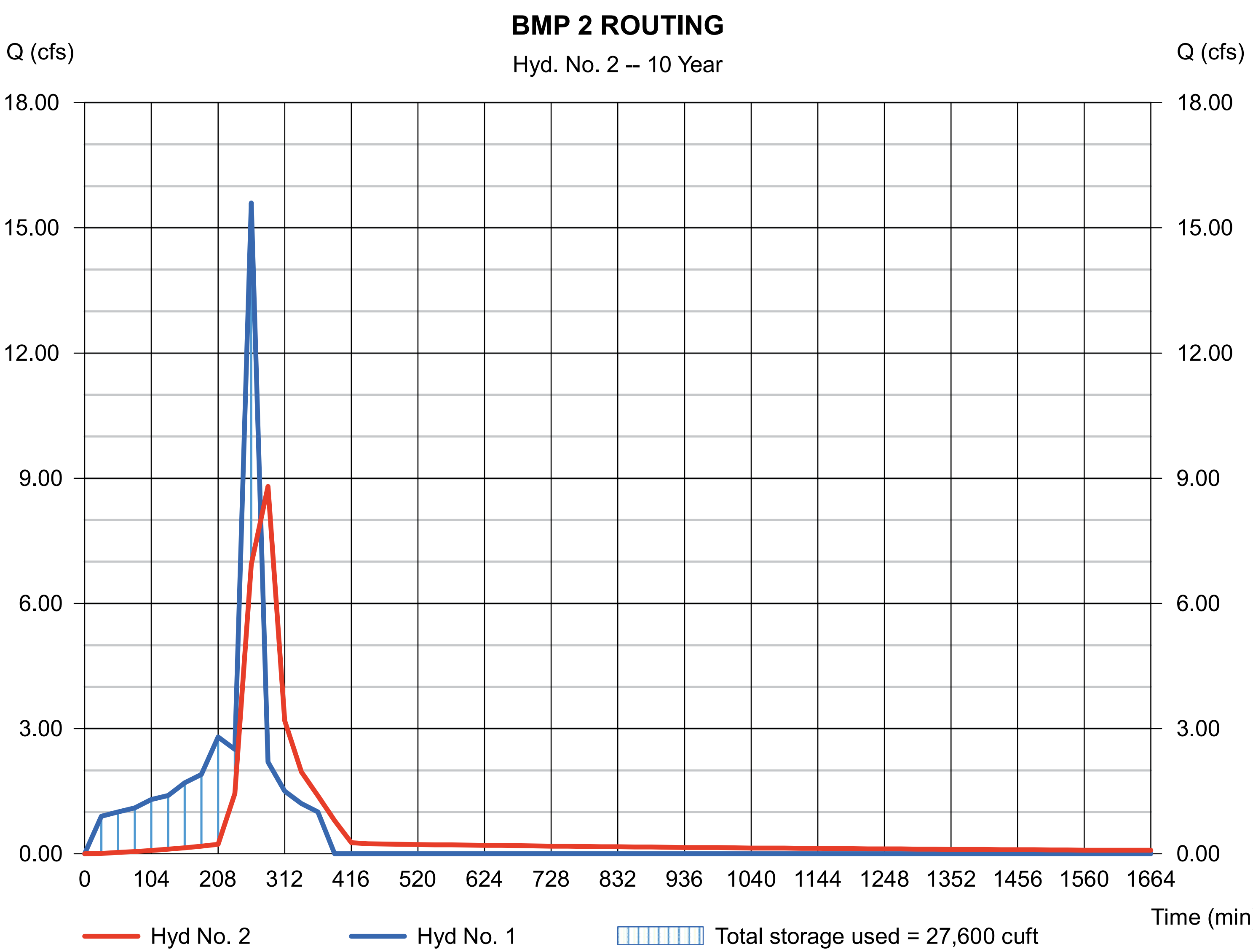
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 8.805 cfs
Storm frequency	= 10 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 56,247 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Max. Elevation	= 496.99 ft
Reservoir name	= <New Pond>	Max. Storage	= 27,600 cuft

Storage Indication method used.



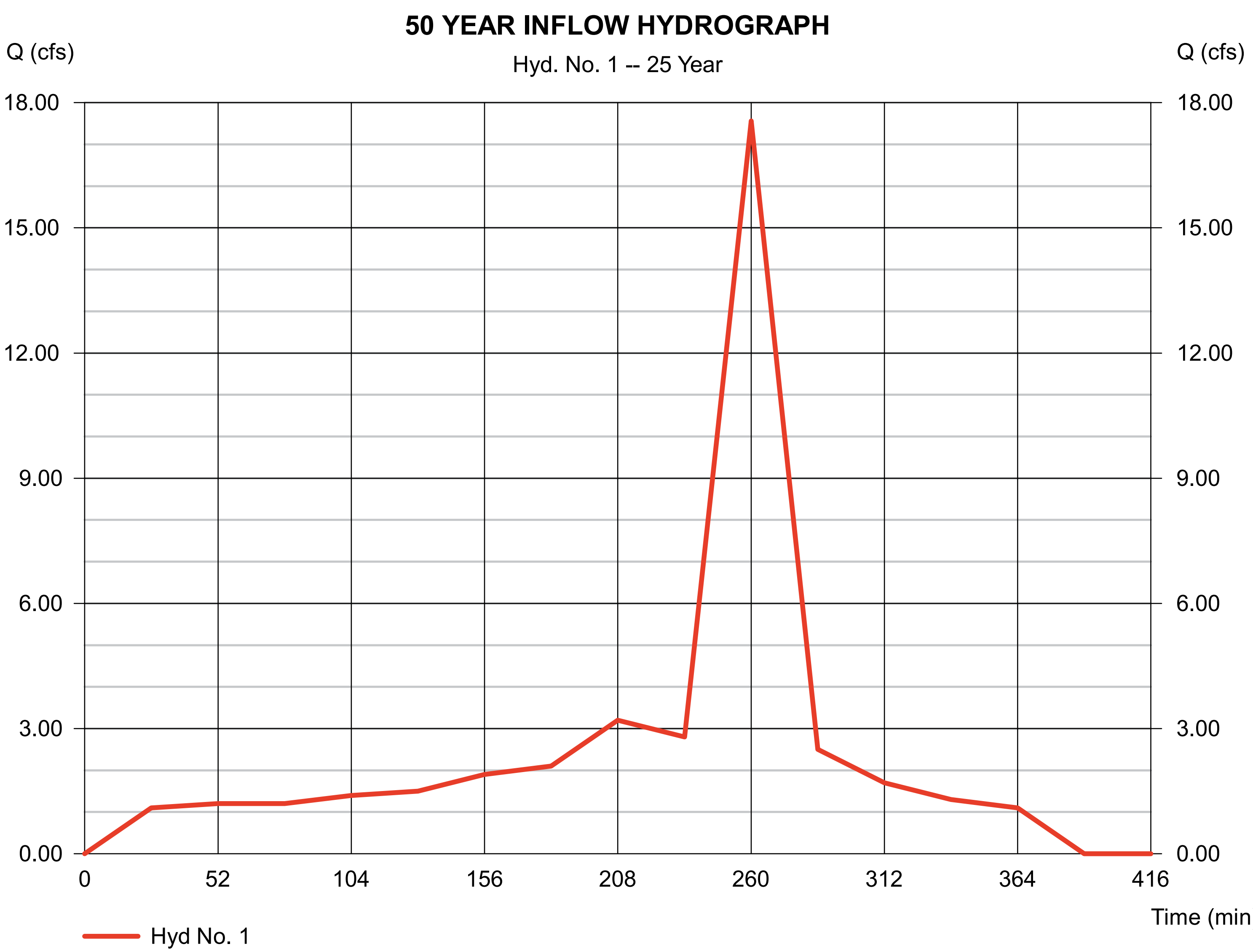
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 17.56 cfs
Storm frequency	= 25 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 63,274 cuft



Hydrograph Report

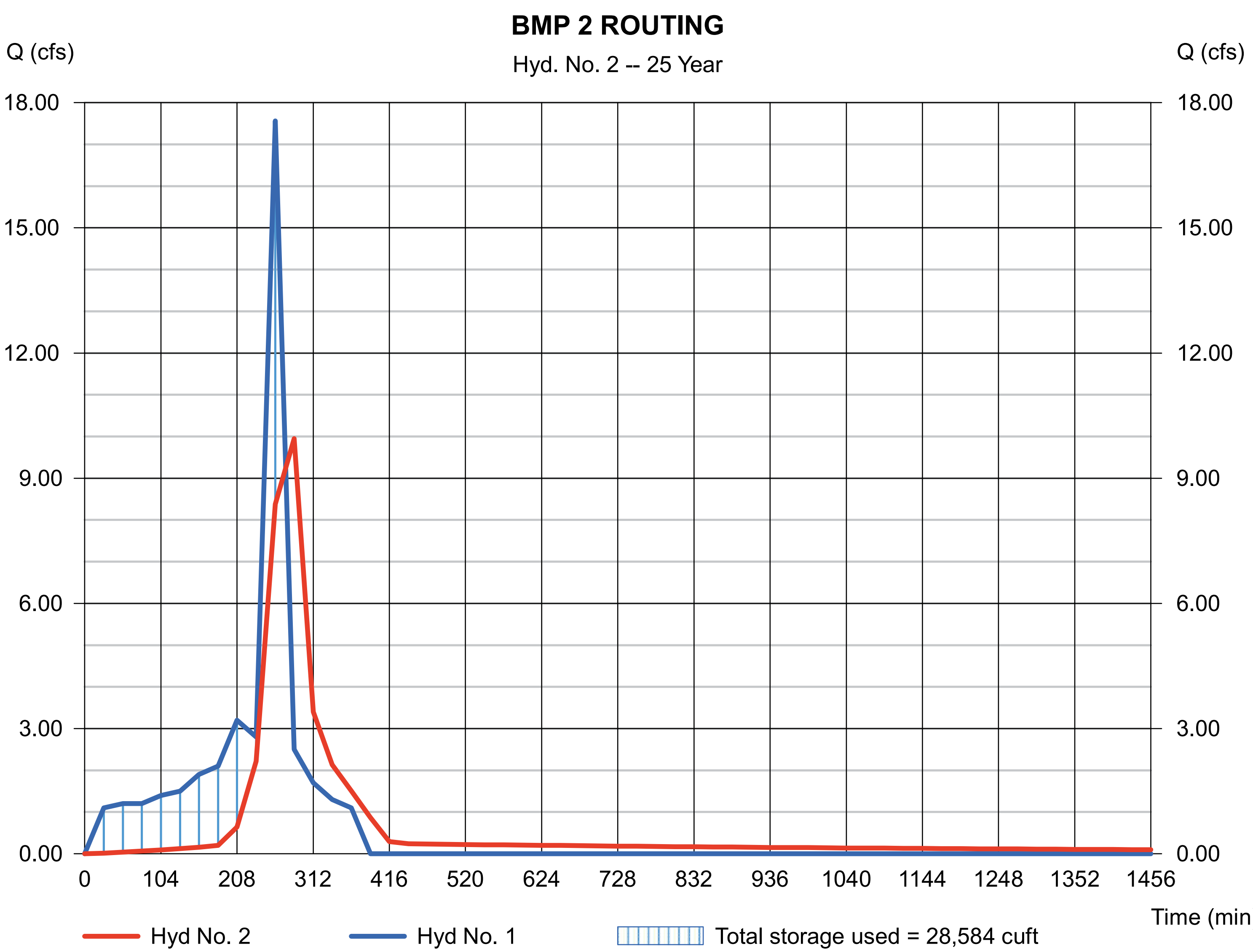
Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 9.950 cfs
Storm frequency	= 25 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 63,204 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Max. Elevation	= 497.04 ft
Reservoir name	= <New Pond>	Max. Storage	= 28,584 cuft

Storage Indication method used.



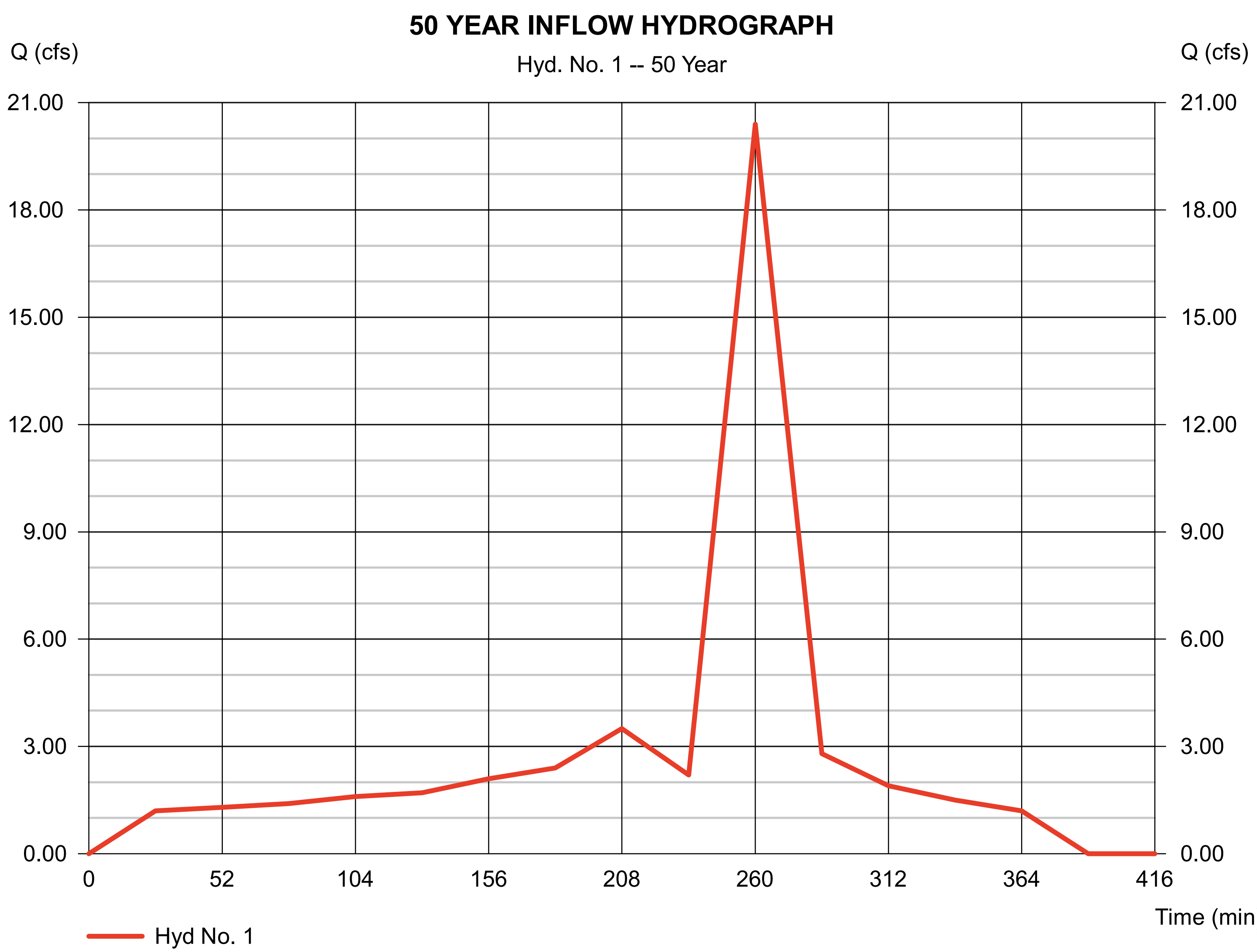
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 20.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 70,512 cuft



Hydrograph Report

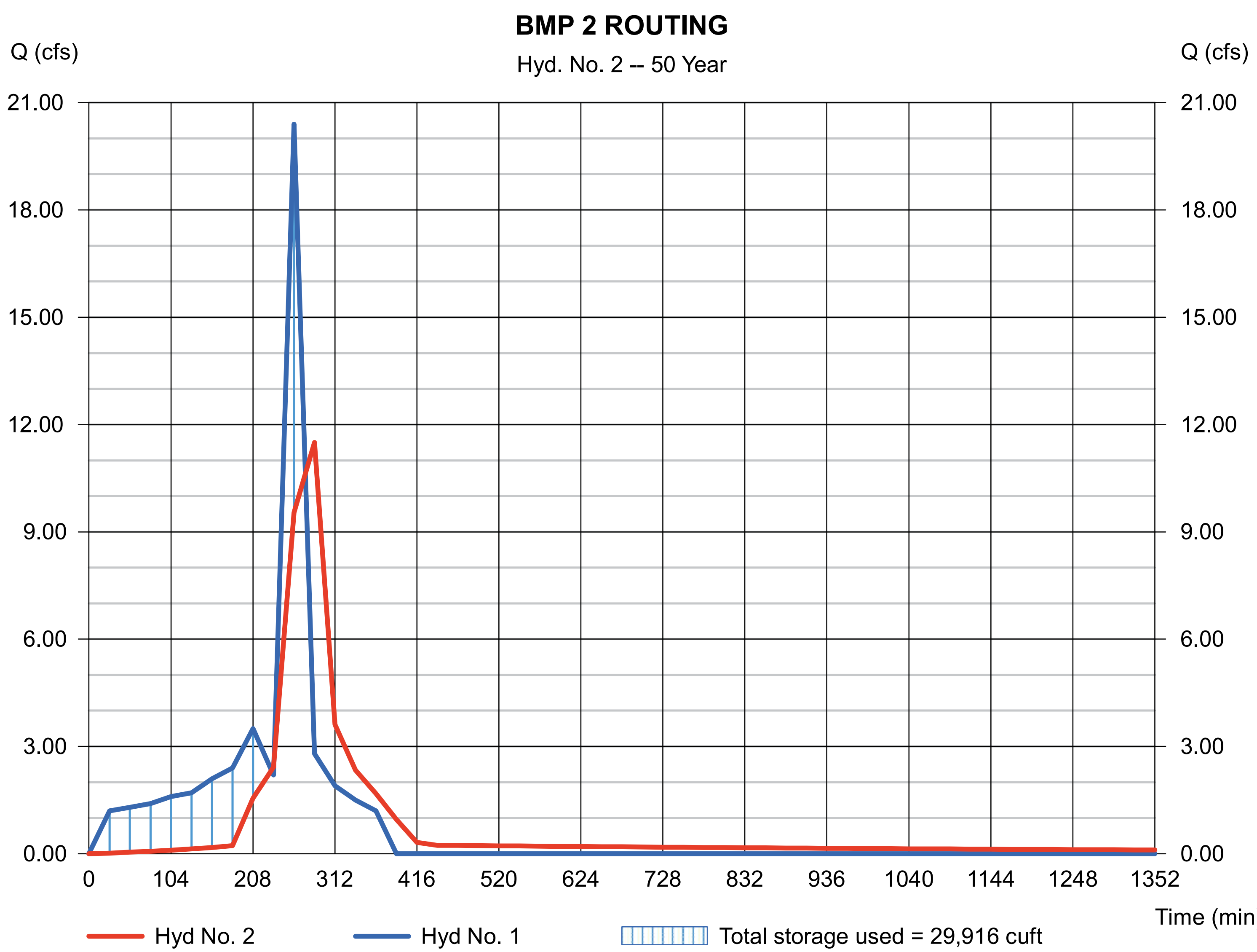
Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 11.50 cfs
Storm frequency	= 50 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 70,443 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Max. Elevation	= 497.11 ft
Reservoir name	= <New Pond>	Max. Storage	= 29,916 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 13.25 cfs
Storm frequency	= 5 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 49,530 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	0.800
52	0.900
78	1.000
104	1.100
130	1.200
156	1.500
182	1.700
208	2.500
234	2.600
260	13.25 <<
286	2.000
312	1.300
338	1.000
364	0.900

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 7.497 cfs
Storm frequency	= 5 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 49,461 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 496.93 ft	Max. Storage	= 26,476 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.200	496.20	26.34	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
156	1.500	496.26	33.26	0.123	-----	-----	-----	-----	-----	-----	-----	0.123
182	1.700	496.33	33.26	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
208	2.500	496.42	33.26	0.201	-----	-----	-----	-----	-----	-----	-----	0.201
234	2.600	496.52	33.26	0.248	-----	-----	0.361	-----	-----	-----	-----	0.609
260	13.25 <<	496.75	33.26	0.320	-----	-----	5.171	-----	-----	-----	-----	5.490
286	2.000	496.80 <<	33.26	0.334	-----	-----	7.163	-----	-----	-----	-----	7.497 <<
312	1.300	496.63	33.26	0.283	-----	-----	2.730	-----	-----	-----	-----	3.013
338	1.000	496.57	33.26	0.265	-----	-----	1.505	-----	-----	-----	-----	1.770
364	0.900	496.55	33.26	0.257	-----	-----	0.966	-----	-----	-----	-----	1.223
390	0.000	496.52	33.26	0.249	-----	-----	0.458	-----	-----	-----	-----	0.707
416	0.000	496.50	33.26	0.242	-----	-----	-----	-----	-----	-----	-----	0.242
442	0.000	496.49	33.26	0.237	-----	-----	-----	-----	-----	-----	-----	0.237
468	0.000	496.48	33.26	0.231	-----	-----	-----	-----	-----	-----	-----	0.231
494	0.000	496.47	33.26	0.226	-----	-----	-----	-----	-----	-----	-----	0.226
520	0.000	496.46	33.26	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.211	-----	-----	-----	-----	-----	-----	-----	0.211
598	0.000	496.43	33.26	0.206	-----	-----	-----	-----	-----	-----	-----	0.206
624	0.000	496.42	33.26	0.201	-----	-----	-----	-----	-----	-----	-----	0.201
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.192	-----	-----	-----	-----	-----	-----	-----	0.192
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.183	-----	-----	-----	-----	-----	-----	-----	0.183
754	0.000	496.37	33.26	0.179	-----	-----	-----	-----	-----	-----	-----	0.179
780	0.000	496.36	33.26	0.175	-----	-----	-----	-----	-----	-----	-----	0.175
806	0.000	496.35	33.26	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
832	0.000	496.35	33.26	0.167	-----	-----	-----	-----	-----	-----	-----	0.167
858	0.000	496.34	33.26	0.163	-----	-----	-----	-----	-----	-----	-----	0.163
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
1014	0.000	496.30	33.26	0.142	-----	-----	-----	-----	-----	-----	-----	0.142
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.129	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.26	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.83	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.10	0.115	-----	-----	-----	-----	-----	-----	-----	0.115
1274	0.000	496.24	31.39	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.68	0.110	-----	-----	-----	-----	-----	-----	-----	0.110
1326	0.000	496.23	30.00	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.33	0.105	-----	-----	-----	-----	-----	-----	-----	0.105
1378	0.000	496.22	28.67	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.04	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
1430	0.000	496.21	27.41	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
1456	0.000	496.20	26.80	0.096	-----	-----	-----	-----	-----	-----	-----	0.096
1482	0.000	496.20	26.20	0.094	-----	-----	-----	-----	-----	-----	-----	0.094
1508	0.000	496.19	25.62	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
1534	0.000	496.19	25.04	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
1560	0.000	496.18	24.48	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
1586	0.000	496.18	23.94	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
1612	0.000	496.18	23.40	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1638	0.000	496.17	22.88	0.082	-----	-----	-----	-----	-----	-----	-----	0.082
1664	0.000	496.17	22.37	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
1690	0.000	496.16	21.87	0.079	-----	-----	-----	-----	-----	-----	-----	0.079
1716	0.000	496.16	21.38	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1742	0.000	496.16	20.91	0.075	-----	-----	-----	-----	-----	-----	-----	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 15.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 56,316 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	0.900
52	1.000
78	1.100
104	1.300
130	1.400
156	1.700
182	1.900
208	2.800
234	2.500
260	15.60 <<
286	2.200
312	1.500
338	1.200
364	1.000

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 — Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 8.805 cfs
Storm frequency	= 10 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 56,247 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 496.99 ft	Max. Storage	= 27,600 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.400	496.23	29.94	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
156	1.700	496.29	33.26	0.140	-----	-----	-----	-----	-----	-----	-----	0.140
182	1.900	496.37	33.26	0.179	-----	-----	-----	-----	-----	-----	-----	0.179
208	2.800	496.47	33.26	0.228	-----	-----	-----	-----	-----	-----	-----	0.228
234	2.500	496.56	33.26	0.260	-----	-----	1.184	-----	-----	-----	-----	1.444
260	15.60 <<	496.79	33.26	0.330	-----	-----	6.603	-----	-----	-----	-----	6.932
286	2.200	496.83 <<	33.26	0.342	-----	-----	8.463	-----	-----	-----	-----	8.805 <<
312	1.500	496.64	33.26	0.286	-----	-----	2.905	-----	-----	-----	-----	3.191
338	1.200	496.58	33.26	0.268	-----	-----	1.695	-----	-----	-----	-----	1.963
364	1.000	496.55	33.26	0.259	-----	-----	1.128	-----	-----	-----	-----	1.387
390	0.000	496.53	33.26	0.251	-----	-----	0.544	-----	-----	-----	-----	0.795
416	0.000	496.50	33.26	0.243	-----	-----	0.022	-----	-----	-----	-----	0.265
442	0.000	496.49	33.26	0.237	-----	-----	-----	-----	-----	-----	-----	0.237
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.226	-----	-----	-----	-----	-----	-----	-----	0.226
520	0.000	496.46	33.26	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.211	-----	-----	-----	-----	-----	-----	-----	0.211
598	0.000	496.43	33.26	0.206	-----	-----	-----	-----	-----	-----	-----	0.206
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.175	-----	-----	-----	-----	-----	-----	-----	0.175
806	0.000	496.36	33.26	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.142	-----	-----	-----	-----	-----	-----	-----	0.142
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.26	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.90	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.17	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
1274	0.000	496.24	31.45	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.74	0.111	-----	-----	-----	-----	-----	-----	-----	0.111
1326	0.000	496.23	30.06	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.39	0.106	-----	-----	-----	-----	-----	-----	-----	0.106
1378	0.000	496.22	28.73	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.09	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
1430	0.000	496.21	27.46	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
1456	0.000	496.20	26.85	0.097	-----	-----	-----	-----	-----	-----	-----	0.097
1482	0.000	496.20	26.25	0.094	-----	-----	-----	-----	-----	-----	-----	0.094
1508	0.000	496.19	25.67	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
1534	0.000	496.19	25.09	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
1560	0.000	496.18	24.53	0.088	-----	-----	-----	-----	-----	-----	-----	0.088

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 17.56 cfs
Storm frequency	= 25 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 63,274 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	1.100
52	1.200
78	1.200
104	1.400
130	1.500
156	1.900
182	2.100
208	3.200
234	2.800
260	17.56 <<
286	2.500
312	1.700
338	1.300
364	1.100

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 9.950 cfs
Storm frequency	= 25 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 63,204 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 497.04 ft	Max. Storage	= 28,584 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.500	496.25	33.26	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
156	1.900	496.33	33.26	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
182	2.100	496.41	33.26	0.200	-----	-----	-----	-----	-----	-----	-----	0.200
208	3.200	496.52	33.26	0.248	-----	-----	0.391	-----	-----	-----	-----	0.640
234	2.800	496.59	33.26	0.272	-----	-----	1.943	-----	-----	-----	-----	2.215
260	17.56 <<	496.82	33.26	0.339	-----	-----	8.034	-----	-----	-----	-----	8.374
286	2.500	496.86 <<	33.26	0.350	-----	-----	9.600	-----	-----	-----	-----	9.950 <<
312	1.700	496.65	33.26	0.289	-----	-----	3.108	-----	-----	-----	-----	3.397
338	1.300	496.59	33.26	0.270	-----	-----	1.861	-----	-----	-----	-----	2.131
364	1.100	496.56	33.26	0.261	-----	-----	1.248	-----	-----	-----	-----	1.510
390	0.000	496.53	33.26	0.252	-----	-----	0.618	-----	-----	-----	-----	0.869
416	0.000	496.50	33.26	0.243	-----	-----	0.046	-----	-----	-----	-----	0.289
442	0.000	496.49	33.26	0.238	-----	-----	-----	-----	-----	-----	-----	0.238
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.227	-----	-----	-----	-----	-----	-----	-----	0.227
520	0.000	496.46	33.26	0.222	-----	-----	-----	-----	-----	-----	-----	0.222
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
598	0.000	496.43	33.26	0.207	-----	-----	-----	-----	-----	-----	-----	0.207
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.176	-----	-----	-----	-----	-----	-----	-----	0.176
806	0.000	496.36	33.26	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.143	-----	-----	-----	-----	-----	-----	-----	0.143
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.27	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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BMP 2 ROUTING

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.94	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.20	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
1274	0.000	496.24	31.48	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.78	0.111	-----	-----	-----	-----	-----	-----	-----	0.111
1326	0.000	496.23	30.09	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.42	0.106	-----	-----	-----	-----	-----	-----	-----	0.106
1378	0.000	496.22	28.77	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.13	0.101	-----	-----	-----	-----	-----	-----	-----	0.101

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 20.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 70,512 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	1.200
52	1.300
78	1.400
104	1.600
130	1.700
156	2.100
182	2.400
208	3.500
234	2.200
260	20.40 <<
286	2.800
312	1.900
338	1.500
364	1.200

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 11.50 cfs
Storm frequency	= 50 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 70,443 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 497.11 ft	Max. Storage	= 29,916 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.700	496.29	33.26	0.137	-----	-----	-----	-----	-----	-----	-----	0.137
156	2.100	496.37	33.26	0.178	-----	-----	-----	-----	-----	-----	-----	0.178
182	2.400	496.46	33.26	0.225	-----	-----	-----	-----	-----	-----	-----	0.225
208	3.500	496.56	33.26	0.262	-----	-----	1.290	-----	-----	-----	-----	1.552
234	2.200	496.60	33.26	0.275	-----	-----	2.144	-----	-----	-----	-----	2.418
260	20.40 <<	496.85	33.26	0.347	-----	-----	9.190	-----	-----	-----	-----	9.536
286	2.800	496.90 <<	33.26	0.360	-----	-----	11.14	-----	-----	-----	-----	11.50 <<
312	1.900	496.66	33.26	0.292	-----	-----	3.324	-----	-----	-----	-----	3.616
338	1.500	496.60	33.26	0.273	-----	-----	2.064	-----	-----	-----	-----	2.338
364	1.200	496.57	33.26	0.264	-----	-----	1.415	-----	-----	-----	-----	1.679
390	0.000	496.53	33.26	0.253	-----	-----	0.706	-----	-----	-----	-----	0.959
416	0.000	496.50	33.26	0.244	-----	-----	0.075	-----	-----	-----	-----	0.319
442	0.000	496.49	33.26	0.238	-----	-----	-----	-----	-----	-----	-----	0.238
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.227	-----	-----	-----	-----	-----	-----	-----	0.227
520	0.000	496.46	33.26	0.222	-----	-----	-----	-----	-----	-----	-----	0.222
546	0.000	496.45	33.26	0.217	-----	-----	-----	-----	-----	-----	-----	0.217
572	0.000	496.44	33.26	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
598	0.000	496.43	33.26	0.207	-----	-----	-----	-----	-----	-----	-----	0.207
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.198	-----	-----	-----	-----	-----	-----	-----	0.198
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.189	-----	-----	-----	-----	-----	-----	-----	0.189
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.176	-----	-----	-----	-----	-----	-----	-----	0.176
806	0.000	496.36	33.26	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.33	33.26	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.150	-----	-----	-----	-----	-----	-----	-----	0.150
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.143	-----	-----	-----	-----	-----	-----	-----	0.143
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.27	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.99	0.119	-----	-----	-----	-----	-----	-----	-----	0.119
1248	0.000	496.24	32.25	0.116	-----	-----	-----	-----	-----	-----	-----	0.116

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 13.25 cfs
Storm frequency	= 5 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 49,530 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	0.800
52	0.900
78	1.000
104	1.100
130	1.200
156	1.500
182	1.700
208	2.500
234	2.600
260	13.25 <<
286	2.000
312	1.300
338	1.000
364	0.900

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 7.497 cfs
Storm frequency	= 5 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 49,461 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 496.93 ft	Max. Storage	= 26,476 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.200	496.20	26.34	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
156	1.500	496.26	33.26	0.123	-----	-----	-----	-----	-----	-----	-----	0.123
182	1.700	496.33	33.26	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
208	2.500	496.42	33.26	0.201	-----	-----	-----	-----	-----	-----	-----	0.201
234	2.600	496.52	33.26	0.248	-----	-----	0.361	-----	-----	-----	-----	0.609
260	13.25 <<	496.75	33.26	0.320	-----	-----	5.171	-----	-----	-----	-----	5.490
286	2.000	496.80 <<	33.26	0.334	-----	-----	7.163	-----	-----	-----	-----	7.497 <<
312	1.300	496.63	33.26	0.283	-----	-----	2.730	-----	-----	-----	-----	3.013
338	1.000	496.57	33.26	0.265	-----	-----	1.505	-----	-----	-----	-----	1.770
364	0.900	496.55	33.26	0.257	-----	-----	0.966	-----	-----	-----	-----	1.223
390	0.000	496.52	33.26	0.249	-----	-----	0.458	-----	-----	-----	-----	0.707
416	0.000	496.50	33.26	0.242	-----	-----	-----	-----	-----	-----	-----	0.242
442	0.000	496.49	33.26	0.237	-----	-----	-----	-----	-----	-----	-----	0.237
468	0.000	496.48	33.26	0.231	-----	-----	-----	-----	-----	-----	-----	0.231
494	0.000	496.47	33.26	0.226	-----	-----	-----	-----	-----	-----	-----	0.226
520	0.000	496.46	33.26	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.211	-----	-----	-----	-----	-----	-----	-----	0.211
598	0.000	496.43	33.26	0.206	-----	-----	-----	-----	-----	-----	-----	0.206
624	0.000	496.42	33.26	0.201	-----	-----	-----	-----	-----	-----	-----	0.201
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.192	-----	-----	-----	-----	-----	-----	-----	0.192
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.183	-----	-----	-----	-----	-----	-----	-----	0.183
754	0.000	496.37	33.26	0.179	-----	-----	-----	-----	-----	-----	-----	0.179
780	0.000	496.36	33.26	0.175	-----	-----	-----	-----	-----	-----	-----	0.175
806	0.000	496.35	33.26	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
832	0.000	496.35	33.26	0.167	-----	-----	-----	-----	-----	-----	-----	0.167
858	0.000	496.34	33.26	0.163	-----	-----	-----	-----	-----	-----	-----	0.163
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.145	-----	-----	-----	-----	-----	-----	-----	0.145
1014	0.000	496.30	33.26	0.142	-----	-----	-----	-----	-----	-----	-----	0.142
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.129	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.26	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.83	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.10	0.115	-----	-----	-----	-----	-----	-----	-----	0.115
1274	0.000	496.24	31.39	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.68	0.110	-----	-----	-----	-----	-----	-----	-----	0.110
1326	0.000	496.23	30.00	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.33	0.105	-----	-----	-----	-----	-----	-----	-----	0.105
1378	0.000	496.22	28.67	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.04	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
1430	0.000	496.21	27.41	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
1456	0.000	496.20	26.80	0.096	-----	-----	-----	-----	-----	-----	-----	0.096
1482	0.000	496.20	26.20	0.094	-----	-----	-----	-----	-----	-----	-----	0.094
1508	0.000	496.19	25.62	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
1534	0.000	496.19	25.04	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
1560	0.000	496.18	24.48	0.088	-----	-----	-----	-----	-----	-----	-----	0.088
1586	0.000	496.18	23.94	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
1612	0.000	496.18	23.40	0.084	-----	-----	-----	-----	-----	-----	-----	0.084
1638	0.000	496.17	22.88	0.082	-----	-----	-----	-----	-----	-----	-----	0.082
1664	0.000	496.17	22.37	0.080	-----	-----	-----	-----	-----	-----	-----	0.080
1690	0.000	496.16	21.87	0.079	-----	-----	-----	-----	-----	-----	-----	0.079
1716	0.000	496.16	21.38	0.077	-----	-----	-----	-----	-----	-----	-----	0.077
1742	0.000	496.16	20.91	0.075	-----	-----	-----	-----	-----	-----	-----	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 | Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 15.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 56,316 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	0.900
52	1.000
78	1.100
104	1.300
130	1.400
156	1.700
182	1.900
208	2.800
234	2.500
260	15.60 <<
286	2.200
312	1.500
338	1.200
364	1.000

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 26 min
Inflow hyd. No. = 1 - 50 YEAR INFLOW HYDROGRAPH
Max. Elevation = 496.99 ft

Peak discharge = 8.805 cfs
Time to peak = 286 min
Hyd. volume = 56,247 cuft
Reservoir name = <New Pond>
Max. Storage = 27,600 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.400	496.23	29.94	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
156	1.700	496.29	33.26	0.140	-----	-----	-----	-----	-----	-----	-----	0.140
182	1.900	496.37	33.26	0.179	-----	-----	-----	-----	-----	-----	-----	0.179
208	2.800	496.47	33.26	0.228	-----	-----	-----	-----	-----	-----	-----	0.228
234	2.500	496.56	33.26	0.260	-----	-----	1.184	-----	-----	-----	-----	1.444
260	15.60 <<	496.79	33.26	0.330	-----	-----	6.603	-----	-----	-----	-----	6.932
286	2.200	496.83 <<	33.26	0.342	-----	-----	8.463	-----	-----	-----	-----	8.805 <<
312	1.500	496.64	33.26	0.286	-----	-----	2.905	-----	-----	-----	-----	3.191
338	1.200	496.58	33.26	0.268	-----	-----	1.695	-----	-----	-----	-----	1.963
364	1.000	496.55	33.26	0.259	-----	-----	1.128	-----	-----	-----	-----	1.387
390	0.000	496.53	33.26	0.251	-----	-----	0.544	-----	-----	-----	-----	0.795
416	0.000	496.50	33.26	0.243	-----	-----	0.022	-----	-----	-----	-----	0.265
442	0.000	496.49	33.26	0.237	-----	-----	-----	-----	-----	-----	-----	0.237
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.226	-----	-----	-----	-----	-----	-----	-----	0.226
520	0.000	496.46	33.26	0.221	-----	-----	-----	-----	-----	-----	-----	0.221
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.211	-----	-----	-----	-----	-----	-----	-----	0.211
598	0.000	496.43	33.26	0.206	-----	-----	-----	-----	-----	-----	-----	0.206
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.175	-----	-----	-----	-----	-----	-----	-----	0.175
806	0.000	496.36	33.26	0.171	-----	-----	-----	-----	-----	-----	-----	0.171
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.142	-----	-----	-----	-----	-----	-----	-----	0.142
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.26	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.90	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.17	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
1274	0.000	496.24	31.45	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.74	0.111	-----	-----	-----	-----	-----	-----	-----	0.111
1326	0.000	496.23	30.06	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.39	0.106	-----	-----	-----	-----	-----	-----	-----	0.106
1378	0.000	496.22	28.73	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.09	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
1430	0.000	496.21	27.46	0.099	-----	-----	-----	-----	-----	-----	-----	0.099
1456	0.000	496.20	26.85	0.097	-----	-----	-----	-----	-----	-----	-----	0.097
1482	0.000	496.20	26.25	0.094	-----	-----	-----	-----	-----	-----	-----	0.094
1508	0.000	496.19	25.67	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
1534	0.000	496.19	25.09	0.090	-----	-----	-----	-----	-----	-----	-----	0.090
1560	0.000	496.18	24.53	0.088	-----	-----	-----	-----	-----	-----	-----	0.088

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 17.56 cfs
Storm frequency	= 25 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 63,274 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	1.100
52	1.200
78	1.200
104	1.400
130	1.500
156	1.900
182	2.100
208	3.200
234	2.800
260	17.56 <<
286	2.500
312	1.700
338	1.300
364	1.100

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 9.950 cfs
Storm frequency	= 25 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 63,204 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 497.04 ft	Max. Storage	= 28,584 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.500	496.25	33.26	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
156	1.900	496.33	33.26	0.158	-----	-----	-----	-----	-----	-----	-----	0.158
182	2.100	496.41	33.26	0.200	-----	-----	-----	-----	-----	-----	-----	0.200
208	3.200	496.52	33.26	0.248	-----	-----	0.391	-----	-----	-----	-----	0.640
234	2.800	496.59	33.26	0.272	-----	-----	1.943	-----	-----	-----	-----	2.215
260	17.56 <<	496.82	33.26	0.339	-----	-----	8.034	-----	-----	-----	-----	8.374
286	2.500	496.86 <<	33.26	0.350	-----	-----	9.600	-----	-----	-----	-----	9.950 <<
312	1.700	496.65	33.26	0.289	-----	-----	3.108	-----	-----	-----	-----	3.397
338	1.300	496.59	33.26	0.270	-----	-----	1.861	-----	-----	-----	-----	2.131
364	1.100	496.56	33.26	0.261	-----	-----	1.248	-----	-----	-----	-----	1.510
390	0.000	496.53	33.26	0.252	-----	-----	0.618	-----	-----	-----	-----	0.869
416	0.000	496.50	33.26	0.243	-----	-----	0.046	-----	-----	-----	-----	0.289
442	0.000	496.49	33.26	0.238	-----	-----	-----	-----	-----	-----	-----	0.238
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.227	-----	-----	-----	-----	-----	-----	-----	0.227
520	0.000	496.46	33.26	0.222	-----	-----	-----	-----	-----	-----	-----	0.222
546	0.000	496.45	33.26	0.216	-----	-----	-----	-----	-----	-----	-----	0.216
572	0.000	496.44	33.26	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
598	0.000	496.43	33.26	0.207	-----	-----	-----	-----	-----	-----	-----	0.207
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.188	-----	-----	-----	-----	-----	-----	-----	0.188
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.176	-----	-----	-----	-----	-----	-----	-----	0.176
806	0.000	496.36	33.26	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.32	33.26	0.156	-----	-----	-----	-----	-----	-----	-----	0.156
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.149	-----	-----	-----	-----	-----	-----	-----	0.149
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.143	-----	-----	-----	-----	-----	-----	-----	0.143
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.27	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.94	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
1248	0.000	496.24	32.20	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
1274	0.000	496.24	31.48	0.113	-----	-----	-----	-----	-----	-----	-----	0.113
1300	0.000	496.23	30.78	0.111	-----	-----	-----	-----	-----	-----	-----	0.111
1326	0.000	496.23	30.09	0.108	-----	-----	-----	-----	-----	-----	-----	0.108
1352	0.000	496.22	29.42	0.106	-----	-----	-----	-----	-----	-----	-----	0.106
1378	0.000	496.22	28.77	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
1404	0.000	496.21	28.13	0.101	-----	-----	-----	-----	-----	-----	-----	0.101

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 1

50 YEAR INFLOW HYDROGRAPH

Hydrograph type	= Manual	Peak discharge	= 20.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 260 min
Time interval	= 26 min	Hyd. volume	= 70,512 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (min	Outflow cfs)
26	1.200
52	1.300
78	1.400
104	1.600
130	1.700
156	2.100
182	2.400
208	3.500
234	2.200
260	20.40 <<
286	2.800
312	1.900
338	1.500
364	1.200

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.23 Thursday, Dec 16, 2021

Hyd. No. 2

BMP 2 ROUTING

Hydrograph type	= Reservoir	Peak discharge	= 11.50 cfs
Storm frequency	= 50 yrs	Time to peak	= 286 min
Time interval	= 26 min	Hyd. volume	= 70,443 cuft
Inflow hyd. No.	= 1 - 50 YEAR INFLOW HYDROGRAPH	Reservoir name	= <New Pond>
Max. Elevation	= 497.11 ft	Max. Storage	= 29,916 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
130	1.700	496.29	33.26	0.137	-----	-----	-----	-----	-----	-----	-----	0.137
156	2.100	496.37	33.26	0.178	-----	-----	-----	-----	-----	-----	-----	0.178
182	2.400	496.46	33.26	0.225	-----	-----	-----	-----	-----	-----	-----	0.225
208	3.500	496.56	33.26	0.262	-----	-----	1.290	-----	-----	-----	-----	1.552
234	2.200	496.60	33.26	0.275	-----	-----	2.144	-----	-----	-----	-----	2.418
260	20.40 <<	496.85	33.26	0.347	-----	-----	9.190	-----	-----	-----	-----	9.536
286	2.800	496.90 <<	33.26	0.360	-----	-----	11.14	-----	-----	-----	-----	11.50 <<
312	1.900	496.66	33.26	0.292	-----	-----	3.324	-----	-----	-----	-----	3.616
338	1.500	496.60	33.26	0.273	-----	-----	2.064	-----	-----	-----	-----	2.338
364	1.200	496.57	33.26	0.264	-----	-----	1.415	-----	-----	-----	-----	1.679
390	0.000	496.53	33.26	0.253	-----	-----	0.706	-----	-----	-----	-----	0.959
416	0.000	496.50	33.26	0.244	-----	-----	0.075	-----	-----	-----	-----	0.319
442	0.000	496.49	33.26	0.238	-----	-----	-----	-----	-----	-----	-----	0.238
468	0.000	496.48	33.26	0.232	-----	-----	-----	-----	-----	-----	-----	0.232
494	0.000	496.47	33.26	0.227	-----	-----	-----	-----	-----	-----	-----	0.227
520	0.000	496.46	33.26	0.222	-----	-----	-----	-----	-----	-----	-----	0.222
546	0.000	496.45	33.26	0.217	-----	-----	-----	-----	-----	-----	-----	0.217
572	0.000	496.44	33.26	0.212	-----	-----	-----	-----	-----	-----	-----	0.212
598	0.000	496.43	33.26	0.207	-----	-----	-----	-----	-----	-----	-----	0.207
624	0.000	496.42	33.26	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
650	0.000	496.41	33.26	0.198	-----	-----	-----	-----	-----	-----	-----	0.198
676	0.000	496.40	33.26	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
702	0.000	496.39	33.26	0.189	-----	-----	-----	-----	-----	-----	-----	0.189
728	0.000	496.38	33.26	0.184	-----	-----	-----	-----	-----	-----	-----	0.184
754	0.000	496.37	33.26	0.180	-----	-----	-----	-----	-----	-----	-----	0.180
780	0.000	496.36	33.26	0.176	-----	-----	-----	-----	-----	-----	-----	0.176
806	0.000	496.36	33.26	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
832	0.000	496.35	33.26	0.168	-----	-----	-----	-----	-----	-----	-----	0.168
858	0.000	496.34	33.26	0.164	-----	-----	-----	-----	-----	-----	-----	0.164
884	0.000	496.33	33.26	0.160	-----	-----	-----	-----	-----	-----	-----	0.160
910	0.000	496.33	33.26	0.157	-----	-----	-----	-----	-----	-----	-----	0.157
936	0.000	496.32	33.26	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
962	0.000	496.31	33.26	0.150	-----	-----	-----	-----	-----	-----	-----	0.150
988	0.000	496.30	33.26	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
1014	0.000	496.30	33.26	0.143	-----	-----	-----	-----	-----	-----	-----	0.143
1040	0.000	496.29	33.26	0.139	-----	-----	-----	-----	-----	-----	-----	0.139
1066	0.000	496.28	33.26	0.136	-----	-----	-----	-----	-----	-----	-----	0.136
1092	0.000	496.28	33.26	0.133	-----	-----	-----	-----	-----	-----	-----	0.133
1118	0.000	496.27	33.26	0.130	-----	-----	-----	-----	-----	-----	-----	0.130
1144	0.000	496.27	33.26	0.127	-----	-----	-----	-----	-----	-----	-----	0.127
1170	0.000	496.26	33.26	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
1196	0.000	496.25	33.26	0.121	-----	-----	-----	-----	-----	-----	-----	0.121

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1222	0.000	496.25	32.99	0.119	-----	-----	-----	-----	-----	-----	-----	0.119
1248	0.000	496.24	32.25	0.116	-----	-----	-----	-----	-----	-----	-----	0.116

...End

APPENDIX A – TABLES AND CHARTS

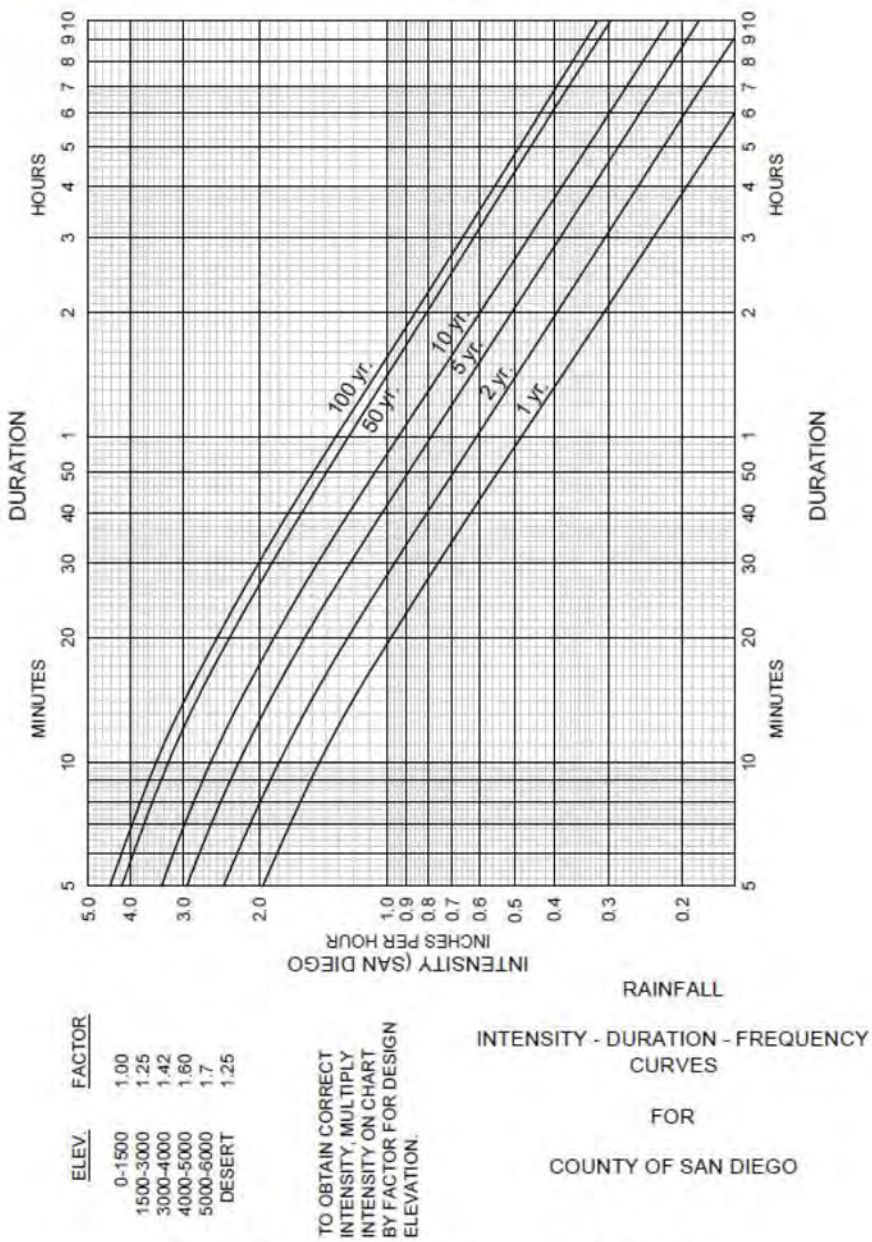


Figure A-1. Intensity-Duration-Frequency Design Chart

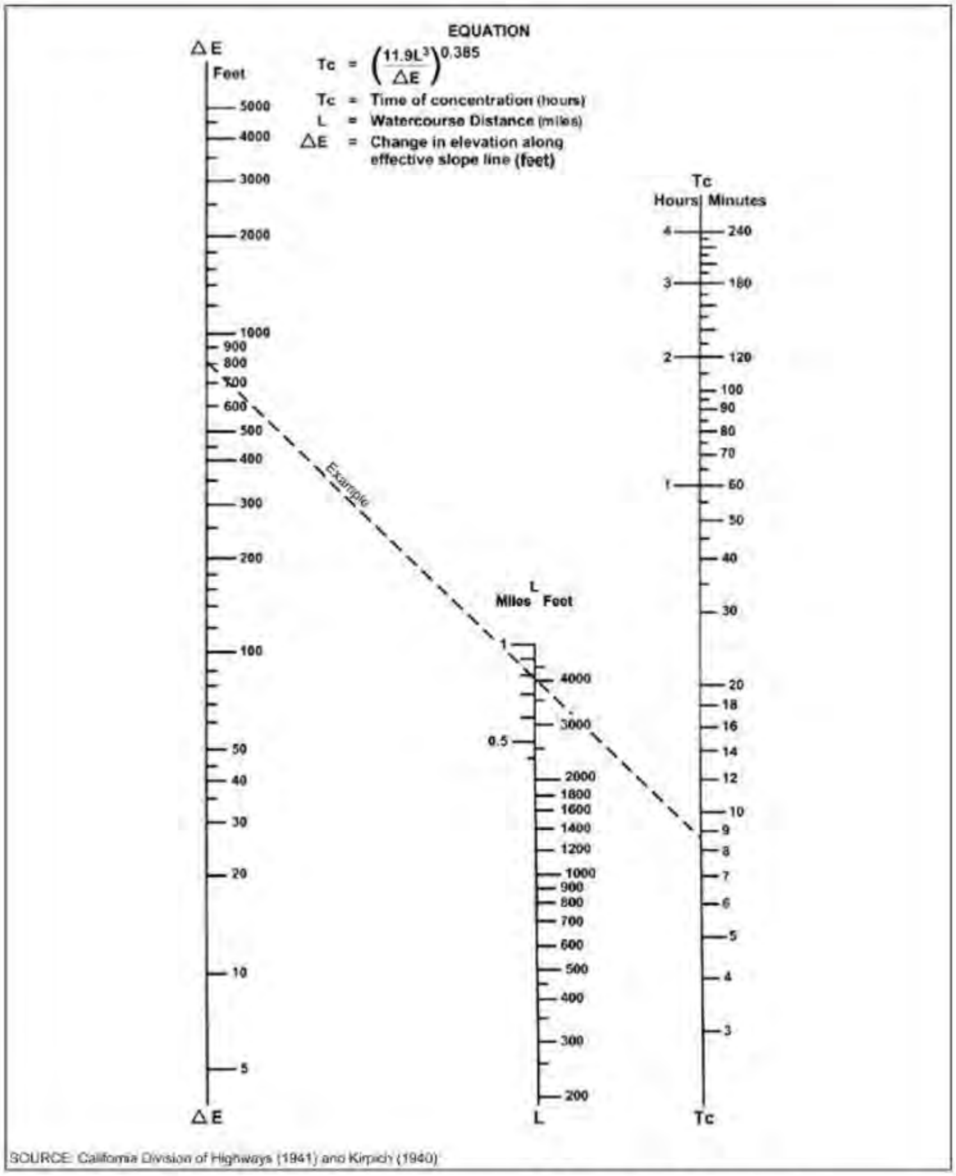
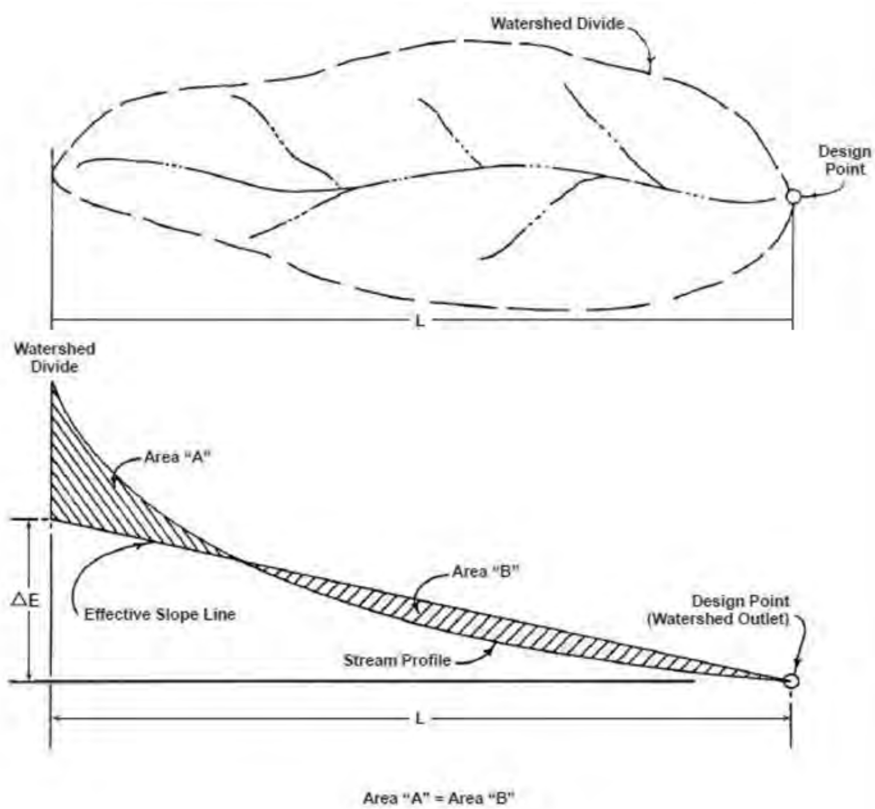


Figure A-2. Nomograph for Determination of T_c for Natural Watersheds

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



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

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

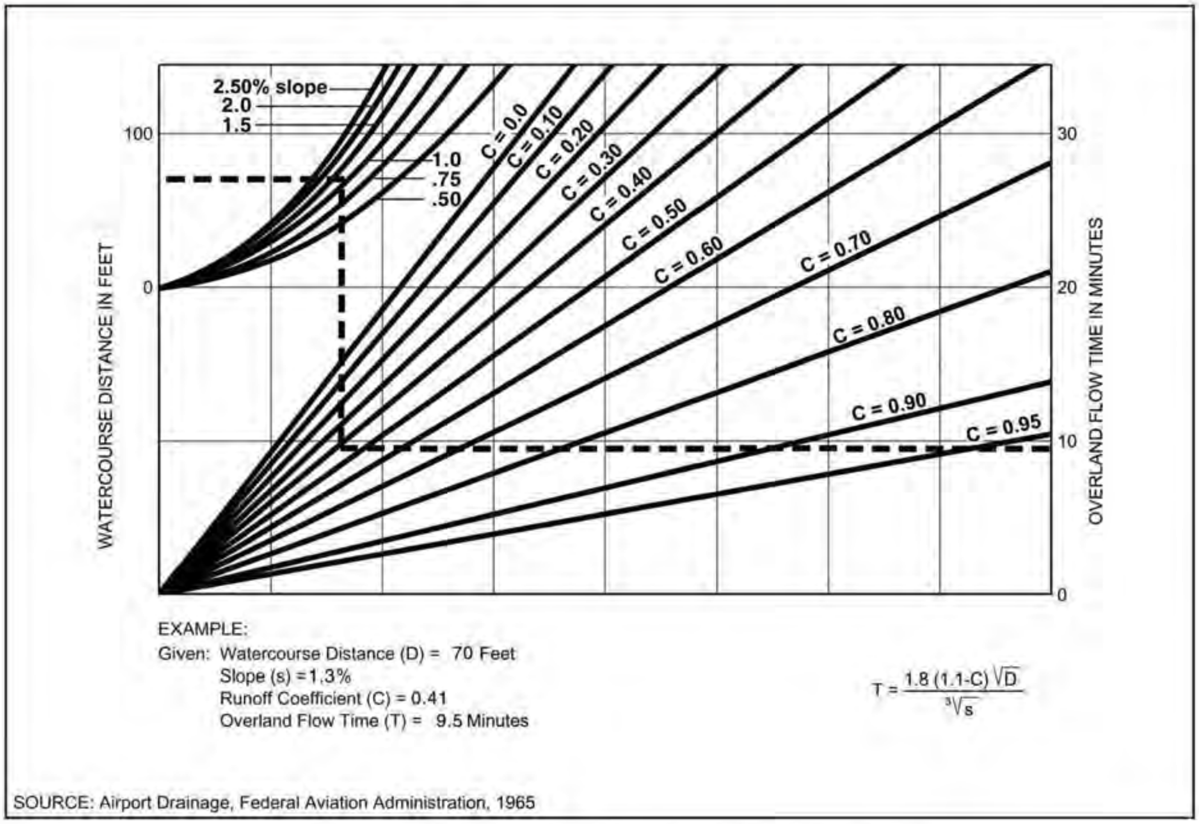


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

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

Ernest F. Brater and Horace Williams King

HANDBOOK OF HYDRAULICS

For the Solution of Hydraulic Engineering Problems

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

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

D = depth of water d = diameter of channel

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

Table A-1. Runoff Coefficients for Rational Method

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

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

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

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

A.1.3. Rainfall Intensity

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

Appendix C

Manning Roughness Coefficients

The Manning roughness coefficient (n) is used to represent flow resistance in open-channel hydraulic computations. This Appendix offers a compilation of Manning roughness coefficients that may be used in the hydraulic design and evaluation of drainage facilities.

These values serve only as a basic guide. The procedure for selecting appropriate values for Manning roughness coefficient, especially in natural channel systems, is subjective and requires judgment and skill that is primarily developed through experience. For work where very accurate determination of water surface profile is necessary, the design engineer should consult the governing Agency to obtain data regarding roughness coefficient values applicable to specific streams. The design engineer may also examine Flood Insurance Study data, or one of several references for more specific information on determining roughness coefficient.

Table C-1. Average Manning Roughness Coefficients for Pavement and Gutters [1]

Material	Manning Roughness Coefficient (n)
Concrete Gutter [2]	0.015
Concrete Pavement Float Finish Broom Finish	 0.014 0.016
Concrete Gutter with Asphalt Pavement Smooth Finish Rough Texture	 0.013 0.015
Asphalt Pavement Smooth Finish Rough Texture	 0.013 0.016

Based on FHWA HEC-22.

[1] Based on materials and workmanship required by standard specifications.

[2] Increase roughness coefficient in gutters with mild slopes where sediment might accumulate by 0.020.

Table C-2. Average Manning Roughness Coefficients for Closed Conduits [1]

Conduit	Manning Roughness Coefficient (n)
Reinforced Concrete Pipe (RCP)	0.013
Corrugated Metal Pipe and Pipe Arch	
2-3/8 x ½ inch Corrugations	
Unlined	0.024
Half Lined	
Full Flow	0.018
d/D>=0.60	0.016
d/D<0.60	0.013
Fully Lined	0.013
3x1 inch Corrugations	0.027
6x2 inch Corrugations	0.032
Spiral Rib Pipe	0.013
Helically Wound Pipe	
18-inch	0.015
24-inch	0.017
30-inch	0.019
36-inch	0.021
42-inch	0.022
48-inch	0.023
Plastic Pipe (HPDE and PVC)	
Smooth	0.013
Corrugated	0.024
Vitrified Clay Pipe	0.014
Cast-Iron Pipe (Uncoated)	0.013
Steel Pipe	0.011
Brick	0.017
Cast-In-Place Concrete Pipe	
Rough Wood Forms	0.017
Smooth Wood or Steel Forms	0.014

[1] Based on materials and workmanship required by standard specifications.

Table C-3. Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[1]

Lining Type	Design Flow Depth		
	0 – 0.5 ft	0.5 – 2.0 ft	> 2.0 ft
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Chapter 7, Section 7.6.17)		

(1) Based on materials and workmanship required by standard specifications.

Table C-4. Average Manning Roughness Coefficients for Larger Open Channels

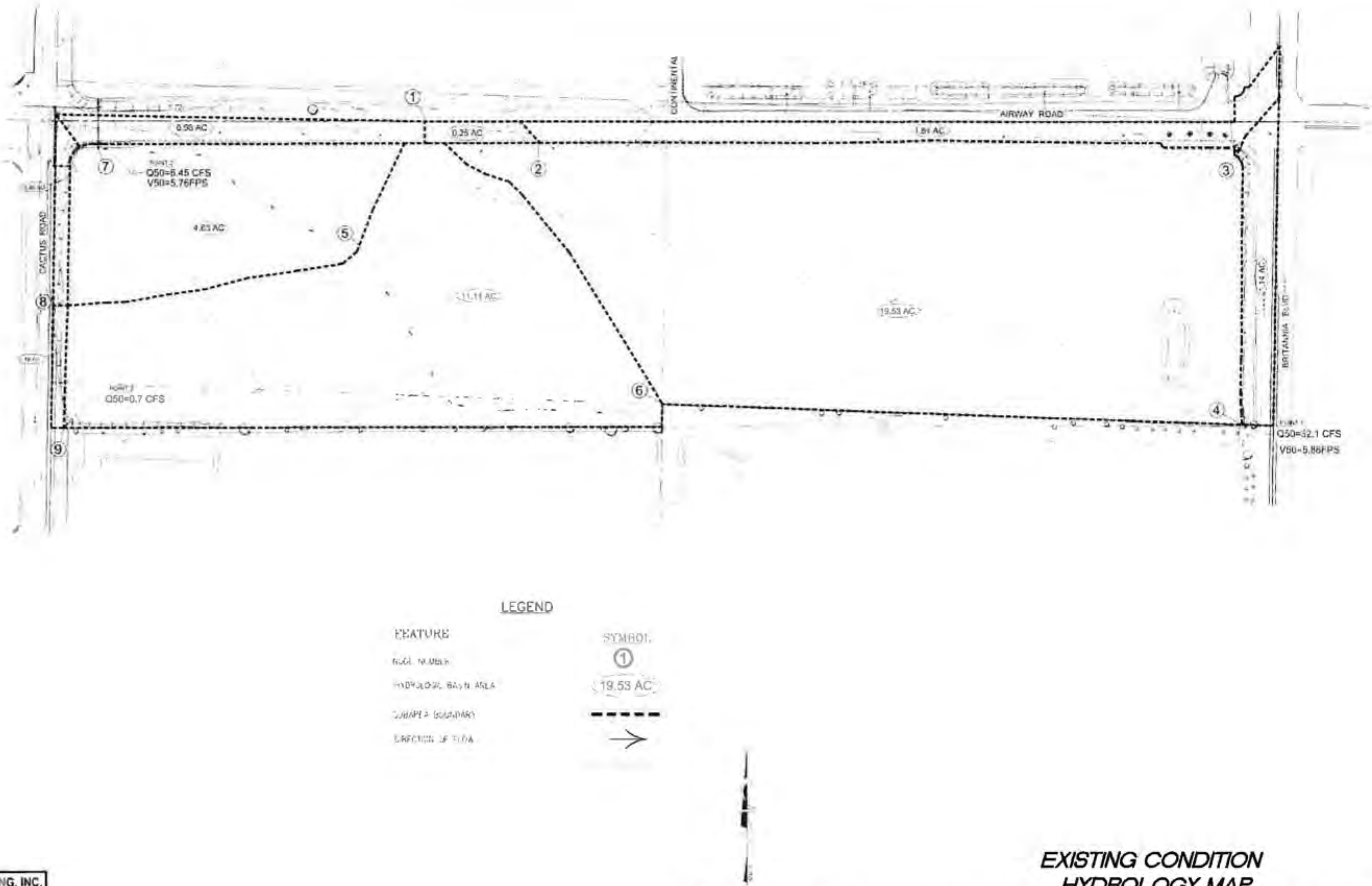
Channel	Manning Roughness Coefficient(n)
Unlined Channels Clay Loam Sand	 0.023 0.020
Lined Channels Grass Lined (well maintained) Grass Lined (not maintained)	 0.035 0.045
Wetland-Bottom Channels (New Channel)	0.023
Wetland-Bottom Channels (Mature Channel)	See Table A-5
Riprap-Lined Channels	See Chapter 7, Section 7.6.17
Concrete (Poured)	0.014
Air Blown Mortar (Gunite or Shotcrete)[1]	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018

(1) For air blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.
Note: For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

Table C-5. Average Manning Roughness Coefficients for Natural Channels

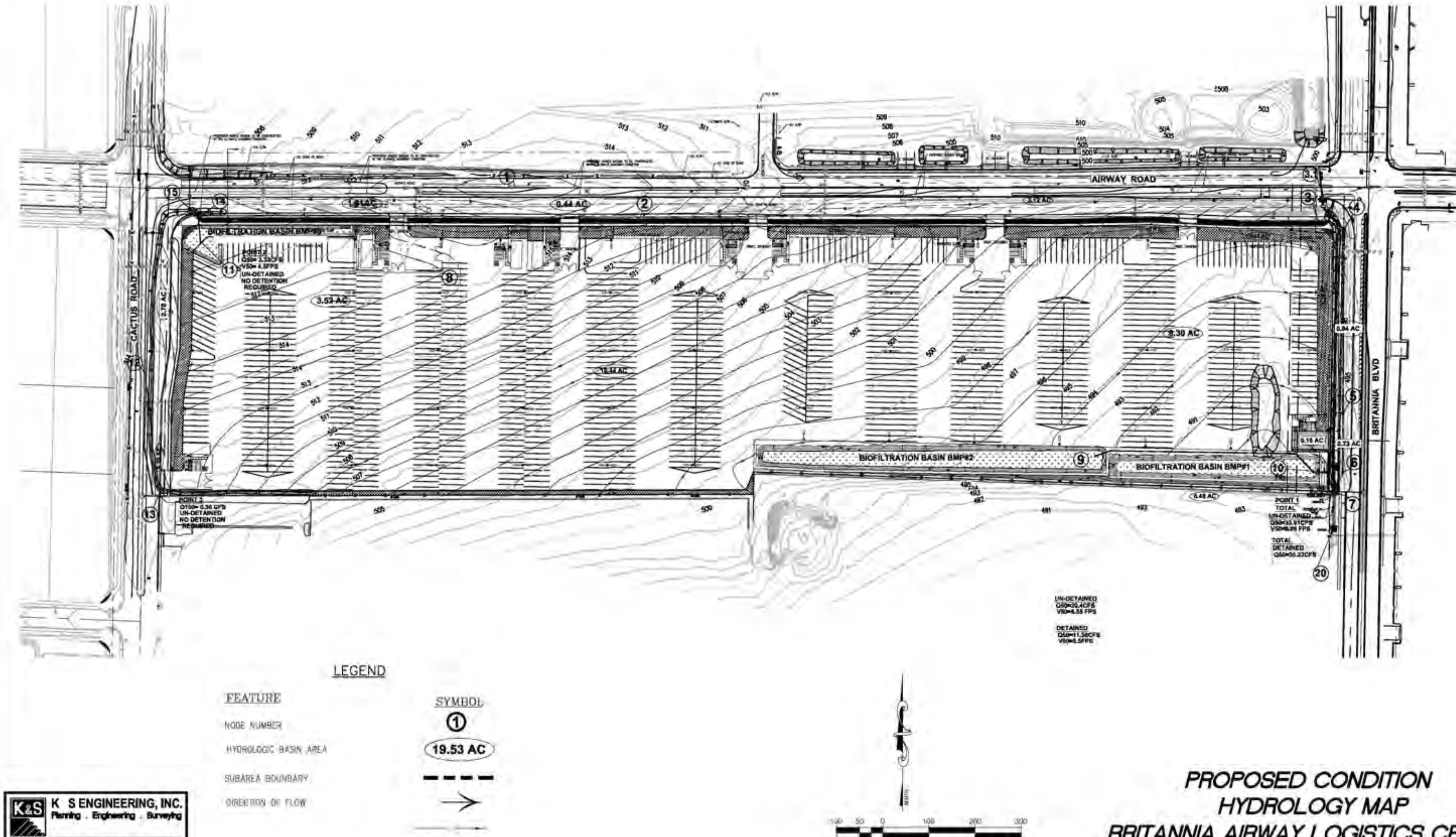
Channel	Manning Roughness Coefficient (n)
Minor Streams (Surface Width at Flood Stage < 100 ft)	
Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase all above values by:	0.015
Irregular Section, with Pools, Slight Channel Meander	
Channels (A) through (E) above, Increase all Values by:	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060
Flood Plains (Adjacent to Natural Streams)	
Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium-to-Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

APPENDIX B – DRAINAGE EXHIBIT



EXISTING CONDITION
HYDROLOGY MAP
BRITANNIA AIRWAY LOGISTICS CENTER

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
(619) 296-5565 Fax: (619) 296-5564



K&S K S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

PROPOSED CONDITION HYDROLOGY MAP
BRITANNIA AIRWAY LOGISTICS CENTER

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GEOTECHNICAL INVESTIGATION

AIRWAY ROAD
AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

BADIEE DEVELOPMENT
LA JOLLA, CALIFORNIA

APRIL 16, 2021
PROJECT NO. G2694-42-01

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G2694-42-01
April 16, 2021

Badiee Development
1261 Prospect Street, Suite 9
La Jolla, California 92037

Attention: Mr. Scott Merry

Subject: GEOTECHNICAL INVESTIGATION
AIRWAY ROAD AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA

Dear Mr. Merry:

In accordance with your request, we have prepared this geotechnical investigation report for the proposed industrial building at the subject site. The site is underlain by Pleistocene Terrace Deposits, topsoil, and minor undocumented fill.

This report is based on our observations made during our field investigation, performed on March 17, 2021, and laboratory testing. The accompanying report presents the results of our study and conclusions and recommendations regarding geotechnical aspects of site development. The subject site is suitable for construction of the proposed industrial building provided the recommendations presented herein are incorporated into the design and construction of the project.

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

Very truly yours,

GEOCON INCORPORATED

Bradley R. Kuna RCE 89846	Rodney C. Mikesell GE 2533	Garry W. Cannon CEG 2201 RCE 56468

BRK:RCM:GWC:arm

(e-mail) Addressee

6960 Flanders Drive ■ San Diego, California 92121-2974 ■ Telephone 858.558.6900 ■ Fax 858.558.6159

TABLE OF CONTENTS

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for a proposed industrial building located south of Airway Road between Britannia Boulevard and Cactus Road in the Otay Mesa area of San Diego, California (see Vicinity Map, Figure 1). The purpose of our investigation was to evaluate subsurface soil and geologic conditions at the site and provide conclusions and recommendations pertaining to the geotechnical aspects of developing the property as proposed.

The scope of our investigation included a site reconnaissance, excavation and logging of 15 exploratory test pits, performing 5 infiltration tests in areas of proposed storm water basins or other storm water management devices, and reviewing published and unpublished geologic literature and reports (see List of References). Appendix A presents a discussion of our field investigation. We performed laboratory tests on soil samples obtained from the exploratory test pits to evaluate pertinent physical properties for engineering analyses. The results of laboratory testing are presented in Appendix B.

Site geologic conditions are depicted on Figure 2 (Geologic Map). A CAD file of the preliminary grading plan prepared by K&S Engineering was utilized as a base map to plot geologic contacts and trench locations.

The conclusions and recommendations presented herein are based on our analysis of the data obtained during the investigation, and our experience with similar soil and geologic conditions on this and adjacent properties.

2. SITE AND PROJECT DESCRIPTION

The property consists of an approximately 36 acre undeveloped rectangular parcel located southwest of the intersection of Airway Road and Britannia Boulevard, in the Otay Mesa district of San Diego, California. Site topography is relatively flat with elevations ranging from approximately 495 feet to 515 feet above mean sea level (MSL).

The proposed improvements consist of a single-story approximately 322,000 square-foot industrial warehouse building located on the eastern half of the property with associated improvements such as utilities, parking areas and driveways, loading docks, and storm water management devices. Proposed cuts and fills are estimated to be up to 5 feet (cut) and 16 feet (fill) across the proposed building pad. The deepest fill will be required in a detention basin located at the southeast building corner.

We understand a parking lot will be constructed on the western half of the property. A building may be constructed on this portion of the property in the future. Current plans show cuts and fills of approximately 5 feet and less are planned across the western proposed parking lot.

We understand that Airway Road, Britannia Boulevard, and Cactus Road will be widened along the perimeter of the property.

The locations and descriptions of the site and proposed development are based on our site reconnaissance and recent field investigations, and our understanding of site development as shown on the preliminary grading plan by K&S Engineering. If project details vary significantly from those described, Geocon Incorporated should be contacted to review the changes and provide additional analyses and/or revisions to this report, if warranted.

3. SOIL AND GEOLOGIC CONDITIONS

The site is underlain by Pleistocene Terrace Deposits mantled by topsoil. Undocumented fill was encountered in the western portion of the site. The geologic units encountered in the trenches are described below. Geologic conditions are depicted on the *Geologic Map* (Figure 2) and on the *Geologic Cross Sections* (Figure 3). Exploratory test pit logs are presented in Appendix A, Figures A-1 through A-15.

3.1 Undocumented Fill (Unmapped)

Up to 5 feet of undocumented fill was encountered in the western portion of the site. The undocumented fill consisted of soft, dark brown to dark grayish brown, sandy clay and loose, silty sand with gravel and some plastic and glass debris. The undocumented fill is unsuitable for support of structural fill or other improvements and will require removal and recompaction during grading. Debris present in the undocumented fill will require removal and exporting.

3.2 Topsoil (Unmapped)

Topsoil mantles the site and typically consists of moist to wet, soft to firm, dark brown to dark grayish brown, sandy clay with trace gravel. Topsoil ranges from one to two feet thick across the site. Remedial grading in the form of removal and recompaction will be required in areas receiving improvements. In addition, topsoil exhibits expansion characteristics and should be placed at depths of 5 feet below finish grade surface.

3.3 Terrace Deposits (Qtc and Qtg)

Pleistocene-age Terrace Deposits (mapped as Pleistocene alluvium, Qvoa, by Tan & Kennedy (2002)were encountered across the site. This unit typically consists of two relatively distinct layers.

An upper clay layer (Qtc) overlying a coarse-grained, granular layer (Qtg). The upper layer consists of stiff, damp to moist, brown, olive-brown to reddish-brown clay with varying amounts of sand. The clay layer extends to depths of 1 to 8 feet below existing grades in the areas explored.

The lower granular layer (Qtg) consists of medium dense to dense, damp to moist, silty and clayey sand with gravel and cobbles. Cobbles up to 12-inches in maximum dimension were observed. Thin, concretionary lenses can be encountered in this unit.

The Terrace Deposits possess adequate strength characteristics for support of structures and/or structural fills. However, the clay layer possesses a "medium to very high" expansion potential (EI greater than 51), and generally poor pavement support characteristics. Expansion indexes of over 200 have been recorded in the clay layer on some nearby projects. Undercutting of the clay layer to a depth of at least 5 feet below finish grade and placing a 5-foot-thick cap of low to medium expansive soils across the site to support planned improvements will be required. Mining of the underlying granular layer and may be required to generate sufficient capping soil and room for clay burial.

4. GROUNDWATER

We did not encounter groundwater or seepage during our site investigation. However, it is not uncommon for shallow seepage conditions to develop where none previously existed when sites are irrigated or infiltration is implemented. Seepage is dependent on seasonal precipitation, irrigation, land use, among other factors, and varies as a result. Proper surface drainage will be important to future performance of the project.

5. GEOLOGIC HAZARDS

5.1 Geologic Hazard Category

City of San Diego (2008) maps the site as Geologic Hazard Category 53: *Level or sloping terrain, unfavorable geologic structure, low to moderate risk.*

5.2 Ground Rupture

No evidence of faulting was observed during our investigation. The USGS (2016), City of San Diego (2008), and Tan & Kennedy (2002) show that there are no mapped Quaternary faults crossing or trending toward the property. The site is not located within a currently established Alquist-Priolo Earthquake Fault Zone. No active faults are known to exist at the site. The risk associated with ground rupture hazard is low.

5.3 Seismicity

Considerations important in seismic design include the frequency and duration of motion and the soil conditions underlying the site. Seismic design of structures should be evaluated in accordance with the California Building Code (CBC) guidelines currently adopted by the local agency. The risk associated with strong seismic ground motion hazard is high; however, the risk is no greater than that for the region.

5.4 Liquefaction and Seismically Induced Settlement

The site is relatively flat and lacks sloped topography necessary for landslides to form. Additionally, City of San Diego (2008) and Tan & Kennedy (2002) do not show landslides on or adjacent to the site. The risk associated with landslide hazard is low.

5.5 Landslides

The site is relatively flat and lacks sloped topography necessary for landslides to form. Additionally, the published geologic maps do not show landslides on or adjacent to the site. Therefore, we consider the rick for landsliding on or adjacent to the site is very low.

5.6 Tsunamis and Seiches

The site is not located within a tsunami inundation zone as defined by California Geological Survey (2009). Elevation at the site is greater than 475 feet MSL. There are no lakes or reservoirs located near the site. The risk associated with inundation hazard due to tsunami or seiche is low.

5.7 Flooding

FEMA (2012) maps the site as *Area of Minimal Flood Hazard (Zone X)*. The risk associated with flooding is low.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were observed that would preclude the development of the property as presently proposed provided that the recommendations of this report are followed.

6.1.2 The site is underlain by undocumented fill and topsoil overlying Pleistocene-age Terrace Deposits. Topsoil ranges from one to two feet thick but may be thicker in unexplored areas of the site. As much as 5 feet of undocumented fill was observed on the site.

6.1.3 Undocumented fill and topsoil are unsuitable in their present condition to receive additional fill soil or settlement-sensitive structures and will require removal and replacement with properly compacted fill. The underlying terrace deposits are suitable for support of structural improvements, however, the upper clay portion of the terrace deposits (as well as the topsoil) is highly expansive. To reduce the potential for soil heave impacting foundations and site improvements, we recommend the terrace deposit clay be undercut to a depth of 5 feet below finish pad grade or 3 feet below footings (whichever results in a deeper excavation). The site should then be capped with at least 5 feet of low to medium expansive soil. This will likely require mining the granular layer of the terrace deposits for use as a pad capping material and to provide an area for burial of expansive clays.

6.1.4 We did not encounter groundwater during our subsurface exploration and groundwater should not be a constraint to project development. However, seepage could be encountered during the grading operations, especially during the rainy seasons.

6.1.5 Except for possible strong seismic shaking, no significant geologic hazards were observed or are known to exist on the site that would adversely affect the site. No special seismic design considerations, other than those recommended herein, are required.

6.1.6 Proper drainage should be maintained in order to preserve the engineering properties of the fill in both the building pads and slope areas. Recommendations for site drainage are provided herein.

6.1.7 Based on the results of our field infiltration testing and laboratory testing, full or partial infiltration on the property is infeasible. A discussion of the infiltration testing and storm water management recommendations is provided in Appendix C.

6.1.8 Provided the recommendations of this report are followed, it is our opinion that the proposed development will not destabilize or result in settlement of adjacent properties and City right-of-way.

6.1.9 Subsurface conditions observed may be extrapolated to reflect general soil/geologic conditions; however, some variations in subsurface conditions between trench locations should be anticipated.

6.2 Soil and Excavation Characteristics

6.2.1 It is the responsibility of the contractor and their competent person to ensure all excavations, temporary slopes and trenches are properly constructed and maintained in accordance with applicable OSHA guidelines, in order to maintain safety and the stability of the excavations and adjacent improvements. These excavations should not be allowed to become saturated or to dry out. Surcharge loads should not be permitted to a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 15 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 15 feet from an existing surface improvement should be shored in accordance with applicable OSHA codes and regulations.

6.2.2 Excavation of the on-site soils should be possible with moderate to heavy effort using conventional heavy-duty equipment. Gravel, cobble, and cemented zones in the terrace deposits may require a very heavy effort to excavate.

6.2.3 The soil encountered in the field investigation is considered to be "expansive" (expansion index [EI] of 20 or greater) as defined by 2019 California Building Code (CBC) Section 1803.5.3. Table 6.2 presents soil classifications based on the expansion index. We expect a majority of the soil encountered in the upper six to ten feet below existing site grades to possess a "medium" to "very high" expansion potential (EI of 51 or greater).

TABLE 6.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

<table>
<tr><th>Expansion Index (EI)</th><th>ASTM D 4829 Expansion Classification</th><th>2019 CBC Expansion Classification</th></tr>
<tr><td>0 – 20</td><td>Very Low</td><td>Non-Expansive</td></tr>
<tr><td>21 – 50</td><td>Low</td><td rowspan="4">Expansive</td></tr>
<tr><td>51 – 90</td><td>Medium</td></tr>
<tr><td>91 – 130</td><td>High</td></tr>
<tr><td>Greater Than 130</td><td>Very High</td></tr>
</table>

6.2.4 We performed laboratory tests on samples of the site materials to evaluate the percentage of water-soluble sulfate content. Appendix B presents results of the laboratory water-soluble sulfate content tests. The test results indicate the on-site materials at the locations tested possess “S0” sulfate exposure to concrete structures as defined by 2019 CBC Section 1904 and ACI 318-14 Chapter 19. 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.

6.2.5 We tested samples for potential of hydrogen (pH) and resistivity and chloride to aid in evaluating the corrosion potential. Appendix B presents the laboratory test results. Based on the test results the soils appear to be corrosive.

6.2.6 Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements susceptible to corrosion are planned.

6.3 Grading Recommendations

6.3.1 Grading should be performed in accordance with the recommendations provided in this report, the Recommended Grading Specifications contained in Appendix D and the City of San Diego’s Grading Ordinance. Geocon Incorporated should observe the grading operations on a full-time basis and provide testing during the fill placement.

6.3.2 Prior to commencing grading, a preconstruction conference should be held at the site with the county inspector, developer, grading and underground contractors, civil engineer, and geotechnical engineer in attendance. Special soil handling and/or the grading plans can be discussed at that time.

6.3.3 Site preparation should begin with the removal of deleterious material, construction debris, and vegetation. The depth of vegetation removal should be such that material exposed in cut areas or soil to be used as fill is relatively free of organic matter. Material generated during stripping and/or site demolition should be exported from the site. Asphalt and concrete should not be mixed with the fill soil unless approved by the Geotechnical Engineer.

6.3.4 Abandoned foundations and buried utilities (if encountered) should be removed and the resultant depressions and/or trenches should be backfilled with properly compacted material as part of the remedial grading.

6.3.5 We recommend undocumented fill and topsoil be removed and replaced as compacted fill throughout the site. Trash and debris may be encountered in the undocumented fill. Trash and debris, if encountered, should be removed from the fill and exported.

6.3.6 We recommend undocumented fill and topsoil be completely removed and replaced as compacted fill. Expansive fill and topsoil should be placed at least 5 feet below finish grade.

6.3.7 We recommend select grading occur to provide a 5-foot-thick cap of *low*- to *medium*-expansive soil. To obtain select capping material, we recommend mining the underlying *low*- to *medium*-expansive, granular layer of the Terrance Deposit (Qtg), which is suitable for site capping, in combination with burial of the expansive clay layer in mined areas, as described below.

6.3.8 Due to the expansive condition of the upper clay layer of the terrace deposits, we recommend the clay layer be undercut to a depth of at least 5 feet below finish pad grade throughout the site (building pads, pavement areas, and roadway widening). Within building pads, the undercut should also extend to a depth of at least 3 feet below the bottom of footings. We expect deeper excavations will be required in the area of the loading docks to reach the required undercut depth. A representative of Geocon should be on-site during removals to evaluate the limits of the remedial grading.

6.3.9 Within structural improvement areas (building pads, pavement areas, etc.) we recommend grading to provide a select pad cap that extends at least 5-feet below finish grade and to a minimum of at least 3-feet below bottom of footing elevation, whichever is deeper. Pad-cap elevation should be adjusted for loading dock ramps and wall footings, which are typically lower than the building pad grade. Based on our experience with nearby sites, the sand-gravel can be mined to depths up to 30-feet below existing site grades. The approximate depth to the sand-gravel terrace deposits soil is shown on Figure 2 next to each trench location.

6.3.10 Mined areas should be selected so as not to create a fill differential greater than 15 feet within building pads, if possible.

6.3.11 Within building pads, the remedial excavation should extend to a horizontal distance of 5 feet beyond the building pad or to a distance equal to the depth of the excavation, whichever is greater. Excavations outside of the building pads should extend to at least 5 feet beyond the structural improvement limits, where possible.

6.3.12 Prior to fill being placed, the existing ground surface should be scarified, moisture conditioned as necessary, and compacted to a depth of at least 12 inches. The site should then be brought to final subgrade elevations with fill compacted in layers. In general, soil native to the site is suitable for use from a geotechnical engineering standpoint as fill if relatively free from vegetation, debris and other deleterious material. Layers of fill should be no thicker than will allow for adequate bonding and compaction. Fill, including backfill and scarified ground surfaces, should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content in accordance with ASTM Test Procedure D 1557. Fill materials placed below optimum moisture content may require additional moisture conditioning prior to placing additional fill.

6.3.13 Imported fill (if necessary) should consist of the characteristics presented in Table 6.3. Geocon Incorporated should be notified of the import soil source and should perform laboratory testing of import soil prior to its arrival at the site to determine its suitability as fill material.

TABLE 6.3
SUMMARY OF IMPORT FILL RECOMMENDATIONS

Soil Characteristic	Values
Expansion Potential	"Very Low" to "Low" (Expansion Index of 50 or less)
Particle Size	Maximum Dimension Less Than 3 Inches
	Generally Free of Debris

6.4 Seismic Design Criteria

6.4.1 Table 6.4.1 summarizes site-specific design criteria obtained from the 2019 California Building Code (CBC; Based on the 2018 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. We used the computer program *U.S. Seismic Design Maps*, provided by the Structural Engineers Association of California (SEAOC) to calculate the seismic design parameters. The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2019 CBC and Table 20.3-1 of ASCE 7-16. The values presented herein are for the risk-targeted maximum considered earthquake (MCE_R). Sites designated as Site Class D, E and F may require additional analyses if requested by the project structural engineer and client.

TABLE 6.4.1
2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	C	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	0.744g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.274g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.202	Table 1613.2.3(1)
Site Coefficient, F_V	1.5	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	0.894g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.411g	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.596g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.274g	Section 1613.2.4 (Eqn 16-39)

6.4.2 Table 6.4.2 presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

TABLE 6.4.2
ASCE 7-16 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.324g	Figure 22-7
Site Coefficient, F_{PGA}	1.2	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.388g	Section 11.8.3 (Eqn 11.8-1)

6.4.3 Conformance to the criteria in Tables 6.4.1 and 6.4.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

6.4.4 The project structural engineer and architect should evaluate the appropriate Risk Category and Seismic Design Category for the planned structures. The values presented herein assume a Risk Category of II and resulting in a Seismic Design Category D. Table 6.4.3 presents a summary of the risk categories.

TABLE 6.4.3
ASCE 7-16 RISK CATEGORIES

Risk Category	Building Use	Examples
I	Low risk to Human Life at Failure	Barn, Storage Shelter
II	Nominal Risk to Human Life at Failure (Buildings Not Designated as I, III or IV)	Residential, Commercial and Industrial Buildings
III	Substantial Risk to Human Life at Failure	Theaters, Lecture Halls, Dining Halls, Schools, Prisons, Small Healthcare Facilities, Infrastructure Plants, Storage for Explosives/Toxins
IV	Essential Facilities	Hazardous Material Facilities, Hospitals, Fire and Rescue, Emergency Shelters, Police Stations, Power Stations, Aviation Control Facilities, National Defense, Water Storage

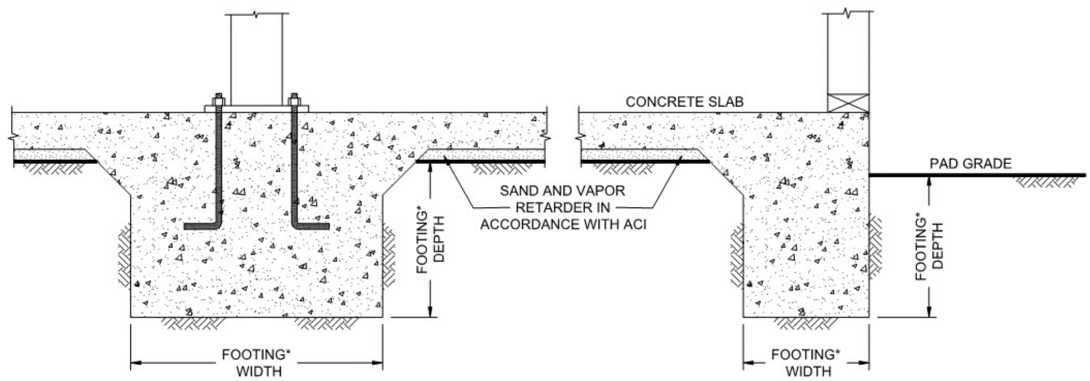
6.5 Shallow Foundations

6.5.1 The proposed structure can be supported on a shallow foundation system founded in compacted fill provided the grading recommendations in this report are followed. Foundations for the structure should consist of continuous strip footings and/or isolated spread footings. Table 6.5 provides a summary of the foundation design recommendations.

TABLE 6.5
SUMMARY OF FOUNDATION RECOMMENDATIONS

Parameter	Value
Minimum Continuous Foundation Width	12 inches
Minimum Isolated Foundation Width	24 inches
Minimum Foundation Depth	24 Inches Below Lowest Adjacent Grade
Minimum Steel Reinforcement	4 No. 5 Bars, 2 at the Top and 2 at the Bottom
Allowable Bearing Capacity	2,000 psf
Bearing Capacity Increase	500 psf per Foot of Depth
	300 psf per Foot of Width
Maximum Allowable Bearing Capacity	3,500 psf
Estimated Total Settlement	1 Inch
Estimated Differential Settlement	½ Inch in 40 Feet
Footing Size Used for Settlement	9-Foot Square
Design Expansion Index	90 or less

6.5.2 The foundations should be embedded in accordance with the recommendations herein and the Wall/Column Footing Dimension Detail. The embedment depths should be measured from the lowest adjacent pad grade for both interior and exterior footings. Footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.



Wall/Column Footing Dimension Detail

6.5.3 The bearing capacity values presented herein are for dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces.

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

- For fill slopes less than 20 feet high, building footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.
- When located next to a descending 3:1 (horizontal:vertical) fill slope or steeper, the foundations should be extended to a depth where the minimum horizontal distance is equal to H/3 (where H equals the vertical distance from the top of the fill slope to the base of the fill soil) with a minimum of 7 feet but need not exceed 40 feet. The horizontal distance is measured from the outer, deepest edge of the footing to the face of the slope. An acceptable alternative to deepening the footings would be the use of a post-tensioned slab and foundation system or increased footing and slab reinforcement. Specific design parameters or recommendations for either of these alternatives can be provided once the building location and fill slope geometry have been determined.
- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures that would permit some lateral soil movement without causing extensive distress. Geocon Incorporated should be consulted for specific recommendations.

6.5.5 We should observe the foundation excavations prior to the placement of reinforcing steel and concrete to check that the exposed soil conditions are similar to those expected and that they have been extended to the appropriate bearing strata. Foundation modifications may be required if unexpected soil conditions are encountered.

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

6.6 Concrete Slabs-on-Grade

6.6.1 Interior concrete slabs-on-grade for the structure should be at least 7 inches thick. As a minimum, reinforcement for slabs-on-grade should consist of No. 3 steel, bars placed at 16 inches on center in both horizontal directions mid-point in the slab.

6.6.2 A vapor retarder should underlie slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials. 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 a manner that prevents puncture in accordance with manufacturer's recommendations and ASTM requirements. The project architect or developer should specify the type of vapor retarder used based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

6.6.3 The project foundation engineer, architect, and/or developer should determine the thickness of bedding sand below the slab. In general, 3 to 4 inches of sand bedding is typically used. Geocon should be contacted to provide recommendations if the bedding sand is thicker than 6 inches.

6.6.4 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 plan. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plan.

6.6.5 To control the location and spread of concrete shrinkage cracks, crack control joints should be provided. The crack control joints should be created while the concrete is still fresh using a grooving tool, or shortly thereafter using saw cuts. The structural engineer should take into consideration criteria of the American Concrete Institute when establishing crack control spacing patterns.

6.6.6 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 equipment and storage loads.

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

6.7 Conventional Retaining Wall Recommendations

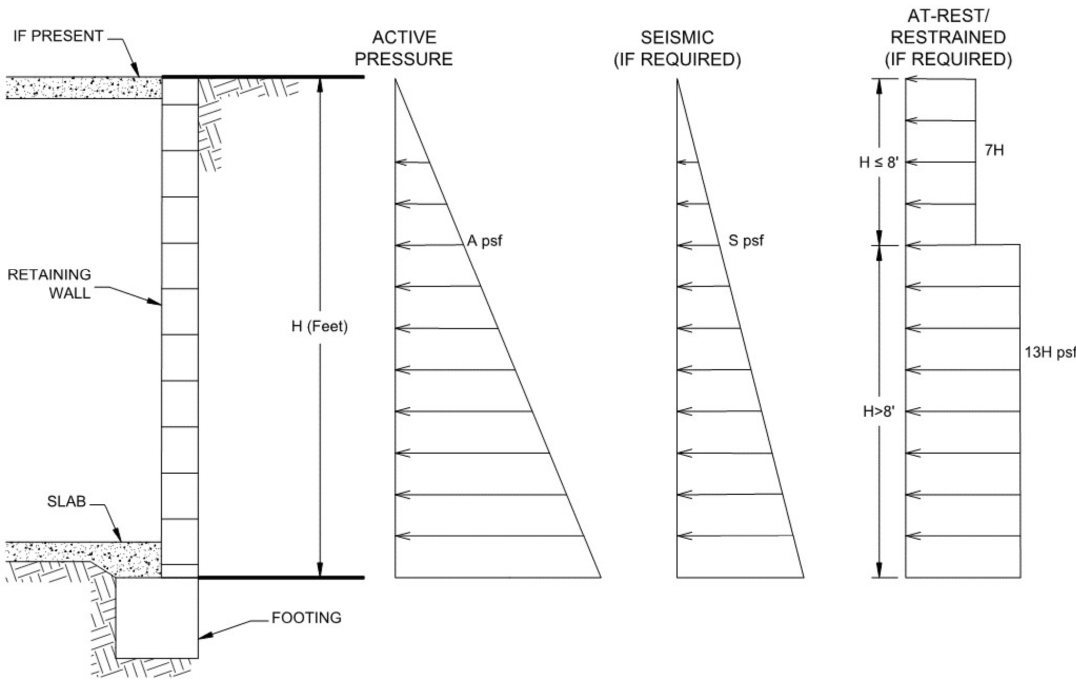
6.7.1 Walls that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall) at the top of the wall should be designed using the values presented in Table 6.7.1. Soil with an expansion index (EI) of greater than 50 should not be used as backfill material behind retaining walls.

TABLE 6.7.1
RETAINING WALL DESIGN RECOMMENDATIONS

Parameter	Value	
	EI≤50	EI≤90
Active Soil Pressure, A (Fluid Density, Level Backfill)	35 pcf	45 pcf
Active Soil Pressure, A (Fluid Density, 2:1 Sloping Backfill)	50 psf	60 pcf
Seismic Pressure, S	15H psf	
At-Rest/Restrained Walls Additional Uniform Pressure (0 to 8 Feet High)	7H psf	
At-Rest/Restrained Walls Additional Uniform Pressure (8+ Feet High)	13H psf	
Expected Expansion Index for the Subject Property	EI≤50	

H equals the height of the retaining portion of the wall

6.7.2 The project retaining walls should be designed as shown in the Retaining Wall Loading Diagram.



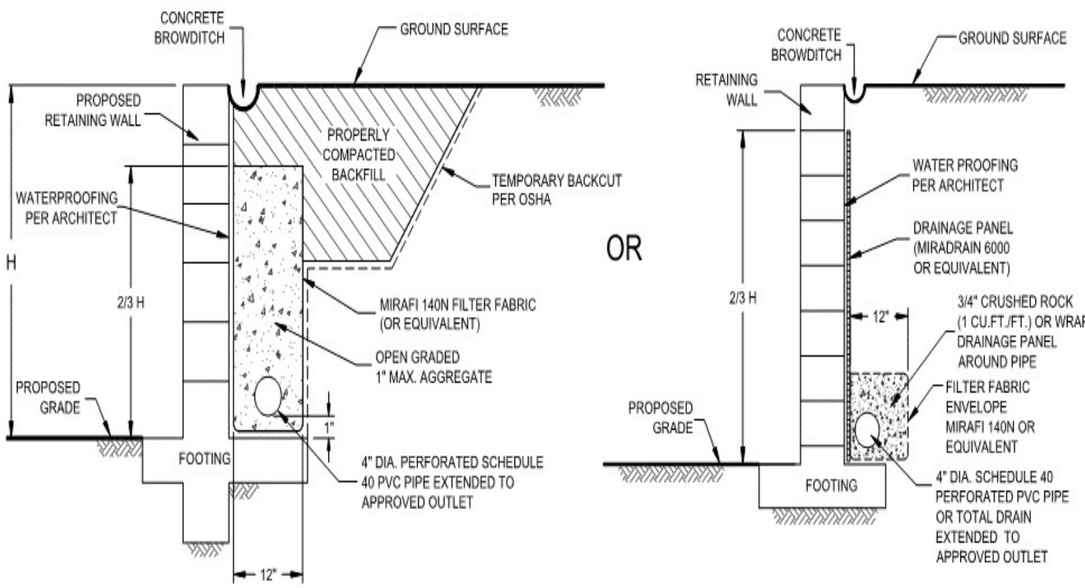
Retaining Wall Loading Diagram

6.7.3 Where walls are restrained from movement at the top (at-rest condition), an additional uniform pressure of 7H psf should be added to the active soil pressure for walls 8 feet or less. For walls greater than 8 feet tall, an additional uniform pressure of 13H psf should be applied to the wall starting at 8 feet from the top of the wall to the base of the wall. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to 2 feet of fill soil should be added.

6.7.4 The structural engineer should determine the Seismic Design Category for the project in accordance with Section 1613.2.5 of the 2019 CBC or Section 11.6 of ASCE 7-16. For structures assigned to Seismic Design Category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 1803.5.12 of the 2019 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 15H psf should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.388g calculated from ASCE 7-16 Section 11.8.3 and applied a pseudo-static coefficient of 0.3.

6.7.5 Retaining walls should be designed to ensure stability against overturning sliding, and excessive foundation pressure. Where a keyway is extended below the wall base with the intent to engage passive pressure and enhance sliding stability, it is not necessary to consider active pressure on the keyway.

6.7.6 Drainage openings through the base of the wall (weep holes) should not be used where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted granular (EI of 50 or less) free-draining backfill material with no hydrostatic forces or imposed surcharge load. The retaining wall should be properly drained as shown in the Typical Retaining Wall Drainage Detail. If conditions different than those described are expected, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.



Typical Retaining Wall Drainage Detail

6.7.7 The retaining walls may be designed using either the active and restrained (at-rest) loading condition or the active and seismic loading condition as suggested by the structural engineer. Typically, it appears the design of the restrained condition for retaining wall loading may be adequate for the seismic design of the retaining walls. However, the active earth pressure combined with the seismic design load should be reviewed and also considered in the design of the retaining walls.

6.7.8 In general, wall foundations having should be designed in accordance with Table 6.7.2. The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore, retaining wall foundations should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.

TABLE 6.7.2
SUMMARY OF RETAINING WALL FOUNDATION RECOMMENDATIONS

Parameter	Value
Minimum Retaining Wall Foundation Width	12 inches
Minimum Retaining Wall Foundation Depth	12 Inches
Minimum Steel Reinforcement	Per Structural Engineer
Bearing Capacity	2,000 psf
Bearing Capacity Increase	500 psf per additional foot of footing depth
	300 psf per additional foot of footing width
Maximum Bearing Capacity	3,500 psf
Estimated Total Settlement	1 Inch
Estimated Differential Settlement	½ Inch in 40 Feet

6.7.9 The recommendations presented herein are generally applicable to the design of rigid concrete or masonry retaining walls. In the event that other types of walls (such as mechanically stabilized earth [MSE] walls) are planned, Geocon Incorporated should be consulted for additional recommendations.

6.7.10 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 retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

6.7.11 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.

6.8 Lateral Loading

6.8.1 Table 6.8 should be used to help design the proposed structures and improvements to resist lateral loads for the design of footings or shear keys. The allowable passive pressure assumes a horizontal surface extending at least 5 feet, or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance. Where walls are planned adjacent to and/or on descending slopes, a passive pressure of 150 pcf should be used in design.

TABLE 6.8
SUMMARY OF LATERAL LOAD DESIGN RECOMMENDATIONS

Parameter	Value
Passive Pressure Fluid Density	350 pcf
Passive Pressure Fluid Density Adjacent to and/or on Descending Slopes	150 pcf
Coefficient of Friction (Concrete and Soil)	0.35
Coefficient of Friction (Along Vapor Barrier)	0.2 to 0.25*

*Per manufacturer's recommendations.

6.8.2 The passive and frictional resistant loads can be combined for design purposes. The lateral passive pressures may be increased by one-third when considering transient loads due to wind or seismic forces.

6.9 Preliminary Pavement Recommendations

6.9.1 Preliminary pavement recommendations for the streets and parking areas are provided below. The final pavement sections should be based on the R-Value of the subgrade soil encountered at final subgrade elevation. For pavement design we used an R-Value of 5 based on laboratory testing of samples of soil taken during our field investigation. Preliminary flexible pavement sections for varying traffic indices are presented in Table 6.9.1. The project civil engineer or traffic engineer should determine the appropriate Traffic Index (TI) or traffic loading expected on the project for the various pavement areas that will be constructed.

TABLE 6.9.1
PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS
(ON-SITE PRIVATE PAVEMENT AREAS)

Traffic Index	Asphalt Concrete (inches)	Class 2 Base (inches)
4.5	3	6
5	3	8
5.5	3	10
6	3.5	10.5
6.5	3.5	12
7	4	13
7.5	4.5	13.5
8	5	14.5

6.9.2 For the widening portions of Airway Road, Cactus Road, and Britannia Boulevard, the City of San Diego will require the pavement section to meet City of San Diego Schedule "J", which requires the use of cement treated base (CTB). Table 6.9.2 provides pavement sections for varying street classifications using City of San Diego Schedule "J" for an R-Value between 0 and 9.9. The project civil engineer or traffic engineer should determine the appropriate street classification.

TABLE 6.9.2
PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS
(PUBLIC STREETS)

Street Classificaiton	Max ADT	Traffic Index	Pavement Design Section Schedule "J"	
			Asphalt Concrete (inches)	Cement Treated Base (inches)
Collector	7,500	8.0	4.0	15.5
Local (Industrial)	2,000	8.5	4.5	16
Collector	15,000	9.0	5.0	17.0
Collector (Comm./Ind)	5,000	9.5	5.0	18.5

6.9.3 Asphalt concrete should conform to Section 203-6 of the *Standard Specifications for Public Works Construction* (Green Book). Cement treated base should conform to Greenbook Section 301-3.3. Class 2 aggregate base materials should conform to Section 26-1.02B of the *Standard Specifications of the State of California, Department of Transportation* (Caltrans).

6.9.4 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.

6.9.5 A rigid Portland cement concrete (PCC), pavement section should be placed in roadway aprons and cross gutters. 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 6.9.3.

TABLE 6.9.3
RIGID PAVEMENT DESIGN PARAMETERS

Design Parameter	Design Value
Modulus of subgrade reaction, k	50 pci
Modulus of rupture for concrete, M_R	500 psi
Concrete Compressive Strength	3,200 psi
Traffic Category, TC	A and C
Average daily truck traffic, ADTT	10 and 300

6.9.6 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 6.9.4.

TABLE 6.9.4
RIGID VEHICULAR PAVEMENT RECOMMENDATIONS

Location	Portland Cement Concrete (inches)
Automobile Parking Stalls (TC=A)	6.0
Driveways (TC=C)	8.0

6.9.7 The PCC vehicular 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.

6.9.8 The rigid pavement should also be designed and constructed incorporating the parameters presented in Table 6.9.4.

TABLE 6.9.4
ADDITIONAL RIGID PAVEMENT RECOMMENDATIONS

Subject	Value
Thickened Edge	1.2 Times Slab Thickness
	Minimum Increase of 2 Inches
	4 Feet Wide
Crack Control Joint Spacing	30 Times Slab Thickness
	Max. Spacing of 12 feet for 5.5-Inch-Thick
	Max. Spacing of 15 Feet for Slabs 6 Inches and Thicker
Crack Control Joint Depth	Per ACI 330R-08
	1 Inch Using Early-Entry Saws on Slabs Less Than 9 Inches Thick
Crack Control Joint Width	¼-Inch for Sealed Joints
	⅜-Inch is Common for Sealed Joints
	$^{1}/_{10}$- to $^{1}/_{8}$-Inch is Common for Unsealed Joints

6.9.9 Reinforcing steel will not be necessary within the concrete for geotechnical purposes with the possible exception of dowels at construction joints as discussed herein.

6.9.10 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. Crack-control joints should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials. The depth of the crack-control joints should be determined by the referenced ACI report.

6.9.11 To provide load transfer between adjacent pavement slab sections, a butt-type construction joint should be constructed. The butt-type joint should be thickened by at least 20 percent at the edge and taper back at least 4 feet from the face of the slab. As an alternative to the butt-type construction joint, dowelling can be used between construction joints for pavements of 7 inches or thicker. As discussed in the referenced ACI guide, dowels should consist of smooth, 1-inch-diameter reinforcing steel 14 inches long embedded a minimum of 6 inches into the slab on either side of the construction joint. Dowels should be located at the midpoint of the slab, spaced at 12 inches on center and lubricated to allow joint movement while still transferring loads. In addition, tie bars should be installed as recommended in

Section 3.8.3 of the referenced ACI guide. The structural engineer should provide other alternative recommendations for load transfer.

6.9.12 Concrete curb/gutter should be placed on soil subgrade compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Cross-gutters that receives vehicular should be placed on subgrade soil compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Base materials should not be placed below the curb/gutter, or cross-gutters so water is not able to migrate from the adjacent parkways to the pavement sections. Where flatwork is located directly adjacent to the curb/gutter, the concrete flatwork should be structurally connected to the curbs to help reduce the potential for offsets between the curbs and the flatwork.

6.10 Exterior Concrete Flatwork

6.10.1 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations presented in Table 6.10. The recommended steel reinforcement would help reduce the potential for cracking.

TABLE 6.10
MINIMUM CONCRETE FLATWORK RECOMMENDATIONS

Expansion Index, EI	Minimum Steel Reinforcement* Options	Minimum Thickness
EI ≤ 90	6x6-W2.9/W2.9 (6x6-6/6) welded wire mesh	4 Inches
	No. 3 Bars 18 inches on center, Both Directions	
EI ≤ 130	4x4-W4.0/W4.0 (4x4-4/4) welded wire mesh	
	No. 4 Bars 12 inches on center, Both Directions	

*In excess of 8 feet square.

6.10.2 Even with the incorporation of the recommendations of this report, the exterior concrete flatwork has a potential to experience some uplift due to expansive soil beneath grade. The steel reinforcement should overlap continuously in flatwork to reduce the potential for vertical offsets within flatwork. Additionally, flatwork should be structurally connected to the curbs, where possible, to reduce the potential for offsets between the curbs and the flatwork.

6.10.3 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. 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 verified prior to placing concrete. Base materials will not be required below concrete improvements.

6.10.4 Where exterior flatwork abuts the structure at entrant or exit points, the exterior slab should be dowelled into the structure's foundation stemwall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

6.10.5 The recommendations presented herein are intended to reduce the potential for cracking of exterior slabs as a result of differential movement. However, even with the incorporation of the recommendations presented herein, slabs-on-grade will still crack. 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. Crack control joints should be spaced at intervals no greater than 12 feet. 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.

6.11 Slope Maintenance

6.11.1 Slopes that are steeper than 3:1 (horizontal:vertical) may, under conditions which are both difficult to prevent and predict, be susceptible to near surface (surficial) slope instability. The instability is typically limited to the outer three 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 Storm Water Management

6.12.1 If storm water management devices are not properly designed and constructed, there is a risk for distress to improvements and property located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water being 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 into the subsurface occurs, downstream improvements 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.

6.12.2 We performed an infiltration study on the property. A summary of our study and storm water management recommendations are provided in Appendix C. Based on the results of our study, full and partial infiltration is considered infeasible due to slow infiltration characteristics of the on-site soil. Basins should utilize a liner to prevent infiltration from causing adverse settlement and heave, and migrating to utilities, and foundations.

6.13 Site Drainage and Moisture Protection

6.13.1 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 2019 CBC 1803.3 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.

6.13.2 In the case of basement walls or building walls retaining landscaping areas, a water-proofing 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.

6.13.3 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.

6.13.4 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that subdrains to collect excess irrigation water and transmit it to drainage structures, or impervious above-grade planter boxes be used. In addition, where landscaping is planned adjacent to the pavement, we recommend construction of a cutoff wall along the edge of the pavement that extends at least 6 inches below the bottom of the base material.

6.14 Grading and Foundation Plan Review

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

LIMITATIONS AND UNIFORMITY OF CONDITIONS

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

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

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

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

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N

NO SCALE

VICINITY MAP

GEOCON INCORPORATED

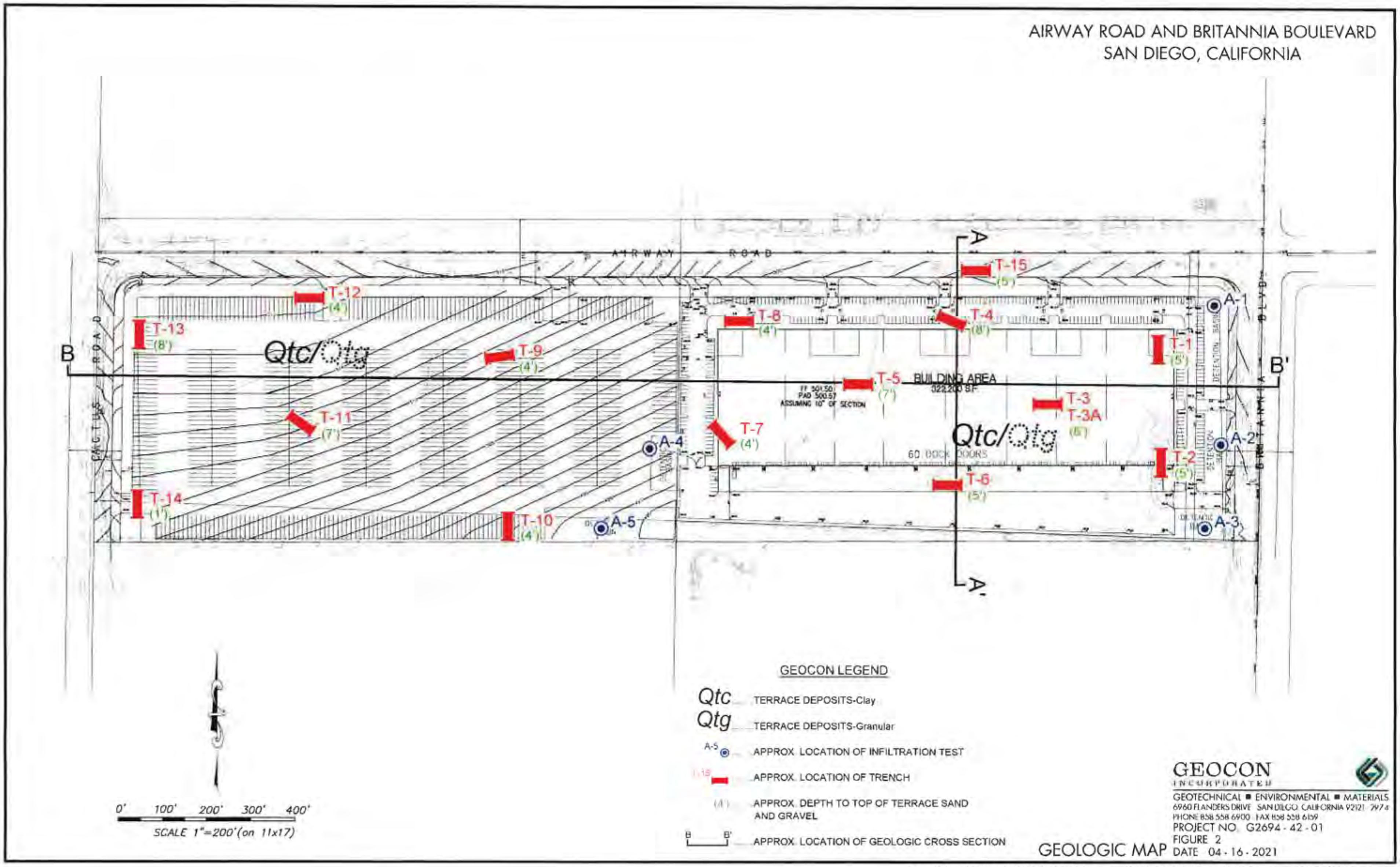
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

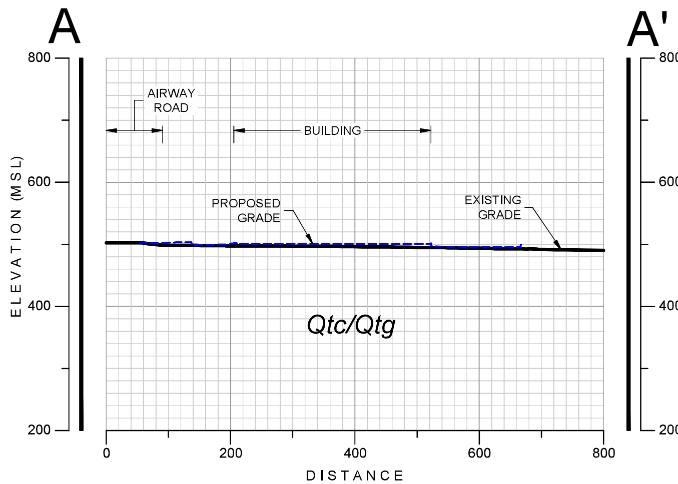
AIRWAY ROAD AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 04 - 16 - 2021	PROJECT NO. G2694 - 42 - 01	FIG. 1



AIRWAY ROAD AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA
AIRWAY ROAD
T-15
(5')
T-12
(4')
T-13
(8')
T-8
(4')
T-4
(8')
T-1
(5')
B
B'
Qtc/Qtg
T-9
(4')
T-5
(7')
BUILDING AREA
322,200 SF
T-3
T-3A
(6')
T-11
(7')
T-7
(4')
A-4
Qtc/Qtg
60 DOCK DOORS
A-2
T-2
(5')
T-6
(5')
T-14
(1')
T-10
(4')
A-5
A-3
A-1
A
A'
GEOCON LEGEND
Qtc TERRACE DEPOSITS-Clay
Qtg TERRACE DEPOSITS-Granular
APPROX. LOCATION OF INFILTRATION TEST
APPROX. LOCATION OF TRENCH
APPROX. DEPTH TO TOP OF TERRACE SAND AND GRAVEL
APPROX. LOCATION OF GEOLOGIC CROSS SECTION
0' 100' 200' 300' 400'
SCALE 1"=200'(on 11x17)
GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 FAX 858 558-6159
PROJECT NO. G2694-42-01
GEOLOGIC MAP
FIGURE 2
DATE 04-16-2021

AIRWAY ROAD AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA



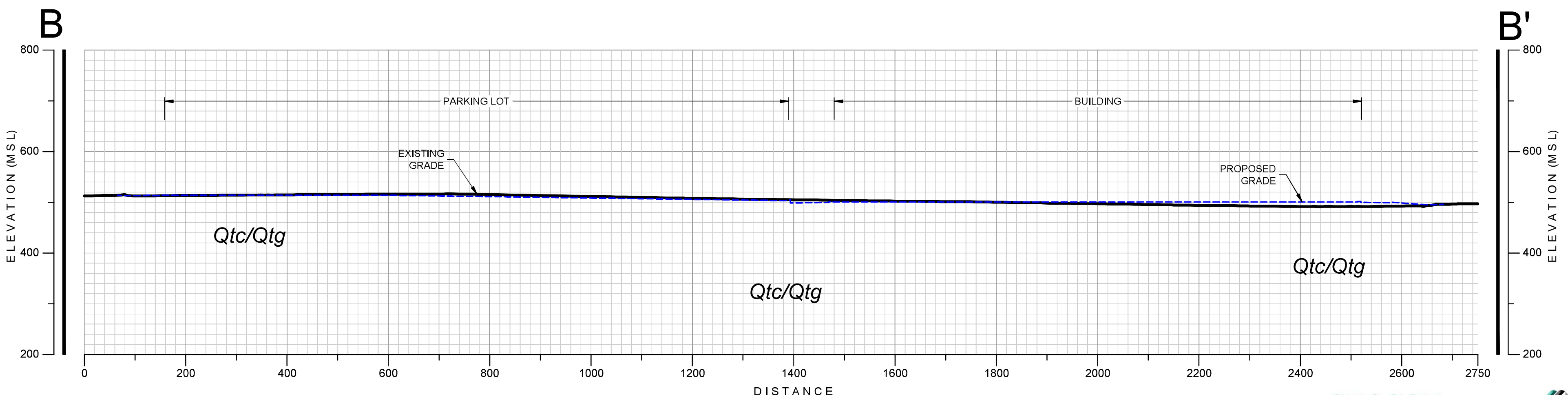
GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 200' (Vert. = Horiz.)

GEOCON LEGEND

Qtc........TERRACE DEPOSITS-Clay

Qtg........TERRACE DEPOSITS-Granular



GEOLOGIC CROSS-SECTION B-B'

SCALE: 1" = 200' (Vert. = Horiz.)

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PROJECT NO. G2694 - 42 - 01
FIGURE 3
DATE 04 - 16 - 2021

Plotted:04/16/2021 2:49PM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2694-42-01 (Airway Rd and Britannia Blvd)\SHEETS\G2694-42-01 XSections.dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

We performed our field investigation on March 17, 2021. Our investigation consisted of the excavation and logging of 16 exploratory test pits. The exploratory test pits were excavated to depths between 3 and 9-½ feet. We also performed five infiltration tests. The approximate locations of the exploratory test pits and infiltration tests are shown on Figure 2.

The soil conditions encountered in the trenches were visually examined, classified, and logged in general conformance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). Exploratory test pit logs are presented on Figures A-1 through A-15. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

PROJECT NO. G2694-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 1** ELEV. (MSL.) **492'** DATE COMPLETED **03-17-2021** EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft, wet, dark brown, Sandy CLAY			
2	T1-1			CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist to wet, dark olive brown, Silty to Sandy CLAY -Becomes olive brown			
4								
6	T1-2			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, moist, tan brown, Silty, fine to medium SAND; trace clay			
					TRENCH TERMINATED AT 6.5 FEET Groundwater not encountered			

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

G2694-42-01.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.

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TRENCH T 2

ELEV. (MSL.) 485' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T2-1			CL	**TOPSOIL** Soft, wet, dark grayish brown, Sandy CLAY; trace gravel			
2	T2-2			CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist, olive brown, Silty to Sandy CLAY; few caliche staining			
4	T2-3			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, moist, light brown, Silty, fine to coarse SAND; trace clay			
6					TRENCH TERMINATED AT 6 FEET Groundwater not encountered			

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

G2694-42-01.GPJ

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

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

GEOCON

PROJECT NO. G2694-42-01

TRENCH T 3

ELEV. (MSL.) **493'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, wet, dark gayish brown, Sandy CLAY			
2				CL	**UNDOCUMENTED FILL (Qudf)** Firm, wet, light grayish brown, Sandy CLAY; little gravel and cobble; 12-inch diameter RCP encountered			
					TRENCH TERMINATED AT 3 FEET Groundwater not encountered			

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

G2694-42-01.GPJ

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

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

GEOCON

PROJECT NO. G2694-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 3A ELEV. (MSL.) 493' DATE COMPLETED 03-17-2021 EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft, wet, dark grayish brown, Sandy CLAY; trace gravel			
2 4				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist, olive brown to light grayish brown, Silty to Sandy CLAY			
6				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Dense, moist, yellowish brown to brown, Silty, fine to coarse SAND; some gravel and cobble			
					TRENCH TERMINATED AT 7 FEET Groundwater not encountered			

Figure A-4,
Log of Trench T 3A, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

PROJECT NO. G2694-42-01

TRENCH T 4

ELEV. (MSL.) 498' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist to wet, dark grayish brown, Sandy CLAY			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm to stiff, moist, grayish brown to dark gray, Silty to Sandy CLAY; little caliche staining in upper 12"			
4								
	T4-1				-Becomes stiff			
6								
					-Becomes mottled grayish brown and tan brown			
8	T4-2			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, tan brown, Silty, fine to medium SAND			
					TRENCH TERMINATED AT 8.5 FEET Groundwater not encountered			

Figure A-5,
Log of Trench T 4, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

TRENCH T 5

ELEV. (MSL.) **500'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY; trace gravel			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Stiff, moist, light gray and light grayish brown, Sandy CLAY; few gravel and cobble; some caliche staining in upper 12"			
4	T5-1							
6								
	T5-2			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Dense, damp, tan brown, Silty, fine to medium SAND; few clay			
8					TRENCH TERMINATED AT 8 FEET Groundwater not encountered			

Figure A-6,
Log of Trench T 5, Page 1 of 1

G2694-42-01.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. G2694-42-01

TRENCH T 6

ELEV. (MSL.) 494' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY; trace gravel			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm to stiff, moist, olive brown, Sandy CLAY			
4								
				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, moist, live olive brown, Silty, fine to coarse SAND			
6					TRENCH TERMINATED AT 6 FEET Groundwater not encountered			

Figure A-7,
Log of Trench T 6, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

TRENCH T 7

ELEV. (MSL.) 502' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T7-1			CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Stiff, moist, grayish brown, Sandy CLAY			
4	T7-2			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, yellowish brown, Silty, fine to coarse SAND			
					TRENCH TERMINATED AT 4.5 FEET Groundwater not encountered			

Figure A-8,
Log of Trench T 7, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

PROJECT NO. G2694-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 8 ELEV. (MSL.) 505' DATE COMPLETED 03-17-2021 EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Stiff, moist, dark grayish brown, Sandy CLAY; trace gravel; few caliche staining			
4	T8-1			SM/SC	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, moist, tan brown and olive brown, Silty to Clayey, fine to medium SAND			
					TRENCH TERMINATED AT 5 FEET Groundwater not encountered			

Figure A-9,
Log of Trench T 8, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 9 ELEV. (MSL.) 512' DATE COMPLETED 03-17-2021 EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Firm, moist, dark brown, Sandy CLAY			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm to stiff, moist, dark grayish brown, Sandy CLAY			
4				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, grayish brown, Silty, fine to coarse SAND; few clay			
					TRENCH TERMINATED AT 5.5 FEET Groundwater not encountered			

Figure A-10,
Log of Trench T 9, Page 1 of 1

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

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

GEOCON

PROJECT NO. G2694-42-01

TRENCH T 10

ELEV. (MSL.) 503' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm to stiff, moist, dark grayish brown, Sandy CLAY			
4	T10-1			SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, brown and light brown, Silty, fine to medium SAND			
					TRENCH TERMINATED AT 5 FEET Groundwater not encountered			

Figure A-11,
Log of Trench T 10, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

PROJECT NO. G2694-42-01

TRENCH T 11

ELEV. (MSL.) **514'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**UNDOCUMENTED FILL (Qudf)** Soft, moist, dark grayish brown, Sandy CLAY			
2								
4					-Excavates with few cobble			
	T11-1			CH/CL	**TERRACE DEPOSITS-CLAY (Qtc)** Stiff, moist, dark gray, Sandy CLAY; some caliche staining			
6								
				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense to dense, damp, light brown, Silty, fine to medium SAND			
8					TRENCH TERMINATED AT 8 FEET Groundwater not encountered			

Figure A-12,
Log of Trench T 11, Page 1 of 1

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SAMPLE SYMBOLS

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

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

GEOCON

TRENCH T 12

ELEV. (MSL.) 513' DATE COMPLETED 03-17-2021

EQUIPMENT CAT 430F RT BACKHOE W/ 24' BUCKET BY: N. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**UNDOCUMENTED FILL (Qudf)** Loose, moist, dark brown, Silty, fine to medium SAND; trace plastic, glass debris			
2				CL	**TOPSOIL** Soft, moist, dark gray, Sandy CLAY			
				CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist to wet, gray, Sandy CLAY			
4				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, light brown, Silty, fine to coarse SAND			

TRENCH TERMINATED AT 5.5 FEET
Groundwater not encountered

Figure A-13,
Log of Trench T 12, Page 1 of 1

G2694-42-01.GPJ

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

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

GEOCON

TRENCH T 13

ELEV. (MSL.) **511'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T13-1			CL	**UNDOCUMENTED FILL (Qudf)** Soft, moist, dark brown, Sandy CLAY; trace plastic debris			
2				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
4				CH/CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist to wet, dark olive brown, Silty to Sandy CLAY			
6	T13-2			CH	Firm to stiff, moist, olive brown, Silty CLAY			
8	T13-3			SC/CL	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, damp, olive brown, Clayey, fine to medium SAND to Sandy CLAY			

TRENCH TERMINATED AT 9.5 FEET
Groundwater not encountered

Figure A-14,
Log of Trench T 13, Page 1 of 1

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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.

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PROJECT NO. G2694-42-01

TRENCH T 14

ELEV. (MSL.) **512'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Loose, moist, dark brown, Clayey, fine to coarse SAND; trace gravel			
2				SM	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense to dense, damp, light yellowish brown, Silty, fine to medium SAND			
	T14-1							
4					-Becomes dense			
					TRENCH TERMINATED AT 5 FEET Groundwater not encountered			

Figure A-15,
Log of Trench T 14, Page 1 of 1

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

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

GEOCON

PROJECT NO. G2694-42-01

TRENCH T 15

ELEV. (MSL.) **499'** DATE COMPLETED **03-17-2021**

EQUIPMENT **CAT 430F RT BACKHOE W/ 24' BUCKET** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2				CH/CL	**TERRACE DEPOSITS-CLAY (Qtc)** Firm, moist, grayish brown, Silty to Sandy CLAY			
4								
6				SC	**TERRACE DEPOSITS-GRANULAR (Qtg)** Medium dense, moist, grayish brown to olive brown, Clayey, fine to coarse SAND			
					TRENCH TERMINATED AT 6.5 FEET Groundwater not encountered			

Figure A-16,
Log of Trench T 15, Page 1 of 1

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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.

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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 *in-situ* dry density and moisture content, maximum dry density and optimum moisture content, expansion potential, soluble sulfate content, chloride content, p.H. and resistivity, and resistance value (R-Value). The results of these tests are summarized on Tables B-I through B-VI.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-02

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T1-1	Dark brown, Clayey, fine to coarse SAND; trace gravel	124.7	11.1
T2-3	Brown, Silty, fine to coarse SAND; trace clay	124.9	11.5
T7-1	Dark gray, Clayey, fine to coarse SAND; trace gravel	113.5	14.8

TABLE B-II
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829-03

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index	Expansion Classification
	Before Test (%)	After Test (%)			
T1-1	11.3	26.2	102.2	76	Medium
T2-3	10.3	22.1	107.6	57	Medium
T7-1	14.5	32.8	92.7	110	High
T8-1	14.5	34.1	92.4	111	High
T13-1	15.3	33.0	93.0	98	High

TABLE B-III
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Sulfate Exposure
T1-1	0.002	S0
T2-3	0.062	S0
T7-1	0.001	S0

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE CHLORIDE ION CONTENT TEST RESULTS AASHTO TEST NO. T 291

Sample No.	Chloride Ion Content ppm (%)
T1-1	77 (0.008)
T2-3	706 (0.071)
T7-1	143 (0.014)

TABLE B-V
SUMMARY OF LABORATORY POTENTIAL OF HYDROGEN (PH) AND RESISTIVITY TEST RESULTS CALIFORNIA TEST METHOD 643

Sample No.	pH	Minimum Resistivity (ohm-centimeters)
T2-2	8.1	440
T7-2	7.67	770

TABLE B-VI
SUMMARY OF LABORATORY RESISTANCE VALUE (R-VALUE) TEST RESULTS ASTM D 2844

Sample No.	Description (Geologic Unit)	R-Value
T2-2	Dark brown, Clayey, fine to coarse SAND; trace gravel (Qtc)	< 5
T7-2	Brown, Clayey, fine to coarse SAND; trace gravel (Qtg)	7

APPENDIX C

APPENDIX C

STORM WATER MANAGEMENT

We understand storm water management devices are being proposed in accordance with the current 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 and improvements 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 (CRSL, 2008). The website also provides the Hydrologic Soil Group. Table C-1 presents the descriptions of the hydrologic soil groups. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

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

The property is underlain by undocumented fill, surficial deposits such as topsoil, and Terrace Deposits. 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
Stockpen gravelly clay loam, 0 to 2 percent slopes	SuA	46	D
Stockpen gravelly clay loam, 2 to 5 percent slopes	SuB	54	D

Infiltration Testing

We performed five infiltration tests at the locations shown on Figure 2. The tests were performed at the bottom of test pits in a 4-inch-diameter hand auger boring that was 12 inches deep. Table C-3 presents the results of the testing. The calculation sheets are also attached.

We used the guidelines presented in the Riverside County Low Impact Development BMP Design Handbook. Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is equivalent to the infiltration rate. Therefore, the Ksat value determined from our testing is assumed to be the unfactored infiltration rate.

TABLE C-3
UNFACTORED, FIELD-SATURATED, INFILTRATION TEST RESULTS

Test No.	Depth (inches)	Geologic Unit	Field Infiltration Rate, I (in/hr)	Factored* Field Infiltration Rate, I (in/hr)
A-1	96	Qt	0.015	0.008
A-2	96	Qt	0.015	0.008
A-3	96	Qt	0.027	0.014
A-4	85	Qt	0.027	0.014
A-5	88	Qt	0.0027	0.0014

* Factor of Safety of 2.0 for feasibility determination.

STORM WATER MANAGEMENT CONCLUSIONS

Soil Types

Undocumented Fill (Qudf) – We encountered undocumented fill at existing grade in some portions of the site. The undocumented fill within structural improvement areas will be removed and replaced with compacted fill. Water that is allowed to migrate into the undocumented fill will cause settlement. Therefore, full and partial infiltration should be considered infeasible within undocumented fill.

Topsoil (Unmapped) – We encountered topsoil varying between 1 to 2 feet thick across the site. Topsoil within structural improvement areas will be removed and replaced with compacted fill. Water that is allowed to migrate into the topsoils may cause settlement. Therefore, full and partial infiltration should be considered infeasible within topsoil.

Terrace Deposits (Qtc/Qtg) – We encountered approximately 1 to 5-½ feet of stiff clay and sandy clay overlying dense clayey to silty sand with gravel. Infiltration into terrace deposits is not feasible due to low infiltration characteristic and high expansion potential.

Groundwater Elevation

Groundwater was not encountered in our test pits to a depth of 9½ feet below the existing ground surface. Infiltration should not impact groundwater.

Existing Utilities

No known utilities cross the site. Infiltration due to existing utility concerns would be feasible.

Soil or Groundwater Contamination

We are unaware of contaminated soil or groundwater on the property. Therefore, full and partial infiltration associated with this risk is considered feasible.

Slopes

There are no existing slopes that would be impacted by infiltration.

Infiltration Rates

Our test results indicated very slow infiltration rates. The rates ranged from 0.0027 to 0.027 in/hr. The factored rate for feasibility determination ranges from is 0.014 to 0.0014 in/hr. The infiltration rates are not high enough to support full or partial infiltration.

Storm Water Management Devices

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. The penetration of the liners at the subdrains 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. Liners should be installed on the side walls of the proposed basins in accordance with a partial infiltration design.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1) 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 Form D.5-1) that helps the project civil engineer estimate the factor of safety based on several factors. Table C-4 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

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

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

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

TABLE C-5
FACTOR OF SAFETY WORKSHEET D.5-1 DESIGN VALUES[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, $S_A = \Sigma p$			2.0

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

CONCLUSIONS

Our results indicate the site has relatively slow infiltration characteristics. Because of the site conditions, it is our opinion that there is a potential for lateral water migration. Undocumented fill, topsoil, and expansive clay exists on the property and has a high potential for adverse settlement when wetted. It is our opinion that full or partial infiltration is infeasible on this site. Our evaluation included the soil and geologic conditions, estimated settlement and volume change of the underlying soil, slope stability, utility considerations, groundwater mounding, retaining walls, foundations and existing groundwater elevations.

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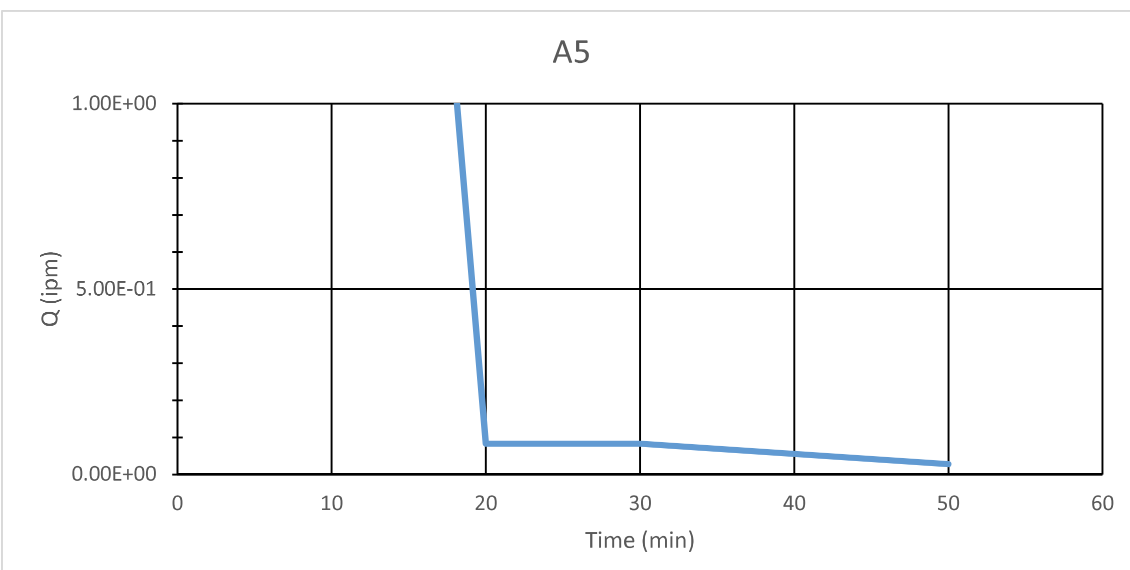
A5

Dia_{hole}	4	inches
$Depth_{hole}$	0	inches
$Depth_{inst}$	0	inches
Ht_{res}	87.6	inches
Wt_0	23.39	lbs
D =	80.35	inches
h_{calc} =	3.77	inches
$h_{measured}$ =	4	inches

K (iph)	R&E
	2.73E-03

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
10	10	21.590	1.800	2.88E-02	4.98E+01	4.98E+00
20	10	21.560	0.030	4.81E-04	8.31E-01	8.31E-02
30	10	21.530	0.030	4.81E-04	8.31E-01	8.31E-02
40	10	21.510	0.020	3.21E-04	5.54E-01	5.54E-02
50	10	21.500	0.010	1.60E-04	2.77E-01	2.77E-02



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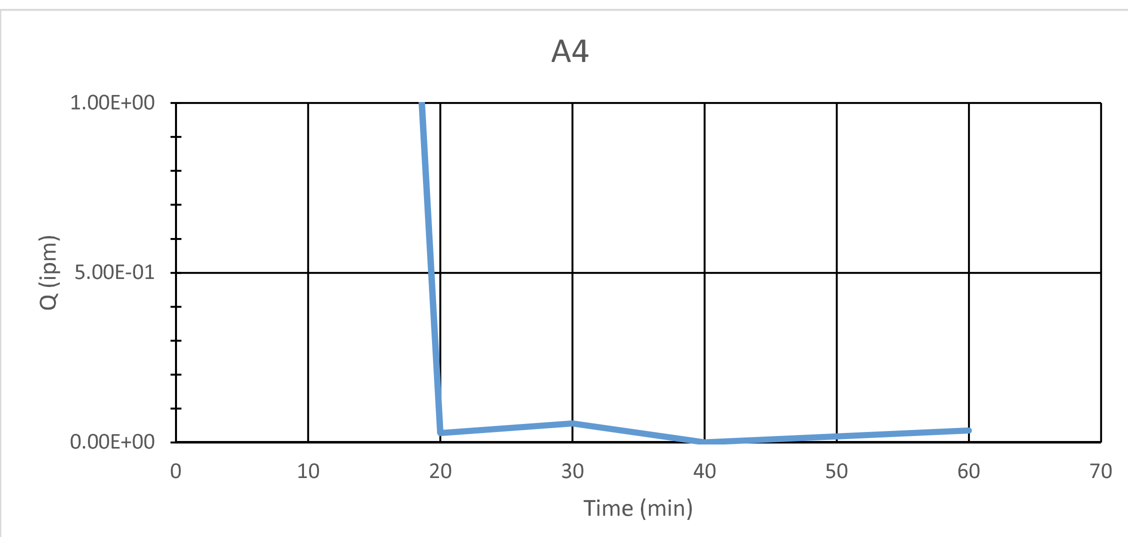
A4

Dia_{hole}	4	inches
$Depth_{hole}$	0	inches
$Depth_{inst}$	0	inches
Ht_{res}	85.2	inches
Wt_0	20.8	lbs

K_{fs} (iph)	R&E
	2.66E-03

D =	77.95	inches
h_{calc} =	3.76	inches
$h_{measured}$ =	4	inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
10	10	18.280	2.520	4.04E-02	6.98E+01	6.98E+00
20	10	18.270	0.010	1.60E-04	2.77E-01	2.77E-02
30	10	18.250	0.020	3.21E-04	5.54E-01	5.54E-02
40	10	18.250	0.000	0.00E+00	0.00E+00	0.00E+00
60	20	18.225	0.025	4.01E-04	6.92E-01	3.46E-02



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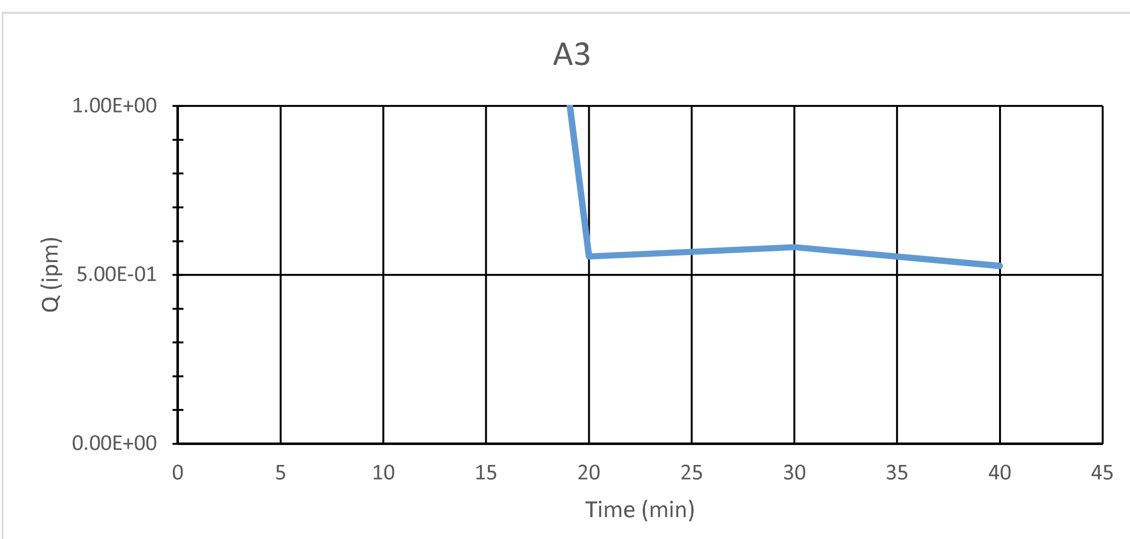
A3

Dia_{hole}	4	inches
$Depth_{hole}$	0	inches
$Depth_{inst}$	0	inches
Ht_{res}	96	inches
Wt_0	24.04	lbs

K_{fs} (iph)	R&E
	2.73E-02

D =	88.75	inches
h_{calc} =	3.80	inches
$h_{measured}$ =	4	inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
10	10	22.110	1.930	3.09E-02	5.34E+01	5.34E+00
20	10	21.910	0.200	3.21E-03	5.54E+00	5.54E-01
30	10	21.700	0.210	3.37E-03	5.82E+00	5.82E-01
40	10	21.510	0.190	3.04E-03	5.26E+00	5.26E-01



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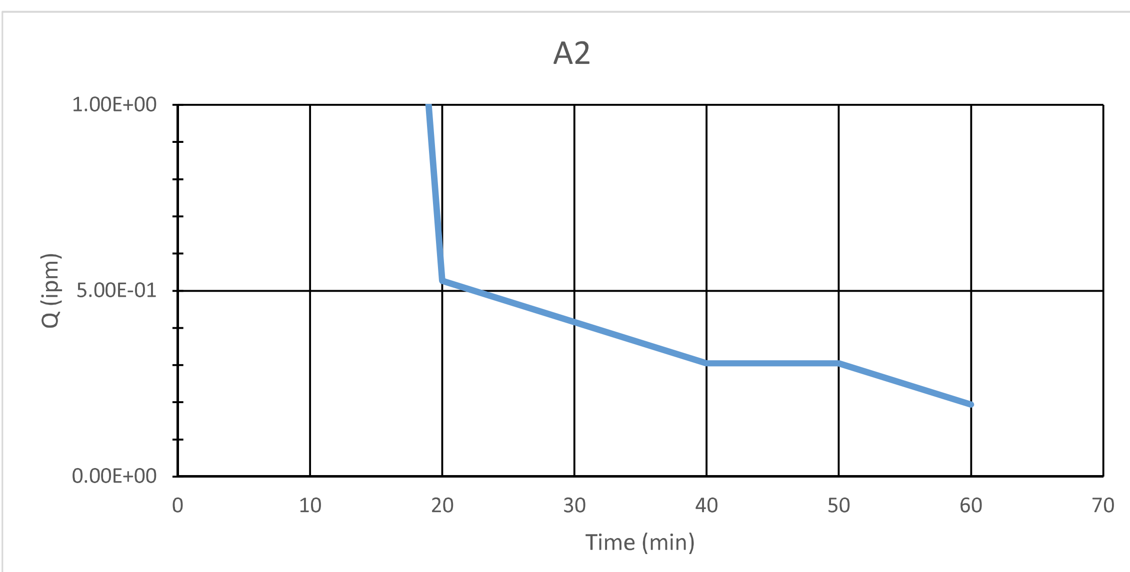
A2

Dia_{hole}	4	inches
$Depth_{hole}$	0	inches
$Depth_{inst}$	0	inches
Ht_{res}	96	inches
Wt_0	21.27	lbs

	R&E
K_{fs} (iph)	1.50E-02

D =	88.75	inches
h_{calc} =	3.80	inches
$h_{measured}$ =	4	inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
10	10	19.420	1.850	2.96E-02	5.12E+01	5.12E+00
20	10	19.230	0.190	3.04E-03	5.26E+00	5.26E-01
30	10	19.080	0.150	2.40E-03	4.15E+00	4.15E-01
40	10	18.970	0.110	1.76E-03	3.05E+00	3.05E-01
50	10	18.860	0.110	1.76E-03	3.05E+00	3.05E-01
60	10	18.790	0.070	1.12E-03	1.94E+00	1.94E-01



G2694-42-01
Britania & Airway
3/17/2021
gwc

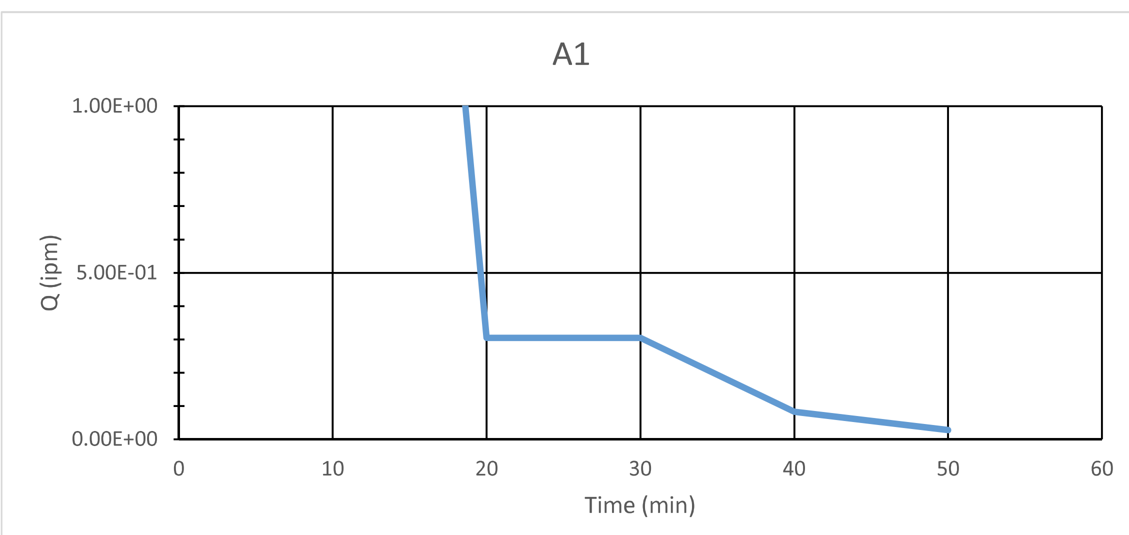
A1

Dia_{hole}	4	inches
$Depth_{hole}$	0	inches
$Depth_{inst}$	0	inches
Ht_{res}	96	inches
Wt_0	18.08	lbs

K_{fs} (iph)	R&E
	1.50E-02

D =	88.75	inches
h_{calc} =	3.80	inches
$h_{measured}$ =	4	inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
10	10	16.150	1.930	3.09E-02	5.34E+01	5.34E+00
20	10	16.040	0.110	1.76E-03	3.05E+00	3.05E-01
30	10	15.930	0.110	1.76E-03	3.05E+00	3.05E-01
40	10	15.900	0.030	4.81E-04	8.31E-01	8.31E-02
50	10	15.890	0.010	1.60E-04	2.77E-01	2.77E-02



Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
Entire Site	Preliminary
Criteria 1: Infiltration Rate Screening	

1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☑No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☑Yes; Continue to Step 1C. ☐No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☒No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐Yes; continue to Step 1E. ☐No; select an appropriate infiltration testing method.

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

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

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

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

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

Five borehole infiltration tests were performed for the project. The test results are as follows:

A1: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A2: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A3: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A4: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A5: 0.0027 in/hr (0.0014 in/hr with factor of 2.0)

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[11]		
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐Yes	☐No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No

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

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐Full infiltration Condition ☒Complete Part 2

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
Entire Site	Preliminary
Criteria 3 : Infiltration Rate Screening	

3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☑ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☒ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☒ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

Five infiltration tests were conducted on the property. The infiltration results are as follows:

A1: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A2: 0.015 in/hr (0.008 in/hr with factor of 2.0)
A3: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A4: 0.027 in/hr (0.014 in/hr with factor of 2.0)
A5: 0.0027 in/hr (0.0014 in/hr with factor of 2.0)

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[iii]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐Yes	☐No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☑ No Infiltration Condition

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

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

AIRWAY ROAD AND BRITANNIA BOULEVARD
SAN DIEGO, CALIFORNIA

PROJECT NO. G2694-42-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

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

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

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

2. DEFINITIONS

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

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

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

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

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

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

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

3. MATERIALS

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

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

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

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

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

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

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

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

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

4. CLEARING AND PREPARING AREAS TO BE FILLED

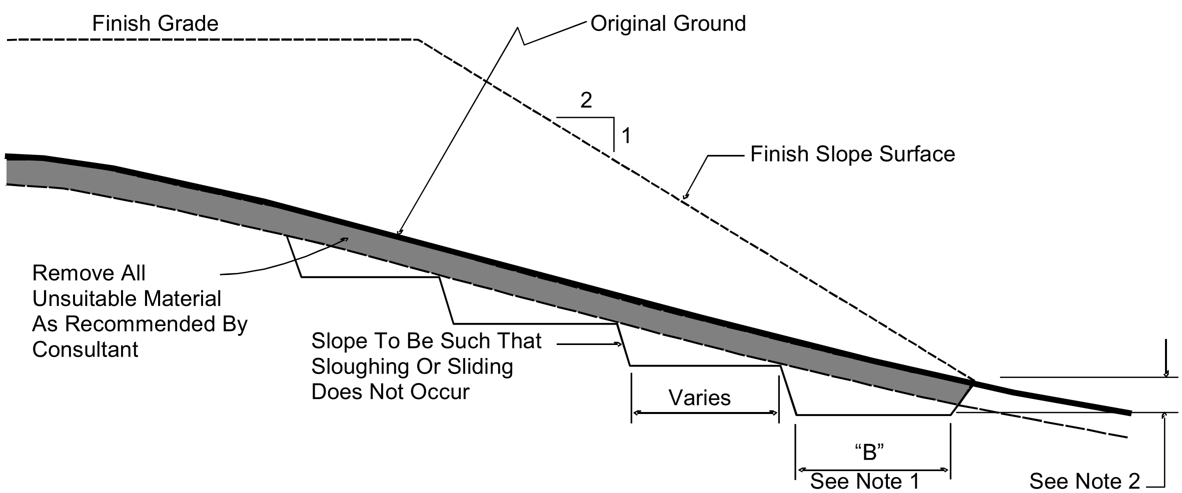
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material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

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

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

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

TYPICAL BENCHING DETAIL



No Scale

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

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

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

5. COMPACTION EQUIPMENT

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

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

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

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

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

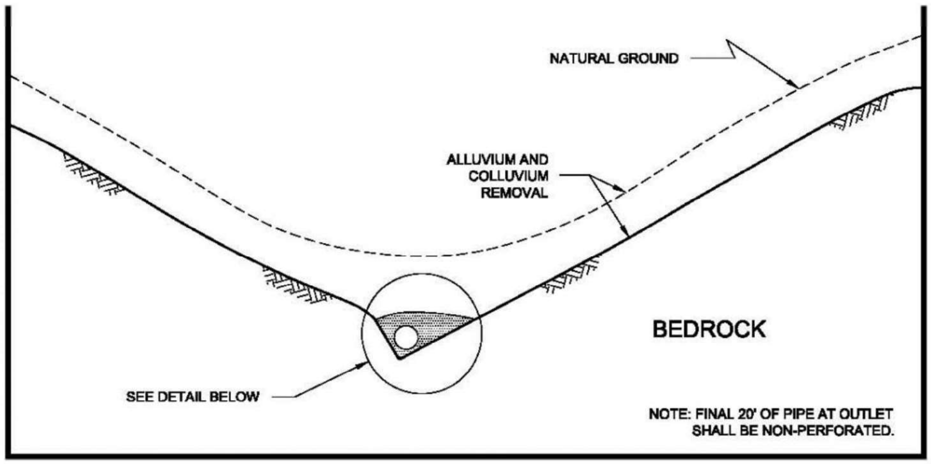
6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant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

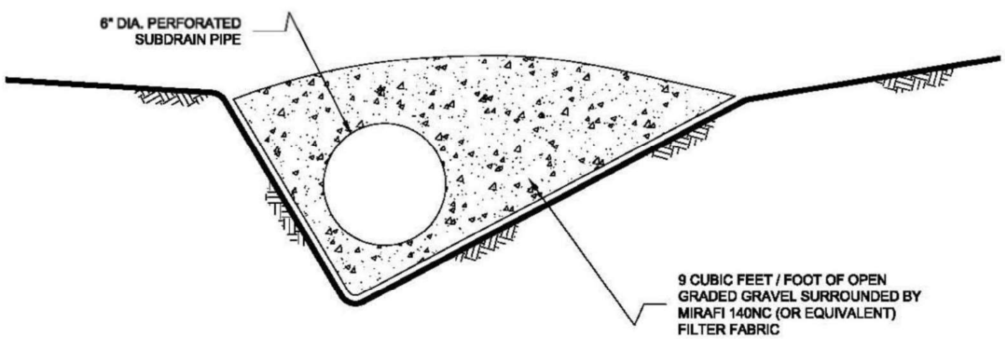
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

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

TYPICAL CANYON DRAIN DETAIL





NOTES:

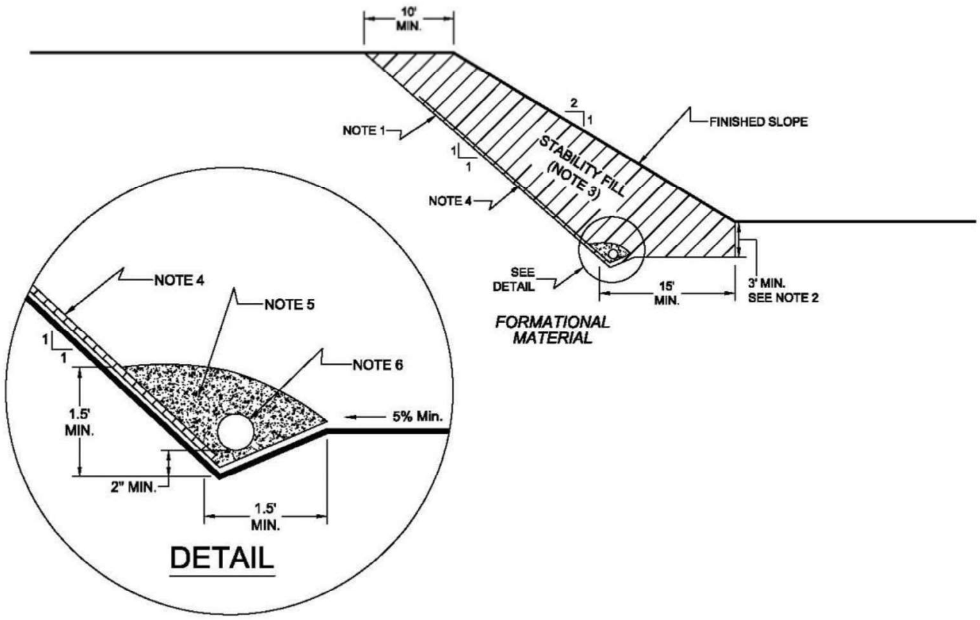
1......6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

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

NO SCALE

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

TYPICAL STABILITY FILL DETAIL



NOTES:

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

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

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

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

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

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

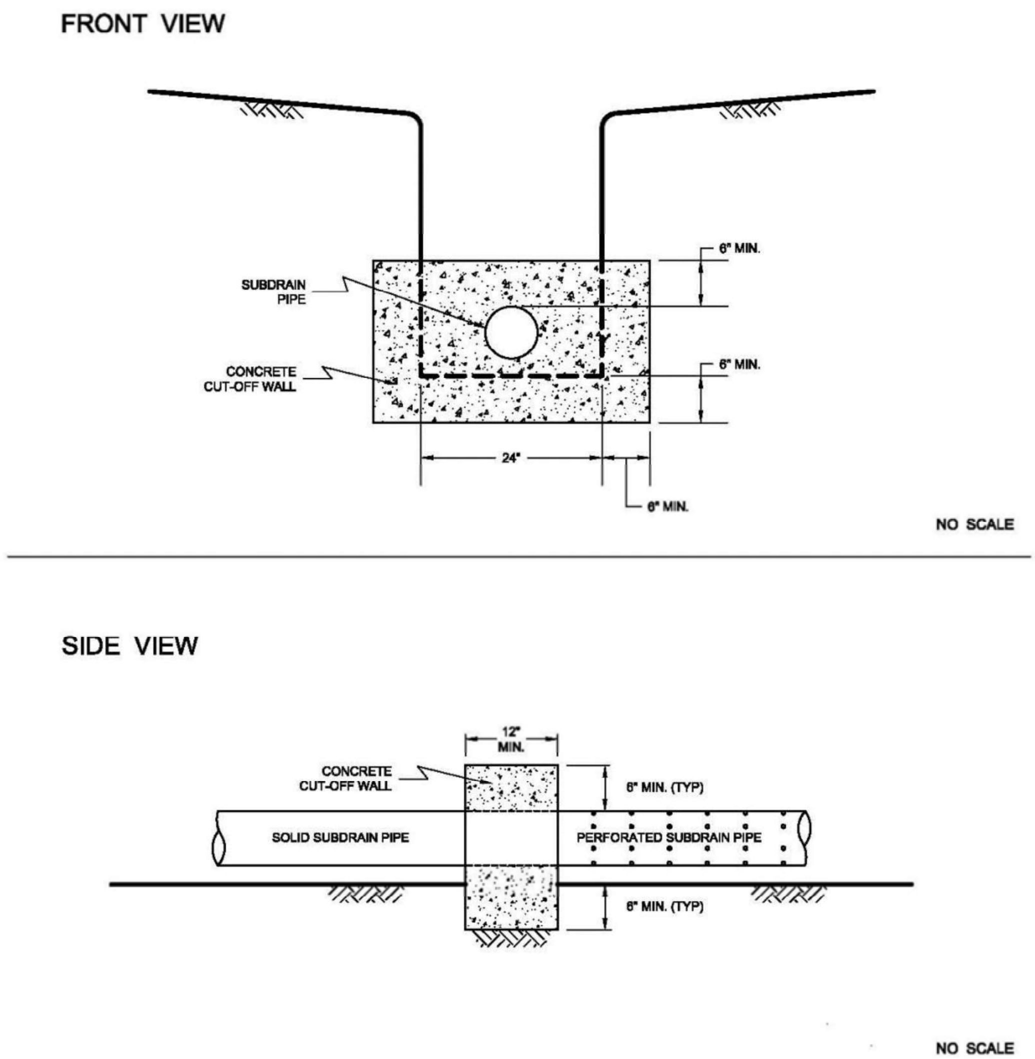
NO SCALE

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

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

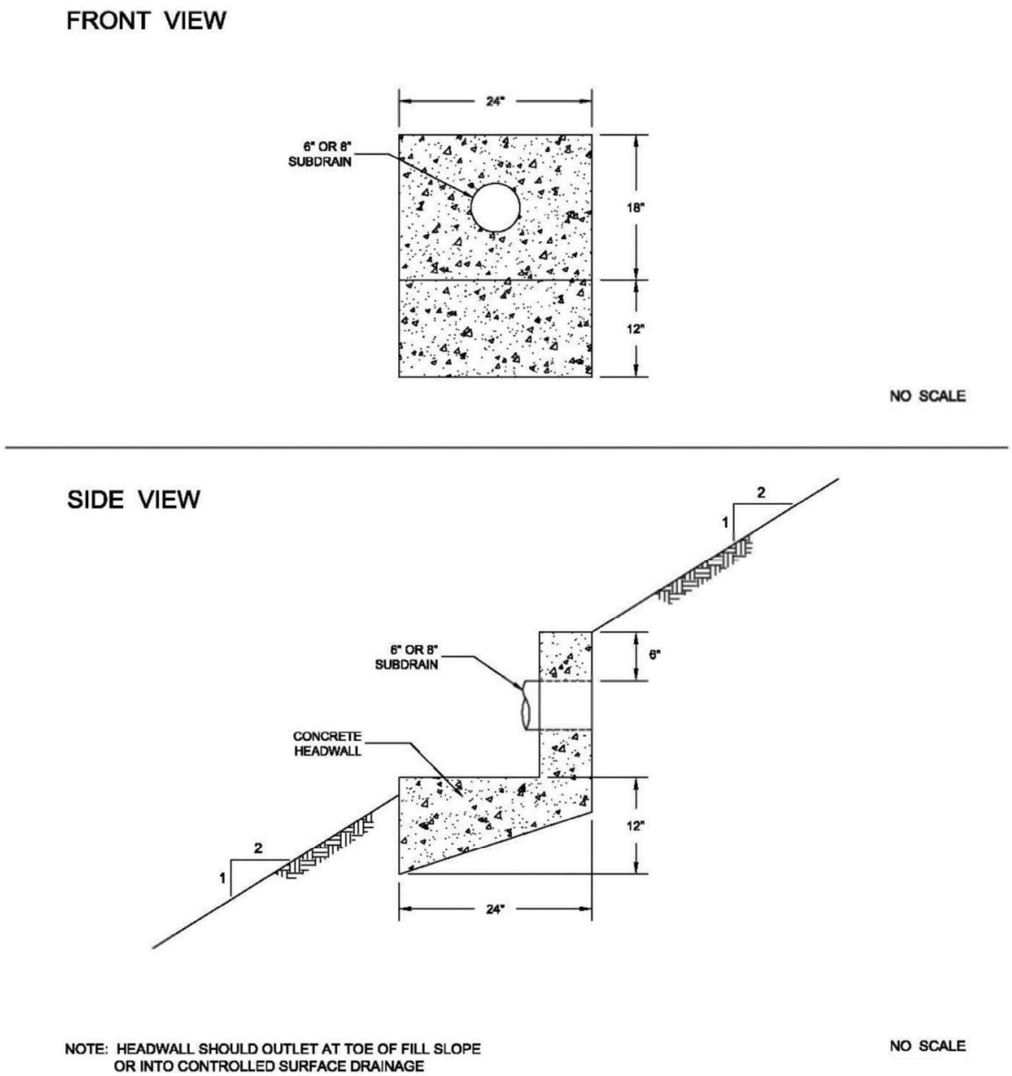
7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

TYPICAL CUT OFF WALL DETAIL



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



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

California Geological Survey (2009), *Tsunami Inundation Map For Emergency Planning, State of California ~ County of San Diego, Del Mar Quadrangle,* Scale 1:24,000

CRSL (2008), *SoilWeb*, Streaming, seamless interface to USDA-NCSS, SSURGO, and STATSGO Soil Survey Products, https://casoilresource.lawr.ucdavis.edu/gmap/, accessed April 16, 2021

FEMA (2012), *Flood Insurance Rate Map (FIRM) Map Number 06073C2200G, Effective May 12, 2012*, http://www.fema.gov, accessed April 16, 2021;

Tan, S.S. and M.P. Kennedy, (2002), *Geologic Map of the Otay Mesa 7.5' Quadrangle San Diego County, California*, 1:24,000 Scale, California Geological Survey;

USGS (2016)*, Quaternary Fault and Fold Database of the United States:* U.S. Geological Survey website, http://earthquakes,usgs.gov/hazards/qfaults, accessed April 16, 2021.

CAUTION: IF THIS SHEET IS NOT 30"x42", IT IS A REDUCED PRINT

Tabulation

	BLDG.	TRAILER PARKING	TOTAL	
SITE AREA				
In s.f.	698,560	740,802	1,439,362	s.f.
In acres	16.04	17.01	33.04	ac
BUILDING AREA				
Office	14,000		14,000	s.f.
Warehouse	308,200		308,200	s.f.
TOTAL	322,200		322,200	s.f.
COVERAGE	46.1%		22.4%	
AUTO PARKING REQUIRED				
Office 3.3/1,000 s.f.	46		46	stalls
Whse 1/1,000 s.f.	308		308	stalls
TOTAL	354		354	stalls
AUTO PARKING PROVIDED				
Standard (8.5' x 18')	349		349	stalls
TRAILER PARKING PROVIDED				
Trailer (10' x 55')		620	620	stalls
ZONING ORDINANCE FOR CITY				
Zoning Designation (BT-1-1)				
MAXIMUM BUILDING HEIGHT ALLOWED				
Height - no limit				
MAXIMUM FLOOR AREA RATIO				
FAR - 2.0				
SETBACKS				
Front - 25' avg., 20' min				
Street Side - 25'				
Side - 15				
Rear - 0' abutting R zone - 50'				

Aerial Map

Legend

- POTENTIAL OFFICE
- WAREHOUSE
- ▼ DRIVE THRU DOOR

Note: This is a conceptual plan. It is based on preliminary information which is not fully verified and may be incomplete. It is meant as a comparative aid in examining alternate development strategies and any quantities indicated are subject to revision as more reliable information becomes available.

Conceptual Site Plan

Airway Road

Otay Mesa, CA

HPA architecture

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Irvine, CA 92612
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BADIEE DEVELOPMENT

March 8, 2021 / Job #20161

Scheme 5

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